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Natural History for the North of England

EDITED BY

W. A. SLEDGE, Ph.D., B.Sc.,

THE UNIVERSITY, LEEDS,

with the assistance as referees in special departments of

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THE NATURALIST

FOR 1955

GOOSANDERS IN SPRING

WM. G. HALE

On the fringe of the Lancashire Pennines, some 500 feet above sea-level, lies a valley containing a reservoir. Although during the winter only odd Goldeneye and the occasional Mallard and Pochard may be seen on the reservoir, Goosander find it a convenient resting and feeding ground during their spring migration, and from the beginning of February until the middle of April, the species may be found there, resting on the bank or diving for fish, or perhaps flying restlessly up and down the valley, before flying off north.

The reservoir is not large, being only half a mile in length and 350 yards across at its broadest point, and it is divided into two by a dam, so that the water-level in the smaller, top portion is some six foot above that in the lower portion, and water from the top, which is surrounded by reeds and mares' tails, flows down an overflow into the lower part of the reservoir, the banks of which are clear of vegetation.

It was on this reservoir that I recorded the highest total of Goosanders yet observed together in Lancashire, on 30th March, 1953, when for some hours I watched a flock of twenty-six birds, on the lower part of the reservoir. There were only two male birds present, and little diving or flighting was taking place. Eventually the whole flock left the water, and flew low over the surface, eighteen of them re-settling, the other eight circling high over the reservoir. Nine birds left the water and joined the circling birds which left flying high in a south-easterly direction, the remaining birds continuing to feed as they had done before the flock broke up. This proceedure is typical of the departure of Goosanders from the reservoir, for although almost invariably the whole flock will take flight before a departure, seldom do they all leave together, and it is usual for some birds to re-alight on the water, if the flock is reasonably large; that is if it exceeds ten or twelve birds in all. Smaller numbers frequently leave together, but never have I seen a party of more than eleven ducks leaving the valley. Sometimes before they leave, the Goosanders are very restive, making several journeys between the upper and lower portions of the reservoir, flying only a few inches above the surface of the water. When they actually leave, the birds fly the length of the reservoir several times, in order to gain height, before circling. I believe that the departing Goosanders circle in order to obtain their bearings, and I have observed that when the visibility is relatively poor, the birds circle for a greater time. On the other hand, when the weather is good, and the horizon clear of haze or cloud, and these are exceptional circumstances, the birds do not rise to such a great height, nor do they circle before leaving. Sometimes some of the circling birds seem to get their bearings before the others, and leave the rest of the party, and whenever I have observed this, the rest of the birds have always taken the same route after circling for a little longer.

The fact that the number of birds present varies almost daily, suggests that passage is continuous from early February, but all the birds leaving the reservoir do not leave in a northerly direction, even though the majority do so, and some may return. I believe that birds leaving in a northerly direction make for Stocks Reservoir, near Slaidburn, Yorkshire, and J. K. Fenton informs me that the peak numbers are observed there at the beginning of March, and that this peak falls off fairly sharply up to mid-April. Numbers leaving the reservoir that I have watched, gradually increase until the last week of February, and from then until the end of March they are more or less constant. By mid-April there are no Goosanders present. According to J. K. Fenton and A. Pilkington, the number of Goosander on Stocks Reservoir is at a maximum of over one hundred in March, and I am of the opinion that in spring this latter reservoir functions as a gathering ground for birds from further south.

On the Lancashire reservoir I made observations which indicate that the majority of the male Goosanders move north before the majority of the female birds. Before the end of the second week in March, male birds have been predominant in the flocks that I have watched, but after this date the number of females has greatly exceeded that of males, so much so in fact that in two flocks observed on 2nd April

and 10th April, 1953, totalling forty birds, only two were males. Although there were birds present on the reservoir between these two dates, I am convinced that there were no birds in the second flock that were present in the first.

Whilst the Goosander have been present on the reservoir, I have been able to study their feeding habits. The chief method by which the birds obtained food was by diving for fish. Two types of dive were observed, the chief of which was utilised in deep water, when birds were observed to jump right out of the water, arching the neck before re-entering. A second type of dive, used only on the top part of the reservoir where the water is comparatively shallow, was observed to cause a great disturbance of mud, for after ' up-ending ', like Mallard, the Goosander slid under the surface, and moving rapidly for a short distance under the water, re-surfaced almost invariably with a fish, and leaving a trail of murky water behind it. When watching this latter method of diving, I was concealed on one occasion behind a dry stone wall, not ten yards from the feeding birds, and I observed that when the birds were under the water only the feet were utilised in propulsion, the wings being kept to the sides of the bird. The water was made muddy primarily I think, by the bird's feet coming in contact with the bed of the reservoir, when swimming after fish. Times of the second type of dive seldom exceeded 8 seconds, whereas the average of twenty of the jump-type of dive was 26 seconds, with a maximum of 40 seconds and a minimum of 8 seconds.

Apart from diving, the Goosander observed on the top portion of the reservoir frequently resorted to dabbling, like Mallard, as a method of obtaining food. Fish were also taken in the shallows by birds swimming on the surface, but having their heads and part of the neck submerged, so that from time to time when the head was raised, the beak contained a small fish. This method of fishing was practised only in shallow water.

Surprisingly enough, in all the hours I have watched Goosander, only occasionally have I seen a male bird dive for fish. Whilst the females were diving, the male birds seemed to wait for them to catch a large fish which could not be swallowed hurriedly, and then one or more males would chase the female in an attempt to take the fish. In my experience, the female has always managed to swallow the fish after being chased for some yards, but I do not doubt that on occasions the male bird (I have not seen females behave in this way) succeeds in obtaining the female's catch. The males, I think, feed chiefly at dawn, or are perhaps nocturnal feeders, for the amount of food that I have seen them take during the day, and at dusk, has been much less than that taken by the females, which feed right through the day.

On two occasions only have I heard Goosanders calling. The first time was when I was watching birds dabbling, from a distance of about ten yards, and occasionally I heard a low, conversational ' Wuk ', which would have been inaudible at twice the distance of observation. On another occasion a call-note came from a bird in flight, when it uttered the same note as before, but distinctly louder, as it passed overhead. The wing-whistle is quite characteristic of the species.

In the flocks observed up to the end of March, the sex-ratio has usually been uneven, and I have seen no indication that pairs have been formed within the flock. During April, however, when the large flocks have moved north, I have seen parties of four or six birds on the reservoir, and whilst on the water they have segregated into pairs, each pair feeding well away from the next, not keeping in a compact flock as they do earlier in the year. When flushed, the pairs joined forces, but even then each pair was discernable, as Jackdaw pairs are in the flying flock. Frequently at this time of the year, the odd pair may be disturbed from one of the bays round the reservoir, and I am of the opinion that the breeding pair is firmly established amongst many of the April-migrating Goosanders.

In conclusion the writer wishes to thank J. K. Fenton and A. Pilkington for their correspondence on the movement of Goosanders between the Lancashire reservoir, where all the above observations were made, and Stocks Reservoir, near Slaidburn, Yorkshire.

Only during the last few years has Stocks (a fairly new reservoir) become comparable with Eccup reservoir as a haunt of Goosanders in late winter and early spring. The increasing numbers that frequent Stocks and waters to east and west, has meant no reduction in numbers at Eccup. It would appear that more Goosanders are wintering in Yorkshire and Lancashire than formerly, and that numbers are increasing yearly.—(R.C.).

BLACKBIRDS (*Turdus merula*) AT SPURN IN 1954

G. H. AINSWORTH, A. E. PLATT, AND R. CHISLETT

On November 6th, 1954, we had the largest catch of birds that we have ever had at the Spurn Bird Observatory in one day. The catch was composed as follows:

	Warren Trap	*Chalk Bank area*	*Total*
Blackbird	207	75	282
Song-Thrush	2	—	2
Redwing	—	4	4
Robin	8	2	10
Garden Warbler	—	1	1
Starling	1	10	11
Goldcrest	2	—	2
Chaffinch	4	4	8
	224	96	320

Additional species recorded but not trapped included a Short-eared Owl and a Great Grey Shrike.

Blackbirds can always be found on the Spurn Peninsula. In January, 1954, about a dozen were present, decreasing to two or three up to early March, when the spring movement northward began as usual. Spurn has seldom been adequately watched during March, but it is known that males and females come through in about equal numbers, and presumed pairs have been caught together many times. After the March passage, early in April, numbers fall again to a very few, until some of the juveniles bred in the district begin to wander, which may be from mid-May onwards.

The autumn passage usually begins in early October, with the peak towards the end of the month. On October 17th, 1954, when G.H.A. and R.C. were at Spurn together, larger flocks passed down than G.H.A. had previously seen. This was early for a peak period. Some of the flocks numbered up to 50 birds and there was a preponderence of males, mainly juveniles, of which small numbers descended to the bushes and were caught. For the rest of October Blackbirds appeared average in numbers.

Events on November 6th were utterly abnormal. Fortunately the cottage had housed a strong party, consisting of A. E. Platt, J. S. Trimingham, and J. Burley who worked the Warren Trap for the whole day, and G. H. Ainsworth and D. R. Wilson who worked the Chalk Bank traps and got thoroughly wet. R. Chislett helped until he had to leave reluctantly at 10-30 a.m. to attend a meeting of the Y.N.U. Executive.

November 5th had been a calm day with almost no wind, a good day for starting, for birds that often travel at night like Blackbirds. At dawn on the 6th a north-easter of Force 5 was blowing, against which the Warren bank and bushes gave shelter, and a drizzle had set in that lasted all day, with intervals mainly of heavier rain. One Robin only was caught at the first drive, before 7-0 a.m., and four Blackbirds soon after. By 8-0 a.m. so many Blackbirds went forward before us into the trap that the trapping box became full, and the collecting-box too, and some were allowed to escape. At the first post-breakfast drive 45 birds were taken together, and accommodated temporarily in collecting-box and cages for ringing at leisure. The field of stubble above the cottage became alive with birds, mainly Blackbirds, and Starlings, but with many Redwings and Fieldfares, and some larks and finches. Many came off the sea to the stubble, but others had probably struck the coast beyond our vision. Most of the birds appeared to be very tired. Four Blackbirds that settled in the gun-site-warden's hen run were unable to rise above the four foot of surrounding netting. A few allowed themselves to be picked up in the open. Before nightfall the ringers were very tired too, after a fantastic day.

All along the road down the peninsula Blackbirds were numerous. The figure of 2,000 at which they were estimated may have been an underestimate. Adult males and females were included but the majority were first-winter birds. From previous recoveries of ringed birds we know that many of our autumnal visitors come from Scandinavia, and that in winter they may occur almost anywhere across

this country to southern Ireland. One of the 282 Blackbirds ringed this day has already turned up—on November 17th at Rochdale, Lancashire. Another was found dead on November 10th near Oldenburg, in *western Germany*—only four days later. Had this bird, having already been caught in the storm of November 6th, been diverted again by the subsequent winds from the west ?

On the 7th November many of the birds had passed on, but 46 Blackbirds were ringed, and the 10 other birds ringed included a Red-backed Shrike, a Blackcap and a Chiffchaff. On the 8th, 15 more Blackbirds were ringed before breakfast, and there seemed to be more about than on the 7th, and more could have been ringed, but the remaining ringers used their last morning for observation. Among the species noted on the 8th were a juvenile Swallow, a Woodcock, a Water-rail, and some divers. During the morning many parties of starlings, finches and buntings passed southward, and some of Rook and Jackdaw.

Further Blackbirds continued to be caught during November at week-ends. Many Snow-buntings and odd Lapland Buntings were seen. Of the *c.* 2,000 birds ringed at Spurn in 1954 some 600 have been ringed in November. When making our plans for bird holidays (and work) in 1955 shall we not have to consider November more seriously than heretofore ? G. H. Ainsworth is of opinion that in most years more birds pass through the Spurn peninsula during November than in any other month, but the peninsula has been watched less adequately during that month than in some others. Perhaps those who can spare time in November will give the matter serious thought in 1955.

Winged Thunderbolt, by **G. D. Adams.** Pp. 166, with frontispiece and 7 plates by Arthur Brook. Constable & Co. Ltd., 1954. 15/-.

This purports to be the life story of Pinto, a Peregrine Falcon and the writer has obviously made a close study of the habits of this species. The book is of a type well-known to bird lovers and they may expect in due course to be introduced to ' Mulo ' the Buzzard, ' Crark ' the Carrion Crow, ' Nog ' the Heron and the rest of the characters. ' Pinto ' lives an adventurous life, which includes a period in captivity and the interest of the reader is sustained t o the end.

On page 77 the author states ' Twenty miles apart as they ranged was of little note, and they could be together again in thirty seconds '. This is fast going; it is in fact supersonic.

E.W.T.

Film-Strip. The Wildfowl Trust. *The Peter Scott Series No.* 1. 32 frames in colour. Unicorn Head Visual Aids Ltd., 40 Broadway, Westminster, S.W.1.

The pictures include wild geese on the wing, on stubble, and being ringed in Iceland and England; the decoys and the decoyed; and rare captive ducks at Slimbridge. Some of the ducks and swans can easily be recognised even without the aid of the excellent commentary provided; as can also Mr. Scott and some of his visitors, including Her Majesty the Queen and H.R.H. The Duke of Edinburgh. The film-strip is excellent, and with a suitable projector and the commentary, can be used effectively by anyone for educational purposes. No price is stated.

R.C.

In Praise of Birds, an Anthology, by **Gwen Hilditch.** Pp. 64, with 9 page illustrations. Frederick Muller, 1954. No price.

In this anthology, whose title seems a little prematurely ' borrowed ' from Canon Raven, sensibility and sententiousness rub uneasy shoulders. Some good photographs are badly reproduced but the coloured binding is attractive and gay.

The Neighbours: an Animal Anthology compiled and illustrated by **Fougasse.** Pp. x+118. Methuen. 7/6.

This anthology of prose and poem about birds and beasts illustrated in Fourgasse's inimitable way should solve the problem of anyone wishing to find an attractive gift-book for a naturalist friend or indeed for anyone not wholly devoid of a sympathetic attitude towards animals. All royalties are being given to the Universities' Federation for Animal Welfare.

Wild Company, prefaced by **T. V. Bulpin.** Pp. 95, with 42 plates and a coloured frontispiece. The Bodley Head, 1954. 15/-.

This is essentially a picture book consisting of a series of photographs of wild animals of the African jungle. The plates are of the highest quality.

LEAFING AND LEAF-FALL DATES OF THREE COMMON TREES

A. MALINS SMITH

DURING the life of the Phenological Section of the Yorkshire Naturalists' Union, a scheme for recording the dates of leafing-out and leaf-fall of common trees was started. The Phenological Section had only a short life, but I carried on the scheme for five and a half years, a period which proved long enough to establish some general results which I am setting out in what follows.

The general principle of the scheme was to observe the same chosen tree each year, so that comparisons from year to year could be made on the same trees. I had a horse-chestnut, an ash and an oak visible from my window and these trees were observed each spring and autumn. The procedure prevented any mistakes which would have been made if records had been made of different individual trees in the different years. It is well-known that trees of the same species show great individuality in their times of leafing and leaf-fall. A little observation, however, shows that a tree which is an early leafer in one year is so also in other years. There is little doubt that this character is principally due to heredity. It must be influenced also by environment; thus the oaks of the south of England no doubt come into leaf earlier than those of the north, due to the milder climate. Yet individual differences in dates of leafing are as noticeable in the south as in the north and these differences are no doubt hereditary.

The leafing-out and leaf-fall of a tree are usually gradual processes and it is often not easy to choose a definite date for either. The instructions given to phenological observers were that the date for leafing-out was to be taken when the tree was green over from a distance of fifty yards and for leaf-fall in autumn when the tree looked leafless from the same distance. After five years experience I am of opinion that these instructions can be followed by a single observer so as to get accurate dates. I felt that with a little experience I came to have standards in this matter which were uniform and accurate. I should, however, have no confidence in the comparison of results which were the observation of one person in one year and a different person in another.

The following are my results:

LEAFING-OUT IN SPRING

	1949	1950	1951	1952	1953	1954
Horse-chestnut	Apr. 17	Apr. 5	Apr. 28	Apr. 15	Apr. 16	Apr. 13
Oak . .	Apr. 30	May 15	May 26	May 9	May 14	May 15
Ash . .	May 16	May 24	May 28	May 30	May 19	May 29

The general uniformity in these records is clearly seen here, since the dates of leafing-out are in the same order in each year. Since the records are based on single trees, it might be thought that this uniformity would have failed if other individual trees with later or earlier dates of leafing had been chosen. Yet since the trees were chosen at random I think the above uniformity is significant and probably represents the general order of leaf opening in this district.

LEAF-FALL IN AUTUMN

	1949	1950	1951	1952	1953
Horse-chestnut .	Oct. 28	Oct. 15	Oct. 18	Oct. 14	Oct. 12
Ash . . .	Nov. 5	Oct. 31	Oct. 27	Oct. 20	Oct. 25
Oak . . .	Nov. 13	Nov. 13	Nov. 1	Oct. 27	Oct. 31

The above table shows that the dates of leaf-fall are in the same order in each year. This time, however, the order is horse-chestnut, ash, oak, while for leafing-out

it is horse-chestnut, oak, ash. I think it is justifiable to give this order of leaf-fall a general significance for this district.

Period in the Leafy Condition (in Days)

	1949	1950	1951	1952	1953
Horse-chestnut .	194	193	173	182	179
Oak . . .	197	182	159	171	170
Ash . . .	173	160	152	153	159

Since the leaf is the food-making organ of the tree the total period during which the trees bear leaves might be thought to be of essential importance to their growth. It is clear from the above table that it follows a uniform order (with the sole exception of the oak having slightly the longest period in 1949). It is significant that this is the same order as the order of leaf-opening in spring. The horse-chestnut has its long leaf-bearing period because it opens out early and the ash its short period because it opens out late. It seems clear from observation that the horse-chestnut does not gain anything in growth rate from this longer period nor the ash lose anything from its shorter period. An ash tree has vigorous growth, especially in its younger period, and, in this district at any rate, the horse-chestnut is of slower growth than our native trees. We can only suppose that some other factor is of greater importance than the total time of exposure of green leaves to light in any one summer. Of such other factors suggestions could be made, e.g. rate of assimilation or rate of absorption of essential elements.

The shortest leafy period of all, that of the ash in 1951, is only 77 per cent. of the length of the longest, that of the oak in 1949. This is a sufficiently large difference to have some significance, but at present we do not know what its significance is.

Comparison of the Seasons

All the three species show that 1951 was the latest season for leafing-out and the shortest for total leaf-bearing period. In 1949 the three species showed their longest leaf-bearing period.

The Leafing-out of the Oak and the Ash

Owing to its being mentioned in an old rhyme relating to the weather this phenomenon has generally received special attention. In those years when the ash flowers freely, reports are often seen that it has come out before the oak. This seems, however, to be always due to the mistake made by unqualified observers who have compared the *flowering* of the ash with the *leafing* of the oak. If one confines oneself to the records of accurate observers, the result, in Yorkshire at any rate, is always the same, namely that the oak invariably comes first. I have been observing these dates since 1922, and for a longer period than that the Y.N.U. Botanical Committee has received reports on the chief botanical events of the year which usually made some reference to the phenomen under discussion. The correct method, since in both species individual trees show great variation with respect to each other, is to estimate the average time of leafing-out of a great many trees of both species. Both the Y.N.U. reporters and I applied this method and the result has been that the oak is invariably out before the ash. There has been only one exception to this uniformity namely that in 1943 (*The Naturalist*, 1943, p. 15) the late W. E. L. Wattam reported for the Huddersfield district that the ash was in leaf a very short time before the oak. His colleagues from other parts of the county returned the usual result of the oak before the ash, so that it is doubtful if his single result was significant. The interest lent to the leafing of these two species by the old rhyme is therefore in one sense wasted, since in Yorkshire the oak always comes out first. It is possible that there is some variation in other parts of the country, but I have no accurate information on this point.

In the present series of records, however, the oak precedes the ash by periods varying from two to sixteen days. These are observations on particular trees, not averages of several, but they do show that local climatic conditions do not always affect the oak and the ash in exactly the same way.

SOME LEICESTERSHIRE ALGAL RECORDS

F. J. TAYLOR

During the period 1914-1920 the algae of Leicestershire were extensively collected and examined by Miss F. Rich for the projected Flora of Leicestershire. As publication of this was delayed, the algal flora was published separately (Rich, 1925b) together with some notes on some of the new and interesting algae (Rich, 1918, 1925a). This flora included all the records known at that time, and included those of earlier workers. Since then little has been published on the algal flora of Leicestershire, though Miss Rich (1933) made an extensive list of algae from the ' Frying-pan ' pond on Beacon Hill. In connexion with this flora it must be remembered that a number of localities sampled by these earlier workers, especially those in the neighbourhood of Leicester itself, have disappeared as the result of urbanisation, whilst others, especially in Charnwood Forest, have been radically changed by drainage.

During 1946-1950 the writer was engaged in studying the plankton algae of Leicestershire, a group of algae neglected by Miss Rich. Accounts of the periodicity of the plankton in Swithland Reservoir (Reynolds and Taylor, 1950) and Saddington Reservoir (Taylor, 1954) have been published, and these include a number of new algal records for the county. The list below includes some new algal records which have not previously been published (these are asterisked in the list), together with some records of algae which were rarely recorded in the flora.

CHLOROPHYCEAE

Volvocales.

Apiocystis brauniana Naeg. On *Oedogonium* in pond, University College, Leicester, December 1949. Only previously recorded by Bates (1886).

Asterococcus superbus (Cienk.) Scherf. Among filamentous algae on wet rock, Bardon Hill, April 1946. The only other record is from the ' Frying-pan ' pond on Beacon Hill (Rich 1933) where it can still be found. It was also found in Swithland Reservoir (Reynolds and Taylor 1950).

**Coccomyxa dispar* Schmidle. Bradgate Park, 1944, F. A. Sowter.

Chlorococcales.

**Characium sieboldii* A. Br. On *Elodea* in pond, University College, Leicester, May 1946.

Chlorella spp. Miss Rich did not include any species of this genus in her flora. Occasional individuals have been found to be of widespread occurrence, though they only occur in large numbers in such unnatural habitats as chemical solutions in laboratories.

Actinastrum hantzschii Lagerh. Frequently found in canal plankton, and also in the River Soar. The only previous record was from Swithland Reservoir (Reynolds and Taylor 1950).

**Ankistrodesmus falcatus* (Corda) Ralfs, var. *mirabile* W. & G. S. West. Plankton, River Soar near Narborough, April 1946.

Ulotricales.

Hormidium flaccidum (Kütz.) Br. The only previous record was for the terrestrial form from soil in Leicester. The aquatic form was found on wet rocks at Bardon Hill in April 1946. It bore curious H-pieces on the walls similar to those described by Jane and Woodhead (1941) from Wales. These seem to appear when renewed growth takes place after a period of unfavourable conditions.

Chaetophorales.

**Trentepohlia aurea* Mart. Found abundantly on rocks in a wood near Collier Hill, the Oaks, by T. G. Tutin in 1944, and later on a wall by the Brand, opposite Swithland Woods. Since then it has been seen in several places in the Charnwood region.

CONJUGALES.

**Penium cylindrus* (Ehr.) Breb. Moss squeezings, Bradgate Park, 1944, T. G. Tutin.

**Closterium peracerosum* Gay, var. *elegans* G. S. West. This is included in Miss Rich's notes as being found as fluff on *Elodea* at Aylestone in 1919 but is not included in the flora. It was found in the plankton of the River Soar at Narborough in April 1946. The type has been recorded for Leicestershire.

**Pleurotaenium trabecula* (Ehr.) Naeg., var. *rectum* (Delph.) W. & G. S. West. ' Frying-pan ' pond, Beacon Hill, April 1946.

XANTHOPHYCEAE

Botrydium granulatum Grev. This alga of uncertain appearance was found in abundance on the drying mud of a pond near Old Ingarsby in September 1949, but has not been seen there since.

BACILLARIALES

Eunotia gracilis (Ehr.) Rabh. Recorded by Rich (1925b) only from Ulverscroft Lane. It has since been found in *Sphagnum* squeezings from Beacon Hill, and also at Bardon Hill.

**Frustulia rhomboides* (Ehr.) de Toni. Plankton, River Soar, Narborough, April 1946.

**Gyrosigma distortum* (W.Sm.) Cleve, var. *parkeri* Harriss. Plankton, canal, Kilby Bridge, April 1946.

**Stauroneis anceps* Ehr. Plankton, canal, Kilby Bridge, April 1946. Type not previously recorded for Leicestershire, but recorded for Rutland.

**Cymatopleura solea* (Breb.) W.Sm., var. *apiculata* (W.Sm.) Ralfs. Plankton, River Soar, Narborough, April 1946.

Surirella spiralis Kütz. Beacon Hill, April 1946. Only recorded by Rich (1925) as very rare from John O' Gaunt.

EUGLENINEAE

**Euglena oxyuris* Schmarda. Plankton, canal, Kilby Bridge, April 1946.

MYXOPHYCEAE

**Cylindrospermum maius* Kütz. Fallow field, Huncote, 1944, T. G. Tutin.

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RICH, F. (1925b). The algae of Leicestershire. *J. Bot.*, LXIII, pp. 229, 262, 322, 352.

RICH, F. (1933). The algal flora of a Leicestershire pond. *Trans. Leic. Lit. and Phil. Soc.*, p. 1.

TAYLOR, F. J. (1954). Notes on the phytoplankton of Saddington Reservoir, Leicestershire. *Naturalist*, p. 141-148.

***Hydroporus longulus* Mulsant (*celatus* Clark) (Col. Hyd.) at Thorne.** Specimens taken from a peat pool on Thorne Moors, June, 1949, were determined as *H. longicornis* Sharp, and placed in the collection at the Doncaster Museum. Further specimens taken June, 1952, from the same station were mounted and retained. One of these specimens was recently sent to Professor F. Balfour-Browne for confirmation, but was identified as *H. longulus*. Owing to restricted activity, the station has not been visited since June, 1952.

Professor F. Balfour-Browne in *British Water Beetles*, Vol. 1, p. 319, map 64 does not record it as having been taken previously in this vice-county or from a habitat such as the one on Thorne Moors. This would appear to be the first time it has been recorded from fenland.—WM. BUNTING.

G. SALISBURY

The classification of lichens, now that Zahlbruckner's system is being rejected, is of concern to lichenologists. A more natural system would be based on the fungal elements so that the work of mycologists cannot be ignored. An arrangement of the fungal symbionts, however, by Ciferri and Tomaselli ('Saggio di una Sistematica Micolichenologica', *Atti Ist. Bot. e Lab. Critt. Univ. Pavia*, 5, X) has come in for so much unfavourable criticism by a lichenologist (Santesson, *Taxon* 3 (4), 1954), that the position should be re-considered. I have not seen Santesson's criticism but I have seen Ciferri and Tomaselli's reply to it to be published next in *Taxon* and the arrangement itself.

The gist of Ciferri and Tomaselli's reply is that the standpoints of lichenologist and mycologist are entirely different: the attempt is to discredit the testimony of Santesson (or any lichenologist) considering lichens as fungi. In their own words, 'lichenologist and lichenology are outside the scope of what we propose which considers only the opportunity of classifying the fungal symbionts of Lichens in mycological, not lichenological lists, and as Fungi—not as Lichens.' 'The lichenologist is interested in the whole fungal-alga association', unfamiliar with either component taken separately. It may be so, even in lichenologists still living, but Santesson has already stated (*Foliicolous Lichens* I, 1952) that lichen-fungi and lichen-algae must be classified in the same manner as other fungi and algae and is working on these lines. The standpoint of Santesson is therefore no different from that of Ciferri and Tomaselli: other lichenologists should be allowed to determine their own standpoints for themselves.

When Santesson says that it is sensational to learn that the lichen-fungi in *Usnea* and *Lichina*, etc., belong to the same genus, the reply is that it may be a surprise to a lichenologist but this is no surprise to the mycologist. Again the sectarian view that what may appear wrong in lichenology can be perfectly correct in mycology. My own work on *Thelocarpon*, frequently placed by mycologists with the non-lichenised fungi, led me to look up their treatment of this genus. Their *Thelocarponomyces* includes the lichen-fungi in *Harpidium*, *Lichinella*, *Placopsis*, and part of *Thelocarpon*. Santesson's observation that this tends 'to make fun of Lichenology' might be used again; it would not be 'lacking in courtesy'. The methods of the lichenologist would seem ridiculous if after long and careful studies he overlooked important relationships which come so easily to mycologists. He can only repeat that none of the other lichen-fungi seem to be related to that of *Thelocarpon* and it is altogether immaterial whether it is a lichenologist or a mycologist who says so. True, some fungal characters are similar, but this does not prove a relationship as other fungal characters are entirely different.

The arrangement is in the form of a key. The impression is that the abbreviated form of a key was used to work up this arrangement, not that the arrangement is the result of careful study of all the fungal characters presented in the form of a simple key.

The other criticisms by Santesson are answered without reference to lichenologists in general. The final point, however, of Ciferri and Tomaselli's reply that the genera proposed by them have been enumerated in the *Index of Fungi*, 1953, and *A Dictionary of Fungi*, 1954, is all the more reason why consideration should be given to Santesson's opinion that they ought to be expunged.

In conclusion, Ciferri and Tomaselli's arrangement is no worse for the criticism of Santesson. Other lichenologists should consider it but the statement that it is outside the scope of lichenology is not an inducement. It is only necessary to add that any arrangement of the lichen-fungi acceptable to mycologists must also be acceptable in principle to lichenologists, and *vice versa*.

Foliicolous Lichens I. A Revision of the Taxonomy of the Obligately Foliicolous, Lichenised Fungi, by **Rolf Santesson.** *Symb. Bot. Upsal.* **12,** 1. Pp. 590. Uppsala, 1952, 40 kr.

Although only two British species are dealt with—the foliicolous lichens are mainly tropical—this is a book for British lichenologists. 236 species are described under 38 genera; the two species are given in A. L. Smith's *Monograph* as *Biatorina Bouteillei* (Desm.) Arn. and *Bilimbia leucoblephara* (Nyl.) Arn. The first is probably correctly determined (given *Catillaria bouteillei* (Desm.) A. Zahlbr. by Santesson); the second, easily recognised according to A. L. Smith by the white pubescence encircling the apothecia, is probably *Byssoloma rotuliforme* (Müll. Arg.) R. Sant.

which also has a white pubescence. But British specimens are not even examined. With the bare mention of *Bacidia epiphylla* Wheld. & Trav., which is not an obligately foliicolous species as it grows on dead leaves of *Salix repens* (humus), S. Lancs. dunes, there might have been little else to interest British lichenologists.

Santesson's difficulties were that the lichens treated do not form a taxonomic unit and parts of a number of unrelated genera had to be dealt with. Many problems are left: ' the foliicolous species of *Porina* . . . have not been referred to any sections, since a monographical study of the numerous non-foliicolous species is necessary to make possible a natural division of the whole genus '—' the question of the delimitation and denomination of *Gyalecta* and its related genera must largely be left until a careful monographic study of *Gyalecta* has been made '—' a complete and correct generic description of *Lecidea* can hardly be given at present, since the delimitation of the genus is very uncertain '—' a conservation of the name *Catillaria* is only provisional until the genus and related ones have been monographically studied '—' a monographical revision of all the species of *Coccocarpia* is very much needed '—' a future monographical treatment of *Bacidia* cannot be made without very careful studies of *Catillaria, Lopadium, Toninia* and other genera '. Future studies are worth noting and British lichenologists might be tempted to adopt one.

Just as the arrangement of the *Monograph* was criticised by Watson as detrimental to the achievement of a more natural classification, so Santesson criticises Zahlbruckner's system—and incidentally Watson's—for exactly the same reason. Lichens are not now considered to form their own taxonomic unit but must find their proper taxonomic position within the common fungal and algal systems and nothing else seems to be acceptable. Not that Santesson provides more than a sample arrangement; the amassment of accurate information is this author's first concern. ' In contrast to Vainio, who based his opinions on personal knowledge of the lichens treated, several authors . . . published systems based mainly on theoretical speculation upon Vainia's and Zahlbruckner's statements.' First-hand knowledge—Santesson is not in the second-hand business—is not easy to come by; yet considerable data (the author himself calls it brief) is given under the respective families.

If past premises were wrong, or only partly right, leeway is not easily recovered. To date, without going into a discussion on species concept and variation, the only taxon that can be reliably stated is the species. The lack of interest manifested by lichenologists in taxa above species level is noticed by Santesson, but some disinterest is perhaps justified. In his treatment of species, Santesson himself is on more solid ground. In most cases of the 236 species described, type material was available, and altogether material was received from 50 herbaria. As a result of the examination of *Strigula*, one of the few entirely foliicolous genera, of the 87 names published 42 were found to be synonyms, 14 to refer to non-lichenised fungi, 5 to slightly or non-lichenised fungi, 5 to other genera and 8 undeterminable: in all only 8 valid names. Furthermore, 18 species actually referable to *Strigula* were found in other genera; 2 specific epithets could be accepted in *Strigula*, the remainder added to the list of synonyms. As similar figures are given for other genera, the implication is obvious. Incidentally, Santesson is careful to point out that the large number of synonyms is not due to any wide species concept; many superfluous names are published due to the carelessness of authors. ' Some sources of common misinterpretations ' are given in the introduction but many others are referred to in the text. Once again, therefore, Santesson does not go to the literature, except to prove the validity of the names: the other references are not even cited.

While Watson criticised the *Monograph* for its arrangement—which was easily changed as Watson himself was to show—its chief defects lay elsewhere. These Monographs, wrote Watson (*Lichens of Gloucestershire*), ' were of very great assistance to the study of lichens and have encouraged many botanists to collect and name them '—and presumably to publish lists of their determinations. That the *Monograph* never encouraged more than a recording of lichens was, perhaps, due to a semblance of authority. Yet by Santesson's standards the whole work seems condemnable. It dealt only with material in the British Museum; even when type material was available at Kew for comparison, it was not examined. Every problem seemed solvable by reference to previous literature.

The value of Santesson's work is, therefore, that British lichenologists may be encouraged to emulate it. It is written in English, the text (from a linguistic point of view) revised by Mr. David Smith, Oxford, and Mr. J. M. Jones, Uppsala, and is more readable than it otherwise would have been.

G. Salisbury.

THE YORKSHIRE NATURALISTS' UNION: NINETY-THIRD ANNUAL REPORT

The Ninety-second Annual Meeting was held at Spring Hall, Halifax, on Saturday, December 5th, 1953, by the kind invitation of the Halifax Scientific Society.

The Presidential Address was delivered by E. W. Mason, Esq., M.A., M.Sc., F.L.S., on ' Literature, Science and the Naturalist." This was printed in *The Naturalist*, 1954, pp. 41-46.

The Presidency for 1955 has been offered to and accepted by E. Wilfred Taylor, Esq., C.B.E., F.R.S., M.B.O.U.

The Excursions for 1955 will be to:

V.C. 61. Keyingham, for Kelsey Hill Gravel Pits, July 16th.
V.C. 62. Sandsend, near Whitby, May 28th-30th.
V.C. 63. Lindrick Common, June 11th.
V.C. 64. Ripon, for Queen Mary's Dubb, June 25th.
V.C. 65. Carperby, for Locker Tarn, July 9th.

New Members.

The following have joined the Union since the publication of the Annual Report for 1953, or too recently for inclusion in it:

Alderson, G. E., ' Shawldene," Riseber Lane, Leyburn.
Allison, Miss A. E., 19 The Avenue, Richmond, Yorks.
Armitage, J., M.B.O.U., The City Museum, Leeds.
Bartolomé, F. F. M. de, 405 Fulwood Road, Sheffield 10.
Blackwell, Miss E. M., M.Sc., F.L.S., Woodsome Lees. Kirkburton, Huddersfield
Blakey, Miss S., ' Sunny Croft,' Hearn Mount Road, Brighouse.
Brown, Miss A. H. S., Ph.D., 28 Abinger Road, Bedford Park, London, W.4.
Clayson, D. B., B.A., Ph.D., 11 Brookfield Road, Leeds 6.
Clayson, Mrs. M., 11 Brookfield Road, Leeds 6.
Edwards, R. L., M.A., D.Phil., F.R.E.S., Department of Zoology, The University, Hull.
Graddon, W. D., B.Sc., ' Rathgar,' Park Lane, Congleton, Cheshire.
Hirst, Miss M. B., ' Monrovia,' Woodhouse Lane, Brighouse.
Huddleston, Miss A. M., 2 Wansford Road, Driffield.
Knight, W. J., Further Clough Head, Nelson, Lancs.
Lord, Miss G. W., 12 New Parks Crescent, Scarborough.
Martin, S., Meadow Croft, Elloughton, Brough, E. Yorks.
Medd, T. F., Garden Cottage, ' The Uplands,' Malton.
Moore, Mrs. E. M., Newnham, Conan Gardens, Richmond, Yorks
Norris, J. R., 18 Winston Gardens, Leeds 6.
Pilkington, A., 50 Gisburn Road, Barnoldswick, Colne, Lancs.
Pinder, Miss B. J., B.Sc., 4 Rochester Terrace, Leeds 6.
Skinner, E. S., ' Cotswold,' Burley-in-Wharfdale.
Tomlinson, T. B., 89 Caledonian Road, Leeds 1.
Trimingham, J. S., 14 Childers Street, Doncaster.
Walker, Miss D., 99 Otley Road, Harrogate.
Wallis, O. H., Thorncliffe, Burnby Lane, Pocklington.
Ward, Miss C. A., Flat F., Ouselthwaite Hall, Barnsley.
Wildblood, T. J., 110 Cliff Road, Hornsea, E. Yorks.

Changes of Address.

No list is given here, as it is intended to print a list of corrections to the recently published List of Members soon.

Deaths.

C. A. Cheetham, F.R.E.S.
A. A. Pearson, F.L.S.
H. Whitehead, B.Sc.

It is indeed a misfortune that the last issue of *The Naturalist* should have had to carry the obituary notices of three members who have served the Union so well.

The Annual Report is not the place in which to enlarge upon the obituary notices, but in the case of C. A. Cheetham mention is essential in view of the part he played in Union affairs over nearly half a century.

Previous to Cheetham becoming General Secretary of the Union in 1934 there had been two or more secretaries to share the work during 36 of the 49 years. F. A. Mason was General Secretary during the year 1932-33 and for the ten years immediately prior to that F. A. Mason and Dr. (since Professor) W. H. Pearsall had been joint secretaries.

First elected to the Executive in 1908 Cheetham had been playing an increasing part in the Union's management. The minutes of the Executive meetings from 1921 onwards show him as a very active member indeed. He is mentioned as the proposer of many resolutions on problems then facing the Union. Many of these problems were financial and, in fact, sound very topical to-day. No name occurs as frequently in these minutes, year after year, as Cheetham's. He was the Divisional Secretary for S.W. Yorks., Secretary of the Botanical Section and of the Committee of Suggestions for Research and from 1926 till he became General Secretary was one of the Honorary Auditors.

Members of the Union who ever had occasion to write to Cheetham will know how often they received a reply—brief, maybe, but to the point—by return of post. Members who have been Divisional Secretaries and responsible for the organisation of summer excursions, will know how they received a reminder that information for the circular was needed in plenty of time, and followed by others of increasing urgency if time went by and the draft of the circular had not been received in Austwick. The writer regrets to say that he received one note of a single sentence: ' I really do not know what has come over you—if you don't get a move on there will be no meeting.' All this was forgotten when the meeting had taken place and Cheetham announced at the end, as usual, that thanks on these occasions were due to the Divisional Secretaries, who took all the work off him. This modesty and understatement of his own part in any work went very far and may sometimes have led others to underestimate it too. In the circular relating to the Whitsun meeting at Austwick, this last year, he says of the Diptera, ' This section of the insect fauna of Austwick has been well worked, mainly by the frequent visits of the late Dr. F. W. Edwards of the British Museum of Natural History.' He gives himself no credit for over twenty years of patient work which has made Austwick one of the best-worked places in Britain for Diptera.

Cheetham did not like the ' smarter ' hotels and this bias in the choice of headquarters for meetings is one of the smaller ways in which his personality affected the Union. No doubt the majority of members would agree with his judgement in this matter.

The welfare of the Union, as a whole, was a matter of great and personal concern to Cheetham. He was well-fitted to be its General Secretary in his wide knowledge of many branches of natural history and in his expert knowledge of some. He was interested, above all, in the natural history of Yorkshire and, for better or not, strayed very little outside the county. Add to these qualities a forceful, likeable and ever-cheerful personality and it probably is reasonable to think that the Union is never likely again to find a man so well-fitted to be its General Secretary.

FRESHWATER BIOLOGY

(E. Thompson).—In the Dewsbury area conditions for the observing of aquatic insects have been poor. Lack of sunshine helped to keep the insects inactive, and high streams had more periods of flood making the observing of larvae difficult.

Three species of Plecoptera have been fairly numerous along the Coxley stream. Very early in the year *Protonemoura meyeri* (Pict.) was out, with *Leuctra hippopus* (Kemp), one of the Needle Flies, coming later. *Isoperla grammatica* (Poda) was also in evidence.

In most years the Mayfly *Ephemera danica* Muell. has a good year at Coxley, but this season few have been seen. *Bäetis rhodani* (Pict.) on the credit side gave a fair show. Howroyd Beck in the adjacent valley provided a few specimens of *Ecdyonurus venosus* (Fabr.), and *Cloeon dipterum* (L.) was about its old haunts on Emroyd Common in June. Elsewhere the writer was able to visit Ripley on two weekends but again conditions were bad, with only *Caenis macrura* Steph., one of our tiny flies, being present in June.

Trichoptera were about at Bretton, but one of the lakes was drained early in the year. This destroyed many larvae; others survived in wet patches where the water failed to run off, and *Phryganea grandis* L. and *Glyphotaelius pellucidus* Retz. were on the wing on the few warm days.

Greenhill Dam, the home of *Molanna angustata* Curt, was also disturbed. The sides were excavated and concreted, destroying all aquatic vegetation. Throughout the year no plant life appeared but *Molanna* survived, seeming to exist on nothing. Scrapings from the sides of the dam yielded very few algae.

MAMMALS, REPTILES, AMPHIBIANS AND FISHES COMMITTEE

Mammalia (Mrs. A. Hazelwood): Seven Brown Hares were put out of one small wood at Sandbeck near Rotherham by the hunt on October 18th.

There is a report that Rabbits are not so common as they were due to the introduction of myxomatosis to the south and east of Rotherham. The keepers report decimation of the warrens.

At King's Wood, Roche Abbey, five Grey Squirrels were shot in one week in June but the species seems to have established itself there.

A Short-tailed Field Vole was seen running down the Southgar Breakwater at Teesmouth in October.

Two bats are reported 'flying high at Heptonstall near Hebden Bridge just before dusk' and it is suggested that by their size and manner of flight they may have been Noctules. There is no previous record for this species in the locality.

A Porpoise measuring 5 ft. in length was stranded on the Humber side of Spurn on January 3rd.

Pisces (Mrs. A. Hazelwood): An Angler Fish was caught about 1½ miles out from Scarborough Castle on September 3rd. It weighed 9 lb. 8⅞ oz.

A Halibut weighing 41 st. 1 lb. was landed at Hull on November 26th, 1953 by the trawler *Cape Warwick* which had been to the White Sea. It was sold for £43. It is thought to be the second largest Halibut brought to Hull for more than forty years. The larger fish weighed 44 st.

A black Conger Eel measuring 6 ft. from mouth to tail, having a girth of over 2 ft. and weighing 6½ st. was landed at Filey. It had swum into shallow water near the coble landing whence it was hauled ashore by fishermen.

A young Basking Shark 44 ins. long was found dead on the beach near Primrose Valley, Scarborough, by three local schoolboys on November 27th, 1953.

A Thornback was landed at Redcar in July.

In November and December 1952 six or seven Ray's Bream were caught off Redcar.

SOME OBSERVATIONS ON A FAMILY OF FOXES

R. BRAMHILL

Cubs were dropped in Set A at Wadworth again in April, but the vixen took them away at a very early age and changed quarters constantly.

On the 17th June I heard rooks and jackdaws calling in low harsh tones in a spot near Kimberworth, Rotherham. I crept up quietly and saw a fox and vixen with five cubs at the entrance to an earth in a very dirty tip heap close to the road. The time was 9-20 p.m. The same night one of the cubs was shot by a farmer a mile away.

On the 18th June the family of six were still at the earth. Several people passed on a path just up the hill from the tip, but no sooner had they gone than the family went up the hill, crossed the path and a railway line, and turned into the wind. At the earth itself, I noted that the foxes always expected danger from downwind. I assumed that they relied on their noses for danger from upwind, and on their eyes and ears for danger downwind. I have used this information since I observed this fact, and can invariably outwit a fox by approaching at right angles to the wind. I usually find it either sniffing upwind or looking downwind—never across wind.

On the 19th June several people were so close at emerging time that I suspected the vixen would take the cubs away that night.

On the 20th June, the family had gone—and so had the noisy rooks and jackdaws that had called at them on the two previous nights. However, the jackdaws said

that the vixen had gone across the railway and two hundred yards up into a steep wood—when I immediately found them, the whole six, in a new earth in deep bracken.

On the 21st June all six foxes crossed the path by the railway line, five too far away to photograph, and one too near.

On the 22nd June all six were constantly crossing and re-crossing the path. One cub appeared in the bracken at 10 p.m. It was too near to photograph, and was interested in the reflector. The same night at 11 p.m. a Barn Owl hovered over a cub.

On the 23rd June two cubs had a running fight along the railway line. At 10 p.m. the dog fox came silently up the line side. At a point immediately opposite me, he suddenly squealed like a rabbit. A rabbit popped its head up in the grass only a foot in front of his nose. He grabbed it across the back and took it squealing along the railway line and dropped it alive just in front of the cubs. They killed it and ate it, and I could hear the performance.

On the 24th June it was very windy, and the foxes were noticeably worried by it, probably because they could not listen for danger quite so well as they would have wished.

On the 26th June two cubs chased each other down the bank and along the railway line at 10-5 p.m. My wife was sitting on the fence 20 yards lower down the line and they ran under her. She fired her flash and immediately the vixen, which must have been sitting watching me from the bracken just across the line, sprang like a cat on to the line and stood not 15 feet away, calling urgently to the cubs. I fired the flash, but she stood her ground, continuing to call until she was sure the cubs had reached safety, then she disappeared in the bracken.

On the 27th June, my wife, Jim Griffith and I waited thirty yards apart on the fence beside the railway. At 10-50 p.m. a dog fox came out of the bracken in front of Jim (who had hidden in an elder), and stood looking at my wife, thirty yards upwind. Then it dropped on to its haunches and ran alongside the path, right past my wife (who never saw it) using an extremely small depression no more than three inches deep that drained the path. It passed me too at an incredible speed and found time to see me as well.

On the 28th June I was amazed to find when I came into sight of the post in the fence on which I usually sat, that the dog fox was standing there, with his forefeet on the branches which usually hide the upper part of my body (a convenient ash tree grows over the fence just there). As soon as I saw him he knew and he sprang into the bracken and disappeared. He did exactly the same thing on July 3rd.

On 29th June I had smelt a fox in a drain that crosses under a ride at Wadworth, and on the 1st July I stood across wind at 9 p.m. ten feet away. At 10 p.m. a young vixen came out and walked straight across a clearing in front of me—and I never fired the flash !

On 3rd July at Kimberworth, the fox that had waited for me on the fence came back through the bracken to look at me when I squealed like a rabbit. He came silently, and only showed half a head from a discreet distance, so I could not fire a flash. That night the foxes decided not to use this path, and the next night I saw them at the mouth of an earth on a hill across the road. This hill is a steep open field with no cover, and it would not be possible to approach without being seen by both foxes and curious people, for the earth is high up on the slope.

On 23rd August a dog fox called repeatedly at Wadworth, just to annoy a dog that barked hysterically from a nearby farmyard.

On 8th September at Wadworth a fox came out of the usual drain at 7-30 p.m. but went the other way. It did the same on the 3rd and 5th of October, and the growth is too thick to stand on that side.

On the 9th October I smelt fox at an old badger sett, but it did not emerge until so long after dark that I could not see it go. Foxes of course become invisible long before badgers as darkness falls.

On the 10th October a vixen yelled twice at Wadsworth, though I did not see either her nor any other fox. My wife had decided to stay in the car, and a dog fox walked past it at 6-30 p.m.

On the 18th October the hunt at Sandbeck killed three foxes, two dogs and a vixen. Another vixen escaped after a run of about three miles. The hounds had gone down a ride, followed by the horses, hot on her trail, and she came out of the bracken just behind the heels of the last horse. She began to follow the horses, and

I am sure she would have continued to do so, losing scent in the tracks of the very hounds that hunted her, had the whipper-in not cracked his whip at a lagging hound. That startled her and she ran across the fields. She was never in the same field as the hounds and they lost her.

I observed that pheasants which can see a fox repeatedly jump up out of the undergrowth to keep on glimpsing it.

Foxes are common in Wombwell Wood but the quarries that they haunt are so extensive that I have not watched there at night.

ORNITHOLOGY

Interim Report (Ralph Chislett): Reprints of the full report for 1953 were supplied to contributors and made available for others.

At the March meeting Miss I. Werth spoke concerning ' The Summer Flocking of Curlews ', Mr. E. W. Taylor on ' Char in the Lake District', and Mr. C. G. Booth presented an excellent and long film in colour of the Swans, Geese, and Ducks at the Severn Wildfowl Trust.

An important item has been the passing of ' The Protection of Birds Act, 1954 ' through Parliament. Any influence we could bring to bear was used in support and to obtain certain amendments. Some compromise was necessary between different interests. Mr. Dickens has expressed our views and explained the Act shortly in *The Naturalist.*

The year has been marked by a cold spring, and a summer with much rain and devoid of long warm periods.

In the spring, Yorkshire was affected by the abnormally large numbers of Black Terns that appeared in early May over much of the country. Mr. Dickens has been entrusted with the task of summarising the visitation for *British Birds.*

At the end of August and in early September such species as Ruff, Curlew-Sandpiper, Stints and others appeared on the coast and inland in unusual numbers. With some of them, near Kilnsea, was a bird believed to be new to Europe. Study of the descriptions and drawings individually made by some 15 observers occupied a good deal of my time for a period. Eventually a specimen was obtained from Mr. R. Wagstaffe of Liverpool, after detailed inspection of which in company with Mr. Dickens, who had had good views of the bird, I felt that no room for doubt remained of the identification as Stilt-Sandpiper, an American species.

Work at the Spurn Bird Observatory has been well supported. 1,380 birds have been ringed to date, and an unusual number of rare species have been recorded.

In giving up the position of Hon. Secretary to the Ornithological Division may I thank all for their unfailing support, which I am sure will be continued to Mr. R. F. Dickens who takes over from January 1st, 1955. I am retaining for another year the positions of Recorder for the West Riding and Editor of Records and of the Report. Please let me have your last list of records within a few days of the year-end.

CONCHOLOGY

(Mrs. E. M. Morehouse): There are few records to note of any outstanding interest.

On May 1st at Grassington, 18 molluscs and 6 slugs were found, including *Balea perversa* L., *Pyramidula rupestris* Drap., *Limax arborum,* Bouchard-Chantereux. The well-known habitats for *Helicigona lapicida* L. did not yield a single specimen.

On June 5th at Chapel-le-Dale 14 species were noted, again including *Balea perversa* L. and *Pyramidula rupestris* Drap.

At Crummack Dale on June 7th 10 species were found including many *Ena obscura* Müll. *Helicella itala* L. was not found after much searching.

Mr. Lumb in his report to the Halifax Scientific Society said many habitats have been destroyed in that area during the last 30 or 40 years.

Mr. Robinson found many finely keeled specimens of *Paludestrina jenkinsi* Smith, in Goit Stock Woods, Harden there being a proportion of 7 to 3. He also records fine specimens of *Sphaerium corneum* L. and *Ancylus fluviatilis* Müll.

On September 20th at Hardcastle Craggs, Mr. Robinson found *Paludestrina jenkinsi* Smith still persisted, but not so many as heretofore and he suggests this might be due to the severe rains.

When the Y.N.U. were at North Cliff on June 19th, *Planorbis fontanus* Lightfoot, *P. albus* Müll., *P. contortus* were taken from the canal. Mr. Armitage gave Mr. S. G. Appleyard two large *Limax flavus* L.

Mr. A. Smith took *Anadonta anatina* L. from a lake at Deighton Grove, near York. One specimen measured 6¾ inches, all the shells or valves were very thin in texture and the epidermis could almost be rubbed off by the fingers. *Unio pictorum* L. occurred in the same lake.

Helix aspersa v. *lutescens* is still to be seen in the old locality near Scarborough.

ENTOMOLOGY

Lepidoptera (E. Dearing): Scanty reports have been received from recorders in all parts of the county; apparently the weather has kept most observers indoors and this report suffers accordingly. Three features are apparent from the reports received: the relative scarcity of even the commoner species, delayed emergence of imagines, and the slower rate of feeding of larvae.

Notes have been received from Messrs. J. Briggs, C. R. Haxby, F. Hewson, E. Gilmour, S. Sunderland, H. M. Russell, P. J. Stead, J. R. Morgan, G. R. Frost, and D. Wade, whilst several Affiliated Societies have been kind enough to reply to the request for records.

The Bradford Naturalists' Society reports from:

Deffer Wood (63): *Achyla flavicornis* (L.) and *Calostigia multistrigaria* (Haw.) emerging 21/3 had become common by 27/3; on 21/3 *Triphaena comes* (Huebner) larvae on Birch but no food available, *Leucania lithargyria* (Esper) larvae on grass, one *Eupsilia transversa* (Hufn.), *Conistra vaccinii* (L.) common; on 27/3 one *Brephos parthenias* (L.); on 19/4 *B. parthenias* (L.) fairly common, a few *Ectropis bistortata* (Goeze), one *Panolis griseovariegata* (Goeze).

Bishop Wood (64); on 3/4 *Orthosia incerta* (Hufn.), *O. gothica* (L.) *O. stabilis* (Schiff.), *Cerastis rubricosa* very common at sallow, *O. munda* (Schiff.), *O. populi* (Stroem), *Alsophila aescularia* (Schiff.) at light, *Biston strataria* (Hufn.) and *Xylocampa areola* (Esper) also taken; on 15/4 six *Selenia bilunaria* (Esper), one *Gypsites leucographa* (Schiff.), one *Coenotephria derivata* (Schiff.) (on sallow), and one *Bapta punctata* (Fabr.) besides the previously-named species; on 8/5 several *Orthosia gracilis* (Schiff.), four *Ectropis crepuscularia* (Huebner) and one *Eupithecia lariciata* Freyer; on 5/9 one *Zenobia subtusa* (Schiff.) one *Atethmia centrago* (Haw.), one *Dysstroma truncata* (Hufn.), five *Cirrhia fulvago* (L.) (J. North), three *Plusia gamma* (L.) and one *Deuteronomos erosaria* (Schiff.).

J. Briggs writes as follows:

The M.V. light-trap operated in my garden at Little Horton, Bradford, was in use on 117 nights between April 17th and October 18th. The Macros identified totalled 5,569 of 97 species, whilst a further 45 were unidentified since they were too worn or escaped whilst the trap was being emptied. This compares badly with the previous year both as regards weather when the trap could be operated and the catch taken (1953 16,735 specimens of 132 species on 146 nights).

The night-minimum temperature near the trap was recorded each night and at no time did it exceed 63° F., and on only four occasions was it above 60° F. This occurred on August 4th, 5th and 6th and again on September 2nd, when the rise in temperature resulted in a rise in the numbers of the catch.

Only one common species showed an increase over the previous year, *Mamestra brassicae* (L.), which appeared almost every night from 30th May to 11th September without any sign of a gap between 1st and 2nd brood; 148 appeared as against 83 in 1953. One noticeable decrease was that of *Xylophasia crenata* (Hufn.), 9 this year, 431 last.

No species new to the Bradford Naturalists' Society's ' area ' were taken at the trap this year, but two which were new to my own garden appeared, *Panolis griseovariegata* (Goeze) on 26th May (a late date and miles away from likely breeding grounds), and *Polia nebulosa* (Hufn.) which possibly could have bred in local gardens where sycamore is plentiful. *Deilephila elpenor* (L.) was notable for its absence though the food-plant abounds in the district.

A portable generator had been on order for almost a year but it was not until August that I received it and the first trial was at Askham on August 7th. The temperature when we arrived was 58° F. dropping to 53° with a heavy ground mist, 23 species were observed but owing to their restlessness in the trap the total could

only be estimated at about 200. *Leucania impura* (Huebner) was abundant though other expected Wainscots did not appear and no rarities were taken.

The trap was operated again at Askham on five occasions, at Bishop Wood three times, and also at Deffer Wood.

Weather conditions, especially low temperatures, resulted in poor catches, the best being at Bishop Wood on the night of October 2/3rd when the wind was S.E. and the temperature about normal for the time of the year. Twenty-four species came in or around the trap. The 2nd brood of *Thera obeliscata* (Huebner) was abundant, one *Griposia aprilina* (L.) was taken and four species of ' Thorns ' were seen, the most notable being *Deuteronomos fuscantaria* (Haw.) and a dark form of *D. alniaria* (L.). *Agrochola lota* (Clerck), *A. macilenta* (Huebner), *A. circellaris* (Hufn.) and *A. lychnidis* (Schiff.) were taken, though not commonly. Although 24 species were seen, moths flying (apart from *T. obeliscata* (Huebn.)) were scarce. The trap was working from 6-45 p.m. G.M.T. when the temperature was 53° and this noticeably fell towards midnight when flight ceased, though we stayed until 1-30 a.m. G.M.T.

F. Hewson used a M.V. light-trap at Gaisby Lane, Shipley, from 3rd to 25th July and took *Deilephila porcellus* (L.) on 19th, a new local record, 35 *Melanchra persicariaea* (L.) in bred condition, two *Cucullia umbratica* (L.), one *Pheosia tremula* (Clerk) on 21st, one *Drepana falcataria* (L.) on 8th and 11 *Ammogrotis lucernea* (L.) with *Eupithecia centaureata* (Schiff.) common.

P. C. Quin noted *Callophrys rubi* (L.) at Coldstone Beck, Burley Woodhead, on 8th May.

Meyrick gives York as a recorded locality for *Ernarmonia servillana* Dup. This has also been taken at Askham on 19th May by Miss C. M. Rob and is the first record in the Y.N.U. list.

H. M. Russell notes two leaf-mining species which are not previously recorded for the Austwick Area: *Elachista cerusella* (Huebn.) on 23/8 on *Phalaris arundinacea* L. and *Lithocolletis coryli* von Nicelli on 25/8 on *Corylus avellana* L.

S. Sunderland writes that in spring there were more Emperor moths flying on Erringden Moor (63) than he had previously seen.

D. Wade, the Recorder for the Hull Scientific and Field Naturalists' gives the following impressions of occurrences in the Hull area: the Red Admiral was late and scarce; very few Peacocks, Common Blues, Small Coppers, Dingy, Grizzled, Large and Small Skippers; reasonable spring brood of ' Whites ' but 2nd very poor; Orange Tip poor in numbers; Meadow Brown late but persistent. Puss Moth larvae were scarce but Popular Hawk reasonably common, with some Eyed Hawk and Large Elephant Hawk larvae, and the ' prominents ' were fairly common. A colony of White-letter Hairstreaks is ' going strong '.

P. J. Stead reports from Middlesborough: Small Tortoiseshell scarce, Red Admiral only 3 seen; Peacock also only 3; Large White, only 6 or 7 in area but 12-15 near Guisborough (N.W. Harwood); Large Heath, one near Scarborough; no Pearl-bordered or small pearl-bordered Fritillaries in the usual localities; only one Small White seen; Death's Head Hawk at Commondale and Convolvulus Hawk male in Middlesborough in September; a Striped Hawk in Middlesbrough in May 1953, now in the museum.

E. Gilmour states that there are still occasional Death's Head Hawks being brought in to the Doncaster Museum each season. He has had three or four this year.

J. R. Morgan says of the Craven area: Meadow Brown, Small Heath and Small Pearl-bordered Fritillary were as usual at Austwick Moss on 10th July. Small Tortoiseshell was quite common in spring and one Peacock was seen on 19th September at Earby (63). Red Admirals were seen at Gisburn on 19/9. Whites were plentiful according to the weather. Green-veined Whites plentiful at Bolton Woods 11/5, and in Barnoldswick 12/6; small colony at Hebden Gill emerging 4/9. Large White last noted at Barnoldswick (63) 19/9.

G. R. Frost, on behalf of the Wharfedale Naturalists' Society, mentions the following amongst others. The area is the Ilkley district (64). Small Tortoiseshells 28/4; Small Whites 12/5 and again 18/10; Small Heath, Large Skipper, 14/6; Common Blue, 10/7; Red Admiral, 28/9.

Messrs. Stead and Harwood introduced the Scotch Argus into an area in North Yorkshire in 1952 and 1953. The butterflies were obtained from the Lake District and this August 18 males, 2 females and 2 pairings were seen.

There is a correction to the 1953 report: instead of *Calocalpe cervinalis* as recorded for Shipley please read *Larentia cervinalis* (Scopoli).

Hemiptera (J. H. Flint): Poor weather has prevented much collecting this summer, but the results of collecting by visiting entomologists during 1953 and 1954 have combined with the recorder's notes to produce a very satisfactory number of new records, the more notable of which are listed below. Mr. G. E. Woodruffe visited Spurn in 1953 and the list of species he noted has been published (*The Naturalist*, 1954, pp. 96-98) and contains one vice-county and two county records. These species are not listed here. The most notable discovery was *Capsus wagneri* Rem. This species was first recorded from Wicken Fen this year, and single specimens have been taken at Askham Bog by Mr. L. N. Kidd and Mr. A. R. Waterston. It closely resembles *Capsus ater* L., but a series of specimens from Askam Bog examined by Dr. W. D. Hincks all proved to be *C. ater*.

The species listed below include four county records (†) and eleven vice-county records (*). The initials used are those of J. H. Flint and A. R. Waterston.

HETEROPTERA

Tetraphleps bicuspis H.-S. (*64). Commonly on pine, Alwoodley, Leeds, 29/6/53; J.H.F.

Calocoris fulvomaculatus Deg. (64). A series on *Myrica gale*, Askham Bog, 24/7/54; A.R.W.

Poeciloscytus palustris Reut. (†64). On *Galium palustris*, Askham Bog, 24/7/54; A.R.W.

Capsus wagneri Rem. (†64). A single male, by sweeping, Askam Bog, 12/7/53; L. N. Kidd (1954, *Ent. mon. Mag.*, **90**: 172). Another specimen, 24/7/54; A.R.W.

Cryptostemma alienum H.-S. (†64). Banks of the Ribble, Ribblehead, 7/53; D. Leston (1954, *Ent. mon. Mag.*, **90**: 116).

Velia saulii Tam. (64). Gordale Beck, 1/5/54; J.H.F.

Cymatia bonsdorffi Sahl. (*61). Commonly in one pond, Skipwith Common, 9/54; J. Horsman.

Corixa distincta Fieb. (64). Barnbow, near Leeds, 9/53; J.H.F.

C. linnei Fieb. (64). Commonly, Barnbow, 9/53; J.H.F.

Micronecta poweri D. & S. (*64). Commonly in shallow water, Malham Tarn; D. Leston (1954, *Ent. mon. Mag.*, **90**: 115); 6/54; J.H.F.

HOMOPTERA

Idiocerus elegans Flor. (*64). On *Salix*, Askham Bog, 24/7/54; A.R.W.

I. populi L. (*64). Commonly on poplar, Wyke, near Leeds, 7/53; J.H.F.

Macropsis cerea Germ. (*64). On *Salix*, Askham Bog, 24/7/54; A.R.W.

Psammotettix confinis Dahl. (61). In grasses and *Plantago maritima*, Kilnsea Warren, 25/7/54; A.R.W.

Euscelis grisescens Zett. (*64). One female, Askham Bog, 24/7/54; A.R.W.

Macrosteles metrius Flor. (64). Commonly on *Digraphis arundinacea*, Askham Bog. 24/7/54; A.R.W.

Typhlocyba jacunda H.-S. (64). Sparingly on alder, Arthington, 8/54; J.H.F.

T. decempunctata Fall. (*64). A single specimen, Golden Acre, Leeds, 10/54; J.H.F.

T. sexpunctata Fall. (*64). Golden Acre, Leeds, 10/54; J.H.F.

T. crataegi Dougl. (*64). Commonly on hawthorn, Alwoodley Gates, Leeds, 7, 8/54; J.H.F.

T. scalaris Rib. (†64). On oak, Gledhow Valley, Leeds, 7/53; J.H.F.

Empoasca populi Edw. (*64). Sparingly on poplars, Meanwood Valley, Leeds, 1/8/54; J.H.F.

Cixius pilosus Ol. (64). Commonly in a ditch, Wothersome, near Thorner, 30/5/54; J.H.F.

Odonata (J. H. Flint): A poor year generally and very little to report. On the Section's expedition to Malham Tarn in June large numbers of nymphs of *Aeshna juncea* L. were found in a pool on Tarn Moss, but no other species were noted. A late example of this species was captured in Chapel Allerton, Leeds, in the third week of October. Reports of dragonflies have been very few, but Mr. Payne saw numbers of *Sympetrum scoticum* Don. on Skipwith Common on October 2nd.

Coleoptera (G. B. Walsh): The weather during the year has been some of the worst on record. Beetles as a result, have usually been very scarce, and few members of the Committee have sent reports of their activities. A fair list of records has been

built up, but these are mainly the reports of the work of previous years. There are seven new county records and eight for the vice-counties. There would seem to be some spread of the water-beetles, and this would repay further research. The Recorder would also welcome detailed reports of the occurrence of members of the *Quedius boops* aggregate. The following initials are used:

H.B.	...	H. Britten fil.	T.B.K.	...	T. B. Kitchen.
J.H.F.	...	J. H. Flint	H.M.R.		H. M. Russell
E.F.G.	...	E. F. Gilmour	A.S.	...	A. Smith
W.D.H.	...	W. D. Hincks	G.B.W.	...	G. B. Walsh

† New County records. * New Vice-County records.

Carabidae

Lasiotrechus discus (Fabr.) (64). Banks of River Wharfe, Arthington, 8/54; J.H.F.
Agonum ericeti (Panz.) (64). Tarn Moss, Malham (*leg.* C. Hemingway, *det.* J.H.F.).
A. obscurum (Herbst) (64). Rougemont Wood, near Weeton, 18/1/54; J.H.F.

Dytiscidae

Oreodytes halensis (Fabr.) (64). Barnbow, near Leeds, 9/53; J.H.F. The only previous Yorkshire record is (64) Askham Bog; W.D.H.
Agabus arcticus (Payk.) (*64). Fountains Fell Tarn, 6/54; J.H.F.
Ilybius subaeneus Er. (†64). In small numbers in a pond near Barlow; T.B.K.
I. aenescens Thoms., C.G. (64). Tarn Moss, Malham, 6/54, common; J.H.F.
Dytiscus circumcinctus Ahr. (64) Tarn Moss, Malham, 6/54; J.H.F.

Silphidae

Choleva jeanneli Britt. (61). Allerthorpe Common, 19/5/54 (64) Askham Bog, 17/3/54; J.H.F.
Sciodrepa watsoni (Sp.) (61). Allerthorpe Common, 19/6/54; J.H.F.

Staphylinidae

Metopsia clypeata (Muell., P.W.J.) (64). Rougemont Wood, Weeton, 18/1/54; J.H.F.
Megarthrus depressus (Payk.) (62). Strensall, 26/5/47; A.S.
Eusphalerum pallidum (Grav.) (62). Forge Valley, common; G.B.W.; Castle Howard on *Rubus* flowers, 2/8/48; A.S.
Anthophagus caraboides (L.) (64). Malham Tarn Moss; H.M.R.
Deleaster dichrous (Grav.) (64). In rotting vegetation near lake-side, Wothersome, near Thorner (*leg.* J. H. Armitage, *det.* J.H.F.). This has not been recorded from Yorkshire for many years.
Oxytelus piceus (L.) (†62). Sandhutton, 31/7/51; A.S. Fowler records this as very rare in Britain.
O. nitidulus Grav. (62). Buttercrambe, 29/7/51; A.S.
Platystethus arenarius (Geoffr.) (62). Buttercrambe in fungi, 8/49; A.S.
Stenus argus Grav. (*64). Askham Bog, 3/9/49; A.S. A rare species in Yorkshire.
S. cicindeloides (Schall.) (62). Warthill, 11/7/48; A.S.
S. pallitarsis Steph. (61). Hessle, 30/1/50; A.S.
S. pubescens Steph. (62). Throxenby Mere, 29/6/48; A.S.
S. flavipes Steph. (64). Askham Bog, 29/7/50; A.S.
S. aceris Steph. (*64). Aberford, 22/7/50; Askham Bog. 9/10/51; A.S.
Dianous coerulsecens (Gyll.) (64). Malham Tarn sluice-gate, 13/6/54; H.M.R.
Rugilus subtilis (Er.) (†62). Buttercrambe, 12/9/48; A.S.
Philonthus laminatus (Creutz.) (62). Warthill 12/9/48 (A.S.)
P. longicornis Steph. (62) Huntington Wood, 8/5/48; A.S.
Quedius schatzmayri Grid. (*64). Askham Bog, 30/8/50; A.S.
Mycetoporus rufescens Steph. (62). Shipmanthorpe, 20/7/51; A.S.
Lordithon lunulatus (L.) (62). Buttercrambe, 12/9/48; A.S.
Conosomus immaculatus (Steph.) (*64). Askham Bog, 10/51; A.S.
Tachyporus nitidulus (Fabr.) (62). Huntington Wood, 29/5/51; A.S.
T. scutellaris Rye (62). Buttercrambe, 16/8/50; A.S.
T. solutus Er. (62). With the last; A.S.
Gyrophaena congrua Er. (62). Buttercrambe, 6/8/50; A.S.
Proteinus uvalis Steph. (62). Buttercrambe, in fungi, 10/49; A.S.

STAPHYLINIDAE—*continued*

Atheta (*Metaxya*) *obtusangula* Joy (†61). Bubwith, 15/1/51; A.S.
A. (*Hygroecia*) *debilis* (Er.) (62). Throxenby Mere, 23/6/48; A.S. This is the first Yorkshire record away from Derwent flood refuse.
A. (*Atheta*) *crassicornis* (Fabr.) (62). Buttercrambe, 10/49; A.S.
A. (*Acrotona*) *aterrima* (Grav.) (62). Strensall Common, 15/10/50; A.S.
Microglotta puncticollis Steph. (=*pulla* Gyll.) (62). Buttercrambe, 27/5/51; A.S.
Aleochara curtula (Goeze) (62). Huntington Wood, 8/5/48; A.S.
A. ripicla Muls. & Rey (†61). Allerthorpe Common, 3/9/48; A.S.
A. intricata Mann. (62). Huntington Wood, 8/5/48; A.S. The only other Yorkshire records are from Spurn and Whitby.

PSELAPHIDAE

Brachygluta fossulata (Reich.) (64). Rougemont Wood, Weeton, 18/1/54; J.H.F.

ELATERIDAE

Athous vittatus (Fabr.) (65). Masham, 5/48; W. A. Thwaites.
Corymbites incanus (Gyll.) var. *ochropterus* (Steph.) (64). Austwick Moss, 6/6/54; H.M.R.

MYCETOPHAGIDAE

Triphyllus bicolor (Fabr.) (62). Hackness, 19/9/52; W.D.H.

COLYDIIDAE

Bitoma crenata (Fabr.) (*61). Allerthorpe Common, 19/5/54; J.H.F.

ASPIDIPHORIDAE

Aspidiphorus orbiculatus (Gyll.) (*64). Askam Bog, several specimens by sweeping, 11/7/54; W.D.H.

MORDELLIDAE

Anaspis garneysi Fowl. (62). Mulgrave Woods, 10/6/34; H.B.; (*64) Alwoodley, Leeds, 27/6/54; J.H.F.

SERROPALPIDAE

Phloiotrya rufipes (Gyll.) (†63). Cusworth Park, Doncaster, one specimen under bark of dead beech, 8/54; E.F.G.

CERAMBYCIDAE

Strangalia quadrifasciata L. (63). Thorne, 13/7/53; W. Bunting. Previously reported by Dr. H. H. Corbett from Thorne in 1908.
Anaclyptus mysticus (L.) (63). Cusworth Park, 3/7/54; E.F.G.

CHRYSOMELIDAE

Cryptocephalus aureolus Geoffr. (62). Hackness, 6/54; W.D.H.
Longitarsus brunneus (Duft.) (†62). Ravenscar, 1924; G.B.W. Hackness, 19/9/52; W.D.H.

CURCULIONIDAE

Apion punctigerum (Payk.) (64). Rougemont Wood, Weeton, 18/1/54; J.H.F.
Magdalis carbonaria (L.) (*61). Allerthorpe Common, 18/5/54; J.H.F. This is a rare beetle in Yorkshire.

Orthopteroid and Neuropteroid Orders (W. D. Hincks): Little collecting has been done during the season in the several small orders on which it falls to me to report.

Mr. E. G. Bayford reports the occurrence of the imported cockroach, *Rhyparobia maderae* L., in Barnsley. A fine specimen measuring 44 mm. in total length was sent to him on March 24th, by a local fruit importer, from bananas. This species has been previously recorded from the Barnsley district and also from Bradford.

The only other matter in connection with the Orthoptera is the publication during the year of a useful little book on the British Saltatoria by Mr. B. C. Pickard of Ben Rhydding.

Several common species of Neuroptera were collected at Malham Tarn in June and Askham Bog in July but all are well-known and widely recorded species.

In the Psocoptera we are awaiting the results of the work of Dr. Broadhead of Leeds University which will be of great interest.

Hymenoptera (W. D. Hincks): It is hardly necessary to say that the past season has been one of the worst I can remember for Hymenoptera. The Aculeata must have suffered dreadfully as a result of the long continued adverse climatic conditions and probably many colonies of wild bees have been exterminated. Even the bumble-bees which are by far the hardiest of our native Aculeata brought off very scanty families this year and apiarists must have experienced one of the worst seasons on record. In spite of this general picture of disaster when the weather did permit a few hours collecting it was found that the Parasitica at least were fairly well represented in numbers of species and individuals and many late species revelled in the slightly better conditions of the autumn. But did the females find suitable hosts for oviposition and what will be the situation next season ?

The Section's visit to Malham in mid June coincided with one of the many unsettled spells of weather but during the fine periods Hymenoptera (excluding Aculeates) were fairly plentiful. The spring broods of sawflies were not quite over and nearly 30 species were obtained, mostly in small numbers. About 150 species of Parasitica were collected, noticeably deficient in Chalcidoidea and Ichneumonidae due to the earliness of our visit. Two visits to Askham Bog in July proved profitable and the smaller Parasitica seemed almost as abundant as usual.

The Recorder is indebted to Messrs. E. G. Bayford, J. Armitage and J. C. A. Rathmell for sending him specimens; to the late Mr. Harry Britten (H.B.) and to Messrs. Benson (R.B.B.), Eady (R.D.E.), Kerrich (G.J.K.), Kloet (G.S.K.), and Shaw (S.S.), he is grateful for assistance in the identification of specimens. The following list includes the county and vice-county additions, so far determined, for 1953 and 1954. I am able to bring forward 25 new county (†) and 26 new vice-county (*) records. Two species are previously unrecorded as British.

Additions to the Yorkshire Hymenoptera, 1953-54

Tenthredinidae

**Eutomostethus luteiventris* (Klug) (65). Masham, 10/6/48; W. A. Thwaites (G.S.K.)
**Brachythops flavens* (Klug) (65). Masham, 10/6/48; W. A. Thwaites; (G.S.K.)
**Pteronidea ferruginea* (Foerster) (63). Bingley, St. Ives, 10/5/51; J. Wood; (R.B.B.)

Braconidae

**Bracon stabilis* Wesmael (62). Hackness, 5/7/54; F. Arveschoug; (W.D.H.)
**Rogas gasterator* (Jurine) (64). Askham Bog, 11/7/54; W.D.H.
†*Apanteles praepotens* (Haliday) (63). Bingley, St. Ives, 27/6/47; J. Wood; (H.B.)
†*A. infimus* (Haliday) (63). Newsholme Dene, 12/7/47; J. Wood; (H.B.)
†*A. xanthostigmus* (Haliday) (65). Jerveaulx, 18/10/47; W.D.H.; (H.B.)
†*Blacus instabilis* Ruthe (63). Huddersfield, in house, 15/11/29; L. Ward; (det. G. Nixon) (1♀ in coll. Manchester Museum).
**Meteorus filator* (Haliday) (62). Hackness, 19/9/52; W.D.H.; (S.S.)
†*Alysia rufidens* Nees (61). Spurn, Marsh Meadow, 19/7/53, 1♀; W.D.H. (*The Naturalist*, 1954: 104).

Aphidiidae

**Ephedrus plagiator* (Nees) (64). Askham Bog, 15/7/44, 11/7/54; W.D.H.
**Trioxys cirsii* (Curtis) (64). Askham Bog. 12/7/50; S.S.; (W.D.H.)
**T. auctus* (Haliday) (62). Forge Valley, 8/9/52; W.D.H.
**Aphidius ervi* Haliday (64). Leeds, Roundhay Lime Hills, 21/6/44, reared from *apterae* and *alatae* of *Macrosiphum urticae* (Kalt.) (64) on nettle; Askham Bog, 11/7 and 24/7/54; W.D.H.

Ichneumonidae

†*Ephialtes imperator* Kreichbaumer (61). Allerthorpe, 1951, 1♀ (D. Jesper); (W.D.H.)

Cynipidae

**Anacharis euchariodes* (Dalman) (61). Spurn, Warren, 26/7/53; S.S. (*The Naturalist*, 1954: 104).
†*Xylaspis armata* (Giraud) (61). Spurn, South Lane, 21/7/53; S.S. (*The Naturalist*, 1954: 104).
†*Figites consobrinus* Giraud (64). Horton-in-Ribblesdale, 7/42; W.D.H.; (S.S.)

CYNIPIDAE—*continued*

†*Xygosis urticeti* (Dahlbom) (63). Keighley, Marley, 21/9/40, Holmehouse Wood, 30/10/43, Sunnydale, Morton, 8/11/47, Bingley, St. Ives, 29/10/50; J. Wood; (S.S.)

†*Sarothrus tibialis* (Zetterstedt) (63). Newsholme Dene, 23/7/48; Bingley, St. Ives, 15/10/49; J. Wood; (S.S.)

†*Eucoila boienii* (Hartig) (63). Keighley district, 7/10/44, Holmehouse Wood, 22/9/51, Sunnydale, Morton, 8/10/47; Bingley, St. Ives, 11/10/47; J. Wood; (S.S.)

†**Idiomorpha rapae* (Westwood) (64). Leeds, Oakwood, in garden, 22/9/42; W.D.H.; (S.S.) (*63) Bingley, Beckfoot, 20/8/49; J. Wood; (S.S.)

†**Glauraspidia microptera* (Hartig) (63). Keighley, Fell Lane, 10/9/37, 14/9/46; J. Wood; (S.S.) (*62) Beedale, 24/9/44; W.D.H.; (S.S.) (*64) Bolton Woods, 25/9/48, 9/10/48; J. Wood; (S.S.) (*65) Masham, 14/10/47; Hackfall, 26/9/48; (W.D.H.; S.S.)

CHALCIDOIDEA

†**Perilampus laevifrons* Dalman (63). Seckar Woods, 3/7/43; W.D.H.; (G.J.K.) Previously recorded as *P. ruficornis* (F.) (*The Naturalist*, 1944: 38). (*61) Allerthorpe, 1/9/53; W.D.H.

**Eudecatoma mellea* (Curtis) (64). Askham Bog, 11/7/54; W.D.H.

†*Syntomaspis druparum* Boheman (64). Aberford, 30/7/47; J. Wood; (R.D.E.)

†**Torymus arundinis* Walker (64). Askham Bog, 27/7/46. (*61) Blacktofts, 3/9/51; W.D.H.; (R.D.E.)

†*T. euchlorus* Boheman (61). Kilnsea, Long Bank Dyke, 18/6/51; W.D.H.; Spurn, Salt Marsh, 16/6/51; S.S.; (R.D.E.) This species is new to the British List.

†*Megastigmus dorsalis* (F.) (63). Bingley, St. Ives, 26/8/44; W.D.H.; (R.D.E.)

†*Litomastix phalaenarum* Thomson (61). Kilnsea, North Lane, 24-25/7/53; W.D.H.; S.S. (*The Naturalist*, 1954: 104).

**Aphelinus abdominalis* (Nees) (61). Kilnsea, North Lane, 25/7/53; S.S.; (W.D.H.) (*The Naturalist*, 1954: 104).

†*A. tibialis* (Nees) (61). Spurn, Salt Marsh, 18/6/47, South Lane, 21/7/53; Kilnsea, North Lane, 24/7/53; W.D.H.; (S.S.) (*The Naturalist*, 1954: 104).

†*Rhopalicus tutela* (Walker) (62). Hackness, 19/9/52, 1♂; W.D.H.

†*Aprostocetus caudatus* Westwood (64). Askham Bog, 12/7/53; W.D.H.

MYMARIDAE

**Polynema waterhousei* Hincks (62). Near Goathland, 9/9/52, 1♀; W.D.H.

**P. gracile* (Nees) (*longulum* Foerster) (62). Forge Valley, 8/9/52; near Goathland, 9/9/52; W.D.H. This species is now recorded from all vice-counties.

†**Anaphes* (*Patasson*) *brachygaster* Debauche (61). Kilnsea, North Lane, 24/7/53, Long Bank Dyke, 23/7/53; W.D.H. (*The Naturalist*, 1954: 104); (*62) Forge Valley, 8/9/52; W.D.H. The first British records of this species.

†*Enaesius agilis* Enock (61). Spurn, Warren, 19/7/53; W.D.H. (*The Naturalist*, 1954: 104).

**Ooctonus insignis* Haliday (62). Forge Valley, 8/9/52, 18/9/53; W.D.H.

**O. heterotomus* Foerster (62). Forge Valley, 8/9/52; near Goathland, 9/9/52; W.D.H. This species is now recorded from all vice-counties.

**O. vulgatus* Haliday (61). Kilnsea and Spurn, 22-26/7/53 !; W.D.H.; (S.S.) (*The Naturalist*, 1954: 104).

ACULEATA

†*Cephalonomia formiciformis* Westwood (61). Skipwith, 11/9/52; T. B. Kitchen; W.D.H.

**Chelostoma florisomne* (L.) (64). Woodhall, near Leeds, 14/7/44; W.D.H.

Diptera (K. G. Payne): It has indeed been a bad year for the study of Diptera in Yorkshire, in that we have lost, in Chris. Cheetham, the man through whose efforts the Yorkshire fly fauna has become among the best known in the country. The Tipulidae were, of course, his favourite family, and he knew them very well indeed. As in his other studies he was far more than a mere collector and it is a great pity that he published so little from his great store of knowledge.

The following report is compiled solely from the work of Mr. H. M. Russell and of the writer. It contains six new county records and ten new vice-county records.

The former are all by Mr. Russell and include five Agromyzidae and an interesting addition to the list of Empids, *Weidemannia bistigma* (Curt.). The records given without initials are by the writer. There is a great need for additional workers on Dipteria in Yorkshire, for some families—Psychodidae, Phoridae, Sphaeroceridae and Agromyzidae, for instance, have hardly been touched. Others, such as Chironomidae, Empididae, Pipunculidae, Tachinidae and Muscidae, need a tremendous amount of work before even the broad outlines of knowledge of them in Yorkshire are determined.

Tipulidae

Tipula variicornis Schum. (62). Mallyan Spout, Goathland, 3/7/54.

T. subnodicornis Zett. (64). High up on Simon's Fell, Ingleborough, common, 6/6/54. Whatever the connection of the species with Cotton Grass may be, it was emerging plentifully from the vertical sides of a ten-foot deep sink hole near the summit. Individuals emerging successfully were crawling upwards, but the bottom of the hole was littered with dead specimens.

Limonia (*Dicranomyia*) *aquosa* Verral (*62). Mallyan Spout, Goathland, 3/7/54.

L. (*Dicranomyia*) *didyma* Mg. (62). Mallyan Spout, Goathland, 3/7/54.

Helius longirostris (Mg.) (65). Tanfield, damp birch wood, 10/7/54.

Dicranota (*Paradicranota*) *subtilis* Loew (*62). Loftus, Grinkle Beck, females ovipositing in wet moss on the vertical surface of a weir, 2/6/51. (62) Mallyan Spout, Goathland, 5/5/54.

Ula sylvatica (Mg.) (*61). Skipwith Common, 19/9/54.

Limnophila (*Pilaria*) *nemoralis* (Mg.) A common sp. in the aggregate; var. *quadrata* Edwards (†64). Crummackdale, Austwick, sheltered spring at 1150′ O.D. Edwards had specimens from localities in Scotland.

Erioptera flavescens (L.) (*62). Fen Bog, Goathland, 1/7/54.

E. (*Symplecta*) *stictica* (Mg.) (65). Tanfield, damp gravel pit, 10/7/54.

E. (*Ilisia*) *maculata* Mg. (65). Tanfield, damp birch wood, 10/7/54.

Empididae

Oedalia stigmatella Zett. (64). Askham Bog, 13/6/54.

Empis (*Pachymeria*) *femorata* Fabr. (64). Austwick, commonly swept from bracken and male fern in the walled lanes, 5/6/54. This conspicous species, apparently common and with a wide range of habitats in the south of England, has only been recorded in Yorkshire from the Austwick area and Spurn.

E. (*Coptophlebia*) *vitripennis* Mg. (*62). Fadmoor, Kirbymoorside, wet heather moor at 700′ O.D., 28/8/54. This species, otherwise only recorded in Yorkshire from Skipwith and Allerthorpe, is recorded by Parmenter from Surrey and Dorset, August 8th-19th, ' in every case on ling or bracken'.

Rhamphomyia (*Holoclera*) *variabilis* (Fln.) (*62). Fadmoor, Kirbymoorside, wet heather moor at 700′ O.D., 28/8/54.

Wiedemannia bistigma (Curt.) (†64). Malham Tarn sluice gate, 14/6/54; H.M.R. The early stages as well as the adults were taken. Previous British records include: Wearhead (Durham), the Forth area of Scotland, and Nottingham. This is a most interesting addition to the Yorkshire list.

Dolichopidae

Dolichopus (*Melanodolichopus*) *rupestris* Hal. (64). Penyghent, 25/8/54; H.M.R. (*62) Fadmoor, Kirbymoorside, wet heather moor at 700′ O.D., 28/8/54; K.G.P. Previous Yorkshire records of this very interesting sp. by C.A.C. and K.G.P. are all from the tops of the western fells round or above 2,000′ O.D.

Hercostomus nigripennis (Fln.) (62). Outhwaite's Wood, Haxby, York, 1/8/54.

Scellus notatus (Fabr.) (*64). Askham Bog, 11/7/54; H.M.R. (64) Acaster Ings, 25/7/54; K.G.P. This sp. appears to have an interesting distribution. All previous Yorkshire records except one (Robin Hood's Bay) are from V.C. 61.

Liancalus virens (Scop.) (62). Mallyan Spout, Goathland, 3/7/54. A female of this beautiful species was taken holding in its mouth a live and wriggling insect larva, just removed from the wet moss below the ' fall '.

Syntormon pallipes (Fabr.) (64). Tarn Fen, Malham, 18/6/54; H.M.R.

Porphyrops crassipes Mg. (64). Tarn Close and Tarn Fen, Malham, 16-17/6/54; H.M.R. Though the commonest of the Porphyrops species and recorded for 61, 62, and 64, this is still an uncommon fly.

CLYTHIIDAE

Clythia infumata (Hal.) (64). Bred from *Polystictus versicolor* collected in Meanwood Woods, Leeds, 18/9/54; H.M.R.

SYRPHIDAE

Xylota lenta (Mg.) (64). Scarcroft, near Leeds, 27/6/54; H.M.R.

PALLOPTERIDAE

Toxoneura muliebris (Harris) (64). Scarcroft, near Leeds, 23/6/54; H.M.R.

SCIOMYZIDAE

Dictya umbrarum (L.) (64). Tarn Fen and Tarn Moss, Malham, 12/6/54; H.M.R.
Trypetoptera punctulata (Scop.) (64). Wothersome, near Leeds, 30/5/54; H.M.R. (*65) Tanfield, disused calcareous quarry, 10/7/54; K.G.P.

AGROMYZIDAE

Agromyza anthracina Mg. (†64). Scarcroft, near Leeds, 23/6/54; H.M.R., mine in *Urtica dioica* L.
Napomyza lonicerella Hend. (†64). Austwick, 3/9/54; H.M.R., mine in *Lonicera periclymenum* L.
Phytomyza atricornis Mg. (†64). Leeds and Austwick, 8/54; H.M.R. Mines in Chrysanthemum sp. appear common.
P. primulae R.-D. (†64). Leeds and Austwick, 8/54; H.M.R. Mines in *Primula vulgaris* Huds.
P. sphondylii R.-D. (†64). Austwick, 7/54; H.M.R. Mine in *Heracleum sphondyllium* L.

MUSCIDAE

Orthellia caesarion (Mg.) (*64). Summit of Great Whernside, 19/4/54.
Allaeostylus diaphanus (Wied.) (62). Mallyan Spout, Goathland, 3/7/54.

Plant Galls (E. F. Gilmour): Although the bad weather during 1954 has caused many other branches of entomology to yield poor results, the year has been a good one so far as plant galls are concerned, the chief deterrent to collecting being the wet weather. Galls caused by 94 different identified agents on 62 different host plants are recorded this year, with 6 different further agents unidentified so far. In this report only those species with hosts are included which I have not previously recorded in my reports.

Probably the most interesting find this year has been the Cotton-wool Gall on *Quercus robur*, caused by *Andricus quercus-ramuli* L. (Hymenoptera). This gall appears to be rare, at least in Yorkshire, and although a thorough search was made for some weeks following its discovery at Cusworth, no further specimen was discovered.

Once again grateful thanks are due to Miss C. M. Rob, F.L.S., of Thirsk, who has again provided the majority of the specimens seen. Thanks are also due to Dr. T. E. T. Bond for assistance in the identification of certain fungus galls and to Mr. W. G. Bramley for notes concerning last year's report, which are incorporated herein.

The initials in the following list stand for the following persons: W. Bunting (W.B.), J. H. Flint (J.H.F.), E. F. Gilmour (E.F.G.), W. D. Hincks (W.D.H.), A. Leatherdale (A.L.), Miss C. M. Rob (C.M.R.).

	Agent	*Plant*
LEPIDOPTERA	*Ernamonia servillana* (Duponchel (64). Askham Bog, 19/5/54; C.M.R.	*Salix repens* Linn.
	Eucosma tetraquetrana (Haworth) (64). Askham Bog, 24/7/54; E.F.G.	*Alnus glutinosa* (L.) Gaertn.
HYMENOPTERA	*Pontania proxima* (Lepel.) (63). Thorne, 28/7/54; W.B. (64) Bridge Hewick, Ripon, 17/8/54; C.M.R.	*Salix alba* Linn.
	P. vesicator (Bremi-Wolf) (63) Thorne, -/7/54; W.B.	*Salix atrocinerea* Brot.
	P. vesicator (Bremi-Wolf) (65). Tanfield, 10/7/54; C.M.R.	*Salix purpurea* Linn.
	P. vesicator (Bremi-Wolf) (64). Askham Bog, 24/7/54; E.F.G.	*Salix* sp. (*?fragilis* Linn.).

	Agent	*Plant*
HYMENOPTERA (*continued*)	*Pontania pedunculi* (Hartig) (63). Thorne, 2-4/7/54; W.B.	*Salix atrocinerea* Brot.
	P. salicis (Linn.) (65). Tanfield, 10/7/54; C.M.R.	*Salix atrocinerea* Brot.
	P. salicis (Linn.) (65). Tanfield, 10/7/54; C.M.R.	*Salix caprea* Linn.
	Euura amerinae (Linn.) (65). Cover Bridge, Middleham, 15/9/54; C.M.R.	*Salix purpurea* Linn.
	E. amerinae (Linn.) (64). Bridge Hewick, Ripon, 17/8/54; C.M.R.	*Salix alba* Linn.
	Diastrophus rubi (Bouché) (65). Near Binso, 25/7/54; C.M.R.	*Rubus fruticosus* Linn. agg.
	Andricus testaceipes Hartig. (61). Skipwith Common, 28/8/54; C.M.R.	*Quercus robur* Linn. (Mid-rib galls).
	A. inflator Hartig. (63). Thorne, –/7/54; W.B.	*Quercus robur* Linn.
	A. inflator Hartig., form *globuli* (Hartig.) (61). Skipwith Common, 28/8/54; C.M.R.	*Quercus robur* Linn.
	A. curvator Hartig., form *collaris* Hartig. (63). Thorne, 2-4/7/54; W.B.	*Quercus robur* Linn.
	A. glandulae (Schenk) (62). Paradise Lane, Dalton, –/8/54; C.M.R. (63) Thorne, 2-4/7/54 and 17/8/54; W.B. (61) Skipwith Common, 28/8/54; C.M.R.; near Hemsworth, –/8/54; E.F.G.	*Quercus robur* Linn.
	A. quercus-ramuli (Linn.) (63). Cusworth Park, Doncaster, 3/6/54; E.F.G.	*Quercus robur* Linn.
	Cynips quercus-folii Linn. (63). Cusworth Park, Doncaster, 3/6/54; E.F.G.	*Quercus robur* Linn.
	Neuropterus albipes (Schenk) form *laeviusculus* Schenk (65). Carthorpe, 24/8/54; C.M.R.	*Quercus robur* Linn.
	N. quercus-baccarum (Linn.) (61). Birdsall, 19/5/54; C.M.R.	*Quercus robur* Linn.
DIPTERA	*Rhabdophaga marginentorquens* (Winn.) (64). Bridge Hewick, Ripon, 17/8/54; C.M.R.	*Salix viminalis* Linn.
	R. rosaria (Loew) (64). Askham Bog, 24/7/54; E.F.G.	*Salix* sp. (?*fragilis* Linn.)
	R. heterobia (Loew) (64). Bridge Hewick, Ripon, 7/8/54; C.M.R.	*Salix alba* Linn. (Terminal leaf type gall).
	Dasyneura viciae (Kieff.) (65). Cover Bridge, Middleham, 15/9/54; C.M.R.	*Vicia cracca* Linn.
	D. hyperici (Bremi-Wolf) (63). Thorne, –/7/54; W.B.	*Hypericum dubium* Lamotte.
	Wachtliella rosarum (Hardy) (63). Spurn, 25/7/54; E.F.G. Thorne 2-4/7/54; W.B.	*Rosa canina* Linn.
	D. plicatrix (Loew) (63). Thorne, 2-4/7/54; W.B. Cusworth Park, Doncaster, 3/6/54; E.F.G.	*Rubus fruticosus* Linn. agg.
	D. sisymbrii (Schrank) (63). Thorne, 2-4/7/54; W.B.	*Rorippa amphibia* (Linn.) Bauer.
	D. mali (Kieff.) (63). Thorne, 2-4/7/54; W.B.	*Malus sylvestris* (Linn.)
	Macrolabis corrugans (Loew) (63). Thorne, 2-4/7/54; W.B.	*Heracleum spondylium* Linn.

	Agent	*Plant*
DIPTERA (*continued*)	*Jaapiella veronicae* (Vallot) (63). Thorne, 17/8/54; W.B.	*Veronica officinalis* Linn.
	Hartigiola annulipes (Hartig) (64). Moortown, Leeds, –/7/54; J.H.F. (65) Cover Bank, Middleham, 16/9/54; C.M.R.	*Fagus sylvatica* Linn.
	Rhopalomyia ptarmicae (Vallot) (64). Askham Bog, 24/7/54; E.F.G.	*Achillea ptarmica* Linn.
	Contarinia craccae Kieffer (63). Thorne, –/7/54; W.B.	*Vicia sepium* Linn.
	C. loti (Degeer) (63). Hickleton, near Doncaster, 2/6/54.	*Lotus corniculatus* Linn.
	Loewiola centaureae (Loew) (63). Thorne, 2-4/7/54; W.B.	*Centaurea nigra* Linn.
	Chlorops pumilionis (Bjerkander) (63). Woolley Hall, near Wakefield, 11/9/54; C.M.R.	*Agropyron repens* (Linn.) Beauv.
	Pegohylemyia signata (Brischke) (63). Woolley Hall, near Wakefield, 11/9/54; C.M.R.	*Athryium filix-femina* (Linn.) Roth.
HOMOPTERA	*Livia juncorum* (Latreille) (61). Skipwith Common, 29/8/54; C.M.R. (65) Baldersdale, –/8/54; C.M.R.	*Juncus acutiflorus* Hoffman.
	Aphalara nebulosa (Zett.) (63). Woolley Hall, near Wakefield, 11/9/54; C.M.R. Thorne, 2-4/7/54; W.B.	*Epilobium angustifolium* Linn.
	Trioza galii Foerst. (62). Sessay Sta., –/8/54; C.M.R.	*Galium cruciata* (Linn.) Scop.
	Acyrthosiphon (*Microlophium*) *pelargonii* (Kalt.) (?=*malvae* Koch) (63). Thorne, 7/7/54; W.B.	*Malva neglecta* Wallr.
	Amphorophora (*Eunectarosiphon*) *rubi* (Kalt) (63). Thorne, 2-4/7/54; W.B.	*Rubus fruticosus* Linn. agg.
	Myzus lythri (Schrank) (63). Thorne, 2-4/7/54; W.B.	*Lythrum salicaria* Linn.
	Brevicoryne brassicae (Linn.) (64). Bridge Hewick, Ripon, 17/8/54; C.M.R.	*Sinapis arvensis* Linn.
	Doralis viburnii (Scop.) (65). Carthorpe, 24/8/54; C.M.R. (63) Cusworth Park, Doncaster, 3/6/54; E.F.G.	*Viburnum opulus* Linn.
	D. ulmarie (Schrank) (63). Thorne, –/7/54; W.B.	*Filipendula ulmaria* (Linn.) Maxim.
	D. pomi (Degeer) (63). Thorne, 2-4/7/54; W.B.	*Malus sylvestris* (Linn.) Mill.
	Hyperomyzus lactucae (Linn.) (*ribis* Koch) (63). Thorne, 13/7/54; W.B.	*Ribes rubrum* Linn.
	H. lactucae (Linn.) (63). Thorne, 7/7/54; W.B.	*Ribes nigrum* Linn.
	Semiaphis atriplicis Linn. (62). Paradise Lane, Dalton, –/8/54; C.M.R.	*Atriplex patula* Linn.
	S. cucubali (Passerini) (65). Carthorpe, 24/8/54; C.M.R.	*Silene cucubalus* Wibel.
	Hyalopterus arundinis (Fabr.) (63). Thorne; W.B.	*Prunus domestica* Linn.
	H. arundinis (Fabr.) (62). Dalton Whin, –/8/54; C.M.R.	*Prunus spinosa* Linn.

	Agent	*Plant*
Acari	*Epitrimerus avellanae* Nalepa (65). Tanfield, 10/7/54; C.M.R. (63) Thorne, –/7/54; W.B.	*Corylus avellana* Linn. (Bud galls).
	E. tetanothrix Nalepa (63). Thorne, 2-4/7/54; W.B.	*Salix atrocinerea* Linn.
	E. ulmi Nalepa (63). Thorne, –/7/54; W.B.	*Ulmus procera* Sahlk.
	E. trilobus Nalepa (62). Near Hemsworth, –/8/54; E.F.G. (63) Thorne, 7 & 13/7/54; W.B.	*Sambucus nigra* Linn.
Fungi	*Urocystis violae* (Sow.) Fisch. (62). Catton, 10/5/54; C.M.R.	*Viola odorata* Linn.
	Taphrina aurea Fries. (63). Thorne, 2-4/7/54; W.B.	*Populus nigra* Linn.
	Puccinia malvacearum (63). Thorne, 7/7/54; W.B.	*Malva neglecta* Wallr.
	Xenodochus carbonarius Schlecht (63) Thorne, –/7/54; W.B.	*Sanguisorba officinalis* Linn.

BOTANY

Plant Records (G. A. Shaw): The year 1954 has produced four plants new to the Yorkshire list, all, however, being segregates of former aggregate species. These are *Aphanes microcarpa* (Boiss. & Reut.) Rothm., *Rumex tenuifolius* (Wallr.) Love, *Epipactis phyllanthes* Smith var. *vectensis* Young and *Juncus kochii* Schultz.

It has again been a difficult matter to decide which records should appear in the report, for quite a number, whilst of great local interest, were scarcely of sufficient importance to warrant inclusion in the report. To quote a few examples: from Mr. Murgatroyd's list we have *Sagina apetala*, never recorded before from the Halifax Parish, and *Carex hirta* not recorded since 1904, while a record of *Pedicularis palustris* by D. R. Grant from Intake Gate, Rombalds Moor, is of local importance as this plant is at present unknown elswehere in this part of Airedale.

I have again thought it best to list the obvious aliens and casuals separately, giving only natives or well-established introductions in the main part of the list.

I wish to thank all those who have sent in records, and I would like to ask all Affiliated Societies in future to make a habit of sending in records in September of each year without any prompting by your Convenor. † New to Yorkshire.

Dryopteris spinulosa (Mull.) Watt (63). Pecket Wood, near Hebden Bridge; F. Murgatroyd.

Ranunculus sardous Crantz (61). Cliff top at Flamborough; M. M. Sayer.

Impatiens parviflora DC. (63). Blackburn Valley, near West Vale, Halifax; F. Murgatroyd and H. Foster.

†*Aphanes microcarpa* (Boiss. & Reut.) Rothm. (61). Skipwith Common; R. Rose and C. M. Rob. (62) Gribdale Gate, Great Ayton; G. F. Willmot and C. M. Rob. (65) Cover Banks, Middleham; C. M. Rob. This last gathering is not typical and more may be heard of this later. Miss Rob also informs me that there is a similar non-typical gathering from Pilmoor in Herb. Foggitt.

Epilobium pedunculare A. Cunn. (65). In the dried-up dam, Whitfield Gill, Askrigg; J. Appleyard, C. M. Rob and G. A. Shaw. (64) In a lime quarry near road between Ripley and Ripon; F. Murgatroyd.

E. hirsutum L. × *E. montanum* L. (63). As a weed in the Botanic Gardens, Lister Park, Bradford; F. Murgatroyd and M. M. Sayer.

Euphorbia virgata Waldst. & Kit. (63). Dowley Gap, near Bingley; the late J. A. Horne, 1942; E. Jackman per A. M. Smith, 1954.

†*Rumex tenuifolius* (Wallr.) Love (62). Bransdale; C. M. Rob.

Anagallis arvensis L. ssp. *foemina* (Mill.) Schinz & Thell. (62). The Mill, Thornton-le-Dale; H. Rowntree.

Centunculus minimus L. (64). Ride in Bramham Park Woods; C. D. Pigott.

Orobanche elatior Sutton (62). On *Centaurea scabiosa*, Broughton Lane, near Hildenley, Malton; T. F. Medd per W.A.S. An interesting confirmation of a record of 1855, given in Baker's *North Yorkshire*.

O. minor Sm. (64). Four stems at Esholt this year. Following the great infestation of 1951 no *Orobanche* plants were to be found in 1952 or 1953; G. A. Shaw.

Lathraea squamaria L. (63). Hugset Wood and Silkstone Fall Wood, near Barnsley; Barnsley Naturalists, per R. S. Atkinson.

†*Epipactis phyllanthes* Smith var. *vectensis* Young (61). On the wolds west of Hull. First found in 1953 by Mrs. Grewe, of Hull. Visited in 1954 by Dr. Young, who hopes in due course to publish a note in *The Naturalist* concerning the occurrence.

Gagea lutea (L.) Ker-Gawl. (65). Mill Gill, Askrigg; J. Appleyard, C. M. Rob and G. A. Shaw.

Juncus compressus Jacq. (61). Meadow by the edge of Hornsea Mere; E. Crackles.

†*J. kochii* Schultz (64). Grassington; D. R. Grant. Malham Tarn; S. Shaddick. (63) Tong Moor, near Pudsey; D. R. Grant, per A.M.S. Probably widespread.

Schoenoplectus tabernaemontani (C. C. Gmel.) Palla (61). Kelsey Hill gravel pits; E. Crackles. (62) Strensall; Dr. A. Wegener, per C. M. Rob.

Glyceria declinata Breb. (63). Near Clayton, Bradford; J. Appleyard.

Alopecurus myosuroides Huds. (63). Garden at Pudsey; D. R. Grant.

Aliens, Casuals, Etc.

Miss E. Crackles reports the following from bombed sites at Hull (61):

Brassica juncea (L.) Czern. & Coss. (det. Kew).

Medicago falcata L. ×*M. sativa* L. (×*M. varia* Martyn) (conft. Kew).

Lotus tenuis Waldst. & Kit.

Ammi majus L. (det. Kew).

Solanum sisymbrifolium Lam. (det. Kew).

Verbena officinalis L.

Galium tricorne Stokes (det. Kew).

Solidago gigantea Art. var. *leiophylla* (Fern.) Fern. (det. Kew).

Conringia orientalis (L.) Dum. (62). Again at Topcliffe Station; C.M.R.

Berteroa incana (L.) DC. (62). Topcliffe Station; C.M.R.

Neslia paniculata (L.) Desv. (62). Topcliffe Station; C.M.R.

Rapistrum hispanicum (L.) Crantz (62). Topcliffe Station; C.M.R.

Silene schafta Gmel. (62). Allerston Forest, Staindale; H. Rowntree.

Erodium botrys (Cav.) Bertol. and *E. cygnorum* Nees (62). Shoddy field, Sowerby; J. Dony and C.M.R.

Medicago minima (L.) L. (62). Topcliffe Station; C.M.R. (62) Shoddy field, Sowerby; J. Dony and C.M.R. (65) Baldersby Station; J. Dony and C.M.R.

M. denticulata Willd. (65). Baldersby Station; J. Dony and C.M.R. (62) Shoddy field, Sowerby; J. Dony and C.M.R.

M. laciniata (L.) Mill. With the last in both places.

M. praecox DC. (62). Shoddy field, Sowerby; J. Dony and C.M.R.

Trifolium resupinatum L. (64). Acomb; C. J. Vyle, per C.M.R.

Echium plantagineum L. (62). Shoddy field, Sowerby; J. Dony and C.M.R.

Veronica filiformis Sm. (64). River bank above Tanfield; C.M.R.

Marrubium vulgare L. (62). Shoddy field, Sowerby; J. Dony and C.M.R.

Galinsoga parviflora Cav. (65). Hawkhills, Crayke; J. H. Evers, per K. G. Payne.

G. ciliata (Rafn.) Blake (62). York; C. Brereton, per C.M.R. (64) As a weed in a flowerbed at the University, Leeds; G. A. Shaw.

Xanthium spinosum L. (62). Shoddy field, Sowerby; J. Dony and C.M.R.

Senecio tanguticus Maxim (61). As weed in allotment, Sutton, near Hull, 1952; E. Crackles. (63) Also known for some years in an old lane at Thackley, near Bradford; M. Shaw.

Silybum marianum (L.) Gaertn. (61). As weed in garden, Bilton, E. Yorks; E. Crackles.

Vulpia ambigua (Le Gall) A. G. More (62). Old gravel pits between Tanfield and Thornborough; C. M. Rob.

Hordeum leporinum Link (62). Shoddy field, Sowerby; J. Dony and C.M.R.

Apera spica-venti (L.) Beauv. (62). Topcliffe Station; C.M.R.

Ecology (Miss D. Hilary): There seems to be very little ecological work going on at present and I should like again to appeal for some of the younger members of the Union to take up this most interesting branch of botany. For some time past there have been no ecological reports on the various areas visited in the Union's excursions and there is a need for someone to undertake this work.

Miss E. Crackles sends the following report of a week spent at Malham Tarn Field Centre doing ecological work in July, 1954: 'An attempt to get together an

ecological team to visit Malham Tarn Field Centre for a week met with little success. The " team " finally consisted of the chairman and two members of student age. Most of the week was spent in studying the vegetation on a group of " spoil heaps " surrounding the pit-shaft of a disused lead mine between Malham and Settle. Valuable experience was obtained from the application of various field-study methods and from the critical examination of results.'

Mr. Horsley is continuing his work on Juniper and sends the following summary of results.

JUNIPER IN SWALEDALE

G. F. HORSLEY

Over 30 visits have now been made to the juniper area on Harkerside; this is a summary of the results.

The cause of the dead shoot tips with brown leaves has been traced to nibbling by animals during the coldest months of the year, i.e. in January and February. Later these dead tips drop off. Frequently the nibbled twigs do not die back, and the nibbled ends can still be seen plainly throughout the following summer. Sheep are much more abundant than rabbits on Harkerside, and they are probably mainly responsible. There are no goats within seven miles of the area. Regeneration on Harkerside appears to be at a standstill. The ripe fruits disappear rapidly from the bushes in the autumn and winter, but the ground is so closely covered with vegetation that germination must be a rare event. Moreover, sheep are so abundant that very few seedlings are likely to survive. But the number of bushes less than 50 years old is considerable, so that conditions for regeneration were not always so unfavourable. This is a line on which further work might yield interesting results.

Whilst the bushes are young and not too tall, overshading by bracken and crowberry does serious damage to the leaves, and in some cases the bushes have been smothered and killed. It is known, of course, that juniper is very intolerant to overshading (Tansley, A. G., 1939, *British Islands and their Vegetation*). Bushes which are ' moribund ', i.e. with some living and some dead branches, nearly always carry a luxuriant growth of the common moor lichen, *Parmelia physodes* Ach. On Harkerside we can distinguish several different plant communities, e.g. strips of grassland, heather moor and bracken areas. The juniper thrives on the bracken areas, and is rare upon the others.

The roots of the juniper are known to form both ecto- and endo-mycorrhizas in Sweden (Rayner, M. C., 1945, *Trees and Toadstools*); but their presence on Harkerside has not yet been established. It might have a bearing on ' the juniper problem '. There is no evidence at present of the significance, if any, of attacks by fungi, bacteria or insects, or damage by frost or drying winds or lack of soil moisture.

To sum up: There is ample scope for enlarging our knowledge of the natural history of the juniper in Swaledale, and this could have interesting results because the conditions here are so different from those on the chalk downs of southern England, where the juniper has been studied much more intensely. The conditions, in fact, are so different—the soil, the climate, the ' biotic factors '—that one might doubt whether the juniper is really ' at home ' in Swaledale. And yet bushes up to 12 feet high occur on Harkerside, and not many years ago regeneration was the rule.

It is hoped to continue this work but volunteers are needed to assist by naming specimens, and in other ways.

Bryology (Joan Appleyard): The usual spring and autumn meetings of the Section were held but attendance was disappointing. The number of new records which continue to be made show that even in such a well-worked county as Yorkshire there is much to be done before we have anything like a complete picture of the distribution of bryophytes.

Mielichhoferia elongata was refound near Ingleby Greenhow this year by the writer. This is its only station in England and it has not been seen there since 1914 although several bryologists have searched for it.

Records include one hepatic and two mosses new to Yorkshire (†) besides four other new vice-county records (*).

Hepatics

Ricciocarpus natans (L.) Corda (62). Gormire; K. Mattinson.

Aneura sinuata (Dicks.) Dum. var. major (Lindb.) (63). Todmorden, on Y.N.U. excn.; K. Mattinson. (64). Quarry near Micklefield; J.A.

HEPATIC—*continued*

Fossombronia pusilla (L.) Dum. (62). Lockwood Beck Reservoir; J.A.
F. wondraczeki (Corda) Dum. (63). Chellow Dene. (64) Tong Park; J.A.
†*Aplozia atrovirens* (Schleich.) Dum. var. *sphaerocarpoidea* (De Not.) Massal. (conf. E. W. Jones) (64). Whitfield Gill; J.A. on Bryol. excn.
Lophozia floerkii (Web. et Mohr) Schiffn. (63). Near Huddersfield, with red gemmae; J.A.
Sphenolobus exsectiformis (Breidl.) Steph. (64). Birk Crag, Harrogate; J.A.
Cephalozia media Lindb. (61). Skipwith Common; J.A.
Nowellia curvifolia (Dicks.) Mitt. (65). Whitfield Gill; Bryol. excn.
Cephaloziella hampeana (Nees) Schiffn. (conf. E. W. Jones) (64). Mackershaw; J.A.

MOSSES

**Aloina brevirostris* (Hook. & Grev.) Kindb. (63). Wentbridge, on Bryol. excn.; J.A.
**Heterocladium heteropterum* B. & S. var. *flaccidum* B. & S. (62). Mallyan Spout; J. Robertson, on Y.N.U. excn.
Dichodontium pellucidum (Hedw.) Schp. var. *fagimontanum* (Brid.) Schp. (64). Churn Milk Hole, Pen-y-ghent; J.A.
Tortula marginata (Bry. Eur.) Spruce. (63). Wentbridge, on Bryol. excn.
†*T. subulata* Hedw. var. *graeffii* Warnst. (64). Ingleton; J.A. First English record.
Campylopus fragilis (Turn.) B. & S. (64). Tong Park; J.A.
Pottia intermedia (Turn.) Fürnr. (63) Wentbridge, on Bryol. Excn.
P. davalliana (Sm.) C. Jens. (63). Wentbridge, on Bryol. excn.; J.A.
P. recta (Sm.) Mitt. (63). Wentbridge, on Bryol. excn.; J.A.
Barbula hornschuchiana Schultz. (63). Wentbridge, on Bryol. excn. (64) Grassington; J.A.
B. cylindrica (Tayl.) Schp. (63). Holmbridge; J.A.
B. vinealis Brid. (63). Wentbridge, on Bryol. excn.
†*Weissia rostellata* (Brid.) Lindb. (63). Hipperholme; J.A.
Gymnostomum calcareum Nees & Hornsch. (64). Limestone quarry near Garforth; J.A.
Trichostomum tenuirostre (Hook. & Tayl.) Lindb. (63). Holmbridge; J.A.
Funaria obtusa (Dicks.) Lindb. (62). Lockwood Beck Reservoir; J.A.
Mielichhoferia elongata Hornsch. (62). Refound near Ingleby Greenhow; J.A.
Pohlia rothii (Correns) Broth. (*62). Ingleby Greenhow; J.A. (64) Valley of Desolation, Tosside; J.A.
Bryum intermedium (Ludw.) Brid. (63). Leeming, near Keighley; J.A.
**B. erythrocarpum* Schwaegr. (64). Clapdale; A. C. Crundwell and J.A.
Mnium pseudopunctatum B. & S. (63). Marley Bog; J.A.
Philonotis calcarea (B. & S.) Schp. (64). Valley of Desolation; J.A.
Amphidium mougeotii (B. & S.) Schp. (62). Ingleby Greenhow; J.A.
A. lapponicum (Hedw.) Schp. (64). Churn Milk Hole, Pen-y-ghent; J.A.
**Heterocladium heteropterum* B. & S. var. *flaccidum* B. & S. (62). Near Mallyan Spout; J. Robertson on Y.N.U. excn.
Cratoneuron commutatum (Hedw.) Roth. var. *falcatum* (Brid.) Moenk. (63). Marley Bog; J.A.
Acrocladium cordifolium (Hedw.) Rich. & Wall. *c. fr.* Nosterfield, Y.N.U. excn.; J.A.
Brachythecium glareosum (Bruch.) B. & S. (64). Mackershaw; J.A.
B. albicans (Hedw.) B. & S. (64). Tong Park; J.A.

Mycology (Miss J. Grainger): During the year the Committee has suffered a severe loss by the death of Mr. A. A. Pearson, several times Chairman of the Mycological Committee, a Past President of the Union and our referee for Agarics and Boleti. His monographs on *Boleti, Lactarius* and *Russula,* published in *The Naturalist,* have been widely sought after as reprints.

It is gratifying to know that Dr. Dennis (Kew) is to complete Mr. Pearson's unfinished monograph on *Mycena,* and that there is also a prospect of the genus *Cortinarius* receiving similar treatment.

The Committee is very active and the spring and autumn forays have been well attended. The members include a good proportion of keen young people.

On October 23rd a joint day foray with the North Western Naturalists was held at Woodsome, Huddersfield, by kind invitation of Miss E. M. Blackwell. A good attendance from both societies braved the inclement weather, and several interesting finds resulted.

YORKSHIRE NATURALISTS' UNION

INCOME AND EXPENDITURE ACCOUNT for the Year ended 20th November, 1954

EXPENDITURE

	£ s. d.	£ s. d.
GENERAL PRINTING:		
Circulars	67 9 0	
Members' and Associates' Cards	21 2 3	
Deeds of Convenant	11 13 6	
List of Members	28 18 6	
		129 3 3
"THE NATURALIST":		
Members' and Exchange Copies	292 5 11	
Extra Pages	32 9 6	
Editorial Expenses	4 12 9	
		329 8 2
SUNDRY EXPENSES:		
Bank Charges	2 2 0	
Rent of Rooms	0 11 0	
Excursion Expenses	3 18 5	
Stationery, etc.	4 11 10	
Secretaries' and Treasurer's Petty Cash	21 18 2	
Expenses of Mammals, etc., Committee	0 19 7	
		34 1 0
		£492 12 5

INCOME

	£ s. d.	£ s. d.	£ s. d.
MEMBERS' SUBSCRIPTIONS:			
Allocated to *The Naturalist*		229 5 0	
,, General Expenses		125 9 10	
		354 14 10	
Less Arrears brought forward from 1953	50 0 0		
Deduct Payments in Advance—1953	11 11 0		
		38 9 0	
		316 5 10	
Add Arrears at 20th Nov,, 1954, after making necessary reserve	50 0 0		
Deduct Payments in Advance	11 6 0		
		38 14 0	
			354 19 10
LEVIES FROM AFFILIATED SOCIETIES		26 14 9	
Add Amount due 20th November, 1954		12 3 6	
		38 18 3	
Less Amounts due 20th November, 1953		11 5 9	
			27 12 6
SALE OF PUBLICATIONS			4 8 11
,, (Special Mycological)			9 13 4
DISCOUNTS RECEIVED			11 5 10
DONATION			0 10 6
INTEREST FROM INVESTMENTS			21 7 6
INTEREST ON DEPOSIT ACCOUNT—General Purposes			7 11 7
DEFICIT of Income to meet Expenditure for the year, carried to accumulated Fund			55 2 5
			£492 12 5

BALANCE SHEET as at 20th November, 1954

LIABILITIES AND FUNDS

	£ s. d.	£ s. d.
INVESTED FUNDS:		
Booth Fund	100 0 0	
Cheeseman Fund	100 0 0	
W. W. Nicholas (Ornithological) Fund	100 0 0	
		300 0 0
OTHER FUNDS (Legacy of the late R. C. Fowler-Jones):		
Allocated to Mycological purposes	250 0 0	
Allocated to General purposes	250 0 0	
		500 0 0
ACCUMULATED INTEREST ON W. W. NICHOLAS (ORNITHOLOGICAL) FUND:		
Amount as at 20th November, 1953	1 12 3	
Add Amount during the year ended 20th November 1954	3 0 0	
		4 12 3
ACCUMULATED INTEREST ON MYCOLOGICAL FUND:		
Amount as at 20th November 1954	7 11 8	
Less Amount disbursed	0 13 0	
		6 18 8
LIFE MEMBERS' ACCOUNT as at 20th November, 1953		477 0 0
		£1,288 10 11

ASSETS

	£ s. d.	£ s. d.
INVESTMENTS OF FUNDS (NOMINAL VALUES):		
£100 3½% Conversion Stock	100 0 0	
£100 3½% War Stock	100 0 0	
£100 3% British Transport Guaranteed Stock, 1978-1988	100 0 0	
		300 0 0
GENERAL INVESTMENTS (NOMINAL VALUES):		
£200 4% Consols (Bank of England)	200 0 0	
£159 10s. 11*d.* 4% Consols (Post Office)	159 10 11	
		359 10 11
SUBSCRIPTIONS AND LEVIES OUTSTANDING (*Less* Reserve)	62 3 6	
Less Subscriptions paid in advance	11 6 0	
		50 17 6
WESTMINSTER BANK LTD.:		
Deposit Account	500 0 0	
Current Account (Dr.)	8 16 8	
		491 3 4
ACCUMULATED FUND:		
Amount Forward—20th November, 1953 (Dr.)	31 16 9	
Deficit for year from Income and Expenditure Account	55 2 5	
		86 19 2
		£1,288 10 11

Audited and found correct,

W. A. WILSON,
W. BENNETT } *Hon. Auditors.*

FIELD NOTES

Autumn Bryological Meeting at Wentbridge.—Wentbridge, on the magnesian limestone, was chosen for the bryological excursion on October 2nd. A fine warm day made collecting very pleasant in the attractive Went Valley, although only two members were present to enjoy it. The north bank of the stream was explored first, most of the collecting being done in a wood where there were rocky outcrops. These were too dry for bryophytes but the smaller boulders were more fruitful. Hepatics were few, those seen included *Plagiochila asplenioides* (L.) Dum. var. *minor* (Lindenb.), *Lophocolea heterophylla* (Schrad.) Dum., *Madotheca platyphylla* (L.) Dum., *Lunularia cruciata* (L.) Dum. *Tortula marginata* (Bry. Eur.) Spruce was everywhere on stones. Other mosses were typical of the habitat, e.g. *Fissidens pusillus* Wils. ex Milde, *Trichostomum brachydontium* Bruch, *Tortella tortuosa* (Hedw.) Limpr., *Weissia controversa* Hedw., *Isopterygium depressum* (Bruch) Mitt., *Eurhynchium striatum* (Hedw.) Schp. emend. Størmer, *E. confertum* (Dicks.) Milde, *Neckera crispa* Hedw. The stream was crossed at Kirk Smeaton. Nothing of interest was seen on the way back to Wentbridge until an area of stony ground near a quarry provided the best finds of the day. The outstanding discovery was *Aloina brevirostris* (Hook. & Grev.) Kindb., a very rare moss hiterto recorded from only four vice-counties, including (61) and (64) but new to (63). Other mosses found in the same area were: *Pottia recta* (Sm.) Mitt., *P. intermedia* (Turn.) Furnr., *P. davalliana* (Sm.) C. Jens., *Barbula vinealis* Brid., *B. hornschuchiana* Schultz, *B. tophacea* (Brid.) Mitt. and *Neckera complanata* (Hedw.) Hüben.—J. Appleyard.

***Laccophilus variegatus* Germar (Col. Hyd.) at Thorne.**—Two specimens taken at Thorne, V.C. 63, have been confirmed as *L. variegatus* Germar by Professor F. Balfour-Browne. In correspondence (8/5/53) the Professor had asked if I had any knowledge of Mr. Bayford's record for this species (*The Naturalist*, 1907, 316-318, The Natural History of Thorne Waste). Apart from the E. G. Bayford record for Thorne, and two records by W. D. Hincks (Spurn, 21/8/49 and 8/6/50) all other records of this species are confined to four vice-counties in the south and south-east of the country. On re-checking the specimens taken at Spurn, W. D. Hincks determined them as *L. minutus* L. This leaves only the isolated Bayford record for the north of England.

I informed Professor F. Balfour-Browne that I had no knowledge of Mr. Bayford's record but that I had taken the species in Thorne and district. No specimens of this species were taken in the brief time alloted to water beetles during 1953, and none have been taken this year when activities have been even more restricted. During the last two years only one of the stations at which it is known has been visited, and this has been partially drained, and is being used as a dump for road-sweeper's refuse.

The specimens sent were taken in 1950. The water from which they were taken was exceptionally clear, and fit for drinking.

It has given me great pleasure to confirm the record by Mr. Bayford.—Wm. Bunting.

A Note on the Adder (*Vipera berus berus*).—A forestry worker during the course of his duties on November 12th, 1954, at Bakers Warren, near Hackness, north of Scarborough, caught a pregnant female of this species. The specimen was brought into the Natural History Museum and five days later (November 17th, 1954) eight young were born, one dying shortly after birth.

In this country the gestation period of this species is from two to three months. Fertilisation does not take place until towards the end of May and the peak period of the birth of young is from August to mid-September.

In North Sweden and Finland, as well as the mountainous regions of Europe, the breeding process is retarded into every second year, due to the arctic summer, when the Adder is forced back into hibernation for a further eight or nine months.

It is possible that the pregnancy of this specimen was accelerated due to the warmth of the vivarium. In normal circumstances the birth would not have taken place until spring 1955. It could be suggested that this late pregnancy might have been due to late mating, but this is very unlikely. H. Velsøe (Structure and Seasonal Variation of the Male Reproductive Organs of *Vipera berus*, *Spolia Zool. Mus. Haumensis*, Copenhagen, 1944) has pointed out that during autumn only a small percentage of mature spermatozoa are present in the male. The most reasonable explanation is suggested by Dr. M. Smith (The British Amphibians and Reptiles, 243, 1951) that an unseasonable summer is responsible for the rare occurrences of delayed development.—Geoffrey G. Watson.

BOOK REVIEWS

The Natural Regulation of Animal Numbers, by **David Lack.** Pp. 343, with coloured frontispiece and 52 text-figures. Geoffrey Cumberlege, Oxford University Press, 1954. 35/-.

In his introduction Dr. Lack says that his book ' is a signpost, not a catalogue '; in point of fact it is both, and, as a catalogue, although a catalogue raisonné, it misses some of the spontaneity of its author's other writings based on his personal investigations. It is, however, the only book on a newly-developed subject and as such is indispensable. He reviews here population stability, clutch size, reproduction and mortality rates, the food and disease factors, sporadic fluctuations of population, the predator-prey relationship, migration, territory and what he terms *dispersion*, that is the spread of animals over the suitable habitats in their range, as distinct from the *dispersal* of young animals from their place of birth. As would be expected the vast majority of Dr. Lack's conclusions are based on the study of birds rather than that of other animal populations, although the latter (including work on mankind) is freely quoted for purposes of comparison.

He attributes the regulation of clutch-size to evolution through natural selection ' to correspond to the largest number of young for which the parents can on the average find enough food '. And it should here be pointed out that most of his data are taken from the study of small passeres, so that one is frequently given to wonder how far they might apply in the case of sea birds which apparently have an inexhaustible food supply, but which lay small clutches at (often) irregular intervals and have no second brood, even if the first fails. Dr. Lack's main theme is that ' the reproductive rate of each species . . . is that which normally results in the greatest number of young surviving to independence '. He rejects the view that reproductive rate is adapted to mortality but, although we prefer his view—in that it involves a less prophetic adaptation than dependence on the mortality rate—we cannot refrain from observing that, in the case of sea birds, more corroborative evidence is needed.

Dr. Lack is perfectly fair to his readers, has a commendable reluctance to draw conclusions from inadequate material, and does not disguise the fact that this is a pioneer book and that much work remains to be done. This is illustrated by his repeated quoting of the same papers, such as Bump on the Ruffed Grouse or Klujver on the Titmice. He is an inspiration to future research when he draws attention to such points as: Is the number of broods the largest possible for the species in the region ? How far are bird numbers limited by food ? What is the food value of territory ? What is known about non-breeding in adult birds ?

The passages on the balance between predators and their prey have an important bearing on bird protection. They are unhappily unlikely to be read by game preservers and gamekeepers.

Subjects which might have been raised are the sex ratio in eagles (page 108), the importance of grain in the Herring Gull's diet (page 126), food competition between the Black Grouse and the Pheasant (page 160), the Starling ousting native hole-nesters in South Africa (page 202), and the case of the Black-headed Bunting migrating eastwards to India (page 247). He says (page 249) ' it is perhaps surprising that no species has been shown to breed regularly in both its summer and winter quarters '. Perhaps he means ' individuals of the same species ', because, as he himself implies, the Bee-eater breeds regularly at both ends of its range; the same may also apply to the Avocet, Night Heron and Great Spotted Cuckoo; in the last of these cases it might be possible to ascertain whether the same individuals were concerned by comparing their eggs with those of their hosts and European cuckoo eggs with African cuckoo eggs, for in the Mediterranean area the hosts of this species are crows, in South Africa they are usually starlings.

Dr. Lack's book is especially valuable in collating results obtained over a long period and convincing the amateur naturalist (such as the reviewer) of the value of apparently trivial short papers when these are reviewed collectively. The author never fails to be interesting and this is not only a valuable synopsis, but also a stimulus to lines of future research. The book is intended not only for professional zoologists but also for amateur students, and it is part of Dr. Lack's skill that he has made the subject readily comprehensible to the latter.

M.F.M.M.

The Physiology of Insect Metamorphosis, by **V. B. Wigglesworth.** Pp. viii +151, with 4 plates and 45 text figures. Cambridge University Press, 12/6.

This book is the first of a new series to be known as *Cambridge Monographs in Experimental Biology.* If all attain the standard of this first volume it will be a notable series indeed.

Dr. Wigglesworth is the foremost authority in this subject and has a gift of exposition which can make most complex matter readily comprehensible. In reading this book one experiences a feeling of having penetrated into the very heart of the zoological problems of the century. It is not easy of course, but that it is possible is a great tribute to the insight of the author.

It is true to say that we now know more of the intricate mechanisms involved in the development and differentiation of insects than of any other group of animals. In this book all this real knowledge is invested in a unifying theme, namely that metamorphosis is only one aspect of the general phenomenon of polymorphism. How delighted the late Professor W. Garstang would have been to have linked this conception with his own theories of paedomorphosis. The living examples here provided would have enabled him to drive home his theories with irresistible force. Truly there has never been an entomological study which has contributed so much to the advancement of the whole science of zoology. The supreme interest and importance of Dr. Wigglesworth's book is that it shows quite clearly that the time is now ripe for the consideration and inclusion of his results in all the major fields of zoological study—genetics, evolution, and morphogenesis. There is little doubt that in time to come this latter subject will prove to have been the outstanding problem of twentieth-century biology and the works of Dr. Wigglesworth will prove to have been the most notable contributions to its solution.

H.H.

Handbooks for the Identification of British Insects. Vol. X Part 4 (a), **Diptera Cyclorrhapha, Calyptrata I,** Section (a), **Tachinidae and Calliphoridae,** by **F. I. van Emden.** Pp. 133, 42 figs. Published by the Royal Entomological Society of London. 14th September, 1954. Price 20/-.

The important parasitic family Tachinidae has been the subject of recent publications in this country by Audcent, Day, Wainwright and van Emden. The last-named author has now brought together the available data in a valuable synopsis consisting of a useful host index and a series of very full keys. The 42 figures each comprise a number of rather crowded separate items and being placed at the foot of the page give the work a slightly continental appearance. The keys follow to a large extent groupings resulting from Mesnil's recent (1939) classification of the family and are consequently rather difficult to use. However anyone who will take the trouble to master the chaetotaxy and other special characters of the flies will find them more satisfactory than artificial keys and the author expresses his conviction that they will prove quicker and easier in the long run.

Both families are treated rather more fully than is usual in this series, providing the salient morphological characters, biology and distribution of the species included. This is undoubtedly an excellent and valuable addition to the rapidly-growing literature on British Diptera.

W.D.H.

A Revised Key to the Adults of the British Species of Ephemeroptera, by **D. E. Kimmins.** Freshwater Biological Association, Scientific Publication No. 15. Pp. 71, 30 figs. 1954. Price to non-members, 3/-.

This is a second edition of Scientific Publication No. 7, published in November, 1942, and now out of print. It follows very much the same lines as the widely-used earlier publication except that the keys to nymphs (families and genera) are now omitted. After brief introductory chapters a series of well-illustrated keys is given to the imagines and sub-imagines. Brief notes on ecology, with special reference to the Lake District, follow the keys. Forty-seven species were included in the first edition and in the present publication another British species is brought forward. This is *Caenis robusta* Eaton, 1884, which was reared from nymphs taken at Wheatfen Broad, E. Norfolk, by Dr. T. T. Macan.

This useful booklet will be as popular with entomologists, naturalists and fishermen as its predecessor though one regrets the omission of the nymphal keys. Perhaps it is the intention to issue a separate more detailed bulletin on this subject.

W.D.H.

African Insect Life, by **S. H. Skaife.** Pp. 397 with 75 plates (including 5 coloured), and 190 figures. Longmans, Green and Co., Cape Town. [1954.] 63/-.

Dr. Skaife has produced a general introduction to the families of African insects to interest the amateur naturalist and others who wish to know something of the insect life around them. The orders of insects are dealt with, chapter by chapter, selected families and species serving as examples with descriptions of structure and life history. Locusts, termites and other insects with complicated life patterns are treated at correspondingly greater length, while the American cockroach is used to demonstrate, very briefly, physiology.

The work is primarily concerned with general description and life histories and the selection of material has been ably done and should allow the reader to place approximately many of the more familiar and conspicuous insects and learn something of their ways. Each chapter is followed by a brief summary of the classification of the order described, but this is so simplified as to be of little practical use. The book is amply and suitably illustrated by line drawings, but these make no pretension to accuracy in detail, and there are a number of good coloured plates. The photographs reproduced on the black and white plates vary considerably in quality. A few are good, but many are lacking in definition and the heavy retouching, notably in plates 43, 50 and 59, emphasises their poor quality. There are no references to sources, and even a brief bibliography would have been of assistance to those readers whose interest is sufficiently awakened to desire more detailed information.

J. H. F.

Biology of Deserts, edited by **J. L. Cloudesley-Thompson.** Pp. iv+224. Institute of Biology, Tavistock Square, London, W.C.1. 1954. 14/-.

This volume contains the collected papers (28) read at a conference on ' The Biology and Productivity of Hot and Cold Deserts ' organised by the Institute of Biology and held in London during September, 1952. Many overseas as well as British scientists contributed to the symposium which consisted of sessions devoted to such aspects of desert biology as Climate and Physical Environment, Plant Ecology, Entomology and Ecology, Mammalian Physiology and Ecology, and Economic Aspects. Most of the papers are naturally concerned with the scientific problems involved in attempts to increase the productivity of deserts and arid zones to meet the ever increasing needs of a hungry world and in this context Dr. S. M. Manton's paper on ' Biological Research and the Productive Transformation of Steppe and Desert in the Soviet Union ' is of particular interest. Dr. Uvarov's paper on ' The Desert Locust and its Environment ', Professor Good's account of ' The Bahrein Islands and their Desert Flora ' and Professor Stebbing's paper on ' Forests, Aridity and Deserts ' are other notable contributions. A synopsis of some of the chief topics mentioned in the sessional discussions is also included.

The Ray Society: A Bibliographical History, by **Richard Curle.** Pp. vi+102 The Ray Society: sold by Bernard Quaritch, 11 Grafton Street, London, W.1. 10/6.

The Ray Society was founded in 1844, its principal aim being to arrange for the publication of works on natural history which were unlikely to be commercially profitable. These have mostly been elaborate and finely illustrated monographs by leading authorities, of the more recondite groups of the British fauna and flora. The 137 volumes so far issued include an impressive list of treatises nearly all of which have reached a very high standard and many of which even if now out-of-date textually are still indispensable on account of their splendid illustrations whilst others have never been superseded.

In the first part of this volume Mr. Curle gives a very interesting account of the genesis and vicissitudes of the Society (which must surely be unique in having maintained its subscription rate unchanged for 110 years!), of the importance of the works it has sponsored and the inner history of certain individual works, together with much information on the illustrations and illustrators, the relative scarcity of the publications, the printers publishers and agents, the works which have been accepted but have not for various reasons been published, and the future outlook of the Society. In the second part full bibliographical details are given of all the issued volumes. These details include the size of the editions, their issued prices and whether still in print or not. The bibliography is arranged under appropriate zoological and botanical headings and a chronological sequence of volumes completes the book which is throughout a mine of useful information both about the books and the Society which has published them.

W.A.S.

British Knapweeds: A Study in Synthetic Taxonomy, by **E. M. Marsden-Jones** and **W. B. Turrill.** Pp. xiv+202, with 27 plates and 3 text figures. Ray Society: sold by Bernard Quaritch, 11 Grafton Street, London, W.1. 1954. 27/6.

The knapweeds of the *Centaurea nigra* group used to be regarded as a complex taxonomic group with about a dozen species—the distinguishing characters of which were never easy to comprehend—represented in Britain. More than twenty-five years ago Mr. Marsden-Jones and Dr. Turrill began to study the group on modern research lines and soon showed that polymorphy is due to extensive hybridisation. Most of the supposed species they have synthesised experimentally and their comprehensive study of very numerous wild populations reinforced by equally comprehensive genetical work on a large number of stock plants has yielded convincing evidence that variability in wild populations is wholly due to the widespread occurence of hybrid swarms in the origin of which three species only (*C. jacea, C. nigra* and *C. nemoralis*) are concerned.

The broad outline of these results will already be familiar to most taxonomists and the present work, in so far as it is largely devoted to setting out in detail the experimental evidence on which the taxonomic conclusions are founded, will be of much greater interest to geneticists than to non-academic systematists. The latter will find interest in the account of the taxonomic history of the group and the distributional statistics for wild and herbarium examples examined from all over the British Isles.

W.A.S.

The Brown Rot Diseases of Fruit Trees, by **H. Wormald.** Ministry of Agriculture and Fisheries Technical Bulletin, No. 3. Pp. vi+114, with 20 plates and 7 text figures. H.M. Stationery Office, 5/-.

The Technical Bulletins of the Ministry of Agriculture and Fisheries were introduced to provide up-to-date information in a comprehensive yet compact form for the benefit of technical specialists and others engaged in the more scientific aspects of agriculture. The present member of the series fulfils this function with marked success due largely to the unrivalled experience of the author, Dr. Wormald. This publication, however, deserves a far wider public than the purely professional scientist since, in addition to the mass of esoteric information it contains, complete descriptions are given of all the manifestations of the Brown Rot complex of diseases on apple, pear, quince and medlar, plum, cherry, peach and nectarine, apricot, almond and hazelnut and these, supplemented as many of them are, by good photographs, can be studied with profit by any layman interested in the subject.

The treatment is complete in every respect and especially useful is the section dealing with the rather confused nomenclature and synonymy of the fungi concerned. Dr. Wormald takes a conservative view and follows Harrison in retaining the names *Sclerotinia fructigena* and *S. laxa* for our domestic parasites and *S. fructicola* for the common Brown Rot pathogen of North America. The various sections of the book are full of information but in spite of this wealth of detail the text is clear and eminently readable. In the latter half of the book each disease is treated separately and control measures are outlined where these are applicable. There is a bibliography of nearly 1,000 titles, and the whole work is produced well up to the standard we have come to expect from the scientific publications of the Ministry of Agriculture and Fisheries.

J.H.W.

The Observer's Book of Common Fungi, by **E. M. Wakefield.** Pp. x+118, with 64 plates, 32 in colour. F. Warne & Co., 5/-.

Nearly 200 species of larger fungi comprising all the species likely to be met with by the beginner, are well described and illustrated in this excellent addition to the *Observer's* series. There is a good introduction to the study of toadstools followed by a key to the genera of Agarics and other large Basidiomycetes. The descriptions of the species, as one would expect from so experienced a mycologist as Miss Wakefield, give all the essential characters with a minimum of technicalities. The type of habitat, such as the kinds of trees under or on which species are particularly likely to occur, are duly noted for each fungus. The coloured illustrations which are of much more value for species recognition than the photographs, are on the whole good. Both text and illustrations admirably fulfil the purpose of the series and we know of no better introduction to the systematics of the higher fungi.

W.A.S.

Squirrels, by **Monica Shorten.** New Naturalist Monograph. Pp. 212 with 15 plates. Collins, 1954. 15/-.

Miss Shorten began her study of the two British squirrels by a routine check upon the distribution of the alien species for the Bureau of Animal Population at Oxford. Her interest aroused, she embarked upon a detailed study not only of the distribution of the two species, but in all their aspects. Ideally equipped with a proper critical faculty, Miss Shorten has taken nothing for granted and has produced a detached, detailed yet incisive account which makes it second to none in a series of high standard.

That the ' faults ' which human pre-occupations have ascribed to the imported Grey Squirrel can equally well be imputed to the Red and that the accusations that the native animal has suffered from offensive action by, rather than by competition with, the Grey must be dismissed as ' not proven ' are clearly demonstrated by the author.

Miss Shorten discusses methods of ' control ' and recommends shooting techniques for eliminating grey squirrels from areas where they are not welcome, but the American tendency to *preserve* it as a sporting quarry may commend itself since she gives a series of recipes for cooking what by all accounts is an esculent beast, at least as good as the rabbit and doing considerably less harm to our countryside economy.

The book has many distribution maps and the photographs include some charming portraits of these engaging species.

It is to be hoped that this most satisfying work will be rewarded not only by the sale it deserves but also by a revival in the study of British mammals, so long neglected and all the more likely to repay careful attention. A.H.

Badgers' Year, by **F. Howard Lancum.** Pp. 71, with 25 photographs and sketch-map. Crosby Lockwood Ltd., London, 1954. 6/6.

Mr. Lancum—an authority on the economic status of the badger—has written an informative and authentic account of a through-the-seasons life of a particular family of badgers in a west Devon wood. While acknowledging the occasional rogue and exceptional killer of poultry, the writer proceeds to build up the characters of the sett and its occupants. They emerge as omnivorous feeders, attached to a limited area, highly sensitive, clean of habit at all times, and undoubtedly they are friends of the farmer. This is a slender volume, with illustrations claimed by the publishers to be ' very fine ' and ' unique '. Actually they are indifferent, and there is more merit in the author's amusing designs concluding each chapter. Mr. Brock scores heavily, and animal lovers will be delighted with this devoted investigation. J.A.

An Otter's Story, by **Emil E. Liers.** Pp. 192, with many illustrations in black and white. Hodder & Stoughton, 1954. 10/6.

' This book is a delightful study of the family life of the otter, described with knowledge and affection by a well-known trapper and naturalist ' says the legend on the dust-jacket. The otters, however, are very much fictional characters with human names and attributes, family reunions and the like. The story follows the standard formula for such works, of captures and escapes, traps, hostile owls and friendly bears—for these are American otters—and all comes beautifully right in the end. The illustrations are equally unfortunate by other than fictional standards, a cray-fish with a vertebrate eye being not the least of the incongruities. A.H.

Man meets Dog, by **Konrad Z. Lorenz.** Pp. x+199. Methuen, 15/-.

Readers of *King Solomon's Ring* will welcome the appearance of another book by Konrad Lorenz. Whether they are or are not confirmed dog lovers or cat lovers—and cats also figure frequently in this book—they will find here the same penetrating insight into animal behaviour as was so richly unfolded in Lorenz's previous work. In this book he analyses canine characters and personalities relating their different sorts of fidelity and many traits in their behaviour to differences in the degree to which jackal or wolf blood is predominant. The book is full of entertaining stories and enlightening comments based on many years of experience in keeping and breeding dogs and, as in his previous book, the delightful marginal drawings give an added charm to the lively and humane qualities of the writing. W.A.S.

The Under-water Naturalist, by **Pierre de Latil.** Pp. 276, with 15 plates. Jarrolds, 1954. 16/-.

The last twenty years have seen the invasion by humans of that larger part of the world which lies beneath the sea. The first flurry of enthusiasm of the under-water hunters and archaeologists is giving way to a re-assessment of the significance of this new experience and this book will be a timely aid to those who would explore the submarine world with a background of what knowledge is so far available concerning the lives of its denizens. The author combines a long experience of marine zoology with an awareness of its limitations, a zest for knowledge and the gift for being both informative and eminently readable. It is fair to add that the author has been singularly fortunate in his translator.

The book breaks much new ground and explodes many legends. I suppose that it will be a long time before the English littoral and off-shore zones will receive the study which has already been made along the shore of the Mediterranean but one hopes that the time will come when our marine fauna can be observed as living creatures rather than merely as specimens. Mons. de Latil deals, however, with many fishes which are to be found on our southern coasts.

There is a notion abroad that the greater part of exploration and discovery lies in the historic past but this work demonstrates how very much more lies ahead.

A.H.

Animals my Adventure, by **Lutz Heck.** Pp. x+170, with 53 photographic illustrations on 26 plates. Methuen, 1954. 18/-.

This is a translation, in an abridged form, of the original German *Tiere—Mein Abenteuer.* Most of it is concerned with the collecting of birds and mammals for museums and zoos and follows the same pattern as so many of its predecessors; the failures, the successes, the hardships and the gratifications are related, but there is nothing of natural history. Other chapters deal with gorillas in captivity, with the destructiveness of air-raids on the Berlin Zoo and there are some desultory observations upon Canadian rodents. The final section of the book treats of experiments by the author, who is Director of the Berlin Zoo, to re-create the extinct Aurochs, the European Bison and the Tarpan by the crossing of such present-day strains as possess the requisite atavistic characters. It is a pity that the account is limited to the obtaining of the material and that nothing is said of the way in which the selected re-combinations were brought about. It is to be assumed that the author's understanding of the principles of Mendelian inheritance transcends that of his translator but the photographs of the results of his experiments are by no means convincing.

The remaining photographs offer nothing new and are badly captioned. One of a dead gorilla bears a note that it was shot when it ' attacked my companion ', whereas in the text it is said to have been shot in mistake for a bush-pig which his companion saw ' in the vegetation, a bit of brown skin '. There are many errors which may be attributable to translation, as when a toreador is said to have played the bull with a ' mantilla ', and in fairness to the author one is compelled to withhold judgment upon the original work.

E.H.

Wander and Watch, by **Walter J. C. Murray** and **L. Hugh Newman.** Pp. 195, with 184 photographs. Staples, 11/6 net.

This is a joint effort by a schoolmaster and a butterfly farmer, the third of their series, and planned on a familiar ' through the seasons ' pattern. A dozen photographers are concerned with the illustrations including one of the authors who is described as a very well-known nature photographer, although the reader will be unable to discover who is responsible for any particular portrait of bird, mammal, reptile or insect.

It is a readable and carefully written book, touching on many aspects of the countryside and its wild inhabitants, and the opening chapter is attractive and convincing. But in the chapter devoted to flowering trees and grasses, two butterflies, a moth and the cuckoo intrude unnecessarily. More original and to the point are the pages devoted to grey seals and sea-birds of the Farnes; and there is a botanical flavour about the final chapter which also touches on Fox, Long-tailed Fieldmouse and Grey Squirrel, concluding with the Green Woodpecker as a suburban colonist.

J. A.

Ways of Mammals in Fact and Fancy, by **Clifford B. Moore.** Pp. 273. The Ronald Press Company, New York. $3.50.

The Director of Forest Park Museum, Springfield, Massachusetts, has collected hundreds of facts and rejected many fallacies in this book. The facts are the observations of famous and lesser-known naturalists of many decades. The fancies are discussed in a light vein, indeed neither fact nor fancy has been laboured. Thirty-five different mammals are dealt with specifically in the first two hundred pages, and in the next fifty or so, general facts and fallacies are discussed. Though the book is written in America by an American and not many of the mammals are found in Great Britain there will be a sustained interest for most readers. At first glance the serious naturalist might be tempted to lay it down, but I myself have read from cover to cover with great interest.

R.B.

Animals in Armor, by **Clarence J. Hylander.** Pp. 204, with numerous photographic illustrations. The Macmillan Co., New York (London branch, 10 S. Audley Street, W.1). 24/6.

Whereas the young student of reptiles in England may easily be thwarted by the paucity of subjects, there is no such danger in the United States. The author of this introduction to the reptile fauna of the region lists 360 species of snakes, lizards tortoises and saurians.

The book opens with an introductory chapter on reptiles in general and continues with a résumé of the characters of each family and a description of the commoner and the more striking species. It is well illustrated with photographs of notable clarity and a concluding chapter makes recommendations for further study.

E.H.

Tracks, Trails and Signs, by **Fred J. Speakman.** Pp. iv+154, with 16 plates. Bell, 1954. 10/6.

This is intended as an introduction to the out-door world, primarily for young children. It has a somewhat authoritarian manner and its injunctions as to the way to behave in the country are very right and proper—except that the caption beneath a drawing of an adder and a grass snake enjoins ' to keep snakes and lizards perfectly still, hold the hands over them until they cease moving, then remove the hands '. There are many factual discrepancies which will puzzle the young readers long before they attain their outdoor matriculation; those who write for children should be especially careful to be accurate, for children's confidence is so freely given, so sadly lost.

A.H.

Berried Treasure, by **F. Kingdon-Ward.** Pp. 192, with 40 photographic illustrations and coloured frontispiece. Ward, Lock & Co., 25/-.

This is a book for gardeners who want to know ' how to sustain colour through autumn into winter '. In it the author describes those shrubs and small trees which merit a place in the garden on account of their fine displays of late-maturing and conspicuous fruits. Both well-established favourites and many unfamiliar species are here described by one who has seen nearly all the plants he writes about growing wild, and his account is enlivened by many personal reminiscences drawn from his unrivalled knowledge and experience as a plant collector. Anyone who has space available in rock garden, small beds, along walls, or elsewhere will find in this very readable and well illustrated book plenty of ideas for dispelling the atmosphere of dejection which is so apt to envelope the garden after the summer flowering period is over.

W.A.S.

The Pennines and Adjacent Areas, by **W. Edwards** and **F. M. Trotter.** *British Regional Geology Series,* Third edition. Pp. vi+86, with 25 text figures and 12 plates. H.M. Stationery Office, 1954. 5/-.

The need for a new edition of this work (the second edition was issued only six years ago) reflects the rapid progress in research on the rocks of the region. Whilst the subject-matter follows the same sequence as in Dr. Wray's previous accounts, the text of this edition has been largely re-written and there are several alterations in the text figures. The size remains the same though the price is doubled.

Mountains and Valleys, by **Shirley Carpenter, Marie Neurath** and **Stewart Irwin. Icebergs and Jungles,** by **Shirley Carpenter** and **Marie Neurath.** Volumes I and II of *The World in Pictures* series. Pp. 30, with numerous coloured illustrations. Rathbone Books, Adprint House, London, W.1. 4/6 each or both books bound together in cloth 10/6.

The copious coloured illustrations, shadow relief maps and isotype drawings of these introductions to physical geography compel interest and at the same time afford visual explanation. Combined with the simple text they are well-planned to stimulate a lively interest in geography in the juvenile readers for whom they are intended.

Photograms of the Year 1955: The Annual Review of the World's Photographic Art. Pp. 152 with 120 plates, 8 in colour, $10\frac{3}{4}'' \times 8\frac{1}{4}''$. Published for *Amateur Photographer* by Iliffe & Sons, Ltd., Stamford Street, London, S.E.1. 17/6.

Photograms of the Year is now in its 60th year of publication and the current issue includes the customary generous selection of pictures chosen from amongst the years' outstanding pictorial photographic work. As always in this publication the photographs selected owe their compelling interest to the combination of artistic expression with technical perfection, while the quality of reproduction does justice to the very high standard of the work portrayed. A new feature in this year's volume is the inclusion of eight colour photographs together with articles by W. J. Pilkington and E. M. Heimann on the technical and pictorial aspects of colour photography. R. H. Mason supplies the critical plate-by-plate commentary and Bertram Sinkinson gives a résumé of the year's photographic work.

Film-strips. Flowering Trees. 28 frames in colour with notes by **J. H. Elliott.** Order No. 6108, 25/-. **Ferns.** 17 frames in colour with notes by **L. Baranyay.** Order No. 6134. Educational Productions, Ltd., East Ardsley, Wakefield, Yorks.

These two film-strips are of unequal value. That on flowering trees could be used in a variety of connections and for many ages. Young children would enjoy it as an illustration for lessons on flowers and their fruits and it would interest older ones who are studying trees at all stages. The photographs have been chosen to illustrate insect-pollinated types. Full length shots are given of the whole tree with closer views of flowering and fruiting sprays. The only unsuccessful shot is White-beam which does not stand out from its neighbours. The photographs present many points which cannot be brought into the classroom but to find out how these trees are fitted for insect-pollination needs close-up views of single blossoms. It is perhaps a good thing that such a strip makes it imperative to get hand specimens. It would be regrettable if film-strips were used as a substitute instead of an aid to the study of biology. The commentary is very helpful to the teacher but would need simplification for use below the modern school.

In the film-strip on ferns, eight frames are designed to illustrate the life-history of these plants. These are adequate apart from the rather crude representation in frame 4 of a section through a sorus and of detached sporangia. No explanation is given in the notes of the stalked, stellate structures associated with the sporangia which are sure to invite questions, and the portrayal of the annulus is poor. The remaining nine frames are supposed to illustrate ' common representative ferns ' yet only three are common while Maidenhair, Royal Fern and Holly Fern which not one pupil in a thousand is ever likely to find wild, are included. The notes on this section display singularly little knowledge of the habitats of the species shown and teachers would be well advised to ignore them.

Filmstrip. Butterflies of the Garden. 36 frames with notes by L. H. Newman. Unicorn Head Visual Aids, 40 Broadway, Westminster, S.W.1. 12/6.

This gives the life-stages of ten species commonly found in gardens, showing caterpillar, chrysalis and one view only of the adult. Eggs are not shown. The selection of species is good but the result disappointing. The absence of colour and lack of upper as well as under views make it little use for recognition, but it might help those who knew the adults to find the other stages. The commentary is useful but the photography often fails to illustrate points referred to in it, sometimes through lack of detail or through poor choice of background. Close-ups of the favourite plants of each species would have been more helpful than so many similar garden vistas. Age-range 15 and upwards.

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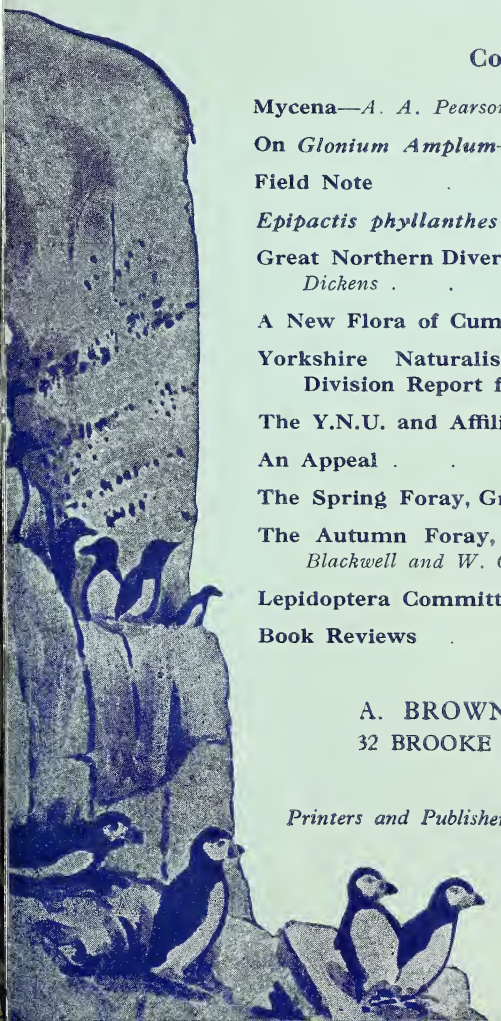

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Copies of Mr. A. A. Pearson's Papers 'Mycena," 'The Genus Lactarius' and 'The Genus Inocybe' and second editions of 'British Boleti' and 'The Genus Russula' may be obtained, price 2/6 each, post free, from the Editor of *The Naturalist.*

NOTICE.

Exchange copies of the following periodicals may be had on loan from The Editor of *The Naturalist.* The University, Leeds 2, on receipt of stamped addressed envelope:

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Science Progress.
Essex Naturalist.
The London Naturalist.
The Scottish Naturalist.
Irish Naturalists' Journal.
Transactions of the Lincolnshire Naturalists' Union.
Transactions of the British Mycological Society.

MYCENA

A. A. PEARSON

[The manuscript of this paper as left by Mr. Pearson, consisted of the table and key to the species which were almost complete. Dr. R. W. G. Dennis has, where necessary, added to these and has written the introduction and supplementary notes and index.—Ed.]

Mycena is one of the most thoroughly studied genera of agarics, at least in the northern hemisphere. For Europe we have the detailed and well-illustrated monograph by Kühner (1938) and for North America the equally detailed studies of A. H. Smith (1947). Most of the common European species were also studied by Lange and were figured in colour in *Flora Agaricina Danica* Vol. 2, 1936. In spite of this impressive volume of modern documentation there is still no general agreement regarding the precise limits of the genus or the interpretation of many of the older specific names. It is often forgotten that Fries never treated *Mycena* as a genus at all. For him its species, like nearly all agarics other than Cortinarii, Coprini, Hygrophori, Marasmii, Lactarii and Russulae, were species of *Agaricus* and sub-generic names, like *Mycena*, were introduced only as an aid to finding one's way about among the horde of species in this comprehensive genus. As far as we know the first person seriously to raise *Mycena* to generic rank was an obscure German author of a popular handbook, Kummer's *Der Fuhrer in die Pilzkunde*, 1871. Quélet followed his lead in the next year and most subsequent authors have done the same, treating Fries' sub-genera as genera without attempting to delimit them more precisely than he had done.

Kühner extended the limits of *Mycena* to include a number of species formerly referred to *Omphalia* because they had somewhat decurrent gills and in this he was followed by Smith. Singer (1951), on the other hand, has tried to define *Mycena* less vaguely by emphasising the amyloid reaction of its spores and in doing so has excluded the Adonideae and Albidulae and even transferred the fungus Kühner thought to be *M. pseudopura* to the tropical poroid genus *Poromycena*. Such a narrow circumscription has much to recommend it but is difficult for the beginner to apply, especially since the amyloid reaction is often difficult to see in the very thin spore walls of many species. Hence the genus is taken here in the old-fashioned sense of Lange, with the addition of *Omphalia fibula* which is clearly allied to the Adonideae in spite of its decurrent gills. For those who wish to adopt a more modern view combinations have been made by Singer both in *Hemimycena* and in *Marasmiellus* for the following specific epithets: *acicula, adonis, alba, fibula, flavoalba, gypsea, hiemalis, lactea, olida* and *subalpina*. Of these alternative dispositions of the nonamyloid species *Hemimycena* is probably to be preferred for *Marasmiellus* was based on an eccentric marasmioid fungus from Jamaica and its extension to include species of mycenoid and omphalioid facies has been severely criticised.

In our traditional sense *Mycena* is an easy genus to recognise in the field by its usually rather small, more or less campanulate pilei on rather slender stalks, with the gills usually ascending, less often arched, either light coloured or white-pruinose with the spores. Many of the species, too, can be recognised with confidence by field characters but for the majority it is necessary to have recourse to the microscope and the iodine reaction of spores and trama. If a good spore deposit has been obtained on a glass slide the change to dark blue with Melzer's re-agent can often be observed without further trouble but in doubtful cases it may be necessary to transfer stained spores to water and examine in daylight under the highest power of a compound microscope. The reaction is best shown by spores that have previously been dried. In most cases a blue reaction to Melzer's re-agent on the part of the spore wall is accompanied by a dark reddish reaction of the tramal hyphae.

Except in the sub-genus *Mycenella* the spore outline is smooth and usually ellipsoid and the species fall rather sharply into two series based on the shape of the cystidia. In the first series, Ciliatae, these are simple, finger-shaped or somewhat ventricose below and cylindrical or pointed above, occasionally they may be once or twice forked or bear a few slender branches. In the second series, Granulatae, the gill edge is closely set with pyriform or clavate cystidia crowned with numerous small warts or with slender cylindrical processes which in a few species may be slightly branched. Cystidia may occur only on the gill edge (cheilocystidia) or scattered also over the gill face (pleurocystidia). The cheilocystidia, especially in Ciliatae, may contain coloured sap which gives the gill edge a distinctive coloration

contrasting with that of the gill face. This is a point which should always be looked for on the fresh specimen, preferably with a hand lens. In the Gummosae the gill edge is gelatinised and can be picked off as a viscid thread by the point of a needle when fresh. In critical studies it may be necessary also to study the anatomy of the pileus and especially the structure of its superficial layers. Often there are slender, radiating, more or less colourless hyphae on the surface, sometimes with curiously warted or nodulose outer walls, overlying much broader underlying hyphae with coloured sap which give the colour to the pileus.

In the field attention should be paid especially to the nature of the stem which may be viscid or dry, smooth or pubescent or conspicuously longitudinally furrowed, with a base which may be rooting or not, often bearing rather long stiff hairs (strigose), or in a few minute species growing on wood, the stem may spring from a distinct basal disc. A few species are easily recognised by the white or coloured juice they contain, easily seen by snapping the fresh stem and, if necessary, squeezing it slightly.

Taste is not usually important though the bitter flavour of *M. erubescens* is distinctive, but the smell may be very helpful when appraised by a discriminating and experienced nose. An ' ammoniacal ' or ' nitrous ' smell, reminiscent of nitrous oxide characterises the Alcalinae and a smell of iodoform the Iodiformes. The latter is more evanescent and difficult to detect than the former but is often quite noticeable for a few seconds after a tin which has contained fresh specimens overnight is opened.

Several species have quite well defined ecological nitches though none is suspected of partaking in a mycorrhiza. Some occur regularly on the bark of living trees, others are characteristic of dead and fallen leaves of one particular tree and the species found on rotting wood are usually distinct from those found on the ground though here the situation in the Alcalinae is still not really cleared up. One tropical species, *M. citricolor* (Berk. & Br.) Sacc. is parasitic on leaves of shrubs and herbs and causes a serious disease of coffee in the wetter parts of tropical America.

M. galericulata is said to be edible, most of the others are too small to be worth a trial but no species of *Mycena* is known to be actively poisonous to man.

M. rorida has been credited with luminescence but there is some discrepancy between observers regarding the site of the light-giving tissue. In the tropical form with 4-spored basidia the light is variously stated to be emitted by the hymenium or by the freshly-shed spores. Josserand (1935) has studied the European form with 2-spored basidia and found feeble luminosity only in the substrate immediately surrounding the stem base. Hence the light may be emitted from the mycelium but this has yet to be critically confirmed. Josserand found the luminescence to be very feeble and to be visible only after observation for 15 minutes or more in total darkness and then not in all collections. It would be of considerable interest to investigate the luminosity of fresh young sporophores in British collections of this rather common species.

Several other species exist in races with 4-spored or 2-spored basidia and in these there are corresponding slight differences in spore size between the two races. In a few species where the 2-spored form is that usually found the fact is indicated in the 7th or 8th column of the tabulated description, after a note on the cystidia.

World Distribution

Mycena is an overwhelmingly north temperate genus with its headquarters apparently in North America. There A. H. Smith (1947) recorded 218 species and others have been described since. In western Europe Kühner and Romagnesi now recognise 106 species, many of them found also in North America. In contrast Dennis (1951) found in Trinidad only 25 species referable to *Mycena* in the widest sense, including poroid forms sometimes placed in distinct genera. If those with amyloid spores alone are included this small number is reduced to about a dozen species. Petch and Bisby (1950) listed 23 names under *Mycena* from Ceylon but it is doubtful if all these would be retained in the genus by modern specialists. The number is, however, remarkably near that from Trinidad. From Madagascar, on the other hand, Metrod (1949) received 85 species, 70 of them new, which he referred to *Mycena*, mostly without indication of the iodine reaction as he had to deal mainly with collections in formalin or spirit, on which Melzer's reagent was no longer effective. Singer and Digilio (1953) found Mycenas abundant in Argentina but their material has yet to be worked out in detail. Only a few species are common to both the temperate and torrid zones.

Key to British Species

1. Cystidia simple, cylindrical, fusiform or ventricose, sometimes with a few long finger-like branches but not pyriform or warted . CILIATAE 2
   Cystidia more or less pyriform, crowned with numerous short warts or slender processes . . . . . GRANULATAE 36
2. Spores warted (MYCENELLA) . . . . . *lasiosperma*
   Spores smooth 3
3. Stem exuding white or coloured juice (' milk ') when broken . . . 4
   Stem containing a little colourless sap only 7
4. Juice white 5
   Juice red 6
5. Taste mild, milk copious, pure white 5a
   Taste bitter, milk scanty, whitish or reddening . . . *erubescens*
5a. Cap grey-brown with darker umbo and striae . . . *galopus*
   Cap and stem pure white . . . . . *galopus* var. *candida*
   Cap very dark grey or almost black . . *galopus* var. *leucogala*
6. Slender terrestrial species with stem not more than 1 mm. thick *sanguinolenta*
   Stouter species with thicker stem, fasciculate on stumps *haematopus*
7. Gill edge coloured in contrast to gill face 8
   Gill edge concolorous with gill face or whiter 13
8. Gill edge yellow to light brown, terrestrial species, often in grass *avenacea*
   Gill edge reddish to purplish-brown or blackish, on wood or on the ground in woods 9
9. Cap 3-5 cm., convex, purplish-brown, gill edge dark purplish-brown *pelianthina*
   Cap smaller, campanulate 10
10. Odour nitrous, gill edge dotted pink, in swarms under conifers *rubromarginata*
   Without a nitrous odour, on wood or cones 11
11. Gill edge pink or pinkish-brown, on pine cones . . . . *seynii*
   Gill edge green or blackish 12
12. Gill edge black or dark grey-brown, cystidia with dark grey juice *atromarginata*
   Gill edge green, cystidia with greenish juice (doubtful species) *atrovirens*
13. Minute species in which the stem arises from a basal disc 14
   Stem without a basal disc 16
14. Spores globose, on bark . . . . . *clavularis*
   Spores elliptical 15
15. Gill edge gelatinised, on debris of marsh plants . . . . *bulbosa*
   Gill edge dry, on dead leaves and grasses . . . . *stylobates*
16. Stipe conspicuously downy throughout, sometimes blue-green at base *amicta*
   Stem with a slimy coating . . . . . *rorida*
   Stem conspicuously longitudinally grooved, often twisted, rooting *polygramma*
   Stem smooth or merely strigose at the base 17
17. Smell nitrous, like nitrous oxide or ammonia 18
   Not so 20
18. On wood, often fasciculate . . . . . *alcalina*
   On the ground or on debris of marsh plants, solitary, smaller than the above 19
19. Among debris in woods, moors and swamps, cystidia fusiform, sometimes branched, smell well developed . . *alcalina* var. *chlorinella*
   On lawns, grass verges, etc., cystidia flask-shaped, smell variable *ammoniaca* and *aetites*
20. Cap of red, pinkish or violaceous hue 21
   Cap grey-brown to black 26
   Cap white or light yellow to orange (Disc dark in *fibula* var. *swartzii*) . 31
21. Stem bright yellow 22
   Stem white or pinkish 23
22. Cap 1-4 cm., dingy pink to light brown . . . . *flavipes*
   Cap seldom 1 cm., vermilion . . . . . *acicula*

23. Spores nonamyloid 24
Spores amyloid 25
24. Cap conical, coral red, seldom over 1 cm. . . . . *adonis*
Cap convex then flat, buff to violaceous, larger . . *pearsoniana*
25. Strong smell of radish . . . . . *pura*
No such smell . . . . . *zephira*
26. Cap blackish to blue-grey, stem almost black . . *atrocyanea*
Paler 27
27. Taste bitter, cap pruinose at margin, on mossy trunks or wood chips *erubescens*
Taste not distinctive 28
28. Spores globose . . . . . *salicina*
Spores elliptical 29
29. Cap conical with pointed umbo . . . . . *vitilis*
Cap campanulate to hemispherical 30
30. Cap more than 1 cm., grey-brown, with a bloom, not striate *polygramma* var. *pumila*
Cap seldom over 1 cm., whitish with brown umbo and striae, gills broad, horizontal, on woody debris . . . . . *speirea*
Cap seldon over 1 cm., as above but gills narrow, ascending, on trunks *hiemalis*
31. Cap yellowish 32
Cap white 34
32. Cap broadly convex, up to 3 cm., on wood . . . . *subalpina*
Cap convex, slightly umbilicate, up to 1 cm., gills arched, among grass *fibula*
Cap conical, less than 3 cm., gills ascending 33
33. Among grass . . . . . *flavoalba*
On stumps, especially beech . . . . . *olida*
34. Spores globose 6-9μ or subglobose 8 × 7μ, on bark of trees . . *alba*
Spores subfusoid, 11-13 × 4-6μ, stem minute, on debris in marshes *quisquiliaris*
Spores elliptic-cylindric 35
35. Among fallen needles under conifers, seldom over 1 cm. across *lactea*
Deciduous woods, larger . . . . . *gypsea*
If tough with rooting stem longitudinally fluted see *polygramma*, a white form.
36. Minute white species with stem arising from a basal disc. 37
No basal disc 38
37. Pileus smooth, on dead leaves, especially oak . . . *mucor*
Pileus frosted with white particles, on trunks and woody debris *tenerrima*
38. Stem containing saffron-coloured juice . . . . *crocata*
Juice colourless 39
39. Gill edge coloured 40
Gill edge concolorous with gill face or whiter 43
40. Minute pink species on dead fern fronds . . . . *pterigena*
Larger species on soil or on debris in woods. 41
41. Gill edge dark red, pileus pink . . . . . *rosella*
Gill edge yellow to orange 42
42. Pileus brown . . . . . *elegans*
Pileus whitish to pale yellowish . . . . . *flavescens*
43. Stem viscid 44
Stem dry 49
44. Stem yellow to greenish 45
Stem whitish to brown 47
45. Stem rather stout, 1-3 mm. thick, yellow with a greenish tint, basidia 2-spored, often on wood . . . . . *epipterygioides*
Stem light yellow, at least in part, basidia 4-spored 46
46. Stem slender, 1-1½ mm., often whitish below, in deciduous woods, moors and heaths . . . . . *epipterygia*
Stem stouter, up to 3 mm., sometimes whitish above, in coniferous woods *viscosa*
47. Pileus and gill edge viscid 48

Pileus dry, gill edge without a gelatinous thread . . *clavicularis*
48. Subhymenium not gelatinous . . . . . *vulgaris*
Subhymenium gelatinous 49
49. On the ground . . . . . *pelliculosa*
On coniferous wood . . . . . *mackinawensis*
50. Large caespitose species with pinkish often veined gills, on wood . . 51
Solitary or gregarious but not caespitose species 52
51. Stem light grey . . . . . *galericulata*
Stem chestnut-brown below, in very dense clusters . . *inclinata*
52. Minute white species covered with white mealy particles . . . 53
Not mealy 54
53. Meal on the pileus formed of pyriform warted cells . *osmundicola*
Meal on the pileus formed partly of cylindrical or forked warted cells subsp. *imleriana*
54. Small species on trunks of living trees 55
On the ground or on rotting wood 56
55. Pileus purplish to brown, spores globose 7-11μ . . . *corticola*
(Pileus grey, spores 9-14μ *M. pseudocorticola* Kühner not yet found in Britain).
Pileus whitish with brown disc, spores pip-shaped, 8-9 × 5½-6μ *mirata*
56. Minute whitish species up to 5 mm. across on dead leaves of oak or beech 57
Larger species on different substrata 58
57. Gills horizontal or subdecurrent, on oak leaves . . *polyadelpha*
(If flesh is gelatinous at disc *M. quercus-ilicis* on *Q. ilex* leaves, not yet British).
Gills ascending, on dead beech leaves . . . . . *capillaris*
(If pileus is pale pinkish with 2-spored basidia, on oak leaves, *M. smithiana*, not yet found in Britain).
58. Smell of iodoform 59
Smell mealy, rancid or none 61
59. On stumps and dead branches of deciduous trees *arcangeliana* var. *oortiana*
On the ground 60
60. Pileus pink or buff . . . . . *metata*
Pileus pale olivaceous to whitish . . . . . *chlorantha*
Pileus grey-brown to dark-brown . . . . . *filopes*
61. Dark brown species on heaths, especially amongst burnt heather *uracea*
Woodland species 62
62. In coniferous woods, cystidia pyriform with numerous small warts *cinerella*
In leaf beds of deciduous woods, cystidia cylindrical with a few long appendages . . . . . *fagetorum*

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acicula (Schaeff. ex Fr.) Kummer, 24.
adonis (Bull. ex Fr.) Kummer, 23.
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alba Gillet as var., 18b.
alcalina (Fr.) Kummer, 15.
amicta (Fr.) Quél., 13.
ammoniaca (Fr.) Quél., 16.
arcangeliana Bres., 57.
atroalba (Bolt. ex Fr.) Gillet—identity not clear.
atrocyanea (Batsch ex Fr.) Gillet, 22.
atromarginata (Lasch) Kummer, 7.
atrovirens Rea, 8—a somewhat doubtful species. If the spores were incorrectly measured it may have been *M. viridi-marginata* Karst., with dingy olive cap, greenish gill edge, amyloid spores 8½-11 × 6-8μ and ventricose cystidia with green granular contents, which also grows on mossy trunks.
aurantiomarginata (Fr.) Quél. = *elegans*, 41.
avenacea (Fr.) Quél., 5.
balanina (Berk.) Karst. = *Marasmius cohaerens* (A. & S. ex Fr.) Quél.

Species	Cap	Gills	Stem
I. CILIATAE LANGE			
(*a*) **Basipedes**			
1. *stylobates* (Pers. ex Fr.) Kummer	4-10 mm., convex, gelatinous, white or grey, pellucidly striate, hairs visible under a strong lens.	Crowded, alternate, ventricose, narrow, free.	2½ cm. × 1 mm., si elastic, equal, h white, base with convex, hairy disc wide.
2. *bulbosa* (Cejp) Kühner	3-6 mm., very gelatinous, semiglobate, obtuse or subpapillate, striate or sulcate, greyish-brown then paler, gelatinous cuticle separable.	Crowded, ventricose, adnexed, thin, free, white or pale grey, alternate gills very short.	4-10 mm., filiform, h white or greyish-pulverulent, equal with pubescent upper surface s sulcate.
3. *clavularis* (Batsch ex Fr.) Gillet, *sensu* Kühner non Lange (See also *quisquiliaris*, 38)	2-6 mm., convex, gelatinous hyaline-white or greyish, striate, minutely pubescent.	Distant, sparse, ventricose, often cohering into a pseudo-collarium near the stem.	4-10 mm., filiform, hyaline, base w small, hairy, fu disc.
(*b*) **Calodontes**			
4. *pelianthina* (Fr.) Quél.	2-4 cm., convex or campanulate with broad umbo, gelatinous, livid-violaceous then dingy lilaceous, pellucidly striate.	Distant, ventricose, adnexed, dark violaceous, veined, edge purplish-brown.	5-6 cm. × 5-6 mm., livid-violaceous, fibrillose.
5. *avenacea* (Fr.) Quél.	1-3 cm., convex or campanulate, dingy yellowish-brown or with olive tint, drying clay or bright yellow, striate or sulcate.	Subdistant, ventricose or linear, adnate, white or yellowish-brown with darker edge.	5-7 cm. × 1-3 mm., ish-brown, apex equal, smooth a ished.
6. *rubro-marginata* (Fr.) Kummer = *capillaripes* Peck	1-3 cm., conic-campanulate, obtuse, dusky brown when moist, then livid pinkish or ash grey, margin paler, striate or sulcate, smooth.	Subdistant, linear, adnate, white or greyish-brown with a pink edge.	3-7 cm. × 1-2 mm brown to hyalin equal, smooth.
7. *atro-marginata* (Lasch) Kummer	2-3½ cm., obtusely conical then revolute, cinereous or purplish-brown, margin paler, striate or sulcate.	Subdistant, narrow, linear, adnate, dingy white with a black edge.	4-10 cm. × 2-4 greyish-brown, smooth and p base sometimes
8. *atro-virens* Rea	8 mm., hemispherical, blackish-green at centre, remainder bright green with pale striate margin, smooth.	Subdistant, 2 mm. broad, whitish, edge green, minutely denticulate.	3 cm. × 1 mm., smooth, smoky-g
9. *seynii* Quél. (See also *haematopus*, 11)	2-4 cm., oval then obtusely conical, greyish-brown with pinkish margin then dingy brown with reddish or lilaceous tint, striate, radially silky-fibrillose.	Distant, adnate, whitish or dingy lilac with reddish-brown or fimbriate lilaceous edge.	5-9 cm. × 1½-2 mm lilaceous above, below, base whit

Flesh	Taste and Smell	Spores	Cystidia	Habitat
very thin.	Mild, no smell.	White, amyloid, ellipsoid-cylindric smooth, 7-10 × 3½-4μ	On gill edge, filiform, 4-8μ wide.	Common on leaves, grass, etc.
very thin.	Mild, no smell.	White, non-amyloid, elliptical, 8-10 × 3½-4½μ	On gill edge, clavate or ventricose, on cap pyriform and minutely granulate.	Not rare at base of tufts of rushes. A brown sclerotium may be present.
very thin.	No smell.	White, amyloid, globose or pyriform, mostly 8-10μ with some up to 10-11 × 7-8μ	Slender hairs, fugacious and hard to see.	Not uncommon, on bark among moss.
ous, then thin.	Mild, faint smell of radish.	Pure white, amyloid, cylindric-ellipsoid, 5-7 × 2½-3μ	On gill edge, cylindrical or fusoid, 60-90 × 10-11μ, contents purplish-brown.	Common especially in beech woods.
y brown,	Mild, faint smell of radish.	Ivory yellow, amyloid, ellipsoid, 9-12 × 5-6μ	On gill edge, fusoid and smooth or some irregularly branched and warted, 30-50 × 8-10μ	Common in troops on lawns.
thin.	Mild, smell of ammonia.	Cream-buff, amyloid, 9-10 × 5-6μ elliptical	On gill edge, fusoid, obtuse, 60-80 × 10-15μ with brown or reddish contents.	Common, in vast troops under pines.
n-brown,	Mild, no smell.	Amyloid, 8-12 × 6-7μ, spore print not seen.	On gill edge, fusoid, obtuse, sometimes bifurcate, 40-60 × 11-14μ, contents dark brown.	Rare in England, less so in Scotland.
, thin.	Mild, no smell.	White, iodine reaction unknown, pip-shaped, 5-6 × 3μ	Clavate to cylindric, 35-40 × 3-4μ, filled with greenish juice.	Beech stump, known only from the type collection which is not available for checking.
in.	Smell faint, pleasant.	Pale yellow, amyloid, cylindrical, 12-13 × 6-8μ	Clavate, about 40 × 8-13μ	Rare, on pine cones.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
I. CILIATAE LANGE								
(*a*) **Basipedes**								
1. *stylabates* (Pers. ex Fr.) Kummer	4-10 mm., convex, gelatinous, white or grey, pellucidly striate, hairs visible under a strong lens.	Crowded, alternate, ventricose, narrow, free.	2½ cm. × 1 mm., elastic, equal, white, base with convex, hairy disc wide.	very thin.	Mild, no smell.	White, amyloid, ellipsoid-cylindric smooth, 7-10 × 3½-4 *μ*	On gill edge, filiform, 4-8 *μ* wide.	Common on leaves, grass, etc.
2. *bulbosa* (Cejp) Kühner	3-6 mm., very gelatinous, semiglobate, obtuse or subpapillate, striate or sulcate, greyish-brown then paler, gelatinous cuticle separable.	Crowded, ventricose, adnexed, thin, free, white or pale grey, alternate gills very short.	4-10 mm., filiform, white or greyish pulverulent, equ with pubescent upper surface sulcate.	very thin.	Mild, no smell.	White, non-amyloid, elliptical, 8-10 × 3½-4½ *μ*	On gill edge, clavate or ventricose, on cap pyriform and minutely granulate.	Not rare at base of tufts of rushes. A brown sclerotium may be present.
3. *clavularis* (Batsch ex Fr.) Gillet, *sensu* Kühner non Lange	2-6 mm., convex, gelatinous hyaline-white or greyish, striate, minutely pubescent.	Distant, sparse, ventricose, often cohering into a pseudo-collarium near the stem.	4-10 mm., filiform, byaline, base small, hairy, disc.	very thin	No smell.	White, amyloid, globose or pyriform, mostly 8-10 *μ* with some up to 10-11 × 7-8 *μ*	Slender hairs, fugacious and hard to see.	Not uncommon, on bark among moss.
(See also *quisquiliaris*, 38)								
(*b*) **Calodontes**								
4. *pelianthina* (Fr.) Quél.	2-4 cm., convex or campanulate with broad umbo, gelatinous, livid-violaceous then dingy lilaceous, pellucidly striate.	Distant, ventricose, adnexed, dark violaceous, veined, edge purplish-brown.	5-6 cm. × 5-6 mm. livid-violaceous, fibrillose.	thin	Mild, faint smell of radish.	Pure white, amyloid, cylindric-ellipsoid, 5-7 × 2½-3 *μ*	On gill edge, cylindrical or fusoid, 60-90 × 10-11 *μ*, contents purplish-brown.	Common especially in beech woods.
5. *avenacea* (Fr.) Quél.	1-3 cm., convex or campanulate, dingy yellowish-brown or with olive tint, drying clay or bright yellow, striate or sulcate.	Subdistant, ventricose or linear, adnate, white or yellowish-brown with darker edge.	5-7 cm. × 1-3 mm. ish-brown, apex equal, smooth ished.		Mild, faint smell of radish.	Ivory yellow, amyloid, ellipsoid, 9-12 × 5-6 *μ*	On gill edge, fusoid and smooth or some irregularly branched and warted, 30-50 × 8-10 *μ*	Common in troops on lawns.
6. *rubra-marginata* (Fr.) Kummer = ***capillaripes*** Peck	1-3 cm., conic-campanulate, obtuse, dusky brown when moist, then livid pinkish or asb grey, margin paler, striate or sulcate, smooth.	Subdistant, linear, adnate, white or greyish-brown with a pink edge.	3-7 cm. × 1-2 mm. brown to hyal equal, smooth.	thin	Mild, smell of ammonia.	Cream-buff, amyloid, 9-10 × 5-6 *μ* elliptical	On gill edge, fusoid, obtuse, 60-80 × 10-15 *μ* with brown or reddish contents.	Common, in vast troops under pines.
7. *atra-marginata* (Lasch) Kummer	2-3½ cm., obtusely conical then revolute, cinereous or purplish-brown, margin paler, striate or sulcate.	Subdistant, narrow, linear, adnate, dingy white with a black edge.	4-10 cm. × greyish-brown smooth and base sometime	-brown	Mild, no smell.	Amyloid, 8-12 × 6-7 *μ*, spore print not seen.	On gill edge, fusoid, obtuse, sometimes bifurcate, 40-60 × 11-14 *μ*, contents dark brown.	Rare in England, less so in Scotland.
8. *atra-virens* Rea	8 mm., hemispherical, blackish-green at centre, remainder bright green with pale striate margin, smooth.	Subdistant, 2 mm. broad, whitish, edge green, minutely denticulate.	3 cm. × 1 mm smooth, smoky	thin.	Mild, no smell.	White, iodine reaction unknown, pip-shaped, 5-6 × 3 *μ*	Clavate to cylindric, 35-40 × 3-4 *μ*, filled with greenish juice.	Beech stump, known only from the type collection which is not available for checking.
9. *seynii* Quél.	2-4 cm., oval then obtusely conical, greyish-brown with pinkish margin then dingy brown with reddish or lilaceous tint, striate, radially silky-fibrillose.	Distant, adnate, whitish or dingy lilac with reddish-brown or fimbriate lilaceous edge.	5-9 cm. × 1½-2 mm. lilaceous above below, base	thin.	Smell faint, pleasant.	Pale yellow, amyloid, cylindrical, 12-13 × 6-8 *μ*	Clavate, about 40 × 8-13 *μ*	Rare, on pine cones.
(See also *haematopus*, 11)								

Species	Cap	Gills	Stem
(*c*) **Lactipedes**			
10. *galopus* (Pers. ex Fr.) Kummer	1-2 cm., campanulate, dingy white or grey, disc darker, striate, smooth or pruinose at first on the disc.	Subdistant, linear, adnate, white to grey, closely pubescent under a lens.	5-10 cm. × 1-2 mm., greyish, smooth, times rooting and at base, yields juice when broken
10a. var. *candida* Lange	Pure white.	White.	White.
10b. var. *leucogala* (Cke.) Lange	Black or very dark brown, often sulcate.	Grey, as in typical form.	As in typical form.
11. *haematopus* (Pers. ex Fr.) Kummer	2-4 cm., conical or gibbous, grey-brown with purple tint, striate when moist, margin denticulate.	Subdistant, adnate, slightly ventricose, whitish with pink or lilac tint, edge often darker.	5-10 cm. × 2-3 mm. grey or tinted p pruinose then s base strigose, jui
12. *sanguinolenta* (A. & S. ex Fr.) Kummer	4-20 mm., conic-campanulate or hemispherical, pallid brownish-red with purple tint, umbo often darker, striate or sulcate, smooth.	Subdistant, linear or ventricose, adnate, whitish or flesh-tinted, edge dark reddish-brown.	5-8 cm. × 1 mm reddish-brown, ba gose, often with rhizoids, yields bl juice when broker
(*d*) **Pruinosae**			
13. *amicta* (Fr.) Quél.	1-2 cm., conic-campanulate lead-grey, sometimes with blueish or yellowish tint striate, densely pubescent then smooth, with separable gelatinous cuticle.	Crowded, linear, narrow, adnexed, grey, edge paler and crenulate.	6-8 cm. × 1-2 mm., but covered with white or blueish equal, often rooti
(*e*) **Roridae**			
14. *rorida* (Scop. ex Fr.) Quél.	5-12 mm., subglobose, often with a small umbo, white or buff, dry, sulcate when moist, smooth or scurfy when dry, margin crenulate.	Subdistant, arcuate, broadly adnate or subdecurrent, white, edge often fimbriate.	1-2 cm. × 1 mm., l covered with a transparent gel sheath.
(*f*) **Alcalinae**			
15. *alcalina* (Fr.) Kummer	2-3 cm., conic-campanulate dingy grey-brown or with olive tint, sometimes nearly black, striate when moist.	Subdistant, linear, or ventricose, adnate, brownish-grey or dark grey, edge white.	5-8 cm. × 1-2½ mm brown, rigid, with a villose ba
15a. var. *chlorinella* Lange	Pale grey, much smaller and growing on the ground.	As above.	As above.
16. *ammoniaca* (Fr.) Quél.	1½-2 cm., conical, smoky-grey to black, sometimes drying lead-grey, striate when moist, opaque and sulcate when dry, smooth.	Subdistant, linear, or ventricose, smoky-grey, edge whitish.	2½-5 cm. × 1-2 mm or blackish, equa polished, base s rooting.
17. *aetites* (Fr.) Quél.	Scarcely different from the preceding.	Like the preceding, sometimes veined.	Like the preceding.

(See also *rubro-marginata*, 6)

Flesh	Taste and Smell	Spores	Cystidia	Habitat
very thin.	Mild, no distinctive smell.	Cartridge buff, amyloid, elliptic, smooth, 10-13 × 5-6μ	Fusoid, 60-90 × 10-16μ	In troops, very common.
—	—	As above.	As above.	Uncommon.
—	—	As above.	As above.	Common in burnt places.
ed; thick at sc.	Slightly bitter, smell not distinctive.	White, amyloid, ellipsoid, 7-10 × 5-6μ	Flask-shaped with long neck, 40-70 × 10-15μ, filled with purplish-brown sap.	Caespitose on old stumps, not uncommon.
, very thin.	Mild, smell faint or none.	Cartridge buff, amyloid, pip-shaped, 8-10 × 4-5½μ	Awl-shaped, pointed with swollen base, 30-50 × 5-12μ	Very common everywhere.
h, thin.	Mild, smell faint.	Ivory-yellow, amyloid, elliptical, 6-7 × 3½-4μ	Cylindrical or tapered slightly to a blunt tip, 25-35 × 4-5μ, similar hairs occur on the cap surface and stem.	Not uncommon on ground in pine woods; a vividly blue form was called *M. iris* (Bk.) Sacc.
very thin.	Mild, smell none.	Creamy-white, amyloid, lanceolate, 10-12 × 3½-5μ, basidia 2-spored.	Cylindrical, obtuse, 25-35 × 5-7μ, cuticle of cap with smooth, globose or pyriform cells.	Not uncommon on small twigs, leaves or dead brambles in deciduous woods.
	Mild, smell of ammonia.	White, amyloid, elliptic-cylindric, 8-12 × 4½-6μ	Awl-shaped, pointed, 8-15μ wide.	Not common, on rotting logs.
—	—	As above.	As above or obtuse.	Uncommon.
or white n of stem.	Mild, smell strong of ammonia.	Cartridge buff, amyloid, 6-10 × 4-7μ	Flask-shaped, 40-55 × 15-18μ	Common in short grass or among herbaceous debris.
.	Mild, odourless.	White, amyloid, 9-10 × 5-6μ	Flask-shaped.	Among grass, a large odourless state of the last.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
(*c*) **Lactipedes**								
10. *galapus* (Pers. ex Fr.) Kummer	1-2 cm., campanulate, dingy white or grey, disc darker, striate, smooth or pruinose at first on the disc.	Subdistant, linear, adnate, white to grey, closely pubescent under a lens.	5-10 cm. × 1-2 mm., greyish, smooth, times rooting at base, yield juice when broke	very thin.	Mild, no distinctive smell.	Cartridge buff, amyloid, elliptic, smooth, 10-13 × 5-6 μ	Fusoid, 60-90 × 10-16 μ	In troops, very common.
10a. var. *candida* Lange	Pure white.	White.	White.	—	—	As above.	As above.	Uncommon.
10b. var. *leucogala* (Cke.) Lange	Black or very dark brown, often sulcate.	Grey, as in typical form.	As in typical form	—	—	As above.	As above.	Common in burnt places.
11. *haematopus* (Pers. ex Fr.) Kummer	2-4 cm., conical or gibbous, grey-brown with purple tint, striate when moist, margin denticulate.	Subdistant, adnate, slightly ventricose, whitish with pink or lilac tint, edge often darker.	5-10 cm. × 2-3 mm., red; thick at grey or tinted disc. pruinose then base strigose,		Slightly bitter, smell not distinctive.	White, amyloid, ellipsoid, 7-10 × 5-6 μ	Flask-shaped with long neck, 40-70 × 10-15 μ, filled with purplish-brown sap.	Caespitose on old stumps, not uncommon.
12. *sanguinalenta* (A. & S. ex Fr.) Kummer	4-20 mm., conic-campanulate or hemispherical, pallid brownish-red with purple tint, umbo often darker, striate or sulcate, smooth.	Subdistant, linear or ventricose, adnate, whitish or flesh-tinted, edge dark reddish-brown.	5-8 cm. × 1 mm., reddish-brown, gose, often rhizoids, yields juice when broke	very thin.	Mild, smell faint or none.	Cartridge buff, amyloid, pip-shaped, 8-10 × 4-5½ μ	Awl-shaped, pointed with swollen base, 30-50 × 5-12 μ	Very common everywhere.
(*d*) **Pruinosae**								
13. *amicta* (Fr.) Quél.	1-2 cm., conic-campanulate lead-grey, sometimes with blueish or yellowish tint striate, densely pubescent then smooth, with separable gelatinous cuticle.	Crowded, linear, narrow, adnexed, grey, edge paler and crenulate.	6-8 cm. × 1-2 mm., fish, thin but covered with white or blueish equal, often		Mild, smell faint.	Ivory-yellow, amyloid, elliptical, 6-7 × 3½-4 μ	Cylindrical or tapered slightly to a blunt tip, 25-35 × 4-5 μ, similar hairs occur on the cap surface and stem.	Not uncommon on ground in pine woods; a vividly blue form was called *M. iris* (Bk.) Sacc.
(*e*) **Roridae**								
14. *rarida* (Scop. ex Fr.) Quél.	5-12 mm., subglobose, often with a small umbo, white or buff, dry, sulcate when moist, smooth or scurfy when dry, margin crenulate.	Subdistant, arcuate, broadly adnate or subdecurrent, white, edge often fimbriate.	1-2 cm. × 1 mm., very covered with transparent sheath.		Mild, smell none.	Creamy-white, amyloid, lanceolate, 10-12 × 3½-5 μ, basidia 2-spored.	Cylindrical, obtuse, 25-35 × 5-7 μ, cuticle of cap with smooth, globose or pyriform cells.	Not uncommon on small twigs, leaves or dead brambles in deciduous woods.
(*f*) **Alcalinae**								
15. *alcalina* (Fr.) Kummer	2-3 cm., conic-campanulate dingy grey-brown or with olive tint, sometimes nearly black, striate when moist.	Subdistant, linear, or ventricose, adnate, brownish-grey or dark grey, edge white.	5-8 cm. × 1-2½ mm., brown, rigid, with a villose		Mild, smell of ammonia.	White, amyloid, elliptic-cylindric, 8-12 × 4½-6 μ	Awl-shaped, pointed, 8-15 μ wide.	Not common, on rotting logs.
15a. var. *chlarinella* Lange	Pale grey, much smaller and growing on the ground.	As above.	As above.	—	—	As above.	As above or obtuse.	Uncommon.
16. *ammaniaca* (Fr.) Quél.	1½-2 cm., conical, smoky-grey to black, sometimes drying lead-grey, striate when moist, opaque and sulcate when dry, smooth.	Subdistant, linear, or ventricose, smoky-grey, edge whitish.	2½-5 cm. × 1-2 mm., or or blackish, smooth of polished, base rooting.		Mild, smell strong of ammonia.	Cartridge buff, amyloid, 6-10 × 4-7 μ	Flask-shaped, 40-55 × 15-18 μ	Common in short grass or among herbaceous debris.
17. *aetites* (Fr.) Quél.	Scarcely different from the preceding.	Like the preceding, sometimes veined.	Like the preceding		Mild, odourless.	White, amyloid, 9-10 × 5-6 μ	Flask-shaped.	Among grass, a large odourless state of the last.

(See also *rubro-marginata*, 6)

Species	Cap	Gills	Stem
(*g*) **Adonidae**			
18. *pura* (Pers. ex Fr.) Kummer	2-5 cm., convex or with a broad low umbo, striate when moist, various shades of lilac or pink.	Subdistant, broad, ventricose, adnate, veined, pale lilac.	5-10 cm. × 3-6 mm. rigid, lilac or pir ished, base hairy
18a. var. *multicolor* Bres.	Bright blueish-grey.	—	—
18b. var. *alba* Gillet	White.	White.	White.
19. *pearsoniana* Dennis nom. nov. (*M. pseudopura sensu* Kühner non Cooke)	1-2½ cm., usually small, convex, truncate then flat, pale buff or brown with violaceous tint, smooth, extreme edge striate when fresh.	Crowded or subdistant, linear or wedge-shaped, adnate with decurrent tooth, white flushed with violet, edge eroded.	3-6 cm. × 1-1½ mm or tapering sligh wards, apex pruin laceous when fresl with age, base pu with fine rooting
20. *zephira* (Fr.) Kummer	2-5 cm., conical or gibbous with or without papilla, whitish then reddish or dingy brown, striate or sulcate.	Broad, ventricose, or linear, adnate, white, staining reddish-brown.	3-8 cm. × 2-5 mm. whitish, reddish below, base strig
21. *flavipes* Quél.	1-4 cm., semiglobate, dingy pink or ochraceous with paler margin, mat, minutely fibrillose, striate.	Distant, broad, slightly ventricose, adnate, white then flesh-pink.	2-4 cm. × 1-2 mm. yellow or golden base white, hair
22. *atrocyanea* (Batsch ex Fr.) Gillet	5-13 mm., conic-campanulate, blackish then blueish-grey with dark obtuse umbo, sulcate to disc, pruinose when fresh.	Distant, ventricose, or linear, whitish or cinereous at the base, united in a collar.	3-5 cm. × 1-2 mm blue-black, equ with a sub-bulbo
23. *adonis* (Bull. ex Fr.) Kummer	½-2 cm., obtusely conical, coral or orange-red then pink, margin paler, striate.	Subdistant, linear, narrow, adnate, flesh-coloured.	3-5 cm. × 1-1½ mm white or flushe smooth, base str
24. *acicula* (Schaeff. ex Fr.) Kummer	2-10 mm., usually tiny, subglobate, sometimes with a papilla, orange-vermilion with paler margin, striate, smooth or pruinose.	Distant, ventricose or linear, adnexed or adnate, yellow, edge whitish.	2-5 cm. × 1 mm. rooting, bright then paler, base
25. *fibula* (Bull. ex Fr.) Kühner	5-10 mm., convex then flattened or slightly umbilicate, light orange, striate, smooth.	Arched, decurrent by a tooth, white to pale yellow.	2-4 cm. × 1 mm. light orange, below, downy wi base.
25a. var. *swartzii* (Fr.) Kühner	Pale ochraceous with blackish-brown disc, otherwise as above.	As above.	As above, but pal blackish-brown a
(*h*) **Rigidipedes**			
26. *polygramma* (Bull. ex Fr.) Kummer	2-5 cm., conical then expanded with obtuse umbo, ash-grey or grey-brown with a whitish bloom, then glabrous, sulcate.	Subdistant, linear-lanceolate, adnexed, white, grey or pinkish.	6-10 cm. × 2- silvery or bluei with numerous fi tudinal furrows base strigose, ro

Flesh	Taste and Smell	Spores	Cystidia	Habitat
thick at the	Mild, smell of radishes.	White or cream, amyloid, ovoid, 6-8 × 3½-4μ	Ventricose with obtuse tip, on face and edge of gills, 12-25μ broad.	Very common everywhere, especially with beech.
—	—	—	—	Rare.
—	—	—	—	Uncommon.
ıs or whitish , very thin.	Mild, slightly rancid, faint smell of radish.	White, nonamyloid, pip-shaped, smooth, 5-7 × 3½-4½μ	Clavate or cylindrical, 9-15μ wide.	Uncommon, under spruce.
sh-brown,	Mild, no smell.	White, amyloid, cylindrical, 10-12 × 4-5μ	Fusoid or clavate, 10-24μ wide.	Fir woods, rare.
hin, yellow m.	Taste ? Smell faintly nitrous or raphanoid.	White ? Amyloid, elliptic-cylindric, 7½-10½ × 4½-6½μ	Fusoid, obtuse, 8-13μ wide.	Rare, on stumps or woody debris in mixed woods.
thin.	?	Amyloid, ellipsoid, 8-10 × 5-6μ according to A. H. Smith.	Fusoid-ventricose, 38-54 × 8-12μ according to A. H. Smith.	Rare, further observations required.
cap, very white in	Mild, no smell.	White, nonamyloid, subcylindrical, 9-10 × 4-5½μ basidia 2-spored.	Fusoid, blunt or pointed, 10-12μ wide.	Uncommon, usually singly on wood of deciduous or coniferous trees.
cap, very	Mild, no smell.	White, nonamyloid, somewhat fusiform, 9-12 × 3-4μ	Small, cylindric-fusoid or clavate, about 16 × 4-5μ, often with a ball of yellow gum at the tip.	Common, usually singly on woody fragments.
thin.	Mild, no smell.	White, nonamyloid, narrowly elliptical, 4-5 × 2μ	Cylindric-fusoid, up to 40 × 10μ	Common amongst short grass or moss in damp places.
chraceous, rey.	As above.	As above.	As above.	Common with the typical form.
hen white, horny line the gills.	Mild or slightly acrid, smell pleasant.	Cartridge buff, amyloid, elliptical, 9-10 × 6-7μ	Small, flexuous, often branched hairs, cylindrical, obtuse or pointed, 5-6μ wide.	Common near stumps, solitary or gregarious.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
(*g*) **Adonidae**								
18. *pura* (Pers. ex Fr.) Kummer	2-5 cm., convex or with a broad low umbo, striate when moist, various shades of lilac or pink.	Subdistant, broad, ventricose, adnate, veined, pale lilac.	5-10 cm. × 6 mm., rigid, lilac or pale lilac, base whitish, base hairy.	thick at the	Mild, smell of radishes.	White or cream, amyloid, ovoid, 6-8 × 3½-4 *μ*	Ventricose with obtuse tip, on face and edge of gills, 12-25 *μ* broad.	Very common everywhere, especially with beech.
18a. var. *multicalar* Bres.	Bright blueish-grey.	—	—	—	—	—	—	Rare.
18b. var. *alba* Gillet	White.	White.	White.	—	—	—	—	Uncommon.
19. *pearsaniana* Dennis nom. nov. (*M. pseudopura sensu* Kühner non Cooke)	1-2½ cm., usually small, convex, truncate then flat, pale buff or brown with violaceous tint, smooth, extreme edge striate when fresh.	Crowded or subdistant, linear or wedge-shaped, adnate with decurrent tooth, white flushed with violet, edge eroded.	3-6 cm. × 1-1½ mm., or tapering slightly upwards, apex pruinose when fresh, with age, base pale with fine rooting	ous or whitish p, very thin.	Mild, slightly raucid, faint smell of radish.	White, nonamyloid, pip-shaped, smooth, 5-7 × 3½-4½ *μ*	Clavate or cylindrical, 9-15 *μ* wide.	Uncommon, under spruce.
20. *zephira* (Fr.) Kummer	2-5 cm., conical or gibbous with or without papilla, whitish then reddish or dingy brown, striate or sulcate.	Broad, ventricose, or linear, adnate, white, staining reddish-brown.	3-8 cm. × 2-5 mm., whitish, reddening below, base strigose.	ish-brown,	Mild, no smell.	White, amyloid, cylindrical, 10-12 × 4-5 *μ*	Fusoid or clavate, 10-24 *μ* wide.	Fir woods, rare.
21. *flavipes* Quél.	1-4 cm., semiglobate, dingy pink or ochraceous with paler margin, mat, minutely fibrillose, striate.	Distant, broad, slightly ventricose, adnate, white then flesh-pink.	2-4 cm. × 1-2 mm., yellow or golden, base white, hairy.	llun, ... brow tem.	Taste ? Smell faintly nitrous or raphanoid.	White ? Amyloid, elliptic-cylindric, 7½-10½ × 4½-6½ *μ*	Fusoid, obtuse, 8-13 *μ* wide.	Rare, on stumps or woody debris in mixed woods.
22. *atracyanea* (Batsch ex Fr.) Gillet	5-13 mm., conic-campanulate, blackish then blueish-grey with dark obtuse umbo, sulcate to disc, pruinose when fresh.	Distant, ventricose, or linear, whitish or cinereous at the base, united in a collar.	3-5 cm. × 1-2 mm., blue-black, ... with a sub-bulb	ll, thin	?	Amyloid, ellipsoid, 8-10 × 5-6 *μ* according to A. H. Smith.	Fusoid-ventricose, 38-54 × 8-12 *μ* according to A. H. Smith.	Rare, further observations required.
23. *adanis* (Bull. ex Fr.) Kummer	½-2 cm., obtusely conical, coral or orange-red then pink, margin paler, striate.	Subdistant, linear, narrow, adnate, flesh-coloured.	3-5 cm. × 1-1½ mm., white or flushed, smooth, base	in cap, ... wh	Mild, no smell.	White, nonamyloid, subcylindrical, 9-10 × 4-5½ *μ* basidia 2-spored.	Fusoid, blunt or pointed, 10-12 *μ* wide.	Uncommon, usually singly on wood of deciduous or coniferous trees.
24. *acicula* (Schaeff. ex Fr.) Kummer	2-10 mm., usually tiny, subglobate, sometimes with a papilla, orange-vermilion with paler margin, striate, smooth or pruinose.	Distant, ventricose or linear, adnexed or adnate, yellow, edge whitish.	2-5 cm. × 1 mm., rooting, bright then paler, base	in cap.	Mild, no smell.	White, nonamyloid, somewhat fusiform, 9-12 × 3-4 *μ*	Small, cylindric-fusoid or clavate, about 16 × 4-5 *μ*, often with a ball of yellow gum at the tip.	Common, usually singly on woody fragments.
25. *fibula* (Bull. ex Fr.) Kühner	5-10 mm., convex then flattened or slightly umbilicate, light orange, striate, smooth.	Arched, decurrent by a tooth, white to pale yellow.	2-4 cm. × 1 mm., light orange below, downy base.	s, thin.	Mild, no smell.	White, nonamyloid, narrowly elliptical, 4-5 × 2 *μ*	Cylindric-fusoid, up to 40 × 10 *μ*	Common amongst short grass or moss in damp places.
25a. var. *swartzii* (Fr.) Kühner	Pale ochraceous with blackish-brown disc, otherwise as above.	As above.	As above, but ... blackish-brown	ochrac... grey.	As above.	As above.	As above.	Common with the typical form.
(*h*) **Rigidipedes**								
26. *polygramma* (Bull. ex Fr.) Kummer	2-5 cm., conical then expanded with obtuse umbo, ash-grey or grey-brown with a whitish bloom, then glabrous, sulcate.	Subdistant, linear-lanceolate, adnexed, white, grey or pinkish.	6-10 cm. × ... silvery or bl... with numerou... tudinal furro... base strigose.	... en w... horny ... the ...	Mild or slightly acrid, smell pleasant.	Cartridge buff, amyloid, elliptical, 9-10 × 6-7 *μ*	Small, flexuous, often branched hairs, cylindrical, obtuse or pointed, 5-6 *μ* wide.	Common near stumps, solitary or gregarious.

Species	Cap	Gills	Stem
26a. var. *pumila* Lange	Smaller than the above but differing mainly in the stem.	—	Brownish or horn not silvery and grooved.
27. *vitilis* (Fr.) Quél. non Kühner (= *filopes sensu* Kühner)	1-2½ cm., conical to campanulate with a hard papillate umbo, grey or smoky-brown, striate-sulcate.	Subdistant or crowded, narrow, ventricose or linear, adnexed or free, white or pinkish, margin denticulate.	7-15 cm. × 1-2 mm. elastic, pale gr white, smooth, s base strigose.
28. *subalpina* von Höhnel	1½-3 cm., broadly conical, dingy yellow or buff.	Crowded, ventricose, adnexed or adnate, white.	3½-4 cm. × 1½-2½ white, base witl rhizoids.
29. *erubescens* von Höhnel	3-10 mm., conical or semi-globate, dull grey or brown with pale pruinose margin, striate.	Subdistant, linear or slightly ventricose, adnexed-emarginate, white, sometimes staining red, edge crenulate.	2-4 cm. × 1 mm., hyaline or flushe brown, smooth, strigose, when you tains white juice may turn red.
(*j*) **Albidulae**			
30. *lactea* (Pers. ex Fr.) Kummer	1-1½ cm., conical, obtuse or nearly acute, snow-white or faintly cream, striate when moist.	Very crowded, narrow, linear, adnate, white.	3-7 cm. × 1-1½ mm. smooth, white, h the base.
31. *gypsea* (Fr.) Quél. non Lange	½-3 cm., conical or convex, white, striate when moist, surface mat, pruinose.	Very crowded, narrow, linear, subdecurrent, adnate or adnexed, white.	3-7 cm. × 1-2 mm. white, pruinose smooth.
32. *alba* (Bres.) Kühner	1 cm., hemispherical, white, striate, very minutely pruinose.	Horizontal or arched, adnate to subdecurrent, white.	5-15 mm. × 1 mm. white, very m pruinose.
33. *salicina* Vel.	1-2 cm., convex then plane with a papillate umbo, grey with blackish centre, striate, mat, smooth.	Subdistant, broad, ventricose, adnate breaking free, whitish.	3-4 cm. × 1½-2 white, grey at th covered by pubescence.
34. *olida* Bres.	½-2 cm., conical, obtuse, rarely acute, white with slight yellow tint at disc, glabrous or innately fibrillose, striate if fresh.	Crowded, linear or ventricose, adnate, white.	1-3 cm. × 1-2 mm. white, minutely base tomentose.
35. *flavoalba* (Fr.) Quél.	1-2 cm., conical or campanulate, sometimes with a central papilla, light yellow, white with yellow disc or, rarely, all white, smooth, striate.	Subdistant, ventricose, adnate, white.	2-3 cm. × 1-2 mm. tense, hyaline-wl cream, apex pı base strigose.
36. *speirea* (Fr.) Gillet	½-1½ cm., convex or depressed at the disc, sometimes with a small papilla, dingy white with brown striae, disc brown.	Subcrowded, arcuate, subdecurrent, whitish.	2-5 cm. × ½-1½ mn colour or dingy l base white-strigos

Flesh	Taste and Smell	Spores	Cystidia	Habitat
—	—	—	—	Uncommon.
thin.	Mild, no smell.	Cartridge buff, amyloid, elliptical, 8-11 × 5-6μ	Small hairs with swollen base and pointed tip, often branched, 25-40 × 8-11μ	Common among dead leaves, especially beech.
e-white, sub-y.	Smell faint.	Nonamyloid, cylindric-curved, 7-10 × 2½-4μ	Ventricose, obtuse, 60 × 30-40μ	Uncommon, on woody debris.
	Very bitter like quinine, no smell.	White, amyloid, ovate to pyriform, 9-12 × 6-8μ with 1 or 2 guttules; basidia 2-spored.	Ventricose, lanceolate, often bifurcate or with several prongs, 40-70 × 9-12μ, with multiguttulate contents.	Uncommon, on mossy trunks or chips of wood.
thin.	No smell.	White, nonamyloid, lanceolate, 9-11 × 3-4μ; basidia usually 2-spored.	Small, slightly ventricose, subcapitate hairs, 27-31 × 5-6μ	Common in troops on needles and twigs of conifers.
e-white, thin.	No smell.	White, nonamyloid, lanceolate, 9-11 × 3-4μ; basidia 2 or 4-spored.	Small fusoid hairs with swollen base, 20-30 × 5-6μ	Uncommon, on soil or dead leaves in mixed or deciduous woods.
thin.	No smell.	White, nonamyloid, spherical, 6-9μ; basidia 2 or 4-spored.	Short, cylindrical, 6-9μ wide.	Uncommon, on bark of living trees.
rey in cap, in stem.	Mild, no smell.	White, nonamyloid, globose with large apiculus, smooth, 5-5½μ diameter.	Slender flask-shaped, 60-70 × 10-15μ below and 4-5μ in the neck.	Uncommon, under conifers and willows.
thin.	Mild, smell none or mealy when crushed.	White, nonamyloid, ovate, 6½-9 × 4½-5½μ	Cylindrical or flask-shaped with blunt tip, 40-60 × 6-10μ	Uncommon, in clusters on stumps of deciduous trees.
thin.	Mild, smell none or slightly raphanoid.	Marguerite yellow of Ridgway, nonamyloid, pip-shaped, 6-8 × 3½-4μ	Fusoid, 10-16μ wide, sometimes capped by a drop of mucilage.	Common amongst short grass.
, very thin.	Mild, no smell.	?White, nonamyloid, pip-shaped, 8-10 × 5-5½μ; most basidia 2-spored.	Cylindrical, obtuse, 25-30 × 4-6½μ	Rather common on woody debris.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
26a. var. *pumila* Lange	Smaller than the above but differing mainly in the stem.	—	Brownish or horn not silvery ag grooved.	—	—	—	—	Uncommon.
27. *vitilis* (Fr.) Quél. non Kühner (= *filopes sensu* Kühner)	1-2½ cm., conical to campanulate with a hard papillate umbo, grey or smoky-brown, striate-sulcate.	Subdistant or crowded, narrow, ventricose or linear, adnexed or free, white or pinkish, margin denticulate.	7-15 cm. × 1-2 mm. elastic, pale g white, smooth, base strigose.	thin.	Mild, no smell.	Cartridge buff, amyloid, elliptical, 8-11 × 5-6 μ	Small hairs with swollen base and pointed tip, often branched, 25-40 × 8-11 μ	Common among dead leaves, especially beech.
28. *subalpina* von Höhnel	1½-3 cm., broadly conical, dingy yellow or buff.	Crowded, ventricose, adnexed or adnate, white.	3½-4 cm. × 1½-2 white, base wh rhizoids.	ite-white, sub- ry.	Smell faint.	Nonamyloid, cylindric-curved, 7-10 × 2½-4 μ	Ventricose, obtuse, 60 × 30-40 μ	Uncommon, on woody debris.
29. *erubescens* von Höhnel	3-10 mm., conical or semi-globate, dull grey or brown with pale pruinose margin, striate.	Subdistant, linear or sfightly ventricose, adnexed-emarginate, white, sometimes staining red, edge crenulate.	2-4 cm. × 1 mm hyaline or fluid brown, smooth strigose, when yo tains white ju may turn red	thin.	Very bitter like quinine, no smell.	White, amyloid, ovate to pyriform, 9-12 × 6-8 μ with 1 or 2 guttules; basidia 2-spored.	Ventricose, lanceolate, often bifurcate or with several prongs, 40-70 × 9-12 μ, with multiguttulate contents.	Uncommon, on mossy trunks or chips of wood.
(*j*) **Alblidulae**								
30. *lactea* (Pers. ex Fr.) Kummer	1-1½ cm., conical, obtuse or nearly acute, snow-white or faintly cream, striate when moist.	Very crowded, narrow, linear, adnate, white.	3-7 cm. × 1-1½ mm smooth, white, t the base.	thin.	No smell.	White, nonamyloid, lanceolate, 9-11 × 3-4 μ; basidia usually 2-spored.	Small, slightly ventricose, subcapitate hairs, 27-31 × 5-6 μ	Common in troops on needles and twigs of conifers.
31. *gypsea* (Fr.) Quél. non Lange	½-3 cm., conical or convex, white, striate when moist, surface mat, pruinose.	Very crowded, narrow, linear, subdecurrent, adnate or adnexed, white.	3-7 cm. × 1-2 mm white, pruino smooth.	ite-white, thin.	No smell.	White, nonamyloid, lanceolate, 9-11 × 3-4 μ; basidia 2 or 4-spored.	Small fusoid hairs with swollen base, 20-30 × 5-6 μ	Uncommon, on soil or dead leaves in mixed or deciduous woods.
32. *alba* (Bres.) Kühner	1 cm., hemispherical, white, striate, very minutely pruinose.	Horizontal or arched, adnate to subdecurrent, white.	5-15 mm. × 1 mm white, very pruinose.	thin.	No smell.	White, nonamyloid, spherical, 6-9 μ; basidia 2 or 4-spored.	Short, cylindrical, 6-9 μ wide.	Uncommon, on bark of living trees.
33. *salicina* Vel.	1-2 cm., convex then plane with a papillate umbo, grey with blackish centre, striate, mat, smoothb.	Subdistant, broad, ventricose, adnate breaking free, whitish.	3-4 cm. × 1½ white, grey at covered by pubescence.	grey in c in stem.	Mild, no smell.	White, nonamyloid, globose with large apiculus, smooth, 5-5½ μ diameter.	Slender flask-shaped, 60-70 × 10-15 μ below and 4-5 μ in the neck.	Uncommon, under conifers and willows.
34. *alida* Bres.	½-2 cm., conical, obtuse, rarely acute, white with slight yellow tint at disc, glabrous or innately fibrillose, striate if fresh.	Crowded, linear or ventricose, adnate, white.	1-3 cm. × 1-2 mm white, minutely base tomentos	thin.	Mild, smell none or mealy when crushed.	White, nonamyloid, ovate, 6½-9 × 4½-5½ μ	Cylindrical or flask-shaped with blunt tip, 40-60 × 6-10 μ	Uncommon, in clusters on stumps of deciduous trees.
35. *flavoalba* (Fr.) Quél.	1-2 cm., conical or campanulate, sometimes with a central papilla, light yellow, white with yellow disc or, rarely, all white, smooth, striate.	Subdistant, ventricose, adnate, white.	2-3 cm. × 1-2 mm tense, hyaline cream, apex base strigose.	thin.	Mild, smell none or slightly raphanoid.	Marguerite yellow of Ridgway, nonamyloid, pip-shaped, 6-8 × 3½-4 μ	Fusoid, 10-16 μ wide, sometimes capped by a drop of mucilage.	Common amongst short grass.
36. *speirea* (Fr.) Gillet	½-1½ cm., convex or depressed at the disc, sometimes with a small papilla, dingy white with brown striae, disc brown.	Subcrowded, arcuate, subdecurrent, whitish.	2-5 cm. × ½-1½ colour or ding base white-stru	very th	Mild, no smell.	?White, nonamyloid, pip-shaped, 8-10 × 5-5½ μ; most basidia 2-spored.	Cylindrical, obtuse, 25-30 × 4-6½ μ	Rather common on woody debris.

Species	Cap	Gills	Stem
37. *hiemalis* (Osbeck ex Fr.) Gillet	½-1½ cm., semiglobate or conic, grey-brown, margin paler, disc darker or becoming dingy white throughout, striate.	Subdistant, ventricose or linear, adnate, whitish.	1-3 cm. × ½-1 mm hyaline-white, pruinose, sometii ing.
38. *quisquiliaris* (Joss.) Kühner	1-10 mm., convex or umbilicate, rarely papillate, white, sulcate with crenulate margin when old.	Few, distant, linear or arcuate, white, edge denticulate.	Very short and hyaline-white, often with a min
II. GRANULATAE LANGE			
(*k*) **Discipedes**			
39. *tenerrima* (Berk.) Sacc.	2-6 mm., convex, white or hyaline-grey, striate, frosted with minute granules.	Crowded, ventricose, adnexed, white, adhering near stem in a stellate collar.	1-2½ cm. × 1 mm flexuous, hyali base a small p disc.
40. *mucor* (Batsch ex Fr.) Gillet	2-5 mm., convex, hyaline-white with brownish striae or all white when very small, smooth.	Distant, linear, greyish with white edge, then hyaline-white.	3-4 mm., thread-l a small velvet disc, white, ding
(*l*) **Marginatae**			
41. *elegans* (Fr.) Kummer	1-1½ cm., convex, greyish-brown, margin yellow or saffron, striate.	Crowded, linear, adnexed, greyish-brown, edge bright orange or saffron.	4-5 cm. × 1-2 m or yellow, equ with orange bris
42. *rosella* (Fr.) Kummer	½-1½ cm., conical or hemispherical, sometimes with central papilla, bright pink then paler, striate or sulcate.	Subdistant, linear, adnate to subdecurrent, edge dark red, sometimes crenulate.	2-4 cm. × 1 mm hyaline or flush base white-tom
43. *pterigena* (Fr.) Kummer	2-6 mm., ovoid then campanulate, orange to pale pink, margin brighter, striate.	Subdistant, broad, adnate, triangular, flesh-pink with a red edge.	1-4 cm. × up to orange then p smooth, base strigose but not
44. *flavescens* Vel.	1-1½ cm., conical to expanded, light yellow or grey at the disc, margin striate.	Subdistant, broad, adnexed, ventricose, whitish, edge yellow.	2-4 cm. × 1-2 mm smooth, pallid brown below.
(*m*) **Succosae**			
45. *crocata* Schrad. ex Fr.) Kummer	1-3 cm., conical or campanulate, ash-grey or olive tinted, finally stained reddish by juice.	Subdistant, ventricose, adnexed or adnate, white, staining saffron.	7-12 cm. × 2 saffron, apex lemon or whit smooth, base h saffron or bloo
(*n*) **Gummosae**			
46. *epipterygia* (Scop. ex Fr.) Kummer	1-3 cm., conical or campanulate, greyish-white or with disc livid brown or yellow becoming cream or pale green; covered with a viscid elastic separable pellicle, margin often denticulate.	Subdistant, linear or arcuate, subdecurrent, white or pale pink, edge with a glutinous thread easily detached by a needle when fresh.	5-8 cm. × 1-1½ m lemon yellow base white-strig

Flesh	Taste and Smell	Spores	Cystidia	Habitat
nish when st, then white, .	Mild, no smell.	White, nonamyloid, broadly ovate, 8-9 × 5½-6μ; most basidia 2-spored.	Cylindrical, obtuse, 7-10μ thick.	Common on mossy trunks of deciduous trees.
, very thin.	Mild, no smell.	Amyloid, subfusoid, 11-13 × 4-6μ	Ventricose, obtuse, often capitate, sometimes forked, 30-70 × 7-13μ	Probably common on debris of marsh plants.
, very thin.	No smell.	White or tinted buff, amyloid, subglobose or broadly elliptical, 8-10 × 5-7μ; basidia 2-spored.	Shape variable, warted with a pointed beak, 25-40 × 5-10μ; globose warted cells cover cap.	Common on woody debris and trunks of deciduous trees.
, very thin.	No smell.	White, amyloid, cylindrical, 8-12 × 3-4½μ	Pyriform, sparsely covered with finger-like warts, 7-12μ wide; globose warted cells cover cap.	Probably not uncommon on dead leaves, especially oak, but overlooked.
-yellow, thin.	Smell faint.	Pale buff, amyloid, 7-9 × 4-4½μ ellipsoid.	Pyriform, densely warted, dark yellow, 9-15μ broad.	Uncommon, under conifers, especially on spruce needles.
ink, thin.	Mild.	Amyloid, 8-10 × 4-5μ, ellipsoid.	Bludgeon-shaped, warted, 11-12μ wide, filled with red sap, pleurocystidia smooth.	Fairly common on spruce and fir needles.
sh, very thin.	No smell.	Amyloid, 9-10 × 4½-5μ, ellipsoid.	Pyriform or obovate, set with numerous rather long setulae, contents pink.	Uncommon, on decaying fern fronds.
e, thin.	Mild, no smell.	Amyloid, 8-10 × 4-5½μ, ellipsoid.	Obovate, echinulate, 10-15μ wide, contents sometimes yellowish.	Sandy places, under conifers or under oaks.
n, thin.	Mild, no smell.	Cartridge buff, amyloid, pip-shaped, 7-10 × 5-6μ	Clavate, warted, apex sometimes pointed, 7-8μ wide.	Uncommon, deciduous woods, mainly under beech.
e, very thin.	Mild, smell none or rancid.	Cartridge buff, amyloid, ellipsoid, 8-10 × 4-5μ	Irregularly clavate with several finger-like processes, difficult to examine because of the glutinous edge of the gill.	Very common everywhere.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
37. *hiemalis* (Osbeck ex Fr.) Gillet	½-1½ cm., semiglobate or conic, grey-brown, margin paler, disc darker or becoming dingy white throughout, striate.	Subdistant, ventricose or linear, adnate, whitish.	1-3 cm. × 1 mm., hyaline-white, pruinose, ometimes ing.	...nish when ...ist, then white, ...m.	Mild, no smell.	White, nonamyloid, broadly ovate, 8-9 × 5½-6μ; most basidia 2-spored.	Cylindrical, obtuse, 7-10μ thick.	Common on mossy trunks of deciduous trees.
38. *quisquiliaris* (Joss.) Kühner	1-10 mm., convex or umbilicate, rarely papillate, white, sulcate with crenulate margin when old.	Few, distant, linear or arcuate, white, edge denticulate.	Very sho ... and hyaline-white, often with a mup...	...e, very thin.	Mild, no smell.	Amyloid, subfusoid, 11-13 × 4-6μ	Ventricose, obtuse, often capitate, sometimes forked, 30-70 × 7-13μ	Probably common on debris of marsh plants.
II. GRANULATAE LANGE								
(*k*) **Discipedes**								
39. *tenerrima* (Berk.) Sacc.	2-6 mm., convex, white or hyaline-grey, striate, frosted with minute granules.	Crowded, ventricose, adnexed, white, adhering near stem in a stellate collar.	1-2½ cm. × 1 mm., flexuous, hyali... base a small p... disc.	...e, very thin.	No smell.	White or tinted buff, amyloid, subglobose or broadly elliptical, 8-10 × 5-7μ; basidia 2-spored.	Shape variable, warted with a pointed beak, 25-40 × 5-10μ; globose warted cells cover cap.	Common on woody debris and trunks of deciduous trees.
40. *mucar* (Batsch ex Fr.) Gillet	2-5 mm., convex, hyaline-white with brownish striae or all white when very small, smooth.	Distant, linear, greyish with white edge, then hyaline-white.	3-4 mm., thread ... a small velv... disc, white, ding...	...e, very ...in.	No smell.	White, amyloid, cylindrical, 8-12 × 3-4½μ	Pyriform, sparsely covered with finger-like warts, 7-12μ wide; globose warted cells cover cap.	Probably not uncommon on dead leaves, especially oak, but overlooked.
(*l*) **Marginatae**								
41. *elegans* (Fr.) Kummer	1-1½ cm., convex, greyish-brown, margin yellow or saffron, striate.	Crowded, linear, adnexed, greyish-brown, edge bright orange or saffron.	4-5 cm. × 1-2 ... or yellow, equ... with orange b...	...d-yello... ...ium.	Smell faint.	Pale buff, amyloid, 7-9 × 4-4½μ ellipsoid.	Pyriform, densely warted, dark yellow, 9-15μ broad.	Uncommon, under conifers, especially on spruce needles.
42. *rasella* (Fr.) Kummer	½-1½ cm., conical or hemispherical, sometimes with central papilla, bright pink then paler, striate or sulcate.	Subdistant, linear, adnate to subdecurrent, edge dark red, sometimes crenulate.	2-4 cm. × 1 m... hyaline or flus... base white-tom...	...Pink, ...	Mild.	Amyloid, 8-10 × 4-5μ, ellipsoid.	Bludgeon-shaped, warted, 11-12μ wide, filled with red sap, pleurocystidia smooth.	Fairly common on spruce and fir needles.
43. *pterigena* (Fr.) Kummer	2-6 mm., ovoid then campanulate, orange to pale pink, margin brighter, striate.	Subdistant, broad, adnate, triangular, flesh-pink with a red edge.	1-4 cm. × up t... orange then p... smooth, base ... strigose but not...	...sh, ...ge.	No smell.	Amyloid, 9-10 × 4½-5μ, ellipsoid.	Pyriform or obovate, set with numerous rather long setulae, contents pink.	Uncommon, on decaying fern fronds.
44. *flavescens* Vel.	1-1½ cm., conical to expanded, light yellow or grey at the disc, margin striate.	Subdistant, broad, adnexed, ventricose, whitish, edge yellow.	2-4 cm. × 1-2 m... smooth, pallid... brown below	...e, thin	Mild, no smell.	Amyloid, 8-10 × 4-5½μ, ellipsoid.	Obovate, echinulate, 10-15μ wide, contents sometimes yellowish.	Sandy places, under conifers or under oaks.
(*m*) **Sucosae**								
45. *cracata* Schrad. ex Fr.) Kummer	1-3 cm., conical or campanulate, ash-grey or olive tinted, finally stained reddish by juice.	Subdistant, ventricose, adnexed or adnate, white, staining saffron.	7-12 cm. ... saffron, apex ... lemon or whi... smooth, base ... saffron or blo...	...en, thin	Mild, no smell.	Cartridge buff, amyloid, pip-shaped, 7-10 × 5-6μ	Clavate, warted, apex sometimes pointed, 7-8μ wide.	Uncommon, deciduous woods, mainly under beech.
(*n*) **Gummosae**								
46. *epipterygia* (Scop. ex Fr.) Kummer	1-3 cm., conical or campanulate, greyish-white or with disc livid brown or yellow becoming cream or pale green; covered with a viscid elastic separable pellicle, margin often denticulate.	Subdistant, linear or areuate, subdecurrent, white or pale pink, edge with a glutinous thread easily detached by a needle when fresh.	5-8 cm. × 1-1½ ... lemon yello... base white-stu...	...e, very ...	Mild, smell none or rancid.	Cartridge buff, amyloid, ellipsoid, 8-10 × 4-5μ	Irregularly clavate with several finger-like processes, difficult to examine because of the glutinous edge of the gill.	Very common everywhere.

Species	Cap	Gills	Stem
47. ***viscosa*** (Secr.) Maire	Like the preceding but with rusty red patches.	Like the preceding but usually pink.	Stouter than the prec light yellow, whitish.
48. ***epipterygioides*** Pearson	1-2 cm., hemispherical, centre depressed, greenish, disc dark green, sulcate, margin often crenate, pellicle viscid, elastic, separable.	Subdistant, arcuate, subdecurrent, delicate greenish-yellow, edge with a separable viscid filament.	5-8 cm. × 1-2 mm., ish, usually with stains at the base, often compressed, h viscid.
49. ***pelliculosa*** (Fr.) Quél. non Lange	1-2½ cm., convex, campanulate, smoky-grey, centre darker, striate to disc, pellicle viscid, separable.	Distant, arcuate, adnate to decurrent, united in a collar near stem, glaucous-white, edge with viscid filament.	2-6 cm. × 2-3 mm., light grey, rigid, sn very viscid.
50. ***vulgaris*** (Pers. ex Fr.) Kummer	½-1½ cm., convex, umbilicate, often with a small papilla, grey-brown or olive tinted, margin paler, striate, viscid, pellicle separable.	Distant, linear, adnate, white then grey, edge with a gelatinous filament.	3-4 cm. × 1-2 mm., brown or whitish, tough, elastic, base strigose, rooti
51. ***mackinawensis*** A. H. Smith	1-2 cm., convex to flattened, olive-grey, striate, viscid with a separable pellicle.	Subdistant, arcuate, subdecurrent, light grey, edge viscid.	1-2½ cm. × 1-2 mm., grey, viscid.
(*o*) **Glutinipedes**			
52. ***clavicularis*** (Fr.) Gillet	½-2 cm., dry, subglobate, campanulate or conical, often with central papilla which flattens and collapses to give an umbilicus, dingy white with black or brown striae to the disc.	Crowded, rather broad, ventricose or wedge-shaped, adnate to subdecurrent, smoky-grey or greyish-white with a white edge.	4-5 cm. × 1-1½ hyaline or with a s tint, smooth, t elastic, very viscid.
(*p*) **Robustae**			
53. ***galericulata*** (Scop. ex Fr.) Kummer	2-8 cm., conico-campanulate, umbo obtuse, dingy grey, slightly ochraceous, smoky-brown or whitish, smooth, striate when moist, sulcate when dry.	Subdistant, ventricose, adnate with decurrent tooth, sometimes veined, whitish then flesh-pink.	5-12 cm. × 3-5 mm., often compressed, or horn colour, w above, polished, strigose, fusoid, t elastic, rooting.
54. ***inclinata*** (Fr.) Quél.	2-4 cm., ovoid then campanulate, obtuse, dingy brown or grey, margin white, shining when dry, striate or sulcate, margin often crenulate.	Crowded then sub-distant, linear or ventricose, adnate with decurrent tooth, whitish then pinkish.	6-10 cm. × 2-4 silvery-white, lowe turns brown then chestnut, silky, twisted, rather elast not tough.
(*q*) **Iodiformes**			
55. ***filopes*** (Bull. ex Fr.) Kummer	1-2½ cm., conico-campanulate with obtuse umbo, greyish-brown or blackish with paler margin, striate, smooth.	Crowded, ventricose or lanceolate, narrow, adnexed, white or grey at the base.	7-9 cm. × 1-2 mm., gr brown or smoky, above, equal, fl base strigose, rooti

Flesh	Taste and Smell	Spores	Cystidia	Habitat
, then reddish.	Very rancid.	Like the preceding.	As in the preceding.	Common under conifers, especially spruce.
	—	Cartridge buff, amyloid, broadly elliptical, 9-10 × 7½-8μ; basidia 2-spored.	Clavate with finger-like knobs.	Among moss in damp pine woods and on old pine stumps.
	—	Cartridge buff, amyloid, ellipsoid, 7-10 × 4-5μ	Clavate with finger-like appendages.	Uncommon, gregarious on heaths and in coniferous woods.
h, thin.	Faintly rancid.	White, amyloid, ellipsoid, 7-10 × 4-4½μ	Digitate branched cells occur on gill edge in the gelatinous filament.	Uncommon in coniferous woods.
grey.	Not distinctive.	White, amyloid, 7-9 × 3½-4μ	Fusoid 30-45 × 8-13μ on gill face, filamentous and contorted on gill edge.	Coniferous sticks and branches, uncommon.
sh in the cap, e in the stem.	Mild, no smell.	White, amyloid, ellipsoid or obovate, apiculate, 7-8 × 5-5½μ	Globose or pyriform, thick-walled, 10-15μ wide, with short warts.	Uncommon, in coniferous woods.
sh, drying e.	Mild, smell faintly rancid.	Cartridge buff, amyloid, ellipsoid, 9-12 × 6-8μ; basidia usually 2-spored.	Clavate, apex bearing numerous long or short filaments.	Very common, caespitose on stumps and dead branches.
h.	Mildly rancid, smell very rancid.	Light buff, amyloid, broadly elliptical, 8-10 × 6-7μ	Clavate, apex crowned with slender hairs, 20-30 × 5-10μ	Common, very densely caespitose on stumps of oak and sweet chestnut.
h, thin at the gin.	Mild, smell of iodoform.	White, amyloid, pip-shaped, 8-10 × 5-6μ; 2 or 4-spored.	Sac-shaped, bristling with long or short warts, 10-15μ wide.	Not uncommon, among leaves in deciduous woods.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
47. ***viscosa*** (Secr.) Maire	Like the preceding but with rusty red patches.	Like the preceding but usually pink.	Stouter than the preceding, light yellow, whitish.	[illegible], then reddish.	Very rancid.	Like the preceding.	As in the preceding.	Common under conifers, especially spruce.
48. ***epipterygioides*** Pearson	1-2 cm., hemispherical, centre depressed, greenish, disc dark green, sulcate, margin often crenate, pellicle viscid, elastic, separable.	Subdistant, arcuate, subdecurrent, delicate greenish-yellow, edge with a separable viscid filament.	5-8 cm. × 1-[illegible] mm., [illegible]ish, usually with stains at the base, often compressed, viscid.	—	—	Cartridge buff, amyloid, broadly elliptical, 9-10 × 7½-8 μ; basidia 2-spored.	Clavate with finger-like knobs.	Among moss in damp pine woods and on old pine stumps.
49. ***pelliculasa*** (Fr.) Quél. non Lange	1-2½ cm., convex, campanulate, smoky-grey, centre darker, striate to disc, pellicle viscid, separable.	Distant, arcuate, adnate to decurrent, united in a collar near stem, glaucous-white, edge with viscid filament.	2-6 cm. × 2-3 mm., [illegible] light grey, rigid, [illegible] very viscid.	—	—	Cartridge buff, amyloid, ellipsoid, 7-10 × 4-5 μ	Clavate with finger-like appendages.	Uncommon, gregarious on heaths and in coniferous woods.
50. ***vulgaris*** (Pers. ex Fr.) Kummer	½-1½ cm., convex, umbilicate, often with a small papilla, grey-brown or olive tinted, margin paler, striate, viscid, pellicle separable.	Distant, linear, adnate, white then grey, edge with a gelatinous filament.	3-4 cm. × 1-2 mm., [illegible]ish, thin, brown or whitish, tough, elastic, base strigose, root[illegible]	Faintly rancid.	White, amyloid, ellipsoid, 7-10 × 4-4½ μ	Digitate branched cells occur on gill edge in the gelatinous filament.	Uncommon in coniferous woods.
51. ***mackinawensis*** A. H. Smith	1-2 cm., convex to flattened, olive-grey, striate, viscid with a separable pellicle.	Subdistant, arcuate, subdecurrent, light grey, edge viscid.	1-2½ cm. × 1-2 mm., [illegible] grey, viscid.	Not distinctive.	White, amyloid, 7-9 × 3½-4 μ	Fusoid 30-45 × 8-13 μ on gill face, filamentous and contorted on gill edge.	Coniferous sticks and branches, uncommon.
(*o*) **Glutinipedes**								
52. ***clavicularis*** (Fr.) Gillet	½-2 cm., dry, subglobate, campanulate or conical, often with central papilla which flattens and collapses to give an umbilicus, dingy white with black or brown striae to the disc.	Crowded, rather broad, ventricose or wedge-shaped, adnate to subdecurrent, smoky-grey or greyish-white with a white edge.	4-5 cm. × 1-1[illegible] [illegible]ush in the [illegible]p, hyaline or with a [illegible]ate in the [illegible]m. tint, smooth, [illegible] elastic, very visci[illegible]	Mild, no smell.	White, amyloid, ellipsoid or obovate, apiculate, 7-8 × 5-5½ μ	Globose or pyriform, thick-walled, 10-15 μ wide, with short warts.	Uncommon, in coniferous woods.
(*p*) **Robustae**								
53. ***galericulata*** (Scop. ex Fr.) Kummer	2-8 cm., conico-campanulate, umbo obtuse, dingy grey, slightly ochraceous, smoky-brown or whitish, smooth, striate when moist, sulcate when dry.	Subdistant, ventricose, adnate with decurrent tooth, sometimes veined, whitish then flesh-pink.	5-12 cm. × 3-5 mm., [illegible]ish, [illegible]g often compressed, or horn colour, above, polished, strigose, fusoid, elastic, rooting.	Mild, smell faintly rancid.	Cartridge buff, amyloid, ellipsoid, 9-12 × 6-8 μ; basidia usually 2-spored.	Clavate, apex bearing numerous long or short filaments.	Very common, caespitose on stumps and dead branches.
54. ***inclinata*** (Fr.) Quél.	2-4 cm., ovoid then campanulate, obtuse, dingy brown or grey, margin white, shining when dry, striate or sulcate, margin often crenulate.	Crowded then sub-distant, linear or ventricose, adnate with decurrent tooth, whitish then pinkish.	6-10 cm. × 2-[illegible] [illegible]ish, silvery-white, [illegible] turns brown [illegible] chestnut, silky, twisted, rather [illegible] not tough.	Mildly rancid, smell very rancid.	Light buff, amyloid, broadly elliptical, 8-10 × 6-7 μ	Clavate, apex crowned with slender hairs, 20-30 × 5-10 μ	Common, very densely caespitose on stumps of oak and sweet chestnut.
(*q*) **Iodiformes**								
55. ***filopes*** (Bull. ex Fr.) Kummer	1-2½ cm., conico-campanulate with obtuse umbo, greyish-brown or blackish with paler margin, striate, smooth.	Crowded, ventricose or lanceolate, narrow, adnexed, white or grey at the base.	7-9 cm. × 1-2 mm., [illegible]ish, thin, [illegible] brown or smoky [illegible] above, equal, base strigose, [illegible]	Mild, smell of iodoform.	White, amyloid, pip-shaped, 8-10 × 5-6 μ; 2 or 4-spored.	Sac-shaped, bristling with long or short warts, 10-15 μ wide.	Not uncommon, among leaves in deciduous woods.

Species	Cap	Gills	Stem
56. *chlorantha* (Fr.) Kummer	1-2 cm., conico-campanulate, sometimes with a small papilla, obtuse, olive-green, striate-sulcate.	Crowded, narrow, adnate, white flushed greenish, edge sometimes darker.	3-10 cm. × 2-3 greenish-grey, firm ished, base white,
57. *arcangeliana* Bres. var. *oortiana* Kühner	1-5 cm., obtusely conical, grey-brown then whitish with an olive tint, sulcate-striate.	Crowded, linear, adnexed, white then pinkish, edge fimbriate.	2-4 cm. × 1-1½ mm., polished, lilaceous, when young, base tomentose.
58. *metata* (Fr.) Kummer non Kühner	1-2 cm., conical or subglobate, flesh-pink or buff, disc often papillate, striate when fresh.	Subdistant, linear, adnate, whitish or flesh-pink.	5-7 cm. × 1-2 mm., fragile but rather flesh-pink or horn base white hairy.
(*r*) **Minutissimae**			
59. *capillaris* (Schum. ex Fr.) Kummer	4-5 mm., convex or semi-globate, whitish or grey-brown with white margin, sulcate-striate, smooth.	Distant, few or even absent in minute specimens, whitish.	2-7 cm. × ½-1 mm., h white or apex bl flaccid, smooth or s pruinose, base s swollen, hairy.
60. *polyadelpha* (Lasch) Kühner	1-5 mm., convex, striately grooved, white, diaphanous.	Distant, narrow, short and vein-like in small specimens, arcuate and adnate in large ones.	3-20 mm., filiform, times sub-bulbou lowish pulverulen glabrous, base pub
(*s*) **Reliquae**			
61. *corticola* (Schum. ex Fr.) Kummer	4-12 mm., semiglobate, sometimes umbilicate, dark purple or blackish then azure blue, brown, lilac or pink, striate-sulcate, pruinate.	Distant, broad, adnate or subdecurrent, purplish then paler.	1-2 cm. × ½-1 mm., colour of cap, c pruinose, base st
62. *cinerella* Karst.	5-15 mm., semiglobate or convex, or slightly umbilicate, grey, striate or sulcate with brownish lines, smooth or pruinose under strong lens.	Subdistant, arcuate or wedge-shaped, decurrent, greyish-white, edge paler.	2-4 cm. × 1-2 mm., greyish-white, h base fibrillose.
63. *uracea* Pearson	1-3 cm., conical then expanded or upturned, umbo prominent and usually persistent, sulcate, smoky-grey, centre dark brown or black.	Distant, ventricose, deeply emarginate, dirty white or grey, tinted pink when old, edge straight or eroded.	2-3 cm. × 2-3 mm ished, smoky grey may be reddish base often hairy, rooting.
64. *fagetorum* (Fr.) Gillet	1-3 cm., conical then expanded often with a flat or depressed disc, dingy-white or grey with brownish striae, sulcate, smooth.	Distant, adnate or separating from stem but then united in a collar, white or flushed brown, rather elastic.	3-8 cm. × 1½-2½ equal, grey or h brown, base hairy.

Flesh	Taste and Smell	Spores	Cystidia	Habitat
	Mild, smell of iodoform.	White, amyloid, ellipsoid, 8-9 × 5-6μ	Pyriform, densely warted, 10-15μ wide.	Uncommon, in woods and hedges or on sand dunes.
in cap, grey em.	Mild, smell strong of iodoform.	Slightly buff, amyloid, 7-8 × 4½-5μ; pip-shaped.	Pyriform, densely warted, 12-14μ wide.	Not uncommon on stumps and branches in deciduous woods.
n.	Mild, smell of iodoform.	Ivory white, amyloid, ellipsoid, 7½-10 × 4-5μ	Pyriform, bristly with short warts, 15-20μ wide.	Common, singly or in troops in pastures and woods.
	No smell.	?White, amyloid, lanceolate, 7-11 × 2½-4μ; basidia 4-spored.	Pyriform, warted, 12-16μ wide, cap surface with densely warted hyphae.	Very common on beech leaves.
	No smell.	Lanceolate, amyloid, 7-10 × 3-4μ; basidia 4-spored.	Pyriform, warted, 14-22μ wide, cap surface with clavate or fusoid warted cells.	Said to be very common on oak leaves.
of cap, thin.	Mild, smell faint	White, amyloid, globose, 7-11μ	Clavate with short warts, or filiform appendages, 20-40 × 8-14μ	Common late in year on mossy trunks of deciduous trees.
	Mild or slightly bitter, smell of new meal.	Creamy-white, oblong, pip-shaped, amyloid, 8-10 × 4½-5μ	Clavate or subglobose, finely warted, 8-12μ similar cells on cap surface.	Very common, large troops on ground under pines in late autumn.
or greyish, at centre.	Taste slightly rancid, no smell.	Ivory-white, amyloid, broadly pip-shaped, 8-9 (11) × 6-7 (8)μ	Pyriform, warted, about 20μ wide.	Common on burned heaths, often attached to burnt heather.
hin.	Mealy.	White, amyloid, oblong-ellipsoid, 9-10 × 3-4½μ	Cylindrical with a few finger-like appendages, 30-40 × 7-11μ	Not common, stem attached to dead leaves, especially beech, often at right angles.

Species	Cap	Gills	Stem
56. *chlorantha* (Fr.) Kummer	1-2 cm., conico-campanulate, sometimes with a small papilla, obtuse, olive-green, striate-sulcate.	Crowded, narrow, adnate, white flushed greenish, edge sometimes darker.	3-10 cm. [illegible] greenish-grey, [illegible] ished, base white
57. *arcangeliana* Bres. var. *aartiana* Kühner	1-5 cm., obtusely conical, grey-brown then whitish with an olive tint, sulcate-striate.	Crowded, linear, adnexed, white then pinkish, edge fimbriate.	2-4 cm. × 1-1½ mm. polished, lilaceous when young, base tomentose.
58. *metata* (Fr.) Kummer non Kühner	1-2 cm., conical or subglobate, flesh-pink or buff, disc often papillate, striate when fresh.	Subdistant, linear, adnate, whitish or flesh-pink.	5-7 cm. × 1-2 mm. fragile but rather flesh-pink or horn base white hair
(r) **Minutissimae**			
59. *capillaris* (Schum. ex Fr.) Kummer	4-5 mm., convex or semiglobate, whitish or grey-brown with white margin, sulcate-striate, smooth.	Distant, few or even absent in minute specimens, whitish.	2-7 cm. × ½-1 mm., white or apex flaccid, smooth or pruinose, base swollen, hairy.
60. *palyadelpha* (Lasch) Kühner	1-5 mm., convex, striately grooved, white, diaphanous.	Distant, narrow, short and vein-like in small specimens, arcuate and adnate in large ones.	3-20 mm., filiform, times sub-bulbous, lowish pulverulent glabrous, base
(s) **Reliquae**			
61. *carticala* (Schum. ex Fr.) Kummer	4-12 mm., semiglobate, sometimes umbilicate, dark purple or blackish then azure blue, brown, lilac or pink, striate-sulcate, pruinate.	Distant, broad, adnate or subdecurrent, purplish then paler.	1-2 cm. × ½-1 mm. colour of cap, pruinose, base
62. *cinerella* Karst.	5-15 mm., semiglobate or convex, or slightly umbilicate, grey, striate or sulcate with brownish lines, smooth or pruinose under strong lens.	Subdistant, arcuate or wedge-shaped, decurrent, greyish-white, edge paler.	2-4 cm. × 1-2 mm. greyish-white, base fibrillose.
63. *uracea* Pearson	1-3 cm., conical then expanded or upturned, umbo prominent and usually persistent, sulcate, smoky-grey, centre dark brown or black.	Distant, ventricose, deeply emarginate, dirty white or grey, tinted pink when old, edge straight or eroded.	2-3 cm. × 2-3 mm. ished, smoky grey may be red base often hairy rooting.
64. *fagetarum* (Fr.) Gillet	1-3 cm., conical then expanded often with a flat or depressed disc, dingy-white or grey with brownish striae, sulcate, smooth.	Distant, adnate or separating from stem but then united in a collar, white or flushed brown, rather elastic.	3-8 cm. × 1½-2 equal, grey or brown, base hairy

Flesh	Taste and Smell	Spores	Cystidia	Habitat
	Mild, smell of iodoform.	White, amyloid, ellipsoid, 8-9 × 5-6μ	Pyriform, densely warted, 10-15μ wide.	Uncommon, in woods and hedges or on sand dunes.
in cap, grey cm.	Mild, smell strong of iodoform.	Slightly buff, amyloid, 7-8 × 4½-5μ; pip-shaped.	Pyriform, densely warted, 12-14μ wide.	Not uncommon on stumps and branches in deciduous woods.
ish.	Mild, smell of iodoform.	Ivory white, amyloid, ellipsoid, 7½-10 × 4-5μ	Pyriform, bristly with short warts, 15-20μ wide.	Common, singly or in troops in pastures and woods.
	No smell.	?White, amyloid, lanceolate, 7-11 × 2½-4μ; basidia 4-spored.	Pyriform, warted, 12-16μ wide, cap surface with densely warted hyphae.	Very common on beech leaves.
	No smell.	Lanceolate, amyloid, 7-10 × 3-4μ; basidia 4-spored.	Pyriform, warted, 14-22μ wide, cap surface with clavate or fusoid warted cells.	Said to be very common on oak leaves.
of cap	Mild, smell faint	White, amyloid, globose, 7-11μ	Clavate with short warts, or filiform appendages, 20-40 × 8-14μ	Common late in year on mossy trunks of deciduous trees.
	Mild or slightly bitter, smell of new meal.	Creamy-white, oblong, pip-shaped, amyloid, 8-10 × 4½-5μ	Clavate or subglobose, finely warted, 8-12μ similar cells on cap surface.	Very common, large troops on ground under pines in late autumn.
ish or grey, at centre	Taste slightly rancid, no smell.	Ivory-white, amyloid, broadly pip-shaped, 8-9 (11) × 6-7 (8)μ	Pyriform, warted, about 20μ wide.	Common on burned heaths, often attached to blunt heather.
thin.	Mealy.	White, amyloid, oblong-ellipsoid, 9-10 × 3-4½μ	Cylindrical with a few finger-like appendages, 30-40 × 7-11μ	Not common, stem attached to dead leaves, especially beech, often at right angles.

Species	Cap	Gills	Stem
65. *mirata* (Peck) Sacc.	4-14 mm., convex or subumbonate sometimes with a papilla, whitish, disc pale brown, slight olive tint when dry, striate-sulcate to the disc.	Subdistant, ventricose, fairly broad, adnexed, cream, edge white, eroded.	1-3 cm., filiform, smooth, polished, s swollen below, base times hairy.
66. *osmundicola* Lange	2-12 mm., conical, white to light-grey, sulcate-striate, densely covered with snow-white meal.	Subdistant, narrow, adnate, white.	2-3 cm. × 1 mm., t above, minutely h
66a. var. *imleriana* Kühner	Differs from the type only in	the cylindrical or forked hea	vily warted cells loose
III. MYCENELLA LANGE			
67. *lasiosperma* Bres.	1-2 cm., conical then expanded and umbonate, livid grey then somewhat yellow, disc darker, at first subviscid and clothed with grey pruina, then smooth and striate to the umbo.	Subcrowded, linear, adnexed, white.	3-4 cm. × 1-2 mm., above, honey-l below, firm, white ose, tapering to a villose rooting bas

berkeleyi Massee—based on Cooke's figure 224 (148) of *M. excisa* which resembles a dark-coloured *M. galericulata*, probably the four-spored form. The type specimen has amyloid spores 7-10 × 5-6μ.
bulbosa (Cejp) Kühner, 2.
capillaripes Peck—see *rubromarginata*, 6.
capillaris (Schum. ex Fr.) Kummer, 59.
carneosanguinea Rea—cystidia not described but almost certainly a form of *pelianthina*, 4.
chelidonia (Fr.) Quél.—doubtful, may be a form of *crocata*, 45.
chlorantha (Fr.) Kummer, 56.
chlorinella Lange as var. 15a.
cinerea Massee & Crossland—? form of *aetites*, 7.
cinerella Karst., 62.
citrinella (Pers. ex Fr.) Kummer—a doubtful species, Ricken's interpretation is suggestive of *flavo-alba*, 35.
citrinomarginata Gillet—a woodland form of *avenacea*, 5.
clavicularis (Fr.) Gillet, 52.
clavularis (Batsch ex Fr.) Gillet, 3.
clavus (L. ex Fr.) Rea = *adonis*, 23.
coccinea [Sow.] Quél. = *adonis*, 23. In *Syst. Myc.* Fries placed Sowerby's fungus as a synonym of *Ag. strobilinus* Pers. ex Fr.
codoniceps (Cooke) Sacc.—description inadequate.
collariata (Fr.) Quél.—identity uncertain.
consimilis (Cooke) Sacc.—*Ill.* 1150 (1186) is typical *ammoniaca*, 16.
corticola (Schum. ex Fr.) Kummer, 61.
crocata (Schrad. ex Fr.) Kummer, 45.
cruenta (Fr.) Quél. = *haematopus*, 11.
debilis (Fr.) Quél. resembles *sanguinolenta* but lacks both the red juice and the red gill edge. It is not yet recorded as British, but is likely to occur here.
dilatata (Fr.) Gillet—probably = *stylobates*, 1.
discopus (Lev.) Gillet—probably = *stylobates*, 1.
dissiliens (Fr.) Quél.—has different interpretations.

Flesh	Taste and Smell	Spores	Cystidia	Habitat
yish, very thin.	Mild, no smell.	White, amyloid, pip-shaped, 8-9 × 5½-6μ	Globose or sac-shaped, closely packed, warted.	Rare, on bark of living trees.
te, very thin.	Mild, no smell.	White, feebly amyloid, ellipsoid, 8-9 × 5½-6μ	Clavate, densely warted, 10-13μ wide, similar warted cells on cap form the meal.	Uncommon, on *Osmunda* fibre, etc., in greenhouses.
surface.				
te.	?	White, nonamyloid, globose, sparsely verrucose, 5-7μ diameter; basidia 2-spored.	Fusiform with long narrow neck, apex with or without slender hairs, 50-60 × 9-11μ, also on gill face.	Rare, on rotten logs. Brush-like cells occur on cap surface.

elegans (Fr.) Kummer, 41.
epipterygia (Scop. ex Fr.) Kummer, 46.
epipterygioides Pearson, 48.
erubescens von Höhnel, 29.
excisa (Lasch) Kummer—probably = *galericulata*, 53.
fagetorum (Fr.) Gillet, 64.
farrea (Lasch) Kummer may be *Lepiota sistrata* (Fr.) Quél.
fellea Lange = *erubescens*, 29.
fibula (Bull. ex Fr.) Kühner, 25.
filopes (Bull. ex Fr.) Kummer, 55.
flavescens Vel., 44.
flavipes Quél., 21.
flavoalba (Fr.) Quél., 35.
fuscopurpureus Cooke was a varietal name introduced to replace the var. *erosa* Lasch of *Ag. rubromarginatus* which grew on willow trunks; nobody knows what fungus was meant.
galericulata (Scop. ex Fr.) Kummer, 53.
var. *calopus* Fr. = *inclinata* 54.
galopus (Pers. ex Fr.) Kummer, 10.
gypsea (Fr.) Quél., 31; *sensu* Lange = *olida*, 34.
haematopus (Pers. ex Fr.) Kummer, 11.
hiemalis (Osbeck ex Fr.) Gillet, 37.
imleriana Kühner as var. 66a.
inclinata (Fr.) Quél., 54.
iris (Berk.) Quél. = *amicta*, 13.
juncicola (Fr.) Gillet—description inadequate.
kühneriana A. H. Smith, 19. This name was proposed for a North American species Smith thought probably identical with *M. pseudopura sensu* Kühner non Cooke but which he claimed had amyloid spores. Kühner's fungus certainly has nonamyloid spores and a new name is therefore required for it, see *pearsoniana*.
lactea (Pers. ex Fr.) Kummer, 30.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Cystidia	Habitat
65. *mirata* (Peck) Sacc.	4-14 mm., convex or subumbonate sometimes with a papilla, whitish, disc pale brown, slight olive tint when dry, striate-sulcate to the disc.	Subdistant, ventricose, fairly broad, adnexed, cream, edge white, eroded.	1-3 cm., fusiform, smooth, polished, swollen below, base sometimes hairy.	...eyish, very thin.	Mild, no smell.	White, amyloid, pip-shaped, 8-9×5½-6*μ*	Globose or sac-shaped, closely packed, warted.	Rare, on bark of living trees.
66. *asmundicola* Lange	2-12 mm., conical, white to light-grey, sulcate-striate, densely covered with snow-white meal.	Subdistant, narrow, adnate, white.	2-3 cm. × 1 mm., ...above, minutely ...	...hite, very thin.	Mild, no smell.	White, feebly amyloid, ellipsoid, 8-9×5½-6*μ*	Clavate, densely warted, 10-13*μ* wide, similar warted cells on cap form the meal.	Uncommon, on *Osmunda* fibre, etc., in greenhouses.
66a. var. *imleriana* Kühner	Differs from the type only in ...	the cylindrical or forked hea...	vily warted cells loos...	...ap surface.				
III. MYCENELLA LANGE								
67. *lasiosperma* Bres.	1-2 cm., conical then expanded and umbonate, livid grey then somewhat yellow, disc darker, at first subviscid and clothed with grey pruina, then smooth and striate to the umbo.	Subcrowded, linear, adnexed, white.	3-4 cm. × 1-2 mm., ...above, boney-... below, firm, white, ...ose, tapering to ... villose rooting ba...	...hite.	?	White, nonamyloid, globose, sparsely verrucose, 5-7*μ* diameter; basidia 2-spored.	Fusiform with long narrow neck, apex with or without slender hairs, 50-60×9-11*μ*, also on gill face.	Rare, on rotten logs. Brush-like cells occur on cap surface.

berkeleyi Massee—based on Cooke's figure 224 (148) of *M. excisa* which resembles a dark-coloured *M. galericulata*, probably the four-spored form. The type specimen has amyloid spores 7-10×5-6*μ*.
bulbosa (Cejp) Kühner, 2.
capillaripes Peck—see *rubromarginata*, 6.
capillaris (Schum. ex Fr.) Kummer, 59.
carneosanguinea Rea—cystidia not described but almost certainly a form of *pelianthina*, 4.
chelidonia (Fr.) Quél.—doubtful, may be a form of *crocata*, 45.
chlorantha (Fr.) Kummer, 56.
chlorinella Lange as var. 15a.
cinerea Massee & Crossland—? form of *aetites*, 7.
cinerella Karst., 62.
citrinella (Pers. ex Fr.) Kummer—a doubtful species, Ricken's interpretation is suggestive of *flavo-alba*, 35.
citrinomarginata Gillet—a woodland form of *avenacea*, 5.
clavicularis (Fr.) Gillet, 52.
clavularis (Batsch ex Fr.) Gillet, 3.
clavus (L. ex Fr.) Rea = *adonis*, 23.
coccinea [Sow.] Quél. = *adonis*, 23. In *Syst. Myc.* Fries placed Sowerby's fungus as a synonym of *Ag. strobilinus* Pers. ex Fr.
cydoniceps (Cooke) Sacc.—description inadequate.
dollariata (Fr.) Quél.—identity uncertain.
consimilis (Cooke) Sacc.—*Ill.* 1150 (1186) is typical *ammoniaca*, 16.
corticola (Schum. ex Fr.) Kummer, 61.
crocata (Schrad. ex Fr.) Kummer, 45.
cruenta (Fr.) Quél. = *haematopus*, 11.
debilis (Fr.) Quél. resembles *sanguinolenta* but lacks both the red juice and the red gill edge. It is not yet recorded as British, but is likely to occur here.
dilatata (Fr.) Gillet—probably = *stylobates*, 1.
discopus (Lev.) Gillet—probably = *stylobates*, 1.
dissiliens (Fr.) Quél.—has different interpretations.

...legans (Fr.) Kummer, 41.
...pterygia (Scop. ex Fr.) Kummer, 46.
...pterygioides Pearson, 48.
...rubescens von Höhnel, 29.
...scisa (Lasch) Kummer—probably = *galericulata*, 53.
...sigetorum (Fr.) Gillet, 64.
...urrea (Lasch) Kummer may be *Lepiota sistrata* (Fr.) Quél.
...ellea Lange = *erubescens*, 29.
...bula (Bull. ex Fr.) Kühner, 25.
...opes (Bull. ex Fr.) Kummer, 55.
...rubescens Vel., 44.
...vipes Quél., 21.
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...scopurpureus Cooke was a varietal name introduced to replace the var. *erosa* Lasch of *Ag. rubromarginatus* which grew on willow trunks; nobody knows what fungus was meant.
...lericulata (Scop. ex Fr.) Kummer, 53.
...r. calopus Fr. = *inclinata* 54.
...lopus (Pers. ex Fr.) Kummer, 10.
...psea (Fr.) Quél., 31; *sensu* Lange = *olida*, 34.
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...leriana Kühner as var. 66a.
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...s (Berk.) Quél. = *amicta*, 13.
...neicola (Fr.) Gillet—description inadequate.
...hneriana A. H. Smith, 19. This name was proposed for a North American species Smith thought probably identical with *M. pseudopura sensu* Kühner non Cooke but which he claimed had amyloid spores. Kühner's fungus certainly has nonamyloid spores and a new name is therefore required for it, see *pearsoniana*.
...ctea (Pers. ex Fr.) Kummer, 30.

lasiosperma Bres., 67.
leptocephala (Pers. ex Fr.) Gillet—seems identical with *alcalina*, 15.
leucogala (Cooke) Sacc., 10b.
lineata (Bull. ex Fr.) Kummer is a pale form of *chlorantha*, 56.
luteoalba (Bolt. ex Fr.) Kummer—identity doubtful.
mackinawensis A. H. Smith, 51.
marginella (Fr.) Kummer—Cooke's *Ill.* 1148 (957) appears to be *amicta*, 13.
megaspora Kauff. *sensu* Kühner, probably = *uracea*, 63.
metata (Fr.) Kummer, 58.
mirata (Peck) Sacc., 65.
mucor (Batsch ex Fr.) Gillet, 40.
multicolor Bres. as var. 18a.
nivea Quél. = *gypsea*, 31.
olida Bres., 34.
olivaceomarginata Massee = *avenacea*, 5.
oortiana Kühner as var. 57.
osmundicola Lange, 66.
parabolica (Fr.) Quél. has many interpretations and is best omitted.
paupercula (Berk.) Sacc. has not been recognised for many years. The type has nonamyloid spores 7-8 × 3½-5μ and it may not be a *Mycena* at all.
pearsoniana Dennis, 19.
pelianthina (Fr.) Quél., 4.
pelliculosa (Fr.) Quél., 49.
peltata (Fr.) Gillet—identity uncertain.
plicatocrenata (Fr.) Gillet—hardly distinct from *epipterygia*, 46.
plicosa (Fr.) Kummer—variously interpreted.
plumbea (Fr.) Karst.—a doubtful species.
polyadelpha (Lasch) Kühner, 60.
polygramma (Bull. ex Fr.) Kummer, 26.
prolifera (Sow. ex Fr.) Gillet—Sowerby's figure t. 169 suggests *inclinata*, 54.
psammicola (Berk. & Br.) Sacc.—seems to be a brownish form of *filopes*, 55.
pseudopura (Cooke) Sacc. = *pura* 18; Cooke's material has amyloid spores. See *kühneriana* and *pearsoniana*.
pseudoradicata Lange as *Collybia* = *subalpina*, 28.
pterigena (Fr.) Kummer, 43.
pullata (Berk. & Cooke) Sacc.—identity uncertain.
pumila Lange as var. 26a.
pura (Pers. ex Fr.) Kummer, 18.
quisquiliaris (Joss.) Kühner, 38.
rorida (Scop. ex Fr.) Quél., 14.
rosella (Fr.) Kummer, 42.
rubro-marginata (Fr.) Gillet, 6; Lange called this *M. plicosa* var. *marginata*.
rugosa (Fr.) Quél.—a rugose form of *galericulata*, 53.
saccharifera (Berk. & Br.) Gillet—probably = *tenerrima*, 39.
salicina Vel., 33.
sanguinolenta (A. & S. ex Fr.) Kummer, 12.
setosa (Sow. ex Fr.) Gillet = *mucor*, 40.
seynii Quél., 9.
simillima Karst.—identity uncertain.
smithiana Kühner = *debilis sensu* Lange, see above.
speirea (Fr.) Gillet, 36. Singer thinks Kühner's interpretation erroneous and calls it *Marasmiellus camptophyllus* (Berk.) Singer.
stannea (Fr.) Quel.—probably a dry form of *aetites*, 7.
strobilina (Pers. ex Fr.) Kummer = *adonis*, 23.
stylobates (Pers. ex Fr.) Kummer, 1.
subalpina von Höhnel, 28.
sudora (Fr.) Gillet—a doubtful species.
sulphureomarginata Lange as var. of *luteoalba* = *flavescens*, 44.
swartzii (Fr.) Kühner as var. 25a.
tenella (Fr.) Quél. = *metata*, 58.
tenerrima (Berk.) Sacc., 39.
tenuis (Bolt. ex Fr.) Gillet—not clearly defined.
tintinnabulum (Fr.) Quél.—has been variously interpreted.

trachyspora Rea = *olida*, 34.
uracea Pearson, 63.
urania (Fr.) Gillet—A. H. Smith interprets this as a blue-grey species of Granulatae with amyloid spores 7-9 × 4-5 μ. The British record was Massee's and awaits confirmation.
viscosa (Secr.) Maire, 47.
vitilis (Fr.) Quél., 27.
vitrea (Fr.) Quél.—variously interpreted; Cooke's *Ill.* 237 (160) is probably *subalpina*, 28.
vulgaris (Pers. ex Fr.) Kummer, 48.
zephira (Fr.) Kummer, 20.

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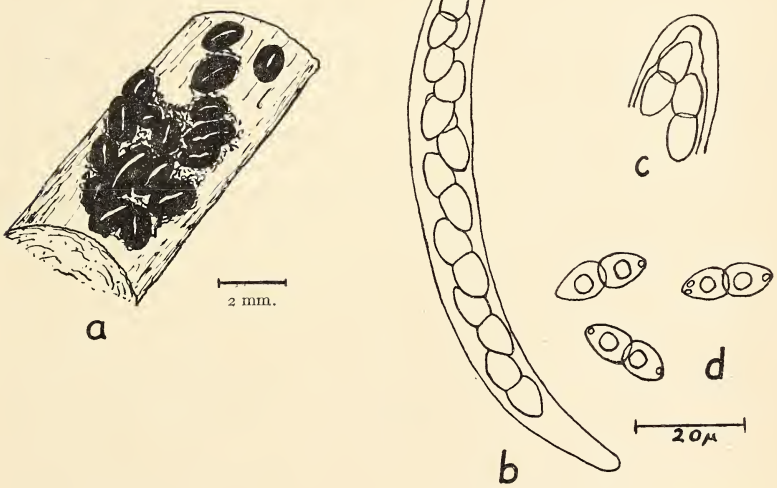
ON *GLONIUM AMPLUM*

G. R. Bisby and C. Booth,
Commonwealth Mycological Institute, Kew.

Glonium amplum (Berk. and Br.) Duby, one of the Hysteriales, was first described a century ago but has remained an uncertain species (see Bisby, *Trans. Brit. Mycol.*



A Habitat sketch of hysterothecia **B** Young ascus **C** Tip of mature ascus **D** Ascospores

Soc., **27**, p. 23, 1944). It was based on collections by Bloxam near Twycross, Leicestershire. The spores in asci are hyaline and two celled, as in *Glonium*, but a few free spores in Bloxam's material were similar but brown, suggesting that the fungus was a species of *Bulliardella*. A collection made during the 1954 Spring

Foray in Yorkshire provides a second station for this rare fungus. This collection is now described briefly.

Hysterothecia single or usually gregarious to crowded, on a loose subiculum of brown hyphae, dull black, oval to elliptical, 0·6-1·4 × 0·35-0·52 mm., mostly oval and about 0·65 × 0·45 mm., with an irregular longitudinal central slit; outer wall of hysterothecia brittle, carbonaceous, inner hymenial layer colourless to yellowish; asci 8-spored, broadly cylindrical, 100-120 × 10-13μ; ascospores obliquely monostichous to distichous, with a central septum, hyaline when young but becoming light brown at maturity, commonly guttulate, 15-19 × 5-6μ; paraphyses branched, abundant.

On dead twigs of *Erica* sp., near Grantley Hall, Yorks., V.C. 64, April 24th, 1954, coll. C. Booth; filed as Herb. I.M.I. 56611.

Although asci and spores were not very well developed in this material, it strongly resembles *Bulliardella sphaerioides* (Karst.) Rehm as redescribed by Lohman (*Pap. Michigan Acad. Sci.*, **17**, pp. 155-62, 1938). It lacks, however, the pinkish tinge in the hymenium which Lohman noted in the type and in an American collection.

The name *B. sphaerioides* is based on *Hysterium sphaerioides* Karst. (1873), which is not only a later homonym of *H. sphaeroides* Alb. & Schw. ex Fr. (1823) (unless the slight difference in spelling be construed as making the epithets distinct), but it is also nineteen years later than the name *Aylographum amplum* Berk. & Br. (1854) on which *Glonium amplum* is based. While *G. amplum* is probably the same fungus, the type material is, we consider, too poor to serve as a basis for the name, whereas Karsten's type material was found by Lohman to be excellent. It is hoped, therefore, that further collections of this species will be made in Great Britain.

The sixteen species of Hysteriales known in Britain include a few that are common, a few rarely collected but probably fairly common, and three or four that seem to be very rare. The species here discussed is one of the rarest. *Lophium elatum* Grev. ex Fr. has been recorded in Britain but once, though there are several collections in continental Europe, *Hysterium insidens* (see Hughes, *The Naturalist*, pp. 93-98, 1952) probably occurs in Britain, but is known here at present only from one record of the conidial state in Yorkshire.

Our thanks are due to Dr. Metcalfe, Jodrell Laboratory, Kew, for identifying the host.

FIELD NOTES

***Trichia floriforme* Lister—an addition to the Yorkshire Mycetozoa.**—On April 25th, 1954, during the Spring Foray of the Mycological Committee, Mr. J. R. Norris of Leeds made an interesting find in a little gully near the refreshment house at Fountains Abbey.

This collection of Mycetozoa had beautiful shiny black ovate sporangia, was obviously immature and defied local identification. I sent a part of the collection to Mr. Howard of Norwich who identified the specimen as *Trichia floriforme* Lister and sent me a small portion of Miss Lister's original collection of the species for comparison.

Mr. Howard said that although he had been collecting Mycetozoa since 1913 he had only collected this species once and that was within the last two or three years.—A. C. Collinge.

Into the Blue, by **Lionel Ferguson.** Pp. 255 with 16 plates. Collins, 1955. 16/-.

Students reading geography at Cambridge have to write a thesis on any aspect of the subject as long as it is original. Instead of a study of some local parish or similar topic, the author of this book and four fellow students decided to write on Lake Tana, the relatively unexplored source of the Blue Nile in Ethiopia, and in 1953 organised an expedition there to get first-hand knowledge. This book is noteworthy in showing how much can be achieved by people with imagination and enthusiasm who are prepared to travel hard and far on a little money. A well-written and entertaining account is given of the 68-day journey there *via* North Africa in a second hand £95 Ford staff car (loaded to a total weight of 3 tons!), the fortnight by the Lake, and the return journey through Syria and Turkey. A short account is given of the people of Lake Tana and their way of life, but not very much precise information about the flora, fauna or geology of the region.

B.A.K.

EPIPACTIS PHYLLANTHES IN YORKSHIRE

D. P. YOUNG

Epipactis phyllanthes G. E. Sm. is an uncommon orchid which is distinctive although it has numerous and often puzzling variants. Some of these forms have been distinguished as *E. vectensis* Brooke & Rose and *E. pendula* C. Thomas, and the name and description of *E. phyllanthes* itself was overlooked for a hundred years. There does not, however, seem to be any solid basis for separating the various forms, at least not at the level of species (Young, 1952).

Its distribution is still incompletely known. In this country it occurs mainly in woods, willow-holts and other shady places on calcareous or non-acid soils, in localities scattered from Somerset and Gloucester to Suffolk and Kent, and in Flintshire; and also on the sand-dunes on the Lancashire and Glamorgan coasts and on the Irish coast opposite. Abroad it has been found on the west coast of France, the foothills of the Pyrenees, and in Denmark, but it doubtless occurs elsewhere.

As already briefly reported (Shaw, 1955), Mrs. I. Grewe of Hull was fortunate enough to find *E. phyllanthes* in 1950 in a beech plantation on the wolds of south-east Yorkshire, thus affording a big extension to its known range in this country. Last year she very kindly took me to see the colony. We saw some two dozen plants scattered over an area of several acres under young beech trees and conifers. This represents quite a large colony as far is this species is concerned; however, the number of plants visible seems to have varied from year to year. It should be explained that although Epipactis are long-lived perennials, their roots do not send up a flowering stem regularly every year, so that the number and position of plants may seem to fluctuate, quite apart from casualties to attack by rabbits, aphis, or fungi.

At the time of my visit the flowers were not quite out, but a few flowers had already shed their pollen—*phyllanthes* is self-fertilised. Later, Mrs. Grewe kindly sent me a few mature flowers. All the flowers examined had a rather small hypochile (3·8–4·0 mm. long) to the lip, with a longer epichile (4·8–5·0 mm.) which was narrow and pointed but not reflexed. The anther was sessile. From the lip structure the plants come under var. *vectensis* (T. & T. A. Steph.) Young, and resemble both in flower structure and habitat the plants of southern and eastern England rather than those of the Lancashire dunes and Flintshire limestone (var. *pendula* Young, with reflexed epichile equalling the hypochile) which are geographically their nearest neighbours.

The discovery of *E. phyllanthes* in Yorkshire opens up the prospect that it might occur on the chalk or oolite in Lincolnshire or Northants, intervening between the Yorkshire station and its next known localities southwards in Bedfordshire and Cambridge. It would be worth searching for both there and in other parts of the Yorkshire wolds. A full description of the species has been given elsewhere (Young, 1952), and it appears in the *Flora of the British Isles* (Clapham, Tutin & Warburg, 1952) and *Wild Orchids of Britain* (Summerhayes, 1951) as *E. vectensis*. A good coloured photograph is in the last book. Briefly, it can be distinguished by the very pendulous flowers, which hang vertically downwards as if too weak to hold themselves up, and by the almost completely glabrous stem. The flowers are small, green with hardly any trace of red or purple colour, and often do not open properly or even not at all, and the ovaries are comparatively large. The leaves are few, smaller than in *E. Helleborine*, of a smooth thick texture, and often noticeably acuminate. As mentioned in the first paragraph, the plant grows in a variety of shady habitats, but it is usually only found in small numbers. It is useless to look for it amongst rank undergrowth. It tolerates and in fact often grows amongst a low ground cover of ivy or sanicle, but anything taller such as dog's mercury seems to crowd it out.

I am indebted to Mr. V. S. Summerhayes for bringing Mrs. Grewe's discovery to my notice.

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GREAT NORTHERN DIVER, INLAND AT FAIRBURN

R. F. DICKENS

On Saturday, November 20th, 1954, after a period of easterly winds, J. Cudworth, J. Ogden and R. F. Dickens came across a winter plumage diver on the main open water at Fairburn. Conditions of visibility were poor at the time, owing to fog, and all that could be safely said of the bird was that its heavy, straight bill ruled out Red-throated Diver.

On the following day, R.F.D. again saw the bird and, although visibility was still not very good, formed the opinion that it was Great Northern Diver. The bird did not appear as large as one might expect for that species. This was subsequently also remarked on by several other observers and may have been due to the fact that the bird rode so low in the water that its total length was not apparent. When it was seen a week later, close to a Shelduck, and was noted to be between $1\frac{1}{4}$ and $1\frac{1}{3}$ times larger than that species, its actual size became obvious. In earlier visits it was not seen sufficiently close to other species for a comparison of size but its heavy-headed appearance, very stout bill, steep forehead and flattened crown pointed to Great Northern Diver. In addition, the crown was slightly darker than the mantle and back, not lighter as would be the case with Black-throated Diver. The paler markings on the back and more especially on the mantle, gave an impression of barring. In the winter plumage of Black-throated Diver, the paler markings give a scaly effect. The throat of this particular bird at Fairburn had traces of a black, but not continuous band with white above it, suggesting the breeding plumage of Great Northern Diver.

It was seen at down to fifteen yards, in good light, on Wednesday, November 24th by K. Dawson, who was able to make some excellent sketches; and on Sunday, November 28th, by R.F.D. again and A. H. B. Lee. These same two observers, together with P. Saunders of the Trent Valley Bird Watchers, watched the diver again on December 5th, when a Black-necked Grebe was also present. J. Cudworth saw the bird for a second time on this same day. It was also seen by B. and C. Winn and B. Dale. December 5th is the last date on which it was noted.

The diver was not always easy to find during its stay, since it spent so much time, and travelled so far and so quickly under water. Dives of thirty-five seconds were frequently recorded and when the bird was fishing thus, it was usually up for less than five seconds; often, in fact, not completely surfacing at all. Detailed observations could only be made when the bird ceased feeding for some length of time. Then, it could be watched preening, ' standing-up ' in the water flapping its wings vigorously, and swimming on the surface quite unconcerned about the presence of observers. It was comparatively tame and not infrequently swam within twenty yards of the road.

Under favourable conditions of light and distance, the red eye was clearly seen and the bill appeared distinctly whitish, especially at the base and along the cutting edges. This probably indicated a young bird—although the bill looked very white it was not the shape of that of the rarer White-billed Diver.

A diver, which may have been this same bird, was seen by several local people earlier during the week prior to November 20th. It is of interest that a Great Northern Diver was seen on Blithfield Reservoir, Staffs., from October 30th to December 9th and another at Cannock Chase Reservoir Staffs., from November 14th to December 11th (J. Lord, *in litt.*); the latter dates closely coinciding with the dates of the Fairburn bird.

A NEW FLORA OF CUMBERLAND

The Carlisle Natural History Society is proceeding with the compilation of a new *Flora of Cumberland*—a project initiated in 1946—and would welcome any assistance in recording the distribution of plants in the county. It is intended that the new Flora shall include flowering plants, ferns, mosses, liverworts and lichens, and the Society would be grateful for records of these plants in Cumberland. The county distribution of many familiar plants is incompletely recorded, so that information about common species is needed as well as for the rare and local plants. Recent verification of many old records is also desirable.

Any such information would be fully acknowledged in the published work. Records should be sent to D. A. Ratcliffe, 72 Newtown Road, Carlisle.

YORKSHIRE NATURALISTS' UNION (VERTEBRATE SECTION) ORNITHOLOGICAL DIVISION

Chairman: E. W. Taylor, C.B.E., F.R.S.

Hon. Secretary: R. F. Dickens, 8 Marlborough Gardens, Leeds 2.

Recorders:

General Editor and West Riding: Ralph Chislett, Masham.
East Riding: H. O. Bunce, 37 Auckland Avenue, Hull.
North Riding—*East:* A. J. Wallis, 13 Raincliffe Avenue, Scarborough.
West: J. P. Utley, B.Sc., M.B.O.U., 24 Neile Close, Romanby, Northallerton.
York District: E. W. Taylor, M.B.O.U., 11 The Avenue, York.
Spurn Bird Observatory: G. H. Ainsworth, 144 Gillshill Road, Hull.

Report for 1954

Attendance at the five Y.N.U. field meetings in the year helped our knowledge of distribution and were reported in the October *Naturalist*. Matters of importance were included in the short Interim Report published in *The Naturalist* for January, 1955.

We cannot know what bird may visit even a half-acre garden unless we are watching in it all the time. The odds are tall against a bird new to the county being seen, identified, and recorded should such occur; but Yorkshire bird-watchers beat the odds twice in 1954. One of the birds, the Stilt Sandpiper, was also new to Britain; the other, the Buff-breasted Sandpiper, had previously occurred in other counties some twenty times. Both are native to North America.

The year has had several unusual features to which references will be found later. Most of them were due to weather conditions. Mildness prevailed until mid-January, whereafter a cold spell ruled until February 12th, with ducks and divers displaced. Short mild periods alternated with longer cold ones until mid-June with frequent rain, heavy on May 21st, and floods followed. Fine intervals in summer were not sustained for long, and there were floods out in August for immigrant waders to visit. Rain had fallen at Masham on twelve days prior to August 25th, after which were five fine days. Results of much interest followed gales and further flooding in autumn, and are recorded hereafter. October 17th and November 6th were significant with many species. The paucity of waders at the High Royd S.F. referred to by R. Crossley may not be unconnected with the prevalence of flooded areas in the Vale of Pickering and elsewhere which many waders found inviting before they passed westward or south.

The Spurn Bird Observatory

(By G. H. Ainsworth and R. Chislett)

Some 200 people visited the observatory for periods varying from one day to three weeks, many repeating their visits. Financially we are sound, the charge we all pay for each night in the cottage enabling us to pay our way without outside assistance. Since those who take their meals in the cottage cause more expense than those who meal at the inn, it has been suggested they should pay an extra sixpence per night. Easterly gales towards the end of the year were too late to affect many passage migrants, but damage ensued to our traps and huts which has to be made good. Those winds also forced upon our notice numbers of oiled Guillemots, Razorbills, Puffins and divers, and one or two Gannets.

Species recorded numbered 171, and 2,016 birds were ringed in the fourteen months to December 31st, the B.T.O. Ringing Committee having altered the date to which schedules are to be made. The species ringed included: Wryneck, Icterine Warbler, Black Redstart, Nightingale, Barred Warbler, Red-backed Shrike, Little Owl, Tree-Creeper, Little Auk, Common Gull, Mallard, Puffin, and Coal-Tit. The last five named were ringed at Spurn for the first time. Species only observed included: Bluethroat, Cirl and Ortolan Buntings, and unusual waders attracted to dykes extended by the new sea-defences built following the floods of early 1953, and to pools and lagoons caused by the rains.

We aim to have the observatory manned at all times. The dates of especially interesting periods cannot be foretold and vary from year to year owing to forces

Birds Ringed at Spurn

	Total for 8 years to 30/10/53	Ringed 14 months to 31/12/54	Total to 31/12/54
Mallard		1	1
Long-tailed Duck	1		1
Common Scoter		1	1
Sheld-Duck	1	1	2
Sparrow-Hawk	16	1	17
Merlin	2		2
Kestrel	7	2	9
Red-legged Partridge	20	3	23
Common Partridge	5		5
Corncrake	1		1
Moorhen	5		5
Oystercatcher	1		1
Lapwing	3		3
Ringed Plover	68	1	69
Common Snipe	1		1
Woodcock	4		4
Green Sandpiper	1		1
Redshank	7		7
Dunlin	7		7
Common Gull		3	3
Little Tern	54		54
Razorbill	1	1	2
Little Auk		1	1
Guillemot	4		4
Puffin		2	2
Wood-Pigeon	1		1
Turtle-Dove	1		1
Cuckoo	84	1	85
Little Owl	3	1	4
Long-eared Owl	3		3
Short-eared Owl	1		1
Swift	2		2
Hoopoe	1		1
Greater Spotted Woodpecker	1		1
Wryneck	7	5	12
Skylark	73	8	81
Swallow	166	32	198
Sand-Martin	34		34
Rook	1	1	2
Jackdaw	6		6
Magpie	8	3	11
Jay	1		1
Great-Tit	46	1	47
Blue-Tit	76	3	79
Coal-Tit		1	1
Willow-Tit	2		2
Long-tailed Tit	3		3
Tree-Creeper	1	1	2
Wren	122	25	147
Mistle-Thrush	1		1
Fieldfare	20	1	21
Song-Thrush	393	18	411
Redwing	82	19	101
Ring-Ousel	10		10
Blackbird	1330	612	1942
Carried forward	2688	749	3437

	Total for 8 years to 31/10/53	Ringed 14 months to 31/12/54	Total to 31/12/54
Brought forward	2688	749	3437
Wheatear	73	18	91
Stonechat	16	5	21
Whinchat	99	14	113
Redstart	316	37	353
Black Redstart	26	6	32
Nightingale	4	2	6
Bluethroat	3		3
Robin	1001	26	1027
Reed-Warbler	2		2
Sedge-Warbler	129	9	138
Icterine Warbler	2	1	3
Blackcap	31	7	38
Barred Warbler	6	3	9
Garden-Warbler	59	33	92
Whitethroat	667	97	764
Lesser Whitethroat	33	8	41
Willow-Warbler	870	112	982
Greenish Warbler	1		1
Chiffchaff	54	3	57
Wood-Warbler	10	1	11
Yellow-browed Warbler	3		3
Goldcrest	193	12	205
Spotted Flycatcher	79	16	95
Pied Flycatcher	368	52	420
Red-breasted Flycatcher	7		7
Hedge-Sparrow	322	53	375
Meadow-Pipit	437	73	510
Tree-Pipit	8		8
Rock-Pipit	4		4
Pied Wagtail	2		2
White Wagtail	1		1
Yellow Wagtail	5		5
Waxwing	1		1
Great Grey Shrike	4		4
Woodchat Shrike	1		1
Red-backed Shrike	2	3	5
Starling	468	79	547
Greenfinch	1092	142	1234
Goldfinch	9	3	12
Siskin	3		3
Linnet	1468	193	1661
Redpoll, Lesser	5		5
Redpoll, Mealy	9		9
Bullfinch	1		1
Crossbill	4		4
Chaffinch	976	82	1058
Brambling	212	77	289
Yellow-Hammer	59	2	61
Corn-Bunting	1	5	6
Reed-Bunting	319	30	349
Snow-Bunting	101	7	108
House-Sparrow	1184	55	1239
Tree-Sparrow	20	1	21
Total	13458	2016	15474

beyond our control. Readers may like a brief indication of some of the more interesting periods of 1954.

Some of the common wading birds reach maximum numbers in winter. Grey Plovers numbered *c.* 500 on January 1st and Knots *c.* 3,000 on March 2nd, when *c.* 500 Scaup ducks could also be seen. At such times parties of Snow Buntings occur.

Spring passage was late. The wave of Willow-Warblers, Redstarts and Pied Flycatchers broke in the period April 29th to May 6th; at least one Blackcap was then moving northward, as we suspect were the other related species.

Whimbrels to the number of 63 occurred on August 1st to 2nd; and warbler passage south began. On August 20th rain fell and the breeze was easterly, and again in the early part of Saturday, the 21st—an ideal combination for bringing passage migrants down to the Spurn bushes; most of the birds had gone by the 23rd. In this short period the peninsula was thronged with Wheatears, Pied Flycatchers, Willow and Garden Warblers, Whitethroats and Yellow Wagtails, and fewer Redstarts, Whinchats, Wrynecks (six), and odd Barred and Icterine Warblers and a Red-backed Shrike. Unusual waders followed the passage of passerines and monopolised much attention until September 11th; included were Ruffs, Curlew Sandpipers, Little and Temminck's Stints, Green and Wood Sandpipers, Greenshanks and a Spotted Redshank; and the two birds new to Yorkshire.

September 12th was a remarkable day for visible migration, with Swallows and Meadow-Pipits travelling in large numbers into a south-west wind, and very few alighting. September 29th to October 3rd produced a Red-necked Phalarope, a Little Gull, a shear-water, and a considerable passage of linnets and pipits. Large numbers of Redwings, Fieldfares and Blackbirds passed on October 17th; and on the 27th, with parties of Skylarks, Bramblings and Starlings added, it was a joy just to watch the procession of flock after flock. November 6th provided the trapping sensation of the year with 320 birds ringed in rain and a north-easter.

Spurn never lacks interest, but in every year some periods are more interesting than others, and may be 'hit' by week-end visitors and be missed by some who stay longer, who, however, have more chances staked in the British weather lottery.

Observation of birds at the Point and in the Beacon area, and the making of counts of birds passing at one place, are usually left for intervals between the routine visits to the traps. If trapping is brisk there may be no legitimate intervals unless the party is big enough to divide. The question of which side of the work is the more important may arise. We would ask our helpers to remember that time, labour and materials expended on the traps is wasted if they are not properly baited and used. Moreover, the presence of many a species would never have been suspected if the bird had not been caught, which particularly applies to rare passerines. Personal enjoyment of bird-engendered exhilaration is not the primary purpose of the observatory but one of its by-products.

The Committee wish to thank all who have helped to achieve the observatory's aims, whether by gifts of blankets, mats, tools and utensils, or books; or by help with repair work; or by thought, energy and time with field work; and particularly those who have recorded events *adequately* in our books. The collective value suffers if individuals do not play a full part.

The High Royd Trap

Roy Crossley, recorder for the Halifax S. S., writes that no large movements of wagtails, pipits or Willow-Warblers eventuated in 1954. Consequently, in combination with a shortage of helpers, fewer birds were ringed: 188 at High Royd, and with nestlings and trappings elsewhere added, a total of 285. 'The wet weather must have played a large part.' Almost all the sewage beds were flooded leaving little feeding ground for pipits, wagtails or waders. Interesting recoveries include: a Blue-Tit ringed 13/11/48, re-trapped 14/11/54; a Willow-Warbler of 29/7/53, re-trapped 1/7/54; and a Yellow Wagtail ringed 11/9/51 found dead at Ben Rhydding in August 1954, which tends to confirm that passage birds at High Royd may breed in the Dales.

Wharfedale N. S. Trap

W. F. Fearnley writes that during the 15 months to December 31st, 1954, 654 birds have been ringed of 44 species, making a total since 1948 of 2,647 covering 67 species. No birds have been recovered at long distances, but several re-traps are interesting in point of dates. A Chaffinch ringed 2/1/50 was re-trapped 22/2/52

and again on 1/1/54. A Blackbird ringed 26/2/50 was re-trapped 3/1/54; and one ringed 15/7/50 was re-trapped on 26/1/52 and on 30/1/54; a third ringed 23/4/51 occurred again on 27/1/52, 6/1/53, and 28/2/54. A Starling ringed 10/3/52 was re-trapped 22/4/54. Quite a number of birds ringed in 1953 were re-caught in 1954.

This year we bow to custom and use the B.O.U. order based on Wetmore in the ' Classified List '. The change caused extra trouble but will help those who have become accustomed to the Wetmore order and who study regional reports comparatively. It will be less useful for comparisons between our past and present reports, but I have placed the Witherby numbers in brackets after the specific names.

It only remains for me to tender my thanks and those of my colleagues to all who have contributed. We shall all regret the retirement from office of R. M. Garnett, who has been a tower of strength as Recorder for the North Riding (East) from 1944, when he succeeded the late W. J. Clarke of Scarborough. R.M.G. is already giving his support to A. J. Wallis and hopes with me that his example will be followed. My own successor as Hon. Secretary, R. F. Dickens, asks me to stress that his duties do not cover records for the West Riding, nor editing either records or reports, matters connected with which should continue to be sent to me.

The following species known to have occurred during the year are not included in the Classified List: Red Grouse, Red-legged and Common Partridges, Pheasant, Rock Dove, Wood-Pigeon, Jay, Marsh-Tit, Long-tailed Tit, Dipper, Bullfinch, House-Sparrow.

CLASSIFIED LIST

1. Black-throated Diver (378).—A bird remained at Brownhill Reservoir, near Holme, from February 6th to 25th (E. Battye, E.C.J.S., C.R.S.); and there was one at Gouthwaite on February 21st and 22nd (A.F.G.W., C.D.R., C.R.S.). The latter bird surfaced once with a trout too large for swallowing that had to be released. A bird passing north at Bridlington on February 28th was in almost complete breeding plumage (G.J.B.). All the appearances inland of divers coincided with stormy weather.

2. Great Northern Diver (376).—At Brownhill Reservoir a diver appeared that was larger than the Black-throat already there on February 23rd, and was considered of this species which Mr. Hadfield's photographs tended to confirm. The two birds did not consort together. A Great Northern Diver at Stocks Reservoir on February 27th was comparable with Goosanders present (J.K.F., A.E.L.). Two Great Northerns were seen on several dates from January 10th to March 9th at Teesmouth (P.J.S., A.B.). In autumn a Great Northern Diver appeared at Fairburn from November 20th to December 5th (K.D., J.C., A.H.B.L.), and one off Teesmouth on several dates from October 5th (P.J.S., A.B.), and one off Marske on November 30th (D.R.S., P.S.); and one at Spurn on August 31st (R.F.D., E.E.J., P.W.), and one on November 13th (R.F.D.).

4. Red-throated Diver (379).—One at Eccup on January 31st flew up and down the reservoir in the evening (R.V.J., J.R.G., W.E.D.). A bird at Chelker Reservoir on May 9th appeared to have been dead for a fortnight or more (J.C.L.). There was one at Brotherton Ing on March 7th (A.H.B.L., R.F.D.). Birds were noted on or near the coast from January to May 8th (one at Reighton in breeding plumage (H.O.B.)), and from September 6th to the year end. The heaviest passages were *c.* 40 off Spurn on February 27th, 44 on November 14th; and *c.* 228 between 10-30 and 11-30 a.m. on December 18th (A.H.B.L.). Several were found oiled.

5. Great Crested Grebe (370).—*C.* 114 birds produced at least *c.* 50 young on Yorkshire waters. Some made second and third attempts as the result of flooding and of being robbed. The maximum of 38 adults at Fairburn in July had fallen to two by October 10th—a bird had been seen there on January 10th (R.F.D., etc.). Groups of birds were on the sea in Bridlington Bay from September to December (G.J.B., F.W.).

6. Red-necked Grebe (371).—On January 31st Red-necked Grebes occurred —one at Eccup Reservoir (A.H.B.L., H.W.); and one at Wintersett Reservoir (E.G., J.C.). A female was picked up dying at Bridlington on February 24th and brought to G. J. Brown, its measurements read—left wing 176 mm., bill 40 mm., tarsus 52 mm. One occurred in Scarborough Harbour on February 27th-28th;

and one on Peasholm Lake on March 7th (A.J.W.). One at Gouthwaite Reservoir on August 28th was in partial breeding plumage (J.B.N.). One at Eccup Reservoir on November 24th was in winter plumage (D.B.I.).

7. Slavonian Grebe (373).—There was one with Scaup in Whitby Harbour on February 18th (A.B.W.); two were at Wintersett Reservoir on February 28th (E.G., A.F.); one at Eccup Reservoir on March 7th (R.V.J., W.E.D.), and on the 14th (A.H.B.L.); one at Swinsty Reservoir on April 4th (W.F.F., H.J.M.); one at Eccup on November 24th (D.B.I.), and on the 25th (D.A.R.). At Gouthwaite on November 29th a bird whinnied, and by imitating the cry A.F.G.W. called it up to a range of *c.* 15 yards where it swam backwards and forwards calling furiously (D.R.S. and P.S.). A bird was found dead on the roadside at Cayton Bay on March 21st (A.J.W.). The Bempton village pond showed a Slavonian Grebe on March 28th (M.W.); and there was one on the East Park Lake, Hull, on February 26th (F.E.C.) to March 1st (M.W.).

8. Black-necked Grebe (374).—No report of breeding but a number of birds have occurred. An injured bird at Whitby died on February 27th (A.B.W.). Two birds were at Bottomboat on July 21st, and on October 3rd (A.F., E.G.); one at Grimwith Reservoir on August 15th (K.C.C.); one at Swillington Ing on September 19th (G.C., K.S.); one at Sunk Island on November 28th (W.A.B.); and one at Fairburn on the same day (R.F.D., P.S., A.H.B.L.) which was still there on December 5th.

9. Little Grebe (375).—There was a half-grown young bird on Denaby Ings on October 30th (J.S.T., A.E.P., J.B.). Some 20 pairs bred at Fairburn; and smaller numbers at many places. Timed dives of birds breeding on a pond near Barnoldswick averaged 19.6 seconds throughout the year (J.K.S.).

[10. Albatross (369).—On September 28th, 1954, at 06.50 G.M.T., two large birds flew north *c.* 300 yards from the Spurn narrow neck. H.G.B., J.D.C. and D.E.M.C. agreed they were not gulls or Gannets. Heads, necks and under-bodies were white; backs and upper wings black, wings were long, tapering and curved; heads and necks longer and thicker than *L. marinus*. Dr. Craggs says the range was too great for the species of Albatross to be distinguished.]

12. Leach's Petrel (351).—An exhausted bird came aboard the *Ben Vennock* somewhere off The Farne Islands in a gale, and was handed to R.S.P.C.A.I. Peacock on December 2nd who released it on the sea at Redcar where it swam away (P.J.S.).

16/21. Shearwaters (355/363).—Shearwaters were entered in the Spurn Roll-Call without sufficient details to justify any species being recorded on September 11th, 19th, and on October 2nd when the bird at *c.* 800 yards offshore appeared ' very dark and fairly large '.

[21. Sooty Shearwater (363).—A bird seen from a boat off Redcar by G. Mountain on August 11th was described as dark all over excepting undersides of wings which had a pale area up the centre, sized as Arctic Skua, wings angled back in flight and held out stiffly ' like a Fulmar's ' as the bird banked. It passed twenty yards from the boat (P.J.S.).]

26. Fulmar Petrel (368).—For the third season Fulmars flew about and over the cliffs between Auburn and Ulrome, south of Bridlington, through the breeding season. A very large bird measured 351 mm. wings, 42 mm. bill, 56 mm. tarsus (G.J.B.). The wing was 6 mm. longer than the longest cited in *The Handbook*. Birds were present off Filey Brig (D.I.T.W.) and on the Whitby cliffs on December 27th (A.J.W.). The species had left the Flamborough cliffs between September 4th and 14th (A.W.). Fulmars occurred at Spurn on various dates in very small numbers except on April 16th when 25 flew northward between 05.40 and 06.10 hours, and seven flew southward between 15.15 and 15.45 hours (J.C.).

27. Gannet (349).—Four pairs bred at Bempton and four young were reared; the largest number to date. Whilst I was watching them from above nine adults flew by in line, three more adults were with the young (E.W.T.). Four young were on the ledge on August 21st; only one on the 28th (H.O.B.). A dead oiled bird was at Atwick on June 26th (M.K.T.). An immature bird that had settled in a flooded quarry at Garsdale was caught, ringed and released on the Eden (R. W. Robson).

28. Cormorant (346).—Occurred frequently on the coast from Spurn to Teesmouth, in the vicinity of breeding haunts and otherwise; and inland about several reservoirs and flashes, and on the Swale near Thirsk on February 1st (C.H.P.). At Hornsea Mere and at Flamborough, in March and April were a few birds with heads similar to that of the southern race. On April 16th one such bird at Flamborough showed a blue gloss (H.O.B.); on April 21st one such bird at Hornsea Mere

showed a green gloss (F.E.C.). White-headed birds seen about Bridlington Bay, examined through ×15 binoculars were believed by G.J.B. to be *Phalacrocorax c. carbo* and not *P. c. sinensis*.

29. Shag (348).—Shags have been seen on the Yorkshire coast much more frequently during the past few years than five years ago, and the frequency increases, with the species reported from a number of coastal places; 29 off South Gare on December 27th was much the largest number. Breeding has been suspected at Flamborough and was proved in 1952 when two nests containing three and two young were found (G. J. Brown), and again in 1954 (K.F. and H.O.B.). One of the climbers claimed to have found eggs in 1953. Eight juveniles being fed in the open were first seen at Bempton on August 8th. The species also occurred inland in winter near Barnsley (T.M.C.), and at Thorne Colliery where a bird got greased and had to be cleaned before release (W. Bunting and R. Brocklesby).

30. Heron (289).—A bird ringed near Tadcaster (Healaugh) on 3/5/50 by R.F.D., was at Market Bosworth (Leicester) 16/5/53. One ringed as young at High Halstow, Kent, in 1953 was at Bolton Abbey on 1/1/54. Three flew north at Spurn at a big height on March 23rd (H.G.B.); two came in high from N-E on August 21st; and more odd birds were seen about Spurn in autumn than usual. One flew in from sea at Whitby on September 23rd (A.B.W.). Occupied nests in the breeding colonies were: Hornsea Mere 28 (B.S., F.E.C.), Scampston 11 (R.M.G.), Sleningford eight (R.C.), Whixley three (R.C.), Harewood 14 (H.J.M., O.M.P.), Healaugh 25 (A.G.), Ripley one (A.F.G.W.), Moreby Park 15 (E.W.T.), Fadmoor three (E.W.T.). A pair bred in a rookery on Sunk Island (W.A.B., K.F.).

38. Bittern (297).—An exhausted bird was picked up near Rise in a frozen dyke in early February (*Hull Daily Mail*). One was shot at Fairburn in December 1953 (R.F.D., B. Winn). One flushed from a dyke at Watton Carr on February 27th (E.B.B.). A bird was found dead near Fountains Abbey on March 13th by G. Waterston; it showed wounds at sides of neck and breast such as could have been acquired in a fight. One was heard near Goole in the summer (W.B.). On August 1st near Bingley a Bittern was observed in the reeds at the river's edge which flew when disturbed (S.L., D.F.W.).

42. Spoonbill (287).—On May 10th at Fairburn, when much unusual movement had been and was taking place, an all-white heron-like bird was seen in flight and as it settled in reeds on the far side. The bill was long and blackish but was only seen in lateral outline, and including the flattened end. Projecting blackish legs, extended slender neck, and slow wing-beats were noted as the bird was mobbed by Black-headed Gulls. R.F.D. was confident in his identification. Mr. C. Muskett informed E. Grace he had seen one at Bottomboat on May 9th.

45. Mallard (317).—The larger concentrations were: at Hornsea Mere *c.* 2,500 on January 5th falling to *c.* 1,000 on February 27th and to *c.* 20 on April 21st (F.E.C.); with *c.* 600 on September 5th, and December 19th, when there were *c.* 2,000 about the upper Humber (S.M.). At Eccup *c.* 1,100 on January 24th (H.W.), *c.* 365 on ice at Copgrove on January 30th (A.F.G.W.); at Leighton *c.* 1,000 on November 24th (P.Y.); at Castle Howard *c.* 1,200 on December 28th (A.F.G.W.).

46. Teal (319).—Maxima were: Swillington Ing *c.* 400 on January 3rd (A.H.B.L.); Hornsea Mere *c.* 300 on January 5th (F.E.C.) and on December 23rd (S.M.); Knostrop S. Works *c.* 250 on October 9th (A.H.B.L.); Hackforth flooded field *c.* 600 on December 12th (Miss M.R.S.). In the upper Humber region numbers rose from *c.* 200 on August 26th to *c.* 1,750 on September 20th and *c.* 1,000 on December 18th (S.M.).

47. Garganey (322).—March 21st was an early date for two pairs at Swillington Ing (R.F.D., A.H.B.L.). At Denaby Ings a male appeared on April 19th, two males on April 24th (A.E.P.) and May 4th, a pair on June 4th, and birds were seen until August 21st (J.S.T.). A pair were seen at Fairburn on May 2nd and later; with odd additional males occasionally (R.F.D.); and at Bottomboat birds were seen on dates in June to August, including 11 on July 25th (E.G., A.F.). At Scampston a male was recorded on August 28th and 29th (R.M.G.). Nowhere was breeding proved.

49. Gadwall (318).—Bred in the county, a brood of nine being seen on July 18th. Single birds and pairs were recorded on five waters in south and central Yorkshire from mid-February into August. There was a duck at Lindley Reservoir on December 24th, and six (three males) at Bottomboat on December 26th (G.C., K.S.).

50. Wigeon (323).—Young were produced in the north-west and in the centre of the County. In one case a pair of Wigeon had been seen in June of 1953 but the

presence of anglers had prevented search; in 1954 after several visits a solitary duckling was located. In the other a duck was seen with two young on June 12th. Odd adults in May/June were seen in three other places. It would appear that the species is in process of slowly establishing itself.

The Wigeon is still, however, mainly a winter visitor, and maxima were not unusual except that at times many were diverted to flood-waters. The autumn maximum did not exceed *c.* 150 at Spurn. About the upper Humber on November 14th D. B. Peakall estimated numbers at *c.* 3,000, and a wildfowler there gave *c.* 5,000 as present on December 19th (S.M.).

52. Pintail (325).—From January to April 11th a few birds appeared at Fairburn (11 on February 21st), Swillington, Bottomboat (eight on March 7th), Eccup (17 on March 21st), Lindley, Fewston, Swinsty, Copgrove, Stocks, Wintersett, and Blackmoorfoot. In autumn birds were fewer and were only reported from Eccup, Mexbro Marshes (one on October 17th) (J. B. Hague, C. I. Bort), Gouthwaite, Coniston Cold, and Hornsea Mere (12 on November 28th, H.O.B.); and at Spurn on August 29th and October 18th.

53. Shoveler (326).—Bred by a number of waters; and seen at all times throughout the year from the Tees to south of the Don in small numbers with maxima at Fairburn *c.* 40 on January 24th (E.G.), at Eccup 32 on October 17th (A.H.B.L.), *c.* 40 on Farnley Lake on November 5th (J.C.S.E.), *c.* 20 at Hornsea Mere on December 27th (H.O.B., L.S.), and *c.* 20 at Denaby Ings on October 2nd (J.S.T.).

[54. Red-crested Pochard (327).—A duck with a dark brown 'cap' contrasting with grey cheeks, and with faint white patch where the wing entered the flank feathers sat high on the waters of Swillington Ing on March 17th (K.D.).]

The species has been introduced to ornamental waters in central Yorkshire recently.

55. Scaup (331).—I have never had nearly so many reports of Scaup before, from Teesmouth to Spurn and on many waters inland. Three drakes summered about Teesmouth. A flock remained about Whitby Harbour from February 10th to March 25th (maximum count of 32) (A.B.W., T.W.A.W., C.E.A.B.). At Spurn the maximum was *c.* 500 for some days from February 28th, after which numbers fell. During the early months birds occurred on many inland waters (maximum 14 on March 21st at Bottomboat (G.C., E.G.)). Two drakes were at Malham Tarn on June 7th (D.R.S., P.S.). Numbers on the coast in autumn were smaller; and inland waters had single birds and couples. Flocks of 60-70 were off Bridlington during December (G.J.B.).

56. Tufted Duck (330).—Ducks with broods were seen on a number of waters. Numbers in the early and late months were normal. Twelve occurred at Spurn on April 17th.

57. Pochard (328).—Fairburn Ings showed the most broods of ducklings. Maximum concentrations were: 200 Fairburn on March 21st (R.F.D.), 137 Wintersett on January 30th (J.C.), *c.* 60 Swillington on February 21st (A.H.B.L.), *c.* 100 at Hornsea Mere on January 9th (F.E.C.). Numbers were fewer in the autumn.

60. Goldeneye (332).—An immature male was still at Gouthwaite on May 23rd (A.F.G.W.); and one (immature male) remained on the Ouse near Nether Poppleton from May 11th to June 17th (C. D. Milne). A drake was on Grassholme Reservoir on June 3rd (K.B.). The earliest of autumn was at Gouthwaite on October 2nd (A.F.G.W.). Numbers at the various waters were average. A Goldeneye at Settle S. F. on November 7th dived although the water was shallow. Three were recorded at Spurn on April 16th and nine on the 17th.

61. Long-tailed Duck (334).—A pair lived near Scarborough Harbour throughout February (A.J.W.). A male occurred on Worsborough Reservoir on April 24th (C.E.B.); and one near Whitby on April 30th and May 2nd (F. Cooke). In autumn there was a male at Worsborough on October 17th (T. M. Clegg); two immature birds were at Fewston from November 7th into December (J.K.F., C.G.B., J.C.L.); a duck stayed at Gouthwaite from November 7th to December 5th (A.F.G.W., A.G.).

62. Velvet Scoter (340).—An adult male was found dead in Dane's Dyke, Bridlington, on April 3rd (G.J.B.). Occurred in Filey Bay on December 5th (A.J.W.), and two off Flamborough (H.O.B.); and three offshore at Redcar on December 27th (D.R.S., P.S.). The species was recorded at Spurn, usually in companies of Common Scoter, on January 24th (one), April 18th (three), May 16th (two), and November 3rd (one).

64. Common Scoter (339).—Normal at Spurn, being seen frequently, with maximum *c.* 400 on January 23rd (R.F.D., P.C.Q.), with only few from mid-May to August; and an autumnal maximum of *c.* 250 on October 14th (C.G.B., H.J.W.). There were *c.* 200 off Withernsea on August 15th (M.W.), and off Flamborough on November 14th (H.O.B.). Odd males and a flock of 15-20 mainly ducks remained about Bridlington through the breeding season (G.J.B.). There were no large winter flocks at Teesmouth but *c.* 100 occurred in Tees Bay on May 13th (P.J.S.). Inland occurrences on a number of waters were more frequent than usual, mainly in summer, with a few in January, and from October to December. The more notable were: *c.* 30 at Gouthwaite including 20 drakes on August 2nd (A.F.G.W.); and *c.* 160 ducks that flew up the Calder Valley at 9 p.m. on August 10th in two long lines at *c.* 280 ft., headed in line between Humber-mouth and the Halifax group of reservoirs where parties and flocks have often been recorded in summer (J.C.). It may be that many scoters that winter about the west coast may reach it overland.

67. Eider-Duck (337).—Birds occurred at Teesmouth: a male on January 16th (O.C.H.); a party of 16 including two drakes on February 18th (A.B.); two ducks on May 6th (P.J.S., J.G.). One off the North Gare on October 10th was the only eider of autumn (P.J.S., A.B.). There was a duck off Filey Brig on January 17th, 31st and March 14th (A.J.W.) and on April 17th (A.P.); one south of Whitby on April 30th (F.C. and H. Brunton); and a drake in eclipse near Flamborough on July 18th and 24th (H.O.B.), and a drake with three ducks on November 14th (H.O.B.).

69. Red-breasted Merganser (343).—Seen from the Yorkshire side of Teesmouth—a pair on February 7th, two females on April 10th, and a male off Redcar on April 11th and September 12th, two females on October 9th, and one on November 7th. Present on the Durham side up to June (P.J.S., A.B.). A male and two females were in the Whitby upper harbour on February 15th and for 10 days later (A.B.W.). Up to four lived in Scarborough Harbour and the South Bay during February (A.J.W.). Single birds were noted at Worsborough Reservoir on January 8th to 12th (C. E. Burton); and at Lindley Reservoir on March 21st (W.F.F.). One occurred at Spurn on October 10th, 12th and 17th.

70. Goosander (342).—Was reported from 18 waters with maxima at Eccup Reservoir, 86 on March 21st (H.W.), and at Stocks Reservoir, 95 on March 9th (A.P.). Last seen, 14 at Eccup on April 18th (C.N.); and at Stocks, four on May 2nd (J.K.F.). The first of autumn appears to have been a juvenile at Eccup on October 24th (D.B.I.).

71. Smew (344).—A few recorded in the early months from Peasholm Lake, Hornsea Mere, Teesmouth, Gouthwaite, Lindley, Eccup, Harewood, Fairburn, Swillington, Wintersett, and Malham Tarn (a male April 16th to 18th, P.L.). At Gouthwaite a male stayed until May 2nd (A.F.G.W.). Maxima six at Swillington Ing on February 6th (Mrs. E.G.) and five at Eccup on February 23rd (R.V.J.). A male was off Filey Brig on December 27th, and a female at Hornsea Mere on December 23rd (S.M.).

73. Sheld-duck (315).—Records that seem most to be connected with the moult-migration of mid-summer are those that come down river at Spurn and pass eastward in July; several flocks so passed from July 3rd to 13th; and *c.* 85 at Stone Creek in late evening on July 20th (W.A.B.). Several pairs bred in areas of the Humber. About Broomfleet there were *c.* 200 in late April, and on July 29th; and numbers had reached *c.* 350 by September 18th (S.M.); with *c.* 150 still there in late December. Sheld-ducks can generally be seen at Spurn, maxima 39 on March 21st, and 53 on July 13th, and 40 on October 4th. A few birds occurred inland on at least 12 waters, mostly January to April and September to December. Large flocks were in Bridlington Bay in the last week of December (G.J.B.). A pair of birds were at Swillington Ing into June (A.H.B.L.).

75/78. Grey Geese (303/307).—A Pink-foot ringed Yorkshire Wolds on October 25th, 1952, was at Sudursveit, Iceland, on May 2nd, 1953. Another that had been ringed in Iceland in July 1953 flew into wires near Shipton in mid-January 1954 (F.J.).

Pink-feet feeding in one Wolds area reached a peak of *c.* 4,000 on October 2nd, were reduced to 400 on October 16th (H.O.B.) and none were seen on October 21st (C.E.K.). Numbers in the Broomfleet/Brough area were recorded as *c.* 2,000 on October 31st and November 14th (D.B.P.). At a meeting of representatives of the

Nature Conservancy, the Wildfowlers' organisations, and Lincolnshire and Yorkshire Naturalists' Unions, a defined area of sanctuary for geese in the Upper Humber was agreed.

Too many flocks were recorded inland for separate mention; and were more numerous in autumn than in the early months. From September 17th to late October flights appeared mainly to be between the Upper Humber and the Wolds and Lincolnshire. Later several large flocks flew westward over central Yorkshire; and northward near to the coast; with odd flocks diverging from all apparent pattern. Most of those identified were Pink-feet.

Odd Pink-feet consorted with Canadas at Harewood, Ripley, and Gouthwaite in April to May 16th; and at Hackforth on November 14th (Miss M.R.S.).

75. Grey Lag Goose (303).—Thirty-eight flew over Beamsley Beacon on April 25th (J.K.F., A.E.L.).

76. White-fronted Goose (304).—One left the Durham side of Teesmouth for Yorkshire on February 21st (P.J.S., A.B.).

80. Brent Goose (312/313).—One north of Kilnsea October 13th (H.J.W., etc.). Up to five Dark-breasted Brents were seen from January to March on various dates on the Durham side of Teesmouth; one dropped to a school playground at Thorntree (Middlesbrough) on February 1st (P.J.S., A.B.).

82. Canada Goose (314).—A few pairs bred at Harewood, Fewston, Ripley, Studley Royal, Bretton, Gouthwaite, and the usual numbers by a number of waters at and around Swinton. An attempt to breed at Castle Howard (nest robbed) was the first (Lord Morpeth). On January 9th there were 267 at Harewood (R.V.J.), (and still *c.* 85 at Swinton). When Harewood lake froze (January 28th to 31st) the geese moved to Eccup where *c.* 260 were seen on January 30th, and *c.* 300 came in from north on February 7th (R.V.J.)—which had probably been away to graze. In autumn the largest flock reported numbered 185 at Leighton in early December (M.R.S.). Appearances of three at Malham Tarn on April 19th (D.R.S., P.S.); one at Esholt on April 22nd (C. C. Beedham), and two at Settle S.F. on April 25th (A.P.) were unusual.

84. Mute Swan (302).—At Fairburn, 43 on August 22nd included three juveniles (A.H.B.L.); 37 at Bottomboat on November 14th (G.C.) were probably the same birds.

85. Whooper Swan (300).—Recorded in the early months on the Ribble at Settle, Eccup, Swinsty, Fewston, over Otley, Gouthwaite, Ripley, Semerwater, Fairburn, Lumley Moor Reservoir, and at Sunk Island with maximum seven at Lumley Moor on March 11th (G. Hunter). In autumn at Gouthwaite, Semerwater, Skipwith, Denaby Ings, and on the Humber by Read's Island; with maximum of 15 at Semerwater on November 7th (C.D.R., D.G.R.); where G. E. Alderson saw three on October 2nd and was told locally the swans had arrived on September 30th.

86. Bewick's Swan (301).—Up to six were about Bottomboat from February 20th to March 21st (G.C., J.C., I.G.B.), and one at Swillington on the latter date (A.H.B.L., J.R.G.). There were three at North Cowton bottoms on December 11th and 26th (P.J.S.).

91. Buzzard (269).—Bred in the north-west; and seen in a number of areas on various dates mainly about the upper parts of the Dales; but including the Whitby Moors, over Thirsk, over Ingleton; and near Haxby in April, and one at Spurn on May 17th, when the birds should be in their breeding areas. One was being mobbed by *c.* 40 Rooks near Warter on October 10th (A.H.B.L.). There is a possibility that some of these birds were of the Rough-legged species but no proof.

93. Sparrow-Hawk (277).—Occurred at Spurn February 27th, March 3rd, 25th to 28th, and April 14th to 19th, and again on August 11th, October 1st, 2nd, 16th and 30th. Much higher up the coast a male moved north at Skinningrove and one occurred over Boulby on May 1st (C.J.H.).

[94. Goshawk (275).—One shot at Gilstead on January 17th whilst attacking a domestic fowl was a falconer's bird and had escaped in December, 1953 (C.D.R.).]

99. Marsh Harrier (271).—An immature bird at Hornsea Mere on September 4th showed a yellowish crown as it flapped low over the reeds (M.W., G.R.B.).

100. Hen Harrier (273).—Recorded in the N-E (Danby, Rosedale and Bransdale) up to March 17th, both sexes being seen, a male on March 17th being the latest (H.O.B.). A female occurred near Saltburn on March 7th (F. Ashton-Johnson). Birds on Bransdale Moor on October 25th and 29th (A. Gordon) would be likely to be of this species. A ' ring-tail ' at the head of Rosedale on September 26th was

on the early side for this species (D.R.S., P.S.). A male was over Hatfield Moor on December 28th (J.S.T.), and one over Dallowgill Moor on December 5th (G. Hunter).

102. Montagu's Harrier (272).—There was no definite evidence of breeding, but birds were seen in the breeding season in the N-E and in the N-W. A pair breeding in Durham had chosen a similar situation to one Yorkshire site—a hillside plantation of young conifers (P.J.S.). A ' ring-tail ' at Skipwith on June 19th may have been Montagu's.

103. Osprey (284).—On May 7th at Garsdale Head a large hawk circled and followed the course of the river. It had pale underparts and wings much less rounded and with tail longer than Buzzard. Seen down to 100 yards range—' I think I was looking at an Osprey ' (H.W.B.).

104. Hobby (W.261).—A bird near Ossett S.F. on August 10th seen in flight at *c.* 40 yards, had blue-grey upper parts, orange thighs, and pointed wings (J.C.). One occurred at Spurn on September 1st (R.F.D.).

105. Peregrine Falcon (259).—A pair spent the summer on the cliffs near Bempton; and may have bred (H.O.B., G.J.B., etc.). On August 5th the male caused a Herring Gull to drop food which the Peregrine gathered before it reached water (D.I.T.W.). In the north-west, four eggs were laid at one eyrie but three disappeared and only one young was reared; at another the birds appeared but ' apparently were robbed '. In the past 19 years two eyries have produced 14 young; and some have been reared despite persecution at a third place. Nevertheless the species has been reported at various places and times, mainly in hill-country but including Stocks Reservoir on February 27th (J.K.F., A.E.L.), the Derwent Valley on November 27th (R.M.G.), Cherry Cob on August 27th (H.O.B.), and Coatham Sands on December 27th (P.J.S., A.B.).

[106. Gyr-Falcon (256/257).—A large pale hawk, described as ' banded all over with brown markings ' that came in from sea at Coatham Sands in January was seen by a fisherman to pounce on some starlings and take one. It might have been of the Iceland or the Greenland race of this species (P.J.S.). A probable Gyr-Falcon escaped from captivity in Hull in early October and a similar bird was seen later at Beverley and at Flamborough; a string was attached to one leg.]

107. Merlin (262).—Bred on a number of Pennine and north-eastern moors. I have notes of more than 20 young being reared of which six were taken for falconry. Two at Lockwood Beck on December 19th (M. Allison) were late for a moorland area but possibly were immigrants; and one occurred in the Derwent Valley on November 27th. At Spurn odd Merlins were recorded on many days from February 27th to May 6th, and from August 6th to December 12th. A bird ringed as young near Hebden Bridge on June 27th, 1953, by J.B.N. and J.C.L. was on Longstone Moor, near Bakewell, Derbyshire, on October 12th, 1953.

[108. Red-footed Falcon (265).—A Red-footed Falcon was reported shot in or about Skelton Park, near Saltburn, in the spring months, but corroboration, or otherwise, has not been obtained.]

110. Kestrel (263).—April 18th was an early date for an old crow's nest to hold five Kestrel's eggs (A.G.). Odd birds are usually about the Spurn Peninsula; but leisurely migration south was unusually noticeable in September with maximum of 17 passing on the 12th (H.G.B., G.C., etc.). The passage continued into October, with a renewal from November 15th to 19th. One ringed as a nestling near Harrogate 24/6/53 was shot at Malicorne, Sarthé, France, 3/10/53 (N. Walls). One ringed near Sedbergh by S. School 22/6/52 was at St. Pol, Pas-de-Calais, France, 10/6/53.

113. Black Grouse (513).—Recorded from neighbourhoods of Buckden, Baldersdale, Wharfedale, Coverdale, Ilton, Upper Swaledale, Wensleydale, and the Trough of Bowland.

117. Quail (520).—Only reported this year from the Goole-Thorne area (W.B.), and from one East Riding area (G.H.A.).

119. Crane (461).—One was found dead near Auburn, Bridlington, on April 5th by R. Little (G. J. Brown) (see *British Birds*, February, 1955).

120. Water-Rail (509).—Only reported in the breeding season from near Croft Spa on May 17th (A.B.), and from Fairburn, although no doubt occurred elsewhere. At other times seen or heard at Fewston, Harewood Park, Swillington Park, Bottomboat, Fairburn, Ossett Spa S.F., near Staveley, Chevet Park, Denaby Ings, Ogden Reservoir, near Bridlington, Boynton, and Albert Dock, Hull; and at Spurn on six days from November 8th to December 11th.

121. Spotted Crake (505).—Heard and seen on a number of dates east of Doncaster (W.B.).

125. Corncrake (504).—One flushed from the grass near to Warren Cottage (Spurn) on May 6th (R.C., R.V.J.). Breeding was proved at Priestley Green, Halifax, where five of the six young escaped the reaper on July 13th (I.G.B., R.Cr.); and near Bingley—three young seen on July 14th (J.C.L.). Near Reeth from three nests, some were killed and action by the farmer helped some to escape (N.M.H.). Probably bred east of Doncaster; and near Sedbergh where the field was not mown until late August (H.W.B.). Birds were heard near Middlesbrough, Askrigg, Summerbridge, Silsden, Harden. One was at Elland S.F. on August 15th (R.Cr.).

126. Moorhen (510).—One ringed as young, Denton, Ilkley, on 28/7/53 was found dead near Bury, Lancashire, on 11/6/54 (D.B.I.). On the big lagoon at Knostrop S.F. there were *c.* 100 on December 27th (A.H.B.L.).

127. Coot (511).—At Fairburn, after an early-month's maximum of *c.* 800 on January 10th numbers visible fluctuated with *c.* 200 cited for May 30th. On June 27th 28 broods were counted. Numbers rose during the autumn to *c.* 1,000 on November 21st and December 5th (R.F.D., J.K.F., etc.). Elsewhere concentrations seemed fewer and not so large as usual. At Eccup Coots are unusual, but the hard weather of late January brought *c.* 20, possibly from Harewood, some of which remained until April 19th (H.W.).

131. Oystercatcher (452).—Nested by the Dales' rivers as usual but spates destroyed some eggs and young and could have been responsible for five birds at Eccup on May 11th (J.R.G.). Flocks were frequent at Spurn except in early June; but *c.* 70 on June 11th was repeated when the next (or the same) party came on July 9th. The largest number recorded anywhere was *c.* 200 on mud in the Tees estuary on January 3rd (P.J.S., A.B.). Continued generally to be more frequent along the coast (A.J.W.).

133. Lapwing (449).—At Methley on January 7th at 08.20 hours *c.* 700 in six flocks flew high W-S-W- (R.F.D.). Near Tadcaster *c.* 1,000 flew north on February 20th (J.K.F., A.E.L.); and there had been eastward movement over Doncaster on February 13th, closely following the decline of the cold spell (J.S.T.). At Whinmoor *c.* 1,000 were on the meadows February 17th to 28th (J.R.G.). The breeding season was too wet to be a good one. At Blaxton *c.* 150 were congregated on June 9th (J.S.T.); and in Baldersdale on June 13th (A.B.). Floodwaters at Killinghall showed *c.* 600 on August 26th (A.F.G.W.). Large-scale movement westward over Chevet Park was noted on October 10th at 08.15 hours (E.G.) and was probably by immigrants. It was late October before Lapwings were recorded coming off the sea at Spurn; and O. C. Hill recorded Lapwings coming in near Redcar on November 9th. On December 31st J. Lord noted very many Lapwings in the Bawtry to Goole area, fewer from Goole to Market Weighton, and fewer still from Malton to Castleton.

134. Ringed Plover (435).—Fewer than usual nested at Spurn. An unfledged chick was on Coatham Sands on August 15th (A.B.). Birds occurred by many inland waters at varying dates. Autumn movement was less noticeable than usual near Bridlington (G.J.B.). At Spurn *c.* 100 or more were recorded for September 6th to 7th and from September 21st to 25th, with *c.* 300 on the 26th; thereafter numbers fell and on some days Ringed Plovers were not seen.

135. Little Ringed Plover (438).—Two birds, scrapes, and a nest with one egg were noted by gravel pits in south Yorkshire (J.S.T.). Three pairs hatched their eggs in central Yorkshire (R.F.D.) with a possible two pairs in another area (K.D., W.B.).

139. Grey Plover (444).—Spurn maxima: *c.* 500 on January 1st-2nd, *c.* 150 on March 21st. In autumn began to appear on August 1st, maxima *c.* 70 August 31st-September 1st, *c.* 200 September 26th, *c.* 100 October 25th-26th. At Teesmouth *c.* 100 December 27th (P.J.S., A.B.). One calling over Fairburn on November 21st was the only bird recorded inland.

140. Golden Plover (440/443).—A pair were on Blea Moor on January 21st (P.Y.). Flocks probably of 'Northern' birds occurred at Bottomboat in April—*c.* 100 on the 20th, many with black faces; flocks had been much larger there in March (G.C., E.G., A.F.). In south Yorkshire *c.* 40 passed over Blaxton on May 1st (J.S.T.). Three hundred 'northerners' were at North Cowton on April 15th (A.B., K.B.); and other flocks were recorded. Winter flocks may include both racial forms; several very large ones were recorded in coastal fields near Redcar and near Bridlington (G.J.B.); and at various places in the West Riding.

142. Dotterel (446).—A pair noted by a tarn on Great Widdale on May 28th would probably continue northward (C. Moody).

143. Turnstone (402).—Peak days at Spurn in spring were April 23rd (*c.* 40) and May 16th (*c.*40). A bird or two could always be seen and numbers increased from August 1st with peaks of *c.* 50 on September 23rd and 24th and October 2nd and 8th. On Coatham Sands peaks were *c.* 60/70 on March 7th (A.B., P.J.S.), with rather smaller numbers in autumn. One turned over mud at Swillington Ing on August 11th (E.G.).

145. Common Snipe (395).—*C.* 100 on October 10th at Skipwith (A.H.B.L.), *c.* 80 at Blaxton Gravel Pits on December 11th (J.S.T.), and 42 flushed in 50 yards at Knostrop S.F. on December 27th (A.H.B.L.) were not very abnormal.

146. Great Snipe (394).—A bird watched at 10 yards range on February 7th through × 15 binoculars in a ' gutter ' at Carnaby showed white outer tail feathers, a slower and more ' laden ' flight than Common Snipe, and did not zig-zag (G.J.B., who has seen the species in Germany).

147. Jack Snipe (398).—One was found dead east of Doncaster on February 6th (J.S.T.). Single birds were reported from a rather wider range than usual including: Elland S.W., Denaby Ings, Ossett Spa S.F., Knaresborough area, Skipwith, and areas of Leeds, Halifax, Lower Teesdale, Bridlington, Hornsea, and at Spurn on February 3rd, October 4th to 7th, and ten on the 8th, and a few from the 16th. April 25th near Knaresborough (J.R.M.) was the latest; and October 4th at Spurn, and at Knaresborough S.F. (three), the earliest date. Five were flushed at Keld Head, Pickering, on October 8th (R.M.G.).

148. Woodcock (393).—Five broods noted near Masham (P.Y., R.C.). On June 26th an adult picked up one large chick 6 feet from where P.Y. stood and carried it away. Another adult carried a chick away for *c.* 100 yards on May 20th and came back for another, flying past me as I ringed the chick (R.C.). Near Sprotborough a nest had four eggs on April 10th (J.S.T.). Young seen near Ogden reservoir constituted only the second record for the Halifax Parish (I.M.). Birds were flushed at Spurn on January 23rd-24th and February 27th; and in autumn on October 17th; and from October 27th to November 21st (four on the 13th). One occurred in the dunes at South Gare on November 21st. P. Baldwin reports record numbers wintering about Methley (1954-55 winter). A bird flushed near Helmsley on November 16th had wings of a light yellow colour; it has been a good Woodcock winter there (A.G.).

150. Curlew (388).—Three came in from sea at Flamborough on August 15th (H.O.B.). Always present about Spurn; maximum *c.* 130 on October 6th; and always present at Gouthwaite, winter maximum *c.* 65 on January 24th and in November-December (A.F.G.W.). The species tends to increase as a winter resident inland, and as a breeder on low ground. Some of the 200-300 seen January to March on Seal Sands, Teesmouth, crossed into Yorkshire occasionally (P.J.S.).

151. Whimbrel (389).—Some passed at Spurn in May, maximum 13 on May 16th (R.M.G.). The return passage was first noted on July 24th, maxima *c.* 50 August 1st, 63 August 2nd (J.C., etc.). One on October 25th was a straggler. Several came in from sea at Flamborough on August 14th and at Easington on September 8th (H.O.B.). Four were at Stone Creek on July 20th (W.A.B.). On August 15th *c.* 62 fed at low water near South Gare (A.B.). Inland records included one that flew N-W over Blaxton Gravel Pits on July 20th, and four that flew S-W near Maltby on August 2nd (J.S.T.), at least one was over Dallowgill Moors on August 27th (R.C.); and one near Malham on September 4th (A.G.).

154. Black-tailed Godwit (387).—Twelve flew S-SE from Co. Durham into Yorkshire on July 25th, and one on August 28th; and one was seen on the Yorkshire side of Tees on September 1st (O.C.H., P.J.S.). South of Bridlington one occurred on July 30th (J. C. H. Leeson), two on October 31st, one still there on November 3rd; one having been on Bridlington Harbour mud on October 29th (G.J.B.). Four occurred on Cherry Cob Sands on August 26th (H.O.B.); and one at Spurn on September 12th (G.C., E.G.).

155. Bar-tailed Godwit (386).—Occurred at Spurn rather patchily in spring up to May 9th. Generally a few in the early months (*c.* 40 March 2nd). Spring maxima 50 on March 23rd. Began to appear again on July 9th but very few until September 6th (20); maximum 25 on September 22nd; and only very few thereafter until 11 on November 29th and 19 on December 11th. Some wintered at Teesmouth—*c.* 60 on Coatham Sands on March 7th (P.J.S.) and *c.* 40 on September

26th (C.J.H., P.J.S.). Noted at Bridlington mid-August to mid-September, never more than five (G.J.B.). The Durham side of Teesmouth maximum was *c.* 355 on October 10th (P.J.S., A.B.). One occurred at Bottomboat on May 15th (G.C.); and one at Stone Creek on May 8th (W.A.B.); and one at Broomfleet on September 14th (S.M.).

156. Green Sandpiper (424).—All spring records were of single birds: at Elland S.F. on January 23rd, February 13th (and 20th, T.D.B.), and March 6th (R.Cr.); near Staveley on March 3rd to April 19th (J.C.A.R., C. Webb); at Keighley S.W. during last fortnight of April (C.D.R.); at Riffa on April 6th (H.M.); One near Guisborough on June 27th was the first of autumn (P.J.S., A.B.); and a bird at Fairburn on July 8th the first inland (R.F.D.). Thereafter the species occurred in too many places for enumeration, with as many as 20 together near Staxton on August 22nd (A.J.W.). The flood-waters out in August-September affected most of the immigrant waders.

157. Wood Sandpiper (423).—A bird at Blaxton Gravel Pits on May 18th was the only Wood Sandpiper of spring (J.S.T., A.E.P., J.B.). In autumn the species occurred with unusual frequency. Up to four on eleven days were recorded at Spurn from August 21st to September 19th (four on September 7th). Three were on marshy ground near Staxton on August 22nd, the first near Scarborough (A.J.W.); and on the same day seven were recorded on the Durham side of Teesmouth where at least one was always present from August 1st to September 3rd (P.J.S., A.B.). Inland the first occurred at Swillington Ing on August 1st (G.C., K.S.). Thence to September 5th single Wood Sandpipers occurred at Cowton (F.C., K.B., A.B.), at Marishes in Pickering Vale (R.M.G.), Fairburn (G.C., E.G.), Elland S.F. (R.Cr., B.M. and I.G.B.), on several dates at Swillington, and near Cottingham (M.W., G.R.B.); and one at Stone Creek on October 16th (W.A.B.).

159. Common Sandpiper (421).—As C.D.R. ringed a chick at Fly Flatts Reservoir on June 27th a parent bird ejected a pellet; it was composed of hard parts of insects bound with soil and grass fragments. First noted at Gargrave on April 17th (C.D.R.). Odd birds occurred at Spurn in mid-May, and from July 24th to September 6th; maximum ten on August 20th.

161. Redshank (428/30).—Always present at Spurn, spring maximum *c.* 100 March 24th, and in autumn *c.* 200 September 6th to 10th, and October 10th to 14th. There were 26 at Bottomboat on February 28th (E.G.); and larger numbers passed up the Calder Valley than usual with *c.* 30 on March 27th (G.C.); which may be connected with the modern tendency for more Redshanks to breed on moorland vamps than formerly.

162. Spotted Redshank (431).—Two called on Bran Sands, Teesmouth, on April 2nd (W. K. Richmond); and one at Spurn on May 7th (R.C.). Other single irds at Spurn occurred on August 28th, September 4th, and September 18th to st. One was at Marishes on August 28th-31st (R.M.G.); two at Knaresborough .F. on August 15th (J.R.M.). One at High Royd S.F. on August 14th (I.G.B., .Cr.); one called at Swillington Ing on September 5th (G.C., K.S.); and two were t Cherry Cobb on August 27th (H.O.B.).

165. Greenshank (432).—Occurred in spring, two at Bottomboat on May 8th (.C.), and one at Cherry Cobb on May 10th (H.O.B.). The first noted of autumn was a bird at Fairburn on July 11th (R.F.D., J.K.F., etc.). Thence to October 4th Greenshanks occurred by estuarial and coastal waters, and inland reservoirs and sewage farms, being reported from 24 places. Numbers inland did not exceed seven anywhere. More occurred at Spurn than previously recorded including eight on August 20th and 13 on September 11th.

169. Knot (403).—Congregations at Spurn and Teesmouth were average in January to March, fluctuating as usual, with maximum at Spurn of *c.* 3,000 on March 2nd, and *c.* 4,000 on Seal Sands (Durham) on February 20th (P.J.S.). In the autumn at Coatham Sands high tide showed *c.* 3,000 on November 25th (A.B.). At Spurn *c.* 2,000 were gathered on September 6th-7th, and again on October 27th, on November 13th the estimate was *c.* 5,000; and masses assembled at high tide continued to grow with maximum on November 28th and 29th of *c.* 9,000. A few Knots occurred inland—one picked up dead at Carlton (Cleveland) early in the year (A.G.), and one dead under wires at High Royd S.F. on January 28th (I.M., R.Cr.). One was at Gouthwaite on May 2nd (A.F.G.W.), and two at Swillington Ing on August 11th (E.G.).

170. Purple Sandpiper (415).—The usual flocks wintered about the rocks

near Bridlington—*c.* 35 on February 8th (G.J.B.); and about Filey Brig—*c.* 40 December 19th (S.M.), and near Whitby. This species rarely occurs inland but an apt description was given of one that occurred at Elland Gravel Pit on November 20th (R.Cr., T.K.).

171. Little Stint (407).—Birds of this species were about Spurn from August 20th to September 8th with maximum of seven on August 26th (R.F.D.). On various dates from August 9th to September 11th there were Little Stints at Teesmouth, Durham side—seven on August 14th and 26th-27th (P.J.S., A.B.). One was with Dunlins at Barmston, Bridlington, on August 16th (G.J.B., J. B. Hague). One occurred at Swillington Ing on August 11th-15th (K.D., C.D.R., A.H.B.L., G.C., E.G.); and one at Fairburn on August 11th (J.K.F.).

173. Temminck's Stint (409).—Two Temminck's Stints were about Kilnsea from August 20th to September 4th (three on August 29th) and were frequently seen at the same time as the Little Stints mentioned above (G.R.E., J.D.C., J.C., R.F.D.). One at Knaresborough S.F. from August 11th-14th was watched at leisure by independent observers (J.R.M., H.J., J.C.A.R.).

178. Dunlin (404/5).—At least eight pairs were proved to breed on five moors. Five birds seen together on one breeding-ground on June 13th differed noticeably in size, and two were much greyer and without black abdomens (R.C.). At Stocks Reservoir a dead bird reposed on the top of a tree stump, with owl pellets below (A.P.). The Spurn maximum was *c.* 4,000 on November 28th. There were *c.* 1,500 at Teesmouth on December 27th (A.B., P.J.S.). One found dead at Bridlington on January 6th bore a Stavanger ring (F.W.) which unfortunately was lost. Another found dead at Bridlington on February 22nd was of the northern race with wing 123 mm. and bill 35 mm. (G.J.B.). Occurred frequently by a number of inland waters.

179. Curlew Sandpiper (406).—One occurred at Spurn on August 15th, three on the 25th and 28th, and some continued to be recorded until September 8th, with *c.* 25 on September 4th as maximum. One was at Easington on September 8th (H.O.B.). From August 21st to September 16th the species occurred on the Durham side of Teesmouth (A.B., P.J.S.); and two were on Coatham Sands on September 25th. One showed its white rump on Filey Brig on August 15th (A.E.P.). One was at Marishes, near Pickering, during floods on August 28th and 31st (R.M.G.).

181. Sanderling (416).—The usual numbers appeared on Coatham Sands from January to May—maximum 210 on January 1st (P.J.S., A.B.); and in the autumn. At Bridlington G. J. Brown thought passage below normal (*c.* 80 on November 28th-30th). At Spurn *c.* 200 on March 20th, and *c.* 300 on the 27th were the maxima; but odd birds occurred at intervals before the autumn passage began on July 24th (*c.* 30). The autumn maximum reached *c.* 100 on October 24th but numbers were fewer than in spring. Sanderlings occurred inland: one at Wintersett on January 31st (E.G., J.C.), one at Bottomboat on March 21st (E.G., A.F.), and two at Blaxton pits July 29th to 31st (J.S.T.); and one at Fairburn, August 3rd and 11th (J.K.F.).

182. Buff-breasted Sandpiper (*Tryngites subruficollis* (Vicillot)) (418).—On September 6th, north of Kilnsea, a Sandpiper associating with Ringed Plovers and Dunlins drew the attentions of J. K. Fenton, Miss A. E. Leach, and S. Martin by its short bill, rounded head, and pinkish-buff head, neck and underparts. The bird was seen later by W. F. Fearnley, H. J. Williamson and Mrs. O. M. Pennock. 'What drew our attention each time we saw it,' writes W.F.F., 'was not so much its plumage, but its habit of walking about in a much more erect attitude than the Dunlins and Ruffs (mixed party of adults and juveniles) which were often near it. When other waders fed in mud this bird preferred the grassy areas, and seemed to pick something off the plants. The back and wings had a mottled appearance with dark and light tones of brown and fawn. The underwing was only glimpsed and is described as 'dirty white' and 'pale cream almost white'. There was no wing-bar nor any white on the tail of which the central feathers were rather darker than the rest. The legs were yellowish. The bird was watched again on the 7th. The observers have no doubt that their diagnosis is correct. This North American species was new to Yorkshire but has occurred previously in a number of other counties.

Stilt Sandpiper (*Micropalama himantopus*).—This bird is not in the British List and therefore cannot be numbered. It occurred near Kilnsea in the little lagoon north of the 'Beacon area' and south-east of Easington, created by the new extension of the 'long bank' following the floods of January/February 1953. The bird was first seen on August 31st, 1954, and noted as something unusual by

P. Waterton and E. E. Jackson who refused to accept any of the suggestions first made as to its possible identity. It was seen subsequently and examined through binoculars and telescopes by fourteen people to whom the bird was not described before they saw it, and who were asked by R. F. Dickens to make detailed notes separately, and to send them to me. Sketches also came. The full story has been published in the January 1955 issue of *British Birds*. Briefly the outstanding feature was the barring across the underparts and on the flanks to the tail, a feature of the breeding plumage that most fortunately this adult bird still retained, and which could refer to very few wading-birds. Legs, bill and many other features confirmed the identification. That a species new to Britain (and perhaps to Europe) should be discovered from the Spurn Bird Observatory was one of its great successes; and I give a list of those who saw the bird and sent me notes. The Stilt Sandpiper is a native of North America. It was one of several North American species to occur in Britain in 1954 for the first known time. The observers, additional to the two discoverers, were: R. F. Dickens, H. O. Bunce, E. C. Dickinson, L. T. Wright, J. Cudworth, J. K. Fenton, R. V. Jackson, P. C. Quin, D. L. Robinson, E. S. Skinner, W. A. and Mrs. Butterfield, and Misses F. E. Crackles and A. E. Leach. G.H.A. and I made an effort to see the bird but were unfortunate.

184. Ruff (417).—Ruffs are unusual in spring. Single birds occurred: April 16th Swillington Ing (G.C., K.S.); April 21st-23rd Keighley S.W. (C.D.R., J.C.L.); May 17th Cowton Bottoms (A.B.); and May 18th Blaxton G. Pits (J.S.T.).

Quite unusually, Ruffs were about several Spurn areas from August 13th to September 22nd. Eleven on September 8th was the maximum. At Teesmouth (Durham side) Ruffs occurred in July and were always present from early August to mid-September (P.J.S., A.B.) with 15 as maximum on September 5th. By Marishes floods, near Pickering, Ruffs occurred from August 22nd to 31st with maximum of 20+ on the 26th, 28th, 29th (R.M.G.). Floodwater by the Nidd at Skip Bridge showed Ruffs from September 3rd to 16th (nine on the 9th, E.E.J., R.C.). Elsewhere two Ruffs occurred at Settle S.F. on July 10th (E. Greenwood); and one or two during August at Stone Creek, Denaby Ings, Ossett S.F., Meltham, Cowton Bottoms, Blaxton G. Pits, and Staxton; and Knaresborough S.F.

187. Grey Phalarope (400).—An adult on Coatham Sands on March 7th showed the short thick bill when it left some Turnstones to fly up the beach to alight near A.B. and P.J.S. One was in Filey Bay on October 31st (A.J.W.).

188. Red-necked Phalarope (401).—One at Spurn on September 29th and 30th had a thin tapering bill (J.D.C., A.H.B.L., H.G.B., etc.).

193. Arctic Skua (493).—One seen from North Gare, Teesmouth, on May 2nd that passed to the Yorkshire side and out to sea (P.J.S.) was the only one recorded in spring. Autumnal movement was heavier than usual at Teesmouth (28 in afternoon of September 12th (K.B., F.C.)), at Bridlington (G.J.B.); and at Spurn (*c.* 20 September 24th). One flew north at Spurn on November 14th (R.F.D., J.C., etc.).

194. Great Skua (491).—More Bonxies were noted than usual, being reported from Spurn on August 1st, 21st (two), September 7th, 14th, 19th, 20th, 25th; Filey Brig August 27th (P.G.); off Flamborough on the 28th (P.G.); south of Bridlington September 1st, 2nd, 3rd (J.C.H.L.); and near Saltburn on September 12th (M.A.).

195. Pomarine Skua (492).—Seventeen skuas came from north to the Tees Estuary on October 16th and continued beyond South Gare. Examined through a telescope at *c.* 250 yards the first five were heavier, broader winged and more mottled than juvenile Arctic Skuas with bigger white underwing patches. The next bird had dark upper parts and white underparts with long 'knobbed' tail, and there were two more pale adults and nine more juveniles. All 17 were considered to be Pomarine Skuas (C. J. Henty).

196. Long-tailed Skua (494).—One shot at Old Snydale, near Normanton, on September 11th proved to be a first winter female (J.A., A.H.).

[197. Ivory Gull (490).—A white gull including wing-tips and tail, smaller than Herring Gulls present, flew along the river between Huddersfield and Leeds on August 11th. It was seen from a train (P.G.R.B.).]

198. Greater Black-backed Gull (486).—Frequency of appearances inland continue to increase. An adult appeared at Fly Flatts Reservoir on August 21st (C.D.R.) at a time of much coastal passage. Sixty at Swinsty Reservoir on December 18th was abnormal (J.B.N., J.C.L.). The Spurn maxima were reached with *c.* 600 on September 1st and 7th, after which numbers decreased; and rose again with *c.* 1,000 daily October 13th to 15th. On the 14th 839 were counted flying

southward from 15.40 to 17.25 hours; and 668 in 1¼ hours before dark (Wharfedale party). On March 17th a second year bird had elongated central rectrices of which the two central feathers protruded by *c.* 3 inches, resembling a skua (G.J.B.).

199. Lesser Black-backed Gull (484/5).—One pair nested again at Kettleness—nest with three eggs June 30th; a pair were on Boulby Cliffs on May 30th (P.J.S.). Birds of the Scandinavian race were noted in winter at several places. The larger inland concentrations were: *c.* 150 flying south over Harewood Park on April 18th (A.H.B.L.); *c.* 300 about Denaby Ings on July 22nd (J.S.T.); *c.* 550 on floodwaters at Skip Bridge at 5-15 p.m. on September 1st which had departed at 5-45 (A.F.G.W.); *c.* 4,000 at Eccup Reservoir at 19.40 hours on September 4th (A.H.B.L.); *c.* 425 came in at Swinsty Reservoir in 20 minutes at 3-30 p.m. on November 7th (H. Hodgson, etc.). One ringed Wolfholme 15/7/51 by P.E.D. was caught and released Rawtonstall 15/10/53.

200. Herring Gull (482).—A ring marked ' 228289 Moskwa ' was taken from a dead Herring Gull of the Scandinavian race and brought to A. F. G. Walker on May 27th. The bird had been found a few days earlier on the Ure banks at Hutton Conyers. A.F.G.W. saw the corpse. It had been ringed as young at Seven Isles, Murmansk Coast on 25/7/51. Concentrations of Herring Gulls occurred: *c.* 400 Eccup February 13th (A.H.B.L.); *c,* 200 Swinsty January 23rd and *c.* 300 on December 18th (J.B.N.); *c.* 250 Eccup December 12th (A.H.B.L.).

201. Common Gull (481).—*C.* 900, Malton to Market Weighton on March 21st (J.L.); *c.* 1,000 Stocks February 27th (J.K.F.). Up to *c.* 100 in November and December parasited Lapwings on Harrogate Stray (A.F.G.W.). A dead bird at Barmston bore a Stavanger ring (044667) on April 17th (F.W.).

202. Glaucous Gull (487).—Detailed descriptions were supplied of birds that occurred at Swillington Ing on January 9th (J.R.G.); at Blackmoorfoot Reservoir on January 30th (J.C.S.E.); at Whitby West Pier on November 20th (P.J.S.), and December 27th (A.J.W.); at South Gare, Teesmouth, on December 5th (P.J.S.); and two at Ilton on December 24th (P.Y.); all were immature birds. An adult was in Cayton Bay on January 10th (A.J.W.).

203. Iceland Gull (488).—An adult was in Whitby Harbour on December 27th (A.J.W. who is familiar with this and the preceding species).

207. Little Gull (477).—An immature bird flew from South Gare on January 31st (P.J.S.) to the Durham side where A.B. and C.J.H. saw it. One occurred at Fairburn on May 10th (R.F.D.). An immature bird on August 7th; and two more with three adults on September 2nd, occurred south of Bridlington (J. C. H. Leeson). An immature bird was found at Hornsea Mere on November 30th and confirmed by A. Hazelwood (M.W., H.O.B.). One was at Spurn on October 2nd.

208. Black-headed Gull (478).—

Ringed as young nr. Leeds 11/7/51 (Davies and Iles); Llanbedr, Wales, *c.* 16/6/53.
Ringed as young Heptonstall Moors 20/6/53; nr. Athlone, West Meath, —/9/53.
Ringed as young Heptonstall Moors 15/6/52; nr. Glasgow, 1/9/53.
Ringed as young Horsey I., Essex 9/7/53; Thrybergh, Rotherham 18/10/53.
Ringed as young Heptonstall Moors 20/6/53; Eccup 11/1/54 (D.B.I.).
Ringed as young Leuchars, Fife 26/6/50; Ilton Moor 15/5/54 (P.Y.).
Ringed as young Vasteras (Vastmanland), Sweden 8/6/52; Eccup 30/1/54.
Ringed as young nr. Riga 20/6/51; Spurn early March 1953.

Parasitism on Lapwings was noted at Keighley on February 20th (C.D.R.). Several perched in thorns to eat haws near Keighley on October 17th (C.D.R.). Two pairs nested on Fountains Fell at *c.* 2,000 feet (P.F.H.). Maximum at Stocks Reservoir *c.* 2,500 on February 27th (J.K.F., A.E.L.); at Eccup *c.* 5,000 at dusk on December 12th (A.H.B.L.).

211. Kittiwake (489).—Occurred inland: one Esholt (dead) on February 2nd (J.B.N.); one Bottomboat March 7th (A.F., E.G.); one at Eccup on August 6th (R.V.J.); one on the Wharfe at Otley on December 5th (J.C.L.). Main return to the Flamborough Cliffs between March 14th and 21st; and main exodus between August 15th and 21st (H.O.B.).

212. Black Tern (462).—The spring passage was abnormal and began with two at Chelker Reservoir (H.J.W.) and four at Fairburn (A.H.B.L.) on May 2nd, one at Whitby on May 3rd (F.C.), one over Ebberston on May 5th (R.M.G.), three at Hull on the 7th (C.E.K.), one at Sunk Island (W.A.B.) and 14 at Spurn (G.H.A.)

on the 8th. May 9th was the second day of an anticyclone over the North Sea with easterly winds. On May 9th Black Terns were 34 at Fairburn (R.F.D.), 26 at Chelker (J.C.L.), 21 at Malham Tarn (P.F.H.), 10 at Wintersett (J.C.); and smaller numbers at Swillington Ing, Eccup, Gouthwaite, Ringstone Edge, Skipwith Common, and over Tong. The day was Sunday or most might have passed unseen. At Eccup were 35 on the 10th (W.E.D., R.V.J.), three at Ben Rhydding (J.C.L.), and one at Allerton Bywater. Four were at Fairburn on the 11th (R.V.J.), and 12th (A.F.). In the same period similar or larger numbers were noted in Cheshire and South Lancashire.

Black Terns were fewer in autumn, very few inland, but from August 8th to September 16th they occurred on a number of days about Teesmouth, at Hornsea Mere (several on August 25th, R. A. J. Harrison), and a few south of Bridlington and at Spurn. November 7th and 21st were very late dates for odd birds at Hornsea Mere (G.R.B., M.W.).

[216. Caspian Tern (466).—In company with the Black Terns at Hornsea Mere on August 25th was a very large tern with red bill, slightly forked tail, and black cap, which the two Ackworth School boys (R. A. J. Harrison and J. Bayes) compared for size and general plumage to a Herring Gull. N. V. Mendham (their master) supports their claim with knowledge of the boys, and H.O.B. has discussed it with R.A.J.H.]

217/218. Common and Arctic Terns (469/470).—An Arctic Tern ringed Farne Islands 13/7/50, Ravenscar 11/6/53. A Common Tern's nest (two eggs) was found on Warrenby Marsh (Teesmouth) on May 28th, five birds were present (O.C.H.). A 'commic' was noted off Sewerby on April 19th (E.G.), at Teesmouth on May 1st (P.J.S.), at Spurn three on May 10th. A few birds appeared over inland waters from May 5th to 11th (Fairburn ten on May 5th, B. Campbell); and one at Ilton on June 4th and 26th (P.Y.); and one near Keighley on June 11th (D.G.R.); and odd birds by a few inland waters from July to September. Coastal passage in late summer was large (maximum at Spurn *c.* 450 on August 8th and 10th. Teesmouth (Durham side) had *c.* 1,400 on August 15th (P.J.S., A.B.)). The latest date was October 27th for a 'commic' at Spurn. One was near Bridlington on December 5th (F.W.).

219. Roseate Tern (468).—An adult fished close in to South Gare breakwater on August 29th (P.J.S., A.B.).

222. Little Tern (471).—Reached Spurn on April 28th; a number of pairs attempted to breed but no young were seen. *C.* 50 birds were at Spurn on June 5th; and *c.* 75 on July 10th. There was an unconfirmed report of breeding south of Teesmouth (P.J.S.). Two Little Terns splashed down several times at Bottomboat on July 25th and flew up the Calder (E.G.).

223. Sandwich Tern (467).—Coastal passage at Spurn was normal from April 24th (three) to October 10th (three); over 100 birds were noted on several days; up to *c.* 200 occurred at South Gare on August 15th (A.B.).

224. Razorbill (496).—Main return to the Flamborough cliffs between March 21st and 28th (H.O.B.).

226. Little Auk (502).—A slightly oiled Little Auk was caught, cleansed and released by T. Jardine at Spurn in January. On October 27th an auk flying south low over the sea at Spurn could be compared for size with incoming thrushes for which watch was being kept (R.F.D.). On December 13th one that had been knocked down by a Greater Blacked-backed Gull to the deck of a fishing vessel off Whitby was brought to A. B. Walker for treatment; later it flew away. On December 19th there was an oiled bird on rocks at Scarborough (A.J.S.).

227. Guillemot (498/9).—Main body returned to Flamborough cliffs between March 21st and 28th (H.O.B.). Numbers thought to be much reduced compared with former years (O.C.H., B. S. Cran). Frequent visits to Bempton suggest breeding success very low in 1954, probably one young reared per 30 pairs (D.B.P.) who may well be right (H.O.B.). Many oiled birds were found on the coast. The species is a protected bird; it is hoped no climbing will be done in 1955.

230. Puffin (503).—Returned to cliffs March 21st to 28th (H.O.B.). Quite plentiful at Bempton on April 19th (G.C., A.F.). One was found alive near Barnsley 'during October' (T. M. Clegg).

232. Stock Dove (381).—Ringed as adult Esholt 8/6/50; shot Topcliffe, near Thirsk, 5/2/54 (D.B.I.).

235. Turtle Dove (383).—First recorded Hutton Rudby on May 5th (J.P.U.). Increasing in Cleveland (P.J.S.).

237. Cuckoo (240).—Earliest records: on April 12th Batley (H.H.), and near Harrogate (E. Dickinson); but was generally a fortnight later (at Spurn on May 4th). Last seen at Ossett S.F. on September 8th (J.C.). Numbers well under average at Spurn and in some other areas, especially of young birds passing down the coast in late summer.

241. Barn Owl (254).—A. Gordon says more plentiful in the Helmsley area; and not scarce in some others. The decline of recent years must at least have been slowed down if not halted.

246. Little Owl (249).—Ringed as nestling Leathley 26/6/51; caught at Horsforth 27/3/54 (D.B.I.). Birds at Ilton and Danby were on high ground. Increasing around Halifax and bred there in several places (I.M.).

247. Tawny Owl (253).—Ringed as young Rawdon 2/5/52; dead in loft at Howden Clough, Birdsall, south Leeds, 2/4/54 (D.B.I.). Status unchanged.

248. Long-eared Owl (250).—Bred in the Thorne area, but records continue scarce even in former regular haunts. One at Spurn August 11th to 13th came in from sea (G.C.).

249. Short-eared Owl (251).—It would be a good thing for the food brought by a pair of Short-eared Owls breeding on a grouse moor to be carefully recorded. Where voles are scarce, if Short-eared Owls do not leave for an area where such are plentiful, it is quite possible that they may use the food most abundant. Six were shot on one grouse moor in the breeding season (J.C.L.); and a Short-eared Owl rose from a half-grown grouse on July 20th near Ilton (P.Y.). The species was reported from a number of areas in and out of the breeding season in hill country and lowlands much more frequently than a few years ago. One ringed as young at Slaidburn 30/5/53 (J.J.B.) was at Lytham St. Annes in the same autumn. Occurred at Spurn in early May, and at intervals from August 1st to December.

On the cliff-top near Filey Brig on October 17th the wings of an Arctic Tern were found where a Short-eared Owl had arisen; a pellet (owl's?) was found by the remains of another tern farther along. Arctic Terns were fishing nearby. One flushed from Filey Brig on November 7th flew N-W out to sea against the wind until lost to view at about three miles out (A.J.W.).

252. Nightjar (227).—First noted on May 11th in south Yorkshire (J.S.T.); and in Nidderdale on the 15th (A.F.G.W.). Reported from a dozen areas, north, central and south, and proved to breed in several.

255. Swift (225).—First noted on April 24th at High Royd (R.Cr.) and at Ben Rhydding (K.C.C.). At Masham two arrived on evening of May 8th and *c.* 20 next day (R.C.); which was average. Very few passed at Spurn until early June when direction was mainly southward. Fair numbers passed south at Flamborough on June 20th (K.F., H.O.B.). On July 24th southward movement at Spurn continued for most of the day, and passage thereafter was small except on August 5th-6th, and 10th-11th, and on the 18th. Odd birds passed on October 4th and 19th. Large concentrations over waters inland on various days from mid-May to late August could be associated with weather conditions. There was strong movement westward along the Derwent Valley near Pickering on August 26th (R.M.G.) A Swift was seen in Burniston village on October 3rd (A.J.W.); and one flew south at Staveley on the same day (A.F.G.W.). At Ossett Spa S.F. on June 27th, among about 30 Swifts was one noticeably larger, with belly creamy-white, which seemed to differ from both Common and Alpine Swift (E.G., A.F.).

258. Kingfisher (234).—Few reported but status considered average.

261. Hoopoe (232).—There was one during three days in September in the grounds of a Hull factory (D. Wade); and one at Driffield on September 7th (P. Gordon).

262. Green Woodpecker (235).—Possibly increased, from the number of reports received. One by the railway at the edge of Hunt Cliff on December 5th was in a strange habitat unless it was an immigrant (D.R.S., P.S.).

263. Great-Spotted Woodpecker (236/237).—The male of a pair breeding near Keighley flew from a dead tree top into a cloud of insects on May 29th; and after hovering with beating wings returned to a horizontal branch to adjust the collected insects. The operation was repeated several times before the bird flew with a beakful towards the nesting hole (C.D.R.).

264. Lesser Spotted Woodpecker (238).—Bred at Helmsley, near Keighley, near York, and probably at Harewood, Chevet and near Masham, and was reported from other areas. E. C. J. Swabey noted the swift lateral movements of the beak

of a bird drumming in April on a dead horizontal ash-branch, and on May 13th on a thin vertical ash-twig.

265. Wryneck (239).—Noted at Spurn from August 20th to September 5th (six on August 21st); five were ringed. In the same period Wrynecks were noted on the Farne Islands, and near Hexham, and on the Durham side of Teesmouth (P.J.S., D.R.S., C.J.H.).

271. Woodlark (69).—Was heard and seen in south Yorkshire, and bred in at least one area (J.S.T.). Was absent from one East Riding area where bred in recent years, but occurred in others.

272. Skylark (70).—Major movements were connected with the cold spell from January 25th to February 12th: passage down the Yorkshire coast from Teesmouth on January 31st (P.J.S.); *c.* 3,000 passed mainly SSW in the morning at Wintersett with *c.* 750 feeding two miles away at 12.30 (E.G., J.C.); and passage mainly eastward over Doncaster (J.S.T.) and Knaresborough (J.R.M.) on February 13th, and over Eccup on the 14th (A.H.B.L.).

273. Shorelark (72).—One occurred at Spurn on November 21st (J.K.F., A.E.L.).

274. Swallow (220).—March 31st at Scissett (J.C.S.E.), April 3rd at Sandsend (A.B.W.); and the 4th at Farnley (E.S.S.), and two at High Royd (R.Cr.), were the dates when earliest noted. At Spurn the first appeared on April 18th but passage, mainly southward, was inconsiderable until May 15th (*c.* 150), and June 5th to 9th. Autumnal passage, again mainly southward was considerable August 1st to 13th, and from August 28th (with occasional days of small passage) to October 5th when birds became few. One occurred on November 8th. Other very late birds were: at Bridlington on November 13th (F.W.); at Flamborough on the 14th (H.O.B.), and at Howden (Mrs. Kitchen), and six over a mill dam at Bradford on the 16th (F. Brock); at Redcar on November 30th, December 1st and 3rd (D.R.S., P.S.), and at Skirlaugh on December 4th (J. Leake, per H.O.B.).

Inland waterside concentrations varied with weather conditions. A white bird at Marton-in-Cleveland during August (N. W. Harwood) was probably a juvenile. A pair at Austwick reared young in a nest built on a ¾-inch ledge inside a henhouse door opened daily; afterwards the birds removed the feather lining presumably for a second nest elsewhere (W. K. Mattinson). On May 2nd five Swallows at dusk roosted in branches over water at Riddlesden—an example of roosting by a small party on passage (C.D.R.). The bed of reed mace at Keighley S.W. had *c.* 350-400 roosting on August 4th, only *c.* 250 on the 18th, and none on the 26th (C.D.R.).

276. House-Martin (222).—Early records were: March 31st at Scissett (J.C.S.E.), April 17th at Luddenden (W. Greaves), April 24th Ben Rhydding (E.S.S.), April 25th Gargrave (two) (C.D.R.). On April 27th one appeared at Spurn, where very few passed in spring; and numbers in autumn were much smaller than of Swallow (*c.* 100 September 6th, 131 September 12th); eight appeared on October 28th; and five on the 30th were the last. North of Bridlington two were seen on December 5th (R. S. Audas, F.W.). Passage movement was noted up-river at Brough on September 18th (S.M.); when none occurred at Spurn. Nests built against the Hunt Cliffs placed so that a gull could get no foothold were undamaged on August 26th; unlike many others (O.C.H.). Flight northward of *c.* 40 Martins with Swallows at Robin Hood's Bay on September 14th; and of *c.* 200 on the 15th into a Force 5 wind from north-east, was followed on the 16th by flight southward of large numbers into a Force 7 wind from west (R.Cr.). A graph of those birds' movement could occasion surprise if procurable. On August 12th at dusk an odd House-Martin roosted in a thorn hedge *c.* 20 feet away from the Swallows roosting at Keighley S.W. (C.D.R.).

277. Sand-Martin (223).—First noted over the Aire near Swillington Ing on March 27th (Mrs. E.G.); and at Cottingley Bridge (D.G.R.); and Knaresborough S.F. (J.R.M., J.C.A.R.) on the 28th. At Spurn not seen until April 18th and spring numbers very small; the main autumn passage took place from July 24th (*c.* 150) to August 13th, and on September 4th-5th; last seen, nine on October 16th. Spates washed out whole colonies in the banks of the Dales rivers during the summer. Inland waterside congregations in August were: *c.* 300 Bottomboat July 21st (A.F.); *c.* 500 August 22nd (E.G.); and *c.* 200 Swillington August 29th (G.C.).

278. Golden Oriole (17).—One occurred near Snainton on May 16th (F.J.).

279. Raven (1).—One ringed in Cumberland by R. H. Brown, 11/4/53, was

at Redmire (N.R.) on —/12/53. Ravens were seen occasionally in Pennine areas but the only nest recorded was robbed.

280. Carrion Crow (3).—On June 28th four crows were disturbed attacking a female Kestrel on the ground, which was badly wounded and died (P.Y.).

281. Hooded Crow (2).—Noted on Gearstones Moor February 2nd (P.Y.) and near by on June 7th where hybrids produced 1953 (R.C.); and on ice at Eccup on February 13th (Mrs. E.G.). Noted at Flamborough on four days in July and August (two on August 21st) (H.O.B.); and one in Jackson's Bay September 9th (A.J.W.); and two were near Blaxton ponds on September 26th (A.E.P.). At Spurn one was noted May 18th, and one passed with a Carrion Crow on the 19th (R.M.G.); not seen there in autumn until November 7th; and were few.

282. Rook (4).—Near Wilsthorpe *c.* 200-250 came in from sea at 5 p.m. on October 7th at *c.* 1,000 feet (G.J.B.). One ringed as nestling at Leathley 19/3/49; Arthington 21/6/54 (P.E.D., D.B.I.). Counts at rookeries near Leeds and in Wharfedale showed no considerable changes from counts of previous years except an increase of 90 over 1953 at Kirby Overblow. One ringed Spurn 5/11/53, *c.* 12/2/54 near Atherstone, Cheshire.

283. Jackdaw (5).—Becomes more numerous in several areas. One ringed as nestling at Farnley 13/5/51 was dead near Ilkley in June 1954 (D.B.I.). A nest at Calverley contained a brass ring (D.F.W.).

284. Magpie (7).—At Whinmoor *c.* 50 roosted in a hawthorn copse on March 24th (J.R.G.). Thirty-nine in a stubble field near Bingley on December 18th was a large gathering (C.D.R.). The old roost near Northallerton (see *British Birds*, 1942/3, Vol. XXXVI) is still occupied (J.P.U.).

288. Great Tit (98).—Ringed Burnside, Westmorland, 11/1/53; Clapham (Yorks.) 23/5/53—22 miles SE (*British Birds*).

289. Blue-Tit (100).—Ringed High Royd 13/11/48, re-trapped 14/11/54, (R.Cr.). At Ilton a second clutch had been laid on July 3rd in a nest from which a brood had flown (P.Y.).

290. Coal-Tit (102).—One ringed at Spurn on October 16th and two seen on the 17th were the first recorded by the Observatory.

293. Willow-Tit (108).—One excavating a hole at Darton on April 19th (J.C.S.E.); and one seen at Sand Hutton (York area) on March 28th (E.W.T.), added to our distributional knowledge.

296. Nuthatch (96).—An adult and a fledged young re-appeared at a bird table at Romaldkirk Hall early in July. The young bird assumed possession and tried to keep other birds away, spending long periods there, and bathing in the drinking bowl (A. P. Coote). Nested at Methley (P.B.) and Bingley (D.F.W.) and in its usual haunts.

[297. Wall-Creeper (95).—Alfred Hazelwood informed me that a strange bird with red wings, seen by a gamekeeper named J. P. Dearnley on November 27th, 1954, was claimed as of this species. J. C. S. Ellis made the journey to investigate. The site was rocky ground, with old trees and young birches, at the head of the Ewden Valley. The bird was described as having a greyish-blue crown and mantle, with a darker tail, and red wings which it continually ' scissored ' (flicked). The underparts were paler, and the bill long and slightly curved. It ran both up and down trees; and on short flights appeared rather ' moth-like '. J.C.S.E. found the keeper more impressed by the bird's breadth (in flight), and by the crimson wings than by anything else. He had found the Wall-Creeper illustration in a book at a library. Winds had been westerly and strong for some days, with a S-W gale on the 27th. The bird was not seen again but I feel the identification is very probably correct. Square brackets are used in the absence of confirmation.]

298. Tree-Creeper (93/4).—One occurred at Spurn on October 9th.

299. Wren (213).—Up to ten (October 16th) were seen at Spurn from September 25th to December 12th; scarce at other times.

301. Mistle-Thrush (174).—A nest in Roundhay Park, Leeds, was used for three broods (R.V.J.). Near Wakefield on September 24th *c.* 40 flew with Starlings and Skylarks (E.G.).

302. Fieldfare (173).—Near Eccup at 11-0 a.m. on April 11th were some 1,500 birds with more coming ' like a long procession piled up '; by noon there were *c.* 2,800-3,000 (R.V.J.). Another pre-migrational concentration (*c.* 800) occurred near Wakefield on April 27th (E.G.). Late dates were: May 7th, a small flock near Skiplam (J.P.U.); May 9th three near Knaresborough (J.C.A.R.); and one at Spurn

on May 14th. Latest of all was one at Whinmoor on June 8th (J.R.G., R.V.J.). The first of autumn were 10 near Malham Tarn on September 18th (P.L.), seven near Tong on October 2nd (D.A.R.), one at Chevet Park on the 3rd (E.G.), and three at Spurn. Considerable numbers came in from sea between South Gare and Marske at various times in late October (O.C.H.). Maxima at Spurn were: October 17th *c.* 800, October 27th *c.* 1,000, November 27th *c.* 250. Some numbers were on the Wolds on October 17th (J. Armitage). Most of the Spurn birds came and passed down the peninsula, as did some of those that came in from sea, of which a small proportion passed up the Humber. Fieldfares, Redwings and Song-Thrushes to the number of *c.* 3,000 flew south at Bridlington in the afternoon of October 17th (G.J.B.). *C.* 30 Fieldfares came into roost at Ossett Spa S.F. on October 17th. On November 2nd *c.* 600 at Flockton Moor included one with a crescentic white patch on the throat (E.G.).

303. Song-Thrush (175/7).—A bird at Methley repeatedly flew with earthworms taken from dug ground to wash them in water before feeding them to its young (P.B.). No numbers occurred at Spurn until October 17th when migrants numbered *c.* 60; and see (G.J.B.) under Fieldfare.

304. Redwing (178/9).—Ringed Spurn 26/10/49; Knockane, Portlaw, Co. Waterford, Eire, in third week February 1954. Mortality was heavy among Redwings and Song-Thrushes in middle fortnight of February at Bridlington; 25 were found dead in the Bridlington School grounds (G.J.B.); (cold spell January 25th to February 12th). On January 31st *c.* 200 turned over leaves blackbird-fashion near Saltaire (S.L.). Nocturnal calling was heard over Doncaster on March 24th and 26th (J.S.T.). April 4th was the date of the last spring record at Spurn; and *c.* 50 on October 1st the earliest of autumn. Large numbers appeared at Spurn—October 15th *c.* 500, October 16th *c.* 400, October 17th *c.* 3,000; on the 18th under 200 were estimated. During a watch by John Cudworth from 06.30 hours to 09.00 hours on October 17th *c.* 1,200 Redwings and *c.* 320 Fieldfares passed by the 'narrow neck'; from 10.15 hours to 13.30 hours from the Chalk Bank to the Warren birds were still more numerous, and Blackbirds were beginning to come into the picture. In the early hours birds came down the peninsula; but at 14.00 hours Redwings and Blackbirds came in over the sea, but most turned to follow the coast southward. Some 300 came in from sea on October 16th on the Durham side of Teesmouth (C.J.H.); up to *c.* 500 moved south at Crakehall in the afternoon, over 50 were on Fountains Fell at *c.* 1,800 feet (P.F.H.); and small parties were at Ripley. On October 17th *c.* 200 were at Ramsgill, and at Harrogate (A.F.G.W.), and a few at Eccup (A.H.B.L.).

On October 27th was another rush of Redwings at Spurn, *c.* 1,200 being estimated; and again the majority passed down the peninsula into the SSW wind. The peak of the movement came after 11.00 hours and was continued into the afternoon; many Fieldfares were included, and some Blackbirds in the afternoon. Later movements at Spurn in October and November were much smaller; but over Leeds City considerable numbers could be heard on November 15th at 18.45, and over Headingley at 19.15 and at 22.00 (A.H.B.L.).

307. Ring-Ousel (182).—One was at Gorple Moor on March 24th (I.M.). A bird on Rombald's Moor in spring ringed both with aluminium and red celluloid had almost certainly been ringed there in 1953 (J.C.L.); seven males were there on March 31st (J.C.L.). Breeding status was average. None was known at Spurn in spring. Three were there on October 27th, and one on October 3rd and 4th; and single birds on Filey cliffs on October 17th (A.J.W.) and in a Bridlington garden on October 22nd (H.F.W.).

308. Blackbird (184).—

Ringed Spurn 19/10/53; Barnetby-le-Wold, Lincs., 20/2/54.
Ringed Spurn 13/10/53; Fjellebrorn, Ulbolle, Fyen, Denmark, 13/11/54.
Ringed Spurn 24/3/54; near Groningen, Holland, *c.* 21/6/54.
Ringed Spurn 23/10/51; Sira, Vest-Agden, Norway, 21/7/54.
Ringed Spurn 6/11/54; near Rochdale, Lancs., 17/11/54.
Ringed Spurn 6/11/54; dead Wardenburg, nr. Oldenburg, West Germany, 10/11/54.
Ringed Spurn 26/3/53; Erge Mistoen, Salten, Norway, *c.* 26/10/54.
Ringed Spurn 20/10/53; Hornnes, Aust, Agden, Norway, 21/8/54.
Ringed Thornaby-on-Tees 9/2/54 by P. A. Rayfield; Mandal, West Agden, Norway, 16/4/54.
Ringed Spurn 10/10/49; Lanivet, Cornwall, 3/1/54.

Some passed at Spurn in March (*c.* 30 on the 24th), and in early April and 20 were recorded on May 10th. In autumn the main passage occurred on October 16th and 17th (*c.* 500). The story of the visitation of November 6th (*c.* 2,000) due to a quick change in weather was told in the January issue of *The Naturalist*. There were *c.* 20 at South Gare on November 7th (P.J.S.) and *c.* 60 about Ossett S.F. (A.F.). On November 14th *c.* 50 roosted in a plantation at Ossett (E.G.).

311. Wheatear (186).—Two were at Stainburn on March 21st (D.F.W.), and two in Nidderdale (C. Shaddick). The first at Spurn occurred on March 27th; *c.* 60 on August 21st, *c.* 30 on September 7th; and the last on October 24th. Two birds considered of the Greenland race were at Grangetown, Teesmouth, on May 1st (P.J.S.), and one on the same day near Ingbirchworth (J.C.S.E.).

317. Stonechat (198).—A male was carrying food in the Sedbergh area on July 2nd (C.M.). Odd birds and pairs were noted at Auburn near Bridlington throughout the year; no breeding proved but the species bred at South Kingfield in 1951 (G.J.B.). Occurred: one Flamborough January 17th (H.O.B.); one near Ottringham March 7th (W.A.B.); Baysdale in July (B. S. Cran); two near Langsett September 25th (J.C.S.E.); two at Fairburn on December 20th (R.F.D., E.E.J.), and odd birds at Spurn in January to March 2nd, and two at Cherry Cobb on September 26th (M.K.T.). Up to five present about Spurn from October 1st to December.

318. Whinchat (197).—Occurred at Spurn on April 19th to May 21st; and in August to October with maxima from August 21st to September 2nd (15 on August 21st).

320. Redstart (201).—One at Threshfield on March 21st was very early (K.C.C.). Bred not uncommonly in the Bridlington area; eight family parties seen in first week of July (G.J.B.). At Spurn passed in spring April 30th to May 12th (ten on May 1st); in autumn from August 16th (six on 21st), with stragglers seen, one on October 3rd and two on the 8th. One was at Hornsea Mere on August 18th (M.K.T.) and some were at Bempton on August 21st (H.O.B.). In some breeding areas the species was below average numbers. A nestling ringed at Everingham by J. W. Lund on 12/6/53; recovered Alcobendas, Spain (12 miles N.E. of Madrid) 16/9/54.

321. Black Redstart (202).—One was near Gristhorpe on January 17th (A.J.W.). Up to four occurred at Spurn from March 20th to April 13th; during which period on March 28th, a probable appeared at Wintersett Reservoir (E.G.). On May 29th one was noted in a moorland clough at Rishforth (V.S.C., I.M.); and a female at Flamborough on May 2nd (D.B.P.). Up to three on October 3rd to 5th and one on November 2nd were the Spurn autumn records.

322. Nightingale (203).—Had arrived in south Yorkshire by May 6th; probably bred (J.S.T., I.G.B.). One sang May 6th to 29th, *c.* 4 miles east of York (F.J.). Occurred at Spurn on May 8th and August 15th.

324. Bluethroat (205).—A Red-spotted Bluethroat was watched in the Spa Gardens, Scarborough, on April 21st (G.H.A., A.J.W.). One was at Spurn on October 3rd (G.H.A., A.McA.), and one on November 7th (D. R. Wilson).

325. Robin (207/8).—Ringed Spurn 19/10/53; near St. Mammès, south of Fontainbleu, France, first week March 1954. In a space of three yards at Manningham in July, a bird sat on one nest and young were being fed in another nest, and eggs in a third nest were deserted (D.V.)—whether more than one pair was implicated is not stated. Maximum at Spurn six on November 5th.

327. Grasshopper-Warbler (145).—First heard at Hornsea Mere on April 29th (M.K.T.), and at Blaxton (S. Yorks.) (J.S.T.), and near Guisborough (N.W.H.) on May 1st. Bred east of Doncaster (W.B.), and in Bridlington area (G.J.B.). Also heard near Loftus, Wintersett, Skipwith, Stocksbridge, Denaby Ings, York, Fairburn, Keighley, etc.

333. Reed-Warbler (149).—Bred at Fairburn (R.F.D.), and near Swillington Ing (I.G.B.); and was building at Altofts on May 30th (E.G.). Status generally normal.

337. Sedge-Warbler (153).—One near Keighley on April 24th (J.K.F.). First noted at Spurn on May 3rd; fewer there than usual. Twenty-five pairs nested in the Fairburn area (R.F.D.).

340. Icterine Warbler (155).—One was caught at Spurn on August 22nd (J.D.C., J.C.). Two occurred on August 26th (G.H.A., E.B.B.), and one on the 27th (H.G.B.).

343. Blackcap (162).—For details of a female at Patrington in the February cold spell see *The Naturalist*, 1954, p. 46. April 13th at Knaresborough (A.F.G.W., Miss M.R.S.) was the earliest date of spring. One was at Spurn on April 20th and on May 3rd, 13th, and June 6th; and in autumn on September 9th, November 1st and November 7th and 8th. A female Blackcap trapped on May 3rd provided evidence of direction of warbler spring movement at Spurn when it was recaptured at the Warren 2¼ hours after it had been ringed at the Chalk Bank South, into which it had been seen to fly from south undriven (R.C.).

344. Barred Warbler (159).—Three were caught at Spurn, August 22nd, 23rd, and on the 26th, when two more were seen (J.D.C., G.H.A.).

346. Garden-Warbler (161.—Not noted until May 8th—at Esholt (J.B.N.) and near Ilton (P.Y.). At Spurn from May 15th to 17th; and in autumn at intervals from August 14th to 26th with *c.* 25 on August 21st ,the largest number ever there recorded in one day (12 were caught); a few occurred September 12th to 14th, and one was caught on November 6th.

347. Whitethroat (163).—Ringed Spurn 7/9/52; 3/10/53 at Vila Nova de Gaia, Portugal. Seven were caught that had been ringed in 1953 and one that had been ringed in 1951. April 19th at Alwoodley (J.P.G.) was the earliest recorded. On May 8th a Whitethroat was at *c.* 1,100 feet altitude near Cold Edge Dams, Halifax (R.Cr.). Appeared at Spurn on May 1st; *c.* 20 noted May 12th to 14th, which number was never exceeded in autumn; and last on September 27th.

348. Lesser Whitethroat (164).—Noted May 8th at Burley (E.S.S.), and at Spurn, where very few occurred; with the last on September 27th. Two on passage, Scalby Mills September 4th (A.J.W.). No evidence of species being other than scarce anywhere.

354. Willow-Warbler (132).—Recorded at Esholt on April 6th (J.B.N.), and at Leeds on April 7th (H.W., R.V.J.). A. Gilpin records four nests 15 inches above ground at Leathley. The first occurred at Spurn on April 12th, a phylloscopine warbler having failed to be identified on March 28th. Passage occurred on April 29th to May 12th, then declined. The peak in August came with *c.* 40 on the 21st; and the last on October 2nd. On December 15th at Scotton, near Knaresborough, Mrs. G. Clarkson saw and heard one in her garden where she is familiar with the species. Ringed Spurn 20/8/50; near Carlisle *c.* 7/5/54.

356. Chiffchaff (129).—At Dewsbury S.F. a dark-legged phylloscopus occurred on January 31st, February 7th and 14th (J.C., E.G., A.F.). A more normal time for a first appearance was March 28th at Otley S.F. (J.H.I.L.), and at Ossett Spa S.F. (G.C.). Not recorded at Spurn until September 4th and a few subsequently, five on October 4th; and belated birds on November 1st, 7th and 13th. One was at High Royd S.F. on November 7th (R.Cr.).

357. Wood-Warbler (135).—One sang near Ilkley on April 25th (J.K.F., A.E.L.). Occurred at Spurn on August 11th and 21st. Status normal generally.

364. Goldcrest (126/7).—Occurred at Spurn (three) on March 21st and 22nd, six on March 28th, four on April 3rd, one on the 12th, and one May 1st. One reappeared on September 12th. There was no large passage, *c.*20 on September 30th being the maximum. A few came with the rush on November 6th, maximum 12 on the 7th.

366. Spotted Flycatcher (121).—May 7th at Bramhope (P.B.) was the earliest; when also there were ten at Hornsea (M.K.T.). A nest near Doncaster in a half-cocoanut suspended on string against a large tree trunk held a half-grown young Cuckoo on June 29th (J.S.T.). A few passed at Spurn from May 10th, and from August 10th, two being there on October 3rd.

368. Pied Flycatcher (123).—Bred in Ingleborough Hall grounds (J.K.F., A.E.L.); and attempted breeding in nest-box on Strensall Common (F. Cooke). General status normal. Late in appearance everywhere—two at Spurn on May 2nd and three on May 4th. At Spurn birds were noted from August 20th to September 8th, with *c.* 50 on August 21st (when ' fair numbers ' were at Bempton (H.O.B.)), and stragglers on September 18th to 21st, and two on October 3rd.

370. Red-breasted Flycatcher (125).—One at Spurn on October 8th (G. R. Wilkinson, E. Huyton).

371. Hedge-Sparrow (210/11).—Seven ringed in 1953, two in 1952 and one in 1951 were recaptured in 1954. Always at Spurn but only odd birds in June-July, and increasing in autumn (*c.* 20 October 2nd).

373. Meadow-Pipit (76).—Ringed Spurn 9/9/53; Odemira (Beza), Portugal, 5/2/54. Two birds ringed in 1951, one in 1952, and two in 1953 were retrapped in

1954. The main Spurn movement in spring came from March 21st to mid-April; and in autumn from August 28th with maxima of *c.* 3,000 on September 12th (J.C.), *c.* 300 on October 3rd, *c.* 300 on October 16th. Spring inland movements corresponded, after the cold-spell concentrations, but autumn movements were spread over longer periods.

[375. Tawny-Pipit (74).—From the details entered in the Spurn log a bird seen by E. Huyton, J. Cudworth and others on October 4th was probably of this species; the bird flew before examination was complete.]

376. Tree-Pipit (75).—April 15th, Esholt (J.B.N.) and April 25th, Chevet Woods (E.G.) were the first records. As usual Spurn had very few—12 on September 12th being unusual.

379. Rock-Pipit (81).—The resident flock near Whitby on December 17th numbered *c.* 24 (A.B.W.). Bred as usual on rocky parts of the coast. A few were seen at Spurn from February to April and from October 3rd.

380. Pied/White Wagtail (90/91).—White Wagtails were recorded from April 7th at Ilkley (J.R.G.) to June 12th at Ilton (P.Y.), and 13th at Ossett (G.C.); and a few in autumn when determination is much more difficult.

Spring concentrations of Pieds occurred at Goldsborough and Denaby Ings. At Ossett Spa S.F. *c.* 40 roosted in willowherb on June 14th (E.G.); *c.* 100 on July 10th (G.C.); *c.* 155 on September 8th (E.G.) and *c.* 200 on September 22nd (G.C.). At Keighley S.W. *c.* 80 were in reed-mace on September 21st; and *c.* 56 flew from a willow at Utley on September 29th (C.D.R.). Knostrop S.F., Leeds, is a favoured winter resort (A.H.B.L.).

381. Grey Wagtail (89).—Scarce in Malham area (P.F.H.), and under normal in numbers generally.

382. Yellow Wagtail (88).—Ringed High Royd as juvenile 11/9/51, Ben Rhydding 1/8/54 (W.F.F., R.Cr.). The earliest dates were April 6th at Ilkley (Miss E. A. Gill); and April 8th Dewsbury S.F. (A.F.); most came from mid to the end of April (suddenly numerous Nidderdale April 28th (D.S.)). A few appeared at Spurn from April 27th and in autumn (*c.* 20 August 21st, and *c.* 25 September 12th). General status normal. A bird with a slate-blue head and whitish eye stripe was at Dewsbury S.F. on May 19th (A.F.).

383. Waxwing (120).—From January to March one or two occurred at Middlesbrough, near Whitby, near Bridlington, near Fadmoor, New Earswick, Keighley, Dewsbury, Kildwick. One near Riplingham on December 18th (D. K. N. Hillas) was the only one reported in autumn.

384. Great Grey Shrike (114).—A bird occurred from January to March near Gouthwaite Reservoir; and again from November 7th to the year end (A.F.G.W. and others). One was caught in early March at Stockeld Park (Mr. Dewar, per R. Procter); and one seen near Shipton, York, on March 20th (F.J.). June 4th in Thorsgill, Barnard Castle (J.P.U.), June 5th near Mickleton, Teesdale (N. Harmby, per P.J.S.) and June 11th on Danby Rigg (Misses M. A. Hoare and I. Lemon) are unusual dates. Occurred in autumn on October 31st near Wakefield (E.G.), and about Spurn on September 12th, November 2nd, 6th (two) and 7th.

388. Red-backed Shrike (119).—Occurred much more frequently than usual. Up to two were at Spurn daily from August 21st to 28th, one on September 5th, and one on November 7th (with the Blackbird rush). The late August movement also brought a juvenile to Bempton (21st, and to Flamborough, 28th, H.O.B.), and one or two to Durham (P.J.S.). One perched on a bush at Lockwood Beck on May 15th (B. S. Cran); and one at Whitley Beaumont. Huddersfield, on June 6th (E.C.J.S.). M. Thompson and M. Wear observed a pair near Cottingham from May 29th to June 4th. One was near South Cave on August 17th (D.K.N.H.). One flushed from the South Gare Dunes on November 21st (M. Allison, per P.J.S.).

389. Starling (14).—

Ringed Scarborough 2/2/52 by A.J.W.; Mginsk, Leningrad, Russia, 15/4/53.
Ringed Askham Bryan 10/2/47 by R. Carrick; near Viliand, Estonia, —/3/50.
Ringed York 15/2/53 by Bootham School; Galterud, Norway, 1/5/53.
Ringed York 10/2/53 by Bootham School; Hamdorf, Schleswig-Holstein, 20/6/53.
Ringed Scarborough 15/12/52 by A. J. Wallis; Scholderup, Germany, —/8/53.
Ringed Scarborough 29/1/52 by A. J. Wallis; nr. Bredsted, Schleswig-Holstein, 20/7/53.

Ringed Thornaby-on-Tees 13/1/52 by P. A. Rayfield; Mildsted, Schleswig-Holstein, 19/7/53.
Ringed York 13/1/54 by Bootham School; Askern *c.* 20/7/54.
Ringed York 11/2/54 by Bootham School; Langwede, over Nortorf, Pendsburg, Holstein, Germany, *c.* 23/8/54.

Large roosts were scarce in Yorkshire in autumn, but there was a very large one near Castle Howard (A.F.G.W.); and one near Skipwith. To the artificial roosting-sites Transporter Bridge, Middlesbrough, must be added (O.C.H.). Migrant flocks at Spurn were smaller than in some years but *c.* 3,000 occurred on November 1st, and *c.* 2,000 on October 27th and November 2nd.

390. Rose-coloured Starling (16).—Descriptions of a bird with common Starlings in a Northallerton garden on October 1st supplied to J.P.U.; gave him confidence that this was the species.

391. Hawfinch (18).—Occurred near Ingleby Greenhow, Great Ayton, Sedbergh, Skipton, Ripley, Harrogate, Tanfield, in Wharfedale, Bretton Park, Eccup, Thorne, Doncaster and elsewhere, and known to breed in several places.

392. Greenfinch (25).—One ringed at Spurn in 1949, two in 1951, two in 1952, four in 1953 were recaptured in 1954. At Spurn more (*c.* 50) were present in January than at any other time until October 2nd when the autumnal passage began of which *c.* 250 on October 16th was the maximum daily record. The largest inland congregations occurred during the cold spell: February 2nd *c.* 700 near Wakefield (E.G.); others were near Bradford *c.* 160 on October 16th (J.C.L.), near Eccup *c.* 300 on October 2nd (D.B.I.) and near Bottomboat *c.* 200 on November 24th (A.F.).

393. Goldfinch (20).—Shown by reports to be becoming more frequent in many areas. Occurred at Spurn in January to March and occasionally after; and from October 2nd to December (15 on October 3rd). About 30 were at Gouthwaite on April 16th (J.R.G.), *c.* 50 on Brough foreshore on September 3rd (S.M.), *c.* 50 near Knaresborough on September 12th (J.R.M.), *c.* 30 at Askwith on September 26th (H.J.W.), and near Wakefield October 19th (E.G.).

394. Siskin (21).—Two were at Keldy on May 9th and onward to June 13th; the species had visited near-by alders in the winter (H.O.B.). Four were at Spurn on October 3rd and two on the 17th, from which time small parties were reported inland.

395. Linnet (30).—Ringed birds recaptured at Spurn in 1954 included one of 1950, two of 1951, and many of 1952 and of 1953. By far the most of the 193 Linnets ringed at Spurn in 1954 were caught from March to May, as also with the birds retrapped which had mainly been also ringed in spring; which seems to indicate birds of passage. Birds breeding along the peninsula were fewer than usual. The spring maximum was *c.* 500 on April 4th; and in autumn *c.* 550 on October 1st, and up to *c.* 2,000 October 15th to 17th, most of which only passed along the peninsula without coming down. Flocks at Knaresborough, *c.* 350 August 22nd (J.C.A.R.) and at Ossett S.F., *c.* 300 on August 29th (A.F.) would be likely to be birds from no great distance.

396. Twite (28/29).—Status as usual. Twenty-three were in a field near Lindley Wood reservoir on February 7th (J.H.I.L.). Nesting was proved in a few breeding colonies (J.C.L., J.B.N.). A few odd pairs were seen elsewhere; none of them in the North-East.

397. Redpoll (23/25).—The breeding status of the Lesser Redpoll was normal. More numerous than ever in the Harrogate area (A.F.G.W.). A flock of *c.* 200 at a wood near Doncaster on November 27th was noteworthy (J.S.T.). Only occurred at Spurn October 2nd to 4th (maximum 12) and on the 10th and 16th.

404. Crossbill (36).—Parties occurred in the Great Ayton area in the early months (H. E. Ingram, per P.J.S.). One was found dead near Goathland on May 21st (F.J.). A party that included adults of both sexes and juveniles remained about Pinewoods near Harrogate from May 12th to June 3rd, maximum 30 to 40 on May 17th (Misses H. E. Holmes and M. R. Sanderson and A.F.G.W.). Miss J. Fairhurst saw *c.* 20 in early July 1953, near Harrogate.

407. Chaffinch (40/41).—Ringed Spurn 3/10/51; Vosselaar, Anvers, Belgium, 10/10/53. A male and a female ringed at Spurn in October 1953 were both retrapped in March 1954; the male at least was there in January. Up to *c.* 100 were at Spurn March 21st to 23rd mostly flying south, and six were at Flamborough on March 21st (H.O.B.). The autumn movement began on October 15th, passage was not large. South of Bridlington Chaffinches increased in cliff-top fields in late September but left in the first week of October (G.J.B.). Several hundred roosted in

rhododendrons on November 13th at Blaxton (J.S.T.); and *c.* 500 were in a finch flock at Bretton on December 14th (E.G.).

408. Brambling (42).—Fifteen appeared at Spurn on March 28th and a few thereafter until May 8th (one). In autumn the first (four) appeared on October 3rd; maxima were up to *c.* 100 October 15th to 19th, and up to *c.* 150 October 27th to November 2nd. In both these periods flocks remained for several days and *c.* 70 were ringed mainly by the use of bait at the Chalk Bank. None were seen after November 21st. Inland in spring several odd birds remained until early May. Early observations of parties in autumn fitted with the two passage periods at Spurn.

409. Yellow Hammer (44).—About 100 were included in a big finch flock near Wakefield on February 2nd (E.G.). Two near Malham Tarn on March 21st were unusual both for altitude and type of country (D.R.S., P.S.). Some movement was noted at Spurn: *c.* 10 on April 17th; up to 15 October 1st to 3rd.

410. Corn Bunting (43).—About 30 at Spurn on March 3rd was much the largest flock noted there. There were *c.* 50 at Cadeby on January 30th (J.S.T.). Breeding status was normal. Near Queensbury a fledgling was being fed on July 11th in a thriving colony at *c.* 1,000 feet altitude (I.G.B.).

415. Cirl Bunting (49).—A York schoolboy stated he noted the dark chin of the male of a pair nesting near Overton, and an egg he produced conformed more to 'cirl' than to 'yellow' when compared with museum specimens (E.W.T.). Two buntings north of Kilnsea on September 19th were closely examined by J.C., J.B.N., H.G.B. and A. R. Sumerfield, and were considered of this species (females or juveniles) because they lacked the chestnut rump of the Yellow Hammer.

416. Ortolan Bunting (50).—One at Spurn on October 3rd showed a pale yellow orbital ring and pink-horn bill, and was examined and described in detail as seen at *c.* 20 yards in good light through binoculars and telescope (J.C., H.G.B., and others).

421. Reed Bunting (55).—Birds trapped at Spurn included seven that had been ringed in 1953, and one each in 1952, 1951 and 1950. March 27th to April 5th (up to *c.* 20) and October 16th (*c.* 20) were the times when the species was most in evidence. General status normal.

422. Lapland Bunting (58).—One occurred on January 17th and two on the 31st on Yons Nab, Gristhorpe Bay—the first for the Scarborough area since 1893 (A.J.W.). Lapland Buntings were seen again on the Durham side of Teesmouth on a number of dates in the late autumn (P.J.S.). At Spurn on November 7th, J. S. Trimingham, who had seen and heard the species at Cley a few weeks earlier, noticed a high-pitched call 'tsew' and then 'tickylik', which he described as 'rapid, high-pitched rather metallic'. The bird was flying northward alone along the seaward side near the Chalk Bank. J.S.T. has no doubt of this bird; and fancied he heard it again on the 8th. On November 14th a bird flushed from the roadside south of the Warren, flew high, then pitched into the marram; and was flushed twice more. On rising it trilled ('ticking' note) then used the whistled 'peu' note continuously before dropping again. It had no white on the wing (J.C., D.B.I., A.H.B.L., B.P., R.F.D.). A single bird was seen on December 11th when notes were compared with Snow-Buntings, and the 'rippling' (rather than 'ticking') note described as less musical and the 'tchew' note more explosive. On November 28th three were seen on moors between Richmond and Barnard Castle (A. Anderson in *The Field*, 13/1/55). Two Lapland Buntings were exhibited in a Scarborough cage bird show in the autumn which behaved as if not long caught—the owner could not be found (P.J.S.).

423. Snow Bunting (59).—Up to 70 occurred at Spurn in January (last seen on March 28th); and up to *c.* 50 in autumn. Numbers at Coatham Sands reached *c.* 250 by November 21st (P.J.S., A.B.). There were *c.* 40 on stubble at Flamborough November 14th (H.O.B.); 24 near Filey on December 5th (I.G.B.); and a flock in the cliff-top fields near Bridlington in the winter months, where small flocks came in from sea in late December (G.J.B.). Most of the several birds and small parties inland were in the east of the county.

425. Tree-Sparrow (62).—Status normal.

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The Pocket Guide to Nests and Eggs, by **R. S. R. Fitter.** Illustrated by R. A. Richardson. Pp. xvi+172, 48 pl. Collins, London, 21/-.

In order to appraise a book intended for the tyro, it is necessary to shed a few years and attempt to see it with the eyes of a beginner, unfamiliar with even the commonest species.

This guide is based on the same author's *Pocket Guide to British Birds* and follows the same system for identification, relying upon relative size as the primary factor. Since only eight categories of size are given, based on length, this gives rise to many cases wherein the interpretation may be extremely dubious. Thus the Buzzard and the Oystercatcher are said to be 'medium long', the Greater Black-back and the Shag, very long! Having determined the category of size, the observer must then decide whether the bird is a denizen, in the breeding season, of the land, the water, or the water-side. To decide that the Golden Plover is a land bird, the Greenshank a water bird, to ascribe the Grey Lag to the water-side and the Shelduck to the water shows a nicety of discrimination which may baffle the unwary, let alone the expert.

The plates are not bad on the whole but where colour is at all critical the tonal quality of the reproduction is so poor as to make them useless. Each bird is shown on the nest, with an egg visible but so small as to be of no value for comparison. Included in the work and, oddly enough, illustrated without colour, is a number of species which are likely or putative additions to our breeding list.

A chapter deals with the making of nesting boxes and the business of ringing is so consistently mentioned as to give the impression that it is a reasonable practice for the veriest beginner, although the contrary is explicitly stated in the introduction.

I would not give the book to a budding ornithologist, but I can see its usefulness to those whose interest is casual or vicarious, as those school teachers who wish to help enthusiastic youngsters and who have no knowledge themselves. On this account, the book might be improved by sacrificing some of the rarer species and amplifying the accounts of some of the commoner ones which owe their abundance as a rule to their adaptability which gives them a greater range of nesting behaviour than is indicated in this work.

A.H.

THE Y.N.U. AND AFFILIATED SOCIETIES

The Executive of the Y.N.U. is anxious to strengthen the liaison between the Union and its Associate Members and would urge Secretaries of Affiliated Societies and full Union members attached to these Societies to make known to their members the aims and objects of the Union and its relation to their own Society. It is believed that many members of local Societies are unaware that the Y.N.U. is a confederation of Natural History Societies throughout the county and that all members of Affiliated Societies are Associate Members of the Union and as such are entitled to attend Union excursions, sectional meetings and annual meetings. Details of these meetings are included in the Associate Members' Cards and printed circulars giving full information as to excursion arrangements are posted some time prior to each field meeting to Secretaries of all Affiliated Societies for the information of their members. Union excursions are so arranged that one field meeting is held in each vice-county each year so that affiliated members in all Societies will have a reasonable opportunity of attending at least one excursion. Apart from the advantages available to Associate Members of attending excursions and sectional meetings and meeting Union members other than those attached to their own Society they should also be aware that the Union includes naturalists with specialised knowledge in nearly all branches of natural history who will gladly help them with identifications or information relating to their own interests. The Associate Members' Card contains full information as to the officers and personnel of each of the Sections and committees of the Union covering some twenty different branches of natural history. The Executive of the Y.N.U. would welcome a closer and more active co-operation between Affiliated Societies and the Union both by increased representation of Associate Members at Union meetings and by their contribution of field notes, records and observations suitable for publication in *The Naturalist*.

AN APPEAL

Many who reside in or near the City of York are already familiar with ' The Moorlands ', a woodland about a mile distant from the villages of Skelton and Shipton.

This mixed woodland with its great variety of Azaleas and Rhododendrons was brought to a state of great perfection by the late Mr. Tew, whose residence adjoined, and on his death was purchased by the York Retreat. During the former period visitors in large numbers were permitted to visit the woods on payment of a small fee which went to local charities. Recently when the house and a part of the woodlands passed to the North Riding Mental Home it was decided to dispose of some fourteen acres.

The Council of the Yorkshire Naturalists' Trust is anxious to purchase this woodland and to preserve it in its present condition as a bird sanctuary and as an area of considerable interest to all lovers of nature. It has been fortunate in obtaining an option to purchase, for three months, during which it has undertaken to do its utmost to raise the sum of £500 for the outright purchase of the property. The Council is confident that many in the York area, and indeed throughout the county, who are interested in Natural History or who have enjoyed the privilege of wandering in these woods when the flowering Azaleas and Rhododendrons provide a blaze of colour, will be pleased to subscribe in order to ensure that this part of the woodland is not destroyed and others may enjoy the same pleasure.

The Yorkshire Naturalists' Trust already owns much of and administers the whole of Askham Bog in the Ainsty of York and owns or will shortly own two other properties in the Doncaster area. Those who wish to assist in the preservation of ' The Moorlands ' are invited to do so in one of the following ways:

(1) By the payment of an annual subscription of 10/- which entitles the subscriber to become an Ordinary Member of the Trust and to visit any of the Trusts' properties during the period of membership.

(2) By making a single donation of £10 which entitles the subscriber to become a Life Member of the Trust and to visit the Trusts' properties at all times.

(3) Others may wish to assist towards the preservation of this beautiful woodland without becoming members of the Trust. A contribution will be gratefully received from these also.

Contributions should be forwarded to the Honorary Treasurer of the Trust, The Yorkshire Museum, York.

E. Wilfred Taylor,
President.

THE SPRING FORAY, GRANTLEY HALL
April 23rd-25th, 1954

W. G. BRAMLEY

Some fifteen members and friends attended the 1954 Spring Foray. Grantley Halls the adult college of the W.R.C.C., provided excellent accommodation for the needs of the student and a spacious workroom.

Though cold the weather favoured us. Most of the members arrived in a pessimistic frame of mind as the previous weeks had been anything but genial; but the vicinity of the Hall shewed that there would be plenty of material. Fountains Abbey grounds and woods also provided plenty of material. The woods at Sawley were somewhat less productive and due to a break-up of the party were more extensively explored than originally intended. A short excursion into Spa Gill provided further material, including an amazing amount of *Hymenochaete rubiginosa*.

Our Chairman brought four students to swell our numbers. Mr. C. Booth, now a member of the staff of C.M.I., also brought along a colleague, Dr. Brown, whom we are pleased to welcome as a new member of the Union.

Thanks are due to Mr. Graddon for the list of Discomycetes, to Mr. Booth and Dr. Brown for the Pyrenomycetes and Hyphomycetes, and to Mr. R. Watling for the Basidiomycetes. To all other members and friends we owe a debt for their collecting and help on a most enjoyable foray.

Almost the first specimens found later turned out to be noteworthy. *Apostemidium leptospora* is not often recorded but quite a quantity turned up. On the same branch and greatly resembling it was *Patinella coracina*, probably the first British record. The number of Discomycetes surprised most of us and a few of the smaller Hyaloscyphaceae have not yet been fully identified.

The Pyrenomycetes also provided many new or only occasionally-recorded species. Especially noteworthy are both species of *Ceratostomella, Rhynchostoma apiculata, Ohleria rugulosa, Glonium amplum* and *Melanopsamma pomiformis*.

Since the Spring Forays were restarted in 1946 much more attention has been paid to the Hyphomycetes, especially by members of the C.M.I. This has led to the Yorkshire list being much extended. The present foray is no exception. *Aegerita viridis* and *Catenularia atra* are regarded as rare species. *Bisporomyces chlamydosporis* has recently been proved to be the conidial stage of the Pyrenomycete *Chaetosphaeria innumera* by J. Webster of Sheffield University.

Appended is a list of some of the more noteworthy gatherings.

G. = Grantley. S. = Sawley. F. = Fountains Abbey.
Gr. = In Herb. W. D. Graddon.
Yk. = In Herb. Yorkshire Museum.
Those numbered = Accession Numbers in Herb. C.M.I.
† = Not in Mason & Grainger, *Catalogue of Yorkshire Fungi*.
* = Not in Mason & Grainger for V.C. 64.

DISCOMYCETES

**Apostemidium leptospora* (B. & Br.) Boud., on Cherry Laurel. G., Gr., Yk.
†*Dasyscypha brevipila* Le Gall, on Cherry. F., Gr.
†*D. corticalis* (Pers.) Mass. f. *canescens* Cooke, on *Ulmus*. F., Gr., Yk.
D. nivea (Hedw.) Sacc., on Cherry and Oak. F., Gr.
D. apala (B. & Br.) Dennis, on *Juncus*. G., Gr.
**D. fugiens* (Buck) Mass., on *Juncus*. G., Gr.
†*Hyaloscypha dematiicola* (B. & Br.) Nannf. (Stat. con.) 56571.
†*H. stevensonii* (B. & Br.) Nannf. F., Gr.
**H. leuconica* (Cooke) Nannf., on Conifer. F., Yk.
**Mollisia discolor* (Mont. & Fr.) Phill. F., Gr.
M. melaleuca (Fr.) Sacc. Gr.
†*Patinella coracina* Bres., on Cherry Laurel. G., Gr.
**Pyrenopeziza mercurialis* (Fuckel) Boud., S., Gr.
**Tapesia livido-fusca* Rehm. Gr.

PYRENOMYCETES

†*Ceratostomella ampullesca* (Cooke) Sacc., on *Ulmus*; 56414.
†*C. cirrhosa* (Pers. ex Fr.) Sacc., 56381 (a).
**Cucurbitaria berberidis* (Pers.) Gray, on *Berberis* sp. G., Yk.
†*Glonium amplum* (B. & Br.) Duby, 56611.
†*Hysterium angustatum* (A. & S.) Chev., 56590.
†*Melanopsamma pomiformis* (Pers.) Sacc., on *Ulmus*; 56393.
†*Melanopsammella inaequalis* (Grove) Höhnel, on *Acer*; 56394.
†*Camerops tubulina* (A. & S.) Shear (=*Nummularia lutea* (A. & S.) Nits.), on *Quercus*; 56382.
†*Ohleria rugulosa* Fuckel, on *Ulmus*; 56383.
†*Ophionectria cerea* (Berk. & Curt.) Ell. & Everh. (Stat. Con.: *Helicosporium vegetum* Nees) 56429.
**Rhynchostoma apiculata* (Currey) Wint., on Conifer; 56612.

BASIDIOMYCETES

†*Corticium niveo-cremeum* Höhnel & Litsch. F.
†*Helicobasidium purpureum* Pat., Spa Gill.
Hymenochaete corrugata (Fr.) Lév., G.
Mycoleptodon fimbriatum (Pers.) B. & G. F.
Pleurotus sapidus Schulz. G.
Polyporus brumalis (Pers.) Fr. G.
Trametes rubescens (A. & S.) Fr., on *Salix*. S.
Puccinia adoxae Hedw. f. S.
†*P. cirsii-lanceolata* Schroet., Ol. G.

HYPHOMYCETES

†*Acladium conspersum* Link ex Link, 56430.
†*Aegerita viridis* Bayliss-Elliot, 56566.
†*Bisporomyces chlamydosporis* van Beyma, 56486.
†*Botrytis truncata* (Cooke) Sacc. No doubt this is the same as *Gueguenia caespitosa* Bainier (1907).
†*Brachysporium bloxhami* (Cooke) Sacc., 56493.
†*B. britannicum* Hughes, 56485.
†*B. masoni* Hughes, 56620.
†*Catenularia atra* (Corda) Sacc.
†*Diplococcium spicatum* Grove, on Conifer; 56496.
**Graphium caliciodes* (Fr.) Cooke & Mass. (In M. & G. as *G. flexuosa* (Mass.) Sacc. and in recent lists as *Sporocybe flexuosa* (Mass.) Mason).
†*Menispora tortuosa* Corda, on *Fraxinus*; 56495.
†*Penicillium stoloniferum* Thom., on *Polyporus betulinus*; 56568.
†*Torula ramosa* Fuckel, 56381 (a).
**Verticillium cyclosporum* (Grove) Mason & Hughes, 56553. (In M. & G. sub *Stachylidium*.)
†*V. tenuissimum* Corda, 56426 (a).

THE AUTUMN FORAY, GRASSINGTON
September 24th-27th, 1954

MISS E. M. BLACKWELL AND W. G. BRAMLEY

QUITE a number attended the Autumn Foray at Grassington, an encouraging feature being the number of keen young people. On the Sunday some eighteen students from Bingley Training College joined us, but their mycological baptism proved unfortunately to be a very wet one. The party was rather split up in accommodation, but a large room at headquarters was used as a workroom and for the display of specimens.

Two days were spent in Grass Woods and the immediate vicinity and here material was not too plentiful. This accorded with conditions generally in other parts

of the county. On the Monday Bolton Abbey woods were explored; a more rewarding day both as to weather and specimens. Here was a greater abundance of fungi and a greater variety of species. This most probably was due to the more sheltered position and the greater depth of soil, which in many parts of Grass Woods is often thin over the underlying porous limestone.

We are indebted to Dr. La Touche, A. Collinge and R. Watling for lists of species. Thanks are also due to Miss E. M. Wakefield and Mr. D. Reid for help in the determination of specimens.

*=not in Mason & Grainger for V.C.64.
†=not in Mason & Grainger.
G=Grass Woods.
B=Bolton Abbey.

MYXOMYCETES

†*Physarum carneum* List. & Sturgis. G.
**P. pusillum* List.
Lamproderma scintillans Morg.

HYPHOMYCETES

†*Mycogone cervina* Ditm. ex Chev., on *Helvella lacunosa*, B.

DISCOMYCETES

Catinella olivacea (Batsch) Boud. G.
Macropodia macropus (Pers.) Fuckel G.
Otidea cochleata (Linn.) Fuckel G.
Sarcoscypha coccinea (Jacq.) Fr. G. (A late date, generally a Spring species.)
**Sphaerospora asperior* (Nyl.) Sacc. (In M. & G. sub *Ciliaria*.)

BASIDIOMYCETES

Agaricaceae

Cantharellus cibarius Fr.
**C. tubaeformis* (Bull.) Fr., under Beech, B.
Coprinus ephemerus (Bull.) Fr.
**Cortinarius glandicolor* Fr. B.
**C. largus* Fr.
**C. turbinatus* (Bull.) Fr.
Hygrophorus chlorophanus Fr.
H. laetus (Pers.) Fr.
H. miniatus Fr.
**H. nigrescens* Quel.
**H. russo-coriaceus* Berk. & Miller
Hygrophorus unguinosus Fr.
Lactarius acris (Bolt.) Fr.
L. torminosus Fr.
L. uvidus Fr.
Paxillus panuoides Fr. B.
Pluteus salicinus (Pers.) Fr. B.
†*Russula versicolor* J. Schaeffer. B.
R. virescens (Schaeff.) Fr.
Tricholoma sulphureum (Bull.) Fr. G.
T. sulphureum var. *bufonium* (Pers.) Fr. G.

Polyporaceae

**Polyporus adiposus* B. & Br., on Birch, B.

Hydnaceae

Odontia papillosa (Fr.) Bres., on wood, G.; Skirethorn wood on *Larix*.

Thelephoraceae

Corticium (*Gleo.*) *porosum* Berk. & Curt. G.
†*Peniophora caesia* (Bres.) Boud. & Galz., Skirethorn wood.
P. incarnata (Pers.) Cooke, Skirethorn wood.

Clavariaceae

**Clavaria gracilis* Berk. & Desm. (det. E.M.W.). (In M. & G. sub *Pistillaria*.)
**C. umbrinella* Sacc.
**Pistillaria quisquiliaris* Fr., on Bracken.

LEPIDOPTERA COMMITTEE

The Lepidoptera Committee held a meeting in the Tolson Memorial Museum, Huddersfield, on February 5th, 1955. Some twenty members and friends attended. The President, Mr. E. W. Taylor, opened the meeting and introduced Mr. F. Hewson, who acted as Chairman in the absence, due to illness, of Mr. M. D. Barham. Mr. Hewson mentioned that similar meetings had been held previously in members' houses but that this was the first venture in a public place. Informality was the keynote of the meeting and it was hoped that such meetings would bring together lepidopterists and so enable them to interchange their views on various topics. It was emphasised that discussion was beneficial to students at all stages and that beginners should not be afraid of attending similar meetings in their search for information.

The Committee expressed its gratitude to Mr. E. W. Aubrook, the Director of the Museum, for his kindness in allowing use of the room and for permitting the Morley and Porritt Collections to be examined. Some three hours were spent in discussion and members attending expressed their convictions that similar meetings should be arranged in the future.

It may be practicable to arrange meetings in other parts of the county and so enable those who cannot travel great distances to attend. A hearty welcome is extended to all interested in Lepidoptera to co-operate with the Committee in these ventures. Any member of the Union wishing to be notified of the dates and arrangements of future meetings should send his or her name and address to Mr. E. Dearing, 37 Ormerod Road, Burnley, Lancs.

BOOK REVIEWS

Moths, by **E. B. Ford.** New Naturalist Series, Vol. 30: Collins, London. Pp. xx + 266, 56 plates inc. 32 in colour and 12 maps. Price 35/-.

Since the publication of *Butterflies* in 1945, Dr. Ford's volume on *Moths* has been eagerly awaited by entomologists. The present book, admitted by the author to be Part II of his work on the general biology of British Lepidoptera, cannot be properly appreciated unless the earlier work has been studied. *Moths* has been limited to an account of the so-called Macro-Lepidoptera for the smaller moths are difficult to handle and their distribution, structure and variation are less well known.

Only the first chapter deals with anatomy and physiology as these aspects were discussed fully in *Butterflies*. Dr. Ford is a distinguished geneticist. His four chapters on genetics are finely written and the biological principles should be easily understood by a careful reader. He shows that the amateur can do much to further scientific knowledge in this subject by systematic breeding experiments, providing the varieties obtained are used to further the experiment and are not simply treated as ' curios ' to be killed, set and placed in a cabinet drawer. The chapter on Polymorphism is most interesting and will do much to clarify the difficulties so frequently encountered.

Possibly the chapter on ' Melanism, Industrial and Otherwise ' will be the most interesting to North Country readers for the Lancashire and Yorkshire industrial areas are the home of several black or dark forms of moths. The suggested causes of industrial melanism are threefold: (1) melanic specimens are better protected when resting on soot-blackened objects and vegetation; (2) predatory enemies are fewer owing to the general destruction of life in such situations; (3) a gene normally at a slight disadvantage may be considerably advantageous under conditions of persistent soot deposit. Included is the result of an experiment by Dr. H. B. Kettlewell where typical and black specimens of the Peppered moth were placed on tree trunks in a soot-polluted area. Robins and Hedge Sparrows were seen to pick moths off the trunks—the black specimens having much the higher rate of survival.

The same high standard is maintained in the chapters on Dispersal, Protective Devices, Geographical Distribution, Habitat, Relict Faunas, Geographical Races and Evolution. The amount of information given on these subjects is wide when one considers the small space at the disposal of the author. The matter of the chapter on Injurious Moths is thin, as indeed it must be, if the effects of ' Micro-Lepidoptera ' such as the Codlin, or those feeding on stored products are omitted.

There is no mention of the Bordered White (*Bupalus piniarius* L.), whose depredations on pine are causing concern to the Forestry Commission.

The book is illustrated from photographs by Mr. S. Beaufoy and these are up to the standard of excellence and artistry we have come to expect from him, though a few of the coloured plates have suffered in reproduction. The illustrations are well chosen and the references between text and plates are good. Also there is an appendix on classification (Kloet & Hincks), a glossary and bibliography.

There are 12 maps showing the distribution of 14 species. Unfortunately, those numbered 2, 8 and 11 do not give a correct picture of distribution. These are: *Entephira caesiata* Schiff., which spreads farther south through east Cheshire, north Derbyshire into Staffordshire and thence into north and mid-Wales; *Ortholitha bipunctaria* Schiff., is common on limestone in parts of north Derbyshire and north Wales; *Drepana binaria* Hufn. is found from Flintshire and Cheshire to spread northwards through Lancashire to south Westmorland. All records quoted above were published between 1948 and 1953. It is hoped that some correction may be made in future printings as it is likely these maps may be quoted as authoritative since they are published in one of the outstanding works on British Lepidoptera.

H.N.M.

A Handbook of British Flowering Plants, edited by **A. Melderis** and **E. B. Bangerter.** Pp. 360 with 24 colour plates and 220 drawings. Ward Lock and Co. Ltd., 63/-.

This handsomely produced and well illustrated book is presumably designed as a guide to the identification of wild flowers for the use of amateur botanists and non-specialists. There is, however, no preface or introduction explaining the scope of the book or why it is described as being ' edited ' rather than compiled by those under whose names it is issued; nor is there any reference to or acknowledgment of the source of the illustrations all of which are apparently original. A glossary and artificial keys to the families precede the main body of the work wherein all British genera are included. No keys for the determination of genera and species are given and if the primary purpose of the book is to facilitate identification, their exclusion is a serious omission, for in many families such as the Umbelliferae and Cruciferae, some short cut at least to generic recognition is essential. One doubts too the wisdom of including in a book of this kind intended for beginners, a large number of extremely rare plants such as *Scheuchzeria, Lloydia, Maianthemum, Arbutus* and numerous rarities in genera which also include more widely distributed species, and yet of excluding many common plants which are sure to be encountered by users of the book. Only one Fumitory for example is described, *Polygala calcarea* is included but not *P. serpyllifolia, Atriplex patula* but not *A. hastata, Galium hercynicum* but not *G. pumilum, Arctium minus* but not *A. vulgare, Aira praecox* but not *A. caryophyllea* and only three species of *Juncus* are described. The descriptions are, in general, good, the meaning of the latin name is explained, colloquial names are given under each species and miscellaneous information of biological or other interest is often included. The drawings are both accurate and artistically satisfying but in Plate 14 five of the ten species depicted are wrongly labelled. This is an attractive book though one doubts whether its value to a beginner will be commensurate with its high price.

W.A.S.

The Observer's Book of Mosses and Liverworts, by **Arthur L. Jewell.** Pp. 128 and 64 Plates (32 in colour). Frederick Warne & Co. Ltd. London, 1955, 5/-.

This small book is admirably suited to fulfil its purpose of introducing the amateur naturalist to the fascinating and somewhat neglected groups of the mosses and liverworts. The introduction outlines the general characteristics of the groups and then 116 species, mostly of common occurrence, are described and illustrated in such a way that they may, with a little practice, be recognised in the field. The illustrations are clear and give the form of the plant, supplemented by drawings of such detail as may be seen with a lens. The nomenclature for the liverworts is that of McVicar's Handbook (1912) and for the mosses that of the Check List of British Mosses (1950), with older synonyms included. Besides the index, there are two lists, one with the species grouped in their families, the other with them grouped according to habitat. Attention is drawn to more technical books and to the existence

of the British Bryological Society, which affords facilities should the beginner be inspired to study the bryophyte flora in greater detail.

L.I.S.

A Naturalist's Life of New York, by **William Beebe.** Pp. 165, with a few line illustrations. The Bodley Head, London, 1954, 12/6.

Dr. Beebe's latest book—a lighthearted account in his usual informal style—is a survey through a naturalist's eyes of an area covering a radius of one hundred miles with New York City as centre. Past and Present are treated in a colourful manner and sabre-toothed tiger, forest horse, mammoth and mastodon are brought to life again. The reader skips from pollen-grains to sea-eels' eggs, and from stick insects to birdwatching from the top of the Statue of Liberty. House-Sparrows jostle with jungle fowl, cockroaches crowd on to frogs and toads, and finally there is the story of a deep-sea trawl and the wondrous forms of life it revealed.

J.A.

Malayan Animal Life, by **M. W. F. Tweedie** and **J. L. Harrison.** Longmans, Green & Co., London, 1954. Pp. x+238, pl. 1, figs. 151. 18/-.

This is a work intended to provide an introduction to the study of animals in Malaya, for children and for visitors from overseas. The word ' animals ' is used in its true, full sense and the invertebrates get their fair share of attention, especially the littoral fauna. In each class, a limited but representative number of species is briefly mentioned, sufficiently for their identification. It is interesting to note that over a third of the mammals recorded for Malaya are bats, that the most familiar passage wader is the Common Sandpiper which occurs along with the Grey Wagtail and that many of the fresh-water fishes are well-known as the inhabitants of our tropical aquaria.

There is a useful glossary of technical terms and a list of Malay names. For anyone Malaya bound, the book will serve to whet the appetite on the voyage for a rich and varied fauna and may encourage recruits to those Malayan naturalists whose ranks already include such giants as Sir Stamford Raffles and Alfred Russell Wallace.

E.H.

Reptiles and Amphibians of Western North America, by **Robt. C. Stebbins.** McGraw Hill, 95 Farringdon Street, London, E.C.4, 1954. Pp. 528, pl. 104. 68/-.

This is a comprehensive text-book of herpetology; its introduction and treatment take nothing for granted and methods of collecting, preserving and recognition are fully dealt with.

The occurrence, description and habits of each species are fully but succinctly given, together with a brief bibliography, a figure and a distribution map. There is a very full glossary to complete what is likely to remain for a long time the definitive work on these classes for this part of the New World.

E.H.

The Living Desert, by **Jane Werner** and the Staff of the Walt Disney Studio. Pp. 124 with numerous coloured illustrations. Rathbone Books, Adprint House, Rathbone Place, London, W.1. 8/6.

Those who have enjoyed the remarkable Disney film will welcome this book as a permanent record of a kind of natural history which is in a class of its own. The dramatic intensity of conditions in the Great American Desert, which stretches from Oregon to Old Mexico, and the beauty and strangeness of its wild life have been recorded in colour photography on a scale which has not yet been attempted in any comparable habitat of the Old World. Nothing less than a team of expert nature photographers could have achieved this result and though a European reader is necessarily lacking in first-hand information by which to check the accuracy of the natural history record, it is an understatement to say that the pictures carry conviction.

The text of the book is written informatively and lucidly. It does not follow the details of the film commentary though it conveys, if anything rather better, the narrative side of the work. It is equally readable by those who have seen the film and by those who have not. There is a small amount of new matter not included in the film.

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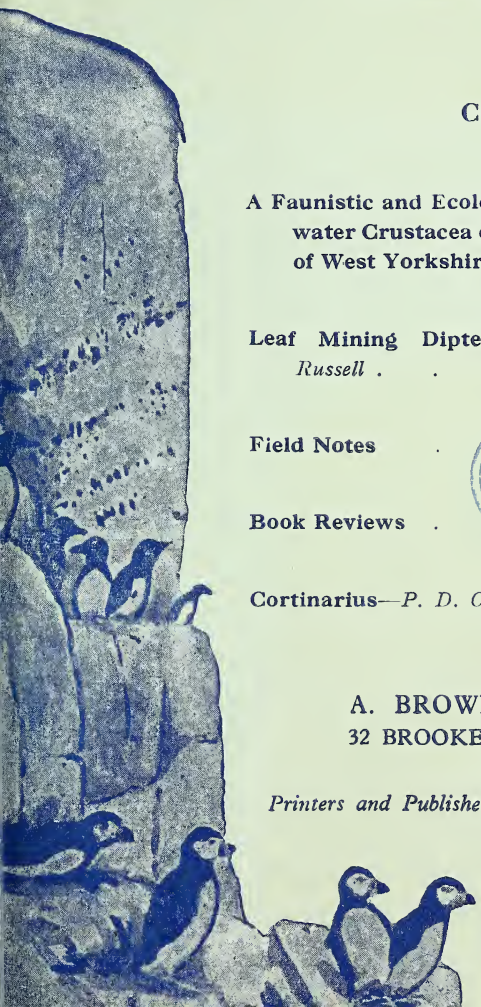

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Miss E. M. Blackwell, M.Sc., F.L.S., will deliver the Chairman's address, preceding the Annual Meeting on Saturday, September 24th, at 7-30 p.m., at Kell Grange Hotel, Pateley Bridge.

Subject: MYCOLOGY AND MYCOLOGISTS IN YORKSHIRE

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NOTICE.

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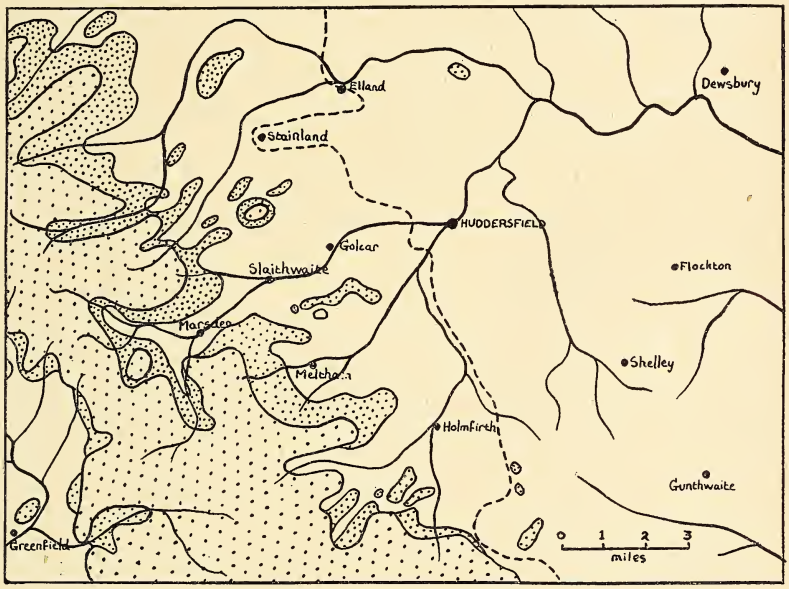
The Scottish Naturalist.
Irish Naturalists' Journal.
Transactions of the Lincolnshire Naturalists' Union.
Transactions of the British Mycological Society.

A FAUNISTIC AND ECOLOGICAL SURVEY OF THE FRESHWATER CRUSTACEA OF THE HUDDERSFIELD DISTRICT OF WEST YORKSHIRE

G. FRYER, B.SC.

INTRODUCTION

During the past few years the writer has studied the freshwater crustacean fauna of the Huddersfield district of West Yorkshire during such periods of time as have been available and, while no pretence is made that the report here given represents a complete survey of the area in question, sufficient information is now to hand to enable some of its salient features to be recognised. A further reason for the publication of these remarks at this juncture is the fact that as the writer is no longer domiciled in the area surveyed it was thought desirable to place on record the facts



Sketch Map of the Area Surveyed
Broken line indicates boundary of Millstone Grit (to the west) and Coal Measures (to the east). Coarse stippling=Cotton grass moor. Fine stippling=Grass heath. Areas left blank represent cultivated land, woodland, or built up areas accerding to location. (Based largely on Woodhead (1931).)

so far accumulated. It is interesting to note at the outset that while faunistic surveys of the freshwater Crustacea have been made in various parts of Britain, none cover terrain whose geology and vegetation are like that embraced by the Huddersfield district.

THE AREA SURVEYED

No hard and fast boundaries are recognised in the following account, but in general only records made within approximately 10 miles of the town of Huddersfield are taken into account. Certain physiographical and edaphic features of the area require consideration before the fauna is discussed, as these serve to put the survey into its correct perspective.

The geology of the area is well dealt with by the two memoirs of the Geological Survey, viz., *The geology of the country around Huddersfield and Halifax* (1930), by Wray, Stephens, Edwards and Bromehead, and *The geology of the country around Holmfirth and Glossop* (1933), by the same authors, while for a concise account of

the geology and vegetation one can do no better than refer to the booklet by Woodhead (1931). A pamphlet by Woodhead (1923) also gives an outline sketch of the type of country dealt with. For present purposes it can be stated briefly that to the west of the area lies the main Pennine ridge, the watershed forming the approximate western boundary of the area surveyed; while, passing eastwards, there is gradual decrease in altitude and rainfall, an increase in the mean annual temperature, and a change in the underlying rock from the Millstone Grit, first to the Lower, then to the Middle Coal Measures. So far as the freshwater fauna is concerned, three distinct zones can be recognised, passing from west to east, these being as follows:

(1) Peat-covered Millstone Grit areas;
(2) Non-peat-covered Millstone Grit areas;
(3) Coal Measures.

The distribution of these zones and the general features of the vegetation are shown on the accompanying map. Each zone requires brief mention in so far as freshwater habitats are concerned.

(1) Peat-covered Millstone Grit areas

As Woodhead has pointed out, ' nowhere in Europe can so extensive a cotton-grass association be seen as on the Southern Pennines '. All the high peat-covered moorland of the Huddersfield district comes within the area comprising this association. Botanically this region is well known, both as regards the composition of the present-day plant cover and as regards its history. Zoologically it is but little known, hence a study of even one group of freshwater organisms existing there is of somewhat unusual interest.

This area is exceedingly bleak, and such habitats as occur within its confines are of the severest type. Several writers have given accounts of the factors serving to render moorland waters so inhospitable to animals, and convenient summaries are given by Carpenter (1928) and Welch (1935). Some of the operative factors in the present instance are given below.

The moorlands hereabouts serve as catching grounds for water which is impounded in numerous reservoirs in the Huddersfield area. These can be regarded as dystrophic lakes, falling as they do into this category both according to the criteria propounded by Thienemann and by Strøm, both of whose schemes of classification of lakes are conveniently reproduced by Welch (1935). They are characterised by an almost complete lack of macrophytic vegetation, either marginal or submerged, have a low pH and a low calcium content, and, as will be seen later, have a sparse crustacean fauna.

In addition to the reservoirs two other types of habitat can be listed for the moors so far as crustaceans are concerned, namely moorland pools and rush beds with *Sphagnum*. (The latter name is given as few sizable patches of *Sphagnum* are unaccompanied by *Juncus effusus*.) The pools vary in size, and usually, like the reservoirs, lack a true marginal macrophytic flora, the only plant penetrating the water usually being *Eriophorum angustifolium* or, more rarely, *Juncus spp.* Neither the reservoirs nor the pools are in any way comparable with the moorland pool in the Lake District described by Macan (1950) which is, by comparison, richly provided with both submerged and marginal vegetation. No such pools or tarns occur in the area in question which is far bleaker than the area in the Lake District discussed by Macan, and indeed those acquainted with the Yorkshire Pennines in this locality would hardly regard the setting of the lakeland water as moorland.

The factors rendering these moorland habitats so severe include the following: Generally exposed situation; extreme acidity (the pH of all these habitats is seldom as high as 4·0); presence of ' humic acids '; low calcium content and deficiency of bases generally; lack of marginal and submerged vegetation; lack of bottom muds other than those composed of peat particles; presence of iron deposits; and, in the swamps, sometimes the presence of hydrogen sulphide. The lowness of the pH values (minimum recorded 3·3) may seem extreme, as indeed it is, but such results have been obtained elsewhere, e.g. Pearsall (1938b) has supplied somewhat similar figures which he recorded in peaty pools on Austwick Moss, and has also (1938a) emphasised the extreme acidity of cotton-grass soils, quoting figures below pH3 which he obtained in the vicinity of pools visited during the present survey.

The presence of iron deposits requires special mention. The bottom of certain pools and the stems of *Eriophorum angustifolium* at the margins (when present) are often coated with a flocculent rust-coloured layer of ferruginous material, and such deposits are of even more frequent occurrence in swamps. Experience shows that if such material is present in more than small amounts, this can usually be taken as indicative of the complete absence of Crustacea from that situation. This type of limiting factor has apparently been noticed before, for Brown (1943) showed how the density of a stream fauna varied inversely with the amount of ' yellowish-brown deposit ' present, and in a discussion of factors limiting freshwater populations Macan (1949) says ' Sir Malcolm Watson noticed that places with an iron deposit did not harbour mosquito larvae. His explanation is that water seeping out of the ground contains ferrous iron which is oxydised to ferric iron on contact with the air. This comes down as an insoluble floc and carries with it the micro-organisms on which the mosquito larvae feed.' Now, while the chemical reasoning of the above suggestion is doubtless correct and probably applies to the cases under consideration,[1] the exclusion of animals by such deposits is probably due, not to the carrying away of small organisms, but to the fact that the vegetation (essentially algae) on which aquatic animal life, with the exception of surface-dwellers, ultimately depends, is effectively smothered and, if not killed, at least insulated from its would-be grazers. The first link of any food chain is thus broken and the result is a more or less azoic region.

The presence of ferruginous deposits is often accompanied by an oily film, sometimes present as a distinct ' skin ', on the water surface. Not until this account was being compiled was any published information on this phenomenon located, this being a concise summary of such contemporary knowledge as exists given by Muirhead-Thompson (1951, p. 178) (q.v. for references), so here little can be said save that the presence of such a film portends evil so far as the collector of crustaceans is concerned.

In order to give some idea of the chemical conditions prevailing in the water found on the moorlands the following analyses and field determinations of pH, all made in the month of December, are given.

The waters of Black Moss Reservoir, discussed in some detail below, had a pH of 3·6, a calcium content of 0·98 mg/litre, a concentration of magnesium too minute to detect even by the modern versenate method, and less than 0·0125 mg. nitrate nitrogen/litre. At the time of sampling the water was 88% saturated with dissolved oxygen.

Water in a swamp of *Eriophorum angustifolium* with a ferruginous deposit had a pH of 3·7, a calcium content of 1·12 mg/litre, and less than 0·025 mg. nitrate nitrogen/litre.

Accurate pH determinations (using a Lovibond comparator) in reservoirs, pools, and swamps, gave values ranging from 3·3 to 3·7, with a single exception to be discussed later. Less accurate determinations made at other times indicate that these conditions prevail throughout the year as might be expected.

Streams on the moors, for reasons explained later, need hardly be considered as habitats for Crustacea.

(2) Non-peat-covered Millstone Grit areas.

The non-peat-covered Millstone Grit area also contains several distinct major habitats which can be listed as reservoirs, canals, ponds and springs. It must be remarked at this point that the paucity of ponds both on the Millstone Grit and on the Coal Measures is, from the point of view of the freshwater biologist, lamentable, and, bearing in mind the not inconsiderable rainfall of the area, somewhat remarkable; but it enables one to survey a larger percentage of those ponds which do occur than would otherwise be the case. (On the Millstone Grit where grits and sandstones predominate this lack of ponds is somewhat understandable in view of the permeable nature of the rock, but as impermeable shales predominate on the Coal Measures, even though the rainfall there is lower, the dearth of ponds remains a puzzle).

In general, conditions in this region are much less severe than in the moorland areas. Thus, while the water is often acidic, it is less so than on the moors, the calcium concentration and salt content generally are higher, there is little contamination with ' humic acids ', the bottom substratum is seldom peaty, and the aquatic

[1] An explanation of the main chemical reactions involved is given by Thresh, Beale and Suckling (1949).

flora, while still sparse, is richer both qualitatively and quantitatively than in the area previously considered.

Although logically the physical characteristics of the springs should be mentioned at this point discussion of this topic is deferred until their fauna is dealt with.

(3) The Coal Measures.

Grainger (1942), speaking of the soils of the Huddersfield district, states that ' an outstanding difference in fertility is found between the soils formed from the Millstone Grit rocks and those derived from the Coal Measures', and goes on to show how, in the district concerned, the soils on the Coal Measures contain a greater supply of bases than do those on the Millstone Grit. As a consequence of this, the waters of the Coal Measures zone are less acidic and contain more nutrient salts than do those of the Millstone Grit, and Grainger reproduces maps made by Chippendale showing the degree of hardness along the course of some Millstone Grit and Coal Measures streams which serve to illustrate this point.

In this zone the place of the reservoirs in zones (1) and (2) is largely taken by artificial lakes, and these are few in number. These and ponds constitute the major habitats so far as crustaceans are concerned. Presumably because of their relative richness in nutrient salts these bodies of water have quite a different character to those previously discussed, being more richly provided with macrophytic vegetation, both marginal and submerged, and therefore providing for animals microhabitats of a type virtually unrepresented in many moorland and Millstone Grit waters. This change is accentuated even more if one proceeds eastwards from the area considered and studies the waters of the Wakefield area. Here the larger bodies of water, e.g. the Wintersett Reservoirs, are to be regarded as rich eutrophic lakes, and one of them is mentioned later in some detail for comparative purposes.

THE CRUSTACEAN FAUNA

The Cladocera and Copepoda have been studied intensively, while the Ostracoda, for various reasons, but notably owing to the lack of literature in the early stages of the survey, have had to be somewhat neglected. The few species of Malacostraca found have been taken into account as have the Branchiura. With very few exceptions the nomenclature used follows Gurney (1931, '32, '33) for the Copepoda, Scourfield and Harding (1941) (itself based essentially on Lilljeborg (1900)) for the Cladocera, and Klie (1938) for the Ostracoda. The following of Gurney for the nomenclature of the Copepoda means that several groups ranked as genera by many recent authors are here treated only as subgenera. While this procedure may be deplored by the ' splitters ', perhaps with reason in certain cases, it is felt that in a survey such as this the results of which are, it is hoped, likely to be of general interest to the non-specialist, the terms *Cyclops*, *Diaptomus*, etc., are enlightening, more familiar, and, if followed by the correct specific epithet, as accurate, as *Macrocyclops*, *Mesocyclops*, *Eudiaptomus*, etc.

The fauna of the three zones the physical attributes of which have been considered are discussed in turn below.

(1) Peat-covered Millstone Grit areas.

The peat-covered moorlands, on the whole, harbour a very sparse crustacean fauna. This is most readily illustrated by presenting faunal lists of the seven investigated reservoirs which to a large extent typify the general state of affairs.

Crustacean fauna of some moorland reservoirs:

March Haigh Reservoir	(015130)	*Cyclops vernalis. Chydorus sphaericus.*
Brun Clough Reservoir	(019094)	*Chydorus sphaericus.*
Redbrook Reservoir	(027098)	*Cyclops languidus. Chydorus sphaericus.*
Black Moss Reservoir	(033088)	Nil.
Swellands Reservoir[1]	(037091)	Nil.
Cupwith Reservoir	(038141)	*Cyclops sp. Chydorus sphaericus.*
Deanhead Reservoir	(038151)	*Diaptomus gracilis. Cyclops vernalis. Chydorus sphaericus.*

(Authoritative names of all species mentioned are given in the local list at the end of the paper.) (Figures in brackets are normal national grid references.)

[1] Also known as Swillers Clough Reservoir.

Only one visit has been made to Deanhead Reservoir; the others have been visited several times. The record *Cyclops sp.* in the case of Cupwith Reservoir refers to a single specimen noted at the time of collecting but not found when the material was later examined.

These faunas, while exceedingly sparse, are nevertheless interesting. Indeed, their very sparsity is of the utmost interest in illustrating the obviously uncongenial nature of these reservoirs so far as the providing of habitats for Crustacea is concerned. The lists show that only one species of cladoceran and three species of Copepoda have been recorded. The cladoceran, *Chydorus sphaericus*, is a ubiquitous species which is tolerant of a wide range of environmental conditions and its presence, unaccompanied by any other cladoceran, is merely a further manifestation of its high ecological valency. Of the three copepods *Cyclops vernalis* is not uncommon in barren oligotrophic lakes in spite of Gurney's (1933) surprising remark ' never in lakes or other open waters ', by which he presumably meant to imply that the species is not planktonic. These finds show that the environmental spectrum of this species includes dystrophic waters. None of the specimens examined showed any tendencies towards the forma *robusta* which Lowndes (1928) has shown to be merely a variant of the typical form and which Sars (1913) states is a bottom dwelling form found at the edges of lakes. The other cyclopoid, *Cyclops languidus*, is tolerant of a wide range of conditions but is usually found in small weedy waters or amongst very wet moss. In Redbrook Reservoir it occurred at one point in small numbers amongst stones which there comprised the bottom substratum and on which was a sparse growth of filamentous Green Algae. It is not impossible that its presence in what is for this species a rather atypical habitat is to some extent correlated with the lack of competition in the reservoir. The calanoid copepod *Diaptomus gracilis*, recorded from Deanhead Reservoir, is, like the other crustaceans of the reservoirs, to be regarded as an ecologically euryvalent species, occurring in the open water of a wide variety of water basins.

The argument that the fauna of these reservoirs is sparse because of their comparatively recent construction is quite untenable, for reservoirs not on the moorland which were constructed at approximately the same date have a much richer fauna (*vide infra*) and furthermore the rapid colonisation of newly evolved water bodies by small crustaceans is a well-known phenomenon.

A few remarks concerning Black Moss Reservoir, which has failed to produce a single crustacean in spite of careful search, will serve to illustrate the type of habitat with which one is here dealing. The setting of this reservoir, of which chemical data have already been given (cf. p. 103) is virtually on the Pennine summit ridge or, in other words, in an extremely exposed situation. Thus, even when there has been little wind in the lower-lying parts of the district, spray has been seen to be whipped from the surface of this and the adjoining Swillers Clough Reservoir and be lifted 10 ft. or more into the air. The bottom is covered essentially with cotton-grass peat and peaty silt, though a little sand occurs at one point. Even the deeper parts of this (and the other moorland reservoirs of the district) have a bottom deposit of peaty silt or merely peat particles, this being the result of the erosion and re-deposition of material from the degenerating cotton-grass moorland from which the inflow water is derived. Submerged macrophytic vegetation is non-existent, and the marginal vegetation consists of a very few tufts of *Eriophorum angustifolium* occupying less than 1% of the total shoreline. These facts are tabulated for comparative purposes in table 2.

The cumulative effect of these adverse factors is reflected by the total absence of crustaceans of any kind, even the ubiquitous cladoceran *Chydorus sphaericus* having failed to establish itself there. It might be remarked that the rest of the fauna is similarly sparse, molluscs being completely absent, and insects being restricted in the main to corixids. The open waters do, however, support a planktonic rotifer—*Brachionus sericus* Rousselet (=*B. urceolaris* var. *sericus*) (kindly identified by Messrs. E. D. Hollowday and A. L. Galliford), which is characteristic of moorland waters. This rotifer occurs also in Swellands, Redbrook and March Haigh reservoirs and a *Brachionus*, probably this species, occurs in Deanhead Reservoir.

As a final point concerning these reservoirs attention may be directed to the rapid rate of deposition of peaty silt within them. Thus, when Deanhead Reservoir was partly drained in 1913 a deposit of this material 12 ft. thick was found to have accumulated during a period of about 70 years, i.e. deposition, at least near the inflow, had taken place at the rate of about 2 in. a year even if consolidation be

ignored. This instability of the bottom in the sub-littoral and profundal regions is probably not without its effect in limiting the fauna.

Turning now to the moorland pools, as opposed to the rush beds with *Sphagnum*, it is found that they, like the reservoirs, have a very sparse crustacean fauna; and indeed several of them, including some without any ferruginous deposit have failed to produce any crustaceans whatsoever in spite of careful search. The total list of species found in all the pools investigated is as follows:

Copepoda	Cladocera
Cyclops fimbriatus	*Bosmina obtusirostris*
C. agilis	*Alona guttata*
C. vernalis	*Alonella excisa*
C. venustus	*Chydorus sphaericus*
C. bisetosus	
C. languidus	

One moorland pool requires special mention, this being a large pool adjacent to Black Moss Reservoir, which is utilised each year as a nesting site by a colony of Black-headed Gulls. The excrement of these birds, together with egg shells and perhaps the remains of food, has no doubt been instrumental in raising the level of chemical nutrients in the water which differs somewhat from all other samples examined. For example, it has a pH of 4·0–4·1, whilst the highest value recorded elsewhere on the moors by accurate means is 3·7. Analysis revealed a calcium content of 1.24 mg/litre and a level of 0.119 mg. nitrate nitrogen/litre. These figures, although low, are nevertheless higher than those obtained as a result of analysis of water from Black Moss Reservoir and from a swamp collected at the same time which have already been quoted (cf. p. 103) and with which comparison should be made. Doubtless the phosphate content of the water is also enriched by the excrement of the birds. This chemical enrichment is reflected in a fairly dense growth of rank aquatic grasses (*Glyceria*) such as have not been observed elsewhere on the moors, and this in its turn provides habitats for crustaceans, a total of six species, listed below, having been taken. (No other pool has produced more than three species.)

Copepoda	Cladocera
Cyclops fimbriatus	*Chydorus sphaericus*
C. agilis	
C. vernalis	
C. venustus	
C. languidus	

The rush beds with *Sphagnum* are perhaps the most interesting habitats on the moors and have produced some interesting crustaceans, though again the fauna is generally very sparse. The total list of species so far discovered is as follows:

Copepoda	Cladocera
Cyclops venustus	*Alona rustica*
C. bisetosus	
C. languidus	
Canthocamptus zschokkei	
Moraria brevipes	

The moorland streams appear to be devoid of Crustacea. The bryophytes present in some of them have been examined for harpacticoid copepods without success, and that characteristic amphipod of English streams, *Gammarus pulex*, is also absent. In the case of the latter the low calcium content of the water (coupled with low pH, which Schumann (1928) showed to be toxic) may be the limiting factor preventing its occurrence, for, while it has been claimed by certain workers that calcium content has no effect on the distribution of this organism, others have given various figures as the minimum tolerated, e.g. 9–10 mg/litre by Wundsch (1922) whose work has, however, been criticised by Steusloff (1943). However, as Schumann (1928) indicated that a calcium concentration of 13 mg/litre was necessary for the formation of the exoskeleton in *G. pulex* and the concentration in the streams in question probably never exceeds about 2 mg/litre it is fairly certain that this factor does play some part in restricting its occurrence.

Certain features of the moorland fauna call for comment. First of course its extreme poverty is remarkable, this applying both in a qualitative and quantitative

sense. Very few species are recorded and the omissions include several sphagnophile forms and forms associated with oligotrophic and dystrophic lakes which might be expected, as well as several almost ubiquitous species. In the reservoirs the absence of any planktonic form of *Daphnia, Bosmina* or *Cyclops* is noteworthy and the littoral cladoceran *Alonopsis elongata* might have been expected. One feature to which the absence of very common and widespread species which tolerate acidic conditions elsewhere (e.g. the cladocerans *Simocephalus vetulus* and *Scapholeberis mucronata*) can probably be attributed is the lack of marginal vegetation in the pools and reservoirs.

In the pools a rather disappointing feature of the investigations has been the total failure to find such cladocerans as *Acantholeberis curvirostris* and *Streblocercus serricaudatus* whose home is typically in such situations. True, deep pools with abundant *Sphagnum* which are especially favoured by these species are not to be found in the area, but *Acantholeberis curvirostris* at least is not confined to such pools for I have found it in pools lacking *Sphagnum* and very similar in general appearance to those in the area under consideration in casual collections made elsewhere, e.g. on Fountain's Fell (Pennines) and at Goathland (N.E. Yorkshire). The same paucity of species is found among the Copepoda and of the species recorded from the ponds only *Cyclops venustus* can be regarded as a sphagnophile form.

It is only when the rush beds with *Sphagnum* are considered that an appreciable percentage of such forms make their appearance in the lists. Of the copepods from these habitats *Cyclops venustus* and *Moraria brevipes* are characteristically associated with *Sphagnum* though such investigators as have previously found the former species have generally encountered it in pools rather than in swamps. Some details of its occurrence and ecology in the Huddersfield district have been given in a previous paper (Fryer, 1953). *Moraria brevipes* is a rather rare species and has only been found once on moors proper in the area under consideration. In these swampy habitats *Cyclops bisetosus* appears to be the commonest copepod, while *Cyclops languidus* is not infrequently met with. *Canthocamptus zschokkei* has been encountered only once in such situations though in the swamp concerned it was quite numerous. The sole cladoceran recorded from the rush beds with *Sphagnum—Alona rustica*—shows a preference for acidic waters in which *Sphagnum* is growing and has only been found in such situations in the district under consideration.

The complete absence of ostracods from the moorland waters is noteworthy. It is perhaps justifiable to correlate this fact with the very low calcium content of the available habitats, for these organisms, unlike the Copepoda and Cladocera, possess a bivalved carapace for the production of which a supply of calcium is an essential prerequisite. No claim is made, however, that other contributory factors are not involved.

Before passing to a consideration of the next zone it is of interest to make a brief comparison of the moorland pool faunas noted above with those of some high tarns in the Lake District visited by Gurney (1923) as by this means the paucity of species and the uniqueness of the habitats on the Southern Pennines is emphasised. First it should be noted that while Gurney's lists represent merely casual visits, some of the pools here considered have been investigated on several occasions. Reporting his finds from Floutern Tarn (altitude 1250 ft.) which had a vegetation of *Littorella* and *Lobelia*, and *Sphagnum* at the margins, Gurney says ' seven species *only* of Entomostraca were taken ' (the italics are mine), while in the even higher Greendale Tarn (1320 ft.) which had a flora of *Lobelia, Littorella, Callitriche; Myriophyllum* and *Isoetes* (none of which with the exception of a single find of *Callitriche* have been found on the Huddersfield moors) he found no fewer than eleven species. The lowest number of species which he recorded from any tarn was three in Levers Water (1350 ft.), a tarn with a rocky floor and sides apparently devoid of vegetation. The species he recorded were *Alonopsis elongata, Acroperus harpae* and *Bosmina obtusirostris*. Gurney remarks that ' the lifelessness of the tarn is rather remarkable and I can offer no explanation '. What his comment would have been had he visited the Pennine pools here considered can only be imagined !

(2) Non-peat-covered Millstone Grit areas.

Turning now to the non-peat-covered Millstone Grit areas, several marked differences in the Crustacean fauna become apparent. The total number of species recorded is greatly in excess of that listed for the peat-covered area, and whole groups of crustaceans (Ostracoda, Branchiura and Malacostraca) unrepresented in the latter

region are encountered here. This increased diversity of the crustacean fauna can first be illustrated by comparing the faunas of two reservoirs located in this zone with those of similarly constructed bodies of water on the moors. The two reservoirs concerned are Hill Top Reservoir, Slaithwaite, and the Longwood Compensation Reservoir. The former (Nat. Grid. Ref. 074142) lies quite near to the moorlands from which most of its drainage comes, and its waters are therefore acidic, but its pH is by no means so low as that of the moorland waters, being usually within the range of 5·0–5·5. Some nutrient materials are doubtless brought in due to the passage of the inflowing stream over non-peaty areas which are utilised to a slight extent for agricultural purposes. Chemical data for this reservoir are given in table 2 and are not duplicated here.

Longwood Compensation Reservoir (Nat. Grid. Ref. 100174) lies more remote from moorland and its drainage area is, in the main, more influenced by agriculture than that of Hill Top Reservoir, but, in spite of a relatively high content of calcium and nitrogen it cannot be regarded otherwise than as an oligotrophic lake which is, however, in process of eutrophication as a result of inflowing nutrients. Chemical analyses made in the month of December showed a calcium concentration of 20·6 mg/litre and a concentration of nitrate nitrogen equivalent to 1·79 mg/litre. The pH was between 6·8 and 7·0. Neither reservoir is provided with any appreciable marginal flora, and, apart from clumps of *Luronium natans* and *Callitriche* sp. at one end of Hill Top Reservoir, submerged and semi-emergent vegetation is virtually absent in each case. Faunal lists of crustaceans so far discovered in these reservoirs follow.

Hill Top Reservoir:

Cladocera	Copepoda
Daphnia obtusa	*Diaptomus gracilis*
Diaphanosoma brachyurum	*Cyclops agilis*
Bosmina coregoni lilljeborgi	*C. viridis*
Chydorus sphaericus	*C. vernalis*
	C. venustus
	Canthocamptus pygmaeus

Longwood Compensation Reservoir:

Cladocera	Copepoda	Ostracoda
Daphnia cucullata	*Diaptomus gracilis*	*Cypricercus fuscatus*
D. longispina	*Cyclops agilis*	
Simocephalus vetulus	*C. albidus*	
Bosmina longirostris	*C. vicinus*	
B. longirostris var. *cornuta*		
Leydigia leydigi		
Alona affinis		
Rhynchotalona rostrata		

Both these reservoirs exhibit certain faunistic peculiarities which can be briefly dealt with at this point, Hill Top Reservoir being mentioned first. Here three of the recorded species are noteworthy; *Cyclops venustus* on account of its rarity and little-known ecological preference; *Daphnia obtusa* from a biological point of view, and *Bosmina coregoni lilljeborgi* systematically. The first two records have been dealt with in a previous paper (Fryer 1953), but for convenience it can be stated that the interest attached to the occurrence here of *D. obtusa* is that it occurs, not as might be expected, in shallow marginal water, but as a member of the plankton. Whilst this has already been commented upon it might be suggested here that its persistence as a member of the plankton is perhaps not unconnected with the fact that no other planktonic *Daphnia* (e.g. *D. longispina*) is present in the reservoir.

The other species requiring comment is the *Bosmina* which in summer swarms in the plankton. This is a short-spined form which on the criteria used by Scourfield and Harding (1941) should be called *B. lilljeborgi* but which, during four years of observations, has not undergone the seasonal variation in form reputed to occur by Rühe (1912) and quoted by Wagler (1937) as one of its characteristics. Lilljeborg (1900) while giving magnificent illustrations and numerous descriptions does not help to decide with certainty to what systematic category this form should be assigned. This difficulty is one which is regularly encountered by the systematist

when dealing with the *obtusirostris-corregoni* complex, and I partly follow Rylov (1935) in designating the form in question *B. coregoni lilljeborgi* but see no point in giving quadrinomial (or even more complex !) nomenclatural status, as does this author, when one is obviously dealing with an organism which is very plastic in both an ecological and in a morphological sense and which varies widely in form even in adjacent and apparently similar bodies of water.

The interest of Longwood Compensation Reservoir lies in the fact that while its basin is morphometrically oligotrophic in character its crustacean fauna reflects the tendency towards eutrophication brought about by the inflow of nutrients, and the presence of such species as *Daphnia cucullata, Bosmina longirostris* and *Cyclops vicinus* indicates conditions which differ from those more usually encountered on the Millstone Grit, this being corroborated by the rotifers which occur. *D. cucullata* has not been found elsewhere in the Huddersfield district.

Within the Millstone Grit area the Huddersfield-Ashton canal has been fairly fully investigated and although its fauna is sparse in parts, more especially in the vicinity of Marsden, on the whole it has proved to be a rich collecting ground and deserves special mention. This canal lies in the valley bottom and for a considerable part of its course (below Slaithwaite) therefore flows through a region which, unlike the majority of the Millstone Grit area, was flooded by water in glacial times, for a tongue of the lake formed by a lateral moraine of the Vale of York glacier dammed back the Calder and flooded all the land in this region which now lies below an altitude of about 400 ft. The resulting glacial sediments plus later alluvial deposits have probably had some influence on the chemical conditions and hence flora and fauna now extant in the canal. In the writer's opinion this, and not merely excessive collecting, serves in large measure to explain the unusually large total of crustacean species obtained from it.

At its extreme eastern end the canal actually lies on the Coal Measures and one crustacean, the amphipod *Orchestia bottae*, has been found only in this region. Otherwise the faunal list given below represents forms from the Millstone Grit only.

The Malacostraca are perhaps as well represented as is possible in this country, for in addition to the Crayfish (*Astacus pallipes*), which is abundant, the amphipods *Orchestia bottae, Crangonyx gracilis,* and *Gammarus pulex* occur (cf. Fryer, 1950, 1951a and 1951b), while the isopod *Asellus aquaticus* is abundant in places. The total crustacean fauna recorded from the entire canal is listed below.

Cladocera	Copepoda	Branchiura
Simocephalus vetulus	*Diaptomus gracilis*	*Argulus foliaceous*
Ceriodaphnia pulchella	*Cyclops albidus*	
Bosmina coregoni lilljeborgi	*C. fuscus*	Malacostraca
Leydigia leydigi	*C. agilis*	
Alona affinis	*C. agilis speratus*	(Decapoda)
A. guttata	*C. macruroides*	*Astacus pallipes*
A. costata	*C. fimbriatus poppei*	
Alonella nana	*C. vernalis*	(Amphipoda)
Rhynchotalona rostrata	*C. vernalis americanus*	*Gammarus pulex*
Pleuroxus uncinatus	*C. bisetosus*	*Orchestia bottae*
Chydorus globosus	*Canthocamptus staphylinus*	*Crangonyx gracilis*
C. sphaericus	*C. pygmaeus*	
C. piger	*C. minutus*	(Isopoda)
Polyphemus pediculus		*Asellus aquaticus*

In addition to the above the copepod *Cyclops languidus* has been found in water-filled holes among mud made by cows' feet at the edge of the canal and thus perhaps merits a place in the faunal list.

The ponds on the Millstone Grit are, as already pointed out, few in number, and in general they house a sparse crustacean fauna, three or four species only being the usual total produced per pond. The same applies to several artificial dams which have also been investigated. Thus in twenty-two ponds and dams (excluding the one to be described below and excluding such water as sewage works tanks) the average number of species produced was only about three. The maximum recorded for one such body of water was nine, and perhaps the average of three paints a rather too severe picture of the situation for the list of habitats includes some in which peculiar conditions prevailed and which produced no crustaceans, e.g. a pond at Meltham densely shaded by Rhododendrons and containing little

aquatic vegetation. There can be no doubt, however, that sparsity is the rule in such habitats.

An exception must be made, however, so far as a temporary pond at Longwood is concerned. This pond, which is no more than twenty yards long and five or six yards wide, is normally dry in the summer months when it becomes overgrown with grasses and *Ranunculus flammula*, but in winter it fills with water when the level of the adjoining Longwood Compensation Reservoir rises and overflows into it. This pond, besides being far richer in species than other ponds on the Millstone Grit, has produced a surprising array of rare ostracods (Fryer, 1953), two of which, *Eucypris crassa* and *E. lilljeborgi* are new to Britain. Several visits during three winters produced the following assemblage of species:

Cladocera	Copepoda	Isopoda
Chydorus sphaericus	*Cyclops agilis*	*Asellus aquaticus*
	C. viridis	
Ostracoda	*C. vernalis*	
Eucypris crassa	*C. bisetosus*	
E. elliptica	*Canthocamptus staphylinus*	
E. lilljeborgi	*C. pygmaeus*	
Cypricercus fuscatus		

The ecological preferences of several of these species, coupled probably with the absence from the pond of large predators, are well shown by the fact that although, as in the case of the various species of *Eucypris*, the organism in question was often very common in the pond, careful search on the other side of the dry-stone wall which separated it from the reservoir failed to reveal a single specimen in the latter body of water. This can be seen by comparing the foregoing list and that which follows with the list already given for the reservoir itself.

In June 1953, due to unusual weather conditions, the pond, which is normally dry at this time of the year, was still full of water, and a collection revealed the following species:

Cladocera	Copepoda
Simocephalus vetulus	*Diaptomus gracilis*
Ceriodaphnia pulchella	*Cyclops agilis*
	C. macruroides
Ostracoda	
Eucypris lilljeborgi	

The difference between the summer and winter faunas is interesting but even more so perhaps is the difference on the pond and reservoir sides of the wall, for the latter acts merely as a coarse sieve so far as small crustaceans are concerned. Perhaps the most striking difference was the presence of dense swarms of *Ceriodaphnia pulchella* in the pond and, so far as could be ascertained, its complete absence from the reservoir.

The total of sixteen species produced by this pond is unusual for a pond on the Millstone Grit, exceeding as it does the next highest total by seven.

Within the Millstone Grit area occur a number of wooded cloughs which extend as tongues into the moorland and which generally have a number of seepages of water, small *Sphagnum* swamps, and puddles in places, besides the main stream. An investigation of one such clough—Drop Clough, near Marsden—showed that these microhabitats contained an interesting crustacean fauna including such sphagnophile forms as the copepods *Cyclops venustus*, *Moraria brevipes* and *M. sphagnicola*, and the cladoceran *Alona rustica*, together with the copepod *Canthocamptus zschokkei* of whose ecology special mention is made later.

One of the most noteworthy physiographical features of the Millstone Grit area is the occurrence of a considerable number of cold springs, mostly rheocrenes, several of which have been made the subject of careful search for crustaceans. Many of these springs have been utilised by the tenants of upland farms and hamlets as a source of water by placing at their outlet a trough of local stone which usually becomes coated with a layer of bryophytes and algae, and these, together with the nooks and crannies of the natural water source harbour, among other organisms, minute crustaceans.

This spring fauna is composed of two elements, one a specialised element characteristic of such situations, the other consisting of ubiquitous species capable of tolerating a wide range of environmental conditions. The most widespread and characteristic crustacean of these habitats is the harpacticoid copepod *Canthocamptus zschokkei* which has been found in 17 of the 27 springs which have been investigated with positive results. It has also been found in several seepages which could probably be classified as springs of the limnocrene type but these are not included in the subjoined list. This prevalence of *C. zschokkei* in such habitats is in keeping with what is known of the crustacean fauna of cold springs on the continent of Europe for Klie (1925) found this to be the commonest species present during the course of his comprehensive survey of such habitats. It and *C. cuspidatus* have been claimed as relict forms and it is just possible that in some cases their presence may be explained on these grounds. (See general remarks.). Apart from these two species, and possibly *Cyclops venustus*, the ostracod *Potamocypris thienemanni* is the only crustacean found whose true home appears to be in cold springs. The latter, which has been described elsewhere as an addition to the British fauna (Fryer, in the press) was previously known only from three springs in Germany. The spring at Wessenden in which this species was discovered has been described in some detail in the paper referred to, but it might be remarked that the part of it where the ostracods occur consists essentially of a vertical cliff face covered with bryophytes over which water flows. It thus differs somewhat from most of the other springs studied.

Mention might be made of two features concerned with the occurrences of the ubiquitous copepod *Cyclops agilis* in these springs. Its discovery in 13 springs occasioned no surprise for this is a common species in almost any habitat which offers the least possibility of colonisation, but it was noted that almost invariably the specimens taken from springs were a beautiful golden orange in colour instead of the more usual shades of brown. This colour, which is cuticular in nature and not due to colouration of the body contents, was often particularly intense in the region of the receptaculum seminis which is generally more highly coloured than the rest of the body in this species. Whether this colouration can be correlated with the low temperature or with any other feature of the habitat awaits investigation.

In one spring, designated Holme Lane No. 1 in the list, females of *C. agilis* were found which lacked the serrations on the outer edge of the furcal rami which are normally so very characteristic of this species. This would appear to be due to a very rare genetic mutation for I have found no reference to such specimens in the literature. If, as seems likely, the responsible gene or gene combination is recessive, its expression in certain females of the population (males never have serrated furcal rami), may well be due to the restricted size of the habitat in which opportunities for genetic interchange are limited and in which the ' Sewall Wright effect ' may operate.

A full list of springs and their faunas is appended in tabular form (Table 1) in order that the associations of species in a given spring can be seen at a glance. For obvious reasons springs investigated which have not produced any crustaceans are not included in the list.[1] The names given to the springs are somewhat arbitrary but serve, together with the normal national grid references derived from a 1 in. to the mile map, to locate them with a fair degree of precision. The presence of the Triclad Turbellarians *Crenobia alpina* and *Polycelis felina* (perhaps more familiarly known as *Planaria alpina* and *Polycelis cornuta* respectively) is noted whenever these organisms have been found in a spring as a considerable body of data exists concerning the ecological requirements of these reputedly ice age relicts, especially in so far as temperature and oxygen tensions are concerned.

As a final point in connection with the springs of the area, the absence of the ostracod *Ilyodromus olivaceous* which is known to occur in springs elsewhere in the Pennines in Yorkshire and Derbyshire may be noted. Possibly this species, which is known to be a cold water form, prefers a higher calcium content than is to be found in the Millstone Grit area.

In contradistinction to the streams on the moorland those of the non-peat-covered Millstone Grit area, in spite of their low calcium content, frequently contain the amphipod *Gammarus pulex*. The bryophyte fauna of the stream beds, however, which in some parts of the British Isles includes a variety of harpacticoid copepods, proved distinctly disappointing.

[1] Unfortunately details of these springs were not kept and their exact number cannot be given but perhaps 15 or so are involved.

TABLE 1—The crustacean fauna of some cold springs on the Millstone Grit in the Huddersfield district.

		Canthocamptus staphylinus	*Canthocamptus zschokkei*	*Canthocamptus pygmaeus*	*Canthocamptus cuspidatus*	*Cyclops agilis*	*Cyclops bisetosus*	*Cyclops vernustus*	*Cyclops bicuspidatus*	*Chydorus sphaericus*	*Alona guttata*	*Alonella nana*	*Herpetocypris reptans*	*Potamocypris thienemanni*	*Gammarus pulex*	*Crangonyx gracilis*
Standedge Top, Marsden	023097						×									
Wessenden, Marsden	049106		×	×	×	×				×	×			×		
Reddisher Road, Marsden	046119			×												
Tunnel End, Marsden	041119[2]					×										×
Slaithwaite Hall	056130[2]		×							×			×			
Below Slaithwaite Hall	057129		×							×						
Booth Banks, Slaithwaite	060133		×						?							
Holme Lane No. 1, Slaithwaite	050139					×		×								
Holme Lane No. 2, Slaithwaite	051139		×			×		×		×		×				
Above Stanley House, Lingards	066126		×					×								
Birks' Well, Slaithwaite	071133[1]		×			×										
Merrydale Clough No. 1, Slaithwaite	059143		×													
Merrydale Clough No. 2, Slaithwaite	059143							×								
Follingworth, Slaithwaite	064142						×			×						
By Hill Top Reservoir, Slaithwaite	073141		×													
Crimble Clough	080149[2]														×	
Near Crimble	087147					×				×						
Wilberlee	069149		×			×										
Jacob's Trough, Scammonden	067159		×			×										
Pole Moor, Scammonden	068160							×								
Spring Head, Scapegoat Hill	085162		×			×				×	×					
Old Lane, Scapegoat Hill	092161		×			×		×								
Clough Head, Bolster Moor	082157		×	×												
Wellhouse, Golcar	097151[2]		×			×									×	
Below Nettleton Hill, Longwood	096172[1]	×	×			×				×						
Shay Wood, Longwood	095176		×													
Digley, Holmebridge	109072					×										

[1] Associated with *Crenobia alpina*

[2] Associated with *Polycelis felina*

To summarise the conditions prevailing on the Millstone Grit one can say, then, that apart from the faunas associated with special habitats such as springs, the general picture presented is one of paucity. This is in keeping with what is known concerning other organisms, both aquatic and terrestrial, occurring in this region, and it is interesting to note that the only other published information known to the writer concerning the crustacean fauna of a Millstone Grit area, scanty though it be, bears out this conclusion. Thus Brady (1910), commenting on the crustacean fauna of the Sheffield area in a paper to be referred to again later makes several comments to the effect that the Millstone Grit harbours few species. Indeed, so far as the ostracods are concerned, he says 'I have made, during the three years of my residence here, a careful search for Ostracoda; the search has been almost fruitless,' and he goes on to record three species only, all common, as a result of his labours.

One surprising feature of the Millstone Grit of the Huddersfield district is the absence or rarity of certain species which might be expected to occur. Among the Cladocera for instance *Eurycercus lamellatus* can probably be described as exceedingly common in the British Isles as a whole and is tolerant of a wide range of conditions yet it has not been found in this zone. The area also falls within the range of *Alonopsis elongata* and apparently suitable habitats are not uncommon (as is the case in zone (1)) but this species has not been encountered. Likewise *Acroperus harpae* is a common and ecologically euryvalent species, yet it has been found only once on the Millstone Grit, while *Scapholeberis mucronata* which is also quite common has not been recorded. *Chydorus ovalis* too might have been expected. The infrequent occurrence of any species of *Daphnia* or *Ceriodaphnia* in the smaller bodies of water is also noteworthy—a fact which has elicited comment from aquarists desirous of procuring this commodity as a food for fishes. Similar cases can be cited for the Copepoda (e.g. *Cyclops bicuspidatus*) but the absentees are here not so conspicuous as among the Cladocera. While this may be to some extent a reflection on the insufficiency of the number of collections it is indicative of conditions adverse to their occurrence. The true nature of these limiting factors will only be revealed by careful ecological work perhaps coupled with experiments.

It might be noted in this connexion that under conditions of artificial enrichment on the Millstone Grit the fauna differs qualitatively to a marked extent. Thus in a number of different tanks and troughs at the Milnsbridge sewage works (largely redundant) both *Daphnia longispina* and *Daphnia obtusa* have been taken in abundance, and such species as the cladoceran *Bosmina longirostris* and the copepod *Cyclops strenuus*, which favour 'richer' conditions than those generally found on the Millstone Grit, also occur.

(3) The Coal Measures.

Turning now to the Coal Measures one finds a different state of affairs. As less collecting has been done in this zone than in the Millstone Grit, and as the faunal lists for the latter zone are swollen by the addition of species from habitats such as *Sphagnum* swamps and springs which are absent or rare on the Coal Measures the total number of species noted in this zone is slightly less than that recorded for the Millstone Grit.[1] There can be no doubt, however, that so far as the more 'usual' habitats are concerned, the Coal Measures fauna is richer and more varied than that of the zones already considered; a fact which readily becomes apparent if faunal lists of individual bodies of water are given and comparison be made with those given for Millstone Grit habitats. Further, a qualitative difference is seen in the fauna and some of the species (e.g. the cladocerans *Scapholeberis mucronata*, *Eurycercus lamellatus* and *Acroperus harpae*) whose absence or rareness on the Millstone Grit has been noted are here not uncommon. So far as the larger bodies of water are concerned artificial lakes such as those at Bretton take the place of the reservoirs in the zones previously considered, but their faunal lists indicate quite a different set of environmental conditions and indeed reflect those already described (page 104).

[1] If the species restricted to the *Sphagnum* swamps and springs on the Millstone Grit be discounted, then the number of species recorded from that zone is slightly less than from the less well worked Coal Measures.

The following species have been found at Bretton.

Bretton Lakes, Bretton Hall Park.

Cladocera.	Copepoda	Amphipoda
Daphnia longispina	*Diaptomus gracilis*	*Gammarus pulex.*
Ceriodaphnia pulchella	*Cyclops albidus*	
Simocephalus vetulus	*C. fuscus*	Isopoda
Scapholeberis mucronata	*C. distinctus*	*Asellus aquaticus*
Eurycercus lamellatus	*C. agilis*	
Graptoleberis testudinaria	*C. viridis*	
Peracantha truncata		
Pleuroxus uncinatus	Ostracoda	
P. trigonellus	*Cypridopsis* sp.	
Chydorus sphaericus		

All these species save *Cyclops agilis* and *C. viridis* have been recorded from the lower lake and as these two species are exceedingly common and the two lakes are in some degree of continuity by overflow it may be assumed that both would be found in the lower lake if search were made for them.

The same tendency to increased productivity is seen in the smaller bodies of water. Thus the pond in Gledholt Wood (Huddersfield)—known locally as T.P. Pond—while lying literally only a few yards over the junction of the Millstone Grit and Coal Measures already shows this tendency as can be seen by perusal of the following list.

Gledholt Wood Pond.

Cladocera	Copepoda	Ostracoda
Daphnia longispina	*Diaptomus gracilis*	*Cypridopsis vidua*
Ceriodaphnia sp.	*Cyclops albidus*	*Cypria ophthalmica*
Simocephalus exspinosus	*C. agilis*	*Candona* sp.
Bosmina longirostris	*C. fimbriatus*	
(inc. var. *similis*)	*C. viridis*	Branchiura
Acroperus harpae	*C. vicinus*	*Argulus foliaceous*
Alona affinis	*C. vernalis?*	
A. rectangula	*C. languidus*	Amphipoda
A. guttata	*Canthocamptus pygmaeus*	*Gammarus pulex*
Chydorus sphaericus	*C. wulmeri?*	
		Isopoda
		Asellus meridianus

The queries against two of the copepods are given as the only specimens found were immature. In the case of the harpacticid believed to be *Canthocamptus wulmeri* this is regrettable as the species concerned is rather rare and has not been encountered elsewhere in the district.

As a further example of the crustacean fauna of a small body of water on the Coal Measures the list of species collected on a single visit to the dam at Gunthwaite in August can be quoted.

Gunthwaite Hall Dam.

Cladocera	Copepoda
Daphnia longispina	*Diaptomus gracilis*
Simocephalus vetulus	*Cyclops albidus*
Scapholeberis mucronata f. cornuta	*C. fuscus*
Eurycercus lamellatus	*C. agilis*
Acroperus harpae	*C. strenuus*
Alona guttata	*Canthocamptus pygmaeus*
Chydorus globosus	
C. sphaericus	Ostracoda
	Cypridopsis obesa

This appears to be a fairly general state of affairs on the Coal Measures and although a few ponds have produced only two or three species the general picture is one of a fairly rich and diversified crustacean fauna.

A few miles to the east of the area surveyed, but still on the Coal Measures, lie several interesting bodies of water in the Wakefield area which are eutrophic in character and whose faunas appear to be particularly rich. Of these, Cold Hiendley

Reservoir (Wintersett) has been visited several times and has produced a remarkably rich assemblage of crustaceans. This body of water is particularly rich in nutrient salts as can be seen by perusal of the following figures (*cf.* also table 2). I am much indebted to Messrs. J. Heron and J. F. Makereth for checking some of my analyses and for the figures for sulphate and chloride content.

Chemical Analysis of Water of Cold Hiendley Reservoir, January, 1953

Calcium	75·0 mg/litre
Magnesium	41·0 mg/litre
Sulphates	292·8 mg/litre
Chlorides	$\simeq$70·0 mg/litre
Nitrogen	0·056 mg. nitrate N/litre
pH	7·0—7·5

For ionic balance a considerable amount of some metallic radical must be present and this is probably accounted for chiefly by sodium though the means of estimating this were not available.

The origin of the nutrient salts appears to be the surrounding land (which possibly contains beds of gypsum) for enquiries kindly instigated by Mr. A. C. Laughton indicate that no mine pumpings have ever been turned into the reservoir as was suspected when the high salt content of the water was first revealed. Of incidental interest is the fact that the concentration of magnesium exceeds that which Hutchinson (1932) found to be the maximum concentration tolerated by certain (but not all) races of *Daphnia longispina*.

The following list indicates the diversity of the fauna:

Cold Hiendley (Wintersett).

Cladocera
Diaphanosoma brachyurum
Sida crystallina
Daphnia cucullata
D. longispina
Simocephalus vetulus
Ceriodaphnia reticulata
C. quadrangula
C. pulchella
C. laticaudata
Scapholebris mucronata f. cornuta
Eurycercus lamellatus
Acroperus harpae
Alona affinis
A. tenuicaudis
Graptoleberis testudinaria
Pleuroxus laevis
P. aduncus
Chydorus globosus
C. sphaericus
Polyphemus pediculus

Copepoda
Diaptomus gracilis
Eurytemora velox
Cyclops albidus
C. fuscus
C. agilis
C. agilis speratus
C. viridis
C. affinis
C. fimbriatus
C. fimbriatus poppei
C. languidoides hypnicola
C. leuckarti
Nitocra hibernica
Canthocamptus staphylinus
C. pygmaeus

Ostracoda
Candona candida
Herpetocypris reptans
Cypria ophthalmica
Cypridopsis vidua
Cypricercus obliquus
Cyclocypris sp.

Amphipoda
Gammarus pulex

Isopoda
Asellus aquaticus

The differences between a rich eutrophic body of water such as this and the dystrophic and oligotrophic waters of the zones previously considered are most striking and are summarised in table 2.

Of incidental interest is the fact that whilst the fauna of the adjacent Wintersett Reservoir (literally only a few yards from Cold Hiendley Reservoir) has been the subject of no more than casual observations the indications are that it is similarly rich in crustacean species, yet the plankton appears to have quite a different composition, containing as it does *Daphnia hyalina* var. *lacustris*, *Bosmina longirostris* and *Cyclops vicinus*, three species not recorded from Cold Hiendley Reservoir, this being yet another illustration of qualitative differences in the faunas of adjacent water bodies. It might also be mentioned that other bodies of water in the Wakefield area appear to be similarly rich in species, e.g. a single visit to Woolley Dam (now unfortunately drained) in 1950 produced 11 species of Cladocera.

TABLE 2—Comparison of the physico-chemical and ecological characteristics and the crustacean faunas of three West Yorkshire reservoirs.

	Altitude in feet	*Nature of surrounding terrain*	*Nature of bottom*	*Percentage and type of marginal vegetation*	*Amount of submerged and semi-emergent vegetation*	*pH*	*Calcium content, mg/l*	*Other chemical features*	*Typology*	*Recorded number of species of Crustacea*
Black Moss Reservoir	1336	Cotton-grass moorland	Essentially cotton-grass peat, with some sand	<1% Represented only by a few tufts of *Eriophorum angustifolium*	Nil	3·6	0·98	Mg^{++} and NO_3^- present in infinitesimal amounts	Dystrophic	0
Hill Top Reservoir (Slaithwaite)	548	Rough land (on Millstone Grit), largely uncultivated	Rather sandy	Sparse. Mainly *Glyceria* and rushes (about 40% at high water but much less during most of year)	In general sparse, but with dense *Luronium natans* and *Callitriche* sp. at one end	5·0 to 5·5	10·01	Mg—4·18 mg/l N as NO_3–0·757 mg/l	Oligotrophic	10
Cold Hiendley Reservoir (Wintersett)	*ca.* 170	About 50% agricultural land (on Coal Measures), some uncultivated land, and a little woodland	Varied, and including some putrefying ooze	>90% Mainly 'reeds'	Plentiful. *Myriophyllum*, *Elodea*, *Littorella*, *Potamogeton*, etc.	7·0 to 7·2	75·0	'Abnormally' high concentrations of Mg^{++}, SO_4^{--} and $Cl.^-$ NO_3^- surprisingly low	Eutrophic	43

A further, and distinctly specialised habitat, which has been searched with some measure of success on the Coal Measures is the leaf carpet of woods; collections from Woodsome having revealed the harpacticoid copepods *Moraria varica*, *M. arboricola*, and *Canthocamptus pygmaeus*, while *Moraria varica* has also been found at Elland (Fryer, 1953). Unsuccessful search has been made for crustaceans in the leaf carpet of the Millstone Grit area, but as the process of searching in this debris for the minute forms involved is a very tedious and time-absorbing occupation few samples have been examined, and it must not be assumed that copepods do not occur in such situations in the latter area.

General Remarks

During the ice age the higher parts of the region surveyed formed part of a fairly extensive ice-free nunatak (Woodhead, 1929; 1931) and the interesting question of whether or not any crustaceans were able to persist there during this period and subsequently survive in specialised habitats to the present day merits consideration. In the writer's opinion the only possible candidates for such distinction are a few spring-dwelling and *Sphagnum*-haunting species plus such ubiquitous species as *Cyclops agilis*, *Canthocamptus pygmaeus* and *Chydorus sphaericus* which may well have done so but which are never considered as glacial relicts on account of their present-day wide distribution. Apart from these species which may have persisted as relict *populations* but for which it is impossible to obtain proof, the only species among those recorded which need be considered are the copepods *Canthocamptus zschokkei*, *C. cuspidatus*, *Moraria brevipes* and *Cyclops venustus*, the cladoceran *Alona rustica*, and the ostracod *Potamocypris thienemanni*. All these have been found, with the exception of one record each for *Canthocamptus zschokkei* and *Cyclops venustus*, only in springs, cold streamlets, or *Sphagnum* swamps and seepages. No definite claim is made that any of them do represent glacial relicts but the possibility does exist, and the fact that they have been found on several occasions associated with two triclad turbellarians *Crenobia alpina* and *Polycelis felina* whose claims to relict status have oft-times been put forward enhances this possibility.

Comparison with other Areas

Apart from a short note by Brady (1910) who briefly discusses the crustacean fauna of the Sheffield area no published work has appeared concerned with any region in immediate proximity to that surveyed here. Brady's remarks, while brief, bear out, however, that the fauna of the Millstone Grit is a sparse one and he notes that as soon as one passes from waters on this geological formation to those on the Carboniferous Limestone, even though the distance involved be small, there is a remarkable increase in the number of species encountered. The paucity of species on the Millstone Grit he attributed to the acidic nature of the waters, which are largely derived from peaty uplands, and to the absence of lime.

From a geographical point of view there is little to be said as the smaller crustaceans, with the exceptions of the Diaptomidae among the Copepoda, are, because of their great powers of dispersal, notoriously unreliable organisms upon which to base zoogeographical speculations. So far as the Diaptomidae are concerned it would appear that the Huddersfield area is too far south to harbour the northern British forms which with the exception of *Diaptomus laticeps* which extends to the Lake District (and N. Wales) are confined to Scotland; and is too far north to include the Germanic *D. vulgaris* in its fauna. The only recorded species of this family is *D. gracilis*. Possibly further search in winter will reveal *D. castor* as the area falls within its geographical range.

Three areas in Britain, the English Lake District, the Norfolk Broads and the Epping Forest, have been worked fairly extensively by students of the freshwater Crustacea and brief comparison can be made between them and the Huddersfield district. Naturally many species are common to all four areas but some of those found in the Huddersfield district have been recorded from the Lake District and not from the two south-eastern localities, or *vice versa*, while a few have not been recorded in the areas with which comparison is made.

Table 3 indicates the affinities of those species which are known to occur in the Huddersfield district and only in the Lake District *or* the Norfolk Broads or Epping Forest as well as indicating a few species which predominate in one or other of these areas.

Perusal of the facts thus portrayed reveals that, contrary to what might be expected, the fauna of the Huddersfield District bears more similarities to that of south-east England than to that of the Lake District, a fact which is made all the more apparent when the absence of typical Lake District species such as *Cyclops strenuus abyssorum*, *Leptodora kindti*, etc., is taken into account, as well as the fact that some species recorded from the Huddersfield district, e.g. *Bosmina longirostris*, *Ceriodaphnia pulchella* and *C. laticaudata* are common in south-east England and uncommon or rare in the Lake District. The explanation probably lies in the fact that such upland habitats as appear superficially similar to those in the Lake District have their faunas severely limited by factors (high acidity, low calcium content, etc.) which do not operate so severely in the latter area, whereas certain parts of the district provide habitats similar in certain respects to those found in south-east England and which are absent from the Lake District. In other words the similarities

Table 3—Similarities and differences in the crustacean faunas of the Huddersfield District, the English Lake District, and two areas in S.E. England.

	Lake District	*Huddersfield District*	*Norfolk Broads*	*Epping Forest*
Orchestia bottae		×	×	
Daphnia pulex		×	×	×
D. obtusa		×	×	×
D. cucullata		×	×	×
D. longispina		×	×	×
Bosmina coregoni s. lat.	×	×		
Pleuroxus uncinatus	rare	×	×	×
Polyphemus pediculus	×	×	rare	
Cyclops vicinus		×	×	×
C. venustus	×	×		
C. strenuus s. str.		×	×	×

and differences are due essentially to ecological factors and not to geographical ones, a fact which has been made abundantly clear during the present survey. Indeed, perhaps the most important conclusion emerging from the results of this work is that purely local conditions, which may change over a distance of a few miles or even a few yards, are in the case of the freshwater Crustacea more important within a limited area than are geographical factors. This has recently been demonstrated also in a very pleasing manner by Pirocchi (1949) who showed that a series of adjacent ponds which had different characters each maintained its own quite distinct fauna from year to year although an interchange of organisms was possible annually as a result of unification of the ponds by flooding.

As the size of the area considered is relatively small it would be invidious to make numerical comparisons between it and the other areas of Britain which have been carefully worked, but considering the number of habitats studied the fauna cannot be described as particularly rich. Further collecting which may yet reveal some of the rarer species is necessary, however, before this point can be strongly emphasised.

Faunal Lists and Ecological Notes on Individual Species

The following is a complete list of all the species recorded in the Huddersfield area. (Species recorded in Cold Hiendley Reservoir quoted for comparative purposes

are not considered). An attempt is made to give as briefly as is compatible with coherency, details of the local distribution of the species recorded together with such remarks as have been thought to be of value in adding to our knowledge of the ecology of the species concerned.

MALACOSTRACA

EUCARIDA, DECAPODA, MACRURA

Astacus pallipes Lereboullet: While occurring in certain streams on the Coal Measures, e.g. near Cawthorne, I know of no stream on the Millstone Grit in which it occurs. It is, however, common in the Huddersfield-Ashton canal in spite of persecution by anglers, and has apparently occurred there for many years. Its presence there was noted by Wattam in 1931.

PERACARIDA, AMPHIPODA

Orchestia bottae M. Edws.: The occurrence of this introduced species at Huddersfield has been dealt with elsewhere (Fryer, 1950).

Crangonyx gracilis (=*Eucrangonyx gracilis*) S. I. Smith: The occurrence of this introduced species in the Huddersfield-Ashton canal has been discussed elsewhere (Fryer, 1951, a and b). More recently I have taken it in a dam and in a spring, both at Marsden. In each case it could have, and almost certainly had, entered these habitats from the canal. Its occurrence in a cold spring (in company with *Polycelis felina*) contrasts markedly with conditions at Huddersfield where it is found in artificially-warmed water and indicates the eurythermous nature of the species.

Gammarus pulex L.: Common in both static and flowing waters throughout the district except on the moors and in streams derived from them.

ISOPODA

Asellus aquaticus L.: Very common throughout the district except on the moors.

A. meridianus Racovitza: Only encountered in the pond in Gledholt Wood.

CLADOCERA

Sida crystallina (O. F. Müller): Recorded only from the Long Pond, Denby Grange.

Diaphanosoma brachyurum (Liéven): Only recorded from Hill Top Reservoir, Slaithwaite, where it appears to have rather short periods of great abundance and then disappears completely.

Daphnia pulex (De Geer): Apparently quite rare in the Huddersfield district as it has been recorded only from disused tanks at the Huddersfield Sewage Works, Deighton, and from a dam at Lockwood. In the former case the find was made after the publication of Johnson's (1952) work which demonstrated the previous failure to recognise that the old '*D. pulex*' was a composite species, and in the latter case preserved material was available so there is no doubt that both sets of specimens belonged to this species and not to *D. curvirostris* which has not been recorded in the area.

D. obtusa Kurz: Quite common in the area as a whole. Its range of habitats is considerable for it has been found in such different situations as a turbid horse-trough at Farnley Tyas and in the plankton of Hill Top Reservoir. In spite of this ecological euryvalence it has not been met with on the moors and is rare in ponds on the Millstone Grit.

D. longispina O. F. Müller: Probably the commonest species of the genus in the area and occurring in a variety of waters though not invading the moors. One rather unusual situation in which it was discovered was a large stone trough at Gunthwaite. The water in the trough, however, was very clear and not of the turbid nature frequently associated with horse troughs.

D. cucullata Sars: Only recorded from the plankton of the Longwood Compensation Reservoir.

Scapholeberis mucronata (O. F. Müller): Recorded on only a few occasions from waters on the Coal Measures. Its absence or rareness elsewhere in the district is difficult to understand as it is a species tolerant of a variety of environmental conditions including high acidity. The records include individuals of the forma *cornuta*.

Simocephalus vetulus (O. F. Müller): Very common. Even this ubiquitous species has not been found on the peat-covered moorland, but elsewhere it is equally common on both the Millstone Grit and the Coal Measures.

S. exspinosus (Koch): Not uncommon on both the Millstone Grit and the Coal Measures. All the specimens seen appear to be of the variety *congener*. This variety may be more common in Britain than the s. str. form and it is noteworthy in this connection that Berg (1929) found only this variety during his survey of the Cladocera of Denmark.

Ceriodaphnia quadrangula (O. F. Müller): Only recorded from some temporary ponds at Brick End, Bretton, on the Coal Measures.

C. pulchella Sars: While the commonest species of the genus in the area and quite frequent in several parts of the Huddersfield-Ashton canal it has not been met with on many occasions elsewhere and cannot be regarded as common.

C. laticaudata P. E. Müller: Recorded only from an old-established pond near Gunthwaite Hall, on the Coal Measures.

Bosmina longirostris (O. F. Müller): Recorded on a few occasions from two localities on the Millstone Grit and two on the Coal Measures. Both the Millstone Grit localities were artificially enriched waters. The varieties *cornuta* and *similis* have been met with, both associated with the typical form.

B. coregoni Baird *s. lat.*: The form which I have designated *B. coregoni lilljeborgi* occurs in Hill Top Reservoir, Slaithwaite, in the Huddersfield-Ashton canal, and in Blackmoorfoot Reservoir, Linthwaite. In the latter reservoir it often occurs, apparently alone, in prodigious numbers (as it does in Hill Top Reservoir) and clogs the filters of this important waterworks undertaking. In both these reservoirs it appears to be essentially a detritus feeder. Because of this its presence in Blackmoorfoot Reservoir may be beneficial in reducing the rate of deposition of sediment for it converts peaty detritus which would otherwise settle on the bottom as such, into a form of organic matter which, when the cladoceran dies and sinks to the bottom, becomes available as food to bottom-dwelling organisms such as Chironomid larvae which eventually leave the water thus removing a certain amount of organic material from the bottom. The form encountered in a moorland pool on Black Moss is, on morphological grounds, referable to *B. coregoni obtusirostris* yet if one regards it as such and the other individuals as *B. c. lilljeborgi* one has the curious case of representatives of the '*longispina* Reihe' (*B. c. obtusirostris*) and the '*coregoni* Reihe' (*B. c. lilljeborgi*) occurring in the same area. The former 'Reihe' is made up of arctic and alpine forms and its distribution includes northern and western Britain, while the latter consists of an assemblage of forms found essentially in Central Europe and south-west England. An overlap may be expected in certain areas of which, on geographical grounds, the area considered is one, but one tends to be a little sceptical of such a taxonomic system when apparently identical forms are found under such different conditions as dystrophic-oligotrophic reservoirs and a polluted and therefore much enriched portion of the canal.

Eurycercus lamellatus (O. F. Müller): Common on the Coal Measures, but elsewhere not recorded. (See remarks on page 113).

Acroperus harpae Baird: Met with several times on the Coal Measures but only once on the Millstone Grit.

Alona quadrangularis (O. F. Müller): Not common. Recorded only from a swamp at Longwood and a small dam in the Deanhead Valley, Scammonden, both on the Millstone Grit.

A. affinis (Leydig): Very common in the district among the bottom detritus and weeds in almost any kind of water and especially associated with stones, but nevertheless not recorded from the peaty uplands.

A. costata Sars: Fairly common.

A. guttata Sars: Common. Generally found on muddy bottoms but also among submerged bryophytes.

A. rectangula Sars: Only recorded from the pond in Gledholt Wood and from a pond near Shelley, both on the Coal Measures. In each case it occurred near the margin among mud and dead leaves or encroaching grasses.

A. rustica Scott: Recorded several times from *Sphagnum* patches and seepages from the latter, often of very small volume, and definitely to be regarded in this area as an acidophilic sphagnophile. The specimens are usually a beautiful amber in colour.

Rhynchotalona rostrata (Koch): Recorded from the Huddersfield-Ashton canal and from the Longwood Compensation Reservoir. Its habit of burrowing into the mud film of submerged stones of which fauna it is, in the canal, an important constituent, has been mentioned elsewhere (Fryer, 1953).

Leydigia leydigi (Shödler): Recorded from the Huddersfield-Ashton canal at Golcar and from the Longwood Compensation Reservoir.

Graptoleberis testudinaria (Fischer): The record for the lower lake in Bretton Hall Park is the only one for what is in many parts of Britain a common species.

Alonella excisa (Fischer): Recorded only from a moorland pool near Buckstones. This was my first record of a cladoceran in the district and, in view of the fact that I failed to find it elsewhere I visited this pool on several occasions in order to confirm my determination and failed to find it or any other crustacean, until August 1952 when it re-appeared in large numbers.

A. nana (Baird): Not uncommon in the district. Found among bottom debris and weeds.

Peracantha truncata (O. F. Müller): One record only—the lower lake in Bretton Hall Park.

Pleuroxus trigonellus (O. F. Müller): Only recorded from the lower lake in Bretton Hall Park.

P. uncinatus Baird: Only recorded from the Huddersfield-Ashton canal where however, it is very common in places, and from the lower lake in Bretton Hall Park. It seems generally to creep among bottom debris and mud which is presumably stirred up by the recurved rostrum which acts as a plough. It can, however, swim quite strongly when occasion demands.

Chydorus globosus Baird: Frequently met with in various parts of the Huddersfield-Ashton canal but usually in small numbers. Otherwise recorded only from a dam at Gunthwaite.

C. sphaericus (O. F. Müller): Ubiquitous. By far the commonest species of cladoceran in the area and found in almost any kind of water including moorland habitats where it is generally the only cladoceran found. I have not, however, recorded it from *Sphagnum* swamps but it does occur in association with this plant in pools.

C. piger Sars: Only recorded from the canal at Golcar where it is fairly plentiful.

Polyphemus pediculus (L): Very common in the Huddersfield-Ashton canal yet not encountered elsewhere within the district.

COPEPODA

Diaptomus gracilis Sars: Very common in the open water of ponds, reservoirs and dams within the area. It has succeeded in colonising one moorland reservoir—Deanhead.

Cyclops albidus Jurine: Very common indeed, being, apart from *C. agilis* (q.v.) the commonest cyclopoid in the area. It occurs in a variety of situations, usually where weeds are present, and the absence of these may be a contributory factor to its absence from moorland waters as may the absence of food, for extensive studies, the results of which will be published elsewhere, have revealed that this is a markedly carnivorous species.

C. fuscus Jurine: Several records indicate that this is probably a common species in the area. I have found nothing to indicate any differential ecological preferences exhibited by this species and the closely related *C. albidus* with which it frequently co-exists.

C. distinctus Richard: Recorded only from the lower lake in Bretton Hall Park where it occurred in company with the closely allied species *C. albidus* and *C. fuscus*.

C. agilis s. str. Koch: Exceedingly common in a wide variety of habitats, and the commonest cyclopoid in the area. Even this species fails, however, to colonise the typical moorland pools in the area. As extensive studies on its food and feeding habitats have shown it to be an apparently indiscriminate algal feeder (Fryer, unpublished) and as algal growths, while seldom very dense, are to be found in many pools, lack of food can hardly be the chief limiting factor governing its absence. An absence of predators from such pools should, theoretically, be conducive to its occurrence so, taking all these facts into consideration it would appear that purely physico-chemical factors restrict its occurrence. Experimental studies using this species may throw valuable light on the physiological effects of moorland waters on living organisms.

C. agilis speratus Lilljeborg : Recorded from the Hudderfield-Ashton canal, where in places it is fairly common, from the canal at Elland and from the Upper Lake in Bretton Hall Park. The ecological data accumulated are insufficient to demonstrate any distinct preferences exhibited by this sub-species but it has usually been encountered among weeds or, as at Golcar, on the surface of stones. Gurney (1933) states that it seems to be confined to clear weedy waters but this is only partially true as the canal at Elland is dirty and turbid and the canal in the Colne Valley too becomes very turbid after rain.

' Intermediate ' forms between this sub-species and *C. agilis* are not rare. On the other hand an extreme *speratus* whose furcal rami were 8·5 times as long as wide has been seen.

C. macruroides Lilljeborg: Only recorded from the canal at Golcar, from a dam near Holmfirth, and from a pond at Longwood, all on the Millstone Grit.

C. fimbriatus Fischer: While not often encountered this species has been recorded from all three zones in the district in several habitats. The single record for the peat-covered area, however, is for the ' modified ' pool mentioned on page 106.

C. fimbriatus poppei Rehberg: Gurney (1933) gives only five known British records for this species and had not encountered it himself. I found a colony in which it was quite plentiful among rather densely matted grasses with a coating of flocculent algal material at the margin of the canal at Marsden in early May, 1953 when females with egg sacs were numerous and nauplii were abundant.

A point of morphology can conveniently be introduced at this point. The armature of the fifth leg in this species appears to have been erroneously described in the standard works of reference by Kiefer (1929) and Gurney (1933), both authors stating that the inner seta is but little longer than the median *spine*. The median structure is in fact a *seta* and not a spine—just as it is in *C. fimbriatus*. Indeed it is a very slender seta in my material. The outermost structure is a very stout and slightly spiniform seta which is slightly *shorter* than the median seta and only slightly longer than the inner spine which itself is a trifle longer than the comparable spine in *C. fimbriatus* which is correctly and accurately figured by Kiefer and Gurney as well as by Sars (1913). The armature of leg five does differ from that of its homologue in *C. fimbriatus* but not in the manner described by Kiefer and Gurney. (These observations were substantiated by a find made at Cold Hiendley Reservoir outside the area considered here.)

C. affinis Sars: Only recorded from the canal at Elland and from the dam at Coxley near Middlestown, both on the Coal Measures.

C. strenuus s. str. Fischer: Met with on several occasions. It seems to prefer rather ' richer ' conditions than prevail on the Millstone Grit for it has been found in this zone only in dams at Lockwood and Netherthong, both constructed on alluvium and both perhaps receiving (the former almost certainly so) polluted water from the River Holme on occasions, and in tanks and troughs at the Milnsbridge sewage works. Its preference for artificially enriched conditions is perhaps indicated by its presence in tanks at two other sewage works—Deighton (Huddersfield) and Fenay Bridge.

Some of the specimens found show tendencies towards the sub-species *abyssorum*, e.g. endopod 3 of leg 4 is sometimes rather slender, but none have been met with which can be assigned to this form which is so characteristic of northern Britain. Whether or not these tendencies can be taken as showing that the change from *C. strenuus s. str.* to *C. s. abyssorum* is gradual, i.e. whether or not a cline exists, is extremely doubtful and I am inclined to think that such differences from the ' typical ' form as have been seen are within the normal range of structural variation in what is well known to be a very variable species.

C. vicinus Uljanin: Only recorded from the plankton of Longwood Compensation Reservoir, from the pond in Gledholt Wood and from a dam at Lockwood. The habitats are in keeping with Gurney's statement (1933) that it may be regarded as confined to eutrophic waters. A curious feature of its life cycle in this area is that females with egg sacs have been taken in December and January but Gurney states that it is chiefly a summer form breeding in spring and summer in the Norfolk Broads ' though surviving the winter in some conditions '.

C. viridis (Jurine): Quite common in many habitats but not encountered on the peat-covered uplands.

C. vernalis s. str. Fischer: A common species in the district and one of those which seems to be able to some extent to colonise the moorland habitats.

C. vernalis americanus Marsh: Taken on several occasions at various points in the Huddersfield-Ashton canal and in dams at Shelley and Marsden. Some remarks on its taxonomic status and ecology are given elsewhere (Fryer, 1954).

C. venustus Norman and Scott: Some aspects of the ecology of this species were given in a recent paper (Fryer, 1953) in which details of 12 records from the Huddersfield area were given. More recently, although opportunities for searching for it have been few, it has been recorded from seven additional stations in the area. All these are located near to but not actually on the moorland, being in cloughs or rough moor-edge fields. The habitats consist essentially of very small pools, puddles, or seepages, or, less frequently, springs, usually but not always, with *Sphagnum* present. Although generally considered to be a rare species it must be regarded as relatively common under the above conditions in the Huddersfield district.

Females with egg sacs have been seen in every month from April to November. Evidence of winter activity is slight due to lack of opportunity for collecting during the colder months, but mature individuals have been seen in December.

[*C. bicuspidatus* Claus: The presence of this species in the list rests on the finding of a single dead and damaged individual in material collected from a spring at Booth Banks, Slaithwaite, and until more material is to hand should be regarded only as provisional.]

C. bisetosus Rehberg: One of the commonest species of the district and one which appears to be very adaptable. It has been encountered chiefly in small, often temporary, pools including some in the moorland zone, but also in other situations, e.g. in the canal and in springs. It has been claimed (Roy, 1932) that this species usually occurs unaccompanied by other small crustaceans and that under experimental conditions it is unable to survive in competition with other copepods. While in several cases this species has been found in small habitats with few possible competitors this is by no means an invariable rule and further work seems to be called for in this connexion.

C. languidus Sars: Can generally be located in puddles in swampy situations which are likely to receive less attention from collectors of the Crustacea than are more open bodies of water. Here it often accompanies *C. bisetosus*. This species is one which has achieved some measure of success in colonising available moorland habitats.

[*C. leuckarti* Claus: Only recorded from an aquarium in which it ' appeared '. It has been shown elsewhere that this species enters into a dormant state in winter (Fryer and Smyly, 1954) and as such it was possibly introduced into the aquarium in question.]

Canthocamptus staphylinus (Jurine): Very common in weedy waters of various kinds, especially during the winter months. Also recorded from one spring.

C. minutus Claus: Only encountered in rather densely matted grasses at the edge of the canal near Marsden, and in a pond at Oaklands, near Dalton.

C. pygmaeus (Sars): The wide range of habitats which this species is capable of colonising is well-known and is exemplified by the finds made in the Huddersfield district. The habitats from which it has here been recorded include the margins of ponds, a reservoir and a canal, weedy pools, ditches, swamps, springs, water-splashed moss and the leaf-carpet of a wood. The fact that such a ubiquitous species has not been encountered in any of the habitats on the cotton-grass moorland is an indication of their severity.

Roy (1934) showed that the ' musciculous ' form of this species is physiologically differentiated from the aquatic form and pointed out minute (and constant?) morphological differences between the two which, however, he was able by a very delicate operation to cross by artificial means. The characters ' muscicole ' and ' aquatique ' were shown to be inherited on Mendelian lines. Both forms have been recorded from the Huddersfield district, a fact which should be noted if the two ever receive nomenclatural distinction.

C. zschokkei Schmeil: As shown in table 1 this species is very characteristic of springs in the Huddersfield district. Apart from such habitats it has been found in one *Sphagnum* swamp on the moors, in *Sphagnum* seepages in Drop Clough, once in water-splashed moss, and in two streamlets, one muddy and the other densely overgrown with bryophytes. Its occurrence in numerous springs on the continent of Europe has been noted in the text and its occurrence in calcareous springs at Malham and Aysgarth whose waters differed in chemical content to those of the

Huddersfield district indicates that chemical conditions of the environment play little part in governing its distribution. The similarities of these various springs are low temperature, a slight flow of water, and the presence of sheltering bryophytes. These three factors seem to be those demanded of the environment by this species.

C. cuspidatus (Schmeil): Only found in the spring at Wessenden, Marsden, where, however, it occurs in abundance, and in a streamlet in Merrydale Clough, Slaithwaite.

[*C. wulmeri* Kerhervé ?: An immature individual probably of this species was taken in the pond in Gledholt Wood.]

Moraria varica (Graeter): Found in the leaf-carpet of Birks Wood (Woodsome Hall), and Park Wood, Elland (Fryer, 1953).

M. aboricola Scourfield: Found in the leaf-carpet of Birks Wood (Woodsome Hall) (Fryer, 1953).

M. brevipes (Sars): A rather rare species in the district. Found in a *Sphagnum* swamp on the moors N.W. of Marsden, among *Sphagnum* in Drop Clough, Marsden, and among densely matted *Sphagnum* in a pond near ' Nont Sarah's ', Scammonden.

M. sphagnicola Gurney: Only encountered in wet *Sphagnum* in Drop Clough, near Marsden.

(Note on the genus *Moraria:* Only four species of this genus have been recorded from England, and, so far as the writer is aware, all four have never previously been recorded from within the confines of an area as small as that considered here).

BRANCHIURA

Argulus foliaceous L.: Not uncommon in the Huddersfield-Ashton canal where numerous specimens were taken from a pike on one occasion and where anglers report it as common on the roach from time to time. Also found in the pond in Gledholt Wood.

OSTRACODA

Insufficient attention has been paid to the Ostracoda of the district to merit notes being given on individual species, but the sub-joined list includes all the species which have been recorded. Of these it may be stated that *Cypria ophthalmica* is very common in many situations and is rivalled in this respect by *Cypridopsis vidua*. The genus *Cyclocypris* appears to be well represented numerically and *Candona candida* is not uncommon. The complete absence of ostracods from waters on the cotton-grass moorland has already been emphasised. Of the species listed *Eucypris crassa, E. lilljeborgi,* and *Potamocypris thienemanni* were recorded in Britain for the first time during the course of the survey.

Candona candida (O. F. Müller).
C. parallela G. W. Müller.
Cyclocypris laevis (O. F. Müller).
C. ovum (Jurine).
Cypria ophthalmica (Jurine).
Eucypris crassa (O. F. Müller).
E. lilljeborgi (G. W. Müller).
E. elliptica (Baird).
Cypricercus fuscatus (Jurine).
C. affinis (Fischer).
Herpetocypris reptans (Baird).
Cypridopsis vidua (O. F. Müller).
C. obesa Brady and Robertson.
Potamocypris thienemanni Klie.

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acknowledge with gratitude the assistance rendered by my wife who has been my companion and helpmate in the field on many occasions.

Summary

A report is given of a faunistic survey of the freshwater Crustacea of the Huddersfield district of West Yorkshire.

Physiographic data are given for the area and correlations between these and the crustacean fauna are demonstrated.

There is a progressive increase both in species, and in general in individuals, from west to east in the area in correlation with a change from Millstone Grit rocks with a covering of cotton-grass peat to non-peat-covered Millstone Grit, and ultimately to Coal Measures strata, and this trend continues to the east of the area where waters of the Wakefield area have been studied. The trend is illustrated by the presentation of faunal lists of selected water bodies.

Attention is called to the faunas of specialised habitats such as rush beds, *Sphagnum* seepages, springs, and the leaf-carpet of woods.

The possibility of glacial relicts occurring within the area is considered.

A brief comparison of the fauna with that of other areas to the north and south is made.

Faunal lists of the species encountered are given, together with ecological and distributional notes in so far as the area studied is concerned.

A total of 84 species and sub-species is recorded of which three, all ostracods, were recorded as new to Britain during the course of the survey.

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LEAF-MINING DIPTERA (AGROMYZIDAE)

H. M. RUSSELL

The leaf-mining habits of insects have long been recognised and associated with four orders of insects: Lepidoptera, Diptera, Coleoptera and Hymenoptera. Until comparatively recent years the Diptera had been studied the least, and in Yorkshire the few records that exist are based almost entirely on captures of adult insects; no attempt having been made to collect mined leaves and breed out their occupants. One of the chief difficulties has been the reliable identification of the adult insects, for it is very often necessary to have the additional evidence of mine, larva and pupa before one can, with certainty, name the species.

From the economic standpoint the family is relatively unimportant, the main damage being confined to ornamental plants such as Chrysanthemum, Primula, Ilex, etc.

The British species of Agromyzidae are comparatively few, Kloet and Hincks *Check List of British Insects* containing some 90 species only. Since the publication of this list however, intensive work on the family by Messrs. K. A. Spencer and L. Parmenter in the south of England has yielded a steady flow of additions.

Certain species are very prolific and abundant. The Holly leaf-miner (*Phytomyza ilicis* Curt.) in particular, appears to be in evidence on the majority of bushes in the Leeds area. Some species have a large number of host plants and can be found almost anywhere; while others are rare, and are limited to a few hosts or are even specific to one host plant. Other species attack aquatic plants and are therefore, specific to aquatic situations.

Most of the leaf-miners apparently pass the winter months as puparia. In some instances the puparia remain in the leaves until the following spring. In other instances the larvae fall to the ground and pupate beneath leaf mould or rubbish, or penetrate a short distance into the soil.

The life history of a Dipterous leaf-miner is of considerable interest. After fertilisation, the female lays its eggs in the plant tissues by means of an elongated ovipositor, one egg being deposited in each hole. Frost (1924) states that he has observed females of the genera *Agromyza* and *Phytomyza* puncturing leaves with the ovipositor, and then turning round and sucking the plant juices through the hole. He states that such feeding punctures are usually large and conspicuous, though some species make very small punctures resembling the feeding punctures of mites and thrips. When the larva hatches it immediately proceeds to consume the egg shell and then finds its way directly to the leaf tissue. Some species live exclusively in the cells of the epidermis, which contain primarily liquid substances. Because of this, the mines are easily overlooked, for they scarcely stand out against the light. The majority of miners proceed directly into the chlorophyll containing parenchyma of the leaf and in consequence the mines become clearly visible. The larvae normally cast their skins three times before changing into pupae. In *Phytomyza* the pupa lies ventrally, in *Ophiomyia* and *Melanagromyza* dorsally to the outside of the leaf. Species which pupate in the mine have a double task to perform when emerging, for they have to first of all break open the puparium and then break through the leaf epidermis. They manage this by the use of their ptilinum, which projects from a fold in the frons which is filled with a liquid, and by forcing in yet more liquid can exert considerable pressure.

The great majority of miners have two generations, of which the first appears in the spring or early summer, the second rather late in the autumn (or even throughout the winter). Hering (1951) states that there is normally no mining activity during the driest and warmest months; the excessive heat during this time resulting in the premature drying-up and withering of the infested leaves, which might impede the normal development of mining larvae. It is thus rare to find inhabited mines between about the middle of July and the end of August, apart from certain exceptions which have specifically adapted themselves to this period.

The frass-line is of great importance in mining insects for identifying the species, demanding special attention and often a very thorough investigation. The deposition of frass can give an immediate clue to the genus of insect mining the leaves.

The various kinds of mines produced by the Agromyzidae can be classified under three distinct types—linear, linear-blotch, and blotch. Some of the linear mines are very narrow at the beginning and gradually enlarge, somewhat resembling a serpent. Such mines are called serpentine mines. Other mines are intermediate between the

linear and blotch types. These are common with the Diptera, and for want of a better name, are called linear-blotch mines. They start as linear mines and suddenly change to blotch type. They differ from the trumpet mines of the Lepidoptera in that the linear part does not enlarge gradually to form a blotch, but makes an abrupt connection with the enlarged part. The blotch mines are considered the most specialised of the three types of mine. This type of mine is formed by the larva eating around in all directions without any system.

There are many ways in which mines can be classified. The first and most logical method would be according to types. These types have already been discussed. The mines can be further arranged according to their position on the leaf, the number of larvae within the mine, the arrangement of the frass, the position of the puparium, and the exit holes made by the larvae as they escape from the leaf.

Considerable variation is shown in the position of the mine on the leaf. The larvae of most species show a preference for the upper surface, although those of a few species are found only on the lower surface. Striking examples of the latter are two species mining the leaves of poplar and willow, respectively. Some species, of which *Cerodonta femoralis* Mg., *Agromyza parvicornis* Loew, and *A. laterella* Zett., are good examples, alternate between the upper and lower surface of the leaf.

Both solitary and gregarious habits are found among the leaf-mining Diptera. In a strict sense, all leaf-miners are solitary, because they hatch from eggs laid singly on the surface or within the leaf, and as the larva emerges from the egg it must start its own mine. Since the eggs are occasionally laid adjacent to one another, the mines soon coalesce, and miners with such habits have been, in the broad sense, termed gregarious. All true linear mines are solitary. The blotch miners have both solitary and gregarious habits.

The position of the puparium has been found constant for each species according to Frost (1924). Most of the larvae, on maturing, cut a slit in the side of the mine, through which they escape.

Methods of rearing leaf-miners are described by Frost (1924) and Hering (1951). The method used by the writer is standard 3 in. by 1 in. glass tubes containing about ¾ in. of damp moss, into which leaves containing the active larvae are placed. The moss controls the moisture, and provided cotton wool plugs are used instead of corks ' damping off ' (with its attendant mould) is considerably reduced. One point should always be borne in mind and that is to obtain a reasonable sample of infested material, for it is essential to press some of the leaves with larvae and pupae ' in situ ' for future assistance when determining the species of miner.

It is hoped that this short paper will provide the necessary stimulus to entomologists in Yorkshire to work the Agromyzidae, and should further information or assistance be required the writer will be only too pleased to help anyone interested in this branch of entomology.

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Welsh Ferns, by **H. A. Hyde** and **A. E. Wade.** Third Edition. Pp. x+131, with 10 plates and 67 figures. National Museum of Wales, Cardiff, 1954. 7/6.

Any English or Scottish botanist who has not already acquired a copy of this excellent handbook should buy one now, for despite the restricted title this is certainly the best available modern account of British ferns. The call for a third edition is some indication of the merit and popularity of the work. The principal change in this edition is the recognition of *Dryopteris abbreviata* and *D. Borreri* as full species.

FIELD NOTES

Y.N.U. Bryologists at Knaresborough.—The meeting of the bryology section on April 2nd took place in fine though rather dull weather. Twelve members, most of whom were beginners, attended the excursion. This was a gratifying improvement on the poor support the section has had recently. Mr. W. Beck of Knaresborough, although not a bryologist kindly came along to give us the benefit of his local knowledge.

The south bank of the River Nidd was followed eastwards. No new finds were made for the district but two interesting species previously recorded were refound namely *Gymnostomum calcareum* Nees & Hornsch. and *Tortula subulata* Hedw. var. *angustata* (Wils.) Limpr.

There was plenty of *Mnium stellare* Hedw. by the river and *Mnium affine* Bland in a patch of swampy ground. *Fissidens viridulus* (Web. & Mohr) Wahl and *Dicranella varia* (Hedw.) Schp. occurred in a small rivulet. On bare ground there was *Pottia davalliana* (Sm.) C. Jens. and among short calcareous turf *Barbula cylindrica* (Tayl.) Schp., *B. revoluta* Brid., *Thuidium delicatulum* (Hedw.) Mitt. and *Gymnostomum calcareum* Nees & Hornsch. on stones among the turf. *Tortula subulata* Hedw. var. *angustata* (Wils.) Limpr. grew in plenty on a steep bank by Goldsborough Mill.

Although their season of fruiting is autumn, it was still possible to identify *Aloina rigida* (Hedw.) Kindb., *A. ambigua* (B. & S.) Limpr. and the rare *A. brevirostris* (Hook. & Grev.) Kindb. on a vertical clay bank at Grimbald's Crag Quarry. *A. brevirostris* has been known here since 1915 and although the main quarry is now being used as a rubbish tip, the *Aloina* may escape destruction as it is outside the main tipping area.

Other mosses seen included: *Barbula tophacea* (Brid.) Mitt., *Dicranella Schreberiana* (Hedw.) Dix., *Eucladium verticillatum* (With.) B. & S., *Rhyncostegiella pallidirostra* (A. Br.) Loeske, *Homalia trichomanoides* (Hedw.) B. & S. *c. fr.* and *Campylium stellatum* (Hedw.) Lange & C. Jens.

Among the hepatics noted were *Lunularia cruciata* L. (Dum.), *Conocephalum conicum* (L.) Dum., *Metzgeria furcata* (L.) Dum., *Lophozia turbinata* (Raddi) Steph., *Aplozia riparia* (Tayl.) Dum., and *Madotheca platyphylla* (L.) Dum.—J. APPLEYARD.

Diptera in the Spathes of *Arum maculatum* L.—While reading the chapter entitled ' Dispersion of Pollen by Animals ' in Kerner and Oliver, *The Natural History of Plants*, Vol. 2, 1902, it occurred to me that the spathes of *Arum maculatum* L. might contain other species of diptera in addition to *Psychoda phalaenoides* L. mentioned in this work.

A. E. Eaton, *Ent. mon. Mag.*, **34,** 122 (1898) recorded females of *P. phalaenoides* L. as the only pollinating agents connected with this plant. He also stated that the flies trapped in the plant had to remain there until the filaments withered and set them free. In a footnote to A. L. Tonnoir (A Synopsis of the British Psychodidae (Dipt.) with descriptions of new species, *Trans. Soc. Brit. Ent.*, **7,** 51 (1940), F. W. Edwards corrected this statement. With R. L. Coe, he identified 198 specimens of Psychoda from *Arum* spathes and found that 158 were *P. phalaenoides* L., all being females, and that the remaining 40 were made up of *P. grisescens* Tonn. (14 males and 19 females), *P. trinodulosa* Tonn. (2 females), *P. brevicornis* Tonn. (1 male and 2 females), *P. setigera* Tonn. (1 female), and *P. severini* Tonn. (1 female). He also noted that the flies can and do come out freely past the filaments when the plant is tapped, so that the trap is not wholly effective. He suggested that intoxication may be the cause of many of the flies remaining below.

I collected the contents of seven spathes from the Thorner Road, Bardsey, on May 31st, 1955, and placed them in a tube containing 75% alcohol. Subsequent examination revealed that this collection was composed of *P. phalaenoides* L., 97%; *P. grisescens* Tonn., 2%, and the remaining 1% *Limosina sp.* and *Elachiptera cornuta* Fln.

My experience with plants from the Thorner area confirms Edwards' observations, for I too found that flies would readily leave the plant if it were tapped. I also noted that when plants were cut open to examine the filaments, etc., a small number of flies were found in an apparently ' dead ' condition. If these specimens were collected and put on one side for a while some very quickly came back to life, and in one or two cases I have seen specimens from newly-opened spathes wandering about in a very unsteady condition. This suggests to me that they had been intoxicated by a substance obtained from the plant.—H. M. RUSSELL.

New Yorkshire Diptera.—On the occasion of the Y.N.U. Whitsuntide meeting at Austwick in 1954, the first day was spent on the slopes of Ingleborough where, in the neighbourhood of the Hill Inn, Chapel-le-Dale, I swept a single specimen of the Trypetid *Tephritis conura* Loew. This species was recorded in *The Naturalist*, 1921, p. 412, as having been found at Keighley on 21/6/19 by Rosse Butterfield. However, the specimen was subsequently re-examined by the late Mr. C. A. Cheetham and found to be the common *Tephritis ruralis* Loew.

Tephritis conura Loew. galls the flower heads of the Melancholy Thistle, *Cirsium heterophyllum* L. and it would be worth while collecting the heads of this plant in the late summer in order to obtain further records of this interesting species of Trypetid. The specimen in my collection has been examined by Messrs. Niblett and Parmenter, and confirmed as *Tephritis conura* Loew. It is therefore, the first record of this species in Yorkshire.

Another addition to the Yorkshire List is the Chloropid *Anthracophaga strigula* Fab., two specimens of which I took at Terry Lug, Wothersome, on the 30th May, 1954. Both localities mentioned above are within the boundaries of V.C. 64.—H. M. Russell,

A Hoopoe at Masham.—On the morning of April 25th, 1955, a Hoopoe (*Upupa epops linnaeus*) was seen at Burnholme Farm, near Masham by Messrs. G. Wharton, W. Bruce and G. Firby. I saw the bird in the evening and was told it had fed on the site of an old manure heap during most of the day. It was subsequently seen by many local residents and by Messrs. J. P. Utley and A. F. G. Walker. The farmers' attentions had been drawn to the bird by the commotion among other species, including Chaffinches and Blue-tits, which chattered and flitted around without attempting actually to mob it.

The bird fed by thrusting its bill vigorously into the ground, several times in quick succession. All observers were impressed by the rapidity with which food was found, and which consisted largely of earthworms with some unidentified larvae. When a worm was seized and withdrawn, dirt would first be shaken from it, then with one end held in the tip of the bill, a backward toss of the head would throw the food into the bird's mouth. Large worms were broken in two and disposed of separately. During much of two days the bird fed almost continuously.

The Hoopoe was remarkably tame and approached as near as 15 feet from observers. Only the alarm notes of Blackbird and Pheasant seemed to disturb it; when the head would be raised, and occasionally the crest, until possible danger had passed. If disturbed from the manure heap site so rich in food, it returned usually within 3 to 5 minutes. The Hoopoe was not heard to call.

On the morning of the 26th, the Hoopoe alternately fed at the same place and preened on a nearby fence. The flight undulated, much like that of a woodpecker, and was generally only a few feet above ground. The bird was not seen after *c.* 21.00 hours on the 26th.—E. E. Jackson.

(*Comments by A.F.G.W. and R.C.:* About the same time Hoopoes were reported in other parts of Yorkshire and Britain. Descriptions of birds seen near Glasshouses, Nidderdale (per S. Dennison) on April 22nd, and near Fountains Abbey on the 27th (per G. R. Wilkinson) could only be ascribed to this species. They could have been the same bird but not very probably. *The Field* of May 19th contained notes concerning Hoopoes in east Sutherland on April 23rd and 26th; in Wiltshire on the 24th, and in Kent on the 26th. More Hoopoes migrating northward in western Europe would seem to have been drifted farther westward than in average years. It was a period of north-easterly winds, strong at times. A.F.G.W. recorded Force 4 on the 24th when many Yellow Wagtails reached Nidderdale and Gouthwaite Reservoir).

A Child's Book of Reptiles and Amphibians, by **Valerie Swenson. A Child's Book of Sea Shells,** by **William M. Hutchinson.** Pp. 26, with numerous illustrations. Publicity Products Ltd., Adprint House, Rathbone Place, London, W.1. 2/- each.

These books survey their respective groups in a manner well calculated to stimulate the interest of boys and girls, for the excellent illustrations—both coloured and black and white—which will first compel attention are supported by texts which are very readable as well as informative. Having regard to present day printing costs it is remarkable that it is possible to produce and market such books at so low a price.

BOOK REVIEWS

British Mosses and Liverworts, by **E. V. Watson.** Pp. xvi + 419, with 18 photographic plates and 217 text figures. Cambridge University Press. 45/-.

Ever since 1896 when H. N. Dixon's *Handbook of British Mosses* was first published, the three editions of that work have been indispensable for all students, both advanced and beginners, of our native mosses. The knowledgeable bryologist uses it because it is by far the best book available; the beginner because there is no adequate and reasonably priced alternative. MacVicar's companion volume on the liverworts, now unobtainable, has similarly held the field for the student of hepatics for over 40 years. Both these admirable books are likely to remain indispensable for some time for all botanists who specialise in the study of bryophytes. For the beginner however they are not easy books to use, and there have doubtless been in the past some potential recruits lost to the ranks of bryology as a result of the discouragement engendered through waging a succession of losing battles against intractable species of Bryum, Barbula, Cephalozia or some other troublesome genus. Those of tougher fibre who persevered long enough to win their bryological spurs can all look back on early attempts at diagnosis which yielded improbable discoveries of mosses or liverworts hitherto recorded only from the starker summits of Scotch mountains or the oceanic havens of western Ireland.

A knowledge of species acquired slowly but surely in the hard way, is not easily forgotten; but there is no special virtue in surmounting needless obstacles. It has been Dr. Watson's aim in this book to smooth the path of the beginner by removing these needless obstacles in the guise of nearly half the recorded species of British bryophytes which, on account of their great rarity or sporadic distribution, it is most improbable that any beginner will encounter. All the common British species are here well described and clearly figured. The descriptions contain a minimum of technicalities combined with a maximum emphasis on those characters of habit and structure easily observed with a hand lens or the unaided eye. Habitat preferences and ecological requirements which are so often characteristic and may afford valuable aids to identification are given closer attention than in any previous account of British bryophytes: the information assembled in the paragraphs dealing with the ecology of each species is in fact one of the most important and valuable features of the book. Less frequent though widespread species are described more briefly, with sufficient detail to enable them to be distinguished from allied types.

The introduction contains all the necessary basic information on structure and life history and on how to proceed with the identification and preservation of specimens. A glossary and key to all the species mentioned in the book are provided and, in addition, a series of very helpful lists of species characteristic of particular environments. There is also a detachable field key to the commonest species for use on excursions, based on characters visible with a hand lens. It remains to be seen whether the keys work efficiently, but the text and drawings both plainly show such painstaking care in their preparation that the keys may also be expected to contain a minimum of snags. Mr. R. H. Hall's excellent photographs add still more to the attractions of the book.

There has long been a very real need for a book of this sort suitable for university and college students, and interested amateurs generally; and I have no doubt at all that this thoroughly competent work will be wholly successful in meeting that need.

W.A.S.

Photosynthesis by **Robert Hill and C. P. Whittingham.** Pp. 165. Methuen's Monographs on Biochemical Subjects. 8/6.

In the preface to this monograph the authors define their aim—' to give a brief account of the biochemistry and the physiology of photosynthesis in such a way as to provide an introduction to present researches in this field '. Their object has been ably achieved. School teachers and university students will find this an extremely valuable handbook.

A very brief historical survey introduces the subject and this is followed by a discussion of plant structure in relation to photosynthesis and the chemistry of the photosynthetic pigments. In a chapter on the contribution of physiological studies, the effects of internal and external conditions on the rate of photosynthesis, quantum efficiency, and fluorescence are discussed. The second half of the book is devoted to biochemical studies. Various reactions involving carbon dioxide and the production of oxygen by isolated chloroplasts and lastly the mechanism of photosynthesis, are described.

E.R.

Embryogenesis in Plants, by **C. W. Wardlaw.** Pp. ix + 381, with 84 figs. Methuen, 1955. 42/-.

The author defines embryogenesis as, ' the inception and formation of the embryo or germ ', and the term embryo is used in the broadest sense to include the initial developmental phase arising from spores as well as from true seeds. This broad definition permits comparisons to be drawn between the early development of the sporophyte and gametophyte generations of archegoniates as well as between that of thallophytes and vascular plants.

In the first three chapters there is a discussion of the factors that may influence plants in their early stages of development. The bulk of the book is concerned with a general survey of embryogenesis in all groups of plants from algae to angiosperms. In each case the salient features of the segmentation pattern and subsequent development are described and details of any experimental investigations are given. An attempt is made to relate these facts to the general corpus of phylogenetic, taxonomic and evolutionary knowledge of each group. The final chapter further elaborates the principles of embryogenesis in the light of the survey already made.

The publication of this book is very welcome for various reasons. In the first place students and teachers of Botany will find the comparative account of embryogenesis indispensable. It summarises a great deal of information, much of it not easily accessible and presents it in, what will be to many, a new light. Secondly the emphasis on the need for experimentation and the use of all available techniques is most refreshing, though only to be expected from one so active in the field of experimental morphogenesis.

It is unfortunate that so much of the discussion of the dynamics of embryogenesis had to be couched in rather vague and speculative terms. This is, however, a striking illustration of the lack of relevant data that can be accumulated only by intensive research. The present work should do much to encourage investigations of the required kind.

H.S.

Aspects of Deep Sea Biology, by **N. B. Marshall.** Illustrated by Olga Marshall. Pp. 380, 5 plates, and numerous illustrations in the text. 1954. Hutchinson's Scientific and Technical Publications. 35/-.

The increasing number of authoritative books about the sea for the intelligent layman is making possible a wide understanding of the nature of the work of the marine biologist and a broad appreciation of the scope of the material which he has to study. The present work deals with unusual material, difficult to obtain and to study. It is written in a manner that inspires interest, and is illustrated by means of beautiful coloured plates and many text figures most of which are of forms not commonly presented. Each chapter is provided with a list of references so that the reader is finally left with a comprehensive bibliography.

A brief history of deep sea biology forms the first chapter, which brings the reader into contact with the persons who made the discoveries, and shows the author's sympathy with his subject as well as his knowledge of it. An account of exploration of the ocean follows, in which reference is made to depth finding, trawling, dredging, measured sampling, midwater netting and deep sea trapping. Visual, televisual and photographic observations and electrical fishing are discussed. Although each section is brief, it leaves the reader with the essence of the matter.

The deep sea environment is described in terms of the floor, from the continental shelf to the abyss, the conditions of pressure, temperature, light and salinity. The movement of water masses is discussed in its own right and as a preparation for the consideration of the distribution of animals, to come later. Distribution of related species is presented in text and figures showing how some may be numerous and some rare in the same environment, or they may be separately occurring in areas side by side, suggesting greater or less competition in the same water mass, or a form of exclusion.

By the nature of the subject, vegetation enters into the discussion very little, except chiefly as forming part of the rain of organic matter which is the early link in the deep sea food chain. Considering that the greatest effect of light on plant growth is within the uppermost 100 metres or so, it is impressive to be presented with this account of the number and variety of animals which live more or less entirely in darkness.

The chapter dealing with the variety of life in the deep covers floating and

bottom living crustaceans, worms, jellyfishes and the like, tunicates, molluscs including cephalopods, fishes, sponges, protozoans and echinoderms, most of them bizarre in appearance with striking adaptations for locomotion or feeding or vision or pressure sensation. Phosphorescent organs are widely distributed among species and upon individuals. Some fishes even have photophores in their mouths which seem to act as lures.

The colour of deep sea animals is dealt with, that of the surface waters only briefly. Red is a common colour below 500 meters, black and brown at greater depths. Vertical distribution varies from latitude to latitude; a species of arrow-worm may be most numerous from 500 to 700 meters in equatorial waters and at 100 metres in subantarctic waters. A nemertean may be most numerous at 1,300 to 1,800 metres off Bermuda and at 500 metres off Greenland.

Considerable treatment is given to sense organs, since so many deep-sea animals live in perpetual darkness and have no eyes, or mere vestiges, yet they seem to move about readily and take food without difficulty. Related fishes, for instance, will have blind abyssal and intermediate eye-bearing forms. Eye size in related species or genera varies with depth of general habitat. Eye form varies also considerably, presenting adaptations to near and far vision.

A large chapter is devoted to ' living light in the deep sea ', with figures and descriptions of different kinds of photophores and of photophore patterns on different species and genera. Many and strange are the structures and adaptations, not least, the fishing lines and lures of the angler fishes.

Some life histories are described, among which are those of the angler, *Ceratias holboelli*, which ranges between 2,500 metres and the surface, and the octopod, *Japatella diaphana*, which is caught adult at 2,000 to 2,500 metres and at one sixth of an inch long near 200 metres. Distribution of the young by vertical and horizontal currents is described.

Altogether this is a fascinating book, serving as a reference work for the professional as well as the amateur. It brings together a great amount of material for the first time in a well ordered and intelligible manner. There is a good index.

E.P.

The Wren, by **Edward A. Armstrong.** Pp. 285 plus 26 pp. of bibliography and index, and 20 photographs on 8 pp. Collins' New Naturalist Monograph Series. 30/-.

A new book by the author of *Birds of the Grey Wind* is a notable event. This time he has tackled a monograph that will live as a mine of information about the European wren and the wrens of the world, and as one of the most worthy of this series of monographs. The book is scientific but not dry, broad in scope and execution yet detailed and documental. The wren of Europe is considered racially, biologically, ecologically, territorially, behaviouristically and comparatively throughout the day from ' rising ' to roosting, and throughout the year. Records from Spurn are among those cited migrationally.

Aspects of the behaviour of *Troglodytes t. troglodytes* are compared with those of wrens of other regions, and with those of other passerine species as occasions require. As an example consider the following from the pages dealing with polygamy among wrens: ' The number of males having more than one mate seems to be almost equal to the number of monogamous males.' ' Polygamy is an element in a highly integrated pattern of adaptation.' ' The males that practise it most efficiently . . . leave most progeny.' Among the other passerine species compared from this biological aspect is the pied flycatcher.

Some of us remember Mr. Armstrong as a ' parson-ornithologist ' in Doncaster and Leeds. When he writes ' on the whole a detailed field study of a bird is best done alone ', I am forced to agree with him; one cannot do much during field meetings. If he found ' few opportunities to watch birds ' in Leeds, he has certainly made many since leaving that haunt of bird-watchers. Many of his field studies have been made in a wood near Cambridge which he appropriately calls ' Wren Wood '. He has also travelled widely noting wrens not only in Europe, including Iceland, but in North, Central and South America. Information of all kinds concerning wrens has been collected, classified and compared, and the facts related in scholarly fashion, and with many interesting tabulations. The bibliography testifies to the breadth of the sources tapped. The result of it all is a remarkable book which can be recommended without reserve.

R.C.

The Birds of Lincolnshire, by **A. E. Smith** and **R. K. Cornwallis.** Lincolnshire Nat. Hist. Brochure No. 2, Pp. 136, $8\frac{1}{2} \times 5\frac{1}{2}$, with 4 plates and map. Published by The Lincolnshire Naturalists' Union, 8/- net.

After three chapters respectively headed ' Birds, Men and the Land ', ' Bird Migration in Lincolnshire ', and ' Lincolnshire Ornithology', 275 species and 28 recognised racial forms are listed in 81 pages with brief mention of status, and of distribution in many cases, and with comment and selected records of the rarer species. The Wetmore order has been followed. No numbers are quoted. Yorkshire ornithologists can now compare the records for their own county with those made south of the Humber, as they already could with those north of the Tees contained in Temperley's *Birds of Durham.*

Despite the influence of John Cordeaux (President of L.N.U. in 1893 and of Y.N.U. in 1896) and of Caton Haigh, Lincolnshire birds do not appear to have been listed until the Rev. F. L. Blathwayt's list appeared in the L.N.U. Transactions in 1915. Soon afterward Blathwayt left the county, and save for the brief period 1919-1922 when W. S. Medlicott acted, vertebrate zoology languished without a secretary until 1932 when S. A. Cox accepted charge. Activity ' was still limited to a very few observers and almost entirely confined to northern ' districts. ' There are very few published records from the whole of the southern half of the county between 1920 and 1940 '. The authors were handicapped but not discouraged, and one can see how Lincolnshire ornithology has benefited from the energetic keenness of Smith and Cornwallis. Results have included the establishment of the Lincolnshire Naturalists' Trust Ltd., of the Gibraltar Point Bird Observatory and Nature Reserve, and various reports, and this book, which is modestly styled a brochure.

Documentation is somewhat sketchy. A bibliography indicates the sources of many records, but the authors have had the benefit of previously unpublished notes from many people which are acknowledged only generally. Very properly they have not hesitated to express doubts when data were inadequate. Of Cordeaux's Little Crake of 9/10/1869 they say ' he gave no supporting evidence of identification '. When the authors give the status of quite rare species without citation of one dated record, are they not inviting similar treatment in the future? ' Four authentic records ' of shot Great Snipe from 1938 to 1952 are cited, but who shot them, or where the specimens went is not stated. That ' we have not considered it necessary to encumber the text with a multitude of references ' is hardly a sound reason for inadequate data or documentation. I have given the question of such text encumbrance much consideration many times, and long since concluded that to omit the names (or initials with a key list) of those who have made a good record was unwise and rather unfair. Some names add the conviction of accuracy to a record. The probable need to conserve space—a need I know well—was a sounder reason. One cannot condense to such an extent without sacrifice of something that readers would like to know.

The main purpose of the brochure is to provide ' a new basis for investigation'. There is much to investigate. Theories concerning migration need many more supporting facts before literal acceptance. Lincolnshire is a large county, second only in area to Yorkshire, with which it has both resemblances and striking differences. Whatever the cause may have been of the virtual disappearance of the Stonechat from Yorkshire as a breeding species, it evidently operated in Lincolnshire. Yorkshire ornithologists will find *The Birds of Lincolnshire* both useful and interesting, and they should have it on their shelves. A useful addition to the county ornithologies has been written. A new and needed date-line has been drawn for Lincolnshire naturalists, from which to work towards the more complete book that will surely follow when this great county has been more adequately watched. Then indeed the joint authors' main purpose will have been fulfilled.

R.C.

My Family of Reptiles, by **Audrey Noel Hume.** Pp. 94, with 16 photographic illustrations. Frederick Muller, London, 1955. 7/6.

Mrs. Noel Hume gives an account of the reptiles, especially tortoises, and the amphibians which she has kept in a London flat. Little emerges except the difficulties of catering for chelonians in a difficult climate, since the pampering her pets received seems barely to have retarded their demise. The account stresses the need for the control of an inhumane traffic in these much abused reptiles.

E.H.

Bird Recognition Vol. III, by **James Fisher.** Pp. 158, with 68 illustrations and 71 maps. Penguin Books, London, 1955.

This, the third volume of the series, continues the pattern of its predecessors and deals with such distantly related groups as the rails, gamebirds, cuckoos and their allies, crows, starlings, hirundines and thrushes. Each species is dealt with under four main headings, namely, *Recognition* which comprises, in this work, size, weight, colour, habits, food and voice; *Breeding* which includes courtship; *Distribution* which is treated specifically and with little regard to its British implications which are left to a map, and *Movements* which treats of migration on a specific basis.

The treatment is necessarily staccato, with some unnecessary purple patches and a little pedantry. ' Aerial plankton ' is a circumlocutary term for flying insects, and ' plant-matter ' differs in no wise from vegetation of common parlance.

The text contains several mis-statements. Cock Ptarmigan are said to ' after mating leave females ' whereas anyone who knows the bird in its alpine home will invariably find the male standing guard near to the sitting hen. The cocks do pack together after the breeding season.

The Wryneck is said to climb ' with the aid of its stiff tail ' though the genus *Jynx* is characterised by soft tail feathers. The juvenile Shetland starling is said to resemble the adult, though it differs little at all from the normal juvenile and certainly bears no closer resemblance to the adult.

The distribution maps are on a vice-comital basis, a notoriously misleading method, interpretable to a limited extent by the informed but not by the tyro for whom the series is principally intended.

The year-cycles given for the species are useful as are the brief but well-formed bibliographies. The illustrations, of very mixed quality, will seldom be helpful and may even mislead, especially in the case of the Nightingale.

It would be churlish not to recognise the pioneer endeavours of the author in the field of small recognition manuals. The success of the earlier volumes has done much to encourage others to similar and more elaborate productions and in this regard especially it is to be regretted that the present series has emerged at such lengthy intervals.

A.H.

Directory of British Fossiliferous Localities. Pp. 282. Published by the Palaeontographical Society. London, 1954. 7/6 or interleaved edition, 12/6.

This Directory was planned to commemorate the centenary of the Palaeontographical Society in 1947 but publication was impossible then due to financial stringency. The generosity of certain donors has now made possible the issue of a volume which will prove of great value to every amateur geologist and naturalist interested in fossils. Over 2,000 entries, grouped in alphabetical order of counties, give details of quarries, cliffs and stream sections where fossils may be found. Map references and geological particulars are given in each case and references to literature enable the interested finder to make further studies. Some localities, such as Victoria Cave, no longer regarded as a collecting locality, are included for their historical interest and occasionally a section is mentioned which has become completely concealed since 1947. Yorkshire is represented by some 120 entries, representative of all the geological periods but surprisingly the well-known Robin Hood Quarry is omitted. It would be impossible to list every fossiliferous exposure in the country and any omission does not materially reduce the value of the volume to the increasing number of amateur geologists who should seize the opportunity to get such a large amount of information at such a small price.

Handbooks for the Identification of British Insects. Vol. IV, Part 8(a). Coleoptera, Staphylinidae, Section (a) Piestinae to Euaesthetinae, by **C. E. Tottenham.** Pp. 79, 196 text-figs. Published by the Royal Entomological Society of London, 30th Nov., 1954. Price 15/-.

The largest family of British beetles, the Staphylinidae, including some 950 species, has not been thoroughly revised since the second volume of Fowler's *British Coleoptera* (1888). Joy's *Practical Handbook of British Coleoptera* (1932) has done much to provide coleopterists with a standard work since Fowler but lacks the detail necessary to achieve the maximum value. We therefore welcome the new revision by Mr. Tottenham which fills a manifest gap in the literature on its subject. In this first part eleven subfamilies, from the Piestinae to the Euaesthetinae inclusive, are

dealt with, including about 250 species. Two further parts are promised to complete the work. The subject is competently and thoroughly treated, within the limits of a synopsis, though one notes with dismay the modern tendency towards subdivision involving smaller genera and the greatly increased use of subgeneric divisions. Tottenham makes a fair case for his generic arrangement though not, perhaps, for the subgeneric, and the use of a non-nomenclatorial designation such as ' cornutus-group ' would be quite as effective as subgenus *Craetopycrus* Tottenham and ' furcatus-group ' would be simpler than *Euceratobledius* Znojko, to take two instances at random. This matter however will hardly worry the ordinary coleopterist and Mr. Tottenham's work will be eagerly used for the valuable aid to the taxonomy of a difficult family which it provides.

W.D.H.

Letters of Charles Waterton, edited by **R. A. Irwin.** Pp. xii+158, with Frontispiece and 6 plates. Rockliff, 18/-.

Charles Waterton, the Squire of Walton Hall near Wakefield, has achieved a great reputation as an eccentric. Col. Irwin's collection of his letters, edited with explanatory notes, will do much to throw this remarkable personality into a different light; for they reveal a character of rare vigour and breadth of interest—an exceptional character certainly, but neverthless an amiable one, full of common sense. If eccentricity is to speak one's mind and to hold firm opinions and beliefs, then Waterton was eccentric, for these letters show clearly a man who was never afraid to hold steadfastly to the beliefs which his long life and wide travel had bred in him. Whether it be a point of natural history or of religious belief, nothing clearly would shake him from his carefully formed opinions; and for them he would fight to the last ditch.

The letters contain many passing observations on wild life, but this is not really a book of natural history. Rather is it a collection of the thoughts of a nineteenth century country-gentleman on the scene around him, whether as the champion of his faith, Roman Catholicism, or as the critic of the government during those difficult days of reform, when the full impact of the industrial revolution was making itself felt.

G.K.Y.

The East Riding of Yorkshire with Hull and York, by **A. G. Dickens.** Pp. x+131, with 24 photographs. A. Brown & Sons, Ltd., London. 10/6.

The East Riding of Yorkshire is not one of the most profitable hunting grounds for the peripatetic guide-book writer, and this is one reason why it is less well-known than it deserves to be and why this little book by the Professor of History in the University of Hull, himself a native of that city, is sure of a warm welcome. It is an admirable blend of the erudite and the every-day and is illustrated by some good and well-chosen photographs, but to many readers it will appeal especially by the way in which it captures and portrays the spirit of the land with which it is concerned, and for its always cogent, and often pungent, comments on human affairs in their local context. It is admittedly intended to whet the appetite for more and it has a useful appendix of suggestions for further reading which might, by the way, in any future edition, be more clearly separated from the end of the last chapter.

R.G.

Filmstrip. Catkin Bearing Trees. 31 frames in colour. Order No. 6019. Educational Productions Ltd., East Ardsley, Yorkshire. 25/- (including notes).

A better title for this would be ' Wind-pollinated Trees '. Few people would call Elm or Beech flowers catkins. Hazel, Alder, Willow, Poplar, Birch, Oak and Walnut are included, all in colour. It was a good idea to treat them in order of flowering, but the absence of clear close-ups of several of the flowers, e.g. female oak and hazel is a pity, as these are not easy to get unless one knows what to look for. The notes by Dr. J. H. Elliott are good and full, but the colours are not as successful as in the companion strip.

The same firm has produced, in association with the Royal Forestry Society of England and Wales, two **Wall Charts** in colour on **Trees** (size 20″ × 30″, price 10/-). These are designed for summer and winter recognition respectively of twigs of common trees. They are most useful, and would be more so if the specific as well as the general names of all were given. Flower, leaf and twig are practically life size and could be used for recognition by pupils of any age.

LECTURER

Bernard C. Pickard is available for booking for museum and society lectures from October 1st, 1955 to March 31st, 1956.

Subjects :

1. "Locusts." A talk on the habits of locusts and the methods of their control. Illustrated, if wanted, by photographs, drawings, etc., for epidiascope. Also live locusts of various species, and set specimens showing life history, varieties, etc., available for inspection by audience.

2. "Grasshoppers and Crickets of Great Britain." Illustrated, if wanted, by colour photographs, colour paintings, drawings, etc., for epidiascope. Also set specimens of each of the twenty-nine British species, as well as large interesting foreign species for inspection by audience.

(Mr. Pickard is the author of "Grasshoppers and Crickets of Great Britain and the Channel Islands" (1954); the first book on this subject since 1936).

Fee—3 Gns. This figure includes all expenses if within 40 miles of Leeds. if over 40 miles, proportion of expenses extra.

Bookings through: C. M. Benger, Rowan House, Southway, Ben Rhydding, Ilkley, Yorkshire.

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CORTINARIUS I

BY

P. D. ORTON

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THE GENUS CORTINARIUS

I. *MYXACIUM* AND *PHLEGMACIUM*

P. D. ORTON

General Notes

This paper is founded on notes left by the late A. A. Pearson, F.L.S., now in the Herbarium of the Royal Botanic Gardens at Kew. These consist of a preliminary sketch of a key and tabular notes on the species, and numerous descriptions and paintings. Neither the sketch of a key nor the tabular notes contain any new species and most of those recorded as new to Britain by Pearson himself are not included, so I have completely revised and extended them to include many details and some extra species from both my own and Pearson's notes. All the relevant extant descriptions and paintings of Pearson have been studied and taken into account. Since it will be necessary to deal with a large number of species—at least 250—it is proposed to produce this paper in three parts, each part dealing with two Friesian subgenera—Part I, *Myxacium* and *Phlegmacium* and some General Notes; Part II, *Inoloma* and *Dermocybe*; Part III, *Telamonia* and *Hydrocybe*—and it is hoped to produce parts II and III in 1956. Our knowledge of this genus is so incomplete however that this cannot be regarded as more than a preliminary effort to tackle this problem.

The genus *Cortinarius* is the largest genus of agarics in Britain and indeed in Europe and North America and probably of the world as a whole. Whilst it includes many of the most beautiful of all the toadstools and is therefore very satisfying from the aesthetic point of view, it is one of the least satisfying to the systematist; this is partly because so many species are seldom seen and cannot in any case be studied unless they are young and in fresh condition, and partly because there have been so many different interpretations of the Friesian species, often well described by Fries macroscopically but lacking the microscopic details now regarded as essential for more accurate species determination. When old most of them turn more or less rusty brown and are then often practically indistinguishable from one another; to quote Fries, "after becoming discoloured in age or dry weather even the large well-marked species are scarcely separable"; old material is therefore worthless and should be firmly rejected unless accompanied by younger specimens. Furthermore, when they do appear they often do so in considerable numbers, so that given favourable conditions many species can be found in quite a small area. The unfortunate collector of Cortinarii then finds himself gathering far more material than he can satisfactorily deal with and some species inevitably get neglected (especially the smaller insignificant brownish specimens). A good *Cortinarius* flush is a very satisfactory sight but also a sharp reminder of one's limitations and the value of patience, particularly as many species of other genera will almost certainly be seen at the same time.

Habitat. Cortinarii are essentially fungi of the woods, comparatively few being found out in the open. Many species are only found in the vicinity of one kind of tree, thus some are typical of coniferous or deciduous woods in general, others of beech, oak, birch, alder, pine, fir, larch, etc., in particular. Some—particularly the *Scauri* group of *Phlegmacium*—are characteristic of chalk soil, others—particularly the subgenus *Telamonia*—of sandy, heathy or acid soils. Some are known to be mycorrhizal, but our knowledge of this subject is as yet very incomplete.

World Distribution. The greatest number of species has so far been found in the Temperate Zones of both Europe and North America and especially in hilly or mountainous districts where this may be the dominant agaric genus. They have been incompletely studied but appear less numerous in species in the Southern Hemisphere and very few species are as yet recorded from the Tropics.

Edibility. No species are known to be truly poisonous and many species are known to be edible, but many are too small or too scarce, especially some of the larger species, to be of great value, and many have unpleasant tastes of various kinds so that the genus is not of very great importance from this point of view. A few of the larger Phlegmacia are however regarded as very good to eat on the continent and are indicated as such in the tabular notes.

Recognised Species. Elias Fries was the first person really to tackle *Cortinarius* and laid very solid foundations for its study, especially in *Monographia Hymenomycetum Sueciae* (1863)—which no person studying *Cortinarius* critically can afford to ignore—and his six subgenera have been maintained by many authors up to the present day. Ricken in *Die Blätterpilze* (1915) raised these subgenera to generic rank and has had some followers in recent times, as for instance Moser in Austria, who, however, has joined *Telamonia* to *Hydrocybe*. Although there may at first sight appear to be considerable difference between a large *Phlegmacium* and a small *Hydrocybe* these agarics are quite a homogeneous group and there would seem to be less reason to split *Cortinarius* than some of the other genera of brown-spored agarics, and it is proposed to keep the genus as such in this work. Any modifications to the Friesian concept of the subgenera will be given in the notes at the beginning of each part. Valuable contributions to our knowledge of *Cortinarius* since Fries have been made by Cooke in this country: Ricken, Bresadola, Lange and Konrad & Maublanc on the continent: Kauffman in North America: and in more recent times by Henry in France, Moser in Austria and A. H. Smith in North America. Fries took particular care over his descriptions but in the absence of microscopical details these have not always proved sufficient and there have been many cases of different authors using one Friesian name for two or more species. As a result of this there is a considerable amount of nomenclatural confusion and many new names have been or will be necessary. Henry and Moser have made a start in this process and have also described numbers of new species, some of which will be found in this paper, either in the tabular notes or in the case of some of those not yet recorded for Britain in the key only. Some taxonomic problems are discussed in the notes in the index.

British Species. Many of the British species were well illustrated in Cooke's invaluable series of coloured plates, although often without accurate microscopical details, and some species are included in the British list solely on the evidence of these plates. Although earlier workers of the present century added a few names, no critical review of British species was made until the publication in 1948 of the *Revised list of British Agarics and Boleti* by Pearson and Dennis. In the making of this list many of the doubtful or unauthentically recorded species were weeded out but very few new names were added and the majority of species left were Friesian species. Some of the names in this list have however been found to be collective and allowance has been made for this where there is no evidence as to the proper identity of previous British collections. Pearson recorded a few more in *New Records and Observations*, V (1952), but left many others in his notes either named but not recorded or given provisional names. I shall hope to include most of these in this paper, some as new species, but although many fresh names will be found this must not be regarded as a complete account of British species, the true number of which is probably over 350, but it is hoped that this may be one step further towards our knowledge of this rather formidable genus.

Summary of Generic Characters

Cortinarius Fr.—Cap small to large, rarely very large, viscid or dry, smooth or innately-silky or -fibrillose or with distinct scales, hygrophanous or not, typically convex then expanded, often umbonate, colours various; gills typically adnate, often emarginate, sometimes with tooth or almost decurrent, of very varied colours when young but often becoming more or less deep rusty and powdered with spores when old; stem slender or robust, equal or ventricose to clavate or marginately bulbous, or attenuated downwards; flesh fibrillose but sometimes hard and compact; taste mild or bitter, smell often characteristic; spores subglobose, ovate, elliptic, pruniform, amygdaliform, limoniform or fusiform, typically rough but sometimes almost smooth, ochraceous-rusty to deep rusty in the mass, rusty to pale yellowish *sub micr.*; basidia 4-spored, very rarely 2-spored; gill-edge fertile, or sterile with cystidia, facial cystidia very rarely present; stem with a cortina most commonly attached to apex more rarely to base, often also visible on the edge of the cap, later often dusted with rusty spores; sometimes a second outer veil is also present (viscid in the subgenus *Myxacium*) fragments of which may entirely cover the lower part of the stem or form one or more well-marked ring-zones or leave volva-like remains at the base or be present on the cap; always growing on the ground mostly under trees less commonly in the open; often in troops or subcaespitose.

Characters of Friesian Subgenera.

I. *Myxacium* Fr.—cap and stem viscid from glutinous general veil.
II. *Phlegmacium* Fr.—cap viscid, stem dry with arachnoid cortina.
III. *Inoloma* Fr.—cap dry, not hygrophanous, at first floccose, fibrillose, velvety or silky, then becoming somewhat smooth; typically with robust, clavate or bulbous stem and flesh thick at disc.
IV. *Dermocybe* Fr.—cap dry, not hygrophanous, silky or velvety floccose then smooth: typically with more slender, equal or attenuated stem and cap thinly and equally fleshy.
V. *Telamonia* Fr.—Cap dry, hygrophanous, smooth or with superficial fibrils or fragments of veil; stem with outer general veil forming one or more ring-zones or peronate scales as well as cortina.
VI. *Hydrocybe* Fr.—Cap dry, hygrophanous, smooth or with white superficial fibrils; stem without second outer veil, cortina rarely forming an arachnoid ring.

(A key to the subgenera will be found preceding the key to the species of *Myxacium* and *Phlegmacium*.)

Part I.—Myxacium and Phlegmacium.

Classification.—The classification I have used is based largely on the work of Henry and Moser, both of whom have given special attention to *Phlegmacium*. The species are grouped for convenience in sections which are often artificial or tentative, sectional names being in most cases derived from the species most typical of that section. There is no attempt at a natural classification, since I feel our knowledge of the species is as yet much too incomplete for this. *Myxacium* is divided up into three fairly well-marked sections partly based on Friesian lines, but separating out the bitter-tasting species and including in this section three species placed in *Phlegmacium* by Fries and one from *Dermocybe*, all first transferred by Lange. There are probably a few other uncommon species yet to be worked out, but *Myxacium* does not present the same taxonomic problems as *Phlegmacium*, except in the *elatior* group. *Phlegmacium* is divided primarily into two groups along Friesian lines, but combining *Cliduchi* and *Elastici* into one group, since their division solely on whether the stem is equal or clavate is not very satisfactory nor necessary. In the *Scauri* the colour of the young gill is used for further subdivision but I have combined the yellowish-gilled species (*Xanthophylli* Henry) with the greenish-gilled species (*Chlorophylli* Henry) into one group (*Xanthophylli* Henry em.) since I find the dividing line between these two groups sometimes difficult to determine. The *Cliduchi-Elastici* are on the whole not so well known as the *Scauri*, especially the sections *Claricolores* and *Sebacei* which need more study in the field, but there are still many problems to solve in both groups. The descriptions are based wherever possible on notes on British material studied since 1946 either by the late A. A. Pearson or myself. In order to make these descriptions as short as possible characters common to all or nearly all the species in one subgenus are not repeated for each species but will be found in the classification summary preceding the tabular notes.

Habitat.—Myxacia and Phlegmacia are found in all types of woods but very rarely in the open, although some species may especially be found along the edges of woods. Woods on chalk soil may be rich hunting grounds for *Scauri* (if conditions are right !): in some ways these plants are to the agaricologist what orchids are to the phanerogamist, some of them are just as elusive and difficult to find and some are also amongst the most attractive of toadstools.

Characters of particular importance in studying these sub-genera are as follows:

Cap. The colour of the young cap is always of importance and many species undergo varied and often striking colour changes as they mature. It is therefore important and sometimes essential to have at least one young specimen so that the complete range of colour change can be seen. All species are more or less viscid at first, some, especially Myxacia, very much so; evidence of previous viscidity in a dry specimen can often be inferred from leaves or other debris which may have stuck to the young cap. A number of species are innately-fibrillose, i.e. they appear streaky, having darker often radially arranged fibrils in the surface of the cap. Only a few are truly scaly but some have remnants of the cortina or veil attached to the cap which should be carefully looked for. Shape is of less importance in these subgenera; most are convex, then expanded or slightly depressed, comparatively few are conical or umbonate.

GILLS. The colour of the young gill is an essential character and it is often impossible to name a specimen unless this character is known; many species show a series of colour changes as they mature often different to those of the cap. Most species have adnate more or less emarginate, linear or slightly ventricose gills so that shape is not so important as a diagnostic character. The edge of the gill is often strikingly uneven or denticulate but this character may vary with age and too much stress should not be laid on it. Sterile specimens are very rare but are occasionally met, e.g. of *calochrous*, when the gills appear very pure bright violet.

STEM. Shape is of considerable importance in the stem. The *Scauri* differ from almost all other agarics in having a more or less pronounced marginate bulb whilst in the *Cliduchi-Elastici* the stem is clavate or with less conspicuous bulb or ventricose or in comparatively few cases equal. Colour is perhaps less important, but again colour changes may take place (generally a darkening with age). The colour of the cortina and its abundance or otherwise should be noted and some species have in addition fragments of the general veil adhering to the lower part of the stem or bulb or elsewhere, in some Myxacia these are viscid at first and give the stem a varnished appearance when dry. Most species have a fibrillose stem which is usually solid, but this character has not much diagnostic value.

FLESH. Again colour is of considerable importance and changes may take place with age or in a few cases when bruised or exposed to air. In some Phlegmacia the flesh is very hard and firm at least when young; (see also Chemical Reactions).

TASTE AND SMELL. Some few species have all parts bitter, in others only the cap cuticle or the gluten covering it may be so. Smells are more varied and difficult to deal with, but a sensitive and discriminating nose is a very useful asset when studying Phlegmacia.

SPORES. Although it is often possible to determine Myxacia and Phlegmacia in the field, especially after a little experience, it is always advisable and often essential to examine spores for size and shape. A lot of time can be wasted if this is not done when examining the more critical species. These data should always be obtained from a spore print if possible, since examination of a portion of gill is always liable to show a proportion of abnormally sized or immature spores. All that it is necessary to do is to place the cap or a portion of it over a slide for 15 minutes or more and then examine the spores on the slide in water. If spores from an older and therefore dry spore print are examined, strong ammonia is a useful medium. These characters often show remarkably little variation in one collection, but specimens of one species from different localities may show more variation, although this is often within quite small limits. Examples of all shapes from subglobose to elliptic, amygdaliform or limoniform can be found (see figs. 10–17). A length of 10μ is often a useful point at which to divide spores into ' large ' and ' small ' categories. Degree of roughness and the colour of the spore print should also be noted but enough is not yet known about these characters to be sure of their diagnostic value. There are many cases of macroscopically similar species having been confused in the past because the spores were not examined.

CYSTIDIA. ' True facial cystidia are only present in one species described in this part (*subtortus*) and indeed are very rare in the whole genus, but a number of species have sterile cells (sometimes called cystidia) on the gill edge, the shape and size (especially width) of which may be useful for species determination, although their shape may not be constant. Many species have the gill edge fertile.

OTHER CHARACTERS. It is useful to note the width and shape of the hyphae of the cortina and cap surface, but from what little is known of these characters they do not appear to be particularly important diagnostic characters in these subgenera.

CHEMICAL REACTIONS. Various reagents have been used, both on the flesh and the cap cuticle. Perhaps the most useful, especially for Phlegmacia, is strong NaOH (30-40%) (KOH usually gives similar results). Others for use in special cases are $AgNO_3$ and strong ammonia. Among reagents used extensively on the continent the following may be mentioned—phenolaniline, tincture of Guaiacum and $FeSO_4$, which are of general use, and a special reagent called Tl-4 by Henry (a mixture of thallium oxide, HCl, HNO_3 and sodium bicarbonate which gives a characteristic lilac or violet colour on the flesh with the section *Purpurascentes* and also on *scaurus* and *subvirentophyllus*). Many species have not yet been properly tested for their chemical reactions.

Figures of various species of *Cortinarius* belonging to the sub-genera *Myxacium* and *Phlegmacium* illustrating shapes of cap, gills and stem (×1) and characters of spores (×1800).

1. *C. caroviolaceus*, expanded-convex cap and large wide marginate bulb. 2. *C. subturbinatus* (section), emarginate gills, incurved margin of cap and oblique marginate bulb. 3. *C. pluvius* (section), broadly umbonate cap and ventricose subdecurrent gills. 4. *C. croceocaeruleus*, sl. depressed cap and ventricose pointed stem. 5. *C. calochrous*, flattened marginate bulb. 6. *C. amoenolens*, patches of general veil adhering to cortina on stem and edge of rounded marginate bulb. 7. *C. olidus*, cortinal ring-zone and patches of veil at base of stem. 8. *C. subpurpurascens*, immarginate bulb. 9. *C. parherpeticus*, narrowly marginate bulb. 10. *C. livido-ochraceus*, elliptic punctate spore. 11. *C. emollitus*, elliptic-amygdaliform smooth spore. 12. *C. crystallinus*, subglobose or broadly ovate punctate spore (sometimes 1-guttulate). 13. *C. turbinatus*, ovoid-pruniform rough spore. 14. *C. subturbinatus*, amygdaliform rough spore. 15. *C. mucosus*, elongate sublimoniform rough spore. 16. *C. splendens*, sublimoniform rough spore. 17. *C. elegantissimus*, limoniform coarsely warted spore.

Conclusion. One of the difficulties in studying this genus is the great importance of colour, and good illustrations are of particular value. Quotations are given from standard works in the notes in the index, but there are still not a few species for which there is no authentic published plate. It is impossible to do more than give approximate indications of the frequency of occurrence of the species in Britain, since past lists are liable to be inaccurate and insufficient critical work has been done on these fungi. Out of 102 species included in the notes, 80 are British with reasonable certainty, 12 need confirmation and 10 are not British but are included because they may have been recorded under another name. A few additional European species have been included in the key only, since they may well occur in this country. Some 20 species which I hope to record more fully at a later date are here recorded for Britain for the first time. These are indicated in the Index and Notes by a dagger (†) preceding the species name. I should be very glad to hear of any authentic additional records or to help with puzzling discoveries (and there are certain to be some), which should be accompanied by a description (and spore print if possible) even if fresh specimens are sent, since Cortinarii do not keep their colours long after being picked. Communications should be addressed to ' Department of Botany, The University, Reading, Berks.' It is hoped that the key will assist in more accurate determination of species and will thereby increase our knowledge of these rather attractive toadstools, but it must not be expected that the key will enable all collections to be named. May I once again emphasise the importance of examining young and fresh material and checking field work by spore measurement whenever possible. Finally I should like to record my very grateful thanks to Dr. R. W. G. Dennis of The Royal Botanic Gardens, Kew, who has not only allowed me to have very free access to specimens and papers in the Herbarium, but has also given me much very valuable and helpful advice.

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Some few abbreviations have been used in the key and tabular notes of which the following is a list:

conif. coniferous or conifers.	f. fairly.
cvx. convex.	occ. occasionally.
decid. deciduous.	sl. slightly.
esp. especially.	sub.micr. under the microscope.
exp. expanded.	v. very.

An asterisk (*) preceding the species name denotes a species not yet recorded for Britain and a dagger (†) a new record for Britain.

Key to the Friesian subgenera of *Cortinarius*

1. Cap and sometimes also stem viscid, at least when young . . . 2
1. Cap and stem dry . . . 3
   2. Cap and stem viscid . . . I. *Myxacium*
   2. Cap viscid, stem dry . . . II. *Phlegmacium*
3. Cap not hygrophanous . . . 4
3. Cap hygrophanous . . . 5
   4. Cap innately scaly, fibrillose or silky, flesh rather thick; stem typically stout, ± clavato-bulbous . III. *Inoloma*
   4. Cap innately silky at first (rarely velvety-scaly), generally becoming smooth, flesh thin; stem typically slender, ± equal or attenuated upwards . . . IV. *Dermocybe*
5. Stem peronate or annulate from the remains of the veil in addition to the cortina . . . V. *Telamonia*
5. Stem with cortina ± fugacious, more rarely leaving traces near base, without veil in addition . . . VI. *Hydrocybe*

Key to the species *Myxacium* and *Phlegmacium*

1. Cap and stem viscid, at least at first; flesh soon soft—(I. Myxacium) . 2
1. Cap viscid at least at first, stem dry; flesh firm or soft (II Phlegmacium) 21

I. Myxacium

2. Taste immediately bitter, at least in cap cuticle; spores less than 10μ long, punctate to almost smooth, if subglobose, smaller, $4\frac{1}{2}$–$6/3\frac{1}{2}$–$4\frac{1}{2}\mu$ . . . 3
2. Taste mild (rarely with sl. bitter after taste); spores rough to very rough, mostly over 10μ long, or subglobose, $6\frac{1}{2}$–$10/6$–8μ . . 9
3. Cap pale to deep violaceous at first, soon discolouring pale ochraceous; (stem ventricose-fusiform ± pointed at base; under beech) *croceo-caeruleus* (14)
3. Cap never violaceous . . . 4
   4. Cap bright orange-yellow or golden-tawny with paler non-striate margin; cap cuticle and flesh bitter; stem white, ventricose-fusiform or clavate, ± pointed at base; spores elliptic- to ovate-pruniform, $6\frac{1}{2}$–$8/4\frac{1}{2}$–$5\frac{1}{2}\mu$ . . . *vibratilis* (15)
   4. Cap paler in colour, white to ochraceous or buff, or if tinged tawny or orange, cap margin striate or cap cuticle only bitter or stem coloured slightly or spores different shape . . . 5
5. Flesh mild, cap cuticle bitter; stem firm; flesh and gills becoming rather deep coloured (yellowish or ochraceous-buff) . . *causticus* (16)

5. Both flesh and cap cuticle bitter; stem often soon soft (except *ochroleucus* (20)); flesh on the whole paler 6
   6. Cap and stem nearly always dry; stem firm and tough; cap with white silky sheen; (spores elliptic-pruniform, 7–8/4–5μ; esp. under oaks) . . . . . *ochroleucus* (20)
   6. Cap and stem viscid at least when young; stem soon ± soft; cap with or without white silky sheen 7
7. Cap small, 12–30(40) mm., disc often tinged tawny, margin striate when moist; gills rather broad and distant, very pale; stem equal or sl. swollen below, often flexuose, very soft and slender, often remaining viscid; (spores elliptic or sl. amygdaliform, 6½–8/4–5μ) *pluvius* (17)
7. Cap medium to large, rarely small, (15)30–100 mm., paler, margin never striate; gills often narrower and more crowded or darker; stem equal to fusiform with ± pointed base, often firmer at first and more robust, soon dry 8
   8. Spores subglobose to broadly ovate, 4½–6/3½–4½μ; stem often fusiform or attenuated downwards; gills often narrowly adnate and narrow . . . . . *cristallinus* (19)
   8. Spores elliptic-amygdaliform, 7–9/4–5μ; stem equal or sl. swollen near ± pointed base; gills often emarginato-adnate and ± ventricose . . . . . *emollitus* (18)
9. Spores subglobose or broadly ovate, 6½–10/6–8μ; viscid veil on stem smooth making the stem look varnished when dry . . . 10
9. Spores ± amygdaliform to limoniform, more than 10μ long (rarely less than 10μ and then elliptic); viscid veil on stem often floccose . . 13
   10. Cap bright blue or violaceous at first; (stem ventricose or clavate-acuminate, blue at first) . . . . . *salor* (12)
   10. Cap without distinct blue or violaceous tints at first (sometimes with sl. violaceous flush in *epipoleus* (13)) 11
11. Gills deep blue or blue violaceous at first; common species; (cap ± yellow sometimes tinged tawny; stem ± clavate, white, often smeared with yellowish veil below cortinal zone) . . *delibutus* (10)
11. Gills not blue or violaceous at first; uncommon species . . . 12
   12. Cap pale- to golden-yellow; gills pinkish- or ochraceous-clay, then buff; stem clavate or swollen at base, white, or tinged ochraceous below; (resembling a slender *delibutus*, but without blue tints) . . . . . *illibatus* (11)
   12. Cap ochraceous-grey with olive-violaceous flush then dingy white with livid ochre centre; gills clay at first; stem clavate or fusiform, ± pointed at base. . . . . *epipoleus* (13)
13. Gill edge with conspicuous balloon-shaped, pyriform or clavate cystidia, 10–30μ wide; cap with markedly striate or wrinkled margin or smooth; spores amygdaliform to limoniform 14
13. Gill edge without such conspicuous cystidia, but sterile ± clavate cells about 8–12μ wide resembling basidia may be present; cap with smooth or more rarely sl. striate or grooved margin; spores elliptic to limoniform 17
   14. Gills violaceous at first, then violaceous rusty or purplish-umber, always rather dark coloured, often interveined and veined on the sides; cap remaining conical or conico-exp. for a long time, margin strongly wrinkled-striate; stem often rather long and robust, ± ventricose . . . . . *elatior* (6)
   14. Gills never violaceous, paler in colour, ochraceous-clay to rusty- buff, rarely interveined but sometimes veined on the sides; cap often expanding, if ± conical margin smooth or sl. wrinkled-striate or colours paler; stem slender or robust, equal or ventricose . 15
15. Cap pale to deep yellowish or ochraceous, often with tawny tinge at disc, margin smooth or almost so; stem rather long, almost pure white, sometimes with sl. violaceous tinge . . . *pseudosalor* (8)
15. Cap never so brightly coloured, at least disc not ochraceous but livid or olivaceous, margin smooth or not; stem short or long, ± violaceous or bluish at least in part 16

16. Stem rather slender and soft; cap often small, 18–50 mm., at first covered with blue-violaceous gluten then greyish- or livid-brown with smooth margin; gills subdistant, ± ventricose *stillatitius* (9)
16. Stem often stouter and firmer; cap generally larger, 30–110 mm., livid- or olive-brown, never violaceous, margin often striate or grooved; gills f. crowded, not or sl. ventricose *mucifluus* (7)
17. Stem with conspicuous whitish or pale bluish scales on a darker (tawny, chestnut or bay-brown) background 18
17. Stem without pale scales on a darker background, white, violaceous or tinged ochraceous 19
18. Cap bright coloured, ± tawny; spores 12–15/7–8μ or larger; stem apex and gills sometimes bluish at first; typically under conifers, also under beech . . . . *collinitus* (1)
18. Cap duller coloured, clay- or bay-brown but sometimes with tawny tinge at margin; spores 10–13/6–7μ; no blue tints anywhere; under deciduous trees, generally in wet places . *trivialis* (2)
19. Cap becoming greyish with silky sheen at least in part; stem violaceous in part; spores elliptic, $7\frac{1}{2}$–$9/4\frac{1}{2}$–5μ . . . *livido-ochraceus* (4)
19. Cap never greyish with silky sheen; stem not violaceous; spores elliptic-amygdaliform to sublimoniform, $10\frac{1}{2}$–$16/5\frac{1}{2}$–7μ 20
20. Cap ± chestnut, then yellow-brown esp. at margin; gills not violaceous at first; stem equal, white; spores elongate sublimoniform, 13–16/6–7μ . . . . *mucosus* (3)
20. Cap egg- or orange-yellow; gills pale violaceous at first; stem ± clavate, whitish sometimes tinged yellowish in part; spores elliptic-amygdaliform, $10\frac{1}{2}$–$11/5\frac{1}{2}$–$6\frac{3}{4}$$\mu$ . . *Metrodi* (5)

II. PHLEGMACIUM.

21. Gills and flesh discolouring ± deep violet or purplish when bruised or rubbed; (spores 8–11/5–$6\frac{1}{2}$ μ) 22
21. Not so 24
22. Gills at first pale to pallid-buff (rarely with sl. lilac tinge); cap yellow-buff to pallid date-brown, not violet *subpurpurascens* (54)
22. Gills at first deep violet; cap pale yellowish to dark umber, sometimes ± violaceous esp. near margin 23
23. Cap tawny-buff to dark umber, margin often deep violet at first; stem with variable bulb (immarginate to ± distinctly marginate); often robust . . . . . *purpurascens* (53)
23. Cap pale yellowish to pale date-brown, sometimes with sl. violaceous tinge, margin never deep violet; stem less robust, equal or sl. clavate; small to medium, rarely larger . . . . *porphyropus* (55)
24. Stem with well-marked wide marginate (Fig. 1) or rounded marginate (Fig. 6) bulb, more rarely variable and then sometimes immarginately bulbous . . . . . (Scauri) 25
24. Stem not marginately bulbous, equal, clavate or irregularly bulbous . . . . . (Cliduchi-Elastici) 84

A. Scauri. (See also § 22.)

25. Young gills white, whitish or clay . . . . (Leucophylli) 26
25. Young gills lilac, bluish or violaceous . . . (Cyanophylli) 41
25. Young gills yellow to olive or greenish . . (Xanthophylli) 66

a. Leucophylli

26. Smell strong and persistent, fragrant, of orange blossom; (cap yellowish-buff with yellower margin; spores amygdaliform, 9–10/5–6μ). . . . . *evosmus* (30)
26. If smell strong, not of orange blossom 27
27. Cap at first white, whitish, clay or pale creamy-ochre 28
27. Cap at first pale yellow to chestnut 32
28. Stem with conspicuous wide marginate bulb; flesh sometimes with bluish tinge 29

28. Stem with ± rounded or narrow free-edged marginate bulb, rarely almost immarginate; flesh never bluish 30
29. Spores amygdaliform to sublimoniform, 10–12/6–6½μ; cap white at first discolouring to ochraceous-buff; flesh of stem apex with fugacious bluish tinge; generally robust . . . *caroviolaceus* (34)
29. Spores elliptic-pruniform, 7¼–9/4–5μ; cap whitish or pale clay to pale buff; flesh not bluish at stem apex; generally less robust *rapaceus* (33)
30. Spores elliptic-amygdaliform, 10–11/5½–6μ; cap almost unicolorous pale creamy-ochre; (stem with f. conspicuous but rounded marginate bulb; taste mild) . . **ochropallidus* (23)
30. Spores elliptic-amygdaliform to sublimoniform, less than 10μ long; cap pale clay to ochraceous or buff, disc often darker . . 31
31. Cap pale clay to pale ochraceous or buff; cap cuticle often bitter; stem bulb narrow marginate to rounded marginate, often inconspicuous; spores elliptic-amygdaliform, 8–10/4½–5½μ . *amarescens* (25)
31. Cap creamy-ochre, often tinged tawny-ochre at disc; taste mild; stem bulb f. conspicuous, rounded marginate; spores amygdaliform to sublimoniform, 6–7½/4–4½μ; (cap 30–50 mm.; stem 40–60/5–8 mm. (8–12 mm. in bulb); mixed woods) . . . **(minus* Vel.)
32. Cap unicolorous tawny-reddish at first, then paler at disc; spores ± elliptic 8½–10/4½–5½μ; (stem with conspicuous ± rounded marginate bulb, becoming tinged with colour of cap) *allutus* (24)
32. Cap from yellow to chestnut at first, if with a tendency to be tawny-reddish spores more than 10μ long or differently shaped 33
33. Cap at first pale primrose or chrome-yellow, then deeper yellow with disc generally tinged ochraceous; gills for a long time white; stem with ± conspicuous wide marginate bulb; flesh soon tinged ochraceous-yellow, very firm at first; spores elliptic-amygdaliform 8–10(11)/5–6μ *Langei* (29)
33. If cap pure yellow at first characters otherwise 34
34. Stem with variable sharply marginate, rounded marginate or almost immarginate never wide marginate bulb; cap yellow-ochraceous or buff generally with yellower margin; flesh soon soft and ± yellowish 35
34. Stem with wide marginate bulb, or if less marked, then cap with marked orange tints, or stem with violaceous veil when young; if cap yellowish or ochraceous, flesh firmer and often white . 36
35. Spores ± limoniform, 10–11/5½–6½μ; smell often strong, of apples or acid . . . . . *multiformis* (21)
35. Spores elliptic to elliptic-amygdaliform, 8–9/4½–5μ; smell faint or strong of honey . . . . . *melliolens* (22)
36. Spores subglobose to ovate-pruniform, 8–12/6½–8μ; cap ochraceous or rusty, margin often with olivaceous tinge *turbinatus* (31)
36. Spores amygdaliform to limoniform, rarely elliptic fusiform, sizes various; cap rarely with olivaceous tints 37
37. Spores broadly amygdaliform, punctate-rough, 7–8/4–5μ; (cap 40–70 mm., bright orange-yellow to orange-brown, sometimes with yellower margin; stem 30–60/13–25 mm. (20–30 mm. in bulb), with distinct or almost immarginate bulb; flesh pale yellowish-white, very hard; in fir and mixed woods) . . . **(aurantiacus* Moser)
37. Spores elliptic fusiform, almost smooth, 7½–9/3½–4μ; (cap pale ochraceous to brick-red, innately fibrillose; stem white, discolouring when touched; flesh white; under conifers) **(roseo-limbatus* Secr. var *marginatus* Bres.)
37. Spores more than 9μ long, ± rough; (stem bulb generally well marked) 38
38. Stem with remains of violaceous veil at base at least when young, sometimes sl. bluish or glaucous at apex; (cap yellowish-ochraceous or buff with innate reddish-brown fibrils, margin sometimes reddish- or tawny-brown; under pines) **pinetorum* (32)
38. Stem never with violaceous veil or bluish tints 39

39. Cap chestnut or date-brown-tawny to smoky-brown, very viscid, smooth; spores amygdaliform to ± limoniform, 12–15/7–9μ; in coniferous woods . . . . . *napus* (26)

39. Cap paler, either soon dry and flocculose, or less viscid and with scattered whitish patches of veil at first; spores smaller 40

40. Cap rusty or pallid clay-brown often with darker spots, soon dry, opaque and flocculose; spores sublimoniform to almost fusiform, 9–12/4–5(6)μ; mountainous conifer woods *corrosus* (27)

40. Cap ochraceous-, tawny- or rusty-buff, at first with whitish patches of veil and yellowish margin; spores ± limoniform, 10–14/6–7½μ; beech woods, often on chalk . *subturbinatus* (28)

(b) Cyanophylli.

41. Cap bluish, lilac or violaceous, at least in part or when young . . 42

41. Cap without bluish or violaceous tints 51

42. Smell strong, of orange blossom or of meal 43

42. If smell strong, not of orange blossom or meal 44

43. Smell strong, persistent, fragrant, of orange blossom; cap 50–80 mm., pale ochraceous or milky-coffee with lilac margin; stem 90–100/20 mm. (30 mm. in bulb), with wide marginate bulb, lilac above, pale yellowish below; flesh whitish-lilac under the cuticle, pale yellowish elsewhere; spores ± limoniform, 12–13½(15)/6½–7(8)μ; under beeches *(*suaveolens* Bataille & Joachim)

43. Smell strong of meal, esp. when cut; cap 40–60 mm., grey-blue, ochraceous, olivaceous or clay-brown; stem 40–100/5–13 mm. (12–20 mm. in bulb), with wide marginate to almost immarginate bulb, blue-violaceous above, paler or yellowish below; flesh whitish in cap, violaceous in stem apex, ochraceous in bulb; spores ± limoniform, 9½–12/4¾–7μ; in deciduous or coniferous woods, esp. beech on chalk *(*Dionysae* Hry.)

44. Flesh bitterish to very bitter, + NaOH rose-red; (gill edge with ± conspicuous sometimes characteristically shaped sterile cells; spores amygdaliform to sublimoniform, 12–14/6–6½μ) . 45

44. Flesh mild, + NaOH never rose-red; (cap cuticle sometimes bitter) 46

45. Both flesh and cap cuticle very bitter; sterile cells on gill edge cylindric clavate to irregular or pistol-shaped; generally robust; under conifers *dibaphus* (40)

45. Flesh bitterish, cap cuticle mild; sterile cells cylindric clavate or forked at apex; often less robust; under deciduous trees *nemorosus* (41)

46 Cap cuticle bitterish, + NaOH bright red to purplish-red (cap pale to deep blue-violaceous discolouring ochraceous or buff from disc outwards, not innately fibrillose; spores amygdaliform to sublimoniform, 10–12/5½–6½μ) . . *sodagnitus* (39)

46. Cap cuticle bitterish, + NaOH wine-red; (cap 40–60 mm., grey or bluish-grey becoming pale ochraceous from disc out, with darker innate fibrils; stem 60–70/15 mm., with oblique marginate bulb, pale violaceous above, yellowish below; flesh whitish in cap, dirty violaceous in stem, yellowish in bulb; smell faint, fruity; spores amygdaliform, 9–10/5–5½μ; under conifers) . . . . . *(*caesio-stramineus* Hry.)

46. Cap cuticle mild, + NaOH ± nil to brownish 47

47. Spores elliptic-amygdaliform, 8–10(11)/4–5μ; (entirely pale blue or greyish-blue at first, cap discolouring pale ochraceous from disc out, margin innately fibrillose; smell often strong, musty; under beech) *caesiocyaneus* (37)

47. Spores more than 10μ long 48

48. Cap grey-blue at first, then ± olivaceous at disc, finally tan, finely streaky or spotted; gills blue-violaceous, then smoky-blue, finally clay-cinnamon; spores amygdaliform to subfusiform, 11–16/6½–7½μ; (cap 50–80 mm.; stem 40–50/20 mm., ± violaceous, paler below; flesh pale bluish, yellowish below; inodorous; mountainous conifer woods) *(*herpeticus* Fr. sensu Hry.)

48. No olive tints in cap; gills never smoky-blue; spores ± amygdaliform, 10–12/4½–7μ 49
49. Gills ± deep blue-violaceous at first, finally clay- or rusty-brown; cap dingy violet or grey-blue-violaceous at first, not innately fibrillose; smell faint or stronger when old, unpleasant . *caerulescens* (35)
49. Gills pale bluish, lilac or grey-bluish at first, finally ochraceous or milky coffee; cap pale to deeper blue-violaceous at first, innately fibrillose; smell faint, or strong ± fruity 50
50. Cap deep violet at first, becoming paler with ± ochraceous disc; stem distinctly blue-violaceous when young; smell none or faint of radish; (if cap and stem somewhat deeper violet and smell often strong fruity—var.* *Juranus* Hry (36a)) *Mairei* (36)
50. Cap greyish-white or greyish-violet then ± ochraceous; stem at most greyish-blue when young; smell none or faint fruity **Boudieri* (38)
51. Smell ± strong of meal; taste bitterish; (cap 80–120 mm., whitish, then pale ochraceous; gills pale lilac at first; stem 50–70/10–20 mm. (up to 40 mm. in bulb), white; flesh white; spores amygdaliform 10–12/6–7μ; mountainous conifer woods) . *(*aleuriosmus* Maire)
51. Smell ± strong of meal; taste mild; (cap ochraceous or clay-brown; see §43, *Dionysae*).
51. Smell none or not mealy; taste generally mild, less commonly cap cuticle bitter, or flesh with sl. bitter after taste 52
52. Spores less than 9μ long; young cap ochraceous to buff or tawny, often with greenish or olive tints esp. near margin; flesh in bulb rather deep yellow or ochraceous 53
52. Spores more than 9μ long; young cap rarely with greenish or olive tints; flesh in bulb white to paler yellowish or ochraceous . 55
53. Cap olive-brown then hazelnut or dirty buff; gills at first grey-blue then sooty-blue; stem with conspicuous wide marginate bulb *herpeticus* (51)
53. Cap paler or brighter coloured; gills pale bluish-lilac to grey-blue at first, never sooty-blue; stem bulb variable, from wide marginate to almost immarginate 54
54. Robust; cap pale tawny or buff often tinged olive with greenish margin, then unicolorous tawny-buff and conspicuously innately fibrillose; stem bulb from wide to barely marginate; typically under conifers, also under deciduous trees *glaucopus* (50)
54. More slender; cap pale ochraceous with greenish margin then rusty-buff with olivaceous margin, not so conspicuously innately fibrillose; stem with narrow marginate bulb; under beech on chalk . . . . . *parherpeticus* (52)
55. Cap whitish or pale yellowish at first 56
55. Cap ± deep yellow or ochraceous to orange-brown or chestnut at first . 59
56. Cap cuticle ± bitter, flesh mild; stem with yellowish patches of veil at base and on ± rounded marginate bulb; smell at first faint but distinct, fruity (of plums); spores ± limoniform, very rough (10–13/6–7μ) . . . . *amoenolens* (49)
56. Cap cuticle and flesh mild; smell none or faint, of radish; stem without patches of yellowish veil at base; spores ± amygdaliform, rough 57
57. Cap whitish, then pale buff; stem white with abundant pale bluish or lilac cortina and conspicuous marginate bulb, often bluish on the edge; (cap 70–100 mm.; gills pale clay-bluish or lilac at first; stem 60–70/15–20 mm. (30–35 mm. in bulb); inodorous; spores 10-11/5–6μ; under deciduous trees) . . . . *(*Rickenianus* Maire)
57. Cap pale straw-yellow or ochraceous at first; stem blue-violaceous at first, soon whitish, discolouring yellowish or ochraceous from the base up, bulb not so conspicuously wide marginate 58
58. Slender with ± regular and orbicular soon cvx.-exp. cap; stem with small but distinct marginate bulb, pale lilac then whitish or ochraceous at base; cortina whitish, rather sparse; spores 9–10½/5–6μ . . . . . *parvus* (43)

58. More robust with less regular cap, not expanding so soon; stem with variable ± rounded marginate to immarginate bulb, blue-violaceous discolouring yellowish or ochraceous from the base up; cortina abundant, blue-violaceous; spores 10–14/6–7μ *cyanopus* (48)

59. Cap chestnut or reddish-brown with olive-yellow margin; olive-yellow veil forming patches on stem and bulb; (cap 50–80 mm.; stem 50–70/12–15 mm. (up to 25 mm. in bulb), pale with violaceous tinge, bulb top-shaped; spores ± amygdaliform, 12–15/7–8μ; esp. in coniferous woods) . . . . . *(*subatkinsonianus* Hry.)

59. Cap paler at first or spores smaller, margin not olive tinged (but see §70, *montanus*, which has gills rarely grey-violaceous at first); golden- or pale-yellow veil present or absent; spores smaller 60

60. Cap orange- to reddish-brown at first; stem often short, with inconspicuous marginate or almost non-existent bulb, often flattened at base; (cortina pale ochraceous to yellowish; spores 10–12/6–6½μ) . . . . . *pansa* (47)

60. Cap yellow or ochraceous at first; stem short or long, often with ± conspicuous wide marginate bulb 61

61. Bulb with golden-yellow or yellowish patches of veil; cap bright yellow then ochraceous or tawny-buff at disc 62

61. Bulb without patches of veil (sometimes white-tomentose beneath); cap pale to bright yellow, ochraceous or buff 63

62. Bulb with golden-yellow veil; flesh pale violaceous esp. under cap cuticle and in stem apex, then whitish, ± yellowish in bulb; NaOH + cap cuticle immediately bright orange-red then blood-red, finally purplish-brown; often rather small; spores 11–13/6–6½μ . . . . *aureopulverulentus* (44)

62. Bulb with yellowish veil; flesh pale ochraceous-yellow; NaOH+cap cuticle variable, ± brick-red to reddish-brown; generally more robust; spores 9–11(12)/4½–5μ . . . . **arquatus* (45)

63. Stem blue-violaceous, at least at apex; generally rather small . . 64

63. Stem white or tinged yellowish or rusty, without blue tints externally; small to large 65

64. Cap pale ochraceous to yellowish then ± rusty in places; stem slender, pale violaceous then whitish or pale ochraceous below; flesh pale violaceous in stem, rather thin at disc *parvus* (43)

64. Cap ochraceous-buff with paler margin; stem rather stouter, apex pale violaceous when young, soon ochraceous-buff from base up; flesh white, sl. bluish in stem apex, tinged ochraceous in bulb, thicker at disc . . . . **subarquatus* (46)

65. Gills bright violet at first; flesh white or whitish, often yellowish under cap cuticle or in bulb, without blue tints; gill edge sterile with f. conspicuous ± clavate cells, 6–14/22μ wide . . *calochrous* (42)

65. Gills pale bluish or lilac at first; flesh white in cap and bulb, greyish-blue in stem; gill edge fertile; (cap 60–80 mm., tawny-yellow with yellower margin; stem 80/20 mm. (40 mm. in bulb), white or yellowish, cortina bluish-white; spores elliptic-amygdaliform, 10/5½μ; deciduous or mixed woods) . . . . . *(*Cookeianus* Hry.)

c. Xanthophylli

66. Blue or violaceous tints in cap, stem or flesh 67

66. Without blue or violaceous tints 71

67. Cap sulphur or lemon-yellow at first, discolouring rusty; gills pale olive-sulphur at first; stem greenish-yellow or sulphur discolouring ± rusty below; flesh rather deep azure-blue in centre of cap and stem apex (whitish when old) . . . . . *cedretorum* (56)

67. Not combining azure-blue flesh with yellow cap, gills and stem . . 68

68. Cap reddish-copper to purplish or lilac, sometimes yellowish in part; stem with wide marginate bulb, greyish-lilac to reddish or sulphur with reddish-purple apex 69

68. Cap from pale ochraceous to chocolate brown, umber, olive or greenish; stem with variable rarely wide-marginate often inconspicuous bulb, often bluish or greenish at apex and ochraceous or brownish below 70

69. Cap reddish-copper to reddish-purple; gills greenish-olive or lemon-yellow at first; stem greyish-lilac to ± reddish, rarely sl. yellowish; flesh lilac or violaceous under cuticle, ± reddish-purple in bulb, white or greenish-yellow elsewhere, + NaOH sulphur-yellow; spores 11-14/7-8μ *rufo-olivaceus* (57)

69. Cap purplish, then lilac and yellowish mixed; gills ± sulphur-yellow at first; stem sulphur-yellowish with narrow purplish-red zone at apex; flesh whitish, violaceous under cap cuticle, yellow at periphery of stem; spores 10$\frac{1}{2}$–11$\frac{1}{2}$/6–6$\frac{1}{2}\mu$ . . . *xanthophyllus* (58)

70. Cap olive- to date-brown with darker smoky-brown or chocolate generally spotted margin; gills olive-bistre to olive-cinnamon; spores 10–13/6–8μ; damp conifer woods or moorlands *scaurus* (59)

70. Cap pale ochraceous or buff with olive-yellow to chocolate or umber not spotted margin; gills typically olive-yellow at first, occ. pale grey-violaceous; spores 9–11/5$\frac{1}{2}$–6$\frac{1}{2}\mu$; in damp conifer woods; (cap 35–80 mm.; stem 40–70/10–20 mm., bluish or greenish above, brownish or purplish below; flesh pale dirty brownish, sometimes bluish in stem apex) *(*montanus* Kauff. ssp. *europaeus* Moser)

70. Cap ochraceous or buff with darker streaks and olive or greenish margin; gills dark greenish-olive then rusty-olive; spores 10–12/5–6$\frac{1}{2}\mu$; deciduous and coniferous woods; (cap 50–80 mm.; stem 60–80/10–15 mm., pale greenish with grey-bluish apex, becoming ± ochraceous below; flesh pale, greenish or bluish at stem apex) . . . *(*subvirentophyllus* Hry.)

71. Cap, gills and stem straw-, chrome- or golden-yellow to ochraceous, tawny or rusty, without distinct sulphur, lemon-yellow, olive or greenish tints (except sometimes gills becoming olivaceous when old) . . 72

71. Cap *or* gills *or* stem with some distinct sulphur, lemon-yellow, olive or greenish tints at least when young 76

72. Cap with distinct darker scales at least on disc 73

72. Cap smooth or innately fibrillose or with whitish scales from veil but without darker scales 74

73. Spores 8–12/5-6$\frac{1}{2}\mu$; stem golden-yellow to rusty-orange with white or pale yellow apex . . . . . *fulmineus* (62)

73. Spores 13–14/7–8μ or larger; stem yellow or golden-yellow tinged rusty in places, apex yellow . . . . *parafulmineus* (63)

74. Gills pale straw-yellow then pale cinnamon, sometimes tinged olivaceous when old; cap straw then ochraceous or buff with pale yellowish margin, sometimes with whitish scales from veil; (spores 11–12/6–7μ) . . . . . *lutescens* (64)

74. Gills pale or deep yellow then rusty-buff, -golden or -orange; cap golden-yellow to orange-tawny or darker, smooth or innately fibrillose 75

75. Cap with conspicuous darker innate fibrils; spores 9–12/6–7μ *fulgens* sensu Fries (60)

75. Cap smooth; spores 9–10/5–6μ . . . *fulgens* sensu Cooke (61)

76. Cap predominantly green, sometimes with olive tinge but without yellow tints; spores 10–12/5–7μ 77

76. Cap pale sulphur or lemon-yellow to reddish-copper, sometimes olivaceous but then also with yellow tints; spores 10–17/5–10μ 78

77. Cap dark- to olive-green with paler margin; gills, stem and flesh at first sulphur-yellow . . . . . *atrovirens* (73)

77. Cap olivaceous to grass-green, disc sometimes with sl. brownish tinge; gills and flesh never sulphur-yellow . . . *prasinus* (72)

78. Almost unicolorous sulphur- or lemon-yellow at first, except sometimes disc of cap may be olive-brown; mycelium at base of bulb sulphur or lemon-yellow; spores 9–11/5–6μ . . 79

78. Cap, gills and stem not unicolorous at first, or if almost so spores larger; mycelium at base of bulb white or whitish; spores 10–16/6–10μ 81

79. Entirely sulphur-yellow at first; disc of cap sometimes becoming tinged reddish-brown or with scattered reddish-brown scales; cap cuticle + NaOH deep red or red-brown or purplish-brown; typically rather small, less commonly large . . . . . *splendens* (65)

79. Unicolorous ± deep lemon-yellow, or pale lemon-yellow with olive-brown cap except for margin; cap cuticle + NaOH deep olive or olive-brown; typically medium to large 80

80. Entirely ± deep lemon-yellow; disc of cap later sometimes tinged sl. olivaceous, ± smooth; cap cuticle + NaOH rather deep olive . . . . . *citrinus* (66)

80. Gills and stem pale lemon-yellow at first, gills later olive-yellow; cap olive-brown with pale lemon-yellow margin, often spotted or streaky; cap cuticle + NaOH ± olive-brown *sulphureus* (67)

81. Cap reddish-copper or tawny-brick, with yellowish, greenish or glaucous (rarely sl. bluish) margin, disc sometimes with darker scales; smell often strong, either of fennel or anise; spores amygdaliform to ± limoniform, rough, 10–13/6–8μ 82

81. Cap straw yellow, sulphur or tawny-orange to rusty-buff, sometimes with olivaceous tinge, with pale- to sulphur-yellow margin, smooth or innately fibrillose, sometimes spotted but not distinctly scaly; smell none to rather sickly sweet (aromatic), sometimes resembling fennel; spores limoniform, very rough, 12–17/8–10μ 83

82. Smell of fennel; flesh white or whitish with yellowish or greenish-yellow outline, often becoming reddish-brown in bulb; stem pale greenish-yellow . . . . . *orichalceus* (70)

82. Smell of anise; flesh bright greenish-yellow or sulphur, sometimes greener in stem or reddish-brown in bulb; stem rather bright greenish-yellow, sometimes yellower or browner in places **odorifer* (71)

83. Cap straw-yellow to tawny-buff often with olive tinge, innately fibrillose, margin paler; flesh pale yellowish or whitish then darker (tawny-rusty) in bulb; smell none, or faint, pleasant; in coniferous or deciduous woods . . . . . *elegantior* (68)

83. Cap sulphur-yellow, disc ± rusty-buff or tawny-tinged, smooth; flesh white with sulphur outline, or sulphur in bulb; smell often strong, aromatic, sickly sweet; under beech . . *elegantissimus* (69)

B. Cliduchi-Elastici

84. Young gills white whitish or clay 85

84. Young gills blue or violaceous 107

84. Young gills yellow or olive 117

85. Cap bluish or violaceous at least at margin; stem sometimes with violaceous or whitish scales from veil near base 86

85. Cap whitish, yellowish, tawny or brown, without blue tints; scales from veil, if present, white, yellowish, ochraceous or brown (violaceous only in *roseo-limbatus*—see § 105) 89

86. Very large and robust; cap 75–200 mm. chestnut or chocolate with grey- or darker-violaceous margin, often with thick whitish patches of veil at first, later paler with ± sulcate margin; similar patches of violaceous or whitish veil on stem; spores ± limoniform, 13–18/8–10μ . . *praestans* (90)

86. Slenderer species with smaller spores and other characters . . 87

87. Cap soon dry and felty-fibrillose, cuticle not peeling easily, dull (cork- or tobacco-) brown with narrow sometimes fugacious lilac or violaceous zone at margin; (generally under conifers) . . *balteatus* (89)

87. Cap smooth and shiny or sl. matt when dry, sometimes innately fibrillose at margin, cuticle peeling or not, with wider or deeper violet marginal zone to almost entirely violaceous or with brighter (ochraceous or wine-red) disc 88

88. Cap cuticle peeling easily, reddish-brown or wine-red with narrow but often bright violet marginal zone; stem with patches of rather fugacious or inconspicuous blue-violaceous veil; spores ± amygdaliform, 10–12/5½–6½μ; decid. woods, esp. beech *balteato-cumatilis* (88)

88. Cap cuticle not peeling easily, grey-blue to violet, disc becoming ochraceous, wine-red or sepia-tinged; patches of violaceous veil on stem often conspicuous; spores elliptic-fusiform, 9–12/4½–6μ; coniferous and mixed woods . *cumatilis* (87)

89. Taste bitter, at least in cap cuticle; colours generally pale, or rather dull, white to ochraceous or buff; stem ± viscid at first but often soon drying smooth or striate, less commonly sl. floccose; (spores less than 10μ long, often pale in mass (ochraceous to ochraceous-rusty)) . . 3

89. Taste mild; colours various but often brighter; stem smooth or scaly, never viscid; spores various, often longer and darker rusty in mass . 90

90. Stem often clavate at first *either* with white, yellowish, ochraceous or brownish floccose scales forming ring-like zones or scattered near base *or* cortina forming thick white floccose ring-zone near apex 91

90. Stem equal to clavate or irregularly, rarely rounded bulbous, smooth or striate (rarely with traces of violaceous veil at base), cortina not forming thick ring-zone 102

91. Scales on stem soon coloured yellowish, ochraceous or olive-brown; cap margin never white floccoso-scaly but sometimes appendiculate with remains of cortina 92

91. Scales on stem white or sl. coloured at tips, or cortina forming thick white ring-zone; cap margin often white floccoso-scaly or silky hoary 97

92. Scales on stem thick, woolly, ± persistent, forming ± conspicuous ring-like zones below cortinal zone; cap yellow to ochraceous or tawny, generally rather bright in colour; usually robust and ± inodorous 93

92. Scales on stem thinner, less conspicuous, often reduced to a few near the base, sometimes fugacious; cap generally dull in colour, pale yellow or ochraceous to reddish-brown; medium to large, often with strong smell 95

93. Spores elliptic-fusiform, 12–15/6–7½μ; cap yellow- to ochraceous-tawny with ± bright yellow margin, disc often with small adpressed crowded scales; under conifers and birch; (NaOH + flesh bright or golden yellow) . . . . . *triumphans* (74)

93. Spores ± amygdaliform, 9–12½/5–7μ; cap pale to bright yellow or tinged tawny, margin pale yellow or ochraceous, with or without scales at disc; coniferous or deciduous woods 94

94. Cap pale to bright yellow, disc sometimes tinged tawny or buff, ± smooth except sometimes for small scales on disc from veil; gills creamy-white or grey-blue at first; scales on stem often rather thin, yellowish or yellow-tawny; typically under birch . . . . . *crocolitus* (76)

94. Cap ochraceous to orange-yellow, sometimes with olivaceous tinge, with distinct reddish-brown innate fibrils, margin yellow or sl. olivaceous; gills never bluish; scales on stem thick, woolly, ochraceous or olivaceous; conifers or mixed woods **subtriumphans* (75)

95. Smell of new-mown hay when cut; cap and stem often with olive tints; flesh white; spores 8–10½/4½–5½μ . . . . **cephalixus* (78)

95. Smell unpleasant, often strong, rank or foetid; cap and stem without olive tints; flesh white or pale yellow-brown; spores 9–12/5½–6μ . . 96

96. Cap ochraceous, yellow or buff with paler margin, smooth or with small darker adpressed scales at disc; stem base with scattered yellowish or buff scales at least when young; flesh white, sometimes yellowish under cuticle; smell rank; spores ± amygdaliform, 10–12/5½–6μ; decid. or mixed woods often under beech *olidus* (77)

96. Cap reddish-brown with pale yellowish-brown margin, which is fibrillose at first; stem with cream-ochraceous floccose scales at first; flesh pale yellowish-brown, white at first in stem; smell foetid; spores elliptic, 9–11/5½–6μ; under conifers or in *Sphagnum*; (cap up to 125 mm.; stem 70–110/15–23 mm. (up to 35 mm. below)) . . . . . *(*validus* Favre)

97. Smell strong, unpleasant, rank; cap red-brown with conspicuous white silky marginal zone; spores elliptic-amygdaliform to sublimoniform, 12–14/7–8μ; (under beech, esp. on chalk) *albomarginatus* (80)

97. Smell none, or faint pleasant; cap or spores otherwise 98

98. Stem equal or attenuated downwards, hard and rigid, white, white-floccose at first, then silky striate below ± thick, persistent, floccose cortinal ring-zone; (cap yellowish or ochraceous with darker disc; flesh white; spores elliptic-amygdaliform, 8–10/4–4½μ) . . . . . *turmalis* (83)

98. Stem with ± persistent white or whitish floccose scales below rather thin often fugacious cortinal zone, equal to clavate or fusiform-bulbous; (spores often larger) 99

99. Spores subglobose or broadly ovate, 8–9/6½–8μ; cap ± bright yellow at least in part; (stem robust, clavate or fusiform-bulbous; flesh white, ± ochraceous in base of stem) . . . . . *saginus* (82)

99. Spores elliptic-pruniform to ± limoniform, larger or smaller; if cap yellow, not so bright 100

100. Spores elliptic-fusiform to ± limoniform, 7–9(10)/3½–5μ; (cap 50–90 mm., ochraceous or yellowish with darker often reddish-brown disc, silky-hoary; stem 60–70/12–15 mm., equal or sl. thicker or thinner at base, hard and firm, with some whitish later ochraceous-buff zones below; flesh white; coniferous and deciduous woods) . . . *(*subclaricolor* Moser)

100. Spores larger, elliptic-pruniform to sublimoniform 10–15/6–8μ . 101

101. Spores elliptic-pruniform, 10–14/7–8μ; cap small to medium, pale buff to reddish-brown with darker disc; stem ± equal, f. firm at first *fraudulosus* (81)

101. Spores amygdaliform to sublimoniform, 11–15/6–8μ; cap medium to large, yellowish, ochraceous or pale reddish; stem more robust, clavate or ventricose, sometimes attenuated at base, hard and firm *claricolor* (79)

102. Cap pure white then creamy or sl. yellowish at disc; smell strong of meal; spores small, elliptic-oval, 6–7/3½–4μ *lustratus* (86)

102. Cap never so pale in colour; smell none or not of meal; spores mostly more than 7μ long 103

103. Spores very small, elliptic-oval, 4–5/3–4μ; (cap 30–70 mm., tawny yellow, redder at disc, with paler sl. white pruinose margin; gills whitish clay then pale milky-coffee to ochraceous; stem 30–60/7–15 mm., ± clavate, white or whitish; flesh whitish; under conifers) *(*microspermus* Lange)

103. Spores more than 7μ long 104

104. Spores subgloblose 7–9/5–7μ; (cap 20–50 mm. pale ochraceous-buff or tan, margin often sl. streaky; gills whitish then clay-cinnamon often with uneven edge; stem 35–70/5–8 mm. (7-14 mm. below), ± clavate, white discolouring yellowish from base up, apex occ. with vague bluish tinge; flesh white sometimes yellowish in places; deciduous (more rarely coniferous) woods (*C.* (*Dermo.*) *tabularis* Fr.)

104. Spores elliptic fusiform 7–10/3–4μ; (see notes on *sebaceus*) . . 105

104. Spores elliptic, amygdaliform or ± limoniform, broader, 8-11/4½-6½μ 106

105. Cape pale ochraceous or sl. yellowish to almost brick-red, ± conspicuously innato-fibrillose; stem equal or thicker at base (marginately bulbous in var. *marginatus* Bres.), white at first, sometimes with fugacious violaceous patches of veil at base; flesh pure white; in coniferous woods; (cap 50–100 mm.; stem 50–90/10–15(30) mm.; gills white then pale ochraceous to clay-buff) . . *(*roseo-limbatus* Secr.)

105. Cap ochraceous-yellow or buff, white silky hoary or sl. innato-fibrillose; stem attenuated upwards with ± clavate (rarely attenuated) base, white, discolouring yellowish from base up, without patches of veil; flesh whitish to ochraceous or buff; coniferous and deciduous woods *sebaceus* (84)

106. Cap ochraceous to reddish-brown, smooth or with yellowish patches of veil, margin sometimes ± fibrillose; stem firm, ± equal or sl. ventricose or bulbous, pallid or buff with paler apex; flesh white, sometimes pallid or watery in centre of cap; smell none or faint rank; (spores amygdaliform, 9–10/5–6μ) **crassus* (85)

106. Cap ochraceous or buff often with darker disc and yellower margin, either white silky hoary or with whitish adpressed fragments of veil or smooth, sometimes innately fibrillose; stem soon rather soft, with variable normally ± marginate sometimes immarginate bulb, white soon yellowish or tinged rusty; flesh white soon yellowish at least in stem; smell faint or strong of apples, acid or honey 35

107. Cap bluish or violaceous at least in part or when young . . . 108

107. Cap whitish, yellowish, tawny or brown 111

108. Very large and robust; cap 75–200 mm., chestnut or chocolate with grey- or darker-violaceous margin, often with thick whitish patches of veil at first, later paler with ± sulcate margin; gills whitish or pale clay, sometimes tinged lilac or violaceous at first; spores ± limoniform, 13–18/8–10μ . *praestans* (90)

108. Cap rarely so large, never with whitish patches of veil or sulcate margin; gills bluish-grey-clay to deep violet at first; spores smaller, ± amygdaliform, 9–12/5–7μ 109

109. Cap pale lilac or blue-violaceous, disc soon ± buff or reddish-brown, soon dry and shiny; flesh firm at first but soon soft, + NH_4OH slowly pale yellowish (occ. *slowly* deeper yellowish); smell faint, pleasant or sl. rank when old . . . . . *largus* (93)

109. Cap at first either entirely violet, or date brown to sepia with violet margin, soon dry, smooth or strongly innato-fibrillose; flesh esp. of stem persistently hard and firm, + NH_4OH deep chrome or golden yellow; smell often strong, rank 110

110. Often robust; cap rarely entirely violet at first, usually date-brown or sepia with violet margin, ± smooth; in coniferous woods esp. in hilly country . . . . . *variicolor* (91)

110. Less robust; cap often entirely violet at first, discolouring to dirty buff or date-brown with violaceous or bluish margin, often finally entirely livid brown, innately fibrillose often strongly so; in deciduous or coniferous woods, esp. in low-lying country *nemorensis* (92)

111. Stem with ± persistent yellowish or yellow-tawny scales forming conspicuous ring-like zones below cortinal zone; (see § 94) *crocolitus* (76)

111. Stem without coloured scales forming ring-like zones 112

112. Cap straw-yellowish or pale buff then yellowish-clay to pale milky-coffee; spores ± amygdaliform, 10–14/6–7μ; (mature gills rusty cinnamon to almost chocolate; stem blue-violaceous soon whitish and discoloured yellowish from base up, with variable bulb, rounded to almost clavate) . . . *cyanopus* (48)

112. Cap yellow or ochraceous to rusty-tawny or orange-brown, rarely so pale, if so, spores different 113

113. Spores subglobose, 8–9/6–7μ; cap predominantly yellow; stem whitish or discoloured ochraceous at base with lilac or bluish apex *decolorans* (95)

113. Spores ± amygdaliform or elongate elliptic; cap predominantly ochraceous to rusty-tawny, not yellow except in part 114

114. Spores elongate elliptic or subfusiform, 13–15/6–7μ; (cap ochraceous to tawny-yellow; stem lilac then ochraceous with bluish apex) . . . . . *Riederi* (96)

114. Spores ± amygdaliform, not more than 12μ long . . . 115

115. Spores 7–10/4–6μ; flesh bluish-grey in periphery of stem; cap pale ochraceous-buff sometimes with reddish-brown disc; (stem rather slender, equal to sl. clavate, whitish to ochraceous buff with bluish or greyish apex) . . . . . *decoloratus* (97)

115. Spores 10–12/6–7μ; flesh without blue tints; cap darker and often brighter in colour 116

116. Stem clavate or with rounded bulb, often attenuated upwards, pure white, discolouring pale yellowish, rarely pale bluish at apex; cap yellow-ochre to rusty-tawny, disc sometimes darker and margin yellower . . . . . *varius* (94)

116. Stem ± equal with inconspicuous marginate to almost non-existent bulb, often flattened at base, yellowish or ochraceous with whitish or violaceous apex; cap orange- to rusty-brown with paler ochraceous or yellowish margin . . . *pansa* (47)

117. Young gills sulphur or lemon.yellow; taste mild or bitter; spores ± amygdaliform, 12–15/6½–8μ 118

117. Young gills pale to sooty-olive; taste bitter; spores subglobose, broadly ovate or elliptic pruniform, 7–12/5–7μ 120

118. Taste bitter; smell strong, disagreeable, of gas-tar (like *Tricholoma sulphureum*); (cap ± coppery-red with yellowish to olive margin) . . . . . *russeus* (100)

118. Taste mild; smell either strong, aromatic, of marjoram, or faint, of raw apples 119

119. Smell strong, aromatic, of marjoram; flesh sulphur yellow; cap ochraceous-buff to golden-yellow, disc sometimes tinged rusty, margin more lemon-yellow . . . . . *percomis* (98)

119. Smell faint of raw apples; flesh pale sulphur-yellow, darker under cap cuticle and at base of stem; cap reddish-copper or chestnut with greenish-yellow or orange margin . . . **Nanceiensis* (99)

120. Spores elliptic pruniform, 10–12/5–7μ; (cap 40–50 mm., olive-bistre with paler margin; gills pale olive then olive-bistre; stem with yellow base; flesh violaceous then reddish; damp conifer woods or in *Sphagnum*)
*(*olivascens* (Batsch) Fr. sensu Bataille)

120. Spores subglobose or broadly ovate, 7–10/5–7μ 121

121. Facial and marginal cystidia present; cap pale straw-yellow then bright yellow-buff or tinged tawny, finally tawny-buff; gills, flesh and stem pale olive at first, gradually discolouring ± rusty; in damp woods or in *Sphagnum* esp. on high ground . . . *subtortus* (102)

121. No facial or marginal cystidia present; cap chestnut or olive-brown, sometimes tinged greenish or violaceous; gills sooty-olive to dark olive-rusty then umber; flesh and stem whitish, sometimes tinged greyish, ochraceous or olivaceous, rarely violaceous; in deciduous woods esp. beech, also in coniferous woods . . *infractus* (101)

SUMMARY OF CLASSIFICATION

Subgenus I.—**MYXACIUM.** Cap and stem viscid at least when young. Flesh soon becoming soft. (Spp. 1–20).

II.—**PHLEGMACIUM.** Cap viscid at least when young, generally convex then expanded or slightly depressed. Gills adnate ± emarginate or with tooth, generally ± crowded. (Spp. 21–102.)

I. MYXACIUM.

1. *Colliniti.*—Stem peronate with smooth to ± floccose viscid veil (if smooth, spores more than 10μ long, rarely less and then not subglobose or broadly ovate). Taste mild. (Spp. 1–9.)

a. *Nudi.*—Edge of gill fertile or sterile, without conspicuous balloon-shaped or clavate cystidia (sterile cells when present ± clavate, about 8–12μ wide resembling basidia). (Spp. 1–5.)

(*continued on page 70*)

Species	Cap	Gills	Stem
I. MYXACIUM	Cap and stem viscid at least when young. Flesh soon becoming soft. (Spp. 1-20.)		
1. Colliniti	Stem peronate with smooth to ± floccose viscid veil (if smooth, spores more than 10		
(*a*) **Nudi**	Edge of gill fertile or sterile, without conspicuous balloon-shaped or clavate c		
1. *collinitus* (Sow. ex Fr.) Fr. *sensu* Lange (=*collinitus* var. *caeruliipes* Smith)	36–100 mm., cvx. then exp. with obtuse umbo, **tawny-orange** to olivaceous-tawny, umbo often darker (chestnut), very glutinous, shiny when dry; margin smooth or sl. grooved, incurved at first.	Clay, amethyst-grey or pale violaceous, then ± rusty, subdistant, adnate emarginate, ± linear, edge sometimes white.	50–120/7–20 mm., oft ther long, **equal** or **uated downwards** whitish or pale bluis striate or grooved base of gills, veil f **whitish or pale l bands of scales** bel tinal zone on a **ground concoloro** the **cap.**
†2. *trivialis* Lange (=*collinitus* var. *repandus* Ricken)	35–110 mm., cvx. then exp., broadly umbonate or not (sometimes sl. depressed around umbo when old), clay- to **date-** or **bay-brown** with paler (sometimes sl. tawny-tinged) margin, very glutinous; margin smooth, incurved at first and with remnants of whitish cortina.	Whitish or pale clay, then rusty clay to dull rusty, f. crowded, adnate barely emarginate, sl. ventricose near stem, edge whitish at first, ± even.	50–120/11–23 mm., ± **tricose fusiform,** cylindrical, apex or pale pallid ± veil forming **whit** pale pallid **netlike** below cortinal zon background ± **con ous** with the **ca**
3. *mucosus* (Bull.) Fr.	40–100 mm., cvx. then exp., generally broadly umbonate, **chestnut** or tawny brown, very glutinous; margin paler, smooth or striate, incurved at first.	Whitish, then pale ochraceous to cinnamon, subdistant, adnate, ± emarginate or with tooth, often rather narrow, edge denticulate.	50–150/15–25 mm., **cy cal,** often sl. attenu base, **white,** silky, sometimes but surface **not** be disrupted into scal
4. *livido-ochraceus* Berk.	20–50 mm., cvx. then exp., broadly umbonate, ochraceous or clay colour, drying paler **whitish silky and rather shiny,** cuticle rather thick; margin thin but not striate, often with traces of veil.	Whitish, then cinnamon or dull rusty, f. crowded, adnate or narrowly adnate, rounded near stem, ± ventricose, edge paler, ± even.	25–60/5–10 mm., ± ated at both ends, **ceous, often pale** ochraceous at bas apex, silky striate cortinal zone, **silky** below, stuffed.
5. *Metrodi* Hry. (=*illibatus sensu* Metrod)	40–70 mm., cvx. truncate, then cvx.-exp. with centre often sl. depressed, **bright yellow** or tinged tawny with paler margin, smooth.	**Pale violet,** then ± cinnamon, f. crowded, adnate or subdecurrent, f. narrow.	80–90/9–15 mm., clav or without pointe whitish, clothed wi cid veil up to ye fibrillose cortinal becoming hollow.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
ess and then not subglobose or broadly ovate). Taste mild. (Spp. 1–9).					
cells when present, ± clavate, about 8–12μ wide resembling basidia). (Spp. 1-5)					
then whitish yellowish-e, often ± r from base occ. tinged h at apex of .	Mild. Inodorous.	Elliptic-amygdaliform or sublimoniform, v. rough. **12-15(20)/7-8(9)μ**		Usually under conifers sometimes under decid. trees (e.g. beech). Fairly common.	Easily recognised by conspicuous bands on stem, bright colours and large spores. Differs from *trivialis* (No. 2) in colours, larger spores and habitat.
ish-white, er brown r cap cuti- becoming wish- to ker date- n in lower of stem.	Mild. Inodorous.	Elliptic-amygdaliform to amygdaliform, rough, **10-13/6-7μ**	Gill edge with some sterile ± clavate cells 8–12(14)μ wide.	In decid. woods (e.g. alder, willow) especially when wet, or along ditch banks. Fairly common.	Distinguished from *collinitus* (No. 1) by duller colours, smaller spores and habitat. According to Henry the gills are rarely bluish when young.
or whitish, d tawny or nut under le of cap and times also ase of stem.	Mild. Inodorous.	**Elongate-sublimoniform,** rough, **13-16/6-7(7½)μ** (fig. 15)		Conifers, esp. pine, on sandy or heathy soils. Uncommon.	Distinguished by white ± cylindrical silky-viscid, non-scaly stem and bright coloured cap, also narrower spores.
h or pallid, violaceous in .	Mild. Smell faint, pleasant.	**Elliptic,** punctate to almost rough, **7½-9/4½-5μ** (fig. 10)	Gill edge fertile. (Hyphae in cap 3–5μ wide over ± sausage-shaped cells 40–90/12–20μ).	Deciduous woods. V. uncommon (recently found under beech).	Not well known in Britain and not recorded in recent years from any other country. Distinguished by spore size and shape, peculiar cap colours and ± violaceous stem. (Cap colours appear to be similar to those of *epipoleus* (No. 13) but spores are different.)
h then sl. wish, esp. at of stem.	Mild. Inodorous.	**Elliptic-amygdaliform,** rough, **10½-11/5½-6¾μ** *sec* Metrod.	NaOH + flesh orange-yellow.	Conifers. Rare.	Very like *delibutus* (No. 10) but with very different spores. Included on the strength of spore shape and measurements given in 'Handbook' (Ed. II.), 1891, of Cke., but its presence in Britain needs confirmation.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
1. MYXACIUM	Cap and stem viscid at least when young. Flesh soon becoming soft. (Spp. 1-20.)								
1. Collinii	Stem peronate with smooth to ± floccose viscid veil (if smooth, spores more than [illegible]ess and then not subglobose or broadly ovate). Taste mild. (Spp. 1–9).								
(a) **Nudi**	Edge of gill fertile or sterile, without conspicuous balloon-shaped or clavate cells when present, ± clavate, about 8–12μ wide resembling basidia). (Spp. 1-5)								
1. *collinitus* (Sow. ex Fr.) Fr. *sensu* Lange (=*collinitus* var. *coerulipes* Smith)	36–100 mm., cvx. then exp. with obtuse umbo, **tawny-orange** to olivaceous-tawny, umbo often darker (chestnut), very glutinous, shiny when dry; margin smooth or sl. grooved, incurved at first.	Clay, amethyst-grey or pale violaceous, then ± rusty, subdistant, adnate emarginate, ± linear, edge sometioes white.	50–120/7–20 mm., [illegible] ther white then whitish long, **equal** or [illegible] yellowish-**uated downward**, [illegible] often ± whitish on pale blue from base striate or grooved [illegible] tinged base of gills, veil [illegible] at apex of **whitish or pale** [illegible] **bands of scales** [illegible] tinal zone on a [illegible] **ground concolorous** [illegible] the cap.		Mild. Inodorous.	Elliptic-amygdaliform or sublimoniform, v. rough. **12-15(20)/7-8(9)μ**		Usually under conifers sometimes under decid. trees (e.g. beech). Fairly common.	Easily recognised by conspicuous bands on stem, bright colours and large spores. Differs from *trivialis* (No. 2) in colours, larger spores and habitat.
†**2.** *trivialis* Lange (=*callinitus* var. *repondus* Ricken)	35–110 mm., cvx. then exp., broadly umbonate or not (sometimes sl. depressed a round umbo when old), clay-to **date-** or **bay-brown** with paler (sometimes sl. tawny-tinged) margin, very glutinous; margin smooth, incurved at first and with remnants of whitish cortina.	Whitish or pale clay, then rusty clay to dull rusty, f. crowded, adnate barely emarginate, sl. ventricose near stem, edge whtish at first, ± even.	50–120/11–23 mm., [illegible]-white, **tricose fusiform**, [illegible]er brown cylindrical, apex [illegible] cap cuti-or pale pallid ± [illegible] becoming veil forming white[illegible]ish to pale pallid **nellike** [illegible]er date-below cortinal zone [illegible] in lower background ± concolorous with the cap.		Mild. Inodorous.	Elliptic-amygdaliform to amygdaliform, rough, **10-13/6-7μ**	Gill edge with some sterile ± clavate cells 8–12(14)μ wide.	In decid. woods (e.g. alder, willow) especially when wet, or along ditch banks. Fairly comoion.	Distinguished from *collinitus* (No. 1) by duller colours, smaller spores and habitat. According to Henry the gills are rarely bluish when young.
3. *mucosus* (Bull.) Fr.	40–100 mm., cvx. then exp., generally broadly umbonate, **chestnut** or tawny brown, very glutinous; margin paler, smooth or striate, incurved at first.	Whitish, then pale ochraceous to cinnanion, subdistant, adnate, ± emarginate or with tooth, often rather narrow, edge denticulate.	50–150/15–25 mm., cyl[illegible] or whitish, **cal**, often sl. attenu[illegible] tawny or base, **white**, v[illegible]ost under silky, sometimes [illegible] of cap and but surface **not** b[illegible]times also disrupted into sc[illegible]ose of stem.		Mild. Inodorous.	**Elongate-sublimoniform**, rough, **13-16/6-7(7½)μ** (fig. 15)		Coolfers, esp. pine, on sandy or heathy soils. Uncommon.	Distinguished by white ± cylindrical silky-viscid, non-scaly stem and bright coloured cap, also narrower spores.
4. *livido-ochraceus* Berk.	20–50 mm., cvx. then exp., broadly umbonate, ochraceous or clay-colour, drying paler **whitish silky and rather shiny,** cuticle rather thick; margin thin but not striate, often with traces of veil.	Whitish, then cinnamon or dull rusty, f. crowded, adnate or narrowly adnate, rounded near stem, ± ventricose, edge paler, ± even.	25–60/5–10 mm., ± [illegible] or pallid, ated at both ends, [illegible]olaceous in **ceous, often** pale[illegible] ochraceous at base apex, silky striate cortinal zone, silky [illegible] below, stuffed.		Mild. Smell faint, pleasant.	**Elliptic,** punctate to almost rough, **7½-9/4½-5μ** (fig. 10)	Gill edge fertile. (Hyphae in cap 3–5μ wide over ± sausage-shaped cells 40–90/12–20μ).	Deciduous woods. V. uncommon (recently found under beech).	Not well known in Britain and not recorded in recent years from any other country. Distinguished by spore size and shape, peculiar cap colours and ± violaceous stem. (Cap colours appear to be similar to those of *epipoleus* (No. 13) but spores are different.)
5. *Metrodi* Hry. (=*illibatus sensu* Metrod)	40–70 mm., cvx. truncate, then cvx.-exp. with centre often sl. depressed, **bright yellow** or tinged tawny with paler margin, smooth.	**Pale violet,** then ± cinnamon, f. crowded, adnate or subdecurrent, f. narrow.	80–90/9–15 mm., clav[illegible] then sl or without pointed [illegible]ruth, esp. at whitish, clothed w[illegible] cid veil up to y[illegible] fibrillose cortina[illegible] becoming hollow.		Mild. Inodorous.	**Elliptic-amygdaliform,** rough, **10½-11/5½-6½μ** *sec* Metrod.	NaOH + flesh orange-yellow.	Coniefers. Rare.	Very like *delibutus* (No. 10) but with very different spores. Included on the strength of spore shape and measurements given in 'Handbook' (Ed. II.), 1891, of Cke., but its presence in Britain needs confirmation.

Species	Cap	Gills	Stem
(*b*) **Cystidiosi**	Edge of gill sterile with conspicuous balloon-shaped or clavate cystidia 10–30μ wide.		
6. *elatior* Fr. *sensu stricto*	50–120 mm., campanulate or **conico-cvx.** then conico-exp., often with upturned edge when old, clay- or olive-brown, disc often tinged umber; margin paler, sometimes sl. violaceous, strongly **wrinkled-sulcate.**	**Clay-violaceous** or pallid ± violaceous esp. at the edge, always rather dark, finally **rusty-violet or umber,** emarginato-adnate, fairly crowded, rather thick and broad, often strongly veined on the sides and interveined, edge paler, uneven.	60–180/9–15 (40) mm., **long, fusiform** or v cose with ± pointed apex whitish or violaceous and silky ate, covered with silky or floccose ± veil below cortinal z
7. *mucifluus* Fr. *sensu* Ricken, Konr. & Maubl. (*non sensu* Fr.)	35–110 mm., **cvx. soon cvx.-exp.**, generally ± umbonate, **olivaceous or pallid with darker disc** (umber or smoky brown) and paler margin; margin ± wrinkled-striate, sometimes smooth when really wet.	**Pale ochraceous clay,** then rusty clay or pallid buff, adnate, sometimes with slight tooth, often ± emarginate, f. crowded, not or rarely sl. interveined, edge paler, uneven.	45–100/9–22 mm., often paratively **short** (a same length as diar of cap), often **equal** ± pointed base, s times attenuated d wards or sl. ventr apex white silky-st white or blue-viola below cortinal zone, smooth or sometime floccose-scaly when esp. near base.
†8. *pseudosalor* Lge. (= *mucifluoides* Hry.)	30–70 mm., **conico-cvx.** then conico-exp. or exp. ± umbonate, sometimes with upturned margin, **ochraceous yellow or buff,** disc often tinged tawny, margin paler, ivory ochraceous (*sec* Lange sometimes tinged livid violaceous); margin quite smooth or only sl. wrinkled-striate.	**Ochraceous clay,** then dirty buff, adnate or adnato-decurrent (sometimes narrowly so), ± ventricose, f. crowded, often veined on the sides, edge paler or sl. violaceous, ± even.	80–100/7–15 mm., o **long,** sl. fusiform wi pointed base or attenu downwards, white tinged sl. blue-violac apex silky striate, viscid below cortinal discolouring pale with age.
9. *stillatitius* Fr. *sensu* Bres.	**18-50** mm., cvx. then exp. broadly umbonate, covered with **blue-violaceous gluten** at first then **livid-brown** or olivaceous or greyish white; margin **smooth.**	Pallid or pale violaceous then rusty cinnamon, adnate, emarginate or with tooth, subdistant, ventricose, often broad (up to 15 mm.) edge paler, rather thick and ± uneven.	50–80/3–8 mm., fusifor ventricose or attenu downwards, covered **blue-violaceous** gl like cap, then **whitish** at base and apex, sm with striate apex, soft, stuffed or hollo
2. Delibuti.	Stem smoothly viscid below cortinal zone. Spores less than 10μ long, subglobose to b		
10. *delibutus* Fr.	30–90 mm., cvx. then cvx.-exp. or broadly umbonate, pale yellow, disc often darker or brighter **yellow** or more rarely tinged tawny, tawny buff here and there with age, v. viscid, sl. streaky or (in larger specimens) wrinkled when dry.	**Deep blue or violaceous blue at first,** quickly lilac or pale clay-blue, then yellowish, clay-brown or cinnamon, adnate ± emarginate or with tooth, subdistant to f. crowded, edge paler, denticulate.	50–100/6–15 mm. (8–22 below), clavate or sw at base, **white** smeared with **yellow** cid veil up to cor zone, base white-tome often with white my strands.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
h or yellow-thin, except sc.	Mild. Inodorous.	Broadly amygdaliform, very rough, 12-17/7-9μ	Cystidia balloon-shaped or pyriform, 35–40/18–26μ.	Decid. (esp. beech) and conif. woods. Common.	Recognised by wrinkled ± conical cap, interveined often violaceous dark gills and ± ventricose stem. Typically of large size. (See notes.)
or whitish, k at disc, ually thinner ards margin.	Mild. Inodorous.	Amygdaliform, rough, 12–15½/7–9μ	Cystidia balloon-shaped to clavate, 30–60/16–30μ.	Decid. and conif. woods Common.	Differs from *elatior* (No. 6) by not having a conical cap, no blue in gills, and stem generally short and not fusiform or ventricose. The spores appear also to be slightly less rough. *C. pumilus* (Fr.) Lge. may well be a small form of this species. (See notes.)
h or pale d, tinged w below um- and some- s at base of , f. thick at thinner to- ls margin.	Mild. Inodorous.	Amygdaliform, rough, 12–14/7–9μ	Cystidia balloon-shaped to clavate 30–40/10–22μ	Decid. woods (e.g. beech, hazel or birch). Fairly common.	Has the ± conical cap and long stem of *elatior* (No. 6), but differs in paler colours, smaller size and often pure white stem. (British specimens so far found have not shown any violaceous tints in the cap).
yellowish or rusty, f. k at disc.	Mild. Inodorous.	± limoniform, v. rough, 12–15/6–8μ	Cystidia balloon-shaped or pyriform, 30–50/12–20μ.	In damp woods (deciduous or coniferous). Uncommon. (Found recently in *Sphagnum* under birch.)	Not well known and needs further study. Like a small pale *elatior* (No. 6) but with smooth cap and stem.
Taste mild. h, yellowish ap (esp. at , bluish all ugh when g, blue rs sometimes isting in es, thick at	(Spp. 10–13). Mild (or sl. bitter after mastication). Inodorous, or faint, sl. radishy.	Subglobose to broadly ovate, rough, 7–10/6–8μ	Gill edge fertile.	Decid. or mixed woods (esp. birch and beech). Common, often gregarious or subcaespitose.	Easily recognised by colours and spore shape. The commonest member of this section. (Two uncommon species resemble *delibutus* —*Metrodi* (No. 5) distinguished by spore shape, and *decolorans* s. Cke. (No. 95), which is generally smaller **and** has a dry stem).

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
(*b*) **Cystidiosi**	Edge of gill sterile with conspicuous balloon-shaped or clavate cystidia 10–30μ wide.								
6. *elatior* Fr. *sensu stricto*	50–120 mm., campanulate or **conico-cvx.** then conico-exp., often with upturned edge when old, clay- or olive-brown, disc often tinged umber; margin paler, sometimes sl. violaceous, strongly **wrinkled-sulcate.**	**Clay-violaceous** or pallid ± violaceous esp. at the edge, always rather dark, finally **rusty-violet or umber,** emarginato-adnate, fairly crowded, rather thick and broad, often strongly veined on the sides and intervened, edge paler, uneven.	60–180/9–15 (40) mm., **long, fusiform** or cose with ± pointed apex whitish or violaceous and silky ate, covered with silky or floccose ± veil below cortinal z	ish or yellow-thin, except disc.	Mild. Inodorous.	Broadly amygdaliform, very rough, 12-17/7–9μ	Cystidia balloon-shaped or pyriform, 35–40/18–26μ.	Decid. (esp. beech) and conif. woods. Common.	Recognised by wrinkled ± conical cap, interveined often violaceous dark gills and ± ventricose stem. Typically of large size. (See notes.)
7. *mucifluus* Fr. *sensu* Ricken, Konr. & Maubl. (*non sensu* Fr.)	35–110 mm., **cvx. soon cvx.-exp.,** generally ± umbonate, **olivaceous or pallid with darker disc** (umber or smoky brown) and paler margin; margin ± wrinkled-striate, sometimes smooth when really wet.	**Pale ochraceous clay,** then rusty clay or pallid buff, adnate, sometimes with slight tooth, often ± emarginate, f. crowded, not or rarely sl. interveined, edge paler, uneven.	45–100/9–22 mm., often or whitish, paratively **short** h at disc, same length as dia- ually thinner of cap), often **equal** ards margin. ± pointed base, times attenuated wards or sl. ventr apex white silky-white or blue-viola below cortinal zone, smooth or sometime floccose-scaly when esp. near base.		Mild. Inodorous.	Amygdaliform, rough, 12–15½/7–9μ	Cystidia balloon-shaped to clavate, 30–60/16–30μ.	Decid. and conif. woods Common.	Differs from *elatior* (No. 6) by not having a conical cap, no blue in gills, and stem generally short and not fusiform or ventricose. The spores appear also to be slightly less rough. *C. pumilus* (Fr.) Lge. may well be a small form of this species. (See notes.)
†**8. *pseudosalor*** Lge. (=*mucifluaides* Hry.)	30–70 mm., **conico-cvx.** then conico-exp. or exp. ± umbonate, sometimes with upturned margin, **ochraceous yellow or buff,** disc often tinged tawny, margin paler, ivory ochraceous (*see* Lange sometimes tinged livid violaceous); margin quite smooth or only sl. wrinkled-striate.	**Ochraceous clay,** then dirty buff, adnate or adnato-decurrent (sometimes narrowly so), ± ventricose, f. crowded, often veined on the sides, edge paler or sl. violaceous, ± even.	80–100/7–15 mm., ish or pale **long,** sl. fusiform w pointed base or atten downwards, white and some- tinged sl. blue-violac apex silky striate, f. viscid below cortinal z discolouring pale with age.	ish or pale tinged ow below um- white at base of f. thick at thinner to- margin.	Mild. Inodorous.	Amygdaliform, rough, 12–14/7–9μ	Cystidia balloon-shaped to clavate 30–40/10–22μ	Decid. woods (e.g. beech, hazel or birch). Fairly common.	Has the ± conical cap and long stem of *elatior* (No. 6), but differs in paler colours, smaller size and often pure white stem. (British specimens so far found have not shown any violaceous tints in the cap).
9. *stillatitius* Fr. *sensu* Bres.	**18-50** mm., cvx. then exp. broadly umbonate, covered with **blue-violaceous gluten** at first then **livid-brown** or olivaceous or greyish white; margin **smooth.**	Pallid or pale violaceous then rusty cinnamon, adnate, emarginate or with tooth, subdistant, ventricose, often broad (up to 15 mm.) edge paler, rather thick and ± uneven.	50–80/3–8 mm., fusi ventricose or atte **blue-violaceous** like cap, then whitish at base and apex, with striate apex, soft, stuffed or hol	ellowish or rusty, t. downwards, covered at disc.	Mild. Inodorous.	±limoniform, v. rough, 12–15/6–8μ	Cystidia balloon-shaped or pyriform, 30–50/12–20μ.	In damp woods (deciduous or coniferous). Uncommon. (Found recently in *Sphagnum* under birch.)	Not well known and needs further study. Like a small pale *elatior* (No. 6) but with smooth cap and stem.
2. Delibuti.	Stem smoothly viscid below cortinal zone. Spores less than 10μ								
10. *delibutus* Fr.	30–90 mm., cvx. then cvx.-exp. or broadly umbonate, pale yellow, disc often darker or brighter **yellow** or more rarely tinged tawny, tawny buff here and there with age, v. viscid, sl. streaky or (in larger specimens) wrinkled when dry.	**Deep blue or violaceous blue at first,** quickly lilac or pale clay-blue, then yellowish, clay-brown or cinnamon, adnate ± emarginate or with tooth, subdistant to f. crowded, edge paler, denticulate.	long, subglobose to 50–100/6–15 mm. (8– below), clavate or at base, **white** smeared with **yellow** cid veil up to c zone, base white-tom often with white strands.	Taste mild yellowish esp. at Blush all when , blue sometimes fading in thick at	(Spp. 10–13). Mild (or sl. bitter after mastication). Inodorous, or faint, sl. radishy.	Subglobose to broadly ovate, rough, 7–10/6–8μ	Gill edge fertile.	Decid. or mixed woods (esp. birch and beech). Common, often gregarious or subcaespitose.	Easily recognised by colours and spore shape. The commonest member of this section. (Two uncommon species resemble *delibutus*—*Metrodi* (No. 5) distinguished by spore shape, and *decolorans* s. Cke. (No. 95), which is generally smaller **and** has a dry stem).

Species	Cap	Gills	Stem
11. *illibatus* Fr. *sensu* Henry (=*fulvoluteus* Britz.) (*non sensu* Metrod =*Metrodi* Hry.)	20–60 mm., cvx. then cvx.- or exp.-umbonate, **ochraceous or pale golden yellow,** often tinged tawny or later with sl. olive tint, v. viscid, smooth.	**Pinkish or ochraceous clay,** then ochraceous-buff or tinged rusty, adnate emarginate or with tooth, f. crowded, edge paler, uneven.	60–70/5–10 mm., ventri or clavate or with bas swollen, silvery white c pale violaceous, tinged raceous below, apex s striate, viscid below f cious cortinal zone, sc
12. *salor* Fr.	40–80 mm., cvx. then exp., umbonate or not, **bright azure blue or blue-violaceous** (at least on margin), then grey or livid brownish, glutinous, innately fibrillose below gluten.	**For a long time** lilaceous or **bluish,** then rusty-clay, adnate emarginate, subdistant, edge often bluish, crenulate or not.	60–100/10–20 mm., ver cose or clavate-acumin azure blue or blue vi ceous at first, becon whitish from base smooth and shiny (g nous when moist) be cortinal zone.
13. *epipoleus* Fr. (=*liquidus* Fr. *sec* Hry.)	40–80 mm., cvx. then exp., umbonate or not, **ochraceous-grey with olive-violaceous flush** then dingy white with livid ochre disc, **innately silky hoary** when dry; margin thin, striate.	Clay, then ± cinnamon, (**never violaceous**), adnate or subdecurrent, subdistant, broadest near stem, edge even.	50–90/7–15 mm., clavat fusiform, ± pointed base, whitish or violace apex striate, soft.
3. Amarescentes	Taste bitter (at least in cap cuticle). Colours often pale, esp. of gills and spore print, s (In some species the stem may become ± dry and in No. 20 the cap also.) (Spp. 14–		
14. *croceo-caeruleus* (Pers. ex Fr.) Fr.	20–50 mm., cvx. then exp.-cvx., often with disc sl. depressed, **pale to deep violaceous at first,** discolouring pale ochraceous from disc out or in patches, smooth.	Whitish or with faint blue tinge at first, soon clay ochraceous or with sl. saffron tint, finally rusty yellow or cinnamon, adnate, emarginate or not, f. crowded, often ventricose, edge paler, ± uneven.	40–60/5–13 mm., ventri fusiform ± pointed base (fig. 4), white tinged pallid or yello above, often persiste viscid below cortinal z but sometimes ± dry
15. *vibratilis* (Fr.) Fr.	20–60 mm., cvx. then exp. ± umbonate, bright **orange-yellow** or **golden tawny** with **paler margin,** yellower and shiny when dry.	Cream, then ochraceous or cinnamon-ochraceous, adnate, ± emarginate, crowded, not or sl. ventricose, edge even or uneven.	40–60/4–12 mm., ventri fusiform or clavate, often pointed, white, a ± pruinose, viscid shiny and becoming coloured sl. pale pallid low cortinal zone.
16. *causticus* Fr.	30–80 mm., cvx. broadly umbonate then expanded umbonate or sl. depressed, pale ochraceous or tinged tawny at disc, drying paler and with conspicuous **white silky sheen,** esp. noticeable at or near margin, viscid when moist but often found ± dry. (Continental authors give colours deeper, tawny or orange.)	Pale ochraceous, then yellowish-buff or rusty cinnamon, adnate to adnato-decurrent, emarginate or not (sometimes deeply so), f. crowded, often broad, ± ventricose, edge paler, even to sl. uneven.	30–80/4–12 mm., ± ec but often pointed at l white, whitish or ti ochraceous, apex ± ate, sl. viscid at first b sparse cortinal zone, fi stuffed then ± hol cortex almost carti nous.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
, sometimes ed yellowish, etimes sl. laceous at x of stem.	Mild. Inodorous.	Subglobose to broadly ovate, rough, $6\frac{1}{2}$–9/$7\frac{1}{2}\mu$ *sec* Hry.	Gill edge fertile.	Conif. woods (mountainous spruce *sec* Hry.). Rare.	Not well known and doubtfully British. Like a slender *delibutus* with no blue tints in gills and viscid veil on stem not yellow.
e or whitish, sh under cap stem cuticles.	Mild. Inodorous.	Subglobose, rough, 8–9($10\frac{1}{2}$)/7–8($8\frac{1}{2}$)μ	Gill edge fertile.	Decid. woods, esp. beech. V. uncommon.	Colour of young cap and gills and spore shape characteristic.
or whitish, larker under cuticle	Mild. Inodorous.	Subglobose or pruniform, punctate, 7–9/$6\frac{1}{2}\mu$ *sec* Hry.	Gill edge fertile.	Under spruce, or in moss and leaves in wet places. Rare.	Not well known and rather doubtfully British. Differs from *salor* (No. 12) in absence of blue in gills and duller cap colour; *lividoochraceus* (No. 4) is similar in colours but has different spores.
also cap. Spores less than 10μ long, subglobose to elliptic or elliptic-amygdaliform.					
or yellowish, etimes tinged or bluish er cap cuticle.	Bitter. Smell often strong, unpleasant, sour.	Elliptic-amygdaliform, smooth or almost so, $7\frac{1}{2}$–9/4–5μ	Gill edge fertile.	Beech. Fairly common.	Taste and colours quite characteristic.
, chraceous in n.	Very bitter. Smell none or faint, unpleasant.	Elliptic or ovate-pruniform, punctate, $6\frac{1}{2}$–8/$4\frac{1}{2}$–$5\frac{1}{2}\mu$	Gill edge fertile.	Conif. or mixed woods. Uncommon.	Recognised by taste and bright coloured cap; the brightest coloured member of this section.
llowish or **raceous** in m and under icle of cap, metimes whit- in centre of and stem.	**Flesh mild, only cuticle bitter.** Smell **often strong,** peculiar, pungent.	Elliptic or sl. elliptic-amygdaliform, smooth or almost so, 6–8/4–$4\frac{1}{2}\mu$	Gill edge fertile.	Decid. (esp. oak and beech) and conif. woods. Common some years, often in circles or gregarious.	Readily distinguished by mild flesh, bitter cuticle, firm stem, pale outside coloured within, and silky sheen on cap; also, perhaps less reliably, by smell. Nos. 17, 18 and 19 have bitter flesh and softer stem and No. 20, although having a firm stem, has bitter flesh and is drier and lacks smell.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
11. *illibatus* Fr. *sensu* Henry (= *fulvoluteus* Britz.) (*non sensu* Metrod = *Metrodi* Hry.)	20–60 mm., cvx. then cvx.- or exp.-umbonate, **ochraceous or pale golden yellow,** often tinged tawny or later with sl. olive tint, v. viscid, smooth.	**Pinkish or ochraceous clay,** then ochraccous-buff or tinged rusty, adnate emarginate or with tooth, f. crowded, edge paler, uneven.	60–70/5–10 mm., ventr… or clavate or with ba… swollen, silvery white … pale violaceous, tinged … raceous below, apex … striate, viscid below … cious cortinal zone, …	… sometimes … ld yellowish, … mes sl. … aceous at … of stem.	Mild. Inodorous.	Subglobose to broadly ovate, rough, 6½–9/7½–8½ *µ sec* Hry.	Gill edge fertile.	Conif. woods (mountainous spruce *sec* Hry.). Rare.	Not well known and doubtfully British. Like a slender *d.ilibatus* with no blue tints in gills and viscid veil on stem not yellow.
12. *salor* Fr.	40–80 mm., cvx. then exp., umbonate or not, **bright azure blue or blue-violaceous** (at least on margin), then grey or livid brownish, glutinous, innately fibrillose below gluten.	**For a long time** lilaceous or **bluish,** then rusty-clay, adnate emarginate, subdistant, edge often bluish, crenulate or not.	60–100/10–20 mm., ve… cose or clavate-acumi… azure blue or blue v… ceous at first, beco… whitish from base … smooth and shiny (… nous when moist) b… cortinal zone.	… or whitish, … h under cap … ten cuticles.	Mild. Inodorous.	Subglobose, rough, 8–9(10½)/7–8(8½) *µ*	Gill edge fertile.	Decid. woods, esp. beech. V. uncommon.	Colour of young cap and gills and spore shape characteristic.
13. *epipoleus* Fr. (= *liquidus* Fr. *sec* Hry.)	40–80 mm., cvx. then exp., umbonate or not, **ochraceous-grey with olive-violaceous flush** then dingy white with livid ochre disc, **innately silky hoary** when dry; margin thin, striate.	Clay, then ± cinnamon, **(never violaceous),** adnate or subdecurrent, subdistant, broadest near stem, edge even.	50–90/7–15 mm., clava… fusiform, ± pointed … base, whitish or violac… apex striate, soft.	… or whitish, … darker under … cuticle	Mild. Inodorous.	Subglobose or pruniform, punctate, 7–9/6½ *µ sec* Hry.	Gill edge fertile.	Under spruce, or in moss and leaves in wet places. Rare.	Not well known and rather doubtfully British. Differs from *salor* (No. 12) in absence of blue in gills and duller cap colour; *livido-ochraceus* (No. 4) is similar in colours but has different spores.
3. **Amarescentes**	Taste bitter (at least in cap cuticle). Colours often pale, esp. of gills and spore print, … (In some species the stem may become ± dry and in No. 20 the cap also.) (Spp. 14…			… also cap. Spores less than 10 *µ* long, subglobose to elliptic or elliptic-amygdaliform.					
14. *croceo-caeruleus* (Pers. ex Fr.) Fr.	20–50 mm., cvx. then exp.-cvx., often with disc sl. depressed, **pale to deep violaceous at first,** discolouring pale ochraceous from disc out or in patches, smooth.	Whitish or with faint blue tinge at first, soon clay ochraceous or with sl. saffron tint, finally rusty yellow or cinnamon, adnate, emarginate or not, f. crowded, often ventricose, edge paler, ± uneven.	40–60/5–13 mm., ventri… fusiform ± pointed … base (fig. 4), white … tinged pallid or yell… above, often persist… viscid below cortinal … but sometimes ± dry.	… at yellowish, … defined tinged … or bluish … cap cuticle.	Bitter. Smell often strong, unpleasant, sour.	Elliptic-amygdaliform, smooth or almost so, 7½–9/4–5 *µ*	Gill edge fertile.	Beech. Fairly common.	Taste and colours quite characteristic.
15. *vibratilis* (Fr.) Fr.	20–60 mm., cvx. then exp. ± umbonate, bright **orange-yellow** or **golden tawny** with **paler margin,** yellower and shiny when dry.	Cream, then ochraceous or cinnamon-ochraceous, adnate, ± emarginate, crowded, not or sl. ventricose, edge even or uneven.	40–60/4–12 mm., ventri… fusiform or clavate, … often pointed, white, … ± pruinose, viscid … shiny and becoming … coloured sl. pale pallid … low cortinal zone.	…raceous in … and under … cap, …	Very bitter. Smell none or faint, unpleasant.	Elliptic or ovate-pruniform, punctate, 6½–8/4½–5½ *µ*	Gill edge fertile.	Conif. or mixed woods. Uncommon.	Recognised by taste and bright coloured cap; the brightest coloured member of this section.
16. *causticus* Fr.	30–80 mm., cvx. broadly umbonate then expanded umbonate or sl. depressed, pale ochraceous or tinged tawny at disc, drying paler and with conspicuous **white silky sheen,** esp. noticeable at or near margin, viscid when moist but often found ± dry. (Continental authors give colours deeper, tawny or orange.)	Pale ochraceous, then yellowish-buff or rusty cinnamon, adnate to adnato-decurrent, emarginate or not (sometimes deeply so), f. crowded, often broad, ± ventricose, edge paler, even to sl. uneven.	30–80/4–12 mm., ± … but often pointed at … white, whitish or … ochraceous, apex ± … ate, sl. viscid at first … sparse cortinal zone, … stuffed then ± … cortex almost … nous.	…llowish or …raceous in … nd under … de of cap, … times whit… h centre of … and stem.	**Flesh mild, only cuticle bitter.** Smell **often strong,** peculiar, pungent.	Elliptic or sl. elliptic-amygdaliform, smooth or almost so, 6–8/4–4½ *µ*	Gill edge fertile.	Decid. (esp. oak and beech) and conif. woods. Common some years, often in circles or gregarious.	Readily distinguished by mild flesh, bitter cuticle, firm stem, pale outside coloured within, and silky sheen on cap; also, perhaps less reliably, by smell. Nos. 17, 18 and 19 have bitter flesh and softer stem and No. 20, although having a firm stem, has bitter flesh and is drier and lacks smell.

Species	Cap	Gills	Stem
17. *pluvius* (Fr.) Fr. *sensu* Fries	**12-30 (40)** mm., conico-cvx. or cvx. then exp. ± broadly umbonate (fig. 3), pale ochraceous or buff, disc generally darker (tinged tawny), drying paler (almost white) with silky sheen at least at margin; **margin** often sl. **striate** when moist.	**Very pale,** whitish or clay, then pale ochraceous or yellowish to pallid clay, adnate to adnato-decurrent, often narrowly so, emarginate or not, rather distant, ventricose, edge even or sl. flocculose.	30–60 (80)/2–3 mm., **slen** equal, flexuose, someti swollen more often poi at base, pure white at f discolouring pale palli yellowish, often w silky striate, esp. at a very soft, viscid w fresh, cortina sparse, gacious.
18. *emollitus* Fr.	35–100 mm., cvx. broadly umbonate or truncate then exp. umbonate or irregular, **almost white** at first, disc soon pale ochraceous or buff, often streaky or innately fibrillose about disc, very viscid, shiny when dry.	Creamy then pale ochraceous or ochraceous-clay, finally cinnamon-ochre, adnate emarginate, ± crowded, often broad and ± ventricose, edge concolorous, ± even.	40–80/7–20 mm., equal o swollen near ± poi base, sometimes c pressed, white discol ing sl. pallid at apex, white and ± viscid be fugacious cortinal z later discolouring yel ish, rather soft, stu then hollow.
19. *crystallinus* Fr. *sensu* Kuhner & Romagnesi	(15) 30–70 mm., cvx. or cvx. truncate then cvx.-exp. ± umbonate, **pure white** at first, disc discolouring ivory or pale pallid yellowish but margin generally remaining white, sometimes innately streaky here and there near margin; margin sometimes remaining incurved for a long time.	Whitish or creamy, then pale dingy- or ochraceous-buff, adnate or adnato-decurrent, often narrowly so, ± crowded, generally **narrow** but sl. ventricose near stem, edge paler or not, often sl. uneven.	55–100/4–13 mm., **fusifo or attenuated do wards,** more rarely equal and flexuose, a attenuated or not, bas pointed, pure white dis ouring pale pallid yel ish, apex white pruin viscidly white-tomen below fugacious cort zone, soon ± smooth, at first then rather so
20. *ochroleucus* (Schaeff. ex Fr.) Fr.	30–80 mm., cvx. then exp. umbonate or broadly umbonate, pale whitish, then **pale pallid** with ± ochraceous disc, with **white silky sheen** at least at first, **dry** (but sl. viscid when very wet *sec* Lange); margin sometimes abruptly incurved. (The white silky sheen rubs off showing darker colour below.)	Whitish then clay, pallid or ochraceous, adnate or almost free, broadest near stem, ± crowded.	25–90/5–12 mm., ventri with ± pointed b white silky, cortinal present near apex, fl and rather tough, s then ± hollow.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
lorous in cap, ring whitish, en pure white lower half of m and pale lowish at apex stem.	Bitter. Inodorous.	Elliptic or v. sl. elliptic-amygdaliform, punctate, v. pale *sub micr.* and **ochre** in mass, $6\frac{1}{2}$–$8(8\frac{1}{2})/4$–5μ	Gill edge fertile.	In damp places, e.g. under heather in pinewood, or in wet leaves in ditches. Uncommon, often single specimens.	Recognised by small size, striate edge of cap when moist and soft stem: *emollitus* (No. 18) is larger and less viscid with non-striate cap and appears to have darker more elliptic-amygdaliform spores: *crystallinus* (No. 19) is also usually larger and has quite different spores. (See notes.)
sh, pure white base of stem, ged yellowish apex of stem t under cap icle, often h horny line r gills, firm at t but soon .	Bitter. Smell faint to f. strong, peculiar, or sour.	**Elliptic-amygdaliform**, ± smooth, rusty ochre in mass, **7–9/4–5**μ (fig. 11).	Gill edge fertile.	Decid. woods (esp beech); also conif. *sec* Ricken. Fairly common, often in small numbers or single specimens, sometimes gregarious.	Very similar microscopically to No. 19 but readily distinguished by spores: never so small as *pluvius* (No. 17) nor with striate cap edge and spores apparently darker. Much softer and generally paler than Nos. 16 or 20. (See notes.)
e, soon tinged lowish-white apex of stem, ally darker llowish-buff), irm then soft l spongy.	Bitter. Smell faint to f. strong, sour.	**Subglobose to broadly ovate,** finely punctate or almost smooth, often 1-guttulate, **$4\frac{1}{2}$–$6\frac{1}{2}/3\frac{1}{2}$–$4\frac{1}{2}\mu$** (fig. 12)	Gill edge fertile.	Decid. woods (esp. becch). Fairly common some years, often gregarious.	Distinguished from all other members of this section by spore shape. Similar to *emollitus* (No. 18) macroscopically but appears to have narrower gills, a less equal stem and paler colours. (See notes on *emollitus*.)
sh.	Bitter. Inodorous.	Elliptic-pruniform, ± smooth, 7–8/4–5μ	Not known	Decid. woods esp. oak. Sometimes caespitose. Uncommon.	Rarely seen viscid but included here because of its bitter taste, pale colours and spores, resembling Nos. 16–19. Most closely resembles *causticus* (No. 16) in firm stem and cap with silky sheen, but is drier, not so bright coloured, lacks smell and the flesh is bitter.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
17. *pluvius* (Fr.) Fr. *sensu* Fries	**12-30 (40)** mm., conico-cvx. or cvx. then exp. ± broadly umbonate (fig. 3), pale ochraceous or buff, disc generally darker (tinged tawny), drying paler (almost white) with silky sheen at least at margin; **margin** often sl. **striate** when moist.	**Very pale,** whitish or clay, then pale ochraceous or yellowish to pallid clay, adnate to adnato-decurrent, often narrowly so, emarginate or not, rather distant, ventricose, edge even or sl. flocculose.	30–60 (80)/2–3 mm., slig… equal, flexuose, some… swollen more often… at base, pure white at… discolouring pale pall… yellowish, often … silky striate, esp. at … very soft, viscid … fresh, cortina sparse… gacious.	…ous in cap, …ge whitish, …ure white … turn half of … and pale …ards at apex …rem.	Bitter. Inodorous.	Elliptic or v. sl. elliptic-amygdaliform, punctate, v. pale *sub micr.* and **ochre** in mass, 6½–8(8½)/4–5 *μ*	Gill edge fertile.	In damp places, e.g. under heather in pinewood, or in wet leaves in ditches. Uncommon, often single specimens.	Recognised by small size, striate edge of cap when moist and soft stem: *emollitus* (No. 18) is larger and less viscid with non-striate cap and appears to have darker more elliptic-amygdaliform spores: *crystallinus* (No. 19) is also usually larger and has quite different spores. (See notes.)
18. *emollitus* Fr.	35–100 mm., cvx. broadly umbonate or truncate then exp. umbonate or irregular, **almost white** at first, disc soon pale ochraceous or buff, often streaky or innately fibrillose about disc, very viscid, shiny when dry.	Creamy then pale ochraceous or ochraceous-clay, finally cinnamon-ochre, adnate emarginate, ± crowded, often broad and ± ventricose, edge concolorous, ± even.	40–80/7–20 mm., equal … swollen near ± … base, sometimes … pressed, white disc… ing sl. pallid at apex, … white and ± viscid … fugacious cortinal … later discolouring … ish, rather soft, st… then hollow.	…sh pure white …se of stem, …es yellowish …ges of stem … under cap …ticle, often … horny line … grills, firm at … but soon …	Bitter. Smell faint to f. strong, peculiar, or sour.	**Elliptic-amygdaliform,** ± smooth, rusty ochre in mass, **7–9/4–5** *μ* (fig. 11).	Gill edge fertile.	Decid. woods (esp beech); also conif. *sec* Ricken. Fairly common, often in small numbers or single specimens, sometimes gregarious.	Very similar microscopically to No. 19 but readily distinguished by spores: never so small as *pluvius* (No. 17) nor with striate cap edge and spores apparently darker. Much softer and generally paler than Nos. 16 or 20. (See notes.)
19. *crystallinus* Fr. *sensu* Kuhner & Romagnesi	(15) 30–70 mm., cvx. or cvx. truncate then cvx.-exp. ± umbonate, **pure white** at first, disc discolouring ivory or pale pallid yellowish but margin generally remaining white, sometimes unately streaky here and there near margin; margin sometimes remaining incurved for a long time.	Whitish or creamy, then pale dingy- or ochraceous-buff, adnate or adnato-decurrent, often narrowly so, ± crowded, generally **narrow** but sl. ventricose near stem, edge paler or not, often sl. uneven.	55–100/4–13 mm., fusi… **or attenuated** … **wards,** more rarely … equal and flexuose, … attenuated or not, base … pointed, pure white … ouring pale pallid … ish, apex white … viscidly white-tomen… below fugacious … zone, soon ± smooth. … at first then rather …	…n tinged … ash-white … ges of stem, … darker … ish-buff), … firm then soft … pongy.	Bitter. Smell faint to l. strong, sour.	**Subglobose to broadly ovate,** finely punctate or almost smooth, often 1-guttulate, **4½–6½/3½–4½** *μ* (fig. 12)	Gill edge fertile.	Decid. woods (esp. beech). Fairly common some years, often gregarious.	Distinguished from all other members of this section by spore shape. Similar to *emollitus* (No. 18) macroscopically but appears to have narrower gills, a less equal stem and paler colours. (See notes on *emollitus*.)
20. *ochroleucus* (Schaeff. ex Fr.) Fr.	30–80 mm., cvx. then exp. umbonate or broadly umbonate, pale whitish, then **pale pallid** with ± ochraceous disc, with **white silky sheen** at least at first, **dry** (but sl. viscid when very wet *see* Lange); margin sometimes abruptly incurved. (The white silky sheen rubs off showing darker colour below.)	Whitish then clay, pallid or ochraceous, adnate or almost free, broadest near stem, ± crowded.	25–90/5–12 mm., ventr… with ± pointed … white silky, cortinal … present near apex, … and rather tough, … then ± hollow.		Bitter. Inodorous.	Elliptic-pruniform, ± smooth, 7–8/4–5 *μ*	Not known	Decid. woods esp. oak. Sometimes caespitose. Uncommon.	Rarely seen viscid but included here because of its bitter taste, pale colours and spores, resembling Nos. 16–19. Most closely resembles *causticus* (No. 16) in firm stem and cap with silky sheen, but is drier, not so bright coloured, lacks smell and the flesh is bitter.

Species	Cap	Gills	Stem
II. PHLEGMACIUM	Cap viscid at least when young, generally cvx. then exp. or sl. depressed. Gills gene		
A. Scauri	Stem with marginate or rounded marginate (rarely immarginate) bulb *or* gills and		
(a) Leucophylli	Young gills white, whitish or clay coloured (rarely v. sl. bluish in *amarescens* (No.		
4. Multiformes.	Stem bulb variable, sharply marginate, rounded marginate or almost immarginate,		
	often becoming ochraceous or yellowish. Smell sometimes strong, either of apples (		
21. *multiformis* Fr. *sensu* Konr. & Maubl., Henry (=*polymorphus* Hry.) (*non sensu* Ricken, Bres., Lange)	45–100 mm., cvx. then exp. with margin often **strongly abruptly incurved, yellowish or ochraceous,** disc often darker (tinged tawny), margin generally yellower, sometimes with whitish adpressed fragments of veil; margin even or sl. wrinkled, often innately fibrillose when older.	Whitish or clay, then pallid or ochraceous, finally rusty tinged, often with sl. tooth, barely ventricose, edge almost even to serrulate.	45–70/10–25 mm. (16 mm. in bulb), bulb **va able**, from sharply n ginate to rounded n ginate or clavate-imn ginate, white soon yell ish or tinged rusty, w silky fibrillose, cor white, base white-ton tose.
22. *melliolens* J. Schaeffer (=*multiformis sensu* Ricken, Bres.)	40–100 mm., ± **bright yellow ochraceous** or tawny yellow-buff, **white silky hoary** from veil at least when young (thus resembling *Rozites caperatus*); margin thin, incurved at first.	Whitish or clay, then clay cinnamon or tinged rusty, edge serrulate.	50–80/10–14 mm. (20 mm. in bulb), shape **va able**, ± clavate v immarginate bulb to ec with ± marginate b white becoming ± yell ish or ochraceous, cor white, base white-ton tose.
*23. *ochropallidus* Hry.	60–70 mm., almost **unicolorous** pale creamy-ochre, sl. innately fibrillose, soon dry and opaque; margin smooth, rather thin, soon expanded.	Whitish, then pale ochraceous to buff, edge almost even to sl. serrulate.	70–90/10–15 mm. (up 25 mm. in bulb), ± ec with **f. constant, roun** but distinctly margir bulb, white then ± oc ceous or yellowish, below, cortina fugaci
24. *allutus* Fr. *sensu* Lange	25–55 mm., **unicolorous tawny reddish** or reddish brown at first, disc becoming paler (yellowish or buff), margin remaining darker, sometimes ± appendiculate with white cortina.	Whitish, then ochraceous clay or pallid, edge serrulate, paler or not.	40–60/4–11 mm. (up 25 mm. in bulb), equa sl. attenuated upw with **conspicuous** rounded marginate b white, becoming yello or tawny ochraceous tinged with cap col bulb white below.
†25. *amarescens* Moser (=*talus sensu* Lange)	35–70 mm., sometimes sl. umbonate, pale clay, then **pale ochraceous** to yellow ochraceous or buff, viscid then dry and shining, sometimes sl. innately fibrillose; margin soon straight, often paler.	Pale clay (rarely v. sl. bluish) then clay brown or rusty, ± linear, edge ± uneven or sl. serrulate.	40–75/5–13 mm. (12–23 i in bulb), ± equal v **rather small** ± roun marginate bulb, wh becoming sl. brow below, white silky fi striate, cortina white.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
te ± emarginate or with tooth, ± crowded. Stem never viscid. (Spp. 21–102.)					
ng purplish when bruised or rubbed. (Spp. 21–73.)					
21–34.)					
y marginate. Cap at first ochraceous, yellow, buff or tinged tawny, rarely paler. Flesh soon soft, white at first, honey. (Spp. 21–25.)					
e then whitish ± yellowish . in centre of) and stem, firm at first, n soft.	Mild. Smell often strong of **apples** or acid.	Amygdaliform to **sublimoniform,** rough, **9-11(12)/5½-6½ μ**	Gill edge sterile with cylindric-clavate cells 5–8μ wide. NaOH + flesh yellowish, + cap cuticle reddish- or purplish-brown.	Decid. woods, esp. beech (also conif. *sec* K.M.). Uncommon.	Fries' *multiformis* is a collective species; this is the species with ± limoniform spores more than 10μ long typical of beech woods, distinguished from other Leucophylli by cap colours and variable bulb. (See notes.)
ish or sl. yel- wish.	Mild. Smell of **honey,** faint or strong.	Elliptic to **elliptic-amygdaliform,** almost smooth, **8-9/4½-5μ** *sec* Moser.	Gill edge fertile. NaOH + flesh and cap cuticle ± brownish.	Decid. and conif. woods. (Distribution not known in Britain.	Recognised by its small ± elliptic spores less than 10μ long, f. bright coloured cap, variable bulb and smell of honey. (See notes.)
e then whitish creamy, tinged hraceous in lb.	Mild. Inodorous.	Elliptic-amygdaliform, punctate, **10-11/5½-6μ** *sec* Hry.	Gill edge sterile. NaOH + flesh and cap cuticle ± nil.	Decid. woods, often solitary.	Differs from *multiformis* (No. 21) in dull almost unicolorous cap, with straight thin margin, lack of smell and more distinct rounded marginate bulb. Not yet recorded from Britain (See notes.)
te, then tinged th colour of cap upper part of em and in cap.	Mild. Smell none or faint, pleasant.	**Elliptic,** minutely punctate, **8½–10/4½–5½μ** *sec* Hry.		Conif. woods. V. uncommon.	Not well known in Britain, nor found in recent years, but readily recognised by cap colour, small size and small ± elliptic spores. (See notes.)
te, then whitish tinged buff in wer part of em; (with horny ıe over gills *c* Lange).	Flesh mild, cap cuticle ± bitter. Smell none or faint, pleasant.	Elliptic-amygdaliform, punctate, **8–10/4½–5½μ**	Gill edge fertile.	Conif. or mixed woods (British record beech and yew). Uncommon.	Recognised by its ± uniform pale or rather dull cap colour, small spores and bitterish taste of cap cuticle. Included in this section because of the rather small stem bulb.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
II. PHLEGMACIUM	Cap viscid at least when young, generally evx. then exp. or sl. depressed. Gills [illegible] ± emarginate or with tooth, ± crowded. Stem never viscid. (Spp. 21–102.)								
A. Scauri	Stem with marginate or rounded marginate (rarely immarginate) bulb or gills and [illegible] ging purplish when bruised or rubbed. (Spp. 21–73.)								
(a) Leucophylli	Young gills white, whitish or clay coloured (rarely v. sl. bluish in *amarescens* (No [illegible]-34.)								
4. Multiformes.	Stem bulb variable, sharply marginate, rounded marginate or almost immarginate, [illegible] marginate. Cap at first ochraceous, yellow, buff or tinged tawny, rarely paler. Flesh soon soft, white at first, often becoming ochraceous or yellowish. Smell sometimes strong, either of apples [illegible]-grey. (Spp. 21–25.)								
21. *multiformis* Fr. *sensu* Konr. & Maubl., Henry (=*polymorphus* Hry.) (*non sensu* Ricken, Bres., Lange)	45–100 mm., evx. then exp. with margin often **strongly abruptly incurved, yellowish or ochraceous,** disc often darker (tinged tawny), margin generally yellower, sometimes with whitish adpressed fragments of veil; margin even or sl. wrinkled, often innately fibrillose when older.	Whitish or clay, then pallid or ochraceous, finally rusty tinged, often with sl. tooth, barely ventricose, edge almost even to serrulate.	45–70/10–25 mm. ([illegible] mm. in bulb), bulb [illegible]able, from sharply [illegible]ginate to rounded [illegible]ginate or clavate-[illegible]ginate, white soon [illegible]ish or tinged rusty, [illegible] silky fibrillose, [illegible] white, base white-[illegible]tose.	then whitish ± yellowish in centre of [illegible] and stem, [illegible]ning at first, [illegible]s soft.	Mild. Smell often strong of **apples** or acid.	Amygdaliform to **sublimoniform,** rough, **9-11(12)/5½-6½ μ**	Gill edge sterile with cylindric-clavate cells 5–8 μ wide. NaOH + flesh yellowish, + cap cuticle **reddish- or purplish-brown.**	Decid. woods, esp. beech (also conif. *see* K.M.). Uncommon.	Fries' *multiformis* is a collective species; this is the species with ± limoniform spores more than 10 μ long typical of beech woods, distinguished from other Leucophylli by cap colours and variable bulb. (See notes.)
22. *melliolens* J. Schaeffer (=*multiformis sensu* Ricken, Bres.)	40–100 mm., ± **bright yellow ochraceous** or tawny yellow-buff, **white silky hoary** from veil at least when young (thus resembling *Roxites caperatus*); margin thin, incurved at first.	Whitish or clay, then clay cinnamon or tinged rusty, edge serrulate.	50–80/10–14 mm. ([illegible] mm. in bulb), shape [illegible]able, ± clavate [illegible] immarginate bulb to [illegible] with ± marginate [illegible] white becoming ± [illegible] ish or ochraceous, [illegible] white, base white-[illegible]tose.	[illegible] or sl. yel-[illegible]sh.	Mild. Smell of **honey,** faint or strong.	Ellptic to **elliptic-amygdaliform,** almost smooth, **8-9/4½-5 μ** *see* Moser.	Gill edge fertile. NaOH + flesh and cap cuticle ± brownish.	Decid. and conif. woods. (Distribution not known in Britain.	Recognised by its small ± elliptic spores less than 10 μ long, f. bright coloured cap, variable bulb and smell of honey. (See notes.)
***23.** *ochropallidus* Hry.	60–70 mm., almost **unicolorous** pale creamy-ochre, sl. innately fibrillose, soon dry and opaque; margin smooth, rather thin, soon expanded.	Whitish, then pale ochraceous to buff, edge almost even to sl. serrulate.	70–90/10–15 mm. (up [illegible] 25 mm. in bulb), ± [illegible] with **f. constant,** rou[illegible] but distinctly marg[illegible] bulb, white then ± oc[illegible]ceous or yellowish, [illegible] below, cortina fugac[illegible]	then whitish [illegible]wny, tinged [illegible]raceous in [illegible]	Mild. Inodorous.	Elliptic-amygdaliform, punctate, **10-11/5½-6 μ** *see* Hry.	Gill edge sterile. NaOH + flesh and cap cuticle ± nil.	Decid. woods, often solitary.	Differs from *multiformis* (No. 21) in dull almost unicolorous cap, with straight thin margin, lack of smell and more distinct rounded marginate bulb. Not yet recorded from Britain (See notes.)
24. *allutus* Fr. *sensu* Lange	25–55 mm., **unicolorous tawny reddish** or reddish brown at first, disc becoming paler (yellowish or buff), margin remaining darker, sometimes ± appendiculate with white cortina.	Whitish, then ochraceous clay or pallid, edge serrulate, paler or not.	40–60/4–11 mm. (up [illegible] 25 mm. in bulb), [illegible] sl. attenuated upw[illegible] with **conspicuous** [illegible] rounded marginate [illegible] white, becoming yello[illegible] or tawny ochraceous, [illegible] tinged with cap c[illegible] bulb white below.	[illegible]s then tinged [illegible]colour of cap [illegible]yer part of [illegible]s and in cap.	Mild. Smell none or faint, pleasant.	**Elliptic,** minutely punctate, **8½-10/4½-5½ μ** *see* Hry.		Conif. woods. V. uncommon.	Not well known in Britain, nor found in recent years, but readily recognised by cap colour, small size and small ± elliptic spores. (See notes.)
†**25.** *amorescens* Moser (=*tolus sensu* Lange)	35–70 mm., sometimes sl. umbonate, pale clay, then **pale ochraceous** to yellow ochraceous or buff, viscid then dry and shining, sometimes sl. innately fibrillose; margin soon straight, often paler.	Pale clay (rarely v. sl. bluish) then clay brown or rusty, ± linear, edge ± uneven or sl. serrulate.	40–75/5–13 mm. (12–2[illegible] in bulb), ± equal **rather small** ± rou[illegible] marginate bulb, w[illegible] becoming sl. bro[illegible] below, white silky striate, cortina white.	[illegible] then whitish [illegible]ged buff in [illegible] part of [illegible]with horny [illegible] over gills [illegible]ange).	Flesh mild, cap cuticle ± bitter. Smell none or faint, pleasant.	Elliptic-amygdaliform, punctate, **8-10/4½-5½ μ**	Gill edge fertile.	Conif. or mixed woods (British record beech and yew). Uncommon.	Recognised by its ± uniform pale or rather dull cap colour, small spores and bitterish taste of cap cuticle. Included in this section because of the rather small stem bulb.

Species	Cap	Gills	Stem
5. Napi.	Stem with conspicuous wide lowish or ochraceous esp.	free-edged marginate bulb. Cap at first yellow, buff, ta under cap cuticle, in bulb or	when eaten by grubs. l
26. *napus* Fr. *sensu* Konr. & Maubl. (*non sensu* Vel., Henry)	50–100 mm., **chestnut** or date-brown-tawny to smoky-brown, **very viscid**; margin smooth, often abruptly incurved.	Whitish then pale clay cinnamon to ± rusty, subdistant, ± ventricose, often rather broad, edge serrulate.	30–60/10–25 mm. (up to m.m. in bulb), rather sl and thick, equal or sl. tenuated upwards v **large** ± obconic o oblique bulb, white, s shiny at first, firm, cor white, fugacious, t white then tinged yell ish or rusty.
27. *corrosus* Fr.	50–100 mm., rusty brown, then **pallid clay-brown** often with darker reddish-brown spots, **soon dry,** opaque and flocculose.	Whitish then clay- or darker-rusty, ± linear, sometimes very narrow, edge uneven.	20–50/10–25 mm. (up 30 mm. or more in bu short and robust with spicuous (occasionally well-marked) margi bulb, whitish t tinged ochraceous or r below, cortina white.
28. *subturbinatus* Hry. (=*sulphurinus sensu* Lange)	35–100 mm., **tawny- or rusty-buff,** often darker (date-brown) when older, margin yellowish at first, often with adpressed **whitish patches** from veil, esp. at or near margin; margin for a long time incurved, from sl. to rather conspicuously innately fibrillose when older.	Pale clay then ochraceous clay finally rusty buff, not or sl. ventricose, edge even and concolorous at first, soon paler and serrulate.	35-100/7-20 mm. (18-45 in bulb), ± equal **very wide** sometimes que marginate bulb 2), white, discolouring lowish or ochraceous, near base and upper of bulb, cortina wh bulb white-tomen below.
†**29.** *Langei* Hry.	50–105 mm., cvx. or cvx. umbonate then exp. ± umbonate (often broadly so) to sl. depressed, **pale primrose** or chrome yellow, becoming deeper yellow with age, disc often tinged ochraceous or buff, with scattered white adpressed patches of veil esp. on disc, sometimes sl. innately fibrillose when old; margin incurved at first but soon expanded.	**White** then pale clay (**remaining pale** for a long time), finally cinnamon ochre or pallid rusty clay, adnate emarginate or with tooth, crowded, sl. ventricose, edge paler, ± uneven.	40-80/10-22 mm. (20-35 in bulb), ± equal ab rather wide often obl marginate bulb (somet rounded-marginate w older), white soon tir ochraceous-yellow or lid, esp. at base, w cortina rather sparse, l white then ochraceous- esp. on the edge.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
stnut. Flesh firm, often hard at first, generally ± persistently white or whitish but sometimes tinged yellow with strong aromatic or rank smell. (Spp. 26–32).					
or whitish, horny over or under cap le, firm at thick at	Mild. Inodorous.	Amygdaliform to ±limoniform, rough, **12–15/7–9**μ *sec* K. & M.		Conif. woods, esp. pine. Uncommon.	Like many Phlegmacia of coniferous woods not well known in Britain. More robust and viscid than section Multiformes with more pronounced stem bulb. Distinguished from other Leucophylli by dark cap colour and large spores (and, presumably, habitat).
and white, times sl. yelh or ochracender cuticle disc of or in bulb, at disc.	Mild. Inodorous.	Sublimoniform to almost **fusiform,** f. rough, 9–12/4–5(6)μ *sec* Moser.	Gill edge sterile. cells 6–7μ wide. NaOH + flesh, sl. reddish brown, + cap cuticle darker reddish-brown.	Mountainous conif. woods. V. uncommon in Britain.	Not well known in this country and needs further study. Drier, rather paler and with smaller spores than *napus* (No. 26); *napus* sensu Hry. (=*pseudonapus* Hry.) may be identical.
very firm at t, discolouryellowish or at base of under cap le and esp. e eaten by .	Mild. Smell faint to rather strong, rank or sour (but occ. sl. fruity when young).	Amygdaliform to sublimoniform, f. rough to rough, **(10)11-14/6-7½(8)**μ	Gill edge fertile. NaOH + flesh ± nil, + cap cuticle slowly ± sepia or purplish-brown.	Beech woods. Fairly common on chalk.	Variable in size, often rather large and robust. Distinguished from Nos. 26 and 27 by patches of veil on cap, smell and spore size and shape. (See notes.)
soon tinged **aceous yel**esp. under le of cap and wer part of and bulb, **hard** at	Mild. Smell none or slight (rank).	Elliptic-amygdaliform, punctate, **8-10(11)/5-6**μ	Gill edge fertile. NaOH + flesh sl. darker (pallid buff), + cap cuticle sl. reddish-brown.	Beech woods. Uncommon (so far always on chalk soil).	Readily distinguished by the yellow cap, pale gills, hard flesh when young which, however, turns yellowish and becomes softer with age, and relatively small spores. This description is based on British material, but agrees reasonably well with the fungus described under this name in *Bull. Soc. mycol. Fr.* LV (1939), p. 169, by Henry. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
5. Napi.	Stem with conspicuous wide lowish or ochraceous esp.	free-edged marginate bulb. Cap at first yellow, buff, under cap cuticle, in bulb or	when eaten by grubs.	Flesh firm, often hard at first, generally ± persistently white or whitish but sometimes tinged yel-	with strong aromatic or rank smell. (Spp. 26–32).				
26. *napus* Fr. *sensu* Konr. & Maubl. (*non sensu* Vel., Henry)	50–100 mm., **chestnut** or date-brown-tawny to smoky-brown, **very viscid**, margin **smooth**, often abruptly incurved.	Whitish then pale clay cinnamon to ± rusty, subdistant, ± ventricose, often rather broad, edge serrulate.	30–60/10–25 mm. (typ m.m. in bulb), rather and thick, equal or tenuated upwards **large** ± obconic oblique bulb, white shiny at first, firm, white, fugacious, white then tinged ish or rusty.	ge whitish, ewhat horny over ; under cap ge, firm at thick at	Mild. Inodorous.	Amygdaliform to ±limoniform, rough, **12–15/7–9 μ** *see* K. & M.		Conif. woods, esp. pine. Uncommon.	Like many Phlegmacia of coniferous woods not well known in Britain. More robust and viscid than section Multiformes with more pronounced stem bulb. Distinguished from other Leucophylli by dark cap colour and large spores (and, presumably, habitat).
27. *corrosus* Fr.	50–100 mm., rusty brown, then **pallid clay-brown** often with darker reddish-brown spots, **soon dry,** opaque and floeculose.	Whitish then clay- or darker-rusty, ± linear, sometimes very narrow, edge uneven.	20–50/10–25 mm. long 30 mm. or more in short and robust with spicuous (occasionally well-marked) marg bulb, whitish tinged ochraceous or below, cortina white	ed white, ness sl. yel- ochrace- der cuticle ase of e in bulb, at disc.	Mild. Inodorous.	Sublimoniform to almost **fusiform,** f. rough, 9–12/4–5(6) μ *see* Moser.	Gill edge sterile. cells 6–7 μ wide. NaOH + flesh, sl. reddish brown, + cap cuticle darker reddish-brown.	Mountainous conif. woods. V. uncommon in Britain.	Not well known in this country and needs further study. Drier, rather paler and with smaller spores than *napus* (No. 26); *napus* sensu Hry. (=*pseudonapus* Hry.) may be identical.
28. *subturbinotus* Hry. (=*sulphurinus sensu* Lange)	35–100 mm., **tawny- or rusty-buff,** often darker (date-brown) when older, margin yellowish at first, often with adpressed **whitish patches** from veil, esp. at or near margin; margin for a long time incurved, from sl. to rather conspicuously innately fibrillose when older.	Pale clay then ochraceous clay finally rusty buff, not or sl. ventricose, edge even and concolorous at first, soon paler and serrulate.	35–100/7–20 mm. (18–1 in bulb), ± equal **very wide** sometimes que marginate bulb 2), white, discolour lowish or ochraceous near base and upper of bulb, cortina bulb white-tom below.	very firm at ish, discolour- yellowish or at base of under cap and esp. eaten by	Mild. Smell faint to rather strong, rank or sour (but occ. sl. fruity when young).	Amygdaliform to sublimoniform, f. rough to rough, **(10)11–14/6–7½(8) μ**	Gill edge fertile. NaOH + flesh ± nil, + cap cuticle slowly ± sepia or purplish-brown.	Beech woods. Fairly common on chalk.	Variable in size, often rather large and robust. Distinguished from Nos. 26 and 27 by patches of veil on cap, smell and spore size and shape. (See notes.)
†**29.** *Longei* Hry.	50–105 mm., cvx. or cvx. umbonate then exp. ± umbonate (often broadly so) to sl. depressed, **pale primrose** or chrome yellow, becoming deeper yellow with age, disc often tinged ochraceous or buff, with scattered white adpressed patches of veil esp. on disc, sometimes sl. innately fibrillose when old; margin incurved at first but soon expanded.	**White** then pale clay (**remaining pale** for a long time), finally cinnamon ochre or pallid rusty clay, adnate emarginate or with tooth, crowded, sl. ventricose, edge paler, ± uneven.	40–80/10–22 mm. (20–3 in bulb), ± equal rather wide often o marginate bulb (some rounded-marginate older), white soon l ochraceous-yellow lid, esp. at base cortina rather sparse white then ochraceous esp. on the edge.	brown tinged ochraceous yel- esp. under cap and upper part of and bulb, hard at	Mild. Smell none or slight (rank).	Elliptic-amygdaliform, punctate, **8–10(11)/5–6 μ**	Gill edge fertile. NaOH + flesh sl. darker (pallid buff), + cap cuticle sl. reddish-brown.	Beech woods. Uncommon (so far always on chalk soil).	Readily distinguished by the yellow cap, pale gills, hard flesh when young which, however, turns yellowish and becomes softer with age, and relatively small spores. This description is based on British material, but agrees reasonably well with the fungus described under this name in *Bull. Soc. mycol. Fr.* LV (1939), p. 169, by Henry. (See notes.)

Species	Cap	Gills	Stem
†30. *evosmus* Joachim	40–70 mm., yellowish buff or ochraceous, sometimes tinged tawny, margin brighter yellow when young, disc and margin becoming spotted reddish-brown in places when older, smooth; margin incurved at first, finally expanded.	White or whitish, sometimes tinged yellowish, then ochraceous clay or pale cinnamon-buff, sometimes **deeply emarginate** and rather broad near stem, sometimes sl. emarginate with tooth and sl. ventricosé near stem, edge paler, ± uneven.	30-40/7-12 mm. (20-30 in bulb), ± equal wit spicuous wide some oblique marginate (which is sometime most square or oblo section), white, soon colouring pallid or ye ish, finally ± rusty white silky striate l white cortina, bulb tomentose below.
31. *turbinatus* (Bull. ex Fr.) Fr. *sensu* Bataille, Hry. (*non sensu* Cooke *nec* Ricken)	40–120 mm., cvx. broadly or sl. umbonate then exp. or sl. depressed, ochraceous to tawny rusty, margin yellower or with **olive tinge,** viscid then ± dry and opaque, smooth but innately fibrillose *sub lente.*	White or whitish then ochraceous-clay, finally ± rusty, ± linear, generally narrow, edge ± serrulate.	35–100/12–25 mm. (1 mm. in bulb), equal ± conspicuous wide ginate bulb, whitish greyish then yellowis pale buff, apex often sistently white, fibro-striate below cortina.
*32. *pinetorum* Moser (=*multiformis sensu* Boudier) (*non Boudieri* Hry.)	60–120 mm., cvx. then exp. or sl. irregular, ochraceous-yellow or buff, rarely tinged olive, sometimes spotted or with margin reddish or tawny brown, with ± conspicuous darker **reddish-brown innate** fibrils.	Clay-whitish (sometimes sl. flesh-coloured), then milky coffee, adnate emarginate, crowded, about width of flesh of cap, edge serrulate.	50–110/20–30 mm. (up mm. in bulb), ± e with wide marginate l dirty whitish, ochrac towards base, apex s times with sl. bluis glaucous tinge, co whitish to ochrac bulb often sl. violac from remains of **viol ous veil.**
6. **Rapacei.**	Stem with conspicuous wide free-edged marginate bulb. Cap at first white or wh		
33. *rapaceus* Fr. *sensu* Bres.	35–70 mm., whitish, creamy white or **clay-white**, then **pale** yellowish-ochraceous or buff esp. at disc, often appearing spotted, ± innately fibrillose or hoary; margin generally paler.	White or whitish, then ± ochraceous or milky coffee, often narrowly adnate or with tooth, ± linear, edge even to ± uneven.	45–80/8–10 mm. (15–18 in bulb), equal with spicuous sometimes lique marginate white and white shiny at first, then ye ish or ochraceous near base, apex somet sl. bluish when young

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
e, occ. tinged lowish in ces, f. firm at t.	Mild. Smell **very strong** and persistent, scented, of **orange blossom**.	Amygdaliform to sublimoniform, rough, 9–10/5–6μ	Gill edge sterile, cells 6-8μ wide. NaOH + flesh nil or ± yellowish, + cap cuticle sl. reddish-brown.	Beech woods. Fairly common (so far found on chalk soil).	Easily distinguished by its smell. The cap colour is similar to that of *multiformis* (No. 21); this species is in fact a *multiformis* with strong smell and more pronounced bulb. The gills are sometimes remarkably deeply emarginate.
e and firm at t, then pale am, sometimes ochraceous ler cuticle of .	Mild. Smell faint to f. strong, pleasant, (of mushroom. *sec* A. A. Pearson).	Subglobose to **ovoid pruniform.** very rough, 8–11/6½–8μ (fig. 13)	Gill edge fertile. NaOH + flesh ±ochraceous or buff, + cap cuticle ± reddish-brown.	Beech woods (on chalk). Uncommon.	Best distinguished by spore shape. The olive tinge to the edge of the cap is unusual for this section, but is sometimes also present in *pinetorum* (No. 32) which has very different spores and a ± violaceous veil. (See notes.)
, firm.	Mild. Smell faint but distinct of raw potato or radish.	Amygdaliform to sublimoniform, rough, **12-14½/6-7½μ** *sec* Moser.	Gill edge fertile. NaOH + flesh nil, + cap cuticle reddish-brown.	Under pines.	Its habitat, colours, large spores and violaceous veil should help in recognising this species. Not yet recorded for Britain.
(Spp. 33–34).					
then whitish, etimes yelsh in stem or n horny line er gills.	Mild. Smell none or faint.	Elliptic-pruniform, punctate to almost smooth, **7.2-9/4-5μ** *sec* Moser.	Gill edge sterile, cells 4–7μ wide. NaOH + flesh sl. ochraceous, + cap cuticle brownish.	Decid. and conif. woods, often on dry ground (not on chalk). Often solitary. Uncommon.	Distinguished by pale colours, conspicuous bulb and small ±pruniform spores. Not well known in Britain and needs further study. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
†30. *evosmus* Joachim	40–70 mm., yellowish buff or ochraceous, sometimes tinged tawny, margin brighter yellow when young, disc and margin becoming spotted reddish-brown in places when older, smooth; margin incurved at first, finally expanded.	White or whitish, sometimes tinged yellowish, then ochraceous clay or pale cinnamon-buff, sometimes **deeply emarginate** and rather broad near stem, sometimes sl. emarginate with tooth and sl. ventricose near stem, edge paler, ± uneven.	30-40/7-12 mm. (20-30 in bulb), ± equal with[in] spicuous wide some[what] oblique marginate [bulb] (which is sometimes most square or obl[ique] section), white, soo[n] colouring pallid or [yel]ish, finally ± rusty; white silky striate [be]; white cortina, bulb [and] tomentose below.	[Soft], ecc. tinged [yel]orish in [sta]ves, f. firm at [ba]se.	Mild. Smell **very strong** and persistent, scented, of **orange blossom**.	Amygdalform to sublimoniform, rough, 9–10/5–6 μ	Gill edge sterile, cells 6-8 μ wide. NaOH + flesh nil or ± yellowish, + cap cuticle sl. reddish-brown.	Beech woods. Fairly common (so far found on chalk soil).	Easily distinguished by its smell. The cap colour is similar to that of *multiformis* (No. 21); this species is in fact a *multiformis* with strong smell and more pronounced bulb. The gills are sometimes remarkably deeply emarginate.
31. *turbinatus* (Bull. ex Fr.) Fr. *sensu* Bataille, Hry. (*non sensu* Cooke *nec* Ricken)	40–120 mm., cvx. broadly or sl. umbonate then exp. or sl. depressed, ochraceous to tawny rusty, margin yellower or with **olive tinge**, viscid then ± dry and opaque, smooth but innately fibrillose *sub lente*.	White or whitish then ochraceous-clay, finally ± rusty, ± linear, generally narrow, edge ± serrulate.	35–100/12–25 mm. [so]lid and firm at num. in bulb), equal [or] then pale ± conspicuous wide [ba]m, sometimes gnate bulb, whitish [to] ochraceous greyish then yellow[ish] ar cuticle of pale buff, apex often[ti]sistently white, [sl]fibro-striate below cortina.	Mild. Smell faint to f. strong, pleasant, (of mushroom. *sec* A. A. Pearson).	Subglobose to **ovoid pruniform**, very rough, 8–11/6½–8 μ (fig. 13)	Gill edge fertile. NaOH + flesh ± ochraceous or buff, + cap cuticle ± reddish-brown.	Beech woods (on chalk). Uncommon.	Best distinguished by spore shape. The olive tinge to the edge of the cap is unusual for this section, but is sometimes also present in *pinetorum* (No. 32) which has very different spores and a ± violaceous veil. (See notes.)
*32. *pinetorum* Moser (= *multiformis sensu* Boudier) (*non Boudieri* Hry.)	60–120 mm., cvx. then exp. or sl. irregular, ochraceous-yellow or buff, rarely tinged olive, sometimes spotted or with margin reddish or tawny brown, with ± conspicuous darker **reddish-brown innate** fibrils.	Clay-whitish (sometimes sl. flesh-coloured), then milky coffee, adnate emarginate, crowded, about width of flesh of cap, edge serrulate.	50–110/20-30 mm. (up[to] firm. num. in bulb), ± [bu]with wide marginate dirty whitish, ochr[e] towards base, apex [so]times with sl. bluish glaucous tinge, [ov]whitish to ochra[ce]bulb often sl. violac[e]from remains of **violaceous veil.**	Mild. Smell faint but distinct of raw potato or radish.	Amygdaliform to sublimoniform, rough, **12-14½/6-7½** μ *sec* Moser.	Gill edge fertile. NaOH + ffesh nil, + cap cuticle reddish-brown.	Under pines.	Its habitat, colours, large spores and violaceous veil should help in recognising this species. Not yet recorded for Britain.
6. Rapacei.	Stem with conspicuous wide free-edged marginate bulb. Cap at first white or [sl]. (pp. 33-34).								
33. *rapaceus* Fr. *sensu* Bres.	35–70 mm., whitish, creamy white or **clay-white**, then **pale** yellowish-ochraceous or buff esp. at disc, often appearing spotted, ± innately fibrillose or hoary; margin generally paler.	White or whitish, then ± ochraceous or milky coffee, often narrowly adnate or with tooth, ± linear, edge even to ± uneven.	45–80/8–10 mm. (15-[20] in bulb), equal with [bu]spicuous sometimes [bu]lique marginate white and white shiny at first, then [yel]ish or ochraceous near base, apex some[wh]sl. bluish when young	[Pa]whitish, [so]times yel[lo]ic in stem or [sp]brony line [in] cells.	Mild. Smell none or faint.	Elliptic-pruniform, punctate to almost smooth, **7.2-9/4-5** μ *sec* Moser.	Gill edge sterile, cells 4–7 μ wide. NaOH + ffesh sl. ochraceous, + cap cuticle brownish.	Decid. and conif. woods, often on dry ground (not on chalk). Often solitary. Uncommon.	Distinguished by pale colours, conspicuous bulb and small ± pruniform spores. Not well known in Britain and needs further study. (See notes.)

Species	Cap	Gills	Stem
†34. *caroviolaceus* nov. nom. (=*aleuriosmus sensu* Kauffman, Lange)	45–120 mm., cvx. then exp., **white at first,** soon whitish to pale ochraceous, then pale ochre-buff often darker in places, finally ± uniform ochraceous-buff, very viscid at first, often with adpressed white silky scales from veil or with cortinal remnants at edge of cap, sometimes sl. innato-fibrillose when older; margin paler and incurved when young.	White then clay or pale ochraceous clay, later ochraceous- or rusty-buff, adnate emarginate, ± crowded, ± linear, often rather narrow, edge sometimes paler, even to ± uneven.	50-80/11-15 mm. (32-40 in bulb), equal with spicuous white wide ginate bulb (fig. 1), v at first, then yellowis ochraceous esp. at and on upper side of rarely tinged sl. bluis apex when young, v silky striate, cortina w bulb white-tomei below.
(b). Cyanophylli	Young gills blue, violaceous or lilac. (Spp. 35–55).		
7. Caerulescentes	Young cap grey-blue, lilac or violaceous at least in part.		Cap cuticle mild, or if
35. *caerulescens* Fr. *sensu* Konr. and Maubl. (*non sensu* Lange =*caesiocyaneus*)	50–100 mm., grey-blue-violaceous or **dingy violet** then ochraceous buff or brownish esp. at disc, often with pale yellowish ochraceous adpressed patches of veil at first; margin paler and incurved at first, later ± violaceous, **not** innately fibrillose.	**Blue-violaceous** (often deeply so), then clay- or rusty-brown, ± linear to sl. ventricose, edge ± denticulate, often remaining violaceous for a long time.	50-80/10-20 mm. (30-50 in bulb), ± attenuate wards with conspi marginate often ob bulb, lilac-violaceou blue-violaceous like gills, sometimes beco ± ochraceous at cortina lilac or violac bulb white at first th ochraceous.
36. *Mairei* Moser (=*caesiocyaneus sensu* Maire, Konr. and Maubl., Rea *non sensu* Britz.)	35–100 mm., at first deep violet, then **pale** blue-violaceous or grey-violaceous to lilaceous, disc soon ± ochraceous or sl. tawny tinged and often with whitish adpressed remains of veil; margin pale or grey blue at first, later ± ochraceous, conspicuously **innato-fibrillose.**	Whitish then **pale bluish** (never darker blue or violet), soon clay or milky-coffee, finally rusty tinged, linear to sl. ventricose, edge even to sl. uneven.	40–100/10–15 mm. (3 mm. in bulb), ± at ated upwards with tinct but not very marginate bulb, pale violaceous, apex s times darker, then w or ± ochraceous es base, cortina bluish, white often with w or ochraceous patches veil.
*36a. var. *Juranus* Hry. (=*camphoratus sensu* Ricken)	40–80 mm., **darker** and brighter violet at first; margin less strikingly innato-fibrillose, remaining violaceous.	**Lilac or grey-blue** at first, edge often eroded.	40-65/10-16 mm. (30-35 in bulb), equal or at ated upwards with spicuous marginate **rather deep** blue- with whitish or ochra bulb.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
te then tinged llid or yellow-, esp. under ticle of cap and base of bulb, ten with ± **gacious blue-olaceous** tinge centre and ex of stem.	Mild. Smell **strong,** esp. when young, peculiar, **rank.**	Amygdaliform to ± limoniform, rough, **10-12(13)/6-6½μ**	Gill edge fertile. NaOH + flesh sl. yellowish, + cap cuticle sl. brownish.	Beech woods on chalk. Uncommon.	Distinguished by being entirely white at first later discoloring ± ochraceous, and often of large size with very conspicuous bulb, also by smell and fugacious blue tinge in flesh of stem. Spores larger and rougher than *rapaceus* (No. 33), but the larger-spored *rapaceus* of some authors is very close (see notes on *rapaceus* and *aleuriosmus*).
ing red with NaOH. Flesh mild + NaOH nil or yellowish to brownish, never red. (Spp. 35–39).					
ale violaceous, metimes sl. rker under the p cuticle and upper part of em, white in lb, becoming nged pallid or hraceous esp. bulb or where ounded.	Mild. Smell faint of new meal, sometimes stronger when old.	Elliptic-amygdaliform to amygdaliform, punctate, 9–11/5–6μ	Gill edge sterile, cells 9–10μ wide. NaOH + flesh and cap cuticle ± yellowish or brownish.	Decid. and conif. woods, esp. on chalk. Uncommon.	Recognised by its dark colours, smooth cap, spores over 10μ long and ± negative sodium reaction. (Bres 618 shows a darker variety (var. *cyaneus* Bres.) not recorded for Britain.) (See notes.)
tish, ± pale uish in stem, llowish or hraceous in lb.	Mild. Smell none or faint of radish.	Elliptic-amygdaliform to amygdaliform, punctate, 10–12/5–7μ *sec* Konr. & Maubl.	Gill edge fertile. NaOH + flesh and cap cuticle ± brownish or whitish.	Decld. and conif. woods on chalk. Uncommon.	Recognised by its pale colours (esp. gills), innately fibrillose cap, spores over 10μ long and ± negative sodium reaction. Not recorded from Britain in recent years, but well described by Rea.
tish, bluish in em, pallid in lb.	Mild. Smell often strong, **fruity** (like *Inocybe pyriodora*).	± amygdaliform, rough, 10–11/4.5–4.7μ *sec* Hry.	Gill edge fertile. NaOH + flesh and cap cuticle ochraceous or brownish.	Under conifers on heathy soil, (also decid. *sec* Ricken).	This variety (or species?) has not yet been recorded for Britain. It has a different smell from Nos. 35 and 36, but cap colour rather like No. 35 and pale gills like No. 36.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
†34. *caraviolaceus* nov. nom. (= *aleuriasmus sensu* Kauffman, Lange)	45–120 mm., cvx. then exp., **white at first,** soon whitish to pale ochraceous, then pale ochre-buff often darker in places, finally ± uniform ochraceous-buff, very viscid at first, often with adpressed white silky scales from veil or with cortinal remnants at edge of cap, sometimes sl. innato-fibrillose when older; margin paler and incurved when young.	White then clay or pale ochraceous clay, later ochraceous- or rusty-buff, adnate emarginate, ± crowded, ± linear, often rather narrow, edge sometimes paler, even to ± uneven.	50-80/11-15 mm. (32-40 in bulb), equal with spicuous white wide ginate bulb (fig. 1), at first, then yellow ochraceous esp. at and on upper side of rarely tinged sl. blue apex when young, silky striate, cortina bulb white-tomen below.	ite then tinged allid or yellow- sh, esp. under uticle of cap and t base of bulb, ften with ± **agacious blue- iolaceous** tinge centre and pex of stem.	Mild. Smell **strong,** esp. when young, peculiar, **rank.**	Amygdaliform to ± limoniform, rough, **10-12(13)/6-6½μ**	Gill edge fertile. NaOH + flesh sl. yellowish, + cap cuticle sl. brownish.	Beech woods on chalk. Uncommon.	Distinguished by being entirely white at first later discoloring ± ochraceous, and often of large size with very conspicuous bulb, also by smell and fugacious blue tinge in flesh of stem. Spores larger and rougher than *rapaceus* (No. 33), but the larger-spored *rapaceus* of some authors is very close (see notes on *rapaceus* and *aleuriosmus*).
(b). Cyanophylli	Young gills blue, violaceous or lilac. (Spp. 35–55).								
7. Caerulescentes	Young cap grey-blue, lilac or violaceous at least in part.			enz red with NaOH. Flesh mild + NaOH nil or yellowish to brownish, never red. (Spp. 35–39).					
35. *caerulescens* Fr. *sensu* Konr. and Maubl. (*non sensu* Lange = *caesiocyaneus*)	50–100 mm., grey-blue-violaceous or **dingy violet** then ochraceous buff or brownish esp. at disc, often with pale yellowish ochraceous adpressed patches of veil at first; margin paler and incurved at first, later ± violaceous, **not** innately fibrillose.	**Blue-violaceous** (often deeply so), then clay- or rusty-brown, ± linear to sl. ventricose, edge ± denticulate, often remaining violaceous for a long time.	Cap cuticle mild, or it 50-80/10-20 mm. (30-50 in bulb), ± attenuate wards with conspe marginate often clo bulb, lilac-violaceo blue-violaceous like gills, sometimes bec ± ochraceous at cortina lilac or viola bulb white at first to ochraceous.	ur violaceous, metimes sl. ver under the cuticle and pper part of n, white in becoming ed pallid or ceous esp. nb or where oded.	Mild. Smell faint of new meal, sometimes stronger when old.	Elliptic-amygdaliform to amygdaliform, punctate, 9–11/5–6μ	Gill edge sterile, cells 9–10μ wide. NaOH + flesh and cap cuticle ± yellowish or brownish.	Decid. and conif. woods, esp. on chalk. Uncommon.	Recognised by its dark colours, smooth cap, spores over 10μ long and ± negative sodium reaction. (Bres 618 shows a darker variety (var. *cyaneus* Bres.) not recorded for Britain.) (See notes.)
36. *Mairei* Moser (= *caesiocyaneus sensu* Maire, Konr. and Maubl., Rea *non sensu* Britz.)	35–100 mm., at first deep violet, then **pale** blue-violaceous or grey-violaceous to lilacious, disc soon ± ochraceous or sl. tawny tinged and often with whitish adpressed remains of veil; margin pale or grey blue at first, later ± ochraceous, conspicuously **innato-fibrillose.**	Whitish then **pale bluish** (never darker blue or violet), soon clay or milky-coffee, finally rusty tinged, linear to sl. ventricose, edge even to sl. uneven.	40–100/10–15 mm. mm. in bulb), ± ated upwards with tinct but not very marginate bulb, pale violaceous, apex times darker, then or ± ochraceous base, cortina bluish white often with or ochraceous patches veil.	sh, ± pale ish in stem, wish or aceous in ps).	Mild. Smell none or faint of radish.	Elliptic-amygdaliform to amygdaliform, punctate, 10–12/5–7μ *sec* Konr. & Maubl.	Gill edge fertile. NaOH + flesh and cap cuticle ± brownish or whitish.	Decid. and conif. woods on chalk. Uncommon.	Recognised by its pale colours (esp. gills), innately fibrillose cap, spores over 10μ long and ± negative sodium reaction. Not recorded from Britain in recent years, but well described by Rea.
*36a. var. *juranus* Hry. (= *camphoratus sensu* Ricken)	40–80 mm., **darker** and brighter violet at first; margin less strikingly innato-fibrillose, remaining violaceous.	**Lilac or grey-blue** at first, edge often eroded.	40-65/10-16 mm. (30-35 in bulb), equal or sl ated upwards with spicuous marginate **rather deep** blue with whitish or ochra bulb.	s, bluish in pallid in	Mild. Smell often strong, **fruity** (like *Inocybe pyriodora*).	± amygdaliform, rough, 10–11/4.5–4.7μ *sec* Hry.	Gill edge fertile. NaOH + flesh and cap cuticle ochraceous or brownish.	Under conifers on heathy soil, (also decid. *sec* Ricken).	This variety (or species?) has not yet been recorded for Britain. It has a different smell from Nos. 35 and 36, but cap colour rather like No. 35 and pale gills like No. 36.

Species	Cap	Gills	Stem
†37. *caesiocyaneus* Britz. *sensu* Britz. (=*caerulescens sensu* Lange) (*non sensu* Maire, Konr. & Maubl., Rea=*Mairei* Moser)	32–85 mm., **entirely pale blue** or violaceous or greyish blue at first, then **discolouring** pale straw or dirty ochraceous from centre outwards or in patches, often with scattered whitish adpressed patches of veil on disc; margin conspicuously **innato-fibrillose,** incurved at first.	**Concolorous** then ochraceous or clay-buff, finally ± rusty, ± linear, edge often remaining bluish, later concolorous and ± uneven.	25-70/9-19 mm. (22-40 n in bulb), equal or ± att uated upwards with c spicuous wide margir bulb, **concolorous** t yellowish or ochrace esp. below, bluish cor often abundant, bulb (colorous at first then lowish or ochraceous o with yellowish or ochr ous volva-like remain veil above, whitish or owish below.
*38. *Boudieri* Hry.	40–80 mm., at first **greyish-white, greyish-violet** or tinged flesh colour, then creamy-ochraceous to ochraceous-buff from the disc out, with distinct ochraceous **innate** fibrils; margin creamy-white to greyish or bluish-white.	**Bluish-white** to pale or deeper lilac-blue then ochraceous, edge concolorous, ± denticulate.	50-60/10-15 mm. (up tc mm. in bulb), ± e with pointed someti oblique strongly margi bulb, greyish-blue whitish then yello below, apex pruinose shiny, very firm, bulb coming ochraceous ab
39. *sodagnitus* Hry.	27–100 mm., at first entirely paler or deeper violaceous blue or **violet,** then **discolouring** yellowish or pallid buff from centre outwards, sometimes forming spots, fading to silvery-lilac or grey blue particularly around the margin, cuticle smooth or disrupting into small scales when old.	**Concolorous** then rusty umber or date brown, edge often remaining violaceous for a long time, sl. ventricose or not, edge ± even.	25-100/5-18 mm. (12–30 in bulb), equal or sl. th at apex with well-ma but sometimes small ginate bulb, **concolor discolouring** yellowis ochraceous like the from base up, finally lowish or rusty excep a **persistent** often na violet zone at apex, tina violaceous, bulb v ceous- or whitish-tor tose below.
8. Dibaphi.	Young cap lilac or violaceous at least in part. Cap cuticle bitter or not, +NaOH		
40. *dibaphus* Fr.	50–120 mm., often broadly umbonate, **lilac-violaceous** soon **discolouring** ochraceous or tawny-brick colour from disc outwards, sometimes spotted, smooth or sl. innately fibrillose; margin remaining violaceous for a long time, incurved at first, later often reflexed at extreme edge.	Lilac-violaceous then ochraceous, finally ± rusty tawny, edge ± even, often paler or tinged lilac.	40–80/10–15 mm., ± e with widely margi bulb (rarely narrowly lilac-violaceous then oc ceous or buff from the up, except for a na persistently violac zone at apex, cortina violaceous, bulb ± oc ceous, extreme base whitish.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
ish or grey-blu-h, then whitish ı cap, bluish in tem and yellow-h in bulb.	Mild. Smell often **strong,** disagree-able, musty.	Elliptic-amygdaliform, punctate, **8-10(11)/4-5**μ	Gill edge fertile. NaOH+flesh buff to Van-dyke brown, + cap cuticle ± nil.	Beech woods, esp. on chalk. Fairly common.	Entirely pale bluish at first. Recognised by its characteristic colour change, in-nately fibrillose cap and spores 8-10μ long. Lange's pic-ture is very good.
ite in cap, reamy under cap uticle, greyish in tem, yellowish-chraceous where rounded.	Mild. Almost inodorous (or sl. fruity).	Ovoid-amygdaliform, rough, 9½–11/6–6½μ *sec* Hry.	Gill edge fertile, NaOH+flesh nil, + cap cuticle lilac-buff then pale brown.	Beech and oak woods, often in large circles.	Recognised by innate-ly fibrillose cap ± greyish at first, pale bluish gills and spores more than 10μ long. Not re-corded from Britain (See notes.)
itish, violaceous ı stem apex, ecoming yellow-h in cap and ± chraceous-buff ı bulb, generally ather soft.	Flesh mild, cap cuticle ± **bitter.** Almost in-odorous, or smell faint, of mush-rooms.	Amygdaliform to sublimoniform, rough, (8)10-12/(5)5½-6½μ	Gill edge **markedly** sterile with ± clavate cells 6–20μ wide. NaOH + flesh ± nil or sl. pallid, + cap cuticle **bright red** to purplish-red.	Beech woods. Fairly common on chalk soil.	Entirely violet a first. Well characterised by cap colour change, ± bitter cap cuticle, sodium reaction and sterile gill edge. (The sodium reaction is brightest on the violet parts of the cuticle, sometimes hardly showing in old specimens.) Often small but also found quite large.
er red, Flesh bitterish to very bitter, + NaOH rose red. (Spp. 40–41).					
ite then yellow-h in cap, sl. iolaceous at pex of stem, chraceous-yel-ow in stem base nd bulb, ± chraceous when rounded.	Both flesh and cap cuticle **very bitter.** Inodorous.	Amygdaliform, rough, 12–13/6–6½μ *sec* Hry.	Gill edge sterile, with cylindric-clavate or **pis-tol**-shaped cells 4-8μ wide. NaOH + flesh (and stem cu-ticle) **rose-red,** + cap cut.cle ±nil or pall.d.	Mountainous **conifer** woods.	Differs from *sodagnitus* (No. 39) in bitter flesh, sodium re-action and nar-rower differently shaped sterile cells on the gill edge; and from *nemorosus* (No. 41) by bitter cap cuticle, sl. darker colours, larger size, habitat and differ-ently shaped sterile cells on the gill edge. Not definite-ly recorded for Britain.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
†37. *coesiocyoneus* Britz. *sensu* Britz. (=*caerulescens sensu* Lange) (*non sensu* Maire, Konr. & Maubl., Rea=*Moirei* Moser)	32–85 mm., **entirely pale blue** or violaceous or greyish blue at first, then **discolouring** pale straw or dirty ochraceous from centre outwards or in patches, often with scattered whitish adpressed patches of veil on disc; margin conspicuously **innato-fibrillose,** incurved at first.	**Concolorous** then ochraceous or clay-buff, finally ± rusty, ± linear, edge often remaining bluish, later concolorous and ± uneven.	25-70/9-19 mm. (22-40 in bulb), equal or ± attenuated upwards with conspicuous wide margin bulb, **concolorous** yellowish or ochraceous, esp. below, bluish often abundant, bulb colorous at first then lowish or ochraceous with yellowish or ochraceous volva-like remains veil above, whitish or owish below.	Bluish or grey-bluish, then whitish in cap, bluish in stem and yellowish in bulb.	Mild. Smell often **strong,** disagreeable, musty.	Elliptic-amygdaliform, punctate, **8-10(11)/4-5**μ	Gill edge fertile. NaOH + flesh buff to Vandyke brown, + cap cuticle ± nil.	Beech woods, esp. on chalk. Fairly common.	Entirely pale bluish at first. Recognised by its characteristic colour change, innately fibrillose cap and spores 8-10μ long. Lange's picture is very good.
*38. *Boudieri* Hry.	40–80 mm., at first **greyish-white, greyish-violet** or tinged flesh colour, then creamy-ochraceous to ochraceous-buff from the disc out, with distinct ochraceous **innate** fibrils; margin creamy-white to greyish or bluish-white.	**Bluish-white** to pale or deeper lilac-blue then ochraceous, edge concolorous, ± denticulate.	50-60/10-15 mm. (up to mm. in bulb), ± equ with pointed sometimes oblique strongly marg bulb, greyish-blue whitish then yello below, apex pruinose shiny, very firm, bulb coming ochraceous ab	White in cap, creamy under cap cuticle, greyish in stem, yellowish-ochraceous where wounded.	Mild. Almost inodorous (or sl. fruity).	Ovoid-amygdaliform, rough, 9½–11/6–6½μ *see* Hry.	Gill edge fertile, NaOH + flesh nil, + cap cuticle lilac-buff then pale brown.	Beech and oak woods, often in large circles.	Recognised by innately fibrillose cap ± greyish at first, pale bluish gills and spores more than 10μ long. Not recorded from Britain (See notes.)
39. *sodagnitus* Hry.	27–100 mm., at first entirely paler or deeper violaceous blue or **violet,** then **discolouring** yellowish or pallid buff from centre outwards, sometimes forming spots, fading to silvery-lilac or grey blue particularly around the margin, cuticle smooth or disrupting into small scales when old.	**Concolorous** then rusty umber or date brown, edge often remaining violaceous for a long time, sl. ventricose or not, edge ± even.	25-100/5-18 mm. (12-30 in bulb), equal or sl. th at apex with well-ma but sometimes small ginate bulb, **concolor discolouring** yellowish ochraceous like the from base up, finally lowish or rusty except a **persistent** often nar violet zone at apex, tina violaceous, bulb w ceous- or whitish-to tose below.	Bluish, violaceous in stem apex, becoming yellowish in cap and ± ochraceous-buff in bulb, generally rather soft.	Flesh mild, cap cuticle ± **bitter.** Almost inodorous, or smell faint, of mushrooms.	Amygdaliform to sublimoniform, rough, (8)10-12/(5)5½-6½μ	Gill edge **markedly** sterile with ± clavate cells 6–20μ wide. NaOH + flesh ± nil or sl. pallid, + cap cuticle **brigbt red** to purplish-red.	Beech woods. Fairly common on chalk soil.	Entirely violet a first. Well characterised by cap colour change, ± bitter cap cuticle, sodium reaction and sterile gill edge. (The sodium reaction is brightest on the violet parts of the cuticle, sometimes hardly showing in old specimens.) Often small but also found quite large.
8. **Dihaphi.** 40. *dibaphus* Fr.	Young cap lilac or violaceous at least in part. Cap cuticle bitter or not, + NaOH r			Flesh bitterish to very bitter, + NaOH rose red. (Spp. 40–41).					
	50–120 mm., often broadly umbonate, **lilac-violaceous** soon **discolouring** ochraceous or tawny-brick colour from disc outwards, sometimes spotted, smooth or sl. innately fibrillose; margin remaining violaceous for a long time, incurved at first, later often reflexed at extreme edge.	Lilac-violaceous then ochraceous, finally ± rusty tawny, edge ± even, often paler or tinged lilac.	40–80/10–15 mm., ± s with widely marg bulb (rarely narrowly lilac-violaceous then ochraceous or buff from the up, except for a nar persistently violac zone at apex, cortina violaceous, bulb ± och ceous, extreme base whitish.	Both flesh and cap cuticle **very bitter.** Inodorous.	Amygdaliform, rougb, 12–13/6–6½μ *see* Hry.	Gill edge sterile, with cylindric-clavate or **pistol**-shaped cells 4-8μ wide. NaOH + flesh (and stem cuticle) **rose-red,** + cap cuticle ±nil or pallid.	Mountainous **conifer** woods.	Differs from *sodagnitus* (No. 39) in bitter flesh, sodium reaction and narrower differently shaped sterile cells on the gill edge; and from *nemorosus* (No. 41) by bitter cap cuticle, sl. darker colours, larger size, habitat and differently shaped sterile cells on the gill edge. Not definitely recorded for Britain.

Species	Cap	Gills	Stem
41. *nemorosus* Hry.	60–80 mm., **lilac** or pale violaceous, **discolouring** pale ochraceous or pinkish-cream in places, often with whitish or ochraceous remains of veil, esp. on disc; margin paler, sometimes whitish.	Pale lilac-violaceous (sometimes almost whitish) then clay or rusty brick colour, edge ± uneven often tinged lilac.	50–80/10–20 mm. (up 40 mm. in bulb), ± equ with ± conspicuous ma ginate bulb, often pointe at base, lilac or violaceo then paler and final yellowish-buff from ba up, apex with persiste violaceous zone and pruinose, cortina pa violaceous, bulb becomi ochraceous.
9. **Calochroi.**	Young cap yellow, ochraceous or tawny. Stem with well-marked marginate bulb. Spo		
42. *calochrous* (Pers. ex Fr.) Fr.	45–150 mm., often sl. to broadly umbonate, margin becoming lobed and irregular in large specimens, **bright chrome yellow,** sometimes almost unicolorous but generally with darker pallid or tawny-buff disc (esp. in larger specimens) and paler yellow or ochraceous margin, smooth or in larger specimens sl. innato-fibrillose around disc.	**Bright violet**, then clay-violaceous or purplish pallid, finally rusty umber, narrow, linear or tapering to a point at the cap edge; edge often remaining violet for a long time, even to sl. uneven.	40–80/6–24 mm. (20– mm. in bulb), ± equ with conspicuous margi ate bulb often flattene below (fig. 6), **white** the tinged **yellowish** or pall tawny from the base u cortina whitish, bulb whi ish, soon yellowish on t edge, white-tomentose b low.
†43. *parvus* Hry.	20–50 mm., consistently **small,** shallowly cvx. then exp. ± regular and orbicular, rather thin-fleshed, pale ochraceous or **yellowish,** then darker in patches or with rusty spots, esp. on disc, smooth, matt, margin incurved at first.	**Lilac** or pale violaceous, then watery milky-coffee to rusty-tawny, narrow, ± linear, edge concolorous or paler, often serrulate.	40–60/5–11 mm. (10–20 mm in bulb), equal or thicke above with rather sma but wide marginate bull **pale lilac,** becoming whi ish or pale ochraceou below, cortina sparse whit ish, bulb becoming brown ish above, white-tomen tose below.
†44. *aureo-pulverulentus* Moser (=*herpeticus sensu* Cooke)	25–60 mm., sometimes sl. umbonate, **bright yellow,** almost golden, then ochraceous buff or tinged olive, esp. on disc, smooth or with a few remnants of veil on disc, margin incurved, often brighter golden tinged.	**Pale violaceous** then dirty brownish or olive-buff, ± narrow and linear, edge even or sl. uneven.	20–50/7–12 mm. (15–30 mm in bulb), equal with con spicuous wide marginat bulb, whitish or yellowis at first, apex sometime bluish, then ± buff, cor tina yellow, stem base an bulb edge with ± conspi cuous **golden yellow** vol va-like remains of **veil** bulb white-tomentose be low.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
te or whitish ıged violaceous cuticle of stem, coming spotted hraceous in ılb or where ounded.	Flesh **bitterish,** cap cuticle **mild.** Smell none, or faint of Iris.	Amygdaliform to sublimoniform, rough (less so than in No. 40), 13–14/6½μ *sec* Hry.	Gill edge sterile, with cylindric-clavate cells often forked at apex **(Y-shaped)**, 10–60/4–7μ NaOH + flesh **rose red,** + cap cuticle ± nil.	**Decid.** woods, esp. beech and oak. Uncommon.	Distinguished from all species (except No. 40) by colours and sodium reaction; and from *dibaphus* (No. 40) by mild cap cuticle, paler colours (esp. gills), smaller size, Y-shaped sterile cells on edge of gill and habitat. Often quoted as a var. of *dibaphus*. Not well known in Britain.
tly over 10μ long.	(Spp. 42–46).				
te or whitish, ten yellowish ıder cap cuticle, er gills, or in ılb when old, irly thick at sc.	Mild or with sl. bitterish after-taste. Inodorous.	Amygdaliform, rough, 9–12/5–6μ	Gill edge sterile with ± clavate cells 6–14(22)μ wide. NaOH + flesh yellowish, + cap cuticle variable from blood red to reddish brown.	Typically under beech, (sometimes in other woods, decid. or conif. *sec* Moser). One of the commonest Scauri.	Violet colour confined to gills. Differs from all other members of this section in bright yellow cap, bright violet young gills and white to yellowish stem without blue or violet tints. Appears to vary much in size and also in sodium reaction on cap cuticle. (See notes.)
tish in cap, sl. llowish below ticle, pale vio- or lilac in em, whitish or ownish in bulb, ther **thin** at sc.	Mild. Smell none or faint, pleasant.	Amygdaliform, rough, 9–10½/5–6μ	Gill edge with some sterile cells 6–13μ wide. NaOH + flesh reddish-buff, + cap cuticle paler or deeper reddish-brown.	Beech on chalk (also conif. woods *sec* Moser). Uncommon.	Like a small *calochrous* (No. 42) but with lilac gills and stem and paler thinner-fleshed cap. Sodium reaction on cap cuticle rather variable.
violaceous p. under cap ticle and in em apex, then itish, ± yel- vish in bulb, ther thick at sc.	Mild. Inodorous.	Elliptic-amygdaliform to amygdaliform, rough, 11–13/6–6½μ	Gill edge with some sterile cells 8-17μ wide. NaOH + flesh pale reddish-purple or smoky-grey, + cap cuticle **immediately bright brick red** then blood red, finally purplish-brown.	Beech on chalk, also in conif. or mixed woods. Uncommon.	Like a small rather thick-fleshed *calochrous* (No. 42) but with paler gills, violaceous tinge to flesh, conspicuous golden-yellow veil when young and striking sodium reaction on cap cuticle. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
41. *nemorosus* Hry.	60–80 mm., **lilac** or pale violaceous, **discolouring** pale ochraceous or pinkish-cream in places, often with whitish or ochraceous remains of veil, esp. on disc; margin paler, sometimes whitish.	Pale lilac-violaceous (sometimes almost whitish) then clay or rusty brick colour, edge ± uneven often tinged lilac.	50–80/10–20 mm. (up to 40 mm. in bulb), ± even with ± conspicuous marginate bulb, often pointed at base, lilac or violaceous then paler and finally yellowish-buff from base up, apex with persistent violaceous zone and pruinose, cortina pale violaceous, bulb becoming ochraceous.	Pale or whitish tinged violaceous in cuticle of stem, becoming spotted ochraceous in bulb or where wounded.	Flesh **bitterish,** cap cuticle **mild.** Smell none, or faint of Iris.	Amygdaliform to sublimoniform, rough (less so than in No. 40), 13–14/6½ μ *sec* Hry.	Gill edge sterile, with cylindric-clavate cells often forked at apex **(Y-shaped),** 10–60/4–7 μ NaOH + flesh **rose red,** + cap cuticle ± nil.	**Decid.** woods, esp. beech and oak. Uncommon.	Distinguished from all species (except No. 40) by colours and sodium reaction; and from *dibaphus* (No. 40) by mild cap cuticle, paler colours (esp. gills), smaller size, Y-shaped sterile cells on edge of gill and habitat. Often quoted as a var. of *dibaphus*. Not well known in Britain.
9. **Calochrol.** 42. *colochrous* (Pers. ex Fr.) Fr.	Young cap yellow, ochraceous or tawny. Stem with well-marked marginate bulb. Sp. 45–150 mm., often sl. to broadly umbonate, margin becoming lobed and irregular in large specimens, **bright chrome yellow,** sometimes almost unicolorous but generally with darker pallid or tawny-buff disc (esp. in larger specimens) and paler yellow or ochraceous margin, smooth or in larger specimens sl. innato-fibrillose around disc.	**Bright violet,** then clay-violaceous or purplish pallid, finally rusty umber, narrow, linear or tapering to a point at the cap edge; edge often remaining violet for a long time, even to sl. uneven.	40–80/6–24 mm. (28–5 mm. in bulb), ± equ ate bulb often flatte below (fig. 0), **white** tinged **yellowish** or pa tawny from the base u cortina whitish, bulb wh ish, soon yellowish on th edge, white-tomentose be low.	ally over 10 μ long. ite or whitish, ften yellowish nder cap cuticle, ver gills, or in lb when old, rly thick at sc.	(Spp. 42–46). Mild or with sl. bitterish after-taste. Inodorous.	Amygdaliform, rough, 9–12/5–6 μ	Gill edge sterile with ± clavate cells 6–14(22) μ wide. NaOH + flesh yellowish, + cap cuticle variable from blood red to reddish brown.	Typically under beech, (sometimes in other woods, decid. or conif. *sec* Moser). One of the commonest Scauri.	Violet colour confined to gills. Differs from all other members of this section in bright yellow cap, bright violet young gills and white to yellowish stem without blue or violet tints. Appears to vary much in size and also in sodium reaction on cap cuticle. (See notes.)
†43. *porvus* Hry.	20–50 mm., consistently **small,** shallowly cvx. then exp. ± regular and orbicular, rather thin-fleshed, pale ochraceous or **yellowish,** then darker in patches or with rusty spots, esp. on disc, smooth, matt, margin incurved at first.	**Lilac** or pale violaceous, then watery milky-coffee to rusty-tawny, narrow, ± linear, edge concolorous or paler, often serrulate.	40–60/5–11 mm. (10–20 mm. in bulb), equal or thick above with rather sma but wide marginate bulb **pale lilac,** becoming whi ish or pale ochraceous below, cortina sparse whit ish, bulb becoming brow ish above, white-tomen tose below.	nish in cap, sl. ish below ade, pale vio- or lilac in m. whitish or rnish in bulb, ther **thin** at sc.	Mild. Smell none or faint, pleasant.	Amygdaliform, rough, 9–10½/5–6 μ	Gill edge with some sterile cells 6–13 μ wide. NaOH + flesh reddish-buff, + cap cuticle paler or deeper reddish-brown.	Beech on chalk (also conif. woods *sec* Moser). Uncommon.	Like a small *calochrous* (No. 42) but with lilac gills and stem and paler thinner-fleshed cap. Sodium reaction on cap cuticle rather variable.
†44. *oureo-pulverulentus* Moser (= *herpeticus sensu* Cooke)	25–60 mm., sometimes sl. umbonate, **bright yellow,** almost golden, then ochraceous buff or tinged olive, esp. on disc, smooth or with a few remnants of veil on disc, margin incurved, often brighter golden tinged.	**Pale violaceous** then dirty brownish or olive-buff, ± narrow and linear, edge even or sl. uneven.	20–50/7–12 mm. (15–30 mm in bulb), equal with cor spicuous wide margina bulb, whitish or yellowi at first, apex sometimes bluish, then ± buff, co tina yellow, stem base al bulb edge with ± consp cuous **golden yellow** ve va-like remains of veil bulb white-tomentose be low.	violaceous under cap cle and in apex, then blush, ± yel- ish in bulb, er thick at sc.	Mild. Inodorous.	Elliptic-amygdaliform to amygdaliform, rough, 11–13/6–6½ μ	Gill edge with some sterile cells 8-17 μ wide. NaOH + flesh pale reddish-purple or smoky-grey, + cap cuticle **immediately bright brick red** then blood red, finally purplish-brown.	Beech on chalk, also in conif. or mixed woods. Uncommon.	Like a small rather thick-fleshed *calochrous* (No. 42) but with paler gills, violaceous tinge to flesh, conspicuous golden-yellow veil when young and striking sodium reaction on cap cuticle. (See notes.)

Species	Cap	Gills	Stem
*45. *arquatus* Fr. *sensu* Moser (*non sensu* Lange, Ricken)	50-80 mm., at first entirely **bright yellow** (or almost citron yellow) becoming ochraceous, **tawny-buff** or chestnut from the disc outwards, sometimes spotted, smooth; margin incurved at first, remaining ± bright yellow.	Lilaceous or **pale violaceous,** soon milky-coffee often with reddish-lilac tinge, adnate sl. emarginate or adnato-decurrent, very crowded, edge uneven.	50-75/10-15 mm. (20-25 m in bulb), ± equal w marginate sometimes fl tened bulb, pale ochrace or buff, **apex often li** or violaceous, cortina p bulb often with **yellow** volva-like remains of v above, white-toment below.
*46. *subarquatus* Moser (= *arquatus* *sensu* Lange)	45–60 mm., **ochraceous-buff** with paler ochraceous-yellow margin, sometimes also with paler spots here and there, smooth, almost matt when dry.	**Pale blue violaceous,** then tinged rusty, edge concolorous, sl. uneven.	40-50/12-16 mm. (20-30 m in bulb), attenuated wards with widely m ginate bulb, **whiti apex pale violace** when young, soon ocl ceous-buff from the b up and on bulb-mar bulb white-toment below, **without** remna of veil.
10. Pansae.	Young cap orange or rusty-brown. Stem short, bulb from barely to rounded margi		
†47. *pansa* Fr.	47–100 mm., cvx. then exp. or sl. depressed, sometimes lobed at the margin, **orange-brown** to reddish or rusty brown with paler ochraceous or yellowish-buff margin, sometimes spotted, veil forming whitish patches, esp. near margin when young; margin incurved at first, almost tomentose.	**Lilac-violaceous,** often remaining so for a long time, then rusty or rusty-buff with lilac tinge esp. on the edge, adnate or adnato-decurrent, not or sl. emarginate, edge ± even.	25-40(70)/9-15 mm. (15 mm. in bulb), short, ec or thicker at apex, v small rounded often **inc spicuous** marginate or most non-existent **bu** yellowish or ochrace with whitish or someti violaceous apex, cor pale ochraceous or **yell ish,** bulb yellow to above, white-tomen below, sometimes oblic often flattened below.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
ochraceous-ellowish.	Mild. Smell faint.	Rather **narrowly** amygdaliform, rough, 9–11(12)/4½–5μ *sec* Moser.	Gill edge sterile with cylindric to clavate or vesiculose cells 6–15μ wide. NaOH + cap cuticle variable, bright red to reddish-brown.	Coniferous woods.	Differs from *calochrous* (No. 42) in paler gills when young, cap becoming dark from disc outwards, stem often with lilac tinge and narrower spores. Not recorded from Britain but included since this may be *calochrous* sensu Cooke (707(713)). (See notes.)
ite, sometimes . bluish in pex of stem nd tinged pallid chraceous in ulb.	Mild. Smell faint, pleasant.	Amygdaliform to ± limoniform, rough, 8½–11/5–6½μ *sec* Moser.	Gill edge sterile, cells ± cylindric about 6μ wide. NaOH + cap cuticle slowly ± rose-red or bright red.	Decid., mixed or coniferous woods.	Most closely resembling *aureopulverulentus* (No. 44) but lacking the golden-yellow veil, with duller coloured cap and less striking sodium reaction : *calochrous* (No. 42) is brighter coloured in cap and gills. Not yet recorded from Britain.
n flat below. Spores more than 10μ long. (Sp. 47).					
hitish, pale yelowish under cucle of cap, ometimes with orny line over ills, f. firm.	Mild, (cap cuticle v. sl. bitter *sec* Moser) Smell none or faint, pleasant.	Amygdaliform, rough, 10–12(14)/6–6½μ	Gill edge fertile. NaOH + flesh reddish-tawny buff to pinkish buff, + cap cuticle wine-red fading to reddish-brown.	Beech woods, (beech and pine *sec* Fries, fir *sec* Moser). V. uncommon.	Recognised by short squat stem with rounded or inconspicuous often flattened bulb, yellowish cortina and gill colour. British record needs confirmation since no really young specimens were seen, but seems to agree reasonably well with descriptions—under beech on chalk, Hertfordshire.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
*45. *arquatus* Fr. *sensu* Moser (*non sensu* Lange, Ricken)	50-80 mm., at first entirely **bright yellow** (or almost citron yellow) becoming ochraceous, **tawny-buff** or chestnut from the disc outwards, sometimes spotted, smooth; margin incurved at first, remaining ± bright yellow.	Lilaceous or **pale violaceous,** soon milky-coffee often with reddish-lilac tinge, adnate sl. emarginate or adnato-decurrent, very crowded, edge uneven.	50-75/10-15 mm. (20-25 in bulb), ± equal v marginate sometimes teened bulb, pale ochra or buff, **apex often** li or violaceous, cortina bulb often with **yellow** volva-like remains of above, white-tomen below.	ale ochraceous- yellowish.	Mild. Smell faint.	Rather **narrowly** amygdaliform, rough, 9–11(12)/4½–5μ *sec* Moser.	Gill edge sterile with cylindric to clavate or vesiculose cells 6–15μ wide. NaOH + cap cuticle variable, bright red to reddish-brown.	Coniferous woods.	Differs from *calochrous* (No. 42) in paler gills when young, cap becoming dark from disc outwards, stem often with lilac tinge and narrower spores. Not recorded from Britain but included since this may be *calochrous* sensu Cooke (707(713)). (See notes.)
*46. *subarquatus* Moser (=*arquatus* *sensu* Lange)	45–60 mm., **ochraceous-buff** with paler ochraceous-yellow margin, sometimes also with paler spots here and there, smooth, almost matt when dry.	**Pale blue violaceous,** then tinged rusty, edge concolorous, sl. uneven.	40-50/12-16 mm. (20-30 in bulb), attenuated wards with widely gi nate bulb, **white apex pale violaceo** when young, soon oc ceous-buff from the l up and on bulb-marg bulb white-tomen below, **without** rema of veil.	hite, sometimes ge, bluish in apex of stem and tinged pallid ochraceous in bulb.	Mild. Smell faint, pleasant.	Amygdaliform to ± limoniform, rough, 8½–11/5–6½μ *sec* Moser.	Gill edge sterile, cells ± cylindric about 6μ wide. NaOH + cap cuticle slowly ± rose-red or bright red.	Decid., mixed or coniferous woods.	Most closely resembling *aureopulverulentus* (No. 44) but lacking the golden-yellow veil, with duller coloured cap and less striking sodium reaction: *calochrous* (No. 42) is brighter coloured in cap and gills. Not yet recorded from Britain.
10. **Pansae.**	Young cap orange or rusty-brown. Stem short, bulb from barely to rounded marg			en flat below. Spores more than 10μ long. (Sp. 47).					
†47. *pansa* Fr.	47–100 mm., evx. then exp. or sl. depressed, sometimes lobed at the margin, **orange-brown** to reddish or rusty brown with paler ochraceous or yellowish-buff margin, sometimes spotted, veil forming whitish patches, esp. near margin when young; margin incurved at first, almost tomentose.	**Lilac-violaceous,** often remaining so for a long time, then rusty or rusty-buff with lilac tinge esp. on the edge, adnate or adnato-decurrent, not or sl. emarginate, edge ± even.	25-40(70)/9-15 mm. (1 mm. in bulb), short, c or thicker at apex, small rounded often mu **spicuous** marginate e most non-existent **b** yellowish or ochrac with whitish or somet violaceous apex, con pale-ochraceous or yell **ish,** bulb yellow to above, white-tomen below, sometimes obli often flattened below.	Whitish, pale yellowish under cuticle of cap, sometimes with downy line over tubes, f. firm.	Mild, (cap cuticle v. sl. bitter *sec* Moser) Smell none or faint, pleasant.	Amygdaliform, rough, 10–12(14)/6–6½μ	Gill edge fertile. NaOH + flesh reddish-tawny buff to pinkish buff, + cap cuticle wine-red fading to reddish-brown.	Beech woods, (beech and pine *sec* Fries, fir *sec* Moser). V. uncommon.	Recognised by short squat stem with rounded or inconspicuous often flattened bulb, yellowish cortina and gill colour. British record needs confirmation since no really young specimens were seen, but seems to agree reasonably well with descriptions—under beech on chalk, Hertfordshire.

Species	Cap	Gills	Stem
11. Cyanopodes.	Young cap whitish to ochraceous-buff.		Stem with fairly conspicuous but ± roun
48. *cyanopus* (Secr.) Fr. *sensu* Ricken, Konr. & Maubl. (*non sensu* Lange = *amoenolens* Hry.)	50–100 mm., straw-yellowish or pale buff, then yellowish-clay, olive-clay or pale milky-coffee, smooth, ± shiny when dry; margin incurved at first, sometimes innately fibrillose when old.	Pale or grey blue-violaceous, then milky-coffee to **rusty-cinnamon** or almost chocolate colour, not or sl. ventricose, edge ± serrulate.	45–70/8–20 mm. (20-35 m in bulb), equal or sl. thic ened upwards or dow wards with ± **round** sometimes oblique m ginate to almost **imma ginate** bulb, blue-vio ceous, esp. at apex, so whitish, becoming yello ish or rusty-buff belo cortina violaceous, abun ant at first, bulb oft almost rhomboid, whiti then pallid **without** r mains of veil.
49. *amoenolens* Hry. (= *cyanopus sensu* Lange)	27–130 mm., variable in size and shape, sometimes cvx.-truncate or broadly umbonate, pale straw-yellow or pale ochraceous then ochraceous-buff, sometimes with sl. olive tinge, sometimes spotted, often with adpressed whitish scales from veil esp. near margin, then smooth or sl. innato-fibrillose near margin; margin often paler, incurved at first and with fragments of cortina or veil.	Bluish-grey-clay, then clay or ochraceous-clay, finally **milky-coffee** (never truly rusty or chocolate), not or sl. ventricose, edge concolorous or sl. paler, often sl. uneven.	45-140/8-22 mm. (18-45 m in bulb), equal with rath conspicuous but ± roun **ed** marginate (rarely i marginate) bulb, blue-vi laceous at first, soon whi or whitish, then oft tinged yellowish esp. ne base, cortina bluish whitish, bulb with ± co spicuous **yellowish** patch from **veil** which becon darker with age, whit tomentose below, som times with white myceli strands.
12. Glaucopodes.	Young cap ochraceous to buff or tawny-tinged, often with greenish or olive tints e		
	in bulb.) (Spp. 50–52.)		
50. *glaucopus* Fr. (*non sensu* Rea)	50–120 mm., **pale tawny,** ochraceous or buff, often tinged olivaceous, margin at first greenish, later becoming almost unicolorous orange-buff, with ± **conspicuous** darker radial innate fibrils, hard and fleshy, soon dry; margin at first often abruptly incurved or wavy.	**Pale bluish-lilac** or greyish-lilac, then clay-cinnamon, not or sl. ventricose, edge ± uneven.	(40)60–120/10–24 mm. (2(35 mm. in bulb), equal (thickened upwards wit **wide** or rather **rounde** marginate bulb, short an firm at first, bluish-lila or glaucous then pale ye lowish or whitish esp. i lower part, apex persis ently bluish, cortina pa bluish, bulb whitish the yellowish or ochraceous buff, sometimes not muc thicker than stem.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
inate bulb.	Spores over 10μ long. (Spp. 48–49).				
ish in cap and b, ± ochra- us under cap icle or in stem, laceous in per half of m.	**Entirely mild.** Smell none or faint of radish.	Amygdaliform, rough, 10–14/6–7μ *sec* Moser	Gill edge sterile, cells about 10μ wide. NaOH + flesh ± nil, + cap cuticle chocolate or umber-brown.	Decid. woods, esp. beech and oak A good edible fungus.	Distinguished from *amoenolens* (No. 49) by mild taste of cap cuticle, smell, mature gill colour and absence of volva-like remains of veil on bulb. In some respects resembling the section Varicolores but with different sodium reaction and no blue tints in cap. Not definitely recorded from Britain. (See notes.)
bluish or whit- in cap and b, often deeper e-violaceous in m esp. at apex, ellowish under icle of cap l later in bulb, en with horny e over gills.	Flesh mild, cap cuticle **bitter.** Smell not strong but distinct, pleasant at first (of **plums**), later rankish	± limoniform, **v. rough,** (9)10–13/6–7μ	Gill edge sterile, cells 4-8μ wide. NaOH + flesh ± nil, + cap cuticle sl. reddish-brown, sometimes becoming orange-brown.	Beech woods, (particularly on chalk). Common (at least in S.E. England).	Recognised by the patches of veil on the bulb, bitter cap cuticle, faint but distinct fruity smell (not, however, perceptible by all) and rough, ± limoniform spores. After *calochrous* one of the commonest *Scauri* under beech. (This seems to be *glaucopus* sensu Rea and has probably been recorded under this name in the past.)
margin.	Stem from wide to rounded marginately bulbous. Spores less than 10μ long.				Flesh often yellowish
then yellow- bluish-grey pper part of n, often **per yellow** ulb.	Mild. Smell none or slight of new meal.	Elliptic sl. amygdaliform, punctate, **7–9/4½–5½μ**	Gill edge sterile, cells 4–8μ wide NaOH + flesh greyish-brown, + cap cuticle dark violet *sec* Henry.	Typically under conifers, also in deciduous woods.	A robust species, well characterised by small spores, strongly innately fibrillose cap and yellow flesh in bulb, typical of coniferous woods.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
11. Cyanopodes. **48.** *cyanopus* (Secr.) Fr. *sensu* Ricken, Konr. & Maubl. (*non sensu* Lange = *amoenolens* Hry.)	Young cap whitish to ochraceous-buff. 50–100 mm., straw-yellowish or pale buff, then yellowish-clay, olive-clay or pale milky-coffee, smooth, ± shiny when dry; margin incurved at first, sometimes innately fibrillose when old.	Stem with fairly Pale or grey blue-violaceous, then milky-coffee to **rusty-cinnamon** or almost chocolate colour, not or sl. ventricose, edge ± serrulate.	conspicuous but ± 45–70/8–20 mm. (20-35 in bulb), equal or sl. thickened upwards or downwards with ± **rounded**, sometimes oblique **immarginate** bulb, blue-violaceous, esp. at apex, soon whitish, becoming yellowish or rusty-buff below; cortina violaceous, abundant at first, bulb often almost rhomboid, whitish then pallid **without** remains of veil.	...rnate bulb. ...lesh in cap and ...lk, ± ochra-...eous under cap ...uticle or in stem, ...ubbescous in ...pper half of ...tem.	Spores over 10μ long. **Entirely mild.** Smell none or faint of radish.	(Spp. 48–49). Amygdaliform, rough, 10–14/6–7μ *sec* Moser	Gill edge sterile, cells about 10μ wide. NaOH + flesh ± nil, + cap cuticle chocolate or umber-brown.	Decid. woods, esp. beech and oak A good edible fungus.	Distinguished from *amoenolens* (No. 49) by mild taste of cap cuticle, smell, mature gill colour and absence of volva-like remains of veil on bulb. In some respects resembling the section Varicolores but with different, sodium reaction and no blue tints in cap. Not definitely recorded from Britain. (See notes.)
49. *amoenalens* Hry. (= *cyanopus sensu* Lange)	27–130 mm., variable in size and shape, sometimes evx.-truncate or broadly umbonate, pale straw-yellow or pale ochraceous then ochraceous-buff, sometimes with sl. olive tinge, sometimes spotted, often with adpressed whitish scales from veil esp. near margin, then smooth or sl. innato-fibrillose near margin; margin often paler, incurved at first and with fragments of cortina or veil.	Bluish-grey-clay, then clay or ochraceous-clay, finally **milky-coffee** (never truly rusty or chocolate), not or sl. ventricose, edge concolorous or sl. paler, often sl. uneven.	45-140/8-22 mm. (18-45 ... in bulb), equal with rath... cónspicuous hut ± **rounded** marginate (rarely immarginate) bulb, blue-violaceous in ... at first, soon whi... or whitish, then ofte... tinged yellowish esp. ... base, cortina bluish ... whitish, bulb with ± co... spicuous **yellowish** patch... from **veil** which becom... darker with age, white... tomentose below, sometimes with white myce... strands.	...e bluish or whitish in cap and ...lk, often deeper ...lue-violaceous in ...em esp. at apex, ...yellowish under ...uticle of cap ...d later in bulb, ...ten with horny ...ce over gills.	Flesh mild, cap cuticle **bitter.** Smell not strong but distinct, pleasant at first (of **plums**), later rankish	± limoniform, **v. rough,** (9)10–13/6–7μ	Gill edge sterile, cells 4-8μ wide. NaOH + flesh ± nil, + cap cuticle sl. reddish-brown, sometimes becoming orange-brown.	Beech woods, (particularly on chalk). Common (at least in S.E. England).	Recognised by the patches of veil on the bulb, bitter cap cuticle, faint but distinct fruity smell (not, however, perceptible by all) and rough, ± limoniform spores. After *calochrous* one of the commonest *Scauri* under beech. (This seems to be *glaucopus* sensu Rea and has probably been recorded under this name in the past.)
12. Glaucopodes.	Young cap ochraceous to buff or tawny-tinged, often with greenish or olive tints ... in bulb.) (Spp. 50–52.)			...margin. St... from wide to rounded marginately bulbous. Spores less than 10μ long. Flesh often yellowish					
50. *glaucopus* Fr. (*non sensu* Rea)	50–120 mm., **pale tawny,** ochraceous or buff, often tinged olivaceous, margin at first greenish, later becoming almost unicolorous orange-buff, with ± **conspicuous** darker radial innate fibrils, hard and flesby, soon dry; margin at first often abruptly incurved or wavy.	**Pale bluish-lilac** or greyish-lilac, then clay-cinnamon, not or sl. ventricose, edge ± uneven.	(40)60–120/10–24 mm. (... 35 mm. in bulb), equal ... thickened upwards ... **wide** or rather **rounded** marginate bulb, short ... firm at first, bluish-... or glaucous then pale ... lowish or whitish esp. ... lower part, apex persi... ently bluish, cortina ... bluish, bulb whitish ... yellowish or ochraceous-buff, sometimes not ... thicker than stem.	...then yellow... ...e, bluish-grey ...pper part of ...em often ...per yellow ...bulb.	Mild. Smell none or slight of new meal.	Elliptic sl. amygdaliform, punctate, 7–9/4½–5½μ	Gill edge sterile, cells 4–8μ wide NaOH + flesh greyish-brown, + cap cuticle dark violet *sec* Henry.	Typically under conifers, also in deciduous woods.	A robust species, well characterised by small spores, strongly innately fibrillose cap and yellow flesh in bulb, typical of coniferous woods.

Species	Cap	Gills	Stem
51. *herpeticus* Fr. *sensu* Ricken (*non sensu* Cooke =*aureopulverulentus sec* Moser)	35–80 mm., **olive-brown,** then hazelnut brown or dirty buff, sometimes paler on disc, often spotted, ± innately fibrillose, soon dry, margin incurved for a long time.	For a long time deep grey-blue or **sooty-blue,** then dirty violaceous-cinnamon or sooty-olive, edge concolorous ± uneven.	40-80/10-15 mm. (25-30 m in bulb), ± equal v conspicuous **wide** mar ate bulb, at first blu then pale clay-brown cortina pale bluish, t whitish then ochraceou buff, often napiform.
†52. *parherpeticus* Hry.	40-84 mm., **pale ochraceous** to pale rusty-buff, margin **greenish** at first, then ± persistently olivaceous, disc becoming rusty-buff in places, finally almost unicolorous, disc often with whitish patches of veil, remainder with darker rusty innate fibrils, not very viscid; margin soon expanded, smooth.	**Grey-blue,** soon clay-purplish, then deep yellow-brown or cinnamon-umber, adnate emarginate (in larger specimens deeply so), crowded, ± linear, edge concolorous, even to sl. uneven.	50-60/10-16 mm. (18-28 r in bulb), equal or sl. thic upwards, with shai marked but often **nari** marginate bulb (fig. upper half grey-blue first, lower half whi then discolouring yell ish or pallid from the t up, extreme apex only maining ± persiste bluish, bulb white-ton tose below.
13. Purpurascentes.	Gills, flesh, and often stem, turning ± deep purple when bruised or rubbed (in dry c		
53. *purpurascens* Fr. (=*subpurpurascens sensu* Cooke, Ricken: =*porphyropus sensu* Ricken)	50–150 mm., sometimes broadly umbonate or with wavy margin, esp. when large, tawny-buff or **date brown** to olivaceous or dark umber, sometimes with violet tinge, often spotted or marked with darker patches or streaks; margin often **deep violet** at first, later paler, buff to ± concolorous, very viscid at first, smooth.	Paler or darker **purplish-violet,** then clay-buff or cinnamon to rusty-umber, violaceous tinge sometimes persisting, bruising ± deep purple, not or sl. ventricose, edge ± uneven.	50–120/15–24 mm. (20 mm. in bulb), ± equa sl. thicker upwards v **variable** bulb (immar ate to distinctly mar ate), violet, darker w touched, sometimes coming pallid below, tina purplish, firm at then softish, bulb so times disappearing as s lengthens.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
aceous in cap id apex of stem p. under cuti- e, **ochraceous - uff** in rest of em, white in ulb at first.	Mild. Inodorous.	Amygdaliform, punctate, **8–9½/4½–6μ** *sec* Moser.		Conif. woods. Uncommon.	Differs from *glaucopus* (No. 50) by darker cap, gills and flesh and constantly wide marginate bulb. Its presence in Britain needs confirmation. (See notes.)
ish or grey-blu- h at apex of em, deepest ear gills, bluish- hite to yellowish n cap, soon yel- owish-ochraceous r **deeper yellow** n bulb, paler ellow above ulb.	Mild. Smell none or faint, pleasant.	Elliptic or sl. elliptic-amygdaliform, punctate or sl. rough, **7–8½ / 4–5μ**	Gill edge fertile. NaOH + flesh slowly sl. brownish, + cap cuticle reddish brown.	Beech woods on chalk. V. uncommon.	Resembling *glaucopus* (No. 50) but paler, with cap not so strongly innato-fibrillose and smaller and softer. Habitat may be characteristic. This description is based on a British collection which seems to agree reasonably well with Henry's description in *Bull. Soc. mycol. Fr.*, LXVIII (1951) except that Henry says 'not growing in circles' which was the case with the British collection.

ns this reaction may be less marked.) Stem variable in shape, ± equal to marginately bulbous. (Spp. 53-55).

laceous then ale, turns ± eep purple or iolet when ex- osed to air or ruised.	Mild. Smell none or faint, pleasant.	Elliptic sl. amygdaliform, punctate, 8–10/5–6μ	Gill edge fertile.	Decid. or conif. woods (not generally on chalk soil). Common, sometimes subcaespitose.	One of our commonest Scauri, often at the edge of woods or along paths, recognised by dark colours and colour change of gills and flesh when bruised; stem shape, however, is variable; *subpurpurascens* (No. 54) differs in gills not being violet when young and paler cap and stem; *porphyropus* (No. 55) is paler and generally smaller with ± equal or clavate stem. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
51. *herpeticus* Fr. *sensu* Ricken (*non sensu* Cooke = *aureopulverulentus sec* Moser)	35–80 mm., **olive-brown,** then hazelnut brown or dirty buff, sometimes paler on disc, often spotted, ± innately fibrillose, soon dry, margin incurved for a long time.	For a long time deep grey-blue or **snoty-blue,** then dirty violaceous-cinnamon or sooty-olive, edge concolorous ± uneven.	40-80/10-15 mm. (25-30 in bulb), ± equal conspicuous **wide** bulb, at first b then pale clay-brow cortina pale bluish wbitish then ochrace buff, often napiform	...ceous in cap and apex of stem ...p. under cuti... **ochraceous-** ...buff in rest of ...tem, white in ...bulb at first.	Mild. Inodorous.	Amygdaliform, punctate, **8–9½/4½–6 μ** *sec* Moser.		Conif. woods. Uncommon.	Differs from *glaucopus* (No. 50) by darker cap, gills and flesh and constantly wide marginate bulb. Its presence in Britain needs confirmation. (See notes.)
†52. *parherpeticus* Hry.	40-84 mm., **pale ochraceous** to pale rusty-buff, margin **greenish** at first, then ± persistently olivaceous, disc becoming rusty-buff in places, finally almost unicolorous, disc often witb wbitisb patcbes of veil, remainder witb darker rusty innate fibrils, not very viscid; margin soon expanded, smooth.	**Grey-blue,** soon clay-purplish, then deep yellow-brown or cinnamon-umber, adnate emarginate (in larger specimens deeply so), crowded, ± linear, edge concolorous, even to sl. uneven.	50-60/10-16 mm. (18-24 in bulb), equal or sl. th upwards, with sh marked but often **narr** marginate bulb (fa upper half grey-blu first, lower half wh then discolouring yel ish or pallid from the up, extreme apex colo maining ± persisten bluish, bulb white-to tose below.	...ish or grey-blu... ...sh at apex of ...stem, deepest ...ear gills, bluish- ...white to yellowish ...to cap, soon yel... ...ish-ochraceous **or deeper yellow** ...to bulb, paler ...yellow above ...bulb.	Mild. Smell none or faint, pleasant.	Elliptic or sl. elliptic-amygdaliform, punctate or sl. rough, **7–8½/4–5 μ**	Gill edge fertile. NaOH + flesh slowly sl. brownish, + cap cuticle reddish brown.	Beecb woods on chalk. V. uncommon.	Resembling *glaucopus* (No. 50) but paler, witb cap not so strongly innato-fibrillose and smaller and softer. Habitat may be characteristic. This description is based on a British collection whichseems to agree reasonably well with Henry's description in *Bull. Soc. mycol. Fr.*, LXVIII (1951) except tbat Henry says 'not growing in circles' which was the case with the British collection.
13. Purpurascentes.	Gills, flesh, and often stem, turning ± deep purple when bruised or rubbed (in dry ... ...ess this reaction may be less marked.) Stem variable in sbape, ± equal to marginately bulbous. (Spp. 53-55).								
53. *purpurascens* Fr. (= *subpurpurascens sensu* Cooke, Ricken; = *porphyropus sensu* Ricken)	50–150 mm., sometimes broadly umbonate or with wavy margin, esp. wben large, tawny-buff or **date brown** to olivaceous or dark umber, sometimes witb violet tinge, often spotted or marked with darker patches or streaks; margin often **deep violet** at first, later paler, buff to ± concolorous, very viscid at first, smooth.	Paler or darker **purplish-violet,** then clay-buff or cinnamon to rusty-umber, violaceous tinge sometimes persisting, bruising ± deep purple, not or sl. ventricose, edge ± uneven.	50–120/15–24 mm. (... mm. in bulb), ± equ sl. thicker upwards **variable** bulb (imma ate to distinctly ma ate), violet, darker touched, sometimes coming pallid below, tina purplish, firm at then softish, bulb times disappearing as lengthens.	...aceous then ...pale, turns ± ...deep purple or ...violet when ex... ...posed to air or ...bruised.	Mild. Smell none or faint, pleasant.	Elliptic sl. amygdaliform, punctate, 8–10/5–6 μ	Gill edge fertile.	Decid. or conif. woods (not generally on chalk soil). Common, sometimes subcaespitose.	One of our commonest Scauri, often at the edge of woods or along paths, recognised by dark colours and colour change of gills and flesh when bruised; stem shape, however, is variable; *subpurpurascens* (No. 54) differs in gills not being violet when young and paler cap and stem; *porphyropus* (No. 55) is paler and generally smaller with ± equal or clavate stem. (See notes.)

Species	Cap	Gills	Stem
54. *subpurpurascens* [Batsch] Fr. *sensu* Lange, Henry (non *sensu* Ricken, Cooke =*purpurascens*)	50–110 mm., cvx. or cvx.-umbonate then exp. broadly umbonate to sl. depressed, **yellow-buff** to pallid date-brown, margin in sometimes paler, **not** violet, often spotted or streaky (esp. near margin).	Pale to **pallid buff** (sometimes sl. tinged lilac *sec* Lange), then rusty pallid, bruising purplish or violet, not or sl. ventricose, edge even.	50-70/10-13 mm. (17-25 n in bulb), equal with c **vate** immarginate (fig or sl. rounded margin bulb, whitish or l pallid, apex almost wl when young (sometii with a sl. bluish tinge Lange), becoming slo purplish when bruised.
55. *porphyropus* [A. & S.] Fr. (*non sensu* Ricken =*purpurascens*)	25–80 mm., cvx. then exp., umbonate or not, clay, **pale yellowish** or pale date-brown, sometimes with sl. violaceous tinge, very viscid at first, often innately streaky.	**Deep violet** at first, then clay-brown or watery cinnamon, bruising purplish, not or sl. ventricose, edge concolorous ± even.	30–100/5–10 mm. (up 15 mm. below), **equal** attenuated upwards fr **sl. clavate** base, violet first, then whitish fr the base upwards, bruis purplish, cortina whiti
c. **Xanthophylli.**	Young gills straw-yellow to sulphur- or lemon-yellow, olive or greenish. (Spp. 56–73).		
14. **Xanthocyanei.**	Blue or violaceous tints present in cap, flesh or stem (see also *odorifer* (No. 71) which		
†56. *cedretorum* Maire	40–100 mm., entirely sulphur or **lemon-yellow** at first, then **rusty-buff** to reddish-copper from the disc outwards **often in patches,** margin remaining yellow for a long time, sometimes innately fibrillose near margin when older; margin soon expanded.	Pale **olive-sulphur** or greenish-olive then olive-cinnamon or olive-rusty, rather narrow, not or sl. ventricose, edge paler ± uneven.	30–70/8–15 mm. (20–30 m in bulb), ± equal w conspicuous wide marg ate bulb, sulphur or **gree ish-yellow,** apex son times tinged glauco cortina ± olivaceous, b and base of stem p greenish-yellow, then sp ted to entirely rusty-b or reddish-copper, whi tomentose below.
57. *rufo-olivaceus* (Pers. ex Fr.) Fr. (=*testaceus* Cooke: =*vinosus* Cooke)	60-100 mm., often umbonate, **reddish-copper** to reddish-purple, disc often more reddish, margin at first lilac or greyish-violet then concolorous but paler, smooth, shiny when dry; margin incurved at first.	**Greenish-olive** or lemon-yellow at first, then olivaceous-rusty, finally dark rusty, often ventricose when cap expands, edge denticulate.	50-90/12-20 mm.(22-40 m in bulb), ± equal with d tinct wide marginate bu whitish or **greyish-lil** or lilac-violaceous, rar pale greenish yellow, l coming tinged redd (colour of cap) from b upwards, apex often maining lilac, cortina p lilac, bulb whitish bec ing reddish or purplis red.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
ite in cap, inged pallid in laces in stem, urning ± deep urple or violet /hen bruised.	Mild. Smell none or faint, pleasant.	Elliptic sl. amygdaliform, punctate to rough, 9–10/5½–6μ (8½–11/5–6½μ *sec* Hry.)	Gill edge fertile.	Beech woods. Uncommon.	As thus described (from a Scottish collection) very distinct from *purpurascens* (No. 53), differing in paler colours, esp. of gills which are never violaceous until bruised. Further observations are, however, needed to prove its specific status.
laceous, sometimes whitish or allid in cap, urns purplish vhen bruised or xposed to the ir.	Mild. Smell none or faint, pleasant.	Elliptic sl. amygdaliform, rough, 9–11/5½–6½μ	Gill edge fertile.	Decid. or mixed woods (esp. birch). Fairly common.	Originally included by Fries in Elastici owing to stem shape, this species is now included in this section owing to its obvious affinities. Smaller and paler than *purpurascens* (No. 53), but with violet gills at first and rather slender equal or clavate never marginato-bulbous stem.
ow a sl. violaceous tinge at margin of cap.) (Spp. 56–59.)					
ure blue (whitish when old) in centre of cap and apex of stem, greenish-yellow nder cuticle of cap and in lower part of stem, pale to deep sulphur n bulb, with horny line over gills.	Mild. Inodorous.	± amygdaliform, rough, 10–12/6–7μ	Gill edge fertile. NaOH + flesh ± nil or slowly pale purplish-red, + cap cuticle reddish-brown deepening to purplish.	Beech woods (decid. or mixed *sec* Henry). Probably local (f. common on chalk in Surrey)	A very striking and beautiful species; no other British Phlegmacium combines azure blue flesh in cap with greenish-yellow gills and stem. The blue flesh shows when the cap is peeled (or if bitten by animals).
lac or violaceous under cuticle of cap, white or sl. greenish-yellow in centre of cap and stem apex, ± reddish-purple in bulb, esp. at base.	Bitterish. Smell none or faint.	Amygdaliform to ± limoniform, rough, **11–14/7–8μ** *sec* Moser.	Gill edge sterile, cells 5–10μ wide. NaOH + flesh **sulphur-yellow** then olive-brown to dark purple, + cap cuticle olive to dark brown.	Decid. or mixed woods (esp. beech on chalk).	Well characterised by contrasting colours of cap and gills, large spores and sodium reaction on flesh. According to Moser, Cke 758 (759) *vinosus* also represents this species.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
54. ***subpurpurascens*** [Batsch] Fr. *sensu* Lange, Henry (non *sensu* Ricken, Cooke = ***purpuroscens***)	50–119 mm., cvx. or cvx.-umbonate then exp. broadly umbonate to sl. depressed, **yellow-buff** to pallid date-brown, margin in sometimes paler, **not** violet, often spotted or streaky (esp. near margin).	Pale to **pallid buff** (sometimes sl. tinged lilac *sec* Lange), then rusty pallid, bruising purplish or violet, not or sl. ventricose, edge even.	50-70/10-13 mm. (17-25 mm. in bulb), equal with a **vate** immarginate (4–) or sl. rounded margin bulb, whitish or pallid, apex almost when young (sometimes with a sl. bluish ting Lange), becoming sl. purplish when bruised.	White in cap, stained pallid in places in stem, turning ± deep purple or violet when bruised.	Mild. Smell none or faint, pleasant.	Elliptic sl. amygdaliform, punctate to rough, 9–10/5½–6½–7½–8½–11/5–6½ *μ* (*sec* Hry.)	Gill edge fertile.	Beech woods. Uncommon.	As thus described (from a Scottish collection) very distinct from *purpurascens* (No. 53), differing in paler colours, esp. of gills which are never violaceous until bruised. Further observations are, however, needed to prove its specific status.
55. ***porphyropus*** [A. & S.] Fr. (*non sensu* Ricken = ***purpurascens***)	25–80 mm., cvx. then exp., umbonate or not, clay, **pale yellowish** or pale date-brown, sometimes with sl. violaceous tinge, very viscid at first, often innately streaky.	**Deep violet** at first, then clay-brown or watery cinnamon, bruising purplish, not or sl. ventricose, edge concolorous ± even.	30–100/5–10 mm. (up 15 mm. below), equal attenuated upwards **sl. clavate** base, viole first, then whitish the base upwards, brui purplish, cortina whi	Watery, sometimes whitish or pallid in cap, turns purplish when bruised or exposed to the air.	Mild. Smell none or faint, pleasant.	Elliptic sl. amygdaliform, rough, 9–11/5½–6½ *μ*	Gill edge fertile.	Decid. or mixed woods (esp. birch). Fairly common.	Originally included by Fries in Elastici owing to stem shape, this species is now included in this section owing to its obvious affinities. Smaller and paler than *purpurascens* (No. 53), but with violet gills at first and rather slender equal or clavate never marginato-bulbous stem.
c. Xanthophylli. **14. Xanthocyanei.**	Young gills straw-yellow to sulphur- or lemon-yellow, olive or greenish. (Spp. 56–71) Blue or violaceous tints present in cap, flesh or stem (see also *odorifer* (No. 71) which			Blue a sl. violaceous tinge at margin of cap.) (Spp. 56–59.)					
†**56.** ***cedretorum*** Maire	40–100 mm., entirely sulphur or **lemon-yellow** at first, then **rusty-buff** to reddish-copper from the disc outwards **often in patches,** margin remaining yellow for a long time, sometimes innately fibrillose near margin when older; margin soon expanded.	Pale **olive-sulphur** or greenish-olive then olivo-cinnamon or olive-rusty, rather narrow, not or sl. ventricose, edge paler ± uneven.	30–70/8–15 mm. (20–30 mm. in bulb), ± equal conspicuous wide mar ate bulb, sulphur-gre **ish-yellow,** apex sometimes tinged glauc cortina ± olivaceous, and base of stem greenish-yellow, then ted to entirely rusty or reddish-copper, w tomentose below.	**Azure blue** (whitish when old) in centre of cap and apex of stem, greenish-yellow under cuticle of cap and in lower part of stem, pale to deep sulphur in bulb, with blue line over gills.	Mild. Inodorous.	± amygdaliform, rough, 10–12/6–7 *μ*	Gill edge fertile. NaOH + flesh ± nil or slowly pale purplish-red, + cap cuticle reddish-brown deepening to purplish.	Beech woods (decid. or mixed *sec* Henry). Probably local (f. common on chalk in Surrey)	A very striking and beautiful species; no other British Phlegmacium combines azure blue flesh in cap with greenish-yellow gills and stem. The blue flesh shows when the cap is peeled (or if bitten by animals).
57. ***rufo-olivaceus*** (Pers. ex Fr.) Fr. (=*testoceus* Cooke: =*vinosus* Cooke)	60-100 mm., often umbonate, **reddish-copper** to reddish-purple, disc often more reddish, margin at first lilac or greyish-white then concolorous but paler, smooth, shiny when dry; margin incurved at first.	**Greenish-olive** or lemon-yellow at first, then olivaceous-rusty, finally dark rusty, often ventricose when cap expands, edge denticulate.	50-90/12-20 mm. (22-40 in bulb), ± equal with tinct wide marginate whitish or **greyish-li** or lilac-violaceous, pale greenish yellow, coming tinged (colour of cap) from upwards, apex often remaining **lilac**, cortina lilac, bulb whitish ing reddish or pur red.	Lilac or violaceous under cuticle of cap, white or sl. greenish-yellow in centre of cap and stem apex, reddish purple in bulb, esp. at base	Bitterish. Smell none or faint.	Amygdaliform to ± limoniform, rough, **11-14/7-8** *μ* *sec* Moser.	Gill edge sterile, cells 5–10 *μ* wide. NaOH + flesh **sulphur-yellow** then olive-brown to dark purple, + cap cuticle olive to dark brown.	Decid. or mixed woods (esp. beech on chalk).	Well characterised by contrasting colours of cap and gills, large spores and sodium reaction on flesh. According to Moser, Cke 758 (759) *vinosus* also represents this species.

Species	Cap	Gills	Stem
58. *xanthophyllus* (Cooke) Hry.	55–105 mm., **purplish** then spotted with lilac and becoming yellowish on disc.	Pale to deep **sulphur yellow** at first.	50-70/20-25 mm. (up 45 mm. in bulb), equal attenuated at apex w conspicuous wide marg ate bulb, bright **sulphu yellow** with narrow pu lish-red zone at apex.
59. *scaurus* (Fr.) Fr. *sensu* Favre, Lange, Hry. (*non sensu* Bres. = *montanus* Kauff. subsp. *europaeus* Moser: *nec* Ricken = *subvirentophyllus* Hry.)	30–80 mm., often umbonate, **olive to date-brown,** often tinged **greenish,** with **darker** smoky-brown or chocolate-brown **spots** esp. near margin, innately fibrillose; margin at first incurved.	Olive-bistre then pale **olive-cinnamon,** not or sl. ventricose.	60-100/5-15 mm., **varyi** in shape, ± equal wi clavate or irregular rounded marginate bu **lilac-blue** or greenish-b above, yellowish b (sometimes tinged lem colour) below, then dark yellow-buff or tinged rus bulb occasionally almo absent, whitish at first.
15. Fulgentes. Young gills pale to deeper-yellow, not distinctly sulphur yellow or olive. Cap ± yell			
60. *fulgens* (A. & S. ex Secr.) Fr. *sensu* Fries, Kauff., Moser (*non sensu* Cooke, Lange)	60–150 mm., **golden-yellow** or **orange-tawny** to orange rusty or bronze brown, sometimes spotted, with **conspicuous** darker (almost chestnut) **innate fibrils** esp. on disc; margin incurved at first.	**Pale yellow,** then deep rusty-orange, rather broad, edge even at first, later uneven and often remaining yellowish.	35-70/15-25 mm. (30-40 m in bulb), ± equal wi conspicuous sometimes c lique wide marginate bu yellowish or ochraceo paler above, soon ting rusty below, at fi densely fibrillose fr plentiful pale yellowish ochraceous cortina.
61. *fulgens* (A. & S. ex Secr.) Fr. *sensu* Cooke, Lange (*non sensu* Fr., Kauff., Moser)	60–100 mm., **orange-tawny** to tawny-buff, margin yellow, golden or orange-yellow, **smooth;** margin incurved at first.	Soon **deep yellow** then rusty golden or rusty-buff, ± linear, edge even.	40-70/15-25 mm. (30-50 m in bulb), equal with co spicuous wide margina bulb, yellowish-ochre buff, apex paler or yello ish, tinged tawny or rus towards base, cortina y lowish, bulb yellow th tinged tawny or rust sometimes flattened belo
62. *fulmineus* (Fr.) Fr. *sensu* Bres. (*non sensu* Hry., Rea = *parafulmineus* Hry.)	40–100 mm., tawny or **rusty tawny,** margin paler, golden to orange-yellow, disc with dense agglutinated **rusty scales,** margin incurved at first.	Chrome or golden yellow, then yellow or tawny-rusty, linear or ventricose.	20-50/12-20 mm. (25-30 m in bulb), equal with ± co spicuous wide margina bulb, often rather shc and thick, golden or tawn yellow to rusty-orang paler upwards, apex whi to pale yellow, corti white or pale yellow, bu often rooting.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
ish, **violace-s** under cap icle, yellow at riphery of m.	Not known.	Amygdaliform to sublimoniform, punctate, 10½–12½/6–6½ μ (measurements from Cooke's original specimens now in Kew Herbarium).	Not known.	Mixed woods. V. uncommon.	Not known in recent years; based on Cooke's plate, which shows a characteristic-looking species resembling *rufo-olivaceus* (No. 57) but with sulphur-yellow gills and smaller spores. Needs further study. (See notes.)
owish-buff, ker-under the icle of cap and base of stem, **enish-blue** apex of stem.	Mild. Inodorous.	Elliptic to elliptic-amygdaliform, rough, 10–13/6–8μ *sec* Favre, (9–10/5½–6μ *sec* Lange).	Gill edge fertile.	Damp conif. woods or moorlands. V. uncommon.	An uncommon species found once in recent years in a damp fir wood in Scotland, recognised by cap colours and darker spots near margin, ± olive gills and bluish stem-apex: the stem shape is anything but typical of the Scauri! (See notes.)
ceous, tawny, or rusty, also without pronounced sulphur or olive tints. (Spp. 60-64).					
sh or yellow-then buff or ed rusty, firm rst.	Mild. Smell faint, pleasant.	Amygdaliform to sublimoniform, v. rough, 9–12/6–7μ *sec* Kauff.	Gill edge sterile, cells 4-8μ wide. NaOH + flesh pale pink or purplish, deeper in bulb, of stem, + cap cuticle reddish-brown *sec* Moser.	Conif., decid. or mixed woods. Uncommon (not authentically British).	Differs from No. 61 in streaky, innately fibrillose cap, pale gills, ± uniformly coloured flesh and larger spores: from Nos 62 and 63 in lack of scales on cap and from No. 64 in brighter colours, especially gills. (See notes.)
ish or pale aceous, be-ing **darker,** ay-buff (och-ous- or rhu-o-yellow *sec* ge) in base of and bulb.	Mild. Inodorous.	Sublimoniform, rough, 9–10/5–6μ *sec* K. & R.		Decid. woods. Uncommon.	Recognised by smooth bright-coloured cap, deep yellow gills when young and darker flesh at base of stem and in bulb. Appears to have sl. smaller spores than No. 60 (See notes.)
with yellow ine, often ming yellow-awny-buff at or some-s yellow all ugh, firm, at disc.	Mild. Inodorous.	Amygdaliform, rough, 8–10(12)/5–6½μ *sec* Henry. (Cke's specimen 9–11/6–6½μ)		Decid. or mixed woods (occ. in conif. woods). Uncommon.	Not known in Britain in recent years; resembling *fulgens* sensu Lange (No. 61) in colours, but with scaly cap and white flesh when young; *fulmineus* sensu Rea (No. 63) has larger spores. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
58. ***xanthophyllus*** (Cooke) Hry.	55–105 mm., **purplish** then spotted with lilac and becoming yellowish on disc.	Pale to deep **sulphur yellow** at first.	50-70/20-25 mm. (up to 45 mm. in bulb), equal, attenuated at apex with conspicuous wide margin ate bulb, bright **sulphur-yellow** with narrow pur lish-red zone at apex.	...ish, **violace-**...us under cap ...uticle, yellow at ...ipery of ...ibrm.	Not known.	Amygdaliform to sublimoniform, punctate, 10½–12½/6–6½ μ (measurements from Cooke's original specimens now in Kew Herbarium).	Not known.	Mixed woods. V. uncommon.	Not known in recent years; based on Cooke's plate, which shows a characteristic-looking species resembling *rufo-olivaceus* (No. 57) but with sulpbur-yellow gills and smaller spores. Needs further study. (See notes.)
59. ***scaurus*** (Fr.) Fr. *sensu* Favre, Lange, Hry. (*non sensu* Bres. = ***montanus*** Kauff. subsp. ***europaeus*** Moser: *nec* Ricken = ***subvirentophyllus*** Hry.)	30–80 mm., often umbonate, **olive to date-brown**, often tinged **greenish**, with **darker** smoky-brown or chocolate-brown **spots** esp. near margin, innately fibrillose; margin at first incurved.	Olive-histre tben pale **olive-cinnamon**, not or sl. ventricose.	60-100/5-15 mm., varia in shape, ± equal ...clavate or irregula ...rounded marginate ba **lilac-blue** or greenish-b above, yellowish ...(sometimes tinged ...colour) be ow, then dar ...yellow-buff or tinged ru ...bulb occasionally alm ...absent, whitish at firs	...llowish-buff, ...arker under the ...ticle of cap and ...t base of stem, **...reenish-blue** ...apex of stem.	Mild. Inodorous.	Elliptic to elliptic-amygdaliform, rough, 10–13/6–8 μ *see* Favre, (9–10/5½–6 μ *see* Lange).	Gill edge fertile.	Damp conif. woods or moorlands. V. uncommon.	An uncommon species found once in recent years in a damp fir wood in Scotland, recognised by cap colours and darker spots near margin, ± olive gills and bluish stem-apex: tbe stem sbape is anything but typical of tbe Scauri! (See notes.)
15. Fulgentes. Young gills pale to deeper-yellow, not distinctly sulphur yellow or olive. Cap ± yel ...reous, tawny, or rusty, also without pronounced sulphur or olive tints. (Spp. 60-64).									
60. ***fulgens*** (A. & S. ex Secr.) Fr. *sensu* Fries, Kauff., Moser (*non sensu* Cooke, Lange)	60–150 mm., **golden-yellow** or **orange-tawny** to orange rusty or bronze brown, sometimes spotted, witb **conspicuous** darker (almost chestnut) **innate fibrils** esp. on disc; margin incurved at first.	**Pale yellow,** then deep rusty-orange, ratber broad, edge even at first, later uneven and often remaining yellowisb.	35-70/15-25 mm. (30-40 ...in bulb), ± equal w ...conspicuous sometimes ...lique wide marginate bul ...yellowish or ochraceo ...paler above, soon tbe ...rusty below, at fir ...densely fibrillose fr ...plentiful pale yellowish ...ochraceous cortina.	...ish or pale ...aceous, be- ...ning **darker,** ...ish-buff (och- ...ous- or rau- ...yellow suf ...ter) in base of ...and bulb.	Mild. Smell faint, pleasant.	Amygdaliform to sublimoniform, v. rough, 9–12/6–7 μ *see* Kauff.	Gill edge sterile, cells 4-8 μ wide. NaOH + flesh pale pink or purplisb, deeper in bulb, of stem, + cap cuticle reddish-brown *see* Moser.	Conif., deeid. or mixed woods. Uncommon (not autbentically British).	Differs from No. 61 in streaky, innately fibrillose cap, pale gills, ± uniformly coloured flesh and larger spores: from Nos 62 and 63 in lack of scales on cap and from No. 64 in brigbter colours, especially gills. (See notes.)
61. ***fulgens*** (A. & S. ex Secr.) Fr. *sensu* Cooke, Lange (*non sensu* Fr., Kauff., Moser)	60–100 mm., **orange-tawny** to tawny-buff, margin yellow, golden or orange-yellow, **smooth;** margin incurved at first.	Soon **deep yellow** then rusty golden or rusty-buff, ± linear, edge even.	40-70/15-25 mm. (30-50 ...in bulb), equal with c ...spicuous wide margin ...bulb, yellowish-ochre ...buff, apex paler or yell ...ish, tinged tawny or ru ...towards base, cortina ...lowish, bulb yellow th ...tinged tawny or rust ...sometimes flattened bel	...ish or pale ...aceous, be- ...ning **darker,** ...ish-buff (och- ...ous- or rau- ...yellow suf ...ter) in base of ...and bulb.	Mild. Inodorous.	Sublimoniform, rough, 9–10/5–6 μ *see* K. & R.		Deeid. woods. Uncommon.	Recognised by smooth bright-coloured cap, deep yellow gills when young and darker flesb at base of stem and in bulb. Appears to have sl. smaller spores tban No. 60 (See notes.)
62. ***fulmineus*** (Fr.) Fr. *sensu* Bres. (*non sensu* Hry., Rea = ***parafulmineus*** Hry.)	40–100 mm., tawny or **rusty tawny,** margin paler, golden to orange-yellow, disc with dense agglutinated **rusty scales,** margin incurved at first.	Cbrome or golden yellow, then yellow or tawny-rusty, linear or ventricose.	20-50/12-20 mm. (25-30 ...in bulb), equal with ± c ...spicuous wide margina ...bulb, often rather sh ...and thick, golden or tawn ...yellow to rusty-orang ...paler upwards, apex whi ...to pale yellow, cortina ...white or pale yellow, lea ...often rooting.	...with yellow ...ilise, often ...ading yellow ...tawny-buff at ...or some- ...yellow all ...esh, firm, ...al disc.	Mild. Inodorous.	Amygdaliform, rough, 8–10(12)/5–6½ μ *see* Henry. (Cke's specimen 9–11/6–6½ μ)		Decid. or mixed woods (occ. in conif. woods). Uncommon.	Not known in Britain in recent years; resembling *fulgens* sense Lange (No. 61) in colours, but with scaly cap and white flesh when young; *fulmineus* sensu Rea (No. 63) bas larger spores. (See notes.)

Species	Cap	Gills	Stem
63. *parafulmineus* Hry. (=*fulmineus sensu* Hry., Rea)	50–120 mm., **tawny-rusty** or tinged bronze, margin yellow or orange-yellow, disc with numerous large **darker rusty** or purplish-brown **scales;** margin strongly inrolled at first, innately fibrillose.	Pure yellow (chrome), then yellow- or tawny-rusty, edge concolorous, entire or sl. serrulate.	Up to 70/20-25 mm. ± eq with conspicuous w marginate bulb, yellow golden-yellow then tin rusty in places, apex maining yellow, bulb low, becoming ochracec buff or whitish in pla often pointed at base.
†64. *lutescens* (Rea) Hry.	50–90 mm., cvx. then exp. or sl. depressed, pale straw-yellow, then ochraceous-yellow or **buff** with **paler yellowish margin,** often becoming rusty buff from disc outwards, disc often with adpressed whitish scales from veil, otherwise smooth; margin often abruptly incurved for a long time, ± innately fibrillose and with remains of cortina.	**Pal estraw-yellow,** then pale- or rusty-cinnamon, sometimes sl. olivaceous when older (like *Pholiota squarrosa*), adnate, emarginate, crowded, f. narrow, ± linear, edge concolorrous, ± even.	35-50/10-15 mm. (22-32 r in bulb), equal or thickened at base or a with conspicuous v marginate bulb, aln uniform **pale** or very **straw-yellow,** someti tinged rusty below, l white then ± straw- lowor tinged rusty, wh tomentose below.
16. Splendentes	Young gills and cap at least at margin, sulphur or lemon-yellow, olivaceous only		
†65. *splendens* Hry.	30–80 mm , **bright sulphur-yellow,** sometimes with sl. reddish-brown or tawny-rusty tinge on disc or with scattered darker reddish- or purplish-brown scales; margin soon expanded, remaining sulphur-yellow.	**Bright sulphur-yellow,** then olive- or sulphur-rusty, rather narrow, ± uneven when older.	25-60/7-12 mm. (15-25 in bulb), ± equal conspicuous wide ma ate bulb, **bright sulp yellow,** then somet tinged rusty in places at base), cortina sulp yellow, bulb sl. paler derneath, sometimes tened below, with sulp yellow mycelium.
66. *citrinus* (Lge.) Hry.	40–60 mm., **deep lemon-yellow,** then greenish or olivaceous, typically **unicolorous,** but disc sometimes with sl. rusty or tawny tinge or sl. spotted or streaky, otherwise smooth, margin incurved at first.	Deep sulphur-greenish or **lemon-yellow** then olive-buff or rusty-olive, rather narrow, ± linear, edge even to sl. uneven.	70-80/7-12 mm. (12-30 in bulb), ± equal conspicuous wide ma ate bulb, deep sul greenish or **lemon-low,** sometimes paler age, esp. at apex, co lemon-yellow, bulb s times flattened below lemon-yellowish myce

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
itish or pale ılphur with **eeper sulphur utline,** deeper stem and bulb, ecoming darker hen exposed to r and brownish centre of cap.	Mild. Smell none or faint.	± amygdaliform, very rough, **13-14/7-8**μ *sec* Rea, (14½-15½(17)/7-8¾ *sec* Hry.)	Gill edge fertile. NaOH + flesh rose or rose-buff then cream + cap cuticle reddish-brown.	Decid. woods *sec* Rea. (Mountainous conif. woods *sec* Hry.).	Included on the strength of Rea's spore measurements but its presence in Britain requires confirmation. Differs from *fulmineus* sensu Bres. (No. 62) mainly in much larger spores. (See notes.)
pale yellowish, hite in centre f stem when ɔung, then **pale ellowish,** some-mes pallid or chraceous here ıd there (esp. hen eaten by rubs).	Mild. Smell faint, pleasant.	Amygdaliform to sublimoniform, rough, (10)11–12/6–7μ (12–13/7–8μ *sec* Hry.)	Gill edge fertile. NaOH + flesh and cap cuticle ± nil.	Beech on chalk, (edge of woods *sec* Hry.).	This description is from British specimens and agrees reasonably well with that of Henry in *Bull. Soc. mycol. Fr.* LV (1939), p. 171, except for sl. smaller spores, but the flesh is hardly 'bright yellow' as given by Rea. Has the cap and stem colours and scales on cap like the *multiformis* group, but with characteristic pale yellow gills.
r or not at all.	Spores rarely more than 11/6μ. Mycelium at base of stem ± sulphur or lemon-yellow.				(Spp 65–67.)
colorous, **right sulphur ellow.**	Mild. Inodorous.	Amygdaliform or narrowly sublimoniform, ± rough, 10–11(14)/5–6(6½)μ (fig. 16)	Gill edge fertile. NaOH + flesh sl. reddish or brownish, + cap cuticle **dark red** or red-brown. (See notes.)	Beech on chalk. Fairly common (at least in Surrey).	Entirely bright sulphur at first and typically rather small, cap often becoming ± reddish-brown from centre out. Differs from Nos. 66 and 67 in absence of lemon or greenish-yellow tints and sodium reaction on cap cuticle.
colorous, sul-ıur-greenish or **mon-yellow.**	Mild. Smell none or faint, pleasant.	± limoniform, rough, 9–11/5–6μ	Gill edge fertile. NaOH + flesh and cap cuticle ± **deep olive** or olive-brown.	Beech on chalk. Uncommon.	Entirely sulphur-greenish or lemon-yellow at first; differs from *splendens* (No. 65) in pronounced green tinge and different sodium reaction: *sulphureus* (No. 67) has the cap in part olive-brown from the start and paler gills and stem.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
63. *parafulmineus* Hry. (= *fulmineus sensu* Hry., Rea)	50–120 mm., **tawny-rusty** or tinged bronze, margin yellow or orange-yellow, disc with numerous large **darker rusty** or purplish-brown **scales;** margin strongly inrolled at first, innately fibrillose.	Pure yellow (chrome), then yellow- or tawny-rusty, edge concolorous, entire or sl. serrulate.	Up to 70/20-25 mm., ± ... with conspicuous ... marginate bulb, yellow ... golden-yellow then ti... rusty in places, apex ... maining yellow, bulb ... low, becoming ochrace... huff or whitish in pl... often pointed at base.	...ltish or pale ...lphur with **deeper sulphur** ...outline, deeper ...n stem and bulb, ...becoming darker ...when exposed to ...ir and brownish ...n centre of cap.	Mild. Smell none or faint.	± amygdaliform, very rough, **13-14/7-8**μ *see* Rea, (14½-15½(17)/7-8½ *see* Hry.)	Gill edge fertile. NaOH + 6esh rose or rose-buff then cream + cap cuticle reddish-brown.	Decid. woods *see* Rea. (Mountainous conif. woods *see* Hry.).	Included on the strength of Rea's spore measurements but its presence in Britain requires confirmation. Differs from *fulmineus* sensu Bres. (No. 62) mainly in much larger spores. (See notes.)
†64. *lutescens* (Rea) Hry.	50–90 mm., evx. then exp. or sl. depressed, pale straw-yellow, then ochraceous-yellow or **huff** with **paler yellowish margin,** often becoming rusty buff from disc outwards, disc often with adpressed whitish scales from veil, otherwise smooth; margin often abruptly incurved for a long time, ± innately fibrillose and with remains of cortina.	**Pal estraw-yellow,** then pale- or rusty-cinnamon, sometimes sl. olivaceous when older (like *Pholiota squarrosa*), adnate, emarginate, crowded, f. narrow, ± linear, edge concolorous, ± even.	35-50/10-15 mm. (22-32 ... in bulb), equal or ... thickened at base or ... with conspicuous ... marginate bulb, also ... uniform **pale** or very ... **straw-yellow,** sometimes tinged rusty below, ... white then ± straw ... lowor tinged rusty, ... tomentose below.	...pale yellowish, ...white in centre ...d stem when ...young, then **pale ...yellowish,** sometimes pallid or ...ochraceous here ...and there (esp. ...when eaten by ...grubs).	Mild. Smell faint, pleasant.	Amygdaliform to sublimoniform, rough, (10)11-12/6-7μ (12-13/7-8μ *see* Hry.)	Gill edge fertile. NaOH + flesh and cap cuticle ± nil.	Beech on chalk, (edge of woods *see* Hry.).	This description is from British specimens and agrees reasonably well with that of Henry in *Bull. Soc. mycol. Fr.* LV (1939), p. 171, except for sl. smaller spores, but the flesh is hardly 'bright yellow' as given by Rea. Has the cap and stem colours and scales on cap like the *multiformis* group, but with characteristic pale yellow gills.
16. Splendentes	Young gills and cap at least at margin, sulphur or lemon-yellow, olivaceous only ...			...er or not at all.		Spores rarely more than 11/6μ. Myecilium at base of stem ± sulphur or lemon-yellow.			
†65. *splendens* Hry.	30–80 mm., **bright sulphur-yellow,** sometimes with sl. reddish-brown or tawny-rusty tinge on disc or with scattered darker reddish- or purplish-brown scales; margin soon expanded, remaining sulphur-yellow.	**Bright sulphur-yellow,** then olive- or sulphur-rusty, rather narrow, ± uneveo when older.	25-60/7-12 mm. (15-25 ... in bulb), ± equal ... conspicuous wide ma... ate bulb, **bright sulph... yellow,** then some... tinged rusty in places ... at base), cortina sul... yellow, bulb sl. pale ... derneath, sometimes ... tened below, with sul... yellow mycelium.	...odorous, **...right sulphur ...ellow.**	Mild. Inodorous.	Amygdaliform or narrowly subliminoiform, ± rough, 10–11(14)/5–6(6½)μ (fig. 16)	Gill edge fertile. NaOH + flesh sl. reddish or brownish, + cap cuticle **dark red** or red-brown. (See notes.)	Beech on chalk. Fairly common (at least in Surrey).	(Spp 65–67.) Entirely bright sulphur at first and typically rather small, cap often becoming ± reddish-brown from centre out. Differs from Nos. 66 and 67 in absence of lemon or greenish-yellow tiots and sodium reaction on cap cuticle.
66. *citrinus* (Lge.) Hry.	40–60 mm., **deep lemon-yellow,** then greenish or olivaceous, typically **unicolorous,** but disc sometimes with sl. rusty or tawny tinge or sl. spotted or streaky, otherwise smooth, margin ineurved at first.	Deep sulphur-greeoish or **lemon-yellow** then olive-buff or rusty-olive, rather narrow, ± linear, edge even to sl. uneven.	70-80/7-12 mm. (12-3... in bulb), ± equal ... conspicuous wide ma... ate bulb, deep sul... greenish or **lemon-... low,** sometimes pale... age, esp. at apex, e... lemon-yellow, bulb ... times flattened below ... lemon-yellowish myc...	...olorous, sul...-greenish or ...emon-yellow.	Mild. Smell none or faint, pleasant.	± limoniform, rough, 9–11/5–6μ	Gill edge fertile. NaOH + flesh and cap cuticle ± **deep olive** or olive-brown.	Beech on chalk. Uncommon.	Entirely sulphur-greenish or lemon-yellow at first; differs from *splendens* (No. 65) in pronounced green tinge and different sodium reaction: *sulphureus* (No. 67) has the cap in part olive-brown from the start and paler gills and stem.

Species	Cap	Gills	Stem
†67. *sulphureus* (Kauff.) Lge.	50–100 mm., **pale-sulphur** or olive-yellow, covered except at margin with **olive-brown gluten** which often dries into spotlike scales or streaks, margin incurved at first, remaining pale sulphur **or** lemon-yellow for a long time.	**Pale lemon-yellow,** then olive-yellowish, ochraceous-cinnamon or olive-rusty, ± linear, edge even then ± uneven.	30–80/8–20 mm. (up to mm. in bulb), equal or attenuated upwards wi conspicuous wide margi ate bulb, **pale lemo yellowish,** cortina ± oli bulb pale lemon-yello lemon-yellow tomente below often with lemc yellow or pale sulph mycelial strands, oft flattened below.
17. Elegantiores.	Young gills suphur-yellow to ochraceous. Cap often tawny, rusty or reddish in cen		
68. *elegantior* Fr. *sensu* Ricken, Konr. & Maubl., Moser (*non sensu* Hry. =*elegantissimus* Hry.) (=*turbinatus sensu* Cooke, ?Rea)	50–150 mm., **straw-yellow** to **tawny-buff** often tinged **olive** esp. at disc which is usually darker, sometimes spotted, always **innately fibrillose**; margin paler, sometimes abruptly incurved at first.	**Straw-yellow** or ochraceous-straw, then olive-yellow to olive-rusty, ± ventricose, edge serrulate.	50-100/12-25 mm. (22-50 m in bulb), equal with conspicuous wide (son times rounded) margin bulb, **pale yellowish** ochraceous then ± rus from base up, corti abundant, yellowish ochraceous at first, bu whitish below, oft pointed at base.
†69. *elegantissimus* Hry. (=*elegantior sensu* Hry: =*sulphurinus sensu* Ricken: =*aurantio-turbinatus sensu* Lange)	45–100 mm., **sulphur-yellow,** disc soon ± bright tawny-orange, **rusty-buff** or rusty (varying in amount from only the very centre to all except the extreme margin), sometimes spotted, **smooth;** margin incurved at first, remaining ± sulphur-yellow for a long time.	**Sulphur-yellow** to deep lemon-yellow, then olive-yellow to olive-rusty, rather narrow, ± linear, edge sometimes sl. paler, even to sl. uneven.	60-125/10-18 mm. (22-38 m in bulb), equal or thicker at apex with c spicuous wide margin to almost immargin bulb, lemon-yellow or **su phur-yellow,** often coming pallid or ting rusty at base, corti lemon-yellow, bulb of becoming tinged rus white-tomentose below.
70. *orichalceus* (Batsch ex Secr.) Fr. *sensu* Maire, Konr. & Maubl. (*non sensu* Bres. =*odorifer*)	40–130 mm., **reddish-copper** colour, with **yellowish-olive,** bluish-green or glaucous **margin,** disc often with darker **reddish-brown scales**; margin incurved at first and paler then expanded and ± concolorous.	Greenish-yellow, then olive to rusty-olive, linear or sl. ventricose, edge ± denticulate.	50-120/12-20 mm. (up 30 mm. in bulb), equal sl. thicker at base or a with ± conspicuous w marginate bulb, **p greenish-yellow,** cort whitish or very p greenish-yellow.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
le to deeper emon - yellow, ometimes al- nost unicolorous, ometimes darker ear the cuticle.	Mild. Inodorous or almost so.	Amygdaliform to sublimoniform, f. rough, $9\frac{1}{2}$–11/5–6μ	NaOH + flesh and cap cuticle ± **olive-greenish** to olive brown.	Beech woods. Uncommon (British collection on chalk).	Recognised by the pale lemon-yellow colour of all parts except disc of cap. Resembles *citrinus* (No. 66) rather closely, but is not so uniformly coloured as that species. Further study is needed to prove its specific status. (See notes.)
n yellow or olive margin.	Spores mostly more than 11/6μ.	Mycelium white or whitish.			Often strong smelling (Spp. 68–71).
e yellowish ometimes whit- h when cut) often **arker** (rhubarb r **tawny-rusty**) t base of stem nd in bulb.	Mild. Smell none or faint, pleasant.	Limoniform, v. rough, **12-16/7-9μ** *sec* K. & M.	Gill edge sterile, cells 6–12μ wide. NaOH + flesh (esp. at base of stem) ± rose (inconstant), + cap cuticle reddish-brown.	Mostly under conifers, also in decid. woods (commoner in mountainous country). Uncommon.	Recognised by large spores, ±olive cap with pale yellowish margin and rather pale young gills: *elegantissimus* (No. 69) is brighter sulphur-yellow in parts and has white flesh with sulphur outline and an often strong ± aromatic smell. (See notes.)
ite with sulhur outline or lphur in bulb, metimes with rny line over lls.	Mild. Smell faint to rather strong, characteristic, **aromatic,** sometimes rather overpowering (sickly sweet).	Limoniform, very rough, **12-15(17)/8-10μ** (fig. 17).	Gill edge fertile. NaOH + flesh, almost nil or sl. olive grey, + cap cuticle reddish to purplish-brown then purple-black.	Beech woods. Fairly common on chalk.	Recognised by sulphur cap margin, white flesh with sulphur outline, peculiar smell and large spores. Varies in stem shape and the amount of brown on the cap. Differs from *elegantior* (No. 68) in brighter colours and white flesh with sulphur outline.
te or **whitish** centre, yellow- n or **greenish-llow** in out- ne, often be- ming reddish- own in bulb, ith horny line er gills.	Mild. Smell ± strong, aromatic, of **fennel.**	Amygdaliform to sublimoniform, rough, 10–13/6–8μ *sec* K. & M.		Conif. and mixed woods, especially in mountainous country (or on chalk under beech *sec* Rea). Uncommon.	Recognised by contrasting colours of cap and pale greenish-yellow stem, darker flesh at base of stem and smell: *elegantissimus* (No. 69) is more sulphur coloured and has different coloured flesh and larger spores. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
†67. *sulphureus* (Kauff.) Lge.	50–100 mm., **pale-sulphur** or olive-yellow, covered except at margin with **olive-brown gluten** which often dries into spotlike scales or streaks, margin incurved at first, remaining pale sulphur or lemon-yellow for a long time.	**Pale lemon-yellow,** then olive-yellowish, ochraceous-cinnamon or olive-rusty, ± linear, edge even then ± uneven.	30–80/8–20 mm. (up to 55 mm. in bulb), equal or attenuated upwards with conspicuous wide margin ate bulb, pale **lemon-yellowish,** cortina ± olive bulb pale lemon-yellow lemon-yellow tomentu below often with lemon yellow or pale sulph mycelial strands, often flattened below.	**Pale to deeper lemon-yellow,** sometimes almost unicolorous, sometimes darker near the cuticle.	Mild. Inodorous or almost so.	Amygdaliform to sublimoniform, f. rough, 9–11/5–6 μ	NaOH + flesh and cap cuticle ± **olive-greenish** to olive brown.	Beech woods. Uncommon (British collection on chalk).	Recognised by the pale lemon-yellow colour of all parts except disc of cap. Resembles *citrinus* (No. 66) rather closely, but is not so uniformly coloured as that species. Further study is needed to prove its specific status. (See notes.)
17. Elegantiores.	Young gills suphur-yellow to ochraceous.	Cap often tawny, rusty or reddish in cen		ish yellow or olive margin.	Spores mostly more than 11/6 μ.		Mycelium white or whitish.		Often strong smelling (Spp. 68–71).
68. *elegantior* Fr. *sensu* Ricken, Konr. & Maubl., Moser (*non sensu* Hry. =*elegantissimus* Hry.) (=*turbinatus sensu* Cooke, ?Rea)	50–150 mm., **straw-yellow** to **tawny-buff** often tinged **olive** esp. at disc which is usually darker, sometimes spotted, always **innately fibrillose**; margin paler, sometimes abruptly incurved at first.	**Straw-yellow** or ochraceous-straw, then olive-yellow to olive-rusty, ± ventricose, edge serrulate.	50–100/12–25 mm. (22–50 mm in bulb), equal with conspicuous wide (sometimes rounded) margin bulb, **pale yellowish** ochraceous then ± rus from base up, cort abundant, yellowish ochraceous at first, h whitish below, ofte pointed at base.	**ale yellowish** sometimes whit sh when cut) often darker (rhubarb or tawny-rusty) at base of stem and in bulb.	Mild. Smell none or faint, pleasant.	Limoniform, v. rough, **12-16/7-9** μ *sec* K. & M.	Gill edge sterile, cells 6–12 μ wide. NaOH + flesh (esp. at base of stem) ± rose (inconstant), + cap cuticle reddish-brown.	Mostly under conifers, also in decid. woods (commoner in mountainous country). Uncommon.	Recognised by large spores, ± olive cap with pale yellowish margin and rather pale young gills: *elegantissimus* (No. 69) is brighter sulphur-yellow in parts and has white flesh with sulphur outline and an often strong ± aromatic smell. (See notes.)
†69. *elegantissimus* Hry. (=*elegantior sensu* Hry: =*sulphurinus sensu* Ricken: =*aurantia-turbinatus sensu* Lange)	45–100 mm., **sulphur-yellow,** disc soon ± bright tawny-orange, **rusty-buff** or rusty (varying in amount from only the very centre to all except the extreme margin), sometimes spotted, **smooth;** margin incurved at first, remaining ± sulphur-yellow for a long time.	**Sulphur-yellow** to deep lemon-yellow, then olive-yellow to olive-rusty, rather narrow, ± linear, edge sometimes sl. paler, even to sl. uneven.	60-125/10-18 mm. (22-38 mm in bulb), equal or thicker at apex with co spicuous wide margin to almost immargin bulb, lemon-yellow or s **phur-yellow,** often coming pallid or tin rusty at base, corti lemon-yellow, bulb oft becoming tinged rus white-tomentose below.	**hite with sul-hur outline** or sulphur in bulb, sometimes with horny line over gills.	Mild. Smell faint to rather strong, characteristic, **aromatic,** sometimes rather overpowering (sickly sweet).	Limoniform, very rough, **12-15(17)/8-10** μ (fig. 17).	Gill edge fertile. NaOH + flesh, almost nil or sl. olive grey, + cap cuticle reddish to purplish-brown then purple-black.	Beech woods. Fairly common on chalk.	Recognised by sulphur cap margin, white flesh with sulphur outline, peculiar smell and large spores. Varies in stem shape and the amount of brown on the cap. Differs from *elegantior* (No. 68) in brighter colours and white flesh with sulphur outline.
70. *orichalceus* (Batsch ex Secr.) Fr. *sensu* Maire, Konr. & Maubl. (*non sensu* Bres. =*adorifer*)	40–130 mm., **reddish-copper** colour, with **yellowish-olive,** bluish-green or glaucous **margin,** disc often with darker **reddish-brown scales**; margin incurved at first and paler then expanded and ± concolorous.	Greenish-yellow, then olive to rusty-olive, ±linear or sl. ventricose, edge ± denticulate.	50-120/12-20 mm. (up to 30 mm. in bulb), equal sl. thicker at base or with ± conspicuous marginate bulb, **greenish-yellow,** cor whitish or very greenish-yellow.	**ite or whitish** centre, yellow- sh or greenish- llow in out- e, often be- oming reddish- own in bulb, th horny line er gills.	Mild. Smell ± strong, aromatic, of **fennel.**	Amygdaliform to sublimoniform, rough, 10–13/6–8 μ *sec* K. & M.		Conif. and mixed woods, especially in mountainous country (or on chalk under beech *sec* Rea). Uncommon.	Recognised by contrasting colours of cap and pale greenish-yellow stem, darker flesh at base of stem and smell: *elegantissimus* (No. 69) is more sulphur coloured and has different coloured flesh and larger spores. (See notes.)

Species	Cap	Gills	Stem
*71. *odorifer* Britz.	30–110 mm., **reddish-copper** or tawny-brick in centre, **margin variable** from yellowish or greenish to glaucous- or greenish- or bluish-grey (bluish tints rare), ± unicolorous brownish when old, sometimes with darker spots in centre but not scaly; margin incurved at first.	Greenish lemon-yellow or olivaceous, then tawny- or rusty-olive, linear or lanceolate, edge even then ± serrulate.	35–80/8–20 mm. (15–34 mm in bulb), equal or sl. thick above with wide margi ate or immarginate bull **rather bright greenish yellow,** sometimes oliv at apex or yellower a base, becoming reddisl brown at base, cortin pale yellowish-green, bull esp. the margin, becomin reddish-copper like cap.
18. Prasini.	Young gills sulphur or olive-yellow. Cap predominantly green or ochraceous, never y		
72. *prasinus* [Schaeff.] Fr. *sensu* Konr. & Maubl., Cooke (*non sensu* Bres., Lange)	45–80 mm., sometimes umbonate, **olivaceous to grass-green,** disc often tinged **dirty rusty-tawny** or umber, innately fibrillose or with darker spots; margin incurved at first, often remaining green.	**Olive-yellow,** then darker olive to rusty-olive, often sl. ventricose, edge uneven or not.	30-80/10–20 mm. (20–35 mr in bulb), equal or attem ated upwards with wic marginate bulb, **yellow ish- or olive-green,** ofte paler than cap, cortir yellowish-green at firs bulb yellowish-green, son times becoming ting rusty.
73. *atrovirens* Kalchbr. (=*prasinus sensu* Bres.)	50–80 mm., **dark green** or dark olive-green, margin often paler, smooth or innately fibrillose, margin incurved at first.	**Sulphur-yellow,** then olive-sulphur or tawny-olive, finally tawny-cinnamon, linear or sl. ventricose.	40-80/10-20 mm. (20-25 mi in bulb), equal or thick above or below, wi rounded marginate or ir marginate bulb, **sulphu yellow** then greenish, cc tina abundant sulphi yellow then tinged rust bulb with yellow myceliu
B. Cliduchi-Elastici.	Stem never marginately bulbous, from equal to clavate or irregularly bulbous, n		
19. Triumphantes.	Cap yellow, tawny or brown. Stem with yellowish, ochraceous or olive-tinged sc		
†74. *triumphans* Fr. *sensu* Henry, Kauff. (*non sensu* Ricken, Moser, Cooke, Konr. & Maubl., Lange, Rea)	30–120 mm., **yellow-tawny to ochraceous-tawny,** darker or almost orange at disc, rarely tinged sl. olive, margin brighter yellow, with small adpressed crowded tawny scales esp. on disc.	Clay-cream or clay-ochraceous then ochraceous-buff, sl. ventricose, edge even to ± serrulate.	80-120/10-20 mm. (20-40 m below), clavate, at fi sheathed by whitish v which becomes broken into yellowish-ochracec ring-like zones on a pa background, yellow white and ± striate abc cortinal zone.

Flesh	Taste and Smell	Spores	Gill Edge and Chemical Reactions	Habitat	Observations
ght greenish-ellow or more reen in cap or in eriphery of tem, sometimes - sulphur-yellow t centre of stem r throughout, or ddish-brown in ulb.	Mild. Smell faint to ± strong, of **anise.**	Amygdaliform to ± limoniform, rough. (9)12-13/(5)6–7μ *sec* Moser.	Gill edge fertile. NaOH + flesh reddish-brown, + cap cuticle purplish-black.	Mountainous conifer woods.	Differs from *orichalceus* (No. 70) in smell and brighter coloured flesh and stem. Not recorded for Britain.
ochraceous. Spores 10–12/5–7μ.		(Spp. 72–73.)			
e greenish-ellow, some-mes sl. darker outline.	Mild. Inodorous.	Elliptic-amygdaliform, punctate to almost rough, 10–12/5–6½μ *sec* K. & M.	Gill edge sterile, cells 4-8μ wide. NaOH + flesh olive-green, then reddish or purplish-brown.	Decid. (esp. beech) and mixed woods. Uncommon.	Cap truly green, at least in part, gills, flesh and often stem more yellowish-green: *atrovirens* (No. 73) has the cap darker green and flesh sulphur-yellow at first. (See notes.)
colorous **sul-hur-yellow,** hen olive-sul-hur.	Taste sl. acid. Smell faint, of fennel	± amygdaliform, punctate to almost rough, 10–12/5–7μ *sec* K. & M		Mountainous conifer woods. V. uncommon.	Colours very characteristic. Rare in Britain and not known in recent years.
ly with roundish immarginate bulb. Flesh and gills never turning purplish when bruised or rubbed.					(Spp. 74–102.)
ning ± ring-like zones. No blue tints except sometimes in the young gill of *crocolitus* (No. 76).					(Spp. 74–78.)
ite or pale yel-owish, firm then oft.	Mild. Smell faint.	**Elongate sublimoniform** to elliptic fusiform, sometimes almost oblong, punctate, **12-15(17)/6-7(7½)μ**	Gill edge sterile, cells 8-9μ wide. NaOH + flesh bright- to golden-yellow.	Coniferous woods (esp. pine); also under birch. Uncommon.	A robust species best characterised by large elongate sublimoniform spores and sodium reaction. Recently found in Britain both under pine and birch. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill Edge and Chemical Reactions	Habitat	Observations
*71. *odorifer* Britz.	30–110 mm., **reddish-copper** or tawny-brick in centre, **margin variable** from yellowish or greenish to glaucous- or greenish- or bluish-grey (bluish tints rare), ± unicolorous brownish when old, sometimes with darker spots in centre but not scaly; margin incurved at first.	Greenish lemon-yellow or olivaceous, then tawny- or rusty-olive, linear or lanceolate, edge even then ± serrulate.	35–80/8–20 mm. (15–34 mm. in bulb), equal or sl. thicker above with wide margin ate or immarginate bulb, **rather bright greenish-yellow**, sometimes olivaceous at apex or yellower at base, becoming reddish-brown at base, cortex pale yellowish-green, but esp. the margin, becoming reddish-copper like cap.	**Bright greenish-yellow** or more green in cap or in periphery of stem, sometimes ± sulphur-yellow in centre of stem or throughout, or reddish-brown in bulb.	Mild. Smell faint to ± strong, of **anise.**	Amygdaliform to ± limoniform, rough. (9)12-13/(5)6-7μ *sec* Moser.	Gill edge fertile. NaOH + flesh reddish-brown, + cap cuticle purplish-black.	Mountainous conifer woods.	Differs from *orichalceus* (No. 70) in smell and brighter coloured flesh and stem. Not recorded for Britain.
18. Prasini.	Young gills sulphur or olive-yellow. Cap predominantly green or ochraceous, never			ochraceous. Spores 10–12/5–7μ.		(Spp. 72–73.)			
72. *prasinus* [Schaeff.] Fr. *sensu* Konr. & Maubl., Cooke (*non sensu* Bres., Lange)	45–80 mm., sometimes umbonate, **olivaceous to grass-green,** disc often tinged **dirty rusty-tawny** or umber, innately fibrillose or with darker spots; margin incurved at first, often remaining green.	**Olive-yellow,** then darker olive to rusty-olive, often sl. ventricose, edge uneven or not.	30–80/10–20 mm. (20–35 mm. in bulb), equal or attenuated upwards with marginate bulb, **yellowish- or olive-green,** often paler than cap, cortex yellowish-green at first bulb yellowish-green, sometimes becoming tinged rusty.	**Pale greenish-yellow,** sometimes sl. darker with outline.	Mild. Inodorous.	Elliptic-amygdaliform, punctate to almost rough, 10–12/5–6$\frac{1}{2}\mu$ *sec* K. & M.	Gill edge sterile, cells 4-8μ wide. NaOH + flesh olive-green, then reddish or purplish-brown.	Decid. (esp. beech) and mixed woods. Uncommon.	Cap truly green, at least in part, gills, flesh and often stem more yellowish-green: *atrovirens* (No. 73) has the cap darker green and flesh sulphur-yellow at first. (See notes.)
73. *atrovirens* Kalchbr. (= *prasinus* *sensu* Bres.)	50–80 mm., **dark green** or dark olive-green, margin often paler, smooth or innately fibrillose, margin incurved at first.	**Sulphur-yellow,** then olive-sulphur or tawny-olive, finally tawny-cinnamon, linear or sl. ventricose.	40-80/10-20 mm. (20-25 mm. in bulb), equal or thicker above or below, with rounded marginate or ir marginate bulb, **sulphur yellow** then greenish, cortina abundant sulphur yellow then tinged rust bulb with yellow mycelium.	ceolorous **sulphur-yellow,** then olive-sulphur.	Taste sl. acid. Smell faint, of fennel	± amygdaliform, punctate to almost rough, 10–12/5–7μ *sec* K. & M		Mountainous conifer woods. V. uncommon.	Colours very characteristic. Rare in Britain and not known in recent years.
B. Cliduchi-Elastici.	Stem never marginately bulbous, from equal to clavate or irregularly bulbous,			ly with roundish immarginate bulb. Flesh and gills never turning purplish when bruised or rubbed.					(Spp. 74–102.)
19. Triumphantes.	Cap yellow, tawny or brown.	Stem with yellowish, ochraceous or olive-tinged		ning ± ring-like zones.	No blue tints except sometimes in the young gill of *crocolitus* (No. 76).				(Spp. 74–78.)
†74. *triumphans* Fr. *sensu* Henry, Kauff. (*non sensu* Ricken, Moser, Cooke, Konr. & Maubl., Lange, Rea)	30–120 mm., **yellow-tawny to ochraceous-tawny,** darker or almost orange at disc, rarely tinged sl. olive, margin brighter yellow, with small adpressed crowded tawny scales esp. on disc.	Clay-cream or clay-ochraceous then ochraceous-buff, sl. ventricose, edge even to ± serrulate.	80-120/10-20 mm. (20-40 mm. below), clavate, at sheathed by whitish v which becomes broken into yellowish-ochrace ring-like zones on a background, yellow white and ± striate abo cortinal zone.	le or pale yellow, rush, firm then ble.	Mild. Smell faint.	**Elongate subfusiformoniform** to elliptic fusiform, sometimes almost oblong, punctate, **12-15(17)/6-7(7½)μ**	Gill edge sterile, cells 8-9μ wide. NaOH + flesh bright- to golden-yellow.	Coniferous woods (esp. pine); also under birch. Uncommon.	A robust species best characterised by large elongate subfusiformoniform spores and sodium reaction. Recently found in Britain both under pine and birch. (See notes.)

Species	Cap	Gills	Stem
*75. *subtriumphans* Hry. (=*triumphans sensu* Ricken, Moser)	50–120 mm., **ochraceous** to orange-yellow with distinct reddish- or date-brown **innate fibrils,** sometimes spotted, margin paler, yellowish or sl. ochraceous, disc sometimes also with ochraceous or reddish-brown scales or patches from veil; margin often appendiculate with remains of cortina.	Pale clay or clay-ochraceous, then darker rusty-clay to rusty-ochraceous, ± linear, about half the depth of flesh of cap, edge paler or not, even or sl. denticulate.	65-100/10-20 mm.(20-30 mm below), equal above, sometimes thinner at base when young, ± clavato-bulbous pale yellowish, ochraceous or buff, sometimes dark below, at first with thick woolly ochraceous or olivaceous patches of veil which disappear with age, cortina ochraceous-buff.
76. *crocolitus* Quél. (=*triumphans sensu* Cooke, Konr. & Maubl., Lange, Rea)	50–120 mm., pale to bright **yellow,** disc sometimes tinged tawny or tawny-buff, margin paler, straw-yellow or pale ochraceous, sometimes with fine scales on disc from veil, otherwise **smooth;** margin sometimes with fragments of cortina.	Creamy-white, sometimes **tinged grey-blue** or lilaceous at first, then clay-cream or clay-cinnamon, finally rusty-buff, not or sl. ventricose, edge paler ± denticulate.	70–170/10–25 mm., often long, ± equal above clavato-bulbous base, pale straw-yellow, apex white or whitish silky striate veil forming rather thin yellowish or yellow-tawny scales in ± ring-like zones, cortina white at first.
†77. *olidus* Lange (=*cliduchus sensu* Ricken, Konr. & Maubl: =*cephalixus sensu* Henry *non* Moser)	48–100 mm., sometimes flattened at disc or broadly umbonate, **ochraceous-yellow** or buff, disc often tinged tawny, margin paler, disc often with small sl. darker adpressed scales.	Clay-whitish then pale ochraceous or buff, ± linear or sl. broader near stem, edge paler or not, ± uneven.	50–80/10–15 mm. (up to 25 mm. below), elongate clavate, sometimes pointed at base, **white above yellowish below,** apex silky or sl. pruinose, cortinal zone well marked cortina whitish yellow sometimes becoming yellow-buff, base with scattered ± adpressed yellow ochraceous or yellow-buff often fugacious scales at base (fig. 7), which sometimes form ring-like zone
*78. *cephalixus* (Secr.) Fr. *sensu* Moser *non* Henry (=*papulosus* Fr. *sensu* Bres.)	40–100 mm., sometimes umbonate, **ochraceous-yellow,** clay-buff or sometimes with greenish or **olive** tinge, disc generally darker often granular-rough or cracked into small scales, margin soon straight, thin, sometimes radially split.	Pale whitish-clay, then ochraceous clay or buff, ± ventricose, edge even or uneven.	50–100/10–20 mm. (17–2 mm. below), equal with bulbous base, sometimes almost rounded-marginate **ochraceous yellow** to **olive-brown** below cortinal zone, apex whitish with yellowish or brownish patches of veil near base cortina whitish or with greenish tinge.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
tish or pale, m, often thick disc.	Mild. Smell none or faint, mouldy.	Amygdaliform, rough, **9-11/5-6μ** *sec* Moser.	Gill edge sterile, cells 4-8μ wide. NaOH + flesh buff or sl. orange-brown.	Coniferous or mixed woods.	Differs from *triumphans* sensu Hry. (No. 74) in smaller spores and cap with darker innate fibrils, probably also sodium reaction: *crocolitus* (No. 76) is paler and yellower and has no innate fibrils on cap. Not definitely recorded from Britain.
m, pale yellow- or ± ochra- ous, often be- ming rather t.	Mild. Smell none, or faint, mouldy.	Elliptic-amygdaliform to amygdaliform, punctate to almost rough, **10-12½/6-7μ**	(Not yet investigated.)	Decid. woods, esp. birch. Fairly common.	Differs from No. 75 in yellower colours and ± smooth cap, and from No. 74 in smaller spores and sodium reaction presumably ± nil. Past records of *triumphans* in Britain may well have been this species.
e, sometimes ged yellowish ochraceous un- r cuticle of cap d stem, often ck at disc.	Mild. Smell often strong, esp. when cut, **unpleasant,** rank.	± amygdaliform, punctate to almost smooth, often 1-guttulate, **10-12/5½-6μ** (9–10/5μ *sec* Lange)	Gill edge with some sterile basidiiform cells. NaOH + flesh ± nil or sl. yellow, + cap cuticle sl. brownish.	Decid. or mixed woods (often under beech). Uncommon.	Recognised by smell, rather dull yellowish colours and spores: the veil patches on the stem are much thinner and often less conspicuous than those on Nos. 74-76: differs from *cephalixus* sensu Moser in smell and larger spores.
e, not very ck at disc.	Mild. Smell often strong, esp. when cut, of **new-mown hay** or unripe maize.	Elliptic-amygdaliform to amygdaliform, f. rough, **8-10½/4½-5½μ** *sec* Moser.	Gill edge sterile, cells 4-7μ wide. NaOH + flesh ± nil, + cap cuticle olive-brown.	Coniferous and deciduous woods.	Nearest to *olidus* (No. 77) but with different smell, smaller spores and darker colours with a tendency towards olive shades. Not yet authentically recorded for Britain (Cke 731 (718) *papulosus* is doubtful.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
*75. *subtriumphans* Hry. (=*triumphans sensu* Ricken, Moser)	50–120 mm., **ochraceous** to orange-yellow with distinct reddish- or date-brown **innate fibrils,** sometimes spotted, margin paler, yellowish or sl. ochraceous, disc sometimes also with ochraceous or reddish-brown scales or patches from veil; margin often appendiculate with remains of cortina.	Pale clay or clay-ochraceous, then darker rusty-clay to rusty-ochraceous, ± linear, about half the depth of flesh of cap, edge paler or not, even or sl. denticulate.	65-100/10-20 mm.(20-30 mm. below), equal above, some times thinner at base when young, ± clavato-bulbous, pale yellowish, ochraceous or buff, sometimes darker below, at first with thin woolly ochraceous or ochraceous patches of veil which disappear with age, cortina ochraceous-buff.	Thick, pale, firm, often thick at disc.	Mild. Smell none or faint, mouldy.	Amygdaliform, rough, **9-11/5-6μ** *sec* Moser.	Gill edge sterile, cells 4-8μ wide. NaOH + flesh buff or sl. orange-brown.	Coniferous or mixed woods.	Differs from *triumphans* sensu Hry. (No. 74) in smaller spores and cap with darker innate fibrils, probably also sodium reaction: *crocolitus* (No. 76) is paler and yellower and has no innate fibrils on cap. Not definitely recorded from Britain.
76. *crocolitus* Quél. (=*triumphans sensu* Cooke, Konr. & Maubl., Lange, Rea)	50–120 mm., pale to bright **yellow,** disc sometimes tinged tawny or tawny-buff, margin paler, straw-yellow or pale ochraceous, sometimes with fine scales on disc from veil, otherwise **smooth;** margin sometimes with fragments of cortina.	Creamy-white, sometimes **tinged grey-blue** or lilaceous at first, then clay-cream or clay-cinnamon, finally rusty-buff, not or sl. ventricose, edge paler ± denticulate.	70–170/10–25 mm., often long, ± equal above bulbo-vato-bulbous base, pale straw-yellow, apex white or whitish silky striate veil forming rather yellowish or yellow-tawny scales in ± ring-like zones, cortina white first.	Thick, pale yellowish or ± ochraceous, often becoming rather soft	Mild. Smell none, or faint, mouldy.	Elliptic-amygdaliform to amygdaliform, punctate to almost rough, **10-12½/6-7μ**	(Not yet investigated.)	Decid. woods, esp. birch. Fairly common.	Differs from No. 75 in yellower colours and ± smooth cap, and from No. 74 in smaller spores and sodium reaction presumably ± nil. Past records of *triumphans* in Britain may well have been this species.
†77. *olidus* Lange (=*cliduchus sensu* Ricken, Konr. & Maubl: =*cephalixus sensu* Henry *non* Moser)	48–100 mm., sometimes flattened at disc or broadly umbonate, **ochraceous-yellow** or buff, disc often tinged tawny, margin paler, disc often with small sl. darker adpressed scales.	Clay-whitish then pale ochraceous or buff, ± linear or sl. broader near stem, edge paler or not, ± uneven.	50–80/10–15 mm. (up to 25 mm. below), elongate clavate, sometimes pointed at base, **white above, yellowish below,** apex silky or sl. pruinose, cortinal zone well marked, cortina whitish yellow sometimes becoming yellow-buff, base with scattered ± adpressed yellow ochraceous or yellow-buff often fugacious scales at base (fig. 7), which sometimes form ring-like zones	Thick, sometimes tinged yellowish ochraceous under cuticle of cap and stem, often black at disc.	Mild. Smell often strong, esp. when cut, **unpleasant,** rank.	± amygdaliform, punctate to almost smooth, often 1-guttulate, **10-12/5½-6μ** (9–10/5μ *sec* Lange)	Gill edge with some sterile basidiiform cells. NaOH + flesh ± nil or sl. yellow, + cap cuticle sl. brownish.	Decid. or mixed woods (often under beech). Uncommon.	Recognised by smell, rather dull yellowish colours and spores: the veil patches on the stem are much thinner and often less conspicuous than those on Nos. 74-76: differs from *cephalixus* sensu Moser in smell and larger spores.
*78. *cephalixus* (Secr.) Fr. *sensu* Moser *non* Henry (=*papulosus* Fr. *sensu* Bres.)	40–100 mm., sometimes umbonate, **ochraceous-yellow,** clay-buff or sometimes with greenish or **olive** tinge, disc generally darker often granular-rough or cracked into small scales, margin soon straight, thin, sometimes radially split.	Pale whitish-clay, then ochraceous clay or buff, ± ventricose, edge even or uneven.	50–100/10–20 mm. (15–30 mm. below), equal with bulbous base, sometimes most rounded-marginate **ochraceous yellow** or **olive-brown** below cortinal zone, apex whitish with yellowish or brownish patches of veil near base, cortina whitish or with greenish tinge.	Thick, not very dark at disc.	Mild. Smell often strong, esp. when cut, of **new-mown hay** or untripe maize.	Elliptic-amygdaliform to amygdaliform, f. rough, **8-10½/4½-5½μ** *sec* Moser.	Gill edge sterile, cells 4-7μ wide. NaOH + flesh ± nil, + cap cuticle olive-brown.	Coniferous and deciduous woods.	Nearest to *olidus* (No. 77) but with different smell, smaller spores and darker colours with a tendency towards olive shades. Not yet authentically recorded for Britain (Cke 731 (718) *papulosus* is doubtful.)

Species	Cap	Gills	Stem
20. Claricolores.	Cap yellow, tawny or brown.	Stem and sometimes also cap margin with white floc	
79. ***claricolor*** Fr. *sensu* Konr. & Maubl. (*non sensu* Lange, Bres.)	80–120 mm., **yellowish-cream,** tawny-ochraceous or pale reddish, silky pruinose, esp. near margin, then smooth, cuticle of disc often splitting into small scales; margin pale, incurved at first, ± silky-fibrillose.	Whitish-cream, then pale flesh colour or rusty-clay, ± linear, edge denticulate.	30-90/10-25 mm. (up 50 mm. below), clavate ventricose, sometimes tenuated at base, wh then pale yellowish-och ceous, apex white pru ose, with concentric **wh floccose** fugacious **sca** below white cortinal rir zone.
†**80.** ***albomarginatus*** *nov. nom.* (=*claricolor* *sensu* Lange)	50–105 mm., cvx. then exp. generally umbonate, deep rusty or **red-brown** (fox colour), sometimes paler towards margin, disc smooth or with a few white silky patches, sometimes cracking into small scales when old; margin often remaining abruptly turned down, with a conspicuous **rather thick white silky zone** up to 10 mm. in.	Clay whitish then clay-buff, pale rusty or rusty-buff, adnate emarginate or with tooth, subdistant to f. crowded, broadly linear or sl. ventricose, edge white or pale, ± uneven, sometimes rather thick.	55–140/8–18 mm., equal clavate at base (up to mm.), white then coloured yellowish fr base up, apex white, str. from base of gills often white-pruino white cortina forming conspicuous ring-zone n apex, below this with concentric **white sil scales,** which becc tipped with yellow brown and finally dis pear.
†**81.** ***fraudulosus*** Britz. *sensu* Moser	**25-45(65)** mm., cvx. then exp., sl. umbonate with margin regular or sl. wavy, **pale buff or pink-ish-buff** (*Hebeloma* colour), then darker almost date-brown at disc with yellower tinge at margin, ± innately fibrillose towards margin but disc ± smooth, soon dry; margin at first very white silky from veil, which disappears gradually leaving small ± concentric, adpressed scales around disc, often splitting when old.	White then whitish-clay to pale milky-coffee, finally ochraceous-clay, adnate, emarginate or with tooth, subdistant to f. crowded, often **rather thick,** ± ventricose, edge ± uneven.	25-40(80)/17–11(14) n (11-24 mm. below), eq or sl. thinner at apex base (or rounded bulb at base *sec* Moser), p white then discolou pallid, apex white si striate, cortina white fo ing ring-zone near ap below this with consp ous **floccose white** o brownish tipped **sca** which disappear with
82. ***saginus*** (Fr.) Fr. *sensu* auct. *non* Ricken	40–125 mm., sometimes sl. umbonate, **yellow or yellow-buff,** disc often tinged rusty or tawny, margin more yellow, smooth or with remains of white veil at first; margin incurved at first.	Pale clay or pale ochraceous then clay-cinnamon or ochraceous, adnato- or subdecurrent, ± ventricose, edge uneven.	70-120/10-25 mm. (13-30 below), ± clavate or form-bulbous at b white then yellow or lowish-buff at base, a white, striate, cor white, **white** veil at forming **floccose sc** or zones.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
at least when young (occ. coloured at tips), or cortina forming thick white floccose ring-zone. No blue tints. (Spp. 79–83.)					
whitish-cream, metimes red-ing slightly en exposed to **hard** and a.	Mild. Inodorous.	Amygdaliform to sublimoniform, punctate or **almost smooth, 11-15(17)/6-8(9)μ** *sec* K. & M.		Mountainous conifer woods.	Distinguished by pale colours, hard flesh, large almost smooth spores and stem white floccose-scaly when young. Doubtfully British and probably not *claricolor* sensu Fr. (See notes.)
e or sl. brown-in base of m or when en by grubs.	Mild. Smell **strong, unpleasant,** rank.	**Elliptic amygdaliform** to **sublimoniform,** often with large apiculus, punctate to almost rough, **11-14/7-7½μ**	Gill edge fertile.	Beech woods, esp. on chalk. Uncommon.	Well characterised by reddish-brown cap with thick white marginal zone, unpleasant smell and large sub-limoniform spores.
e then whit-, tinged pallid der cuticle of) and at base stem, f. thick disc, gradually nner towards rgin, firm at st.	Mild. Smell **faint,** pleasant (esp. when cut), sl. sour when old.	**Elliptic-pruniform** or sl. amygdaliform, rough, **11-13(14)/7-7½μ**	Gill edge fertile. NaOH + flesh and cap cuticle ± nil. $AgNO_3$ + flesh slowly rose (up to 30 mins.), later brownish.	Beech woods, (also under conifers *sec* Moser). Uncommon.	Near *albomarginatus* (No. 80) but much smaller, with less striking white zone at edge of cap, different smell and differently shaped spores. This description is from a British collection, with details of maximum size of cap and stem added from Moser.
e, ± ochra-ous at base of em, cream be-ath cuticle of p.	Mild or sl. bitter after much chewing. Smell none or faint, pleasant.	**Subglobose** to broadly ovate, rough, 8–9/6½–8μ *sec* Hry.	No specific chemical reactions, *sec* Hry.	Mountainous conifer woods. Uncommon. Often subcaespitose.	Recognised primarily by its subglobose spores, also by yellow colours and stem white floccose-scaly at first. Not well known in Britain. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
20. Claricolores.	Cap yellow, tawny or brown.	Stem and sometimes also cap margin with white		Vel at least when young (occ. coloured at tips), or cortina forming tbick white floccose ring-zone.					No blue tints. (Spp. 79–83.)
79. *cloricolor* Fr. *sensu* Konr. & Maubl. (*non sensu* Lange, Bres.)	80–120 mm., **yellowish-cream,** tawny-ochraceous or pale reddisb, silky pruinose, esp. near margin, then smooth, cuticle of disc olten splitting into small scales; margin pale, incurved at first, ± silky-fibrillose.	Whitish-cream, then pale flesh colour or rusty-clay, ± linear, edge denticulate.	30-90/10-25 mm. (up 50 mm. below), clavate ventricose, sometimes tenuated at base, wh then pale yellowish-ochr ceous, apex white pru ose, with concentric **wbit floccose** fugacious **scale** below white cortinal zone.	whitish-cream, sometimes red-ventricose, sometimes slightly ming when exposed to ir, **bard** and tm.	Mild. Inodorous.	Amygdaliform to sublimoniform, punctate or **almost smooth, 11-15(17)/6-8(9)μ** *sec* K. & M.		Mountainous conifer woods.	Distinguished by pale colours, hard flesh, large almost smooth spores and stem white floccose-scaly when young. Doubtfully British and probably not *claricolor* sensu Fr. (See notes.)
†80. *albomorginotus* *nov. nom.* (= *claricolor* *sensu* Lange)	50–105 mm., cvx. then exp. generally umbonate, deep rusty or **red-brown** (fox colour), sometimes paler towards margin, disc smooth or with a few whitc silky patches, sometimes cracking into small scales when old; margin often remaining abruptly turned down, with a conspicuous **rather thick wbite silky zone** up to 10 mm. in.	Clay whitish then clay-buff, pale rusty or rusty-buff, adnate emarginate or with tooth, subdistant to f. crowded, broadly linear or sl. ventricose, edge white or pale, ± uneven, sometimes rather tbick.	55–140/8–18 mm., equal clavate at base (up t mm.), white then coloured yellowish f base up, apex white, ste from base of gills often white-pruin white cortina formi conspicuous ring-zone apex, below this with concentric **wbite silk scales,** which bec tipped with yello brown and finally dea pear.	ste or sl. brown-sh in base of rm or when ten by grubs.	Mild. Smell **strong, unpleasant,** rank.	**Elliptic amygdaliform** to **sublimoniform,** often with large apiculus, punctate to almost rough, **11-14/7-7½μ**	Gill edge fertile.	Bccch woods, esp. on cbalk. Uncommon.	Well characterised by reddisb-brown cap with tbick wbite marginal zone, unpleasant smell and large sub-limoniform spores.
†81. *froudulosus* Britz. *sensu* Moser	**25-45(65)** mm., cvx. tben exp., sl. umbonate with margin regular or sl. wavy, **pale buff or pinkish-buff** (*Hebeloma* colour), then darker almost date-brown at disc with yellower tinge at margin, ± innately fibrillose towards margin but disc ± smooth, soon dry; margin at first very white silky from veil, which disappears gradually leaving small ± concentric, adpressed scales around disc, often splitting when old.	White then whitish-clay to pale milky-coffee, finally ochraceous-clay, adnate, emarginate or with tooth, subdistant to f. crowded, often **rather thick,** ± ventricose, edge ± uneven.	25-40(80)/17–11(14) (11-24 mm. below), or sl. thinner at apex base (or rounded bulb at base *sec* Moser), white then discolou pallid, apex white striate, cortina white ing ring-zone near below tbis with conspi ous **floccose white** brownish tipped **scal** which disappear with	re then whit-sh, tinged pallid er cuticle of ge and at base ften, l. thick dge, gradually ener towards rge, firm at st.	Mild. Smell **faint,** pleasant (esp, when cut), sl. sour wben old.	**Elliptic-pruniform** or sl. amygdaliform, rough, **11-13(14)/7-7½μ**	Gill edge fertile. NaOH + flesh and cap cuticle ± nil. $AgNO_3$ + flesh slowly rose (up to 30 mins.), later brownish.	Beech woods, (also under conifers *sec* Moser). Uncommon.	Near *albomarginatus* (No. 80) but mucb smaller, with less striking white zone at edge of cap, different smell and differently sbaped spores. This description is from a British collection, with details of maximum size of cap and stem added from Moser.
82. *soginus* (Fr.) Fr. *sensu* auct. *non* Ricken	40–125 mm., sometimes sl. umbonate, **yellow or yellow-buff,** disc often tinged rusty or tawny, margin more yellow, smooth or with remains of white veil at first; margin incurved at first.	Pale clay or pale ochraceous then clay-cinnamon or ochraceous, adnato- or subdecurrent, ± ventricose, edge uneven.	70-120/10-25 mm. (13-3 below), ± clavate o form-bulbous at white then yellow c lowish-buff at base, white, striate, c white, **wbite** veil at forming **floccose sc** or zones.	= ochra-s at base of s. cream be-th cuticle of	Mild or sl. bitter after much cbewing. Smell none or faint, pleasant.	**Subglobose** to broadly ovate, rough, 8–9/6½–8μ *sec* Hry.	No specific chemical reactions, *sec* Hry.	Mountainous conifer woods. Uncommon. Often subcaespitose.	Recognised primarily by its subglobose spores, also by yellow colours and stem white floccose-scaly at first. Not well known in Britain. (See notes.)

Species	Cap	Gills	Stem
83. *turmalis* Fr. *sensu* Cooke, Ricken	50–100 mm., cvx. then exp. ± umbonate or sl. depressed, remaining ± cvx. for a long time, **yellowish-ochraceous** with darker ± tawny or reddish-brown disc, disc sometimes with remains of white veil; margin incurved for a long time, at first white silky and ± appendiculate from veil.	Pale clay, then clay-ochraceous, milky-coffee or clay-cinnamon, rather narrow, ± uneven.	40–120/10–25 mm., ± ec or often attenuated do wards, shining white, a silky striate, white cor forming a **thick** ± **p sistent floccose ri like zone** near apex, low this with white f cose scales from veil, v **hard** and rigid.
21. Sebacei.	Cap white, yellowish, tawny or brown. Stem from smooth to fibrilloso-striate but		
84. *sebaceus* Fr. (=*sericellus* Moser)	50–120 mm., often umbonate, pale to deep **ochraceous-yellow** or buff, **disc** mostly ± **reddish-brown, white silky hoary** at first, later sl. innato-fibrillose, ± matt when dry; margin sometimes ± appendiculate at first, often upturned when old.	Pale clay or ochraceous then ochraceous milky-coffee or pale cinnamon, edge even or sl. uneven.	70-120/10-25 mm., equal attenuated upwards w ± clavate base, ra attenuated at base, **p white,** then dirty white pale yellowish, white si striate, white cortina ab dant but not form floccose scales.
*35. *crassus* Fr. *sensu* Bres., Lange (*non sensu* Ricken =*C. (Inoloma) pseudocrassus* Josserand)	35–100 mm., generally umbonate, ochraceous to **red-brown,** smooth or spotted with ochraceous-yellowish downy patches of veil, matt when dry; margin 'somewhat fibrillose' *sec* Lange, remaining incurved for a long time.	Pale whitish, then clay to pale cinnamon, adnate scarcely emarginate, crowded, sl. ventricose near stem, edge sl. uneven.	35–100/10–25 mm., equa sl. ventricose or clava **pale dirty whitish,** o raceous or buff, apex pa almost white, sl. pruin ± fibrilloso-striate be cortinal zone.
86. *lustratus* Fr.	30–60 mm., cvx. then exp., ± umbonate with incurved margin, **pure white** then creamy white, disc finally tinged sl. yellowish or ochraceous (resembling *Entoloma prunuloides*, as mentioned by Fries himself), smooth, margin ± appendiculate.	Whitish then pale ochraceous milky-coffee, adnate, emarginate or not, very crowded, **very narrow** (up to 2½(3) mm. wide for cap 40 mm. in diam.), edge even.	40-60/5-10 mm. (up to 13 m below), equal or sl. clava **pure white** then tin pallid below or wh wounded, almost smoo cortina sparse, white.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
white, fairly ck at disc.	Mild. Inodorous.	Elliptic-amygdaliform, almost smooth, **8-10/4-4½μ** *sec* Moser.	Gill edge sterile, cells 4-10μ wide. NaOH + flesh ± yellow-brown, *sec* Moser.	Coniferous, mixed or deciduous woods. Uncommon.	Well characterised by thick floccose cortinal zone, hard white stem, and small spores.
se-scaly, nor with thick floccose cortinal ring-zone.			No blue tints. (Spp. 84–86.)		
ish to ochra-us or buff.	Mild. Inodorous.	**Elliptic-fusiform,** punctate, usually pale yellowish *sub. micr.*, **7-9/3½-4μ** *sec* Moser.		Coniferous and deciduous woods. Uncommon.	Recognised by small elliptic-fusiform spores, yellowish-buff white hoary cap and stem at first pure white and silky striate. Not well known in Britain and needs further study. (See notes.)
e, sl. darker watery in cen- of cap, thick l firm.	Mild. Smell none, or faint, 'rather rankish' *sec* Lange.	± **amygdaliform,** punctate to almost smooth, 9–10/5–6μ *sec* Moser.	Gill edge fertile. NaOH + flesh and gills ± yellowish; NH_4OH + flesh ± yellowish, + gills chrome to golden yellow, *sec* Moser.	Coniferous and deciduous woods (mostly larch and fir, *sec* Moser).	Recognised by ± reddish-brown cap, rather thick dirty pallid stem, pale gills and ± amygdaliform spores. No authentic British record. *C. validus* Favre resembles this species but has elliptic spores and stem cream-ochraceous floccose at first. (See Key § 96 and notes.)
e, discolouring ownish here and re under cut-, firm.	Mild. Smell **strong, mealy.**	Elliptic-oval, punctate to almost smooth, pale yellow-ochraceous in mass, **6-7/3½-4μ** *sec* Moser.	Gill edge sterile with cylindric or sl. lageniform, cells 4–8μ wide. NaOH ± nil.	Mixed woods (e.g. beech and fir). Rare.	A characteristic species distinguished by whitish colours, narrow gills, mealy smell and small spores. Included in British list on strength of Cooke's plate, but apparently not recorded since, and has only been recorded on very few occasions in other countries.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
83. ***turmalis*** Fr. *sensu* Cooke, Ricken	50–100 mm., cvx. then exp. ± umbonate or sl. depressed, remaining ± cvx. for a long time, **yellowish-ochraceous** with darker ± tawny or reddish-brown disc, disc sometimes with remains of white veil; margin incurved for a long time, at first white silky and ± appendiculate from veil.	Pale clay, then clay-ochraceous, milky-coffee or clay-cinnamon, rather narrow, ± uneven.	40–120/10–25 mm., ± … or often attenuated d… wards, shining white, … silky striate, white cort… forming a **thick** ± pe… **sistent floccose ri… like zone** near apex, … low this with white … cose scales from veil … **hard** and rigid.	… white, fairly … thick at disc.	Mild. Inodorous.	Elliptic-amygdaliform, almost smooth, **8-10/4-4½** *µ* *sec* Moser.	Gill edge sterile, cells **4-10** *µ* wide. NaOH + flesh ± yellow-brown, *sec* Moser.	Coniferous, mixed or deciduous woods. Uncommon.	Well characterised by thick floccose cortinal zone, hard white stem, and small spores.
21. Sebacei. Cap white, yellowish, tawny or brown. Stem from smooth to fibrilloso-striate but … cose-scaly, nor with thick floccose cortinal ring-zone. No blue tints. (Spp. 84–86.)									
84. ***sebaceus*** Fr. (=*sericellus* Moser)	50–120 mm., often umbonate, pale to deep **ochraceous-yellow** or buff, **disc** mostly ± **reddish-brown, white silky hoary** at first, later sl. innato-fibrillose, ± matt when dry; margin sometimes ± appendiculate at first, often upturned when old.	Pale clay or ochraceous then ochraceous milky-coffee or pale cinnamon, edge even or sl. uneven.	70-120/10-25 mm., equ… attenuated upwards … ± clavate base, … attenuated at base, … **white**, then dirty wh… pale yellowish, white … striate, white cortina … dant but not form… floccose scales.	…ish to ochra… …rous or buff.	Mild. Inodorous.	**Elliptic-fusiform,** punctate, usually pale yellowish *sub. micr.*, **7-9/3½-4** *µ* *sec* Moser.		Coniferous and deciduous woods. Uncommon.	Recognised by small elliptic-fusiform spores, yellowish-buff white hoary cap and stem at first pure white and silky striate. Not well known in Britain and needs further study. (See notes.)
35.** ***crassus Fr. *sensu* Bres., Lange (*non sensu* Ricken =*C. (Inoloma) pseudocrassus* Josserand)	35–100 mm., generally umbonate, ochraceous to **red-brown,** smooth or spotted with ochraceous-yellowish downy patches of veil, matt when dry; margin 'somewhat fibrillose' *sec* Lange, remaining incurved for a long time.	Pale whitish, then clay to pale cinnamon, adnate scarcely emarginate, crowded, sl. ventricose near stem, edge sl. uneven.	35–100/10–25 mm., equ… sl. ventricose or clav… **pale dirty whitish,** … raceous or buff, apex p… almost white, sl. prun… ± fibrilloso-striate be… cortinal zone.	…ite, sl. darker …er watery in cen… …er of cap, thick …nd firm.	Mild. Smell none, or faint, 'rather rankish' *sec* Lange.	± **amygdaliform,** punctate to almost smooth, 9–10/5–6 *µ* *sec* Moser.	Gill edge fertile. NaOH + flesh and gills ± yellowish; NH_4OH + flesh ± yellowish, + gills chrome to golden yellow, *sec* Moser.	Coniferous and deciduous woods (mostly larch and fir, *sec* Moser).	Recognised by ± reddish-brown cap, rather thick dirty pallid stem, pale gills and ± amygdaliform spores. Noauthentic British record. *C. validus* Favre resembles this species but has elliptic spores and stem cream-ochraceous floccose at first. (See Key § 96 and notes.)
86. ***lustratus*** Fr.	30–60 mm., cvx. then exp., ± umbonate with incurved margin, **pure white** then creamy white, disc finally tinged sl. yellowish or ochraceous (resembling *Entoloma prunuloides*, as mentioned by Fries himself), smooth, margin ± appendiculate.	Whitish then pale ochraceous milky-coffee, adnate, emargmate or not, very crowded, **very narrow** (up to 2½(3) mm. wide for cap 40 mm. in diam.), edge even.	40-60/5-10 mm. (up to 13… below), equal or sl. cla… **pure white** then … pallid below or … wounded, almost smo… cortina sparse, white.	…ite, discolouring …owish here and … under cut… …y firm.	Mild. Smell **strong, mealy**.	Elliptic-oval, punctate to almost smooth, pale yellow-ochraceous in mass, **6-7/3½-4** *µ* *sec* Moser.	Gill edge sterile with cylindric or sl. lageniform, cells **4-8** *µ* wide. NaOH ± nil.	Mixed woods (e.g. beech and fir). Rare.	A characteristic species distinguished by whitish colours, narrow gills, mealy smell and small spores. Included in British list on strength of Cooke's plate, but apparently not recorded since, and has only been recorded on very few occasions in other countries.

Species	Cap	Gills	Stem
22. Cumatiles.	Cap violaceous or bluish, at least in part or when young. Young gills whitish or clay, s		
87. *cumatilis* Fr.	40-120(200) mm., sometimes broadly umbonate, watery lilac or greyish-blue to deeper **violet,** disc becoming **ochraceous,** wine red or tinged sepia, sometimes spotted, matt to sl. shiny when dry; margin remaining ± violet or bluish with darker innate fibrils, cuticle not peeling easily.	**Pale clay,** then clay-ochraceous or cinnamon, finally rusty-clay, rather narrow, ± linear or sl. ventricose, edge uneven.	50-100/10-40 mm., equal clavate, white, then w ish to ochraceous-l from the base up, at f covered with **blue-v laceous patches** of below cortinal zone wh later form scattered sc like patches, cortina w ish to pale violace abundant.
†88. *balteato-cumatilis* Hry. (=*balteatus sensu* Cooke, Lange)	50–150 mm., reddish-brown, wine-red or date-brown, sometimes tinged tawny or violaceous with rather **narrow** but often rather bright **violaceous margin,** shining and smooth when dry; margin for a long time incurved, ± innately fibrillose, cuticle peeling ± easily.	**Pale clay** (rarely with sl. lilac tinge), then pale clay-buff or ochraceous, f. narrow, ± linear, about 3–5 mm. wide for cap 60–85 mm. in diam., edge paler ± uneven.	50–70/18–30 mm., rob clavate or clavato-bulb often rather short, wh or whitish, becoming tin rusty from the base sometimes tinged vi ceous in places, with a often fugacious **violace patches** from veil n base when young, a white-pruinose; base wh tomentose.
89. *balteatus* Fr. *sensu* Konr. & Maubl., Moser (*non sensu* Cooke, Lange =*balteato-cumatilis*)	50–150 mm., sometimes umbonate or with wavy margin when old, clay-, **cork- or tobacco-brown** sometimes with sl. reddish or olivaceous tinge, **margin** generally **narrowly lilac** or violaceous, paling to whitish or pallid (rarely so from the first), soon **dry, felty fibrillose** except at margin, disc sometimes cracking into patches, cuticle not, or hardly, peeling.	**Pale whitish or clay-whitish,** then clay-rusty, rather narrow, linear to sl. ventricose, edge whitish, uneven.	40-90/12-30 mm. (16-35 n below), equal to clavat bulbous at base, of short, white then coloured pallid or ru from base up, silky sh to fibrilloso-floccose be white cortinal zone, a pruinose.

Flesh	Taste and Smell	Spores	Gill Edge and Chemical Reactions	Habitat	Observations
s with faint violaceous or lilac flush. Stem (except No. 89) with violaceous or whitish scales near base from veil. (Spp. 87–90).					
tish, sometimes violaceous under cap cuticle, coming pale hraceous or llid in stem, ry firm at first.	Mild. Smell none, or faint, pleasant.	**Elliptic-fusiform,** punctate, 9–12/4½–6μ *sec* Moser.	Gill edge ± fertile. NaOH and NH_4OH + flesh, sl. yellow. (Not constant.)	Coniferous and mixed woods. Uncommon.	Often large and showy; recognised by blue violaceous tints of cap margin and veil fragments on stem, pale gills and stem and elliptic-fusiform spores: *balteato-cumatilis* (No. 88) differs in smell, brighter and narrower violaceous cap margin, spores and habitat. Not well known in Britain.
te or whitish, metimes sl. olaceous under ticle, hard and mpact, thick at isc.	Mild. Smell ± **strong, rank** or earthy.	Elliptic-amygdaliform to **amygdaliform,** weakly punctate, 10–12(13)/5½-6½μ	Gill edge sterile, cells 6-8μ wide. NaOH + flesh almost nil, NH_4OH + flesh ± tan with yellow edge.	Decid. woods, esp. beech. Uncommon.	Differs from *cumatilis* (No. 87) in more pronounced violet margin to cap, smell, spores and habitat; from *balteatus* (No. 89) in shinier smoother cap with peeling cuticle, narrower gills, violaceous scales on young stem and habitat.
e white, discoloured brownsh when eaten y grubs or under the cap cuicle, hard at rst, thick at lisc (up to 40 mm.), abruptly hinner at margin.	Mild. **Smell faint,** pleasant or earthy.	Amygdaliform to sublimoniform, punctate to almost rough, 10–12/5½–6μ *sec* Moser.	Gill edge sterile, cells 6-8μ wide. NaOH + flesh brownish with yellow margin; NH_4OH + flesh ± yellow.	Coniferous and mixed woods. Uncommon. (Common, esp. under fir and larch early in season in Central Europe.) A good edible fungus.	Distinguished by rather dull brown dry ± felty fibrillose cap with violaceous margin, whitish gills and stem. British records need confirmation, some or all of these may be *balteato-cumatilis* (No. 88).

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill Edge and Chemical Reactions	Habitat	Observations
22. Cumatiles.	Cap violaceous or bluish, at least in part or when young. Young gills whitish or clay, …			…es with faint violaceous or lilac flush.			Stem (except No. 89) with violaceous or whitish scales near base from veil. (Spp. 87–90).		
87. *cumatilis* Fr.	40-120(200) mm., sometimes broadly umbonate, watery lilac or greyish-blue to deeper **violet,** disc becoming **ochraceous,** wine red or tinged sepia, sometimes spotted, matt to sl. shiny when dry; margin remaining ± violet or bluish with darker innate fibrils, cuticle not peeling easily.	**Pale clay,** then clay-ochraceous or cinnamon, finally rusty-clay, rather narrow, ± linear or sl. ventricose, edge uneven.	50-100/10-40 mm., equal, clavate, white, then … ish to ochraceous … from the base up, at … covered with **blue-violaceous patches** of … below cortinal zone … later form scattered … like patches, cortina … ish to pale violaceous … abundant.	…blush, sometimes … sl. violaceous under cap cuticle, becoming pale … ochraceous or … pallid in stem, … very firm at first.	Mild. Smell none, or faint, pleasant.	**Elliptic-fusiform,** punctate, 9–12/4½–6μ *sec* Moser.	Gill edge ± fertile. NaOH and NH_4OH + flesh, sl. yellow. (Not constant.)	Coniferous and mixed woods. Uncommon.	Often large and showy; recognised by blue violaceous tints of cap margin and veil fragments on stem, pale gills and stem and elliptic-fusiform spores: *balteato-cumatilis* (No. 88) differs in smell, brighter and narrower violaceous cap margin, spores and habitat. Not well known in Britain.
†**88.** *balteata-cumatilis* Hry. (= *balteatus sensu* Cooke, Lange)	50–150 mm., reddish-brown, wine-red or date-brown, sometimes tinged tawny or violaceous with rather **narrow** but often rather bright **violaceous margin,** shining and smooth when dry; margin for a long time incurved, ± innately fibrillose, cuticle peeling ± easily.	**Pale clay** (rarely with sl. lilac tinge), then pale clay-buff or ochraceous, f. narrow, ± linear, about 3–5 mm. wide for cap 60–85 mm. in diam., edge paler ± uneven.	50–70/18–30 mm., … clavate or clavate-bulbous … often rather short, … or whitish, becoming … rusty from the base … sometimes tinged … ceous in places, with … often fugacious **violaceous patches** from veil … base when young, … white-pruinose; base … tomentose.	…te or whitish, … sometimes sl. violaceous under cuticle, hard and compact, thick at disc.	Mild. Smell ± **strong, rank** or earthy.	Elliptic-amygdaliform to **amygdaliform,** weakly punctate, 10–12(13)/5½–6½μ	Gill edge sterile, cells 6-8μ wide. NaOH + flesh almost nil, NH_4OH + flesh ± tan with yellow edge.	Decid. woods, esp. beech. Uncommon.	Differs from *cumatilis* (No. 87) in more pronounced violet margin to cap, smell, spores and habitat; from *balteatus* (No. 89) in shinier smoother cap with peeling cuticle, narrower gills, violaceous scales on young stem and habitat.
89. *balteatus* Fr. *sensu* Konr. & Maubl., Moser (*non sensu* Cooke, Lange = *balteata-cumatilis*)	50–150 mm., sometimes umbonate or with wavy margin when old, clay-, **cork- or tobacco-hrown** sometimes with sl. reddish or olivaceous tingo, **margin** generally **narrowly lilac** or violaceous, paling to whitish or pallid (rarely so from the first), soon **dry, felty fihrillose** except at margin, disc sometimes cracking into patches, cuticle not, or hardly, peeling.	**Pale whitish or clay-whitish,** then clay-rusty, rather narrow, linear to sl. ventricose, edge whitish, uneven.	40-90/12-30 mm. (16-35 … below), equal to clavate … bulbous at base, … short, white then … coloured pallid or … from base up, silky … to fihrilloso-floccose … white cortinal zone, … pruinose.	…e white, discoloured brownish when eaten … grubs or uncolored the cap cuticle, hard at first, thick at disc (up to 40 mm.), abruptly thinner at margin.	Mild. **Smell faint,** pleasant or earthy.	Amygdaliform to sublimoniform, punctate to almost rough, 10–12/5½–6μ *sec* Moser.	Gill edge sterile, cells 6-8μ wide. NaOH + flesh brownish with yellow margin; NH_4OH + flesh ± yellow.	Coniferous and mixed woods. Uncommon. (Common, esp. under fir and larch early in season in Central Europe.) A good edible fungus.	Distinguished by rather dull brown dry ± felty fihrillose cap with violaceous margin, whitish gills and stem. British records need confirmation, some or all of these may be *balteato-cumatilis* (No. 88).

Species	Cap	Gills	Stem
90. *praestans* (Cordier) Sacc. (=*Berkeleyi* Cke.: =*variicolor sensu* Ricken: =*torvus sensu* Quélet)	**75-200** mm., chestnut or chocolate-brown, often tinged violaceous or coppery, then dirty buff or tan, innately fibrillose, veil forming rather **thick** scattered **whitish patches** (like an *Amanita*); **margin** for a long time incurved, becoming radially wrinkled or **sulcate,** often **grey-violaceous** to darker violet.	Whitish or pale clay tinged lilac or violaceous, then pale clay-ochraceous to clay-cinnamon or ochraceous-rusty, rather narrow, sl. ventricose, edge becoming paler and ± denticulate.	**70-200/20-60** mm., oft very robust, ventrico clavate or bulbous, at fi violaceous then dir white or yellowish or p pallid from the base with apex white, whiti or lilac, at first colour with **thick silky viol ceous veil** which brea up into violaceous, lat whitish or ochraceous p ches, whitish cortina for ing ring-zone near ape
23. Variicolores.	All parts except sometimes centre of cap lilac to violaceous when young. (Spp. 91–93)		
91. *variicolor* (Pers. ex Fr.) Fr. *sensu* Konr. & Maubl., etc. (*non sensu* Ricken =*praestans*)	50–150 mm., **robust,** date-brown, or sepia with reddish tinge, **margin violet** at least when young, rarely entirely violet, robust, soon dry, cuticle sometimes cracking, margin tomentose at first.	Lilac then ochraceous-clay or cinnamon, rather narrow, ± denticulate.	40-90/12-30 mm. (20-35 m below), clavate or ± bu bous, lilac or bluish, th whitish or tinged pallid base, apex more persis ently bluish, villose fibrilloso-floccose, pale bl ish cortina forming rin zone near apex, very firm
92. *nemorensis* (Fr.) Lge.	35–95 mm., from **entirely violet** or blue-violaceous to dirty buff or **date-brown with ± violaceous margin** at first, soon entirely pallid, livid brown or date-brown, **innately fibrillose** at least near margin when young, often later entirely and strongly so, disc often becoming dry, cracked and flocculose.	Violet or lilac-violaceous, often persistently so, esp. near edge of cap, then clay-violet or clay-cinnamon, finally rusty-buff to rusty umber, sl. ventricose, edge sometimes paler at first, ± even.	45-80/9-30 mm. (14-37 mm below), ± clavate, som times thicker at apex pointed at base, violet blue-violaceous, then whi ish or pallid esp. near bas apex often remaining vi laceous for some time an often pruinose, blue-vi laceous cortina abundan at first, base often bluish or violaceous-tomentos very firm.
93. *largus* Fr.	32–120 mm., **pale lilac** or blue-violaceous, **disc** soon pale to darker **buff,** ochraceous or reddish-brown, margin mostly remaining pale bluish or violaceous, soon dry and **shiny** or sl. innately fibrillose or tomentose when old, margin sometimes remaining incurved for a long time.	Lilac or deeper violaceous, then bluish-grey-clay, clay-buff or cinnamon, finally ± rusty, sometimes persistently bluish near margin of cap, linear or sl. ventricose, edge paler ± denticulate.	48-100/10-20 mm. (14-3 mm. below), equal with ± pointed bulbous base o clavate, blue-violaceou then whitish or ± palli below, apex often prui nose, whitish or pale bluis cortina forming ring-zon near apex, base white tomentose, firm at first.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
e to pale och- eous, some- ues darker un- cap cuticle or ged lilac in ex of stem, rly firm.	Mild. Inodorous.	± limoniform, rough, **13-18/8-10μ** *sec* Moser.	Gill edge sterile, cells rather pointed clavate, 4-6μ wide.	Decid. and conif. woods on chalk. V. uncommon. (often in circles). An excellent edible fungus.	One of the largest Cortinarii, readily distinguished by size, thick veil, dark coloured cap with characteristic sulcate margin when old and large spores. Unfortunately rare in Britain.
, paling to itish esp. in ntre of cap and m, **very hard** d compact.	Mild. Smell often **strong, rank,** earthy (esp. if left in a confined space).	Amygdaliform to limoniform, rough, 10–12/5½–7μ *sec* K. & M.	Gill edge fertile or almost so. NaOH + flesh chrome yellow; NH_4OH + flesh **quickly** (15 to 30 secs.) **deep golden-yellow.**	Mountainous conifer woods. Uncommon. (often in circles). A good edible fungus.	Not so common in Britain as *nemorensis* (No. 92) which differs in being less robust, cap always innately fibrillose and often strongly so, apex of stem ± pruinose and habitat: *largus* (No. 93) is altogether softer and paler.
violaceous, itish in centre cap and stem sometimes sl. lid in stem, **ry firm,** esp. stem.	Mild. Smell often **strong, rank,** earthy, esp. when cut.	Elliptic-amygdaliform to amygdaliform, punctate to almost rough, 9–12/5–6½μ	Gill edge fertile or almost so. NaOH + flesh ± yellow; NH_4OH + flesh **quickly deep chrome** or golden-yellow.	Decid. (esp. beech), mixed or coniferous woods, generally in low-lying country. Solitary or subcaespitose. F. common.	Close to *variicolor* (No. 91) and regarded by some authors as a variety of this species; differs in being typically more slender and having the cap innately fibrillose, often strongly so; it is also often entirely violet at first (except part of flesh), and appears to have sl. different spores — this latter point, however, needs further study.
violaceous or ac becoming itish in centre cap and stem en cut, firm at t, but soon ft.	Mild. Smell none, or **faint,** pleasant (sl. fruity), sometimes rankish when old.	Amygdaliform to sublimoniform, punctate to almost rough, 10–12/5½–6½μ	Gill edge fertile. NaOH + flesh slowly ± yellowish; NH_4OH + flesh, **pale yellowish** or almost nil (occ. *slowly* darker yellow).	Decid. woods (esp. beech and oak). F. common. Often caespitose.	Differs from Nos. 91 and 92 in paler bluish colours of cap and gills, softer flesh and ammonia reaction (also smell, possibly less reliably).

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
90. ***praestans*** (Cordier) Sacc. (= ***Berkeleyi*** Cke.: = ***variicolor*** *sensu* Ricken: = ***torvus*** *sensu* Quélet)	**75-200** mm., chestnut or chocolate-brown, often tinged violaceous or coppery, then dirty buff or tan, innately fibrillose, veil forming rather **thick** scattered **whitish patches** (like an *Amanita*); **margin** for a long time incurved, becoming radially wrinkled or **sulcate**, often **grey-violaceous** to darker violet.	Whitish or pale clay tinged lilac or violaceous, then pale clay-ochraceous to clay-cinnamon or ochraceous-rusty, rather narrow, sl. ventricose, edge becoming paler and ± denticulate.	**70-200/20-60** mm., very robust, ventricose-clavate or bulbous, at first violaceous then dull white or yellowish or pallid from the base, with apex white, whitish or lilac, at first reticulose with **thick silky violaceous veil** which breaks up into violaceous, lilac, whitish or ochraceous patches, whitish cortina forming ring-zone near apex	Pale to pale ochraceous, sometimes darker under cap cuticle or tinged lilac in apex of stem, fairly firm.	Mild. Inodorous.	± limoniform, rough, **13-18/8-10**μ *sec* Moser.	Gill edge sterile, cells rather pointed clavate, 4-6μ wide.	Decid. and conif. woods on cbalk. V. uncommon. (often in circles). An excellent edible fungus.	One of the largest Cortinarii, readily distinguished by size, thick veil, dark coloured cap with characteristic sulcate margin when old and large spores. Unfortunately rare in Britain.
23. Varicolores.	All parts except sometimes centre of cap lilac to violaceous when young. (Spp. 91-9								
91. ***voriicolor*** (Pers. ex Fr.) Fr. *sensu* Konr. & Maubl., etc. (*non sensu* Ricken = ***proestans***)	50–150 mm., **robust,** date-brown, or sepia with red-disb tinge, **margin violet** at least when young, rarely entirely violet, robust, soon dry, cuticle sometimes cracking, margin tomentose at first.	Lilac then ochraceous-clay or cinnamon, rather narrow, ± denticulate.	40-90/12-30 mm. (20-35 mm. below), clavate or ± bulbous, lilac or bluish, then whitish or tinged pallid, at base, apex more persistently bluish, villose-fibrilloso-floccose, pale bluish cortina forming ring-zone near apex, very firm	Pale, paling to whitish esp. in centre of cap and stem, **very hard** and compact.	Mild. Smell often **strong, rank,** earthy (esp. if left in a confined space).	Amygdaliform to limoniform, rough, 10–12/5½–7μ *sec* K. & M.	Gill edge fertile or almost so. NaOH + flesh chrome yellow; NH_4OH + flesh **quickly** (15 to 30 secs.) **deep golden-yellow.**	Mountainous conifer woods. Uncommon. (often in circles). A good edible fungus.	Not so common in Britain as *nemorensis* (No. 92) which differs in being less robust, cap always innately fibrillose and often strongly so, apex of stem ± pruinose and habitat: *largus* (No. 93) is altogether softer and paler.
92. ***nemorensis*** (Fr.) Lge.	35–95 mm., from **entirely violet** or blue-violaceous to dirty buff or **date-brown with** ± **violaceous margin** at first, soon entirely pallid, livid brown or date-brown, **innately fibrillose** at least near margin when young, often later entirely and strongly so, disc often becoming dry, cracked and flocculose.	Violet or lilac-violaceous, often persistently so, esp. near edge of cap, then clay-violet or clay-cinnamon, finally rusty-buff to rusty umber, sl. ventricose, edge sometimes paler at first, ± even.	45-80/9-30 mm. (14-37 mm. below), ± clavate, sometimes thicker at apex, pointed at base, violet to blue-violaceous, then whitish or pallid esp. near base, apex often remaining violaceous for some time, often pruinose, blue-violaceous cortina abundant at first, base often bluish or violaceous-tomentose, very firm.	Blue-violaceous to pallish in centre of cap and stem, sometimes sl. pallid in stem, **very firm,** esp. in stem.	Mild. Smell often **strong, rank,** earthy, esp. when cut.	Elliptic-amygdaliform to amygdaliform, punctate to almost rough, 9–12/5–6½μ	Gill edge fertile or almost so. NaOH + flesh ± yellow; NH_4OH + flesh **quickly deep chrome** or golden-yellow.	Decid. (esp. beech), mixed or coniferous woods, generally in low-lying country. Solitary or subcaespitose. F. common.	Close to *variicolor* (No. 91) and regarded by some authors as a variety of this species; differs in being typically more slender and having the cap innately fibrillose, often strongly so; it is also often entirely violet at first (except part of flesh), and appears to have sl. different spores —this latter point, however, needs further study.
93. ***largus*** Fr.	32–120 mm., **pale lilac** or blue-violaceous, **disc** soon pale to darker **buff,** ochraceous or reddish-brown, margin mostly remaining pale bluish or violaceous, soon dry and **shiny** or sl. innately fibrillose or tomentose when old, margin sometimes remaining incurved for a long time.	Lilac or deeper violaceous, then bluish-grey-clay, clay-buff or cinnamon, finally ± rusty, sometimes persistently bluish near margin of cap, linear or sl. ventricose, edge paler ± denticulate.	48-100/10-20 mm. (14-mm. below), equal with pointed bulbous base, clavate, blue-violaceous then whitish or ± pallid below, apex often yellowish, whitish or pale bluish cortina forming ring-zone near apex, base white-tomentose, firm at first	Blue-violaceous, lilac becoming pallish in centre of cap and stem when cut, firm at first, but soon soft	Mild. Smell none, or **faint,** pleasant (sl. fruity), sometimes rankish when old.	Amygdaliform to sublimoniform, punctate to almost rough, 10–12/5½–6½μ	Gill edge fertile. NaOH + flesh slowly ± yellowish; NH_4OH + flesh, **pale yellowish** or almost nil (occ. *slowly* darker yellow).	Decid. woods (esp. beech and oak). F. common. Often caespitose.	Differs from Nos. 91 and 92 in paler bluish colours of cap and gills, softer flesh and ammonia reaction (also smell, possibly less reliably).

Species	Cap	Gills	Stem
24. Varii.	Cap yellow, ochraceous, tawny or brown. Young gills distinctly lilac or blue-violace		
94. *varius* (Schaeff. ex Fr.) Fr.	50–100 mm., **yellow ochre to rusty-tawny,** disc sometimes darker (reddish-brown), margin paler (more yellow), shiny smooth or sl. matt when dry, margin often appendiculate.	**Lilac or violaceous-blue** for a long time, then lilac-buff to watery or ochraceous-cinnamon, ± linear, edge concolorous, even.	40-90/7-20 mm. (16-35 m below), often rather sh and thick, clavate or w rounded bulb, often att uated upwards, **pu white,** then discolour pallid or pale yellowi rarely pale lilac at ap white cortina form ring-zone near apex, fi
95. *decolorans* (Pers. ex Secr.) Fr. *sensu* Cooke (*non sensu* Fr., Ricken, Bres. = *varius*)	20–60 mm., sometimes umbonate, **pale ochraceous-yellow** to lemon-yellow, sometimes with olive-brown spots or streaks, shining when dry, margin remaining incurved for a long time.	**Pale purplish-lilac,** then clay-brownish to cinnamon or almost umber, linear or sl. ventricose near stem, edge even or uneven.	25-70/4-7 mm. (4-12 m below), clavate or sl. v tricose, rarely equal, **wh ish** then pallid or ochr eous from the base **apex ± lilac,** cort sparse, fugacious.
96. *Riederi* (Weinm.) Fr.	50–100 mm., generally umbonate, often depressed round umbo when old, **ochraceous** to tawny-yellow, shining when dry, smooth.	**Lilac** or bluish then rusty-cinnamon to pale chocolate, edge uneven.	70-100/10-30 mm., ± vate, **lilac then ochra ous,** apex ± persisten lilac and silky stri fibrilloso-striate when cortina sparse, fugacic
97. *decoloratus* (Fr.) Fr. *sensu* Gillet, Moser (*non sensu* Cooke, auct. plur. = *tabularis*)	30–70 mm., ± umbonate, margin sometimes incurved and wavy, **ochraceous-buff** (resembling *Hebeloma* spp.), disc sometimes more reddish-brown, margin sl. greyish-blue when young, soon drv.	**Bluish-grey-lilac,** then clay-whitish or clay-buff, edge ± uneven.	70-75/10 mm. (12-13 n below), equal or sl. clav **whitish** to ochrace buff, **apex bluish-lila** greyish, fibrilloso-stri sometimes twisted, cort sparse, fugacious.
25. Percomes.	Young gills and often cap le mon to sulphur-yellow. (Spp. 98–100.)		
98. *percomis* Fr. (= *aromaticus* Vel.) (*non sensu* Ricken, Vel. = *percomium* Hry.: *nec sensu* Bres. = *russeus*)	30–80 mm., ochraceous **yellow or buff** to golden-yellow, disc sometimes tinged rusty or tawny, margin paler (more lemon-yellow), smooth and shiny except sometimes some adpressed yellowish fibrils at margin.	Paler or darker **sulphur-yellow** then dirty yellowish to olive-buff, finally rusty-olive, rather narrow, ± linear to sl. ventricose, edge concolorous, ± uneven.	40-120/10-25 mm.(15-30 n below), clavate or ± ec with roundish bulb, **s phur-yellow** then tin rusty or dirty ochracec buff from base up, a often pruinose, fibrill striate, cortina yellowish, base wh tomentose and someti pointed.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
94–97). **e**, then some-es tinged my or yellow-in stem, often k at disc (up 0 mm.), firm.	Mild. Inodorous or almost so.	Amygdaliform, rough, 10–12/6–7μ *sec* K. & M.	Gill edge fertile or almost so. NaOH + flesh chrome to orange-yellow.	Coniferous woods (esp. on chalk).. Uncommon. An excellent edible fungus.	Distinguished by contrasting colours of cap and gills and white stem and flesh. (See notes.)
sh to pale raceous - buff sl. lilac e at apex of n.	Mild. Inodorous.	**Subglobose,** rough, 8–9/6–7μ		Deciduous (esp. beech and oak) or coniferous woods. Uncommon.	Resembling a small *delibutus* (No. 10) but with dry stem and bluish stem apex. (See notes.)
sh, tinged raceous under cuticle and base of stem, sh at apex of n.	Mild. Inodorous.	Elongate elliptic or subfusiform, punctate, 13–15/6–7μ (Cooke's specimen) (15–17/7–8μ *sec* Ricken)		Coniferous and deciduous woods. V. uncommon.	Should be readily recognised by cap, gill and stem colours and large spores. Not known in recent years in Britain.
in cap, blu-grey in peri-ry of stem, raceous - buff centre and e of stem.	? Mild. Smell none, or faint, pleasant.	**Amygdaliform,** rough, **7-10/4-6μ** *sec* Moser.	Gill edge sterile, cells 6–12μ wide.	Coniferous and deciduous woods.	Resembles *C.* (*Dermo*) *tabularis* but with grey-blue gills and stem apex and different spores. No authentic British record for this species—for what has usually been called *decoloratus* see notes.
ur - yellow, ker in peri-ry of stem.	Mild. Smell **strong, aromatic,** pleasant, of marjoram, persistent.	Elliptic-amygdaliform to amygdaliform, punctate to almost rough, 12–13½/6–7½(8)μ	Gill edge fertile. NaOH + flesh ochraceous or brownish, then sometimes purplish-red.	Coniferous or mixed woods, generally on chalk (recently found under beech and yew). Uncommon.	Easily recognised by strong persistent aromatic smell, sulphur gills and flesh and rather large spores. (See notes.)

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
24. Varii. 94. *varius* (Schaeff. ex Fr.) Fr.	Cap yellow, ochraceous, tawny or brown. 50–100 mm., **yellow ochre to rusty-tawny,** disc sometimes darker (reddish-brown), margin paler (more yellow), shiny smooth or sl. matt when dry, margin often appendiculate.	**Lilac or violaceous-blue** for a long time, then lilac-buff to watery or ochraceous-cinnamon, ± linear, edge concolorous, even.	Young gills distinctly lilac or blue-viola… 40–90/7–20 mm. (16–35 … below), often rather st… and thick, clavate or … rounded bulb, often … uated upwards, pa… **white,** then discolor… pallid or pale yellow… rarely pale lilac at y… white cortina form… ring-zone near apex, …	(94–97). …ate, then some… …imes tinged …eamy or yellow… …wn stem, often …ack at disc (up … (10 mm.), firm.	Mild. Inodorous or almost so.	Amygdaliform, rough, 10–12/6–7 *μ* *see* K. & M.	Gill edge fertile or almost so. NaOH + flesh chrome to orange-yellow.	Coniferous woods (esp. on chalk). Uncommon. An excellent edible fungus.	Distinguished by contrasting colours of cap and gills and white stem and flesh. (See notes.)
95. *decolorans* (Pers. ex Secr.) Fr. *sensu* Cooke (*non sensu* Fr., Ricken, Bres. = *varius*)	20–60 mm., sometimes umbonate, **pale ochraceous-yellow** to lemon-yellow, sometimes with olive-brown spots or streaks, shining when dry, margin remaining incurved for a long time.	**Pale purplish-lilac,** then clay-brownish to cinnamon or almost umber, linear or sl. ventricose near stem, edge even or uneven.	25–70/4–7 mm. (4–12 … below), clavate or sl. v… tricose, rarely equal, **wh… ish** then pallid or ochr… eous from the base … **apex** ± **lilac,** … sparse, fugacious.	…ish to pale …raceous - buff …mb sl. lilac …ps at apex of …	Mild. Inodorous.	**Subglobose,** rough, 8–9/6–7 *μ*		Deciduous (esp. beech and oak) or coniferous woods. Uncommon.	Resembling a small *delibutus* (No. 10) but with dry stem and bluish stem apex. (See notes.)
96. *Riederi* (Weinm.) Fr.	50–100 mm., generally umbonate, often depressed round umbo when old, **ochraceous** to tawny-yellow, shining when dry, smooth.	**Lilac** or bluish then rusty-cinnamon to pale chocolate, edge uneven.	70–100/10–30 mm., ± … vate, **lilac then ochra… ous,** apex ± persiste… lilac and silky stri… fibrilloso-striate when… cortina sparse, fugac…	…ish, tinged …aceous under …y cuticle and …base of stem, …ish at apex of …	Mild. Inodorous.	Elongate elliptic or subfusiform, punctate, 13–15/6–7 *μ* (Cooke's specimen) (15–17/7–8 *μ* *sec* Ricken)		Coniferous and deciduous woods. V. uncommon.	Should be readily recognised by cap, gill and stem colours and large spores. Not known in recent years in Britain.
97. *decolorotus* (Fr.) Fr. *sensu* Gillet, Moser (*non sensu* Cooke, auct. plur. = *tabularis*)	30–70 mm., ± umbonate, margin sometimes incurved and wavy, **ochraceous-buff** (resembling *Hebeloma* spp.), disc sometimes more reddish-brown, margin sl. greyish-blue when young, soon dry.	**Bluish-grey-lilac,** then clay-whitish or clay-buff, edge ± uneven.	70–75/10 mm. (12–13 … below), equal or sl. clav… **whitish** to ochrac… buff, **apex bluish-lila…** greyish, fibrilloso-str… sometimes twisted, co… sparse, fugacious.	…n cap, blu… …gey in peri… …y of stem, …aceous - buff …reatre and …of stem.	? Mild. Smell none, or faint, pleasant.	**Amygdaliform,** rough, 7–10/4–6 *μ* *sec* Moser.	Gill edge sterile, cells 6–12 *μ* wide.	Coniferous and deciduous woods.	Resembles *C.* (*Dermo*) *tabularis* but with grey-blue gills and stem apex and different spores. No authentic British record for this species—for what has usually been called *decoloratus* see notes.
25. Percomes. 98. *percomis* Fr. (= *aromoticus* Vel.) (*non sensu* Ricken, Vel. = *percomium* Hry.: *nec sensu* Bres. = *russeus*)	Young gills and often cap le… mon to sulphur-yellow. (Spp. 98–100.) 30–80 mm., ochraceous **yellow or buff** to golden-yellow, disc sometimes tinged rusty or tawny, margin paler (more lemon-yellow), smooth and shiny except sometimes some… adpressed yellowish fibri… at margin.	Paler or darker **sulphur-yellow** then dirty yellowish to olive-buff, finally rusty-olive, rather narrow, ± linear to sl. ventricose, … edge concolorous, ± uneven,	40–120/10–25 mm. (15–50 … below), clavate or ± … with roundish bulb, … **phur-yellow** then … rusty or dirty ochra… buff from base up, … often pruinose, fibri… striate, cortina … yellowish, base … tomentose and somet… pointed.	…ur - yellow, …er in peri… …r of stem.	Mild. Smell **strong, aromatic,** pleasant, of marjoram, persistent.	Elliptic-amygdaliform to amygdaliform, punctate to almost rough, 12–13½/6–7½(8) *μ*	Gill edge fertile. NaOH + flesh ochraceous or brownish, then sometimes purplish-red.	Coniferous or mixed woods, generally on chalk (recently found under beech and yew). Uncommon.	Easily recognised by strong persistent aromatic smell, sulphur gills and flesh and rather large spores. (See notes.)

Species	Cap	Gills	Stem
*99. *Nanceiersis* Maire	30–100 mm., sometimes umbonate, **reddish-brown,** reddish-copper or chestnut, paler outwards to **greenish-yellow** or ochraceous **margin,** then ± reddish-brown, disc sometimes spotted, smooth and shiny when dry.	**Pale sulphur** or greenish-yellow, then clay-yellowish or rusty, finally rusty-buff, sometimes sl. decurrent, narrow, ± linear to sl. ventricose, edge often remaining sl. greenish yellow, ± denticulate.	40-75/6-10 mm. (12-22 n below), equal with roun (often conspicuous) bu pale to deeper greeni yellow or yellow, t paler and tinged ru from base up, cortina p lemon-yellow, fugaci bulb sometimes with mains of greyish or li rusty veil.
100. *russeus* Hry. (=*russus sensu* Ricken, Metrod *non sensu* Fr.)	45–100 mm., generally umbonate, **coppery-red** to date-brown, sometimes darker in places, margin yellowish to olive, cuticle very viscid and peeling easily.	**Sulphur-yellow,** then ochraceous-cinnamon or olive to rusty, rather wide, ± ventricose.	50–75/7–25 mm., equal attenuated upwards w bulbous or clavate b often curved, whitish **pale yellowish,** t sometimes tinged bro ish from base up, fibrill striate, rather soft sometimes hollow.
26. Infracti.	Young gills paler or darker olive, without yellow tints. Taste often bitter. (Spp.		
101. *infractus* (Pers. ex Fr.) Fr. (=*anfractus* Fr.)	30–120 mm., **variable** in **shape** and **colour,** ± cvx. then umbonate or depressed, often with abruptly incurved or irregular wavy margin, chestnut or olive-brown, sometimes grey- or bluish-green or blackish- or violaceous-olive, sometimes spotted, disc often paler becoming ochraceous buff, smooth but with darker innate fibrils; margin often darker, sometimes sl. striate and almost hygrophanous.	Constantly **dark olive-rusty to sooty-olive** when young, finally ± umber, often rather broad, sl. ventricose, edge sl. paler, ± uneven or denticulate.	30-80/6-25 mm. (15-30 n below), equal, ventric clavate or rounded bous, whitish or tin grey, olive or ochrac esp. at base, someti darker olive-brown, a sometimes violaceous, rilloso-striate, cortina or olive-brownish, fa abundant.
†102. *subtortus* (Fr.) Fr.	25–65 mm., umbonate or not, sometimes sl. depressed when old, **pale straw-yellow** or straw-olive, then bright yellow tinged tawny or buff or pale golden, **finally tawny-buff,** often streaky in places esp. near margin, silky shiny to ± matt when dry; margin appendiculate or with fragments of cortina near edge when young, sometimes abruptly incurved.	**Pale olive,** then rusty-olive, finally bright golden-brown or deep rusty-cinnamon, ± linear or sl. ventricose near stem, edge paler then concolorous, minutely flocculose to ± even.	40–100/5–11 mm. (5–15 below), equal or att ated upwards or ± vate, occ. thickene apex, base pointed or whitish tinged yello or olive to pale olivac pallid, often yellowe tinged rusty when apex yellowish- or olive-pruinose at first, ± striate, occ. with v bluish tinge when yc pale olive cortina for ring-zone near apex, sometimes patches l this, base white- or yellow-tomentose.

Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
sulphur-yel-v, darker un- cap cuticle l at base of m, sometimes glaucous over s, brownish ere wounded.	Mild. Smell **faint,** of raw apples, esp. when cut.	Elliptic-amygdaliform to sublimoniform, rough, 12–15/6–7½μ *sec* K. & M.	Gill edge sterile, cells cylindric or sl. lageniform, 4–10μ wide. NaOH + flesh purplish-red.	Beech (or mixed) woods on chalk.	Differs from *percomis* (No. 98) in lack of strong aromatic smell, more reddish-brown cap and paler flesh and from *russeus* (No. 100) in different smell and mild taste. Not yet recorded from Britain.
ıur-yellow, er in cap, ›wnish in bulb l under cap ticle.	Bitter. Smell **strong, disagree-able,** of gas-tar or *Tricholoma sulphureum.*	± amygdaliform, rough, 13–15/7–8μ *sec* Metrod.		Coniferous or mixed woods. Uncommon.	Readily distinguished by disagreeable smell, coppery cap, sulphur-yellow young gills and large spores. Not known in Britain in recent years. (See notes.)
ish, greyish or ıraceous-buff, netimes tinged ve or violace-s, often f. thick cap.	**Very bitter,** Smell none, or faint, of radish.	**Subglobose,** rough, 7–9(10)/5–7μ	Gill edge sterile, cells 4–8μ wide. $AgNO_3$ + flesh and gills immediately greenish black to black, weaker on cuticle.	Deciduous (esp. beech) and coniferous woods. Fairly common.	A very variable and f. common species readily distinguished by bitter taste, dark olive young gills and subglobose spores. A number of forms have been described, which however are of doubtful value owing to the great variability of this species. (See notes.)
whitish-olive yellowish then llower and ally rusty-wny, often er in centre, metimes guely violace-s in stem, soon t and spongy.	± bitter, sometimes rather slowly so. Smell faint to **rather strong, aromatic,** pleasant, (cedar-oil).	**Subglobose** to broadly ovate, rough, 7–9/5–6½μ	**Facial and marginal cystidia numerous,** cylindric-clavate or awl-shaped to ± lageniform, rather thick-walled, often incrusted below apex (walls yellowish in NH_4OH), 50–80/6–12μ (apex 4–8μ wide).	In *Sphagnum* and bog-myrtle tufts near or under birch or in wet decid. woods, esp. on high ground. (Also under conifers *sec* Moser) Uncommon.	Easily distinguished by its cystidia, roundish spores, pale olive-yellowish colours when young and smell. The colour change of cap and gills is very deceiving—when old the characteristic pale olive tinge of young specimens disappears completely.

Species	Cap	Gills	Stem	Flesh	Taste and Smell	Spores	Gill edge and Chemical Reactions	Habitat	Observations
*99. *Nanceiensis* Maire	30–100 mm., sometimes umbonate, **reddish-brown**, reddish-copper or chestnut, paler outwards to **greenish-yellow** or ochraceous **margin**, then ± reddish-brown, disc sometimes spotted, smooth and shiny when dry.	**Pale sulphur** or greenish-yellow, then clay-yellowish or rusty, finally rusty-buff, sometimes sl. decurrent, narrow, ± linear to sl. ventricose, edge often remaining sl. greenish yellow, ± denticulate.	40–75/6–10 mm. (12–22 below), equal with rooti (often conspicuous) b pale to deeper green yellow or yellow, paler and tinged from base up, cortina lemon-yellow, fugac bulb sometimes with mains of greyish or rusty veil.	le sulphur-yellow, darker un- or cap cuticle and at base of stem, sometimes l glaucous over gills, brownish where wounded.	Mild. Smell **faint**, of raw apples, esp. when cut.	Elliptic-amygdaliform to sublimoniform, rough, 12–15/6–7½ μ *sec* K. & M.	Gill edge sterile, cells cylindric or sl. lageniform, 4–10 μ wide. NaOH + flesh purplish-red.	Beech (or mixed) woods on chalk.	Differs from *porcinus* (No. 98) in lack of strong aromatic smell, more reddish-brown cap and paler flesh and from *russeus* (No. 100) in different smell and mild taste. Not yet recorded from Britain.
100. *russeus* Hry. (= *russus sensu* Ricken, Metrod *non sensu* Fr.)	45–100 mm., generally umbonate, **coppery-red** to date-brown, sometimes darker in places, margin yellowish to olive, cuticle very viscid and peeling easily.	**Sulphur-yellow**, then ochraceous-cinnamon or olive to rusty, rather wide, ± ventricose.	50–75/7–25 mm., equ attenuated upwards bulbous or clavate often curved, whitish **pale yellowish**, sometimes tinged bro ish from base up, fibril striate, rather solt sometimes hollow.	sulphur-yellow, paler in cap, greenish in bulb and under cap cuticle.	Bitter. Smell **strong, disagreeable,** of gas-tar or *Tricholoma sulphureum*.	± amygdaliform, rough, 13–15/7–8 μ *sec* Metrod.		Coniferous or mixed woods. Uncommon.	Readily distinguished by disagreeable smell, coppery cap, sulphur-yellow young gills and large spores. Not known in Britain in recent years. (See notes.)
26. **Infracti.**	Young gills paler or darker olive, without yellow tints. Taste often bitter. (Spp.								
101. *infractus* (Pers. ex Fr.) Fr. (= *anfractus* Fr.)	30–120 mm., **variable** in **shape** and **colour,** ± cvx. then umbonate or depressed, often with abruptly incurved or irregular wavy margin, chestnut or olive-brown, sometimes grey- or bluish-green or blackish- or violaceous-olive, sometimes spotted, disc often paler becoming ochraceous buff, smooth but with darker innate fibrils; margin often darker, sometimes sl. striate and almost hygrophanous.	Constantly **dark olive-rusty to sooty-olive** when young, finally ± umber, often rather broad, sl. ventricose, edge sl. paler, ± uneven or denticulate.	30–80/6–25 mm. (15–30 below), equal, ventr clavate or rounded bous, whitish or t grey, olive or ochra esp. at base, somet darker olive-brown, sometimes violaceous, rilloso-striate, cortina or olive-brownish, f abundant.	dish, greyish or aceous-buff, sometimes tinged ve or violacc- es, often f. thick ap.	**Very bitter,** Smell none, or faint, of radish.	**Subglobose,** rough, 7–9(10)/5–7 μ	Gill edge sterile, cells 4–8 μ wide. $AgNO_3$ + flesh and gills immediately greenish black to black, weaker on cuticle.	Deciduous (esp. beech) and coniferous woods. Fairly common.	A very variable and f. communis species readily distinguished by bitter taste, dark olive young gills and subglobose spores. A number of forms have been described, which however are of doubtful value owing to the great variability of this species. (See notes.)
†102. *subtortus* (Fr.) Fr.	25–65 mm., umbonate or not, sometimes sl. depressed when old, **pale straw-yellow** or straw-olive, then bright yellow tinged tawny or buff or pale golden, **finally tawny-buff**, often streaky in places esp. near margin, silky shiny to ± matt when dry; margin appendiculate or with fragments of cortina near edge when young, sometimes abruptly incurved.	**Pale olive,** then rusty-olive, finally bright golden-brown or deep rusty-cinnamon, ± linear or sl. ventricose near stem, edge paler then concolorous, minutely flocculose to ± even.	40–100/5–11 mm. (5–15 below), equal or sl ated upwards or ± vate, occ. thickene apex, base pointed o whitish tinged yell or olive to pale olive pallid, often yellowi tinged rusty when apex yellowish or olive-pruinose at first, ± striate, occ. with bluish tinge when y pale olive cortina fo ring-zone near apex, sometimes patches t this, base white- o yellow-tomentose.	whitish-olive yellowish then yellower and ally rusty-wny, often ker in centre, metimes riely violace- e in stem, soon ft and spongy.	± bitter, sometimes rather slowly so. Smell faint to **rather strong, aromatic,** pleasant, (cedar-oil).	**Subglobose** to broadly ovate, rough, 7–9/5–6½ μ	**Facial and marginal cystidia numerous,** cylindric-clavate or awl-shaped to ± lageniform, rather thick-walled, often incrusted below apex (walls yellowish in NH_4OH), 50–80/6–12 μ (apex 4–8 μ wide).	In *Sphagnum* and bog-myrtle tufts near or under birch or in wet decid. woods, esp. on high ground. (Also under conifers *sec* Moser) Uncommon.	Easily distinguished by its cystidia, roundish spores, pale olive-yellowish colours when young and smell. The colour change of cap and gills is very deceiving—when old the characteristic pale olive tinge of young specimens disappears completely.

b. *Cystidiosi.*—Edge of gill sterile with conspicuous balloon-shaped, pyriform or clavate cystidia 10–30μ wide. (Spp. 6–9.)

2. *Delibuti.*—Stem smoothly viscid below cortinal zone. Spores less than 10μ long, subglobose to broadly ovate. Taste mild. (Spp. 10–13.)

3. *Amarescentes.*—Taste bitter (at least in cap cuticle). Colours often pale, esp. of gills and spores in mass, sometimes also cap. Spores less than 10μ long subglobose to elliptic or elliptic-amygdaliform. (In some species the stem may become dry and in *ochroleucus* (No. 20) the cap also.) (Spp. 14–20.)

II. PHLEGMACIUM.

A. *Scauri.*—Stem with marginate or rounded marginate (rarely immarginate) bulb, or gills and flesh turning purplish when bruised or rubbed. (Spp. 21–73.)

a. *Leucophylli.*—Young gills white, whitish or clay coloured (rarely very sl. bluish in *amarescens* (No. 25). (Spp. 21–34.)

b. *Cyanophylli.*—Young gills blue, violaceous or lilac. (Spp. 35–55.)

c. *Xanthophylli.*—Young gills yellow, olive or greenish. (Spp. 56–73.)

B. *Cliduci-Elastici.*—Stem never marginately bulbous, from equal to clavate or irregularly bulbous, more rarely with roundish immarginate bulb. Gills and flesh never turning purplish when bruised or rubbed. (Spp. 74-102)

A. Scauri.

a. Leucophylli.

4. *Multiformes.*—Stem bulb variable, sharply marginate, rounded marginate or almost immarginate, never widely marginate. Cap at first yellow, ochraceous, buff or tinged tawny, rarely paler. Flesh soon soft, white at first, often becoming ochraceous or yellowish. Smell sometimes strong, either of apples (acid) or of honey. (Spp. 21–25.)

5. *Napi.*—Stem with conspicuous wide free-edged marginate bulb. Cap at first yellow, buff, tawny or chestnut. Flesh firm, often hard at first, generally ± persistently white or whitish but sometimes tinged yellowish or ochraceous, esp. under cap cuticle, in bulb or when eaten by grubs. Inodorous or with strong aromatic or rank smell. (Spp. 26–32.)

6. *Rapacei.*—Stem with conspicuous wide free-edged marginate bulb. Cap at first white or whitish clay. (Spp. 33–34.)

b. Cyanophylli.

7. *Caerulescentes.*—Young cap grey-blue, lilac or violaceous at least in part. Cap cuticle mild, or if bitter turning red with NaOH. Flesh mild, +NaOH nil or yellowish to brownish, never red. (Spp. 35–39.)

8. *Dibaphi.*—Young cap lilac or violaceous at least in part. Cap cuticle bitter or not, +NaOH ± nil, never red. Flesh bitterish to very bitter, +NaOH rose-red. (Spp. 40–41.)

9. *Calochroi.*—Young cap yellow, ochraceous or tawny. Stem with well-marked marginate bulb. Spores mostly over 10μ long. (Spp. 42–46.)

10. *Pansae.*—Young cap orange- or rusty-brown. Stem short, bulb from barely to rounded marginate, often flat below. Spores more than 10μ long. (Sp. 47.)

11. *Cyanopodes.*—Young cap whitish to ochraceous-buff. Stem with fairly conspicuous but ± rounded marginate bulb. Spores over 10μ long. (Spp. 48–49.)

12. *Glaucopodes.*—Young cap ochraceous to buff or tinged tawny, often with greenish or olive tints, esp. near margin. Stem from wide to rounded marginately bulbous. Spores less than 10μ long. (Flesh often yellowish in bulb.) (Spp. 50–52.)

13. *Purpurascentes.*—Gills, flesh and often stem turning ± deep purple when bruised or rubbed (in dry conditions this reaction may be less marked). Stem variable in shape, ± equal to marginately bulbous. (Spp. 53–55.)

c. Xanthophylli.

14. *Xanthocyanei.*—Blue or violaceous tints present in cap, flesh or stem (see also *odorifer* (No. 71) which may show a sl. violaceous tinge at margin of cap). (Spp. 56–59.)
15. *Fulgentes.*—Young gills pale to deeper yellow, not distinctly sulphur-yellow or olive. Cap ± yellow, ochraceous, tawny or rusty, also without pronounced sulphur or olive tints. (Spp. 60–64.)
16. *Splendentes.*—Young gills and cap at least at margin sulphur or lemon-yellow, olivaceous only when older or not at all. Spores rarely more than 11/6μ. Mycelium at base of stem ± sulphur or lemon-yellow. (Spp. 65–67.)
17. *Elegantiores.*—Young gills sulphur-yellow to olivaceous. Cap often tawny, rusty or reddish in centre with yellow or olive margin. Spores mostly more than 11/6μ. Mycelium white or whitish. (Often strong smelling.) (Spp. 68–71.)
18. *Prasini.*—Young gills sulphur or olive-yellow. Cap predominantly green or olivaceous, never yellow or ochraceous. Spores 10–12/5–7μ. (Spp. 72–73.)

B. Cliduchi-Elastici.

19. *Triumphantes.*—Cap yellow, tawny or brown. Stem with yellowish, ochraceous or olive-tinged scales forming ± ring-like zones. No blue tints except sometimes in the young gill of *crocolitus* (No. 76). (Spp. 74–78.)
20. *Claricolores.*—Cap yellow, tawny or brown. Stem and sometimes also cap-margin with white floccose scales at least when young or cortina (occ. coloured at tips) forming thick white floccose ring-zone. No blue tints. (Spp. 79–83.)
21. *Sebacei.*—Cap white, yellowish, tawny or brown. Stem from smooth to fibrilloso-striate but not floccoso-scaly nor with thick floccose cortinal ring-zone. No blue tints. (Spp. 84–86.)
22. *Cumatiles.*—Cap violaceous or bluish, at least in part or when young. Young gills whitish or clay, sometimes with faint violaceous or lilac flush. Stem (except No. 89) with violaceous or whitish scales near base from veil. (Spp. 87–90.)
23. *Variicolores.*—All parts except sometimes centre of cap lilac to violaceous when young. (Spp. 91–93.)
24. *Varii.*—Cap yellow, ochraceous, tawny or brown. Young gills distinctly lilac or blue-violaceous. (Spp. 94–97.)
25. *Percomes.*—Young gills and often cap lemon- to sulphur-yellow. (Spp. 98–100.)
26. *Infracti.*—Young gills paler or darker olive, without yellow tints. Taste often bitter. (Spp. 101–102.)

Index and Notes

†*albomarginatus* nov. nom., 80 (*Icon.* L 85 A, *claricolor*)—see notes on *claricolor.*

**aleuriosmus* Maire, see key § 51. (*Icon. Bull. Soc. mycol. Fr.*, XXVI (1910), Pl. VII, f. 4–5).—one of the very few species of Cortinarius with a mealy smell, easily recognised by pale colours, bluish gills and bitterish taste. This name has also been used for two apparently different species not smelling of meal; *aleuriosmus* sensu Kauffmann and Lange which is described as *caroviolaceus*, 34—and *aleuriosmus* sensu Ricken which has been renamed *Rickenianus* Maire, for which see key § 57 and notes on *caroviolaceus.*

allutus, 24. (*Icon.* L 81 B: Cke 704(752))—Fries had not seen this species himself, but that described and figured by Lange seems distinct and is included here. This corresponds to *allutus* var. *rufescens* Hry.; but Henry has also described another variety, var. *luteus* which is yellower in colour and has larger spores (11/6½μ) and corresponds to *allutus* sensu Quélet and to which he refers Cke 705(711), *talus.* It would seem undesirable to have two varieties with such different sized spores under one species name, but since var. *luteus* is not known in Britain as such and Cooke's plate is doubtful it is not included in this paper; see also notes on *talus.*

†*amarescens*, 25. (*Icon.* L 82 5, *talus*)—see notes on *talus.*

amoenolens, 49. (*Icon.* L 84 D, *cyanopus* (good).)
anfractus Fr. = *infractus*, 101.
aromaticus Vel. = *percomis*, 98.
**arquatus*, 45. (*Icon.* no authentic plate known)—this is sensu Moser and may well be *calochrous* sensu Cooke. Henry has described a species *Cookeianus* (see key § 65) with flesh bluish in the stem to which he refers Cke 707(713), *calochrous*. Reference to the original plates at Kew has shown no such blue tints but has shown a yellow cortina which seems to point more towards *arquatus* sensu Moser. In any case further study on fresh material is needed; *arquatus* sensu Ricken would seem distinct in having larger spores and an olive-yellow cortina and has been renamed *subatkinsonianus* Hry., (see key § 59); for *arquatus* sensu Lange see *subarquatus*, 46.
arvinaceus Fr. = *mucosus*, 3, but Cke 732(737) looks more like *delibutus*, 10.
atrovirens, 73. (*Icon.* Cke 720(736): KM 125: Bres 624, *prasinus*).
**aurantiacus* Moser = *napus* sensu Vel.—see key § 37 and notes on *napus*.
aurantioturbinatus Secr. sensu Lange = *elegantissimus*, 69.
†*aureopulverulentus*, 44. (*Icon.* Cke 722(849), *herpeticus*)—Moser has recently shown this to be *herpeticus* sensu Cooke after taking colour into account and measuring spores from an original specimen of Cooke's collection at Kew—see *Bull. Soc. Nat. Oyonnax*, No. 7 (1953).
†*balteato-cumatilis*, 88. (*Icon.* Cke 686(696), *balteatus:* L 87 D, *id.*).
balteatus, 89. (*Icon.* KM 128: Bres 604: Fr 142²)—this is sensu Konr. & Maubl. and Moser; for *balteatus* sensu Cooke and Lange see *balteatocumatilis*, 88.
Berkeleyi Cke. = *praestans*, 90.
**Boudieri*, 38. (*Icon.* no authentic plate known)—according to Moser (*Bull. Soc. Nat. Oyonnax*, No. 7 (1953)) Boud 104, *multiformis* is not the species described by Henry as *Boudieri*, but a distinct larger-spored species with ochraceous or brownish cap and gills at first clay-whitish characteristic of pine-woods, which he has renamed *pinetorum*. Inspection of Boudier's plate seems to confirm this and *pinetorum* is included since it may possibly occur in Scottish or other pine-woods. *Boudieri* Hry. is also included but owing to the young gills being blue-tinged is placed in section Caerulescentes of Cyanophylli.
caerulescens, 35. (*Icon.* Cke 709(722): KM 116: Maubl 57 II: Maire—*Bull. Soc. mycol. Fr.* XXVI (1910), Pl. VIII, f. 1–2)—this is sensu Konr. & Maubl., whose interpretation is now generally accepted; some past British records may well have been either *sodagnitus*, 39, (=*caerulescens* sensu Quélet) or *Mairei*, 36; Cke 708(721) has been referred to *nemorosus*, 41, by French authors, whilst *caerulescens* sensu Lange (L 82 D) is *caesiocyaneus*, 37.
caeruliipes Smith as var.=*collinitus*, 1.
†*caesiocyaneus*, 37. (*Icon.* L 82 D, *caerulescens*)—this is sensu Britzelmayr with smaller spores well described and figured by Lange as *caerulescens;* the larger-spored *caesiocyaneus* sensu Maire, Konr. & Maubl. and Rea has been renamed *Mairei* Moser.
**caesio-stramineus* Hry., see key § 46. (*Icon.* no authentic plate known)—has the bitter cuticle of *sodagnitus*, 39, but less striking sodium reaction, sl. smaller spores and a grey or grey-blue cap at first. I believe I have seen this under beech and yew in Surrey but need to study more material before recording it.
calochrous, 42. (*Icon.* L 81 C: KM 118: Bres 616: Ri 37² (poor)—typically of medium size but large specimens with cap up to 150 mm. have been found apparently not differing in any other way from smaller specimens. Cke 707(713) is doubtful and certainly does not look very typical; it has been referred to *Cookeianus* by Henry, but see notes on *arquatus*. Some of the other species of the section Calochroi may well have been recorded as *calochrous* in Britain in the past.
camphoratus Fr. sensu Ricken = *Mairei* var. *Juranus*, 36a—*camphoratus* sensu Fries belongs to the subgenus *Inoloma* (see part II).
†*caroviolaceus* nov. nom., 34. (*Icon.* L 199 B, *aleuriosmus*, except that it does not show the blue tinge in the flesh, but the specimen is fairly well expanded)—except for small points British specimens described under this name agree with *aleuriosmus* sensu Kauff. (except smell) and Lange (except blue tinge in flesh and mild taste); but the blue tinge is often fugacious and the sl. bitter taste noted by Lange may be more noticeable in an older specimen or to another person; these differences do not seem of major importance, however, and a new name

seems desirable since *aleuriosmus* sensu Maire has bluish gills when young, a smell of meal and bitterish taste whilst *aleuriosmus* sensu Ricken (=*Rickenianus* Maire) also has bluish gills, but is mild and inodorous and with a pale bluish cortina. Although these three species have some points in common it is perhaps convenient for the present to have a separate name for this rather striking white-gilled fungus, since three years' observations have shown the blue tints to be confined to the flesh or occ. the stem apex. Further study may show that this species is also conspecific with *rapaceus* as described by some authors (see notes on *rapaceus*).

causticus, 16. (*Icon.* KM 137: Maire—*Bull. Soc. mycol. Fr.*, XXVI (1910), Pl. V, f. 1-4: Ri 40^2 (but colours rather dark).)

†*cedretorum*, 56 (*Icon.* Maire—*Bull. Soc. mycol. Fr.*, XXX (1914), Pl. VI).

**cephalixus*, 78. (*Icon.* Bres 629, *papulosus*)—this is sensu Moser, which on account of a tendency towards olivaceous colours is taken to be *cephalixus* sensu Fries; *cephalixus* sensu Henry is *olidus*, 77.

citrinus, 66. (*Icon.* L 84 E, *sulphureus* var. *citrinus*.)

claricolor, 79. (*Icon.* KM 126)—this is sensu Konr. & Maubl., but is probably not that of Fries, since he says of the cap "luteus, immutabilis"; Ri 41^1 and Cke 683(693) are doubtful (the latter may be *saginus*); a new name (*albomarginatus*) has been used for *claricolor* sensu Lange differing in red-brown cap with white silky marginal zone and strong smell; *claricolor* sensu Bres. has small spores and has been renamed *subclaricolor* Moser (see key § 100).

cliduchus Fr. sensu Ricken and Konr. & Maubl. = *olidus*, 77—the Friesian species is not known at the present time.

collinitus, 1. (*Icon.* L 88 B, (good): Cke 733(738): Maubl 51: Ri 34^1: Cke 735(740), *mucifluus*)—there has been confusion in the past between this species and a smaller-spored species with duller cap colours first separated by Lange as *trivialis* Lange. Both species have been given varietal names: *collinitus* var. *caeruliipes* Smith = *collinitus*, 1 and var. *repandus* Ricken = *trivialis*, 2.

**Cookeianus* Hry.—see key § 65 and notes on *arquatus* and *calochrous*.

corrosus, 27. (*Icon.* Cke 715(715).)

corruscans Fr.—not known; Cke 730(733) is sometimes referred to *sebaceus*, 84.

**crassus*, 85. (*Icon.* Bres 603: L 88 A)—this is sensu Bres and Lange; Cke 684 (695) is doubtful and *crassus* sensu Ricken has a dry cap and prominent cystidia, see part II, *C.* (*Inoloma*) *pseudocrassus* Josserand.

cristallinus, 19. (*Icon.* ? Bres 626, but spores 6–9/$4\frac{1}{2}$–6μ; non Cke., Lange=*emollitus*)—see notes on *emollitus*.

croceo-caeruleus, 14. (*Icon.* Cke 729(732): L 90 C.)

crocolitus, 76. (*Icon.* Ri 41^4 (poor): Cke 682(692), *triumphans:* KM 129, *id.:* L 85 C, *id.*)—this is sensu Ricken and corresponds to *triumphans* sensu auct. Brit.; French authors do not recognise *crocolitus* Quél. at the present time but see notes on *triumphans*.

cumatilis, 87. (*Icon.* Cke 723(726): Rolland—*Atlas* Pl. 63: Gillet—*Champ. Fr.:* Ri 41^3 (poor).)

cyanopus, 48. (*Icon.* KM 119: Ri 36^2; non Cke 690(699) = *nemorensis*)—this variously interpreted name is taken sensu Ricken and Konr. & Maubl.; British authors appear to have given different interpretations in the past, both Cooke and Rea used the name for a species of the section Variicolores and past records under this name should therefore be treated with suspicion; *cyanopus* sensu Lange = *amoenolens*, 49.

decolorans, 95. (*Icon.* Cke 727(730))—some authors (e.g. Ricken and Bresadola) have used this name for smaller yellower specimens of *varius*, 94, and this is probably Fries' species; the fungus described here is *decolorans* sensu Cooke with subglobose spores (*varius* has larger ± amygdaliform spores).

decoloratus, 97. (*Icon.* Gillet—*Champ. Fr.*)—this name has been used by many authors (including Pearson and myself !) for a dull-coloured fungus with subglobose spores which would seem to be *C.* (*Dermocybe*) *tabularis* (Bull.) Fr., which is sometimes rather viscid but has no blue tints; there appears to be another similar species with ± amygdaliform spores and bluish tints in the stem and flesh which is included here as *decoloratus* sensu Gillet; Cke 726(729) and L 86 D should be referred to *tabularis*.

delibutus, 10. (*Icon.* L 90 E (very good): KM 111: Cke 741(743): Ri 35^4).

dibaphus, 40. (*Icon.* Britz 256; non Bres 620 = *nemorosus*).

**Dionysae* Hry., see key § 43 (*Icon.* Henry—*Bull Soc. mycol. Fr.*, LI (1935), Pl. II, f. 5)—one of the very few Cortinarii with a mealy smell and should be easily recognised by this and its bluish gills and cap colours, which are, however, variable; also smelling of meal are *aleuriosmus* with no blue in cap or flesh and a bitterish taste and *lustratus* entirely without blue tints and very pale in colour and with an equal or sl. clavate stem.

elatior, 6. (*Icon.* L 89 B: Maubl 53: Cke 737(742) (rather poor): Ri 35[1]: Fr 149[1]; non Cke 736(741) = *pseudosalor*)—*elatior* sensu lato (which is sensu auct. Brit. in most cases) includes Nos. 6, 7 and 8 and probably 9 of the present work, but it is perhaps more useful to keep these often rather different looking fungi apart until there is definite evidence that they are or are not all one species; *elatior* sensu stricto is therefore used for the rather robust fungus with ± conical or conico-exp. strongly wrinkled-striate cap and dark often strongly interveined gills.

elegantior, 68. (*Icon.* KM 121: Ri 38[2]: Cke 714(714), *turbinatus*)—a much disputed species here taken sensu Ricken and Konr. & Maubl. which seem to be identical and to which *turbinatus* sensu Cooke and probably also Rea should be referred; Konr. & Maubl. state that Cke 702(709), *multiformis* var. *flavescens* is probably the same as their *elegantior*, which I think seems very likely despite the fact that Lange quoted this plate for his *sulphureus* (No. 67 in this work); Cooke's specimen is not in the Herbarium at Kew so this plate is perhaps best disregarded; *elegantior* sensu Henry is different and has been renamed *elegantissimus* Hry. (No. 69); *elegantior* sensu Kauff. has yellowish mycelium and brighter colours and appears to be different again.

†*elegantissimus*, 69. (*Icon.* L 84 C, *aurantioturbinatus:* Ri 38[1], *sulfurinus*)—this is *elegantior* sensu Henry.

emollitus, 18. (*Icon.* Cke 724(727): L 86 B: Ri 44[1]: Cke 725(728), *cristallinus:* L 87 A, *id.*)—in the past this species and *cristallinus* have been separated chiefly on cap colour or stem shape, but having found these characters rather variable and difficult to work on, I have separated them on spore shape following Kuhner & Romagnesi (*Flore Analytique*, 1953) which seems to me more satisfactory; both species may be white at first but the round-spored species (*cristallinus*) does seem to be paler on the whole, although I have not yet examined enough material to be sure of the value of macroscopic characters in separating these two species.

epipoleus, 13. (*Icon.* Fr 150[3]).

**europaeus* Moser as subsp. of *montanus* = *scaurus* sensu Bres., (*Icon.* Bres 625, *scaurus*)—see key § 70 and notes on *scaurus*.

†*evosmus*, 30. (*Icon.* no authentic plate known.)

flavescens (Cke.) Hry.—in *Bull. Soc. mycol. Fr.*, LV (1939), p. 180, Henry described a species under this name for which he quoted Cke 702(709), *multiformis* var. *flavescens* as an illustration; since then he has renamed this species *flavescentium* on account of a bluish tinge present at the stem apex which is not shown on Cooke's plate; since this much disputed plate has also been quoted by Konr. & Maubl. for *elegantior* and by Lange for *sulphureus* it is perhaps best disregarded, especially as the original specimen is not in the Herbarium at Kew; *flavescens* should therefore be deleted from the British list; *flavescentium*, which is not recorded for Britain, resembles *cedretorum*, 56, but has flesh without blue tints, yellowish-white then pale lemon and the stem with a ± fugacious bluish tinge at the apex, spores ± amygdaliform 10–12/6–6½μ and is found under deciduous trees.

**flavescentium* Hry., see notes on *flavescens*.

†*fraudulosus*, 81. (*Icon.* Britz 18.)

fulgens, 60 and 61—a much disputed and differently interpreted species; since Fries says the cap is "sericeo-fibrilloso" I have taken *fulgens* sensu Kauff. and Moser as the Friesian species (No. 60—*Icon.* no authentic plate known) and kept *fulgens* sensu Cooke and Lange with smooth cap and smaller spores separate (No. 61—*Icon.* Cke 716(716): L 83 D), but have refrained from giving this species a new name since I have not studied fresh material of either species myself; KM 120, *fulmineus* is sometimes quoted as an illustration of *fulgens* but since their description of *fulmineus* stresses the scaly cap as a distinguishing character this does not seem appropriate.

fulmineus, 62. (*Icon.* Bres 621: KM 120: Maubl 56 II: Cke 717(717))—taking the scaly cap as the distinguishing character there appear to be two such species, one with larger spores and one with smaller spores; Henry quotes Cke 717(717) as an illustration for the larger-spored species, which he calls *parafulmineus*, but inspection of original material at Kew has shown the spores to be 9–11/6–6½μ, thus coming within the upper limits of size of the smaller-spored species, *fulmineus* sensu Bres., 62; *parafulmineus* Hry., 63, is also included, however, since Rea gives larger spore dimensions in his description of *fulmineus*; I have not had opportunity to study either species fresh and further study seems necessary.

fulvoluteus Britz. = *illibatus* sensu Henry, 11.

glaucopus, 50. (*Icon.* Cke 706(712): KM 117: Ri 35[7]: Bres 615)—Rea's description suggests *amoenolens*, 49.

grallipes Fr.—not known; Cke 738(734) is doubtful, but suggests *Flammula gummosa*.

herpeticus, 51. (*Icon.* Ri 37[4])—this is *herpeticus* sensu Ricken; *herpeticus* sensu Cooke (Cke 722(849)) = *aureopulverulentus*, 44 (see notes on this species); for *herpeticus* sensu Henry see key § 48, a different species with larger spores and bluish tints in cap as well as stem and gills.

illibatus, 11. (*Icon.* Britz 348, *fulvoluteus*)—this is *illibatus* sensu Henry; for *illibatus* sensu Metrod see *Metrodi*, 5.

infractus, 101. (*Icon.* L 87 C: Bres 610: KM 133: Cke 697(704) (too green): Ri 43[2]: Rolland—*Atlas*, Pl. 63: Cke 698(705), *anfractus*)—probably also illustrated by Ricken as *subsimilis* (Ri 43[4]) and by Lange as *olivascens* (L 86 A).

intermedius Rea—the original paintings show this to be *glaucopus* so this name is now omitted; *intermedius* Hry. is a different species belonging to the Elegantiores not included in this work.

**Juranus* as var. of *Mairei*, 36a. (*Icon.* Ri 36[1], *camphoratus*).

†*Langei*, 29. (*Icon.* no authentic plate known)—in *Bull. Soc. mycol. Fr.* LV (1939), p. 169, Henry quotes Lange 83 A, *sulphurinus* as an illustration to a species he describes as *sulphurinus* var. *Langei* with spores 9–11/4½–5μ; later (*Bull. Soc. mycol. Fr.*, LXVII (1951)) he quotes this plate for *subturbinatus* but also includes var. *Langei* as a separate fungus and in *Rev. de Myc.* VIII (1943) he quotes *Langei* as a separate species; having found in Britain a fungus which I believe to be Henry's original *sulphurinus* var. *Langei* with smaller spores and also several collections of *subturbinatus* (some specimens of which were identified by Henry himself through A. A. Pearson), I have no hesitation in including *Langei* as a separate species (although Lange had nothing to do with it!), differing from *subturbinatus* not only in smaller spores but also in a purer yellow cap, distinctly white gills when young and flesh soon almost entirely ± ochraceous-yellow; L 83 A, *sulphurinus* I would refer to *subturbinatus* as a not very typical illustration, since I have never seen the bulb so distinctly sulphur-yellow although it is often ochraceous or buff; see also notes on *subturbinatus*.

largus, 93. (*Icon.* Cke 693(701): KM 130: Maubl 54: Ri 42[2] (poor)).

latus Fr.—the Friesian species is not known at the present time but for *latus* sensu Bres. = *validus* Favre, see key § 96.

liquidus Fr. = *epipoleus*, 13, *sec* Henry.

livido-ochraceus, 4. (*Icon.* Cke 739(767)).

lustratus, 86. (*Icon.* Cke 688(799)).

†*lutescens*, 64. (*Icon.* no authentic plate known)—British material seems to agree with Henry's description (in *Bull. Soc. mycol. Fr.*, LV (1939), p. 171) except for sl. smaller spores and the fact that the gills did turn sl. olivaceous when older; this species seems to combine features of the Multiformes and the Fulgentes.

luteus as var. of *allutus*—see notes on *allutus*.

Mairei, 36. (*Icon.* Maire—*Bull. Soc. mycol. Fr.*, XXVI (1910), Pl. VIII, f. 1–2: KM 115, *caerulescens* ssp. *caesiocyaneus*)—see notes on *caesiocyaneus*.

**marginatus* Bres. as var. of *roseo-limbatus*—see key § 37 and notes on *roseo-limbatus*.

melliolens, 22. (*Icon.* Ri 39[1], *multiformis:* Bres 611, *id.:* ? L 81 D, *id.* but colours rather pale)—see notes on *multiformis*.

Metrodi, 5. (*Icon.* Metrod—*Bull. Soc. mycol. Fr.* LX (1944), Pl. III, f. 2, *illibatus*).

**microspermus* Lge. (*Icon.* L 199 D).—see key § 103; Moser has used this name for a species with characteristically small spores, which he includes in Phlegmacium despite the fact that Lange originally classed this species in Hydrocybe; *vespertinus* sensu Ricken appears to be similar if not the same, but this is one of the species of the section Sebacei requiring further study and revision.

**minus* Vel.—see key § 31; has the smallest spores yet known for the Scauri.

**montanus* Kauff.—(*Icon.* Bres 625, *scaurus*)—see key § 70; Moser has identified *scaurus* sensu Bres. with this species but as a separate subspecies (*europaeus*) owing to absence of yellow veil and smaller size.

mucifluoides Hry. = *pseudosalor*, 8.

mucifluus, 7. (*Icon.* KM 109 (good): Ri 34^4 (good): L 90 D (not typical); non Cke 735(740) = *collinitus:* nec Fr 148^1 = *trivialis*)—confusion over this name began by Fries illustrating a different species (*trivialis* it seems) from that which he described; Ricken described a species under this name belonging to the *elatior* group with conspicuous marginal cells which is included here, but I doubt if this is the Friesian species; on the occasion of the British Mycological Society Foray in Scotland in 1953 a rather puzzling Myxacium was found under pine at Rannoch which lacked conspicuous sterile cells on the gill edge but nevertheless agreed quite well with Fries' description of *mucifluus;* I shall hope to discuss this at a later date when I have studied more fresh material.

mucosus, 3. (*Icon.* Boud 108 (very good): Cke 734(739) (poor): Ri 34^3 (poor): Ri 34^2, *arvinaceus* (poor).)

multiformis, 21. (*Icon.* Cke 701(708): KM 114: Maubl 57 I; non Ri 39^1: Bres 611: L 81 D = *melliolens*)—this name has certainly had ' many forms ' referred to it in the past since almost any Phlegmacium with a yellowish-ochraceous cap, whitish gills and a ± marginately bulbous stem was called *multiformis*, and past British records are practically worthless unless accompanied by description and spores, and probably included members of the section Napi as well; spore size appears however to be critical and I have followed J. Schaeffer and Moser in referring the species with ± amygdaliform spores over 10μ long to *multiformis* sensu stricto, 21, and the species with more elliptic-amygdaliform smoothish spores less than 10μ long to *melliolens*, 22; as thus defined *multiformis* sensu Cke., Konr. & Maubl. and in my opinion Henry (= *polymorphus* Hry.) are referrable to *multiformis*, 21, and *multiformis* sensu Ricken, Bres. and probably Lange to *melliolens*, 22: *ochropallidus* Hry. has also been included because of its more constantly rounded marginate bulb and uniform pale colours, but it is not recorded from Britain and in any case needs further study. The distribution of these species in Britain cannot be given with any certainty; *multiformis* sensu stricto is certainly British but *melliolens* needs confirmation, although I have examined spores from a collection labelled '*multiformis*, small form ' which were the correct size and shape, but in the absence of further details cannot be named with certainty (this might equally well have been *amarescens* !); for *multiformis* sensu Boudier see notes on *Boudieri.*

**Nanceiensis*, 99. (*Icon.* KM 135: Maire—*Bull. Soc. mycol. Fr.*, XXVII (1911), Pl. XV f. 1–3 (poor).)

napus, 26. (*Icon.* KM 113: Cke 703(710).)—this is sensu Konr. & Maubl. and Cooke; *napus* sensu Henry is rather paler with smaller spores 9–12/5½–6μ and has been renamed *pseudonapus* Hry. and may well be the same as *corrosus*, 27; *napus* sensu Vel. has still smaller spores 7–8/4–5μ and has been renamed *aurantiacus* Moser but is not yet known outside Central Europe—see key § 37.

nemorensis, 92. (*Icon.* L 88 C: Cke 692(863), as var.: Cke 690(699), *cyanopus*).

nemorosus, 41. (*Icon.* Henry—*Bull. Soc. mycol. Fr.* LII (1936), Pl. II, f. 2: Bres 620, *dibaphus:* Cke 708(721), *caerulescens* sec Henry).

nitidus Fr.—not known at the present time; Cke 1189(1191) is doubtful but looks like *delibutus*, 10.

ochroleucus, 20. (*Icon.* Cke 764(775): L 93 D)—originally placed in Dermocybe but transferred by Lange to Myxacium with the similar but more viscid bitter-tasting species.

**ochropallidus*, 23. (*Icon.* no authentic plate known)—see notes on *multiformis.*

**odorifer*, 71. (*Icon.* Bres 622, *orichalceus*)—see notes on *orichalceus.*

†*olidus*, 77. (*Icon.* L 86 E: KM 127, *cliduchus:* Ri 42^3 *id.*).

**olivascens* (Batsch) Fr. sensu Bataille—see key § 120; many authors including Lange have used this name for what is probably the very variable *infractus* with ± subglobose spores; *olivascens* sensu Bataille has, however, quite different spores but is not well known nor authentically recorded for Britain.

orichalceus, 70. (*Icon.* KM 122: Cke 718(754)—this is the species with the smell of fennel, i.e. *orichalceus* sensu Maire, Konr. & Maubl. and Rea; this name has also been used for a fungus smelling of anise differing also in flesh and stem colours, which has been described as *odorifer* Britz. and is included here under that name but is not authentically recorded for Britain; *orichalceus* sensu Ricken (Ri 37^3) besides being inodorous has cap blood-red in centre, gills and stem yellowish-green at first, stem bulb often purplish-brown on the edge, flesh whitish with yellow outline turning sulphur-yellow with NaOH and spores 12–13/6–7μ, is found under conifers esp. on chalk and appears to be different again, but is not recorded for Britain.

†*pansa*, 47. (*Icon.* Fr 145^3 (but colour rather too red): Gillet—*Champ. Fr.*).

papulosus Fr.—not really known; Cke 713(718) is doubtful, and according to Moser *papulosus* sensu Bres. = *cephalixus*, 78.

parafulmineus, 63. (*Icon.* no authentic plate known)—see notes on *fulmineus*.

†*parherpeticus*, 52. (*Icon.* no authentic plate known.)

†*parvus*, 43. (*Icon.* Henry—*Bull Soc. mycol. Fr.* LI (1935) Pl. I, f. 2).

percomis, 98 (*Icon.* KM 134)—this is sensu Konr. & Maubl. with a characteristic fragrant smell; *percomis* sensu Ricken (Ri 42^4) is inodorous and has the cap golden-orange-brown, a sulphur-yellow mycelium and spores 10–12/6–6½μ, and has been renamed *percomium* Hry., but is not recorded for Britain; *percomis* sensu Bres (Bres. 608) has some points in common with *russeus*, 100.

**percomium* Hry.—see notes on *percomis*.

**pinetorum*, 32. (*Icon.* Boud 104, *multiformis*)—see notes on *Boudieri*.

pluvius, 17. (*Icon.* Cke 744(769) (not good); non Ri 35^6, ? = *vibratilis:* nec L 91 A, doubtful)—according to Fries' description this is a small species resembling a pale *vibratilis* but with the cap margin ± striate, the only member of this section to show this feature; *pluvius* sensu Lange seems to be larger, paler and with sl. broader spores and to have more points in common with *emollitus*.

polymorphus Hry. = *multiformis*, 21—see notes on *multiformis*.

porphyropus, 55. (*Icon.* L 87 B (good): Cke 728(731).)

praestans, 90. (*Icon.* Maubl 52: Cke 699(706) and 700(707), *Berkeleyi:* Boud 116, *torvus* var. *Berkeleyi:* Rolland—*Atlas*, Pl. 65, *torvus:* Ri 40^1, *variicolor*).

prasinus, 72. (*Icon.* KM 124: Cke 719(735): Boud 107: Ri 38^4)—this does not include *prasinus* sensu Lange (L 83 C) which is smaller and paler, with cap not spotted and has smaller amygdaliform spores 8½–10/4½–5μ; nor *prasinus* sensu Bres. (Bres 624) which is *atrovirens*, 73.

pseudocrassus Josserand = *crassus* sensu Ricken—see notes on *crassus*.

pseudonapus Hry. = *napus* sensu Henry—see notes on *napus*.

†*pseudosalor*, 8. (*Icon.* L 89 A.)

pumilus (Fr.) Lange—the fungus described and figured by Lange (L 89 D) does not seem to be more than a small *elatior* or more likely *mucifluus*, not separable on size alone; Henry has also used this name for a variety of *trivialis* not having such conspicuous bands on the stem, not included in the present work.

purpurascens, 53. (*Icon.* L 82 A: Cke 710(723) and 711(724): Maubl 56 I: Ri 36^3: Cke 712(725), *subpurpurascens*)—Henry has described two forms according to the shape of the stem—forma *eumarginatus* with ± marginate bulb (corresponding to Cke 710(723)) and forma *largusoides* with clavate or irregularly bulbous stem (corresponding to Cke 712(725)), but I have not thought it necessary to introduce them, preferring to state ' stem variable ' in the description.

rapaceus, 33. (*Icon.* Bres 612 sec Moser; non L 84 A nec Ri 39^2, doubtful)—like *multiformis* this appears to be a collective species and again spore size and shape would appear to be critical since sizes given range from 7–9/4–5μ to 10–12/6–7μ and shape from pruniform almost smooth to amygdaliform rough, but the limits are not yet well defined; I have had no opportunity to study the smaller-spored species or the larger-spored species and neither of these have been reliably recorded from Britain in recent years, but I have included here *rapaceus* sensu Moser with pruniform, almost smooth spores 7–9/4–5μ, which is most likely the Friesian species and corresponds to forma *media* Henry as originally described by

him and to which Moser refers Bres 612 as an illustration, despite larger spore range given by Bresadola; the larger-spored species with ± amygdaliform rough spores 9–12/5–7μ (i.e. *rapaceus* sensu Ricken, probably Lange and possibly Bresadola p.p.) seems to me very close to if not conspecific with *caroviolaceus*, 34, the bluish-tinged flesh of which may quite likely not be a constant character and is in any case fugacious; further study is required to clear up this group.

repandus Ricken as var. of *collinitus* = *trivialis*, 2.

**Rickenianus* = *aleuriosmus* sensu Ricken, (*Icon.* Ri 39[4], *aleuriosmus*)—see key § 57.

Riederi, 96. (*Icon.* Cke 694(702).)

**roseo-limbatus* Secr. = *variegatus* Bres. (*Icon.* Bres 613, *variegatus*)—see key § 105; this species is readily recognisable by its reddish cap and rather small elliptic fusiform spores; the stem bulb is variable, if distinctly marginate see var. *marginatus*, key § 37, (*Icon.* Bres 614).

rufo-olivaceus, 57. (*Icon.* KM 123: Bres 623: Cke 1188(1190), *testaceus:* Cke 758(759), *vinosus;* non Ri 37[1], ? = *xanthophyllus*).

russeus, 100. (*Icon.* Cke 696(751), *russus:* Metrod—*Bull Soc. mycol. Fr.* LX (1944), Pl. III, f. 1, *id.:* Favre—*Schweitz. Zeitschr. für Pilzk.* 1947 Taf. 2, *id.*)—see notes on *russus*.

russus Fr.—not known at the present time; *russus* sensu Ricken and Metrod= *russeus* Hry., 100.

saginus, 82. (*Icon.* Cke 695(703))—this is *saginus* sensu Cooke with subglobose spores; *saginus* sensu Ricken has bluish gills and stem apex when young, yellow or ochraceous cap, non-scaly ventricose or clavate stem and amygdaliform spores 10–11/6–6½μ and is found under conifers but is not authentically recorded for Britain.

salor, 12. (*Icon.* Cke 740(768): KM 110: Ri 35[3]: Bres 630.)

scaurus, 59. (*Icon.* L 84 B; non Cke 721(755), doubtful, nec Ri 37[5]=*subvirentophyllus* Hry.)—this is *scaurus* sensu Favre with characteristic spotted cap margin and pale olive-bistre gills; *scaurus* sensu Ricken has the cap not so dark at the margin and not spotted although sometimes streaky, and darker greenish-olive gills and has been renamed *subvirentophyllus* Hry.—see key § 70; *scaurus* sensu Bres. also has the cap not spotted but has olive-yellow gills and has been renamed *montanus* subsp. *europaeus* Moser—see key § 70; neither of these last two species are recorded for Britain.

sebaceus, 84. (*Icon.* Cke 687(697))—there are two other species which should possibly be included in the section Sebacei but are not well enough known in this country; they are: *serarius* Fr. which has similar spores to *sebaceus* but an orange-brown innately fibrillose cap and the stem sometimes white floccoso-scaly at first and *vespertinus* Fr. sensu Bataille with a yellowish or ochraceous cap and sl. broader spores 7–8/4½–5μ; the section Sebacei as used in this work is imperfectly known not only in Britain but also on the continent and is in need of revision.

serarius Fr.—see notes on *sebaceus*.

sericellus Moser = *sebaceus*, 84—in *Sydowia, Annales Mycologici* Ser. II, VI (1952), p. 82, Moser refers *turmalis* of French authors and also as mentioned by Pearson in 'Agarics at Aviemore' (*Trans. Brit. Myc. Soc.* XXIII (1939)) to *sericellus* and subsequently to *sebaceus*; I have, however, not cited this since from the descriptions *turmalis* sensu Konr. & Maubl. seems to me distinct from *sericellus*, especially in spore size, cortinal characters and flesh colour, but I have no personal experience of either species.

sodagnitus, 39. (*Icon.* Henry—*Bull Soc. mycol. Fr.*, LI (1935), Pl. I, f. 1.)

†*splendens*, 65. (*Icon.* Henry—*Bull. Soc. mycol. Fr.*, LII (1936), Pl. II, f. 1)—it should be noted that in his first description of this species (*Bull. Soc. mycol. Fr.*, LII (1936), p. 174) Henry states that NaOH gives an olive colour with the cap cuticle, this error he later corrected to red-brown. (Ibid. LV (1939), p. 178.)

stillatitius, 9. (*Icon.* Bres 632; non Cke 742(831), doubtful)—this is sensu Bresadola, specimens apparently of this species having recently been found in a damp mossy wood in Scotland; the Friesian species is not known with certainty at the present time and Cooke's plate is doubtful.

**suaveolens* Bataille-Joachim (*Icon.—Bull. Soc. mycol. Fr.*, LVI (1940). Atl. Pl. LXXXIII)—see key § 43; appears to have a similar smell to *evosmus*, 30, but readily distinguished from that species by blue-violaceous colours.

**subarquatus*, 46. (*Icon.* L 83 B, *arquatus*.)
**subatkinsonianus* Hry. (*Icon.* Ri 39[4], *arquatus*)—see key § 59 and notes on *arquatus*.
**subclaricolor* Moser, (*Icon.* Bres 601, *claricolor*)—see key § 100; recognised by small spores, fairly bright brownish cap and ± floccoso-scaly stem.
subpurpurascens, 54. (*Icon.* L 82 C; non Cke 712(725) = *purpurascens*.)
subsimilis Pers.—as described by Ricken (Ri 43[4]) this is almost certainly *infractus*, 101.
†*subtortus*, 102. (*Icon.* Ri 43[3]: Maire & Kuhner—*Bull. Soc. mycol. Fr.*, LI (1935), Pl. III, f. 6–9.)
**subtriumphans*, 75. (*Icon.* Ri 41[2], *triumphans*)—see notes on *triumphans*.
subturbinatus, 28. (*Icon.* L 83 A, *sulphurinus* (not typical))—in *Trans. Brit. Myc. Soc.*, XXXV (1952), p. 114, Pearson recorded *sulphurinus* var. *Langei* as well as *subturbinatus;* both these records should be referred to *subturbinatus;* in the same paper the dimensions of the cap of *subturbinatus* were wrongly given as " 5–19 cm." the correct figures are " 5–10 cm."; the fungus first described by Henry as *sulphurinus* var. *Langei* has smaller spores and a yellower cap and is included here as *Langei*, 29; see notes on *Langei*.
**subvirentophyllus* Hry. (*Icon.* Ri 37[5], *scaurus*)—see key § 70 and notes on *scaurus;* differs from *scaurus* and *montanus* in darker greenish-olive young gills and stem with more distinct marginate bulb.
†*sulphureus*, 67. (*Icon.* L 85 B)—Lange quotes Cke 702(709), *multiformis* var. *flavescens* as an illustration of this species, but for reasons given in the notes on *flavescens* this seems rather doubtful.
**sulphurinus* Quél.—this name has been used for different species—sensu Ricken = *elegantissimus*, 69: sensu Lange = *subturbinatus*, 28; the original *sulphurinus* of Quélet is not well known but according to Moser it is entirely pale sulphur-yellow at first except for deeper gills and whitish flesh, which later becomes yellower, with elliptic-amygdaliform spores 10–12(13)/6–8μ and grows under conifers (firs) but the cap may become tinged or spotted ochraceous later.
tabularis (Bull.) Fr.—see key § 104; although belonging to the section Anomali of the subgenus *Dermocybe* with roundish spores and cap with innate white silky sheen when dry, this species is included in the key because the cap is sometimes rather viscid; it seems that the name *decoloratus* has been used at times for such ± viscid specimens of *tabularis*.
talus Fr.—this name has been used in various ways and is excluded as such from the present work; the original Friesian species (*Icon.* Fr 145[2]) with olive tints in the cap may have been *turbinatus* but is also sometimes referred to *rapaceus* or *multiformis* sensu lato and is in any case doubtful; *talus* sensu Cooke (Cke 705(711)) has been referred by Henry to *allutus* var. *luteus*, inspection of the original specimen at Kew has shown the spores to be ± elliptic-amygdaliform, rough, 10–12/5½–6½μ, which supports this theory, but also would agree with *multiformis* as included here and I am not yet convinced that this plate is anything other than *multiformis*; *talus* sensu Lange is undoubtedly different and has been renamed *amarescens* Moser (No. 25).
testaceus Cooke = *rufo-olivaceus*, 57.
†*triumphans*, 74. (*Icon.* no authentic plate known)—there has been some confusion over the use of this name; I have followed Kauffman and Henry in taking the larger-spored species to be *triumphans* sensu Fries; there are two other interpretations, both smaller-spored species—*triumphans* sensu Ricken, which has the cap innately fibrillose and cap and stem sometimes olivaceous, and has been renamed *subtriumphans* Hry., and *triumphans* sensu Cooke, Konr. & Maubl., Lange and Rea with yellower smoother cap and gills sometimes bluish at first, which I have referred to *crocolitus* and which may well be Fries' forma *minor*; this latter species is so far as is known at the moment the commonest species in Britain, being typical of birch woods, and *triumphans* as included here has been found both under pine and birch, but there is no authentic record for *subtriumphans*.
†*trivialis*, 2. (*Icon.* L 89 C: Ri 35[5], *collinitus* var. *repandus:* Fr 148[1], *mucifluus*)—see notes on *collinitus*.
turbinatus, 31. (*Icon.* Henry—*Bull. Soc. mycol. Fr.* LI (1935), Pl. I, f. 3; non Cke 714(714) = *elegantior*, nec Ri 39[3], doubtful)—there are several different interpretations of this name, the common factor of all being a tendency towards olivaceous tints in the cap; it is here included sensu Bataille and Henry, which

is the species with characteristic subglobose or ovate-pruniform rough spores; *turbinatus* sensu Cooke and probably Rea = *elegantior* sensu Ricken; the identity of some other interpretations is open to doubt; *turbinatus* sensu Ricken has some points in common, notably smaller spores, with *melliolens*, whilst *turbinatus* sensu Boudier (Boud 105) which has sometimes obscure violaceous tints in the young gills or stem apex, flesh darker in bulb and spores ± amygdaliform, 8–10/5–6μ seems different again.

turmalis, 83. (*Icon.* Cke 684(694): Ri 43[6]: KM 136)—see notes on *sericellus*.

**validus* Favre = *latus* sensu Bres. (*Icon.* Favre—Hauts-Mar. Jur. Pl. IV, f. 1)—see key § 96; near *olidus*, 77, but more robust with reddish-brown cap, elliptic spores and different habitat.

**variegatus* Bres. = *roseo-limbatus* Secr.—see key § 105.

variicolor, 91. (*Icon.* Cke 691(700): KM 131: Cke 689(698), *varius*; non Ri 40[1] = *praestans*.)

varius, 94. (*Icon.* KM 132: Ri 42[1]; non Cke 689(698) = *variicolor*).

**vespertinus* Fr.—see notes on *sebaceus;* not well known at the present time; *vespertinus* sensu Ricken from spore size at least seems likely to be *microspermus* Lange (see key § 103).

vibratilis, 15. (*Icon.* Cke 743(744): KM 112: L 90 F: Ri 35[2].)

vinosus Cke. = *rufo-olivaceus*, 57.

xanthophyllus, 58. (*Icon.* Cke 713(753), *dibaphus* var. *xanthophyllus*)—the cap colours somewhat resemble those of *dibaphus* but the gills are a totally different colour; according to Moser Ri 37[1], *rufo-olivaceus* (icon. not description) may represent this species by reason of the sulphur-yellow gill.

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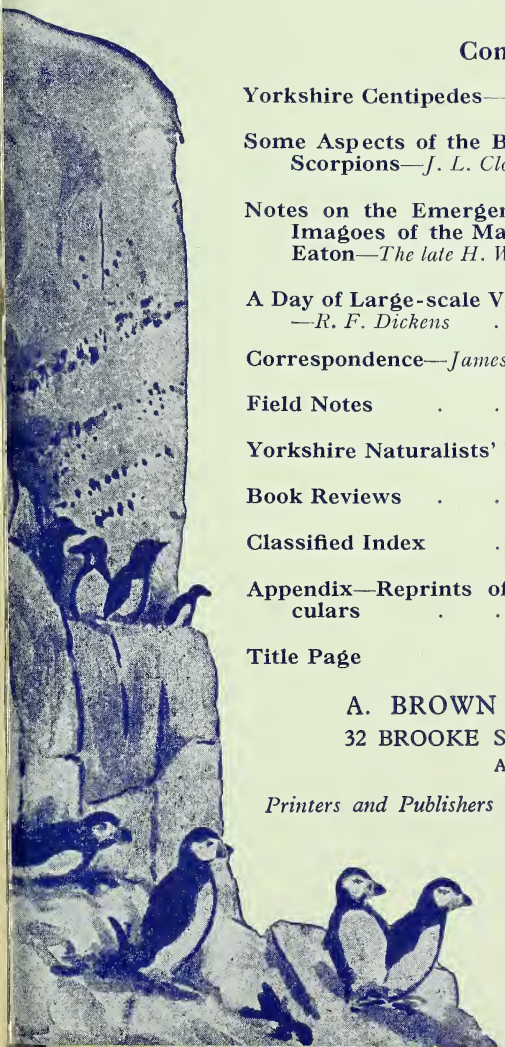

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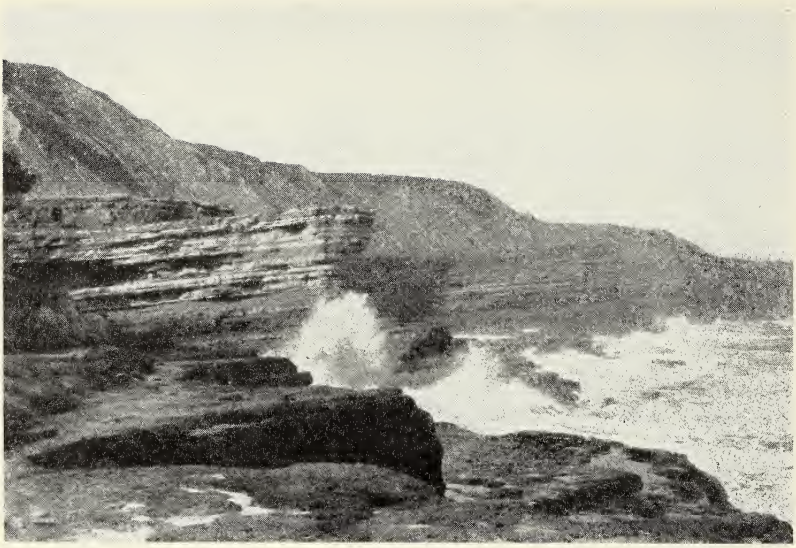

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"VENUS AT HER TOILET"

CENTRE OF ROMAN PAVEMENT AT RUDSTON

YORKSHIRE CENTIPEDES

GORDON BLOWER
Department of Zoology, University of Manchester

THE substance of this paper is treated similarly to that of a previous paper on Yorkshire Millipedes (Blower, 1952). Detailed records of Yorkshire species are given, including all past records from the literature. Species recorded as British but not included in the Yorkshire list are quoted parenthetically, with bibliographical notes on their distribution designed to indicate the likelihood of their occurrence in the county. The list of British species is based on the check list of Brade-Birks (1939), further additions being indicated where appropriate. No diagnostic details are given in the present paper since an illustrated account of the British fauna is in preparation for publication elsewhere; furthermore, difficulty in this respect is not so acute as is the case with Millipedes—the excellent account of the French species (Brölemann, 1930) being adequate for diagnosis of most of the British species.

Past records of centipedes from Yorkshire are very few. My own records are mainly from that part of the North Riding encompassed in vice-county 62. I am fortunate in being able to include material collected by my colleagues Dr. P. M. Butler, of this department, and Mr. P. D. Gabbutt, of the University College, Exeter. These two collections from the Malham area represent practically all that is known of the fauna of V.C. 64 and contain valuable additions to the Yorkshire list. It is to be hoped that the bringing up to date of the faunal records in this paper will stimulate a much wider and more thorough search than has been made hitherto. The adjacent counties of Northumberland, Durham and Lancashire are probably the best worked counties in the country; only the absence of extensive Yorkshire records prevents a comprehensive assessment of the Northern fauna as a whole.

The following list includes thirteen Geophilomorphs, nine Lithobiids and one Cryptopsid from Yorkshire. Of the eleven Geophilomorphs *not* recorded from the county, eight are unlikely to be found; the remaining three are *Scolioplanes crassipes*, *Geophilus algarum*, a littoral species from the north-west, and the exotic *Mecistocephalus carniolensis*, usually found in hot-houses. Of the eight unrecorded Lithobiids, three are unlikely to be found in Yorkshire; three of the five remaining ' possibles ' are hill species.

In the present state of our knowledge it is premature to speak of notable absences. An exception may be made in the case of *Lithobius variegatus* however which is too large and striking to be missed, and yet has not been found in the whole of vice-county 62.

Past records are followed by the author's name and date in brackets. Material collected by Dr. P. M. Butler, Mr. P. D. Gabbutt, Miss M. T. Sewell and Mr. G. B. Walsh and kindly placed at my disposal is acknowledged by their suffixed initials. Some of Dr. Butler's material has already been listed in the Spurn Report; I have re-included it here for completeness. Dr. Butler's collection from Malham forms part of the Y.N.U's survey of this area.

Class CHILOPODA.

Order LITHOBIOMORPHA.

Family LITHOBIIDAE.

Lithobius forficatus (Linné 1758).

Although undoubtedly the best known of the British species of the genus its frequent occurrence in habitats associated with man's activity may have given this species an unwarranted position of importance in our fauna. In many country districts, the next species, *L. variegatus*, is by far the commoner large Lithobiid.

Brölemann (1930) says of this species that it is common everywhere except on mountains. Turk (1947) points out that this generalisation would only apply to the southern parts of Britain where it is rarely found above 800 feet, being replaced at higher altitudes by *L. variegatus*. Turk found *L. forficatus* much higher in one locality in Scotland almost to the exclusion of *variegatus*. Eason (*in litt*). informs me that he has found it all over the high parts of the northern Cotswolds (Eason 1953B) and at one point in the Lake District above 800 feet. In Ireland, Brölemann's generalisation appears to hold good. (See also remarks under '*L. variegatus* ').

V.C. 61. Spurn, very common under debris near beach, Marsh Meadows and round cottage, June 1950-3. (P.M.B.)

V.C. 62. Rievaulx, woodland 31/7/50; Duncombe Park, woodland, several under stones and logs 9/4/51; Easingwold, hedge bank under stones 7/4/51; Thornton Dale 9/50 (P.M.B.); Hovingham, woodland, in damp stump, several, and under stones by road, several, 16/8/51; Grange Moor Plantation near Oswaldkirk, many in beech litter and under bark of conifers 16/8/51; near Ampleforth, under stones in field, many 16/8/51; Wildon Grange, farmland, under stones 1/9/52; Oulston Bank, woodland, under stone and stumps 2/9/52; Oldstead, under stones by road from Byland 2/9/52; Oldstead, Elm Hag, under log in wood 2/9/52; Scarborough, under stones beneath Castle Rock, several immature stadia 3/9/52; Thornton Hill, many under stones by road 4/9/52; White Horse, Kilburn, very common also many immature stadia, one adult female taken with egg—still numerous at 900 feet, 4/9/52; Helmsley, near cornfield, under bark of old elm, 5/9/52.

V.C. 63. Sheffield district (Evans, 1910).

V.C. 64. Harewood, Woodhall and E. Keswick (Falconer, 1911).
Leeds University Garden (Thompson, 1921).
By River Ure, near Wensley, 31/7/50—several with *variegatus*.
Near Gordale Scar 8/54, one immature stadium (P.D.G.).

While it is probably a safe generalisation to say ' everywhere common ' in the North Riding (except perhaps at altitudes higher than those visited by the writer), the actual localities are listed in V.C. 62 not so much to record *forficatus* as to stress the surprising absence of *variegatus* from habitats elsewhere so favourable for this last-named species q.v.

Lithobius variegatus Leach 1813.

As has been mentioned, this handsome Lithobiid is often to be found on moorland terrain, replacing *forficatus*, particularly at high altitudes. It is, however, also characteristic of lowland regions where there has been little interference with natural conditions. In Cheshire, for instance, *variegatus* is the dominant species in woodlands and wild country generally, almost to the exclusion of *forficatus* and in certain regions of the Lake District *forficatus* is quite rare. It is thus very noteworthy that in V.C. 62 where most of my Yorkshire collecting has been done, I have never once seen the animal, notwithstanding the fact that a large proportion of the habitats sampled were just those which, in Cheshire for example, would have yielded this species in large numbers.

L. variegatus is one of the few animal species which appears to be confined to the British Isles. Although Brölemann (1930) suggests that it may yet be found in Brittany, it is still unrecorded from France.

V.C. 62. *No records.*

V.C. 63. Sheffield district (Evans, 1910).

V.C. 64. Harewood Park area (Falconer, 1911).
Ilkley (Brade-Birks, 1917).
By River Ure, near Wensley, 31/7/50, several with *forficatus*.
Malham Tarn, beech litter in grounds of Field Centre house, 2♂ 2♀ 1 imm., under stones, in wood and on scree near house 3♀ 3 imm. ♀ 1 imm. ♂ 1 imm., Gordale Scar, common, both sexes 8/54 (P.D.G.). Malham Tarn, High Folds Hill 1♂, grassland N.E. of tarn, 2♂, Tarn House Plantation 2 imm. 6/54 (P.M.B.).
(Note that only one immature stadium of *forficatus* was seen at Malham.)

(*Lithobius piceus britannicus* Bagnall 1913).
Recorded only on one occasion from Northumberland and Durham by Bagnall (1913), ' a fairly large animal with bright yellow tibiae.' It is a moorland animal in the two counties from which it was recorded.

Lithobius melanops Newport 1845.

This species is often encountered between the bark and wood of fallen trees and is a very active Lithobiid. It is frequent in maritime situations and can be classed as an indifferent halophile.

V.C. 61. Spurn 1♀ 6/51; 2♂ 1 imm. in Marram area under stones 6/52; 2 imm. *Carex arenaria* 6/35 (P.M.B.).

V.C. 62. Grange Moor Plantation, nr. Oswaldkirk, in litter 16/8/51 1♀.

(*Lithobius aulacopus* Latzel 1880).
Recently described as new to Britain from the west bank of Lake Windermere, Lancs. (Eason, 1953) and closely related to *melanops* with which it may have been confused in the past since some specimens of *aulacopus* will run down to *melanops* in Brölemann's key (1930).

(*Lithobius nigrifrons* Latzel & Haase 1880.)
First recorded as British from a field near Gibside, Co. Durham (Bagnall, 1913) and since recorded only from Cornwall (Turk, 1945).

(*Lithobius agilis* C. L. Koch 1847.)
This species has been recorded only from Codmore, Donegal E. and Acton wood, Armagh, in Northern Ireland. Brölemann (1930) records the closely allied *L. tricuspis* Meinert 1872, from Great Britain, although this is not included in Brade-Birks' list.

Lithobius lapidicola Meinert 1872.
First recorded from the North Devon coast by Bagnall (1914). It has since been recorded from the midland counties as far north as Cheshire and I have collected it in the neighbourhood of Coniston (Lancs.). It is a hill species in these northern localities. This animal is easily confused with *L. borealis* q.v. Brade-Birks' tentative record of *lapidicola* from Scotland probably indicates his suspicion that the records of *borealis* should be referred to *lapidicola*.
V.C. 64. Tarn House Plantation, Malham, 3♂, 2 immature stadia 6/54 (P.M.B.).

(*Lithobius borealis* Meinert 1868.)
This species has been confused, at times, with the previous species. It appears that all records of *borealis* prior to Brade-Birks' paper (1916) must be treated with suspicion. Since that date Bagnall (1918) has recorded it from upland regions of Northumberland and Durham and one specimen from Ainsdale, Lancs. The specimen from Ainsdale was identified by Brölemann and is described by Brade-Birks (1933). Recently another specimen has been recorded by Larwood (1941) from Cornwall; his specimen he regards as belonging to a southern group having a similar spinulation to Spanish specimens recorded by Ribaut. Larwood points out that Bagnall's specimen from Ainsdale has a spinulation agreeing with that described by Meinert and may belong to a strictly northern group (Larwood, 1941); see also Brölemann 1930.

(*Lithobius erythrocephalus* C. Koch 1847.)
This species, closely related to *lapidicola*, but quite distinct from it in the presence of lateral coxal spines (VaH) and the absence of prolongations on tergites 9, 11 and 13, was seen by Bagnall first near Wooler, Northumberland, in 1913 and later in the Corstophine Hill Woods, Midlothian (Bagnall, 1930). In Britain, likewise in Europe, it appears to be a hill species. This species is not included by Brade-Birks (1939).

(*Lithobius pilicornis* Newport 1844.)
(*Lithobius pilicornis* var. *doriae* Pocock 1890.)
The typical form of this species is a large animal, comparable with a large specimen of *forficatus* or *variegatus*. The variety *doriae* is a little smaller. Scarcity of records for these two animals, as for *L. piceus britannicus* may well be due to collectors entering '*forficatus*' in their notebooks for any large Lithobiid without taking the precaution of collecting the specimens.

Until recently only the typical form had been recorded from these islands and only from Cornwall. It was for long regarded as a good example of an animal with a Lusitanian type of distribution. Scharff (1907) only knew the animal elsewhere from Algiers and Spain. It has since been recorded from all along the west coast of France and the Iberian peninsula. Its distribution is thus not as discontinuous as Scharff suspected. More recently Larwood (1941) and Turk (1944) have recorded the form *doriae* together with the typical form and all intermediate forms from Cornwall. The form *doriae* in the Pyrenees and S.E. France is geographically isolated from the typical form and thus is a true sub-species there.

Lithobius calcaratus C. L. Koch 1844.
This animal is unmistakable in the field due to its colour, a very deep and sombre brown, almost black. It is very active living under stones in very dry habitats often in moorland or heathland.

V.C. 62. Farndale, under stones 7/4/51 (M.T.S.). Hutton-le-Hole, under stones 7/4/51 (M.T.S.). White Horse, Kilburn, under stones 700 feet up, common under each of about twenty stones in a small sheep-grazed area, one female with egg 4/9/52.
V.C. 64. Malham Tarn, under stones behind Field Centre, 1♀ 8/54 (P.D.G.).

(*Lithobius muticus* C. L. Koch 1847).
This species has been included in Brade-Birks' list (1939) but I have been unable to discover any record of its occurrence in the literature.

Lithobius crassipes L. Koch 1862.
This is a very common animal of the woodland floor being perhaps *the* most typical Lithobiid in rich litter. It is found together with the next, less common species, *curtipes*, from which it can be separated only by reference to the minutiae of spine formulae. Eason (1951) however points out that *curtipes* can be recognised by its habit of curling up when disturbed and rolling off the surface of the stone (cf. *L. duboscqui* q.v.). This and the following two species used to be grouped into a subgenus *Monotarsobius* characterised by a small number of antennal articles and by the absence of a tarso-metatarsal articulation on the first twelve pairs of legs. Some earlier authors used *Monotarsobius* as a generic name.

V.C. 61. Spurn, near Marsh Meadow, *Agropyron-Juncus*, under shore debris on sand, 1♀ 1♂ 6/52. Cottage Garden under stones 1 imm. 6/52. Near Cottage, 1 imm. 6/53 (P.M.B.).
V.C. 62. Salmon's Wood, Sproxton, 10/8/50, 2♀ 1 ♂; Rievaulx woodland 10/8/50, 1♀; Thornton-le-Dale 9/50, 1♀ (P.M.B.); Crayke, woodland 7/4/51, 8/4/51, ♀♀; Easingwold, North Moors 7/4/51, 1♀; Helmsley, under stones near cornfield 9/4/51, 1♀; Duncombe Park, woodland 9/4/51, 5♀ 1♂; Hovingham woods 10/8/51 several in damp stump; Grange Moor Plantation, Sproxton, in beech litter, Oulston by potato field, in hedge bank 2/9/52; Oulston Bank, woodland, common in soil (with *curtipes*) 2/9/52; Scawlings wood, near Oldstead, common in soil (with *curtipes*) White Horse, Kilburn, under stones, etc., common (with *curtipes*). Helmsley, cornfield 5/9/52, 1♀; Duncombe Park, in beech litter 5/9/52 common.
V.C. 64. Malham Tarn, in litter between limestone pavements, under stones near Field Centre 4♀, near Gordale Scar under stones 3♂ 1 imm. 8/54 (P.D.G.). Spiggott Hill Plantation, near Field Centre 1♀ 1♂, under bark near Malham Tarn 1 imm. 6/54 (P.M.B.).

The spinulation of the last two pairs of legs given by Brölemann (1930) is as follows:

	Ventral					Dorsal				
	C.	Tr.	P.	F.	Ti.	C.	Tr.	P.	F.	Ti.
14	—	–m–	amp	amp	–m–	a—	—	amp	—p	—
15	—	–m–	amp	am–	—	a—	—	amp	—	—

With this formula, the majority of my specimens agree, even immature stadia no more than a millimeter in length. One specimen, a male from Rievaulx (250) has 15 VpF present on the right side and vestigial on the left, being otherwise normal. This aberration has been noted by Eason (1951). No specimen had 15 DpF which Eason records on some of his specimens from the Midlands. Lastly, one male (256) from Crayke had 14 VpP duplicated on the left side only.

Lithobius curtipes C. L. Koch 1847.
While on the subject of spinulation it will be advantageous to discuss that of this

species first. The formulae given by Latzel before the ' amp ' system was introduced, and those of Brölemann and Eason are as follows:

		Ventral					Dorsal				
		C.	Tr.	P.	F.	Ti.	C.	Tr.	P.	F.	Ti.
Latzel	14		1	1/3	2/3	1	1	0	3	1	1
	15		1	3	2	0/1	1	0	3	1	
Brölemann	14	——	–m–	amp	amp	–m–	–m–	——	amp	—p	—p
	15	——	–m–	amp	am–	——	–m–	——	amp	—p	——
Eason	14	——	–m–	amp –mp	am– amp	–m–	a—	——	amp –mp	—p	—p
	15	——	–m–	amp	am– –m–	——	a—	——	amp	—p	——

It will be noticed that there is general agreement between the three systems except that the dorsal spine on the coxae of the legs is placed ' anterior ' by Eason and ' median ' by Brölemann; this spine is almost vestigial and thus a decision on this point is difficult.

The spinulation of the four specimens of *curtipes* from the North Riding can be summarised as follows:

Specimen a as Brölemann but without 14 VpF* and 14 VmT* and *with* 15 DpT.
,, b ,, ,, 14 VpF*, 14 VaP*(R) and 14 VaF(L).
,, c ,, ,, 14 VpF*.
,, d ,, ,, 14 VpF* and 15 VaF*(L).

The variations marked with an asterisk are allowed for in Eason's table. Most unusual is the presence of 15 DpT on both legs in (a). Eason quotes the constant presence of 14 DpT in both sexes, together with the vestigial appearance of 14 and 15 DaC (DmC of Brölemann) as good diagnostic features of *curtipes*—14 DpT is never present in *crassipes* and 14 and 15 DaC, by contrast, are well developed in this latter species. An examination of the Yorkshire material supports Eason's findings in this respect. Lastly, it will be remembered, the habit of curling up on being disturbed is said to be diagnostic of *curtipes*.

V.C. 62 (a) Oulston Bank Wood, 1♀ 2/9/52.
(b) Scawling Wood, near Oldstead, 1♂ 2/9/52.
(c) White Horse, Kilburn, under stone, 1♀ 4/9/52.
(d) Duncombe Park, beech litter, 1♂ 5/9/52.

Recorded elsewhere in Great Britain only from Cambridgeshire (Brade-Birks, 1934) and from Coughton Park, Warwickshire, 14/8/50 (Eason, 1951).

Lithobius duboscqui Brölemann 1896.

The smallest member of the genus *Lithobius* in Britain. Characterised by its curling up on being disturbed (cf. *curtipes*). It is often associated with arable land and is common in agricultural soils. Bagnall (1918B) refers to this species being common in Yorkshire but gives no detailed records. He also refers to its being less common farther north.

V.C. 61. Spurn, under trees near cottage.
V.C. 62. Duncombe Park 9/4/51, 1♂. Elm Hag, near Byland, 8/54, 1.

(*Note*—The closely-related *L. microps* which differs from *duboscqui* in having a single claw on the anal legs, in having a larger number of antennal articles, and an increased armature of spines on the last two pairs of legs, was excluded from the British List because it had not been properly distinguished by earlier workers (Brade-Birks, 1916). It is not clear whether Bagnall's record of *L. microps* from

Winlaton, County Durham (1913) is likewise to be discounted. Bagnall's specimen had 32 antennal articles and is listed along with the first record of *L. duboscqui* to Britain.)

(*Lithobius duboscqui* var. *fosteri* Brade-Birks, 1919.)
First recorded from Ireland (Brade-Birks, 1919) and since found by Dr. Turk in Cornwall (Turk, 1944). It differs from the type in having but a single claw on the anal legs. Brade-Birks (1918) recorded two females with a single claw which he doubtfully referred to *L. duboscqui*—it is not clear whether these Kent specimens belong to the variety *fosteri*.

Sub-Family Henicopinae.

Lamyctes fulvicornis Meinert 1868.
This species has but a single ocellus on each side; this, together with the absence of spines on the legs make it quite distinctive. Recorded from Lancashire and Durham, in both counties, in moorland regions.
V.C. 64. Near Tarn House, Malham, under stones, 1♀ 8/54 (P.D.G.).

Order Scutigeromorpha.

Family Scutigeridae.

(*Scutigera coleoptrata* (Linne 1758).)
This species has been taken in a paper mill and wine cellar in Scotland and in a house at Colchester where it was probably introduced. More recently Turk (1947) records it from Jersey where he considers it to be indigenous.

Order Scocopendromorpha.

Family Cryptopsidae.

(*Cryptops anomalans* Newport 1844.)
Pocock (1902) records this species from Kew, Surrey, in quite an open situation. Its claim to be indigenous is however rather slender. Brölemann (1930) gives this species as a synonym of *Cryptops savignii* Leach 1817. Brade-Birks (1939), on the other hand, regards *savignii* as a synonym of *C. hortensis* Leach 1813.

Cryptops hortensis Leach 1813.

V.C. 62. Duncombe Park, under bark of log, 9/4/51; under piece of wood in pasture field, near Helmsley, 5/9/52.

(*Cryptops hortensis* var. *pauciporus* Brölemann 1908.)
Recorded once by Turk (1944) from Cornwall.

(*Cryptops parisi* Brölemann 1920.)
First recorded by Bagnall (1935) from Lancashire and Westmorland and later by Turk (1944) from Cornwall.

(*Cryptops parisi* var. *cristata* Ribaut 1925.)
Recorded tentatively from Dulwich (London) greenhouse by Turk (1944) the determination being on size alone (18.7 mm. long). Dr. Butler collected a specimen undoubtedly belonging to this variety between Cardiff and Caerphilly in April 1953 which was 24.5 mm. long with 11 tibial and 6 tarsal teeth on the anal legs.

Order Geophilomorpha.

Family 1. Himantariidae.

Haplophilus subterraneus (Shaw 1789).
A large and common species in gardens although also characteristic of woodland. Its subterranean habit possibly accounts for the scarcity of records from the latter habitat.
V.C. 61. Spurn, under trees near cottage, 6/51; in soil, formerly cultivated, near cottage, 6/51, 6/53 (P.M.B.).

V.C. 62. Thornton-le-Dale 9/50. Easingwold, in garden, 6/50, 6/51. In rotten potato tuber 6/51, in potato patch 2/8/51. Scarborough, greenhouses, many 12/53 (G.B.W.).

V.C. 63. Sheffield district, cultivated soil (Evans, 1910).

(*Haplophilus subterraneus* var. *complanatus* Chalande & Ribaut 1909)
This variety differs from the typical form only in the absence of the lateral comma-like pits on the middle segments. I have examined several specimens from the north which were without these pits but all the examples were immature stadia co-existing with adults of the typical form. Only recorded once from Cornwall (Turk, 1944).

(*Stigmatogaster gracilis* (Meinert 1870).)
Recorded from Co. Galway, Ireland (Brölemann, 1896).

Stigmatogaster sp. Bagnall 1935.

According to Bagnall the labrum of this animal compares with that of *S. gracilis* but the sternal pore fields are confined to the anterior segments and the anal coxae have 7-8 dorsal pores and 12-16 ventral pores. Bagnall gives the number of legs as 80-84.

V.C. 61. Sewerby, 1♀ 6/34.

Also recorded from Devon, London and Lancashire (Bagnall, 1935).

Family 2. Mecistocephalidae.

(*Mecistocephalus carniolensis* (C. L. Koch 1847).)

Recorded from greenhouses in Edinburgh (Evans, 1919) and Newcastle-upon-Tyne (Bagnall, 1913). An exotic form apparently introduced with imported plants.

Family 3. Schendylidae.

Hydroschendyla submarina (Grube 1872).

This centipede is one of four British Geophilomorphs which live below high-water mark and is probably the most uncommon. Previous to the following Yorkshire record it had been found only in the Channel Isles and Cornwall, the latter record being that of Jackson (1916).

V.C. 62. Cloughton Wyke, under rocks and weeds beneath high-water mark (Cloudsley-Thompson, 1948).

Schendyla nemorensis (C. L. Koch 1837).

One of the smallest Geophilomorphs, similar superficially and in the small number of segments to *Brachygeophilus truncorum* but most readily distinguished from the latter by the absence of anal claws.

V.C. 62. Easingwold, in earth beneath stone, hedgebank, 7/4/51.

(*Schendyla nemorensis* var. *fountaini* Turk 1944.)
This variety was recently established on a female specimen from Cornwall.

(*Schendyla zonalis* Brölemann & Ribaut 1911.)
From the coasts of Devon and Dorset (Bagnall, 1935).

(*Brachyschendyla monoeci* Brölemann 1904.)
From a greenhouse in Cornwall (Turk, 1944).

Family 4. Geophilidae.

(*Chaetechelyne montana* var. *oblongocribellata* Verhoeff 1898.)
One record from Cornwall (Turk, 1944).

(*Chaetechelyne vesuviana* (Newport 1844).)
From Devon only (Sidmouth—Bagnall, 1912).

Scolioplanes maritimus (Leach 1817).

Widely distributed along our shores, not nearly so rare as the other halophile species.

V.C. 61. Spurn, chalk wall near salt marsh, 2♀ 6/52 (P.M.B.).

Scolioplanes acuminatus (Leach 1814).

This and the following species are closely related but distinguishable by the number of pedigerous segments (39-49 in *acuminatus*; 45-59 in *crassipes*). They are both a rich red-brown colour and are very active. Both are recorded from Northumberland and Durham—*acuminatus* alone from Lancashire, Yorkshire and Derbyshire.

V.C. 62. Elm Hag, near Byland, under bark, 1♂ 2♀ 8/54 (♂ with 39 pairs of legs, ♀♀ with 41).
V.C. 64. In wood near Malham Tarn Field Centre, 1♂ with 39 pairs of legs 8/54 (P.D.G.).

(*Scolioplanes crassipes* (C. L. Koch 1835).) See above.

Clinopodes linearis (C. L. Koch 1835).

V.C. 61. Sewerby 1♂ (Bagnall, 1935).
Also recorded from the adjacent counties of Lancashire, Northumberland and Durham.

Necrophloeophagus longicornis (Leach 1814).

This is a very common Geophilid recognisable by the long antennal articles and the clothing of long hairs.

V.C. 61. Spurn, garden near cottage, under stones, 1♂ 6/50, 6/52 (P.M.B.)
V.C. 62. Thornton-le-Dale 1♀ 1♂ 9/50 (P.M.B.); below Castle Rock, Scarborough, 1♂ under stone 3/9/52.
Elm Hag, near Byland, 1♀ 8/54.
V.C. 64. Farnley and Leeds University Garden (Thompson, 1921).
Harewood, Woodhall and East Keswick (Falconer, 1911).
Near Gordale Scar, under stones, 1♀ 1 imm. 8/54 (P.D.G.).
Grassland N.E. of Malham Tarn 2♂ 1 imm. 6/54 (P.M.B.).
V.C. 65. River Ure, near Wensley, under stones in litter, 31/7/50 1♂.

Geophilus carpophagus Leach 1817.

This is undoubtedly the commonest geophilid of non-cultivated districts and, generally, open or upland country. It is a darker, more sombre colour than other geophilids.

V.C. 62. Cloughton Wyke, under stones, top of cliff 17/8/48 3♂; Crayke, under old tarpaulin sheet, several 7/4/51, and in decaying piece of wood, hedge bank 8/4/51 2♀.
Farndale 9/4/51 (M.T.S.); Hutton-le-Hole 7/4/51 (M.T.S.).
Oulston, under stone, 2/9/52. White Horse, Kilburn, 900 feet up, in quite dry soil, 4/9/52.
V.C. 63. Sheffield district in cultivated soil. (Evans 1910.)
V.C. 64. Near Gordale Scar, under stones, 1♂ 1 imm. 8/54 (P.D.G.).

Geophilus insculptus Attems 1894.

V.C. 62. Oulston 7/49. Rievaulx woodland 10/8/50 several; Easingwold, under stone by roadside in clay soil, 8/4/51.
Near Rievaulx, under stone in pasture, 9/4/51; Rievaulx 9/4/51; Hutton-le-Hole 7/4/51 (M.T.S.).
Oulston Bank, woodland, deep in soil, 1♂ 2/9/52.
Thornton Hill, under stone in sandy soil, 4/9/52.
V.C. 64. Near Field Centre, Malham Tarn, 1♂ 1♀ 8/54 (P.D.G.).
Grassland north-east of Malham Tarn 1♀ 6/54 (P.M.B.).
Tarn House Plantation 1♀ 1♂ 6/54 (P.M.B.).
V.C. 65. Bolton Bridge, woodland, 31/7/50.

Geophilus electricus (Linne 1758).

V.C. 62. Whitby (Bagnall, see Stainforth 1913).

(*Geophilus algarum* Brölemann 1909.)
From the coasts of Lancashire and Westmorland, on the shore below high-water mark.

(*Geophilus fucorum* Brölemann 1909.)
South Devon, associated with *S. maritimus* on shore below high-water mark (Bagnall, 1935).

Geophilus anglicanus Bagnall 1935.

V.C. 61. Sewerby (Bagnall 1935).

(*Geophilus pusillimus* Bagnall 1935.)
The species was established on the basis of a single female from London which had a single pore on each anal coxa. It seems possible that the animal was an immature stadium of *Scolioplanes acuminatus* which has the single pore and also the characteristic tooth at the base of the poison claws to which Bagnall refers.

(*Geophilus scillyensis* Verhoeff 1928.)
From the Scilly Isles (Turk, 1947).

Brachygeophilus truncorum (Bergsoe & Meinert 1866).

One of the smallest geophilids, usually with 39 pairs of legs.

V.C. 61. Spurn, under *Hippophae*, near salt marsh, 2♂ 6/52 (P.M.B.).
V.C. 62. Easingwold, under stone, 7/4/51; Thornton Hill 7/4/51.
Near Crayke 8/4/51 1♂; Farndale 7/4/51 (M.T.S.); Oswaldkirk, in coniferous wood, 16/8/51; Oulston 2/9/52.
Rievaulx, woodland, under snow, quite active, 31/12/50.
V.C. 64. Near Gordale Scar, under stones on grassland, 2♀ 8/54 (P.D.G.).
Spiggott Hill Plantation, near Malham Tarn, many ♀♀ ♂♂ 6/54 (P.M.B.).

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A Study of the Insects Living on the Wayfaring Tree, by **K. C. Side.** Pp. 20 with 4 figures and Chart. Amateur Entomologists' Society, Leaflet No. 27. A.E.S.1, West Ham Lane, London, E.15. 1/6.

The author devotes a substantial part of this leaflet to life histories, and the accompanying chart deals with the food chains. It is interesting to note that no fewer than 55 species of coleoptera have been taken on the Wayfaring Tree, *Viburnum lantana* L. and that the remaining 44 species cover 11 other orders. In addition there is a list of animals other than insects found on the tree. There is a useful appendix with brief notes on the insects found, together with a list of references. This contribution to insect ecology should do much to inspire further work on the subject.

British Nesting Birds. A Catalogue of the Beale Memorial Collection in the City of Birmingham Museum and Art Gallery. Pp. 24, with 9 pages of photographic illustrations. 2/3 post free.

The Beale Collection commemorates Alderman C. G. Beale, first Vice-Chancellor of the University and a life-long lover of birds. Funds provided by public subscription enabled 42 nesting sites to be removed bodily; the actual birds to which they belonged were 'collected'; and every care was taken to give 'a faithful presentation of the various nesting groups'. The booklet gives notes on the distribution of the 42 species, their food, nests, clutch-size and eggs. The plates give an indication of the excellence of the arrangements of the groups. In particular, schools within reach of the Museum will find the Collection worth a visit and this catalogue useful as a guide and, within its recognised limits, handy for reference subsequently.

SOME ASPECTS OF THE BIOLOGY OF CENTIPEDES AND SCORPIONS

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ALTHOUGH the morphology and systematics of centipedes and scorpions have been extensively studied, many aspects of the biology of these interesting animals are little known and derive from the writings of early naturalists. Consequently the following notes, based partly on observations upon living specimens collected during a short expedition to southern Tunisia during March and April, 1954, and supplemented by a review of the literature, may be not without interest.

SCOLOPENDROMORPH CENTIPEDES

The order Scolopendromorpha contains two families, the Scolopendridae and the Cryptopidae, of which the former contains about 16 genera including most of the

***Scolopendra cingulata* Latr.**

large tropical and subtropical centipedes having 21 pairs of legs. Many of these are attractively coloured in the living state: for example, the South African *Rhysida afra* (Ptrs.) is a deep and striking shade of blue or blue with a greenish tinge (Lawrence, 1953), while *Scolopendra morsitans* L. has green crossbars on a yellow background. Unfortunately they tend to fade to a uniform dull brown colour when preserved.

The species *S. cingulata* Latr. is distributed widely throughout the Mediterranean regions of Europe, North Africa and the Middle East, but varies considerably in size in different localities. African and Asiatic specimens may reach a length of 18 cm. when fully extended and have a yellow body and blue hind legs (Bodenheimer, 1935). I found an adult female underneath a boulder some 30 miles north of Marseilles on March 29th. A beautiful olive green in colour, she measured some four inches in length and was possessed of surprising strength, agility and speed although somewhat sluggish in cold weather. During the first four weeks after capture she was rattled, without food, in a tin at the back of the jeep in which we drove across Tunisia and France, but in this country she was kept in a crystallising dish covered with a sheet of glass and fed on medium-sized nymphal cockroaches of which on the average she ate about one per week throughout the summer. Adult cockroaches had to be disabled before she would tackle them. She fed also on spiders, flies, moths and other insects and chewed up some worms which she did not finish. She even ate bees and wasps which she caught in mid-air, rearing up the fore part of her body to snatch them with her poison claws as they flew past. Then she dropped them quickly and left them until her poison had had time to take effect.

During the warm weather she was given water daily which she drank, sometimes for periods of several minutes, and the lapping movements of her mandibles and maxillae could readily be observed through the glass of her container. In contrast, *S. clavipes* C.L.K. from Central Tunisia were pale, soft and comparatively weak creatures without the robust appetite of *S. cingulata*. Both species were markedly nocturnal and most of their activity took place during the hours of darkness.

No doubt all Scolopendras are primarily nocturnal, as they lack an impervious cuticular wax-layer (Cloudsley-Thompson, 1954 and unpublished). There is but a single published reference to mass-migration in Chilopoda, and this describes a swarm of Scolopendras, on account of which ' the people of Rhytium, a town in Crete, were constrained to leave their quarters '. (Cloudsley-Thompson, 1949b.)

Study of the literature shows that Scolopendras have a wide range of diet, but in many cases the precise identification of species is dubious. A particularly large specimen of ' *S. gigas* ' (possibly *S. gigantea* L.) from Trinidad kept for over a year in the Insect House of the Zoological Society of London, fed principally on small mice which it devoured with alacrity (Anon, 1898). Scolopendras have been known, in India, to kill and eat small birds (Cumming, 1903) while one voracious centipede (' *S. gigantea* ') was found excavating a large hole from the side of a living toad (Wells-Cole, 1898). On the other hand, specimens of ' *S. morsitans* ' from Texas refused to bite toads (Norman, 1897). More recently, Lawrence (1953) has seen *S. morsitans* L. speedily kill small geckos of the genus *Pachydactylus* by biting them in the neck. One large unidentified Scolopendra was discovered on the floor of a house at Kokine, a suburb of Rangoon, with a small snake writhing in its clutches from the tail of which the skin and flesh for about two inches had been completely removed (Okeden, 1903).

According to Campbell (1932) *S. heros* Girard under laboratory conditions feeds freely upon the agriculturally noxious insects provided: they prefer to remain underground on warm days but are restless on the surface in cloudy and wet weather. Dugès (1887) found that *S.* ' *azteca* ' (= *S. viridis* Say) refused woodlice and earthworms but was partial to flies; the prey, of which the hard parts were rejected, was held firmly to the mouth by the poison claws whilst the mandibles and maxillae tore it to pieces. T. C. Lawrence (1934) observed a large *S. subspinipes* Leach feeding on a slug (*Veronicella leydigi* Sim.), but Plateau (1887) found that in captivity the same species (?) from Borneo would not touch raw meat, worms or various insects. *S. subspinipes* is abundant in the vicinity of the town of Tarragona in the Philippine Islands, and Remington (1950), who describes the effects of their bite, wrote: ' Almost every night the writer saw one or two of the great chilopods feeding voraciously on the winged insects which swarmed into his pyramidal laboratory tent, attracted by the electric light. The centipedes climbed the walls of the tent easily, fastened their powerful anal legs near the ventilator hole of the tent peak, and swung their bodies quickly to one side or the other to seize insects which alighted nearby.'

A number of accounts have been given of fights between Scolopendras and scorpions, but although the poison of scorpions is comparatively ineffective on centipedes, the arachnid always seems to get the better of its adversary (Cloudsley-Thompson, 1949a; Dimmock, 1882; Fabre, 1907).

Scolopendromorph centipedes show a degree of parental care for their young. Often a roughly hollowed-out cavity is made in soft or rotting wood by the body of the mother before the eggs are laid. The parent centipede then curls herself around the eggs so that they are enclosed in a basket-like framework formed by the ventral surface of her body and the inwardly pointing legs. The eggs and embryos are thus safeguarded from contact with the soil, and the mother centipede maintains this position for several weeks until the departure of the adolescent young (Claude-Joseph, 1926; Cloudsley-Thompson, 1951; Cornwell, 1934; Fabre, 1853; Lawrence, 1947, 1953; Wood, 1935, etc.). In the case of *S. dalmatica* C.L.K. it appears that the earth of the ' nest ' is stuck together by some viscous fluid (Fanzago, 1884). Early writers such as Gervais (1847) and Lucas (1868) believed that Scolopendras were ovoviviparus but this error was corrected by Silvestri (1897) who suggested that the mistake arose as an erroneous inference from the way in which *S. cingulata* Latr. assiduously guards its eggs and young ones.

Little exact knowledge of the breeding habits of centipedes is available, and this is partly due to the fact that if the incubating mothers are disturbed they react either by devouring the eggs and embryos or by deserting their brood which is then attacked by fungi (Lawrence, 1947). Thus when a specimen of *S.* ' *prasina* ' (= *S.*

angulata Newp.) was sent with her brood from Trinidad to the London Zoo, on arrival only one young and the adult were found, and both of them were dead (Urich, 1894). Quelch (1894) pointed out that parent centipedes feed quite casually on their young and at times even greedily when kept without food. When McCann (1941) placed in a tube a small bluish-black Scolopendra that he found coiled around her eggs under a stone at Khandala, India, the eggs were eaten within five days: but his conclusion that under normal conditions the parent must periodically leave her eggs or young in order to feed is, of course, incorrect.

Scorpions

Like the Scolopendridae, scorpions are active nocturnal predators which detect their prey largely by means of responses to tactile stimuli: indeed, there are a

***Androctonus australis* (L.)**

surprising number of parallels between the behaviour of these otherwise dissimilar groups. Both pass the daytime in sheltered retreats and issue forth at night in search of prey, both have poorly developed visual powers, and both respond markedly to vibrations and air currents. In one respect however there is a fundamental difference in the physiological basis of their behaviour: whereas centipedes lack an epicuticular layer of wax, scorpions resemble other arachnids and insects in having an impervious integument and efficient powers of water retention (unpublished). Their nocturnal habits are therefore not dictated primarily by the need to avoid dry air. Sergent (1947) has shown that the negative reactions to light of *Androctonus australis* (L.), *Buthus occitanus* (Am.) and *Scorpio maurus* L. are less marked than are their positively thigmotactic responses. It is probable, however, that the significance of this behaviour is ecological rather than physiological.

Scorpions are essentially inhabitants of warm climates and become sluggish in cold weather, although they can withstand freezing for several weeks (Vachon, 1953). The fact that aggregations are sometimes found in certain areas is not due to social instincts—these are conspicuously absent—but to the fact that the young do not scatter far from their place of birth (Millot & Vachon, 1949). Fabre's (1907) claim that when two are found beneath the same stone they are either mating or else one is devouring the other may be an exaggerated generalisation, but is probably not entirely without foundation.

Some scorpions (e.g. *Euscorpius* spp.) normally frequent damp places, others (e.g. *Pandinus, Heteromerus, Palamnaeus* spp.) are forest dwellers whilst perhaps the best known (e.g. *Scorpio, Buthus, Androctonus* spp.) are inhabitants of dry and desert regions. Most scorpions do not drink, but moisture-loving species such as

Euscorpius italicus (Hrbst.) are sensitive both to drought and to excessive moisture (Bott, 1951; Cloudsley-Thompson, 1951). Schultze (1927) however found that the large Philippine forest scorpion *Palamnaeus longemanus* Hrbst. had to be given a certain amount of water every day, and ' it was astonishing what large amounts of water this creature would drink '. The scorpion would take up drops of water from grooves in bark, drops scattered on its body or sip with its mandibles water that had accumulated between the chelae—' that is, it would move the latter close to the mandibles in the way a man holds a glass in his hand and brings it towards his mouth.' At the same time, Sergent (1946) has shown that although *A. australis* is a species particularly adapted to a dry climate, it does not fear water and can resist prolonged immersion (31% survived 24 hours), while *S. maurus* can survive immersion for up to 48 hours (67%).

From his interesting studies Vachon (1952, 1953) has recently suggested that modern scorpions represent the remains of an ancient fauna that originally lived under quite different conditions of temperature and humidity. They are very responsive to microclimatic variations and each species seems to have to live and reproduce itself within strictly limited and characteristic ecological conditions. Nevertheless, scorpions have managed to survive in conditions of heat and drought largely on account of their nocturnal habits and subterranean habitats. Thus the Buthidae are usually found in shallow scrapes under rocks which they dig with their chelae and legs (Becker, 1880, Lankester, 1883, etc.). According to Pocock (1893) *Parabuthus capensis* (Hempr. & Ehbg.) stands on its first and fourth pairs of legs using the tips of the chelae as props while it kicks sand backwards with its disengaged legs. *Euscorpius* spp. hang upside down under pieces of wood, etc., or hide under rocks and do not dig, but *Heteromerus* and *Scorpio* spp. dig deep holes (up to 75 cm. in the case of *S. maurus* whose enlarged pedipalps are probably specially adapted for this purpose). Scorpions of the genus *Hadrurus* in Arizona frequently dig down two or three feet in sandy wastes and river banks. Here they remain even though the burrow has collapsed ' apparently finding no difficulty in breathing ' (Strahnke, 1945). However, Millot & Paulian (1943) have shown that *A. australis* can withstand the blocking of 7 of its 8 lungs for many months without much ill effect, and it is evident that scorpions have considerable respiratory reserves (cf. Zoond, 1931).

No doubt the ability to survive for long periods without food is of great service to scorpions living under the hazardous conditions of desert regions. Thus a well-fed *Hadrurus* may remain buried for four or five months, and in experiments specimens have lived for nine months without food or water (Strahnke, 1945), while, according to Waterman (1950), the West Indian *Tityus trinitatis* (Pocock) can survive three or four months without food provided water is available. *A. australis* can survive four months starvation (Berland, 1932) and Jacquet (1895) found that *B. occitanus* lived for up to 368 days without feeding. Fabre (1907) remarked that the appetite of *B. occitanus* was very slight and Lankester (1883) found great difficulty in feeding *A. australis*. On the other hand I found that the same species in captivity fed readily on cockroaches, eating at least one per week during the summer months, although they would not touch hard beetles such as *Blaps* spp. and *Akis spinosa* L.

The food of scorpions consists chiefly of spiders, harvestmen, flies, roaches, grasshoppers, crickets, mantids, butterflies, ants, beetles (adult and larvae), myriapods and even small mice (Millot & Vachon, 1949). According to Strahnke (1945) *Hadrurus* sp. will eat readily of soft-bodied insects but rejects woodlice and harvestmen (when hungry they will even tackle hard beetles and small lizards), whereas *Euscorpius germinus* (C.L.K.) eats bluebottles, flies, small cockroaches, woodlice, spiders and centipedes (Pocock, 1893).

Schultze (1927) found that various species of Blattidae seemed to be favoured by *P. longimanus* but that crickets, earwigs and certain larvae of Coleoptera were also taken at times. This species is usually found in old or virgin forest under loose bark of dead standing trees, under decaying trunks of trees and logs, or in cavities of rotten stumps located in the jungle, mostly in rather humid and damp places, where such insects abound.

According to Vachon (1953) it is not entirely clear how the scorpion first detects its prey. The eyes are too crude to be of much assistance and in any case the scorpion is a nocturnal animal, for which visual impressions can be of no great significance. Other sense organs must therefore be concerned, notably the sensory hairs or trichobothria found only on the pedipalps. ' These are richly supplied with nerves,

and can detect minute air currents such as those caused by movements of the prey They are, in fact, like tiny receiving sets, pointing in all directions and spread out along the pedipalpi, which when extended act as huge antennae.' When hungry, the animal moves slowly forward supported by its hind legs with claws open and extended and tail raised and pointing forwards. ' Often the scorpion will then hesitate and the final act of capture seems almost accidental, an act of defence rather than of attack. If the prey is active, the scorpion may even withdraw for a time, but it waits patiently and finally achieves its aim.'

Scorpions probably do not usually go to seek their food, but the insects which serve for this purpose come to the scorpion's lair to hide. Some scorpions such as *E. italicus* and *P. longimanus* appear seldom if ever to use poison to kill their prey (Cloudsley-Thompson, 1951; Schultze, 1927) and the sting is used only as a defensive weapon. On the other hand *S. maurus*, *B. occitanus* and *A. australis* will lash out with their sting at the slightest provocation, although if the prey is comparatively quiet it may be devoured alive.

As a result of experiments carried out on these species and *E. germanus*, the writer has recently suggested that the main function of the pectines of scorpions—a pair of these peculiar comb-like structures is attached ventrally one at either side of the genital operculum—lies in the perception of ground vibrations (Cloudsley-Thompson, 1955). Probably they are used more as a warning of danger than in the detection of prey. Some species of scorpions possess stridulating organs with which they can make hissing sounds that serve as a danger signal to meddlesome intruders, warning them to beware of hostile interference: this subject has been discussed fully by Pocock (1896).

In addition to the now thoroughly discredited legend of their suicidal tendencies (Sergent, 1940), scorpions appear to arouse popular interest for a number of reasons, not the least being their curious mating habits. Courtship takes the form of a dance (' promenade à deux ') first observed by Maccary (1810) and later described by Fabre (1907), Serfat & Vachon (1950). In many species the young are born during the night, sometimes in two batches separated by an interval of a day, but in *Buthotus alticola* (Pocock) birth was observed from 7-0 to 9-0 a.m. (Serfat & Vachon, 1950). According to Fabre the young, which are born enveloped in their chorion, are freed by their mother, but this unlikely hypothesis has been disproved by Mingaud (1905) in *B. occitanus*, and by Serfat & Vachon (1950) who state that in *B. alticola* the young free themselves without parental assistance. Mr. E. A. Robins has recently presented me with lantern slides of some of his beautiful photographs showing the young of *Euscorpius flavicaudis* (Deg.) in the act of escaping by lacerating the chorion with their stings. It should be pointed out however, that Waterman (1950) has written the following of *T. trinitatis*: ' I was fortunate to witness parturition in one case. Each young one was born enveloped in a membrane, which served the purpose of facilitating its birth. Immediately after the birth, the mother, with her hands, removed the membrane and the young scorpion was thereby liberated and was able to climb up on its mother's back where it remained safely for several days. A large number of sterile eggs completed the delivery: these the mother ate after she had finished attending to the young. From this observation it will be seen that scorpions are viviparous and not oviparous as some authorities claim.'

The process of mounting the mother's back may take up to two hours, as the little scorpions are very plump and weak (Cloudsley-Thompson, 1951; Schultze, 1927). Here they remain until after their first moult. In *P. longemanus* this period lasts about 10 days (Schultze, 1927), in *E. carpathicus* 14 days (Berland, 1932), in *E. italicus* 10-12 days (Cloudsley-Thompson, 1951), whilst in *E. germanus* it takes about 16 days (unpublished observation). No doubt however, the length of time depends much upon the season and temperature at which the animals are living.

It is hoped that this short review will indicate some of the points upon which further information is urgently required and will encourage naturalists visiting the Mediterranean and other suitable localities to add to our present meagre store of knowledge.

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A Cuckoo in the House, by **Maxwell Knight.** Pp. x + 80, with 11 photographic illustrations. Methuen & Co., 1955. 7/6.

This story of the young cuckoo which Maxwell Knight rescued from cats and reared to release full-winged serves as the peg on which the author hangs quite a lot of extraneous matter in the painless didactic manner which is the essence of popular broadcasting. That this leads to over-simplification is inevitable and many of the author's statements about cuckoos are only true when adequately qualified, a pernicious fault of most ' popular ' natural history.

Although there is little that is new in this brief book, there are some very useful hints on the safe rearing of waifs and strays, the success of which turns largely upon adequate sanitation.

A.H.

NOTES ON THE EMERGENCE OF SUB-IMAGOES AND IMAGOES OF THE MAYFLY *SIPHLONURUS ARMATUS* EATON

THE LATE H. WHITEHEAD AND H. M. RUSSELL

THE observations set out below were initiated by the late Mr. H. Whitehead, and carried out jointly with Mr. H. M. Russell, during May 1954.

On the 18th May, 1954, eight nymphs (Nos. 1-8) were obtained by Mr. H. M. Russell, from the Scarcroft Fishpond, and placed in a large soup plate filled with pond water. Regular observations took place, and on the 25th May, 1954, two nymphs were seen at 4-30 p.m., trying to crawl out of the water. Air bubbles could be seen in the thorax and in the wing sheaths, giving these organs a silvery appearance. As the sides of the plate were slippery, a piece of filter paper was introduced and they crawled up it.

The larger specimen (No. 1) a female, emerged first. Air could be seen under the skin of the abdomen and a longitudinal fissure appeared on the dorsal surface of the thorax. Rapid pulsations then took place, sometimes on the left side of the tergite and sometimes on the right. These appeared to be due to some fluid under pressure and resulted ultimately in the longitudinal fissure widening and the thorax of the sub-imago emerging. This was followed by the head. By slowly wriggling from side to side the wings were cleared, but the abdomen was still enclosed. The 1st and 2nd legs on the left-hand side, followed by those on the right-hand side were freed. The sub-imago then pulled itself forward and drew out the abdomen. The median cercus was not present. The wings were shaken and inflated very quickly. In the female the whole process from the nymph leaving the water to the complete inflation of the wings took 15 minutes.

A similar series of events took place with No. 2 (a male); in this case the time taken was five minutes.

In both sexes it was noticed that a small drop of fluid appeared at the posterior and ran along the cerci without wetting them. This fluid may have played a part in the pulsations observed.

Times of emergence, etc., of the other specimens are set out below:

Number of Specimen	*Sex*	*Sub-imago*	*Imago*	*Duration of sub-imago*
1.	Female.	25th May. 4-30 p.m.	28th May. 11-5 p.m.	3 days.
2.	Male.	25th May. 4-30 p.m.	During night of 28th 29th May.	3 or 4 days.
3.	Female.	26th May. Between 8 a.m. and 6 p.m.	29th May. 9-15 p.m.	3 days.
4.	Male.	27th May. Between 8-30 a.m. and 3-30 p.m.	During night of 29th 30th May.	About 3 days.
5.	Female.	28th May. Between 8-30 a.m. and 1-30 p.m.	30th May.	2 days.
6.	Female.	28th May. Times as for number 5.	30th May.	2 days.
7.	Male.	28th May. Times as for numbers 5 and 6.	30th May.	2 days.
8.	Female.	31st May. 3 p.m.	Died as sub-imago.	

An addition to the Yorkshire Diptera List.—While collecting diptera from decomposing sap exuding from a wound in the trunk of a Horse Chestnut *Aesculus hippocastanum* L. in Kidhurst Wood, Scarcroft (V.C. 64) on July 21st, 1955, I took two specimens of *Periscelis* (*Microperiscelis*) *annulata* Fln. This species is an addition to the Yorkshire List. Members of the Periscelidae are uncommon and according to Colyer and Hammond, *Flies of the British Isles* (1951) usually occur at tree wounds, in the decomposing exudations from which the larvae are said to develop. Of the five species known from the Palaearctic Region only one, *Periscelis* (*Micro-Periscelis*) *heegeri* Duda. appears to have been described completely from egg to adult.—H. M. RUSSELL.

A DAY OF LARGE-SCALE VISIBLE MIGRATION AT SPURN, 27th October, 1954

R. F. DICKENS

After a night of gale-force south-easterly winds with periods of lashing rain, October 27th, 1954, dawned fine at Spurn. Winds had become light (force 2-3), between south and south-west; it was mild, and visibility moderate to good.

Generally speaking, during times of large-scale migration, the largest numbers of birds are seen in the early morning. The period between dawn and about 10.30 usually shows the heaviest movement. On October 27th, 1954, the observers present (Mr. and Mrs. R. Chislett, Mr. and Mrs. E. Sterne, Miss C. A. Ward and R. F. Dickens) saw little before 09.00, when they went for breakfast, to indicate that it would be anything but an average October day for migration. Nine adult and three immature Gannets were seen moving down the estuary; and two divers, almost certainly Red-throated Divers, flew out over the Warren from the estuary to the North Sea. A few Rooks, Linnets, pipits and finches passed south down the peninsula and a few Redwings and Fieldfares were also noted. The largest numbers of any species

Table I

To show numbers, counted or estimated, in flocks of migrant birds arriving along a 250 yards stretch of coast line at Spurn between 14.15 and 16.00 hours on October 27th, 1954.

	14.15 to 14.30	14.30 to 14.50	14.50 to 15.00	15.00* to 15.15	15.15 to 15.30	15.30† to 15.45	15.45 to 16.00	Total of each species in 1¾ hrs.
Fieldfare	30, 5, 2	30, 20, 20, 9, 20, 16	8, 4	8, 30	14, 13, 16, 10, 1, 1	13, 2	15, 10, 30	327
Redwing	50, 17, 8, 2	30, 1, 20, 5, 5, 30	10, 7, 10, 8, 2, 10	20	5, 2, 9, 6, 2	9, 8, 1	5, 2, 20, 2, 1	307
Blackbird	2	1	—	1	1, 1	5, 6, 1	1	19
Starling	50, 20	7, 30, 50, 40, 5	30, 3, 6, 20, 7	30	—	—	5, 12, 5, 20	340
Skylark	—	14, 5	15	—	2, 5	1	4, 1, 12	59
Brambling	—	40	—	—	—	9, 1	3	53
Lapwing	8, 3	2	—	—	—	—	1	14

* From approximately 15.00 hrs. to 15.07 no birds were seen to arrive at all.
† There was again a lull from *ca.* 15.30 to 15.40.

seen before breakfast were *ca.* 30 Skylarks (with the largest party, one of 8); *ca.* 200 Starlings (largest party, 75) and 62 Greenfinches (largest party, 35).

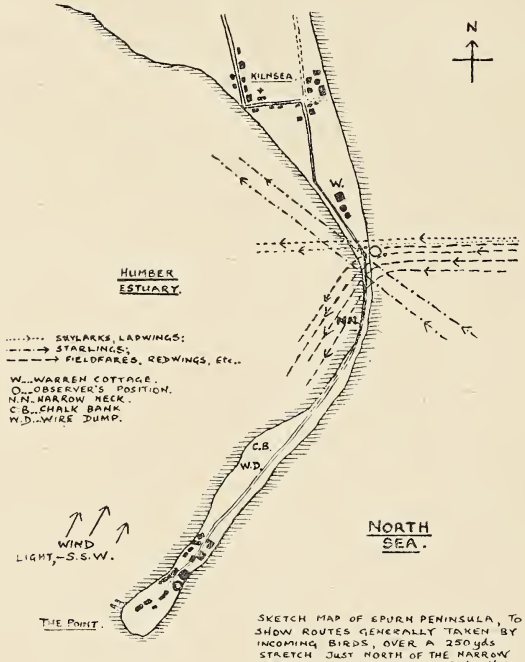
Migration on this steady scale continued until about 11.00 when the movement gradually built up and became much more intensified and continuous. By this time, additional observers, Rev. T. B. Kitchen (the President, at that time, of the Y.N.U.) and Mrs. Kitchen had arrived at the observatory for the day. Between 11.15 and 12.30 approximately, estimates of numbers of birds in the larger flocks, and counts in the smaller flocks, gave totals of 925 Redwings, 405 Fieldfares, 1,050 Starlings, 7 Skylarks and 14 Bramblings passing over the Chalk Bank area towards the Point. Other species of interest included a late Swallow, a Woodcock (the first seen for ten days) and a Common/Arctic Tern, all of which were flying southwards along the peninsula. As the observers were returning from the Chalk Bank area to Warren Cottage for lunch, a Ring-Ousel was seen at the Narrow Neck.

From casual observations during lunch, it was obvious that the passage of birds was continuing at approximately the same intensity. During the afternoon, all the

observers with the exception of R.F.D., were again in the Chalk Bank area and considered that birds were still passing at the same rate, at least, as during the period 11.15 to 12.30. Blackbirds and Lapwings in small numbers were now also involved in the movement, neither of which species had been noted during the morning.

During the afternoon, R.F.D. spent $1\frac{3}{4}$ hours just north of the Narrow Neck keeping check on all birds seen coming in off the sea, over a stretch of about 250 yards. The large numbers seen by the other observers no doubt included many of the birds counted by R.F.D., with the addition of others which were striking the peninsula north of his position and between his position and theirs in the Chalk Bank/Wire Dump area.

Table 1, copied from the writer's rough notes, shows the numbers, in parties, of the chief species which were counted as they actually came in off the sea, over a restricted stretch of about 250 yards.



Scale approx. $\frac{3}{4}$" to one mile.

Very few birds settled on reaching land. The majority approached from the sea more or less at right angles to the coast and when they reached it, turned into the wind and continued down the peninsula. Skylarks and Lapwings tended to cross the peninsula at right-angles and continue straight across the Humber. Starlings, which generally came in rather higher than the thrushes and finches and at more of an angle to the coastline, for the most part passed up the peninsula and along the north shore of the Humber. (During the morning, however, Starlings had been the most numerous species passing down the peninsula over the Chalk Bank area.)

Most of the birds which could be seen arriving where the peninsula widens out to the mainland and north of the stretch over which incoming birds were being counted, appeared to continue directly inland.

Bramblings, to a greater extent than the other species, alighted on reaching land. One solitary bird pitched on the farthest-out wooden post of a groyne, along which it worked its way in easy stages, then dropped on to the beach before flying on again into the cover of marram grass and buckthorn. Further evidence of the greater

tendency for Bramblings to settle was obtained on returning to Warren Cottage. More than 120 of the species were feeding in the stubble field behind the cottage, where a similar sized flock, presumably the same birds, remained for several days.

Apart from Starlings, most of which were flying at *ca.* 150 feet, the majority of birds came in low over the water, often at less than 10 feet above the crests of the waves. In the morning, however, a few Fieldfares had arrived so high that their calls had been the first indication of their presence. Many of the birds which turned when they reached the peninsula, crossed it and proceeded towards the Point flying low over the Humber mud flats, *below* the height of the peninsula.

Some species not included in Table 1 are perhaps worthy of special mention. Two Ring-Ousels were seen, additional to the one at the Narrow Neck at mid-day. At 12.20 a female Merlin was observed flying south, low over the sea, just off shore. Between 14.30 and 14.50 two Goldfinches, a Pied/White Wagtail and a Song-Thrush

TABLE II

To show weather observations from the Spurn Bird Observatory Log book for the three days October 26-28th, 1954.

	OCTOBER 26TH			OCTOBER 27TH			OCTOBER 28TH		
Times of observations	07.00	12.00	17.00	07.00	12.00	17.00	07.00	12.00	17.00
Wind Direction and Force	S.W. 3	S.W. 3	S.S.E. 3	S.S.W. 3	S.S.W. 3	S.S.W. 4	S.S.W. 3	S.S.W. 3	S.S.W. 5
Visibility	P	M	M	M	G	G	M	M	M
Weather	z→b	bc	bc	bc	bc	bc	bc	bc	bc
Temperature	Cool becoming mod.			Mild			Moderate		
General Remarks	Frost early; haze at first, clearing to fine day			Fine. Light S.S.W. wind freshening slightly later			Fine. Light S.S.W. wind freshening towards evening		

flew down the peninsula. This was the only Song-Thrush seen in this large movement of mainly Turdidae. Between 15.15 and 15.30, ten Common Scoters, of which three were drakes, flew north over the sea and two small parties of Greenfinches (six and nine) flew towards the Point. During the last quarter-hour of watching, three Black-headed Gulls approached the peninsula low over the sea and then turned and continued towards the Point. I formed the impression that they were birds coming in as part of this big movement rather than just moving locally.

While watch was being kept for incoming passerines, a small bird was seen 50-75 yards out, flying southwards parallel with the shore just above the waves. The stumpy build, white underparts, small jet-black wings and rapid wing beats, together with its size comparable with that of the thrushes arriving off the sea at the same time, marked it out unmistakably as a Little Auk.

An incident of interest was provided by four Common Gulls, which were seen harrying a thrush (? Redwing) about 150 yards off shore and rather more than that distance north of the observer. After several swoops on to the bird by one or other of the gulls, the four of them came down in the sea and appeared to be squabbling over food. The passerine could certainly not be picked up again in the field-glasses and I think it more than likely that it fell victim to the gulls. Later, nearer at hand, the tactics of the same four Common Gulls could be seen in more detail as they harried a Blackbird which was flying just above the waves towards the shore. The gulls swooped down over it repeatedly as if trying to force it into the water. The Blackbird, however, managed to evade their attacks, reached the shore and immediately took cover in the nearest clump of sea-buckthorn.

Reference to the weather records in the Spurn Bird Observatory log-book for the three October days 26th to 28th makes it obvious that local weather conditions on October 27th were not responsible for the large-scale migration on that day. Similar wind and weather during the preceding and the following days brought no similar migration then.

On the 26th, a few small parties of Greenfinches and Starlings had passed south. A few Fieldfares had been seen leaving the Point for the Lincolnshire coast. Late in the afternoon, Fieldfares in small numbers had come in off the sea, north of the Warren, and had continued westwards up the Humberside. Five of these birds, apparently tired, had settled temporarily opposite the observatory cottage in clumps of *Spartina townsendii*, surrounded by the incoming tide. Similarly on October 28th, there was little visible migration. Small parties of Redwings and Fieldfares and

TABLE III

To show peak numbers as recorded in the Spurn 'roll-call' of species chiefly involved in the heavy passage on October 27th, 1954. Weather conditions were similar during each of the three days. South-east gales during the night of 26/27 are considered responsible for the heavy movement of October 27th.

	October, 1954		
	26th	27th	28th
Skylark	*ca.* 20	90+	*ca.* 40
Fieldfare	a. 80	1000+	*ca.* 100
Redwing	b. 0	1200+	*ca.* 50
Blackbird	*ca.* 35	*ca.* 50	*ca.* 30
Starling	c. 100+	2000+	*ca.* 250
Greenfinch	*ca.* 30	*ca.* 80	*ca.* 60
Brambling	d. 0	120+	100+

a. *ca.* 80 is the maximum recorded for previous nine days.
b. Not more than 6 on any day in previous week.
c. Highest number of over a week.
d. *ca.* 12 is highest record for previous week.

more particularly of Bramblings, remained on the peninsula. Eight late House-Martins and a single Swallow flew south. Skylarks and Starlings continued to pass through but in reduced numbers. Otherwise there was little movement. Yet during these two days weather conditions were almost identical with those of October 27th when passage was so heavy. (See Table II.) During the evening of October 26th, however, winds had backed from south-west to south-south-east and had strengthened considerably. Wind speed at Spurn increased from nine knots at mid-day on the 26th, to 16 knots at 18.00, and 37 at midnight. The passage across Britain during the night of a trough of low pressure was accompanied by heavy rain; and winds along the North Sea coasts of Holland, Belgium and N.E. France had become strong, south-easterly.

The heavy passage of birds during the hours from 11.00 to dusk on October 27th was not due to locally ideal conditions for migration at that time—conditions such as existed also on the 26th and 28th without any parallel movement on those days. It is suggested that the south-easterly gale which had been blowing across the North Sea during the night of 26th/27th had taken birds off their course and was responsible for the exceptional numbers reaching our east coast later, and for those passing down Spurn peninsula in what Chislett (Y.N.U. Ornithological Report, 1954) has called a 'procession of flock after flock' which 'it was a joy just to watch'.

Table III shows the numbers recorded in the Spurn 'Roll-call' for the three consecutive days of October 26th-28th, of the species most involved in this excep-

tional movement. The figures for the 27th are those of birds counted at the Narrow Neck or passing the Chalk Bank area, *during only a part of the time* over which this movement was spread. The numbers actually counted and recorded in the roll-call represent only a proportion of the birds which passed Spurn during this day.

It is obvious, too, that the observers at Spurn saw only a part of a much larger picture. The immigration of birds was noted at other observatories on the east coast and must have taken place on a very wide front. I am grateful to Dr. E. A. R. Ennion, Director of Monks' House Bird Observatory, for permission to quote (from his 1954 report), his account of the same movement farther north on the Northumberland coast. '. . . and a third, far heavier (*passage occurred*) and mainly of Fieldfares, on 27th (*October*). This was most spectacular to watch. They came straight in from the N.N.E. against a strong S. to S.W. wind, force 5-6, under a clear sky; every few minutes from 10.15 almost until dusk, in flocks of 50-20 at around 50 feet; although some . . . flew higher, at 200-300 feet . . . many carried straight on out of sight; a few, mostly Blackbirds, fell out in the dunes, but the majority lit 200-300 yards from the shore and hopped about in the fields for a little while—not long enough to feed—before rising to go on. Out of some 4,000 birds (an average of 35 passing every three minutes for six hours) travelling within 500 yards of the Observatory, we caught only 25.'

Judged from ringing figures alone (a total of only 14 birds), October 27th, 1954, would rank at Spurn also, as a less than average day. Yet, of all days, it is outstanding among many thrilling ones I have experienced watching migration in progress at Spurn, during the past eight years.

CORRESPONDENCE

The Editor, *The Naturalist.*

Sir,

I believe that some of A.H.'s criticisms of my Bird Recognition, volume 3, in *The Naturalist*, No. 854, page 135, are wrong or unwarranted. In the interests of fairness I should like to raise some points as shortly as possible.

1. The reviewer states: '"Aerial plankton" is a circumlocutary (sic) term for flying insects.' This is not so. Not all flying insects belong to the aerial plankton, and the aerial plankton is not exclusively composed of flying insects.

2. The reviewer states, as an example of my pedantry, that '"plant-matter" differs in no wise from vegetation of common parlance'. I myself prefer the more English-sounding words, just as I prefer simple speech to 'common parlance'.

3. It is not axiomatic that, as the reviewer states, 'anyone who knows the (cock) ptarmigan in its Alpine home will invariably find the male standing guard near to the sitting hen.' On the contrary, the cock ptarmigan does leave the hen after mating, though sometimes not until towards the end of incubation. This is dealt with in some detail in Finn Salomonsen's recent *Birds of Greenland.*

4. The reviewer states 'the wryneck is said to climb "with the aid of its stiff tail" though the genus *Jynx* is characterised by soft tail-feathers.' Members of the genus *Jynx* may have soft tail-feathers, but unquestionably the wryneck does climb with the aid of its tail, which is held stiffly down (as was pointed out nearly thirty years ago by the late Horst Siewert). (*Beitr. Fortpfl.-biol. Vög.* **4**: 47-49.)

Apart from these criticisms, which I believe to be mistaken, the reviewer applies the epithet 'notoriously misleading' to the vice-county distribution maps compiled by W. B. Alexander, published in my book. Now, everybody will agree that there are certain disadvantages in the vice-county system, and that it is always better if possible to show distribution by a spot-map. The present state of our knowledge of birds is not such that spot-maps can be presented with great accuracy, though here and there in Bird Recognition I have attempted to do so. On the other hand, on the scale at which the map is reproduced in Bird Recognition a vice-county distribution gives a good first approximation to the real distribution of the bird concerned, producing a map which is meaningful, far better than no map, and which fairly indicates the *type* of distribution (e.g., Lusitanian, Continental, Montane, Coastal, Relict, etc.). The vice-comital system was clearly defined in volume 1 of Bird Recognition and only those too hasty or too lazy to acquaint themselves with this definition are likely to be misled by the vice-comital presentation of the birds' distribution in Bird Recognition volume 3.

Yours faithfully,

JAMES FISHER.

To The Editor,
The Naturalist.
Dear Sir,

I regret that Mr. Fisher does not share the view, which I believe to be fairly general, that a conscientious reviewer should be spared the tedium of subsequent argumentative correspondence. The book and its appraisal are equally available to the reader who can judge for himself and hold the reviewer unduly carping, ill-informed—or otherwise. If criticism is to be called to account, then stricture and approval are alike in question. I was early taught that though I might enjoy the sweet, I must also eat my cabbage.

Since Mr. Fisher raises the question of fairness, however, I must ask leave to trespass upon your space rather fully and reply to his objections seriatim.

1. I cannot find a definition of ' aerial plankton ' and Mr. Fisher's remarks do not help me. ' Plankton ' is defined (*A Dictionary of Biology;* Abercrombie, Hickman and Johnson) as ' More or less passively floating or drifting animals and plants of sea or lake.' Substituting ' air ' for ' sea or lake,' then to say that the ' Nightjar is a nocturnal feeder on aerial plankton ' is so much balderdash. Mr. Fisher's preference for English-sounding words deserts him in the choice of a Greek one which is translated implicitly as ' wandering.' And, by the way, the Nightjar is crepuscular rather than nocturnal.

2. ' Vegetation ' is surely more definitive than ' plant-matter ' which extends even to the compost-heap !

3. I am less concerned with this or that authority than with the evidence of my own senses when among the birds in the field. The presence of a sitting hen is most easily detected by the very obvious alarm-note of the cock. But Salomonsen himself says (The Moults . . . of the Rock Ptarmigan, Copenhagen, 1939). ' During the brooding period of the female, the cock in all known races is known to protect the hen against intruders by attacking the enemies and to divert their attention from the brooding hen ' (p. 397).

4. Mr Fisher says ' Members of the genus *Jynx* may have a stiff tail ' but surely if any doubts remain he may resolve them by looking at a Wryneck ? The manner in which a soft tail may be held stiffly would be an interesting point to discuss, but one irrelevant to my criticism.

5. The vice-comital system was defined by Watson, long ago, but its use in this manner is, I reiterate, notoriously misleading and can be usefully interpreted only by those whose knowledge of distribution, species by species, is already substantial. This is not, surely, a compilation solely for the expert. I must concede that this criticism may be regarded as a matter of opinion but what, Sir, is the function of a reviewer other than to express an opinion ?

Yours faithfully,
A.H.

FIELD NOTE

Fly-catching by a Common Sandpiper.—On July 2nd 1955 at 12.30 hours, as we motored gently along a road bordering a North Riding reservoir, a Common Sandpiper (*Tringa hypoleucos*) arose from the grass verge almost parallel with the car to flit before us. In case the bird had risen from eggs or young, the car was stopped and reversed slowly to a point some 25 yards from the spot whence the bird had flown and some 50 yards from its new position on the road where it ran and walked jerkily. A few minutes earlier a large flock of sheep had been driven past by shepherds and dogs. Scattered down the road some very fresh sheep-droppings were already attracting flies, which the sandpiper proceeded to stalk. Through binoculars, with the bird continually getting nearer, we watched the cautious, walking, intent approach to within inches of a fly; the crouch with head held low, the slow stretch forward of neck, head and bill to cover the last inch or two, and the sudden snatch. This was repeated many times until the bird was only a few yards from us. Sometimes the bird missed and an insect could be seen to fly away; but a number were caught and swallowed. Most orders of insects are well known to be taken by sandpipers, but it was interesting to see a method of capture such as is no doubt often used. When the engine was restarted the bird flitted over the wall of the reservoir, on which one of the pair frequently keeps guard.—G. E. Alderson, Ralph Chislett.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1955

Out of the seven days—of which three were at Whitsun—on which general field meetings of the Union were held, six were fine and very largely sunny. Only at the South Anston and Lindrick Common Meeting was the weather dull and even then it remained dry till we were indoors at tea. The field meetings seem to have been very well enjoyed by those present at them and considerably more members attended than last year. This largely resulted from attendances of more than forty at Ripon and of just fifty at Carperby. This last was especially pleasing as in recent years the number of members at the V.C. 65 meetings has by no means been commensurate with the interest of the country or the excellence of the arrangements made by Miss Rob. Neither, it may be added, has it been commensurate with our lack of knowledge of V.C. 65, especially as regards the distribution of insects and other small animals. V.C. 65 is by far our least-known vice-county in this respect.

The sectional reports on the field meetings appear below and our thanks are due to all who have contributed to them. They are the latest addition to a continuous sequence of such reports going back into the last century and many of which appear under the names of members famous in Yorkshire natural history. In 1905, just fifty years ago, for instance, reports on the meetings at Askrigg, Barnsley, Loftus, Pocklington and Ripon were written, among others, by C. Crossland, W. Ingham, G. T. Porritt, Riley Fortune and Dr. W. G. Smith. However, the regularity with which we have received excellent reports upon ornithology of recent years and the frequency with which similar reports upon flowering plants have appeared, should not be allowed to obscure the fact that the Union's work at the field meetings has been very incomplete. To anyone seriously interested in plants or animals what is missing from the present excursion reports must be almost as obvious as what is there. In botany there are no reports written from the point of view of the plant ecologist. How interesting and valuable such reports can be when written by the expert can be seen by reference to those of Professor Pearsall and Mr. Malins Smith in earlier numbers of *The Naturalist*. Even from the purely systematic point of view our botanical reports this year are very incomplete. For instance, there is no mention of the Algae, and although we have a strong Mycological Committee who organise very successful forays in spring and autumn, active representation at our general field meetings has been limited to one mycologist. The lichens are a very interesting group of plants comprising over 2,000 species in Great Britain. As far as is known to the General Secretaries, no member is working on them, though, some years ago, our former Secretary, Mr. Cheetham, tried to raise some interest. While not a suitable study for anyone whose collecting is restricted to the neighbourhood of industry, these plants of rocks, walls and trees where the air is reasonably pure could be tackled by a botanist who is not afraid of real difficulties in identification. A list of the records of lichens in Yorkshire by Dr. W. Watson formed part of the *Transactions of the Union*, published in 1946.

Notes on mammals are scanty in the reports on the Union's field meetings but, while there might well be more, the study of mammals is not well suited to the conditions of field meetings. The reptiles, though few in species, might provide much of interest to any member concentrating upon them. In animals though it is of the small invertebrates that the absence of reports is most obvious. We no longer have the interesting notes on freshwater life and particularly on the Caddis Flies and Mayflies which were contributed by Mr. Whitehead. Dr. Hincks has left the county and necessarily we are not able to see much of him. Another former President and fine entomologist, J. M. Brown, died in 1951. Among the numerous groups of insects, Arachnida, Myriapoda and Crustacea there are many upon which no substantial amount of work, or no work at all, is being done in Yorkshire. It is hardly appropriate here to list separately all these groups but if there are any members interested the General Secretaries will be very glad to give them such information as they are able and, where possible, to put them in touch with a specialist who can give details of literature and other considerations involved in their study. There are almost unlimited opportunities for any members who would in this way like to make a greater and more individual contribution to the Union's work, the first part of which is ' to promote the thorough and systematic investigation of the fauna, flora and physical features of the county '.

SANDSEND, V.C. 62, Whitsun, May 28th—30th

Over Whitsun we were favoured by weather which left very little to be desired. Sunshine was practically continuous from sunrise to sunset during the three days of the meeting. Twenty-five members, including the President, Mr. E. Wilfred Taylor, and Mrs. Taylor, stayed at The Bungalow Hotel and we were joined by five other members on two of the days and on the Monday also by four members of the Whitby Naturalists' Society and by three members of the Cleveland Naturalists' Society.

The Bungalow Hotel is very well situated on the side of one of the two valleys running inland to Mulgrave Woods from the sea at Sandsend and members who got back in time found tea on the terrace overlooking the valley very pleasant.

On the Saturday and Sunday the ornithologists covered a good deal of wooded and moorland country inland and also examined the sea-cliffs of the Kettleness area. On these first two days the botanists mainly worked along the sea-cliffs north to Runswick Bay, filling in cards for the Distribution Scheme of the Botanical Society of the British Isles. On the Monday all members went through Mulgrave Woods, the ornithologists starting from the lodge on Lythe Bank, the botanists up East Row Beck. Botanical rarities were neither expected nor found, but the woods, still with a good deal of fine old timber in the lower reaches of the becks, were very well worth seeing. From the point of view of the entomologist conditions were good but the insect fauna seemed to be rather poor, as indeed it did in all the localities visited during the week-end. There seems little doubt that this was in part a result of the lateness of the season but the summer has continued a poor one for insects and even a few weeks later the results might not have been very different. Mulgrave Woods were visited by both the late Harry Britten and by the late Dr. F. W. Edwards some years ago and yielded very interesting results indeed. Stonegate Ghyll, a few miles inland, was visited by a bryologist and a dipterist and provided the most interesting ground seen, from the points of view of both.

At the meeting held after tea on the Monday the President was in the chair. Twenty-six other members were present and members of sixteen Affiliated Societies answered to the roll-call. Fifteen new members of the Union were elected before reports on the sectional activities were presented.

In conclusion, a vote of thanks to Lord Normanby was passed, for allowing us to visit Mulgrave Woods, which were closed to the public for a period which included our visit.

Ornithology (R. Chislett): Without the help of expert local leadership the ornithological party did well to list 66 species, against 80 around Grinkle Park in 1952 (May 30th to June 2nd). The terrain was similar, sea-cliffs, fields sloping backward from the cliff top to the high moors, with interesting streams and ghylls wooded from near to the coast back to the moors. Mulgrave Woods included several deep ghylls and streams.

The Kettleness cliffs were rather less interesting than those of Boulby; but Fulmars were fairly plentiful, and one or two Lesser Black-backed Gulls (scarce on the Yorkshire cliffs) were noted among the Herring Gulls. Corn Buntings and Linnets sang nearby.

The high moors, beyond the woods, seemed dry by comparison with Pennine moors, which is probably a main reason why moorland birds are generally less abundant in the north-east than in the north-west. Drainage for projected water supplies will tend to decrease the water-holding capacity of the moors. Dunlins (and sizeable tarns) were absent, as were Ring-Ousels. Golden Plovers were very few but had young. Wheatears were scarce. The Snipe was noted near to the only black-headed gullery (*ca.* 50 pairs). Grouse did not seem to be numerous but chicks were seen. On one moor a Pheasant brooded chicks. Surprisingly, neither Sandpiper nor any species of Wagtail were seen by the streams; but the streams were not covered nearly completely. Curlews and Meadow-Pipits were fairly numerous and Kestrels occurred in several places.

The Mulgrave Woods extend along and laterally far beyond the sides of the Mickleby and East Row Becks, and were rich in woodland species. The three Phylloscopi all occurred and Garden Warblers, Blackcaps and Whitethroats. Cock Redstarts, Tree-Pipits and Pied Flycatchers were also in song. Goldcrests were noted. A family of Tree-Creepers, bunched in a notch high in an ash were watched by everyone as the parent birds repeatedly fed them. Marsh-Tits fed young in a hole, and Long-tailed Tits foraged in a family party. Green and Greater Spotted

Woodpeckers were heard and seen. Tawny Owls hooted and Pheasants crowed. Time and place were excellent for the study of woodland sounds.

Other species noted were: Cormorant, Mallard, Common Partridge, Lapwing (with young), Woodcock, Stock-Dove, Turtle Dove, Woodpigeon, Cuckoo, Swift, Swallow, House-Martin, Carrion Crow (fairly numerous), Rook, Jackdaw, Magpie, Jay, Skylark, Great- and Blue-Tit, Wren, Dipper (one), Mistle- and Song-Thrush, Blackbird, Robin, Hedge-Sparrow, Spotted Flycatcher, Starling, Greenfinch, Goldfinch, Redpoll (in several places), Chaffinch, Reed-Bunting, Yellowhammer.

Mammals, etc. Shot Foxes and a live Stoat were seen. Several Hares were noted in fields and on the moors. Rabbits were far from scarce; myxomatosis still seemed to be miles away. A Hedgehog and several Common Shrews were found dead. A Lizard hurriedly retreated below some heather.

Conchology (Mrs. M. Morehouse): The following molluscs were noted in some woods near Whitby (1) and in Mulgrave Woods at Sandsend (2):

Acanthinula aculeata Müll., 2
Agriolimax agrestis L., 2
A. agrestis var. *reticulata* Moq.-Tan., 2
Arianta arbustorum L., 2
Arion ater L., 1, 2
A. ater L. var. *alba* L., 1
A. ater L. var. *plumbea* Roebuck, 1
A. ater L. var. *aterrima* Taylor, 2
A. ater L. var. *brunnea* Roebuck, 2
A. hortensis Fér., 1
A. minimus Simroth, 1
Clausilia bidentata Ström., 1, 2
Clausilia laminata Montagu, 1
Cochlicopa lubrica Müll., 1, 2
Euconulus fulvus Müll., 2
Helix nemoralis L., 2
Jaminea cylindracea Da Costa, 2
Limax maximus L., 1
Pyramidula rotundata Müll., 1, 2
Vitrea alliaria Mill., 1, 2
V. cellaria Müll., 2
V. nitidula Drap., 2
V. pura Alder, 1, 2

Lepidoptera (F. Hewson): Insects of all orders were noticeably scarce, less than half a dozen Large Cabbage Whites (*Pieris brassicae*) were seen! Mr. E. W. Taylor and Mr. D. F. Walker came across a strong colony of the Green Hairstreak butterfly (*Callophrys rubi* L.) on Moorsholm Moor to the east of Freebrough Hill, and at Runswick Bay Mr. Brook took one Grizzled Skipper (*Pyrgus malvae* L.) of four seen. I spent one day on Newton Mulgrave Moor, taking half a dozen larvae of the Northern Eggar moth (*Lasiocampa quercus* (L.) f. *callunae*), a common species but genetically interesting because of the colour varieties which sometimes occur. The Common Heath moth (*Ematurga atomaria* L.) was indeed common and I saw one Small Tortoiseshell butterfly (*Aglais urticae* L.). A batch of ova of the Vapourer moth (*Orgyia antiqua* L.) had just commenced to hatch. In Mulgrave Wood Mr. O. C. Hill and Mr. Walker observed Grizzled Skippers again, whilst I saw only two Brown Silver Lines moths (*Lithina chlorosata* Scopoli) and another Small Tortoiseshell. The beating tray produced practically nothing.

Diptera (K. G. Payne): The diptera taken at Sandsend were far fewer in species than might have been expected and most species taken were far fewer in individuals than might have been anticipated. There is little doubt that this was part of a relative scarcity of insects extending widely over the orders other than Diptera. It was notable that search of apparently suitable habitats in the vicinity of fast-running water failed to produce a single specimen of *Dicranomyia didyma* Mg., any *Dicranota, Clinocera nigra* Mg. or *Liancalis virens* (Scop.).

One species new to the County was taken—*Coelopa eximia* Stenh. Kelp Flies were plentiful about *Fucus* and other sea-weeds on the shore at Runswick Bay and all the males examined were of this species. Specimens were also taken feeding on the flowers of Alexanders near the shore. Three additions to the V.C. 62 List were: *Sepsis flavimana* Mg., taken in Stonegate Ghyll, 28/5/55; *Piophila vulgaris* Fln., taken on a dead fox in Deepgrove Ghyll near Lythe the same day and *Copromyza stercoraria* Mg., from Mulgrave Woods, 30/5/55. This *Sepsis* was taken by Mr. Cheetham at Cautley Spout, 1/8/27, and it would be interesting to know whether both records being from the vicinity of fast-running water is more than coincidence.

Apart from these, the more interesting flies taken were *Rhamphomyia dentipes* Zett., the males of which have very remarkably developed and distorted hind

femora, from Stonegate Ghyll; *Porphyrops crassipes* Mg. from a ghyll behind Runswick Bay and from Mulgrave Woods, and the following also from the last locality mentioned:

Oedalia holmgreni Zett.
Palloptera saltuum (L.)
Trypetoptera punctulata (Scop.)
Sphaerocera curvipes Latr.

Insects (General): Mr. J. E. Brooks notes that the Dragonfly (*Pyrrhosoma nymphula* (Sulzer) was on Ugthorpe Moors near the colony of Black-headed Gulls, 29/5/55, and that the Humble Bee, *Bombus lucorum* (L.) was common in the wooded valleys behind Runswick Bay the same day, as was the Dingy Skipper Butterfly, *Erynnis tages* (L.).

Flowering Plants (W. A. Sledge): The botanists in the party devoted their energies to recording on a B.S.B.I. Distribution Maps Scheme card, all species seen during the week-end. During the first two days the cliffs between Sandsend and Runswick Bay were examined. The third day was spent in Mulgrave Woods. In all, 250 species were identified and, but for the backwardness of the season, the number would doubtless have been increased by more grasses and sedges being in recognisable condition.

The cliff slopes between Sandsend and Runswick are partly shaly and partly composed of stiff clays with here and there boggy areas which add variety to the flora. *Vicia sylvatica* L. is plentiful in many places on these cliffs but the most striking floristic feature is undoubtedly the exceptional abundance of primroses on the cliffs of Runswick Bay itself. Cowslips on the other hand were not seen anywhere between here and Sandsend. One or two wooded ghylls run down to the sea and in these and parts of Mulgrave Woods many well-grown Maple trees are both conspicuous and apparently characteristic constituents of the woodlands.

Nearly all the species noted were typical of the habitats in which they grew and few call for comment. The elegant *Carex pendula* Huds. was conspicuous in several parts of Mulgrave Woods where a clump of *Symphytum officinale* L. was also seen. This is in my experience rarely met with in Yorkshire where the common comfrey is almost invariably *S. peregrinum* Ledeb. At Khyber Pass, Whitby, *Brassica oleracea* L. was in good flower and at Upgang we had little difficulty in finding *Vicia bithynica* L. in the old station whence it is recorded in Baines' *Flora of Yorkshire* (1840). It was found at Runswick Bay when the Union met there in 1909 but we were unsuccessful in re-locating it there.

The cliffs north of Sandsend are too steep and rocky below to give conditions for more than a very few maritime species, the only ones noted being *Cerastium tetrandrum* Curt., *Plantago maritima* L. and *P. coronopus* L. At Sandsend itself there is a little *Elymus arenarius* L. with *Agropyon junceiforme, Cakile maritima* and *Honkenya.*

Bryology (Mrs. J. Appleyard): A small wooded gill near Lealholm called Stonegate Gill, dropping gradually from about 500 feet, was worked on the Saturday morning. The rock was mostly sandstone and *Tetraphis browniana* (Dicks.) Grev. was abundant, fruit being common. *Brachydontium trichodes* (Web. fil.) Bruch was looked for without success but some of the rarer *Campylostelium saxicola* (Web. et Mohr) B. & S. was found on a stone by the stream. *Cephalozia media* Lindb. *c. per.* was collected from rotten wood. The other species seen were typical of the habitat. *Dichodontium pellucidum* (Hedw.) Schp. was uncommon and poorly developed and *Fissidens viridulus* (Web. et Mohr) Wahl., which was a likely moss to find on stones in the water, was not seen. After lunch, *Drepanocladus aduncus* (Hedw.) Warnst. was found in fruit in a marshy hollow by the shore at Kettleness. Large masses of *Alicularia scalaris* (Schrad.) Corda grew vertically on the cliff nearby.

On Sunday, the most southerly of the gills running into Runswick Bay occupied the greater part of the day. A small purple form of *Scapania dentata* Dum. made close mats on the wet rocks at the mouth of the gill. Here also was a dense barren growth of *Pohlia delicatula* (Hedw.) Grout. The bryophytes in the gill were mostly those natural to the calcareous nature of the soil, a notable feature being the masses of *Barbula tophacea* (Brid.) Mitt., mixed with some *Dicranella varia* (Hedw.) Schp. Other species seen were *Trichostomum crispulum* Bruch, *Cratoneuron filicinum* (Hedw.) Roth *c. fr.* (this species is rare in fruit), *Acrocladium cuspidatum* (Hedw.) Lindb. *c. fr.* and *Lophozia badensis* (Gottsche) Schiffn. On the way back to Sandsend a short visit was made to Deepgrove Gill. This proved dull bryologically, the only

species worth mentioning being *Rhyncostegiella pallidirostra* (A. Br.) Loeske and *Fissidens crassipes* Wils.

On Monday came the visit to Mulgrave Woods, without which no meeting at Sandsend would be considered complete. East Row Beck proved disappointing. Here *Dichodontium pellucidum* (Hedw.) Schp. was abundant, also *Hygrohypnum luridum* (Hedw.) Jennings, in very good fruit. There was a little *Mnium stellare* Hedw. and a nice patch of *Amblystegium juratzkanum* Schp. *c. fr.* was gathered, also *Plagiothecium silvaticum* (Brid.) B. & S. *c. fr. Orthotrichum anomalum* Hedw. var. *saxatile* (Wood) Milde was gathered from the stonework of a bridge and *O. stramineum* Hornsch. from a tree.

ANSTON STONES WOOD AND LINDRICK COMMON, V.C. 63, June 11th

Fewer members than might have been expected, about 25, were present at this meeting in the extreme south corner of Yorkshire. Nine of those present were from the Sheffield area. Probably some members who would otherwise have been present were prevented from coming by the rail strike. Though dull and threatening rain and with too much breeze to suit entomologists, the weather did remain fine till we were indoors having tea. Early on we received rather a setback when we learnt that the cafe which was to have provided tea would be unable to do so as the lady concerned had gone away on holiday the previous week. During the morning, however, one of the Secretaries was able to arrange for the tea and meeting at the Golden Ball in Worksop. It was unfortunate too that Mr. Adams, who was to have been our guide, was at the last moment prevented by another engagement from doing so. Mr. Brooks nobly took over and, though he had not the advantage of having been over the ground before, was of very great assistance. In the absence of a botanist who knew the ground well, it was not possible in the time available to find some of the rarer plants mentioned in the circular. Anston Stones Wood is very fine and the visit to it was very enjoyable. The great quantity of Yellow Dead Nettle a one would have made the visit worthwhile to some of us who live farther north in Yorkshire. The lower part of the wood by the stream was sheltered from the breeze and conditions were reasonably good for the collection of insects. The wet, disused quarries near Shireoaks were visited but the interesting results of Mr. Cheetham's visit in 1947 were not repeated, possibly owing to the lateness of the season and the dullness of the day.

At the meeting following tea in Worksop, Mr. Chislett was in the chair. Members of nine societies answered to the roll-call.

Ornithology (Ralph Chislett): Anston Stones Wood and Lindrick Common each need a full day for ornithological assessment, and on a day that began late and ended early only parts could be sampled. In the wood several Blackcaps and Chiffchaffs occurred, and a single Garden-Warbler and Redstart. Wrens were abundant, but generally the impression was one of moderate scarcity compared with wooded ghylls in North Yorkshire. No Woodpecker was noted.

Despite golf, Lindrick Common remains interesting, most bird life being concentrated about the areas of tall bushes away from the fairways. Skylarks, Yellowhammers, Greenfinches, Chaffinches, Common Whitethroats and Turtle Doves were plentiful. Goldfinches occurred, and a pair of Bullfinches called from one thicket. Tree-Pipits seemed scarce. Moorhen and Coot, Sedge-Warbler and Reed-Bunting and Mute Swan were added by the party who had visited the canal, bringing up the total to 34.

Conchology (Mrs. M. Morehouse): The following molluscs were noted at South Anston Wood (1), in the canal near Shireoaks (2) and in the woods and quarry by the canal (3).

Agriolimax agrestis L., 1, 3
Arion ater L. var. *brunnea* Roebuck, 1
A. ater var. *castanea* Dum. & Mort., 3
A. hortensis Fér., 1
Carynchium minimum Müll., 1, 3
Clausilia bidentata Ström., 1, 3
Ena obscura Müll., 1
Helix hortensis Müll., 1, 3
H. nemoralis L., 1, 3
Limax maximus L., 1, 3
Limnaea pereger Müll., 2
L. stagnalis L., 2
Paludestrina jenkinsi Smith, 2
Pyramidula rotundata Müll., 1
Vitrea alliaria Mill., 1, 3
V. cellaria Müll., 1
V. nitidula Drap., 1
V. pura Alder, 1

Insects (General): Mr. J. E. Brooks contributes the following notes. The Dragonfly *Ischnura elegans* (van der Linden) and its variety *infuscans* Camp. were taken by the canal at Shireoaks. The Humble Bees *Bombus lucorum* (L.), *B. terrestris* (L.), and *B. pratorum* (L.) were all common on the flowers of ransoms at Anston Stones Wood, and the moth *Abraxas sylvata* (Scop.) was common among elm here. Among the Hemiptera, *Hydrometra stagnorum* (L.) was common on the water in the quarry near Shireoaks and the Froghopper *Cercopis vulnerata* Germar was very common on nettles and long grass at Lindrick Common and Shireoaks. Also in the canal area at Shireoaks the beetle *Pyrochroa serraticornis* (Scop.) was noted.

Diptera (K. G. Payne): Of the Union's meetings during 1955 this was the one at which conditions were the least favourable for the collection of insects. The species of fly taken were not numerous. At Anston Stones Wood *Empis pennipes* L. was taken in a place in which Herb Robert was common, and this and *Sciomyza albocostata* Fln.—a widespread woodland species—are new to the V.C. 63 list. *Norellisoma spinimanum* (Fln.) taken here appears not to have been recorded in the vice-county since the writing of the *Victoria County History*, but has frequently been noted in V.C. 64.

A short time was spent in the wet pits between Shireoaks and the canal, but *Chrysogaster* (*Liogaster*) *metallina* F., a rather beautiful Syrphid, was the only one of the interesting species recorded by Mr. Cheetham at the Union's last visit which was found. *Clinocera* (*Hydrodromia*) *stagnalis* (Hal.) was there and, if these pits are in Yorkshire and not in Nottinghamshire, is an addition to the V.C. 63 list.

Some material awaits determination.

Flowering Plants (Miss R. Kilby): Anston Stones Wood was full of colour; *Allium ursinum, Galeobdolon luteum* and *Melandrium rubrum* making a delightful show. *Lathraea squamaria* was found and also *Tilia cordata, T. platyphylla* and *Euonymus europaeus.*

In the quarry near Lindrickdale *Acinos arvensis, Geranium columbinum, Cerastium arvense* and *Blackstonia perfoliata* were found. *Cirsium acaule* was abundant on parts of Lindrick Common and *Carex digitata* was collected.

Many interesting plants listed in the circular—*Minuartia tenuifolia, Ophrys apifera, Valerianella dentata* and *Carex ericetorum*—were not seen.

Mr. R. E. Collins of Bramhope, Leeds, has sent in a list of about sixty species noted during the meeting. It includes *Reseda lutea* (Mignonette), *Arabis hirsuta* (Hairy Rock-cress), *Arenaria serpyllifolia* (Thyme-leaved Sandwort), *Asperula odorata* (Woodruff), *Melica nutans* and *Desmazeria rigida* from Anston Stones Wood,

He notes *Anthyllis vulneraria* (Kidney Vetch or Ladies' Fingers), *Linum catharticum* (Purging Flax) and an *Hieracium* sp. from the railway track and from Lindrick Common, *Helianthemum chamaecistus* (Rockrose), *Cerastium arvense, Poterium sanguisorba* (Salad Burnet), *Myosotis hispida, Sherardia arvensis* (Field Madder), *Plantago media* (Hoary Plantain), *Scandix pecten-veneris* (Venus' Comb) and *Sieglingia decumbens. Senecio squalidus* was by the railway and on the Common.

Bryology (Mrs. J. Appleyard): It was not possible to spend much time in Anston Stones Wood and for lack of a guide the best places were missed. Nothing unexpected was seen and few of the known rarities were collected. *Amblystegium compactum* (C.M.) Aust. was found not far from where the wood was entered. A quarry near Shireoaks was searched for *Desmatodon cernuus* (Hubn.) B. & S. without success. *Bryum inclinatum* (Brid.) Bland was collected there, growing along with the mosses usual in such a place. No other bryophytes worth mentioning were found.

RIPON, FOR QUEEN MARY'S DUBBS, V.C. 64, June 25th

We had a very successful and enjoyable meeting at Ripon and are indebted to Miss Christine Shaddick, our new Divisional Secretary for Mid-West Yorks., for its planning and arrangement. Rather over forty members were present during the day. The weather was fine and warm with a light to moderate breeze and though dull earlier on it became sunny later. About half the party drove straight to The Dubbs from the meeting-place at Ripon Railway Station, while the rest—mainly botanists—walked to The Dubbs via the river bank. The strong botanical party concentrated upon the filling in of record cards for the B.S.B.I. Distribution Scheme. The Dubbs provided a very suitable locality for entomological work and several

entomologists were present. Unfortunately the aquatic fauna was not examined. Perhaps the most obvious features of the insect fauna were the scarcity of butterflies and larger moths and the abundance on the Hawthorn bushes of the gregarious larvae of a moth which Mr. Hewson says is probably *Hypomoneuta padella* L., and of their webs.

At the meeting following tea at The Lawrence Cafe in the Market Square, Mr. Chislett was again in the chair and members of seventeen societies answered to the roll-call.

Ornithology (Ralph Chislett): Two Herons appeared in the air as the cars drew up near The Dubbs, whereon later, Coot, Moorhen, Dabchick and Mallard swam, with Sedge-Warblers singing nearby. Chiffchaffs, Willow-Warblers and Blackcaps were in song, with the Garden-Warbler rather more scarce. The areas of woodland and thorn-bushes also showed Redstarts, Bullfinch, Turtle- and Stock-Doves, Jay and Magpie, Whitethroat and Tree-Pipit. About a dozen Curlews rose from a field of long grass, probably two or three family parties. A Tree-Creeper's nest with four eggs appeared to be deserted. Several Sandpipers called by the river along which anglers were dotted. Other species seen were: Kestrel, Partridge and Pheasant, Lapwing, Redshank, Black-headed and Lesser Black-backed Gulls, Woodpigeon, Swift, Skylark (numerous), Swallow and Sand-Martin, Rook and Crow, Blue-Tit and probable Willow-Tit, Wren, the three common Thrushes, Robin, Hedge-Sparrow, Greenfinch, Chaffinch, Reed-Bunting, Yellowhammer and Tree-Sparrow; bringing the total to 46 species. Of Woodpeckers only disused holes were noted.

Coleoptera (J. H. Flint): Quite a profitable day was spent and a list of seventy species compiled by Mr. Russell and the writer. The morning walk along the river bank was most productive and *Cychrus caraboides* L. var. *rostratus* L., *Clytus arietis* L. and *Ceuthorrhynchus litura* F. were among the species taken. A series of *Dorytomus melanopthalmus* Pk. was beaten from willow.

Beetles were harder to find at The Dubbs. *Elaphrus riparius* L. and *E. cupreus* Duft. were plentiful around the pond margins, but no other species were seen with them. Water beetles were not collected, but a single *Ilybius fenestratus* (F.) was taken. Sweeping produced among others, *Malthodes dispar* Germ., *Anobium fulvicorne* Stm., the Cardinal beetle, *Pyrochroa serraticornis* Scop., *Alophus triguttatus* F. and *Phytobius canaliculatus* Fabr.

The river banks produced a number of interesting beetles. On one small, damp shingle bed specimens of *Nebria gyllenhali* Schr., *Bembidion monticola* Stm. and *Trechus secalis* Pk. were found, while a stretch of dry shingle was well populated with *Bembidion atrocoeruleum* Steph. *B. stephensii* Crotch was found in a damp sandy channel.

Odonata and Hemiptera (J. H. Flint): As was to be expected in June species were not numerous. Several *Agrion splendens* Harris were seen near the river, and there was an abundance of *Coenagrion puellum* L. and *Ischnura elegans* Lind. around The Dubbs together with smaller numbers of *Enallagma cyathigerum* Charp. and *Pyrrhosoma nymphula* Sulz.

A dozen species of bugs were noted, of which *Cixius remotus* Edw. and *Cicadella vittata* L. may be mentioned, both being found while sweeping mixed herbage.

Lepidoptera (F. Hewson): Of butterflies all three Whites (*Pieris* spp.) were seen, a good number of Common Blue (*Polyommatus icarus* von Rott.) and Small Heath (*Coenonympha pamphilus* L.), and at least five Large Skippers (*Augiades venata* Br. & Gr.).

Of moths the Chimney Sweeper (*Odezia atrata* L.) was not uncommon in the mowing fields. Jarring the hawthorns started out Common White Wave (*Cabera pusaria* L.) and Brimstone (*Opisthograptis luteolata* L.). The Silver-Ground Carpet (*Xanthoroe montanata* Schiff.) was common around The Dubbs and larvae of the Magpie moth (*Abraxas grossulariata* L.) were found on hawthorn. One each of the Common Pug (*Eupithecia vulgata* Haworth) and the Grey Birch (*Ectropis punctulata* Schiff.) were taken. Quite a few species of butterfly which we had hoped to see were not observed and except for an abundance of one species of Yponomeutidae, larvae were noticeable by their absence, a feature of the year which we had noted at Sandsend.

Diptera (K. G. Payne): Queen Mary's Dubb seemed to be a good place for diptera and any feeling of the writer while still there that it was less good than it

appeared was dispelled when it transpired that Mr. Russell had three additions to the county list. These were: *Nemotelus pantherinus* L., *Rhamphomyia filata* Zett. and *Calobata ephippium* F.

The *Rhamphomyia* was determined by Mr. J. E. Collin and Mr. Russell's determination of the *Calobata* confirmed by him. Mr. Russell took a male of the *Nemotelus* on the river bank in the morning, besides a female at The Dubbs in the afternoon.

The Syrphid *Chrysotoxum bicinctum* (L.) and the Ephydrid *Caenia palustris* (Fln.), taken at The Dubbs by the writer, had not previously been recorded from V.C. 64.

In total, Mr. Russell noted 47 species of fly and the writer round about the same number. Many species of course were common to the two lists. Among the more interesting species were the following. They were from The Dubbs except where otherwise stated:

Antherix ibis (F.), river bank near Ripon, H.M.R.
Dioctria rufipes (Deg.), river bank and The Dubbs, H.M.R.
Tachydromia arrogans (L.), woodland near the river, H.M.R.
Oedalia holmgreni Zett., H.M.R.,
Empis pennipes L., on flowers of Herb Robert, K.G.P. It is interesting that Lundbeck mentions this association of flower and fly and recalls that Meigen had previously noted it. Parmenter records it from S.E. England and last year the writer found *E. pennipes* plentifully feeding in Herb Robert flowers in S. Devon.
Rhamphomyia flava (Fln.), K.G.P.
Chelifera praecatoria (Fln.), H.M.R.
Ilione albiseta (Scop.), K.G.P.
Parydra aquila (Fln.), K.G.P.
P. littoralis (Mg.), H.M.R., K.G.P.
Chlorops hypostigma Mg., H.M.R.
Paralleloma albipes (Fln.), K.G.P.
Amaurosoma fasciatum (Mg.), K.G.P.
Norellisoma spinimanum (Fln.), H.M.R.

A good deal of material awaits determination.

Flowering Plants (Miss C. M. Rob): This meeting was one of great interest to the botanical section and it was very pleasing to have such a strong representation. Several members filled in Botanical Society Record Cards and the final number of species noted was about 315—a remarkable effort.

The walk through the fields to The Dubbs, though taking up more time than anticipated was well worth while, but a more detailed survey of this area is needed to do it full justice. One interesting feature was the quantity of *Crepis biennis* in one field, the entire grass field being yellow with it. A single plant of *Orchis ustulata* was seen. *Potamogeton alpinus* was plentiful in a ditch near the military bridge.

Unfortunately there was not time to do a full examination of the several pools. Plants noted included *Alisma plantago-aquatica, Apium nodosum, Carex acutiformis, C. acuta, C. disticha, C. elata, C. hostiana* and *C. rostrata*. In all, 19 species of Carex were seen. *Oenanthe aquatica, Scirpus sylvaticus, Primula farinosa* and *Pinguicula vulgaris* occurred in the wet ground between The Dubbs and the river.

Blackstonia perfoliata was on the dry calcareous bank near the largest pond and both Moonwort and Adders Tongue were seen in quantity. This area is of great interest and would repay a full examination at some future date. On this occasion little was possible beyond making a bare list of the species seen, and but a small part of the area could be examined in one day. Each pond appeared to have a rather different flora. Some silting up was taking place and the rough ground surrounding the ponds is almost a thicket of Hawthorn scrub. The river banks appeared to have a good flora and to be well worth a more careful examination.

An interesting feature of the wood between the ponds and the river was the number of very large Spindle Trees (*Euonymus europaeus*)—some of the biggest specimens I have ever seen.

Any notes on this area made at future dates will be welcomed and another visit is most desirable.

Bryology (Mrs. J. Appleyard): Bryophytes were very scarce on the dry ground between Ripon Station and Queen Mary's Dubb. *Bryum inclinatum* (Brid.) Bland and *Trichostomum crispulum* Bruch were found on dry ground at the side of the military road and a small quantity of *Leskea polycarpa* Hedw. on a wooden bridge. In the marshy field where Butterwort and *Primula farinosa* grow there was a dense growth of *Cratoneuron commutatum* (Hedw.) Roth mixed with a little *Drepanocladus revolvens* (Sm.) Warnst. *Dicranella schreberiana* (Hedw.) Dix. and *Pellia fabbroniana* Raddi were common by the brook and there was a little *Physcomitrium pyriforme* (Hedw.) Brid. on a muddy stone. Two interesting finds in the same field were *Amblystegium juratzkanum* Schp. and *A. compactum* (C.M.) Aust. The only other station for the latter in V.C. 64 is Fountains Abbey where it was found in 1944 by Mr. E. C. Wallace. The best find of the day was *Camptothecium nitens* (Hedw.) Schp. in the marshy coppice beyond the field. There is a record for Copgrove in 1879 and Spofforth in 1878 but the only place where it was known to grow to-day is Tarn Moss, Malham.

CARPERBY, WENSLEYDALE, V.C. 65, July 9th

A feature of this most enjoyable meeting was the large number of members who managed to get to such a remote spot. Fifty members were present and sixteen societies were represented. We were glad to welcome several members of the Darlington and Teesdale Naturalists' Field Club, including their Secretary, Mr. F. N. Scaling. The weather was dull and cool to start with, which allowed us to make the ascent to Locker Tarn in comfort. After lunch on the slopes overlooking the Tarn, the sun came out and conditions were perfect in which to enjoy an afternoon's collecting and observing in beautiful country. The ground around Locker Tarn was worked thoroughly, the botanists filling in their record cards. Then some of the party had a look at the dry scars to the south-west of the Tarn where *Hornungia petraea* was seen. A bryological feature of the scars was a form of *Encalypta vulgaris* with a long excurrent nerve. Most members then made their way slowly back to Carperby along the track by way of Well, although a few went over by Blue Scar. After tea at the Wheatsheaf, our President, Mr. E. W. Taylor, took the chair and reports were presented. Votes of thanks were carried to Lord Bolton for permission to go over his land and to Miss C. M. Rob who organised the meeting. A few members then went to Woodhall to see the fine show of Thrift. Also at Woodhall was much Vernal Sandwort and the moss *Weissia controversa* var. *densifolia*, both typical plants of old lead workings.

Fresh-water Biology: Miss A. E. Allison found the nearly complete remains of a Crayfish in a stream running into Locker Tarn and fragments of others were found by members after search.

Ornithology (R. Chislett): Ornithology was well represented and the main party spent the day about Locker Tarn and the surrounding moors. Ducks numbering *ca.* 30 which flew in a flock over the hills west of the Tarn were probably Common Scoters. Several Mallard and Teal were disturbed. Coot had half-grown young, whilst those of the *ca.* 150 pairs of Black-headed Gulls were at various stages, some being on the wing with their parents. A Snipe was flushed from two young and some Redshanks, Golden Plovers, Curlews and Lapwings still obviously had walking young. Young Wheatears flitted along walls wherein a pair of Redstarts were feeding young.

Many of the following additional species were added by J. P. Utley, who worked farther west from Ure level through woodlands up to the moors: Common Buzzard, Red Grouse, Partridge, Pheasant, Moorhen, Common Sandpiper, Cuckoo, Tawny Owl, Swift, three Hirundines (a solitary pair of Sand-Martins were nesting at an altitude of *ca.* 1,250 feet), Rook, Carrion Crow (fairly common), Jackdaw, Magpie, Great-, Blue- and Coal-Tits, Wren, Dipper, Mistle- and Song-Thrush, Blackbird and Ring-Ousel, Robin and Hedge-Sparrow, Blackcap, Garden-Warbler, Whitethroat, Willow-Warbler, Spotted Flycatcher, Meadow- and Tree-Pipits, three species of Wagtail, Starling, Greenfinch, Linnet, Redpoll, Chaffinch, Yellowhammer and Tree-Sparrow. The excellent total of 59 species was achieved.

Mammals, etc.: Two Stoats were seen. Rabbits were fairly numerous on the higher slopes but myxomatosis was beginning to affect those on the lower slopes.

Conchology (Mrs. M. Morehouse): *Pyramidula rupestris* Drap. and *Balea perversa* L. were on the dry limestone walls about Carperby, as we should have expected. The following species were noted:

Agriolimax agrestis L.
Arion ater L.
A. ater L. var. *aterrima* Taylor
A. ater L. var. *plumbea* Roebuck
A. ater L. var. *brunnea* Lehmann
A. hortensis Fér.
Balea perversa L.
Clausilia bidentata Ström.
Cochlicopa lubrica Müll.
Ena obscura Müll.
Euconulus fulvus Müll.
Helix hortensis Müll.
Helix nemoralis L.
Hygromia rufescens Penn.
Jaminia cylindracea Da Costa
Pyramidula rotundata Müll.
P. rupestris Drap.
Vitrea alliaria Mill.
V. cellaria Müll.
V. nitidula Drap.
V. pura Alder
V. rogersi B. B. Woodward
Vitrina pellucida Müll.

Lepidoptera (F. Hewson): From members who went to the Tarn I heard of Northern Eggar (*Lasiocampa quercus* L. var. *callunae* Palmer), Common Heath (*Ematurga atomaria* L.) and Common Swift (*Hepialus lupulinus* L.) moths, and was shown a caterpillar of the Square-Spot Rustic (*Amathes xanthographa* Schiff.).

I spent the afternoon in Woodhall Park, on the way noticing only a Large Yellow Underwing (*Triphaena pronuba* L.) and a number of Chimney Sweeper (*Odezia atrata* L.). Three insects of interest were found, two larvae and one imago. A Light Emerald moth (*Campaea margaritata* L.) still had part of the pupa-case covering the head and face, leaving it blind and helpless. A caterpillar was found feeding on lichen on a sallow, and there are a number of species which habitually do so, notably the ' Footmen '. Some of our former lepidopterists used to say that some of these were abundant in certain localities (for instance G. T. Porritt, *Yorks. Lep.*, p. 24, *Lithosia griseola;* p. 199 *L. complanula* Bdv.), but I cannot recall any recent records. Unfortunately this was the only one found and it failed to survive the journey home.

A caterpillar of a different species was still alive although it carried 15 cocoons of a species of parasite, probably of the genus *Apanteles*.

The absence of even the commonest species, either on the wing or as larvae, was again most noticeable.

I had hoped that the caterpillar carrying cocoons of a parasite might have begun to feed again, for there are a few records of moths and parasites from one caterpillar, but this was not to be. On July 15th I was preparing to post it off to Dr. W. D. Hincks when a tiny ichneumon, which must have emerged very recently, escaped from the box. Dr. Hincks wrote: ' The cocoons are those of the primary parasite, a species of *Apanteles* (family Braconidae) but all the emerged insects are secondary parasites (hyper-parasites) of the genus *Hemiteles* (family Ichneumonidae) . . . It is interesting to note that the 15 cocoons produced 13 females and one male. The escaped one was probably a female . . . ' Dr. Hincks will give us the name after a more detailed examination. The caterpillar was probably *Poecilocampa populi* L. (December moth) though I have not previously taken this species.

Diptera (K. G. Payne): The time available was spent in collecting round the edges of the Tarn, over the exposed mud and shallow water and about a fast stream with a little fall near the Tarn. Ephydridae were plentiful about the mud and one species taken proved to be new to the county list. Eleven other species taken had not previously been recorded in V.C. 65. These additions are as follows:

Tabanus distinguendus Verrall*, taken by Joyce Payne on the writer.
Chelifera diversicauda Collin*
Gymnoternus cupreus (Fln.)*
Syntormon tarsatus (Fln.)*
S. pumilus (Mg.)*
Themira superba Hal.*
Notiphila annulipes Stenh.†
Scatella paludum (Mg.)*
Parydra littoralis (Mg.)*
Borborus ater Mg.*
Spathiophora hydromyzina (Fln.)*
Ornithomyia lagopodis Sharp*

The Chelifera was taken by the fall on the little stream. Characteristics of the pupae of a related species, *Hemerodromia unilineata* Zett., are described and figured by H. E. Hinton (' Some adaptions of insects to environments that are alternately

dry and flooded, with some notes on the habits of the Stratiomyidae,' *Trans. Soc. Brit. Entom.*, **11**, 209-227).

The occurrence of *Notiphila annulipes* Stenh. in Yorkshire might be expected. The card in the Fordham Index gives records from Cornwall to N. Scotland. *Scatella paludum* is a very small but beautiful little species whose face, brilliantly shining white when viewed from above, is quite obvious in the sweeping net. Its occurrence at Locker Tarn is interesting. Collin (1930) mentions it as mainly a coastal species and in Yorkshire the only previous (and so far unpublished) record is from Spurn.

This is the second time the writer has swept the bird parasite *Ornithomyia lagopodis* in a moorland area, the first being at Birks Tarn at 1950 O.D. It would seem probable that it sometimes is very common on moorland birds, or the chance of finding it by sweeping would be very remote.

A female of *Sphaerocera curvipes* Latr. was swept on the moor near Locker Tarn at 1,200 ft. O.D., and its presence was probably connected with that of sheep dung. The common and widespread *Scatella stagnalis* Fln. was abundant on the mud round the Tarn and the individuals of *S. paludum* (Mg.) were but a few among the many of *stagnalis* Fln. in the net. *Dolichopus vitripennis* Mg. and *Loxocera aristata* (Pz.) were among the other species taken here. A good deal more material awaits determination.

Flowering Plants (Miss C. M. Rob): The botanical section was well represented at this meeting, and the filling in of B.S.B.I. record cards gave an added interest to the day. The area visited consisted of grassland, heather moor, the wet ground surrounding Locker Tarn including the small stream, and dry limestone scars. In all, some 170 species were noted.

Between the village and the top of the hill overlooking Locker Tarn *Blysmus compressus* and *Viola lutea* were perhaps the most interesting plants, the former fairly plentiful on the grass road up the fell. Round the Tarn the vegetation was very much trampled by the gulls and little was found on the actual margin. The small feeder streams were undamaged with an interesting flora. Here *Eriophorum latifolium, Carex curta, C. dioica, C. echinata, C. hostiana* and *C. ovalis* occurred. *C. rostrata* was abundant in the Tarn. *Drosera rotundifolia, Equisetum telmateia, Pinguicula vulgaris, Potamogeton berchtoldii, Primula farinosa, Selaginella selaginoides, Triglochin palustre* and *Viola palustris* were also noted.

On the dry limestone scars *Hornungia petraea, Arabis hirsula, Myosotis hispida* and *Sesleria caerulea* were amongst the more interesting plants.

An *Alchemilla* collected by Mr. Shaw was later identified as *A. filicaulis* Buser. After the meeting a visit was paid to Woodhall where the *Armeria maritima* was still in good flower. *Thlaspi alpestre* and *Minuartia verna* were also abundant in the Woodhall area.

The general feeling was that the area was well worth a further visit as only a small part of it had been examined.

Bryology (Mrs. J. Appleyard): Many interesting bryophytes were seen and two were new to V.C. 65, one a hepatic and one a moss variety. On the dry rocks and walls between Carperby and Locker Tarn there were *Scapania aspera* Bernet, *Orthotrichum anomalum* Hedw. var. *saxatile* (Wood) Milde and *Tortula muralis* Hedw. var. *rupestris* Schultz. This variety has been dropped in the *Annotated List of British Mosses*. It is very likely only a habitat form but so, probably, at the other extreme, is var. *aestiva* (P. Beauv.) Brid. which has been retained.

Most of the more interesting species were found near the Tarn. *Drepanocladus uncinatus* (Hedw.) Warnst. was in fruit on rocks in the eastern corner. In a stream running into the Tarn from the north there was a good deal of *Cratoneuron commutatum* (Hedw.) Roth var. *virescens* (Schp.) Rich. & Wall. This is not given for V.C. 65 in the *Census Catalogue of British Mosses* although our records give Baugh Fell, Whitfield Gill and High Force, Teesdale. *Drepanocladus revolvens* (Sm.) Warnst. and *Cratoneuron commutatum* (Hedw.) Roth var. *falcatum* (Brid.) Moenk. were frequent. There were several patches of *Dicranum bonjeani* De Not. and one tuft of *Polytrichum alpestre* Hoppe was seen. *Climacium dendroides* (Hedw.) Web. & Mohr was very fine in several places. *Dichodontium pellucidum* (Hedw.) Schp. var. *fagimontanum* (Brid.) Schp. and var. *flavescens* (Turn.) C. Jens. were present in small quantities. *Hygrohypnum luridum* (Hedw.) Jennings var. *sub-sphaericarpum* (Schleich.) C. Jens. was gathered with abundant fruit from a wet rock. This variety

is new to V.C. 65. On tussocks in the wet, stony ground on the north side there was a great deal of a small, dark, barren form of *Gymnostomum aeruginosum* Sm. and some *Preissia quadrata* (Scop.) Nees. Among these tussocks was found *Moerckia flotowiana* (Nees) Schiffn. new to V.C. 65. This uncommon hepatic has now been found in all the Yorkshire vice-counties except V.C. 61. There was plenty of *Tortella tortuosa* (Hedw.) Limpr. This common limestone moss would probably come under the var. *fragilifolium* Dixon, no longer recognised. On the way up to the scars above the Tarn, a stone was found covered with a small, dark form of *Frullania tamarisci* (L.) Dum. The scars were too dry for most bryophytes but there was a lot of the piliferous form of *Encalypta vulgaris* Hedw. and *Tortula intermedia* (Brid.) Berk. In wet ground below the scars, *Philonotis calcarea* (B. & S.) Schp. was abundant. *Lophozia floerkii* (Web. & Mohr) Schiffn., *L. attenuata* (Mart.) Dum. and *L. ventricosa* (Dicks.) Dum. all grew on a peaty bank. Among shaded limestone rocks near Well were found *Neckera complanata* (Hedw.) Huben., *N. crispa* Hedw., and a small, dry-habitat form of *Thamnium alopecurum* (Hedw.) B. & S., *Metzgeria conjugata* Lindb., *Reboulia hemisphaerica* (L.) Raddi, and Miss K. Mattinson found a little *Tortula subulata* Hedw. var. *graeffii* Warnst. *Orthodontium lineare* Schwaegr. occurred in several places. *Weissia controversa* Hedw. var. *densifolia* Wils. was abundant at Woodhall. Here too was collected *Rhytidiadelphus triquetrus* (Hedw.) Warnst. *c. fr.* and a particularly fine patch of fruiting *Reboulia hemisphaerica* (L.) Raddi.

Fungi (Miss A. Allison): Because of the nature of the ground—too dry in most parts—and the time of the year—too early for many of the larger fungi—not many species were seen. In the damper parts, however, the following species were found in small numbers: *Hygrophorus pratensis* (Pers.) Fr., *H. russo-coriaceus* Berk. & Miller, *Boletus scaber* (Bull.) Fr., *Psathyrella gracilis* Fr., *P. atomata* (Fr.) S. and one specimen of *Cantharellus tubaeformis* Fr. was brought to me. The species found in the largest numbers was *Omphalia sphagnicola* Berk. growing among the *Sphagnum* moss.

KEYINGHAM, FOR THE KELSEY HILL GRAVEL PITS, V.C. 61, July 16th

The Union has been blessed with fine weather on all its general field excursions this summer and the one at Keyingham was very hot indeed. Some members would have liked to follow the example of some young men who were bathing in one of the water-filled gravel pits. Only twenty people were present and seven societies were represented, but this part of Yorkshire is difficult of access to people without cars. Although the day was hot and the air still, entomologists found very little that might not have been expected. The botanists had a good day and saw many plants, both on dry land and in the water, which are rare in other parts of the county. Birds appear to have been few.

An endless supply of excellent tea was provided through the kindness of Mr. W. A. Butterfield, B.Sc., in the pleasant garden of Keyingham School and was much appreciated by everyone. Afterwards, Mr. T. B. Kitchen presided over the meeting at which reports were given and votes of thanks were carried to the landowners who had given us permission to visit their property, to Miss E. Craekles who arranged the meeting and to Mr. Bunce who obtained permission from the landowners. Hearty thanks were also given to Mr. Butterfield whose tea had so effectively slaked our thirsts.

Ornithology (Mrs. J. E. Kitchen): Only two ornithologists were present at this meeting and the day was sunny, warm and still with, consequently, very little movement of birds. As requested, Reed-Warblers and Turtle Doves were specially looked for, but they were not noted.

A total of 31 species was made up as follows: Carrion Crow, Rook, Jackdaw, Magpie, Starling, Greenfinch, Chaffinch, Goldfinch, Yellow-Bunting, Reed-Bunting, House-Sparrow, Skylark, Meadow-Pipit, Sedge-Warbler (very abundant and nesting), Common Whitethroat (two pairs feeding young), Song-Thrush, Blackbird, Robin, Hedge-Sparrow, Swallow, House-Martin, Sand-Martin, Lapwing, Kestrel, Wood-Pigeon, Moorhen, Mute Swan, Herring Gull (juveniles), Black-headed Gull and Greater Black-backed Gull. A Blackcap was heard singing at some distance from the pits.

Coleoptera (Rev. T. B. Kitchen): Beetles were not really plentiful. Some 71 species were found, in and around the pits. It is not a good season for Coleoptera and many species which are usually abundant were only about in small numbers.

All the species recorded were of the type to be expected in such a habitat and nothing was seen worthy of being recorded by name.

Diptera (K. G. Payne): Most of the time was spent in collecting from the vegetation round the edges of the considerable areas of water in the pits. Except in one place there was very little mud, the bottom being very clean and vegetated. No doubt this accounted for the scarcity of Ephydridae. It would be interesting to know whether the scarcity of Dolichopodidae was related. Six species of Sciomyzid were noted—*Ditaenia cinerella* (Fln.), *Tetanocera elata* (F.), *Pherbina coryleti* (Scop.), *Ilione albiseta* (Scop.), *Limnia unguicornis* (Scop.) and *L. fumigata* (Scop.). None of these are uncommon. Another widespread Sciomyzid, *Trypetoptera punctulata* (Scop.) occurred on drier banks higher above the water. Here also the only Trypetid, *Urophora jaceana* Hering was swept. A conspicuous fly was *Chrysops relictus* Mg., individuals of which were perched about on Phragmites stems, as first brought to my notice by Mr. Geyer. Perhaps the most interesting fly taken was *Oxycera trilineata* (F.), a very beautiful black-marked green species. It has been recorded from V.C. 61 and from V.C. 64 in Yorkshire, but seldom. *Leptogaster cylindrica* (Deg.) was the only Asilid taken. *Melieria omissa* (Mg.) and *Herina lugubris* (Mg.) were taken and in Yorkshire seem to be typical species of the south-east of the county.

Some material awaits determination.

Spiders (T. A. Geyer): The heat wave at the time of the meeting appeared to restrict most species to particularly secluded habitats. Nearly all the specimens taken were either on reeds in the water or near the water's edge. Spiders one might have expected to see in dry sandy areas, e.g. *Arctosa perita* (Latreille) and *Agelena labyrinthica* (Clerck), were not, or did not appear to be, present.

Of the species taken, *Araneus cornutus* (Clerck) perhaps provided the greatest interest. It is a species often found near water and which uses inflorescences for its silken retreat. The interesting point, however, is that the general colour of the inflorescence seems to have some effect upon the general body colour of the spider. This was noticed in every case where the species was seen. In a sandpit near Kelsey House one specimen had built its retreat in a dead inflorescence of *Centaurea scabiosa*. Both spider and involucral bracts were dark in colour, the former appearing quite inconspicous. In the same pit a male had spun its retreat in a head of *Typha* and both inflorescence and spider were again dark. Another pit yielded a male and a female but this time their retreat was built in a head of *Scirpus maritimus* which was flowering. Both spiders were light in colour, and harmonised with the general colour of the flower. The species taken were as follows:

LYCOSIDAE (2 spp.)

Lycosa pullata (Clerck), ♀ in short grass

Trochosa ruricola (Degeer), ♀ underneath a plank.

This family was thus not well represented, which is unusual.

TETRAGNATHIDAE (1 sp.)

Pachygnatha sp. (probably immature *P. clerckii*).

Beating probably would have revealed other genera of this family, e.g. *Tetragnatha montana* and *extensa*.

ARGIOPIDAE (4 spp.)

Araneus cornutus (Clerck), ♂ ♀

A. diadematus (Clerck), ♀.

A. quadratus (Clerck), ♀, immature.

Meta segmentata (Clerck), ♀.

THERIDIIDAE (1 sp.)

Theridion ovatum (Clerck), ♀.

Flowering Plants (W. A. Sledge): The Kelsey Hill gravel pits have long been known to and often visited by Hull naturalists. Since the war the largest pits have been brought into use again and much vegetation has been destroyed. The area is however sufficiently extensive to retain most of its former botanical interest. The

occurrence of marshes and pools in some pits gives variety to the flora and some of the most interesting species observed were seen in these habitats. These included:

Ranunculus sceleratus L.
Myriophyllum verticillatum L.
M. spicatum L.
Hippuris vulgaris L.
Apium inundatum (L.) Rchb.
A. nodiflorum (L.) Lag.
Samolus valerandi L.
Veronica catenata Penn.
Baldellia ranunculoides (L.) Parl.
Alisma Plantago-aquatica L.
Hydrocharis morsus-ranae L.
Elodea canadensis Michx.
Potamogeton natans L.
P. densus L.
P. Berchtoldii Fieb.
Juncus subnodulosus Schrank
Typha latifolia L.
T. angustifolia L.
Scirpus maritimus L.
S. tabernaemontani Gmel.
Carex serotina Mérat.

The drier ground of the pits and the field borders adjacent to them yielded:

Ranunculus sardous Crantz
Malva moschata L.
Melilotus officinalis (L.) Lam.
Anthyllis vulneraria L.
Vicia tetrasperma (L.) Schreb.
Daucus carota L.
Hippophaë rhamnoides L. (several bushes in one pit, ? bird-sown)
Erigeron acris L.
Anthemis cotula L.
Matricaria chamomilla L.
Leontodon leysseri (Waller.) Beck.
Picris echioides L.
Catapodium rigidum (L.) Hubbard
Alopecurus myosuroides Huds.

A few specimens of Bee Orchis, queried in the circular as possibly lost since quarrying recommenced, were seen in one part unaffected by digging but the Broomrape (*Orobanche rapum-genistae* Thuill.) which grew here before the war appears to have been destroyed.

Bryology (Mrs. J. Appleyard): The East Riding of Yorkshire is not a good area for bryophytes and records for many of the common species are few. It is probable that more work in the vice-county would provide a better picture of their distribution and add many unrecorded species to the list. At the Keyingham meeting, only the wet ground near the edge of the flooded gravel pits yielded results. One species new to V.C. 61 was found, *Brachythecium salebrosum* (Web. & Mohr) B. & S. This grew on stones by the first gravel pit visited, at Kelsey Hill. What I believe to be a different form of the same species was gathered in a wet flush near another pit, associated with *Aneura pinguis* (L.) Dum. It had the appearance of *B. glareosum* (Bruch) B. & S. but was microscopically more like *B. salebrosum*. Also, the wet habitat was most unlikely for *B. glareosum*. *Dicranella varia* (Hedw.) Schp., *Barbula tophacea* (Brid.) Mitt. and *Cratoneuron commutatum* (Hedw.) Roth also occurred in the flush. Other species seen around the first pit were *Barbula convoluta* Hedw., *Bryum pseudotriquetrum* (Hedw.) Schwaegr., *B. bicolor* Dicks., *Leptodictium riparium* (Hedw.) Warnst. and *Eurhynchium speciosum* (Brid.) Milde. The only other record for the last named moss in East Yorkshire is Staddlethorpe.

BOOK REVIEWS

The Physiology of Diapause in Arthropods, by **A. D. Lees.** Monographs in Experimental Biology, No. 4. Pp. x + 151 with 25 text figures. Cambridge University press, 1955. 12/6.

Remarkable progress has been made during the last decade in the experimental investigation and understanding of diapause in insects and mites, but the published work is widely scattered and often somewhat inaccessible, especially that from Japan and Russia. Dr. Lees' excellent monograph is therefore most timely. It collects together the results of work along different lines, integrates them into a coherent whole and appraises the present position.

The presence or absence of diapause in many insects is decided by external conditions, and is thus readily amenable to experimental investigation, and an account is presented here of the influence of such factors as photoperiodicity, temperature and diet. In other insects, diapause may be genetically determined; or the availability of water may be critical in regulating arrest or continuation of growth. The metabolic adjustments during diapause and the factors leading to its termination are then considered. Diapause has now been shown to be controlled by hormones secreted by glands which are under the influence of the brain; and the

brain in turn appears to be sensitive to external stimuli, which at certain levels can thus set in motion the chain of events leading to diapause. This discovery of hormonal control of diapause is thus a major advance and makes a fascinating story. It opens the way to the correlation of many diverse observations and experimental findings.

Many interesting points of behaviour are mentioned. For instance, one can hardly fail to be intrigued by the adaptibility of a certain chironomid larva (*Polypedilum vanderplanki*) which breeds in temporary rock pools in Nigeria. When the ponds dry up, the larva becomes dehydrated and shrivels up to almost unrecognisable proportions. The water content can be reduced to one per cent. or less, and no respiration can be detected; yet even after three years, if the larva is placed in water it rapidly swells up to its original shape and swims away within an hour or so.

This book can be thoroughly recommended to the serious student of arthropod physiology, and to the specialist it will be of particular value as there are about 300 literature references. The more general reader will find much of interest unless he likes his biology to be served up in sugary words of one syllable.

The book maintains the high standard of the series and is an appropriate companion volume to Professor Wigglesworth's monograph, *The Physiology of Insect Metamorphosis*, which was the first in this series.

B.A.K.

Bird Migration, by **G. V. T. Matthews.** Monographs in Experimental Biology, No. 3, 1955. Pp. viii + 141, with 33 text figures. Cambridge University Press. 12/6.

In this well documented book Dr. Matthews critically examines the various theories that have been put forward from time to time to explain the homing and migratory powers of birds. It is well known for instance that the Great Shearwaters range over the whole area of the Atlantic Oceans, penetrating to 60° N. and that to breed they return in their millions to the Tristan da Cunha group of islands lying 40° S., spread over only 30 miles of ocean and lying 1,500 miles from the nearest land mass. It is not known with certainty however how this and other remarkable feats of bird navigation are accomplished.

It is known that birds possess the five senses common to most vertebrates and that the eye, in particular, is very highly developed but no evidence has been found to lead biologists to believe that further sense organs will be discovered. There is nevertheless clear evidence that young birds are able to fly unassisted in a particular direction, by means of an inherited directional tendency and to fly towards a known goal after being displaced into unknown surroundings.

Dr. Matthews discards sensitivity to the earth's magnetic field or to the Coriolis force as possible explanations and does not therefore accept the theory of the grid composed of the isobars of both as propounded by Yeagley—following his well-known experiments undertaken in Nebraska—especially as this would postulate the evolution of two special ' senses ' developed only for this purpose.

The human navigator can fix his station anywhere on the globe by observing the position of the sun at a known instant of time and it is found that birds ' home ' much more successfully when the sun is visible than when the sky is heavily overcast. The author concludes that the essential feature of bird migration is the sun-arc coupled with a retentive memory and a well developed sense of time.

To all interested in the problems presented by bird and animal migration this book will be of great interest as the author has gathered together a weight of experimental data and furnished a most useful bibliography.

E.W.T.

The Golden Eagle, King of Birds, by **Seton Gordon.** Pp. 246 with 17 photographic illustrations by the author and others. Collins, New Naturalist Series. 16/- net.

For anyone other than this author to have attempted a monograph of the Golden Eagle to-day, great courage would have been required, so much and for so long in Scotland has Seton Gordon made the subject his own. He photographed his first eyrie in 1904. His earlier experiences were related in *Days with the Golden Eagle* (1927). Still year after year he has watched eagles. Packed with information as the book is, ' yet there is more, far more, to learn for the eagle is a complete individualist.' In 1955 the species ' remains my favourite bird '.

The book deals with the lives and behaviour of Golden Eagles throughout the year. Although to-day the species holds its own, not without difficulties, and has re-appeared as a lone breeder in Southern Scotland and Northern Ireland, references

to exact locations of eyries are properly veiled. Longitudes without latitudes are given for two eyries. To reflect upon widely separated sentences relatively in some of Mr. Gordon's books has proved tantalising, but also sometimes profitable. He is glad (so am I) that no census of Golden Eagles in Scotland has been attempted: ' it would undoubtedly be harmful to the species.'

' Eight Years' Observations at a Golden Eagle's Eyrie ' is the title of three late chapters, the latest year being 1953; but in 1954 Gordon was there again. The folklore of the species and its history in Britain are well covered, nor are other parts of the world where it occurs forgotten. Despite his love for eagles and eagle-country, Gordon faces squarely the consequences of the bird's predations which have meant its banishment from wide areas: ' the entrails of grouse she herself swallowed with relish, gobbling them up as though they had been macaroni,' a delicious comparison. Some items of food will surprise: ' 16 May was a day of rain, and the next morning there were many large earthworms in the eagle's eyrie.' Myxomatosis among rabbits may have repercussions upon eagles.

The Golden Eagle gains in interest and pictorially from its scenic, highland background. The photographs have been well selected and reproduced—Niall Rankin and C. E. Palmar have contributed. One wou d have liked in such a book to see one plate from each of the known outstanding sets of Golden Eagle photographs, from those by Macpherson and Rooker Roberts to those of Higham and Auger. Avian monographs often consist of facts and figures, compiled for ornithologists. Seton Gordon's facts are there in abundance, but his prose will also be read with pleasure by the more general reader. It is a long time since I enjoyed a book about any bird so much.

R.C.

Ornithological Report for Northumberland and Durham for 1954, by **G. W. Temperley.** Contains 39 pp. of Classified Notes, and 6 pp. of more general matter including weather conditions. **Ornithological Report on the Farne Islands for 1954,** by **Grace Hickling.** Pp. 20. The two are numbers 5 and 6 of Vol. XI of *Transactions of the Nat. Hist. Soc. of Northumberland, Durham and Newcastle-on-Tyne.* 2/6 each.

As could be expected these excellent reports show that North Sea weather in late August (waders, Wrynecks, etc.) and in October (Turdidae, etc.) produced results similar to those recorded in Yorkshire. Breeding by Stonechats occurred at several places. These are many interesting items including some from Monk's House. Mr. Temperley includes recoveries of ringed migrants; Miss Hickling lists the recoveries of ringed, Farne Islands breeding birds, but if separate reports are issued for parts of, and for the whole of, a region, duplication of some records is inevitable. With more than 150 contributors Mr. Temperley could only use ' a very small proportion of the many thousands of individual records,'—' but every one of them has been valuable in arriving at a true assessment of '—status, distribution and movement. Every county recorder can endorse that.

R.C.

Going Wild. The Autobiography of a Bug-hunter, by **Colin Wyatt.** Pp. 214, with 30 illustrations, mostly photographic with a few monochrome sketches. Hollis and Carter, London, 1955. 21/-.

The author is a redoubtable traveller, mountaineer, ski-ing expert and field naturalist, specialising in entomology and lepidoptera in particular. Camera and sketch-book supplement his jottings made on the spot. As a collector of butterflies and student of their life-histories in various parts of the world, Mr. Wyatt tells a vivid story convincingly, and his chapters on Australia, New Zealand and some of the Pacific Isles are deeply fascinating. His activities range from the Arctic to the Pyrenees; and the reader is given a delightful glimpse of Ceylon before being transported to the Canadian Rockies.

Some of the wilder parts of Morocco are explored, and one is taken through the snow-clad Atlas mountains down to desert regions. The book pulsates with the writer's energy, and his word-paintings convey clear impressions of the various hunting grounds and the insect treasures he found there, no matter whether he is chasing a rare fritillary in Lapland or enquiring into a strange relationship between a blue and an ant in the Australian bush. Strongly recommended to nature lovers fond of travel and with a desire to know something of the fauna and flora of distant lands.

J.A.

CONTRIBUTORS

CLASSIFIED INDEX

COMPILED BY G. A. SHAW

Circular No. 548

Yorkshire Naturalists' Union.

SUBSCRIPTIONS

Will all members please note that subscriptions for 1955 are now due and should be sent to Mr. Shaw at the address given above.

SPRING BRYOLOGICAL MEETING

All interested in mosses, whether as beginners or as experienced bryologists, will be welcome at a meeting to be held at Knaresborough on Saturday, April 2nd, 1955.

MEETING PLACE.—Knaresborough bus terminus at 11 a.m. Buses leave Vicar Lane Bus Station, Leeds, at 9-45 a.m., arriving in Knaresborough at 10-48 a.m. Buses leave Knaresborough for Leeds every hour, on the hour. Further information, if desired, may be obtained from Mrs. Appleyard (address above).

SPRING FUNGUS FORAY

The Spring Foray will be held at the North Riding Adult College at Wrea Head, Scalby, April 14th to 18th, 1955.

Chairman: Miss E. M. Blackwell, M.Sc., F.L.S.
Secretary: Miss J. Grainger, Wilshaw, Meltham, Huddersfield.

ACCOMMODATION.—The charge is 12*s.* 6*d.* per day and members and friends are asked to bring their own towels. Most of the accommodation is in cubicles (four in a room). Bookings should be sent to Miss J. Grainger (address above) by April 1st. (Telephone: Meltham 352). Early booking is advisable and remittances will probably be required before the meeting begins.

TRANSPORT.—Wrea Head is ten minutes walk from Scalby Bus Terminus. A taxi can be obtained from Mr. Sedman, 'Revelin,' High

Street, Scalby (Telephone: Scalby 466). If the taxi is not available labelled luggage can be left at Mr. Sedman's for conveyance later at a charge of 1*s*. Conveyance from Scarborough Central Station by taxi costs 6*s*. There are frequent bus services from Scarborough.

MEETING.—Members should try to assemble for the evening meal at 7 p.m. on Thursday, April 14th, 1955.

AUTUMN FUNGUS FORAY

The Autumn Foray will be held at Pateley Bridge, September 23rd to 27th, 1955.

Chairman: Miss E. M. Blackwell, M.Sc., F.L.S.
Secretary: Miss J. Grainger, Wilshaw, Meltham, Huddersfield.
Recorders: Miss E. M. Blackwell, Kirkburton.
W. G. Bramley, Pickering.
Dr. J. Grainger, Ayr.

HEADQUARTERS.—Kell Grange Residential Hotel, Pateley Bridge (Mr. and Mrs. W. A. Campbell). Terms 17*s*. 6*d*. per day. This hotel is very highly recommended and very popular, but Mr. Campbell has agreed to reserve places till the end of January. Will all regular attenders please note this. There is an excellent workroom.

BOOKING.—Bookings should be made by **January 31st, 1955, enclosing Booking Fee of £1,** which will be deducted from the final amount payable.

TRANSPORT.—There is an hourly (occasionally half-hourly) bus service from Harrogate, and the hotel is near the bus stop.

In case of any difficulty please write to the Secretary of the Mycological Committee (address above).

CIRCULAR No. 549

Yorkshire Naturalists' Union.

The 545th Meeting

WILL BE HELD AT

SANDSEND

V.C. 62

From Saturday, MAY 28th to Monday, MAY 30th, 1955

HEADQUARTERS.—The Bungalow Hotel, Sandsend, near Whitby. Proprietors, Mr. and Mrs. A. L. Clarke. The charge is 21/- per day plus 5% in lieu of staff gratuities. Members should book their accommodation direct with Mr. and Mrs. Clarke as soon as possible, stating that they are members of the Yorkshire Naturalists' Union party.

TRANSPORT FACILITIES.—Sandsend is on the sea coast three miles west and north of Whitby and at the seaward end of Mulgrave Woods. A majority of trains on the Middlesbrough-Scarborough line stop at Sandsend, but members arriving at Whitby by train or bus from York will, in general, have to get a bus to Sandsend from the Bus Station near Whitby (Town) Railway Station, or a taxi. It should be noted that Whitby (West) Cliff Railway Station, from which trains go to Sandsend, is threequarters of a mile from the Town Station, up hill towards the former and that few trains go between the two. Trains which may be useful for travelling to the meeting are as follows for week-days. They may be supplemented for the Whitsun Holiday.

Leeds	dep.	9-22 a.m.	12-45 p.m.	2-15 p.m.	4-25 p.m.
York	,,	10-15 a.m.	1-35 p.m.	3-5 p.m.	5-8 p.m.
Whitby (Town)	arr.	12-14 p.m.	3-25 p.m.	5-13 p.m.	7-2 p.m.
Hull	dep.	5-30 a.m.	8-35 a.m.	2-20 p.m.	5-45 p.m.
Scarborough	,,	8-12 a.m.	11-40 a.m.	4-35 p.m.	8-15 p.m.
Whitby (West Cliff)	arr.	9-19 a.m.	12-50 p.m.	5-41 p.m.	9-19 p.m.
Sandsend	,,	9-30 a.m.	1-0 p.m.	5-51 p.m.	—

		a.m.	a.m.	a.m.	a.m.	p.m.	p.m.	p.m.
Middlesbrough	dep.	6-10	7-38	8-7	9-25	1-7	4-20	5-53
Sandsend	arr.	7-51	—	—	11-1	2-45	6-1	—
Whitby (West Cliff)	,,	7-57	9-20	9-49	11-7	2-51	6-15	7-37

The 7-38 a.m. from Middlesbrough is Saturdays only and the 8-7 a.m. weekdays other than Saturdays.

There are through buses to Whitby from Leeds, and an occasional one from Bradford.

PREVIOUS MEETINGS.—The Union has been in the Whitby area previously in the following years: 1885 and 1894 (Whitby and Mulgrave Woods), 1889 and 1896 (Staithes), 1900 (Sandsend), 1909 (Runswick Bay), 1914 (Sleights), 1925 and 1930 (Egton). It is interesting to read the notes on these meetings in the appropriate copies of *The Naturalist*, for comparative purposes.

ROUTES.—Each day word will be left at the Bungalow Hotel as to where the party has gone. It is not proposed to draw up a fixed programme beforehand, but it is suggested that the three days might well be used to cover the following areas:

(1) Mulgrave Woods.

(2) The sea cliffs north to Kettleness and Runswick Bay.

(3) An inland moorland area with its associated wooded ghylls.

The wooded ghylls running towards the sea at Runswick Bay may also well prove interesting.

PERMISSION.—We are indebted to Lord Normanby for permission to visit Mulgrave Woods on one of the days of the meeting. Members are reminded that the pheasants will be nesting and are asked to make every effort to avoid disturbing them. No dogs can be allowed on the excursions.

THE AREA.—The area with its high sea-cliffs and the fine sweep of Runswick Bay and with the wooded valleys running inland to the moors behind is one of considerable scenic beauty. A good deal may be read of the geological structure and natural history of the area in Baker's *North Yorkshire*. Elgee's *Moorlands of North-Eastern Yorkshire* is still, after 43 years, a fascinating book, containing a great deal of interesting information even if more recent work has thrown rather a different light on some of the subjects discussed. It should be noted that the insect (and other invertebrate) life of moorlands in general and of the North-eastern Yorkshire moors in particular, is still only very inadequately known. The possibility of the occurrence of Arctic-alpine species in north-east Yorkshire cannot be ruled out. The Dipteron *Dolichopus rupestris* Hal., while not of this group, had, in Yorkshire, only been taken at altitudes of about 2,000 ft. O.D. in the West Yorkshire fells till the writer found it on the moors above Farndale last year. It was regarded by Mr. Cheetham as a typical mountain species. The recent rediscovery by Mrs. Appleyard, in the Cleveland Hills of a moss whose only other known British locality is in Scotland may be another indication that the area will repay further investigation.

The last known north-east Yorkshire haunt of the Stonechat is quite near Sandsend.

The Royal Fern still occurs in the area. Ploughman's Spikenard is one of the lime-loving plants to be found and there are interesting records of aliens from old spoil heaps and elsewhere.

ORNITHOLOGY.—Ralph Chislett writes: Ornithologically the purpose will be to explore the coast north-westward and the wooded ghylls and moors inland. Fulmars should be in evidence. A watch should be kept for Shags (now known to be breeding near Flamborough) although Cormorants are more likely. Rock-pipits are probable. Only on the Kettleness cliffs is the Lesser Black-backed Gull known to breed on the Yorkshire coast. Mulgrave Woods are Pheasant preserves and should show a good variety of woodland species. I remember how rich were the wooded

glens of Roxby and Easington that we explored from Grinkle Park. The moors will extend the list possibly to include the Merlin, Short-eared Owl and Nightjar. The Stonechat bred years ago in the Ugthorpe-Lealholme area but seems to have gone. The date will not be too late for possible passage migrants. A goodly list of species identified is certain: it should be made with an eye to the prevalence of species comparatively with what could be expected on similar terrain in the Dale's country of the western parts of the North Riding.

TEA AND MEETING.—Tea at Headquarters, at 5-0 p.m., on the Monday will be followed by a meeting for the election of new members and for the presentation of reports.

Next Meeting.—Anston Stones Wood and Lindrick Common, V.C. 63, on June 11th.

SUBSCRIPTIONS

Will any members who have not paid their subscriptions please note that they were due on January 1st and send them to the Assistant Treasurer, G. A. Shaw, Esq., The Department of Botany, The University, Leeds, 2, without delay.

CIRCULAR No. 550

Yorkshire Naturalists' Union.

The 546th MEETING

WILL BE HELD AT

ANSTON STONES WOOD AND LINDRICK COMMON

V.C. 63

On Saturday, JUNE 11th, 1955

THE DISTRICT.—The area covered by this meeting lies in the extreme south corner of Yorkshire and is of great interest from the point of view of Yorkshire natural history. It is, as Mr. Brooks remarks below, geographically and climatically more akin to Nottinghamshire and Leicestershire. In spite of the rich fauna and flora the area has been rather neglected by the Y.N.U. It would be especially valuable if as many entomologists as possible would come to this meeting. Work is needed on all orders but, naturally, most of all on the orders less popular with collectors.

PREVIOUS MEETING.—The Union visited Anston Stones Wood and Lindrick Common on June 7th, 1947, and information further to that given below may be had from the report upon that meeting (*The Naturalist*, 1947, p. 167) and from the Circular for that meeting. In the latter Professor Fearnsides gives a brief account of the geology of the district. A previous visit was in 1885.

MEETING PLACE.—Meet at South Anston Church at 11-0 a.m.
S. Anston is best reached from Sheffield and Worksop.
It is suggested the party studies the Woods and neighbouring grassland, then continues to Lindrickdale, and Lindrick Common. Tea can be obtained at the

nearby village of Shireoaks, at Hudson Farm Café. Pots of tea, afternoon tea, or meat tea at approximately 3/6 per head can be supplied.

Members should inform K. G. Payne, West Dene, Manor Heath, York (Tel. York 6358) if requiring tea, and state what sort of tea, not later than Tuesday, June 7th.

Buses back to Sheffield, Worksop, Retford and Gainsborough, can be caught at the Toll Bar nearby on the Sheffield-Worksop road.

TRANSPORT.—

Bus Route 85 (Sheffield—S. Anton—Worksop—Retford—Gainsborough) Sheffield (Pond St., by Midland Station) 8-15 a.m. and every hour, arriving at S. Anston (Church) 8-45 a.m. and every hour.

Retford (Canon Sq.)	Worksop (Ryton St.)	S. Anston	Sheffield (Pond St.)
7-15 a.m.	7-47 a.m.	8-5 a.m.	8-44 a.m.
8-45 a.m.	9-17 a.m.	9-35 a.m.	10-14 a.m.
and every hour	and every hour	and every hour	and every hour

Return—

Toll Bar	S. Anston	Sheffield	
1-17 p.m. approx.	1-35 p.m.	2-14 p.m.	
and every hour	and every hour	and every hour	
until 9-17 p.m.	until 9-35 p.m.	until 10-14 p.m.	
9-45 p.m. approx.	10-3 p.m.	10-42 p.m.	
S. Anston	**Toll Bar**	**Worksop**	**Retford**
1-54 p.m.	2-5 approx.	2-12 p.m.	2-44 p.m.
and every hour	and every hour	and every hour	and every hour
until 7-54 p.m.	until 8-5 p.m.	until 8-12 p.m.	until 8-44 p.m.
9-31 p.m.	9-35 p.m.	9-42 p.m.	10-20 p.m.

Travel to this meeting by train, and then by the bus route mentioned above, is possible to members in many parts of Yorkshire, provided that they are prepared to make an early start.

Retford can be reached by 8-42, leaving the following places as follows:

Huddersfield, 6-0 a.m.; Halifax, 6-8 a.m.; Bradford, 6-57 a.m.; Leeds, 7-28 a.m.; Doncaster, 8-20 a.m.

Sheffield can be reached by 8-20 a.m., leaving Barnsley at 7-35 a.m.; at 9-7 a.m., leaving York at 7-20; and at 8-49 a.m. (via Leeds) leaving Hull at 5-30 a.m.

MEETING.—A meeting for the election of new members of the Union and for the presentation of reports on the day's work will be held at Hudson Farm Café, following tea.

FLOWERING PLANTS AND FERNS.—F. W. Adams writes: The area in question is on Magnesian Limestone. Anston Stones Wood is a 'semi-natural' woodland on the plateau and bottom of a short Limestone gorge through which runs Anston Brook.

In places the brook has exposed the underlying Coal Measures.

The wood itself can be regarded as a typical floristically rich Magnesian Limestone Woodland in which *Fraxinus excelsior* and *Ulmus glabra* are abundant. *Acer pseudoplatanus* is naturalised and regenerates freely.

Of special interest in the woodland is the presence of *Tilia cordata* and *T. platyphylla*. The latter is almost certainly introduced whereas the former may well be native. *Lathraea squamaria* is frequent on *Acer pseudoplatanus*.

There is a rich herb layer; *Mercurialis perennis, Endymion non-scriptus,* and *Allium ursinum* are locally dominant or co-dominant. Other species include: *Adoxa moschatellina, Daphne laureola, Galeobdolon luteum, Anemone nemorosa, Viola reichenbachiana,* and *Agropyron caninum. Vicia sylvatica* is at the margin of the wood.

Ferns are abundant on rocks and ground and include the following: *Phyllitis scolopendrium, Cystopteris fragilis* and *Polystichum lobatum.*

Above the wood to the north is limestone grassland dominated by *Brachypodium pinnatum* and *Zerna erecta.* Open habitats to the north-east of the wood contain

Ophrys apifera, Anacamptis pyramidalis, and *Serratula tinctoria.* Nearby on the cliff tops are small colonies of *Carex digitata.*

Part of Lindrick Common has become a golf course. *Circium acaule* is here in abundance in one of its most northerly stations. Other interesting species here include *Carex ericetorum, Spiranthes spiralis, Blackstonia perfoliata* and *Minuartia tenuifolia.* A quarry in nearby Lindrickdale has *Acinos arvensis, Geranium columbinum, Melandrium noctiflorum, Cerastium arvense, Trifolium fragiferum,* and *Valerianella dentata.*

Towards Shireoaks, near the canal are more old quarries with species such as *Astragalus glycyphyllos, Ophrys insectifera, Juncus compressus,* and *Puccinellia distans.*

Both *Gagea lutea* and *Orchis ustulata* are unrecorded from the regions considered above, but are both likely to occur.

MYCOLOGY.—J. Webster writes: Larger fungi are scarce at this time of year, but *Morchella esculenta* is frequent in this region. Amongst the more interesting micro-fungi of the region are:

Botrytis globosa on *Allium ursinum.*
Synchitrium mercurialis on *Mercurialis perennis.*
Puccinia fusca and *Plasmopara pygmaea* on *Anemone nemorosa.*
P. adoxae on *Adoxa moschatellina.*

BRYOLOGY.—F. W. Adams writes: Anston Stones Wood is relatively rich in Bryophytes, growing abundantly on cliffs, rocks, and ground. *Dichodontium pellucidum* occurs by the stream, whilst on some of the damp shady rocks is *Cololejeunea rossettiana,* and *Gymnostomum calcareum. Tortula marginata* and *Fissidens pusillus* are common on stones on the ground. *Amblystegium compactum* is found under a cliff to the south-east of the wood.

Many of the large rocks are covered with *Thamnium alopecurum, Metzgeria furcata, M. pubescens* and *Porella platyphylla.* Pockets in the limestone contain species like *Eurhynchium confertum* and *Rhynchostegiella pallidirostra. Eucladium verticillatum* and *Aneura sinuata* var. *major* are abundant in a quarry in the wood.

Lindrick Common is relatively poor, but *Desmatodon cernuus* is on old lime heaps, and *Leptobryum pyriforme* has also been recorded.

ENTOMOLOGY.—Mr. J. E. Brooks writes: Records are sparse for this area. Because of this, and the fact that it is the most southerly part of the county, there is little doubt that even in well-worked orders it contains species so far unrecorded for the county. Some species reach their northern limit in this corner of the Trent drainage area, which geographically and climatically is more akin to Nottinghamshire and Leicestershire. This was exemplified by the presence together of four members of the Dipterous Family *Stratiomyidae* (and notably *Stratiomys potamida* (Mg.)) reported by Chris. A. Cheetham on the occasion of the Field Meeting of 7/6/47. He gave a useful list of other Diptera in the report of that meeting.

A species which reaches its northern limit hereabouts is *Strymon w-album* (Knoch.) (White Letter Hairstreak) of which there are frequent records for several woods a short distance to the north of Anston Stones. The larvae will be on leaves of the wych elm during June, and as I can find no record of its occurrence in this wood, perhaps some attention could usefully be given to this question.

A dozen common species of butterfly occur here and also *Pyrgus malvae* (Linn.) (Grizzled Skipper). A list of eleven moths, none of which is uncommon, is recorded in the 1947 report. In addition, *Ectropis bistotata* (Goeze) (Engrailed) and *Eupithecia lariciata* Freyer (Larch Pug) are recorded from Kiveton Park, nearby, *Pyrausta cespitalis* (Schiff.) from Lindrick Common and *Hydrelia sylvata* (Schiff.) from Anston Stones Wood. The only Hymenoptera which appear to be recorded are three ants from Lindrick Common. These are *Myrmica laevinodis* Nyl., *Lasius flavus* (Fab.) and *L. niger* (L.).

This general paucity of records is no doubt due to lack of attention to the area. Similar woodlands, only a short distance away, possess a very rich insect fauna, and if we are favoured with fine weather on this next occasion, much ought to be added to existing records.

Next Meeting.—Ripon, for Queen Mary's Dubb, V.C. 64, June 25th.

CIRCULAR No. 551

Yorkshire Naturalists' Union.

The 547th Meeting

WILL BE HELD AT

RIPON

For QUEEN MARY'S DUBBS

On SATURDAY, JUNE 25th, 1955

THE DISTRICT.—Bordered by the River Ure, with its wooded banks and extensive shingle beds, this area provides a variety of interesting habitats—the five 'Dubbs' or small lakes, with marshy ground in the hollows, and dry scrubland above, where some good calcicolous associations are found. There is an exposure of Gypsum on the river bank.

MEETING PLACE.—Ripon Railway Station at 10.45 a.m. (Note: this is outside the town, and members coming from Leeds and Harrogate should *not* alight at the Bus Station but travel through to the Railway Station.) The Dubbs are about three miles from Ripon. Energetic members can walk there by the public footpath (see route below), but a car ferry service will be provided for those who wish to proceed direct to the Dubbs. Members with cars are asked to co-operate with the transport arrangements. Cars will leave the Dubbs at 4.30 p.m. to return to Ripon for tea.

HEADQUARTERS.—The Lawrence Cafe, Market Square, Ripon. A meat and salad tea is available at 4/6 per head. Please inform Miss C. Shaddick by not later than Monday, 20th June, if tea is required. It would also help if members would state whether or not they require transport to and from the Dubbs.

PARKING CARS IN RIPON.—Cars can be parked in the Market Square, but this is often crowded. In case of difficulty members are advised to use the large car park near the Bus Station, reached by turning left down Hallowgate when approaching the Market Square from the Dubbs.

MEETING.—A short meeting to elect new members and receive reports on the day's work will be held at the Headquarters after tea.

PREVIOUS VISIT.—June 17th, 1939. *The Naturalist* for that year gives full reports and members should consult this particularly for lists of fungi and for the Conchological and Entomological sections.

MAP.—Sheet 91 (Ripon) of the New Popular Edition, Ordnance Survey, 1 inch map.

PERMISSION.—We are indebted to the military authorities for permission to visit this area. Please note that no dogs are allowed.

ROUTE.—Those walking to the Dubbs should take the public footpath to North Lees from the south side of the bridge near the railway station. Keeping to the lower path by the river, which has a few rough places, but which is mainly quite good, they will reach a new road constructed by the army. Turn left up this road and follow it up the hill. Where the road joins a second road, turn right and keep straight down to the Dubbs. (Moderate walking time, under an hour.) This route will probably be specially profitable for entomologists. Members going by car leave Ripon by the West Tanfield–Masham road and half a mile beyond North Lees take the private road to the right, which leads straight down to the Dubbs. No particular route will be followed at the Dubbs, as members will have ample time to explore the whole area, including the banks of the Ure.

TRANSPORT.—

Buses:

Leeds	9-15 a.m.	Middlesbrough	8-35 a.m.	York	9-00 a.m.
Harrogate	10-05 a.m.	Thirsk	10-05 a.m.	Boro'bridge	9-55 a.m.
Ripon Station	10-44 a.m.	Ripon Station	10-32 a.m.	Ripon	10-17 a.m.
Bradford members can join the bus at Harrogate.		(Limited stop bus)			

Return journey (from Ripon Bus station):

Half-hourly service to Leeds leaving at 6-25 & 6-55 p.m.	5-46 & 7-46 p.m. to Thirsk and Middlesbrough	6-30 p.m. to Boroughbridge and York.

Trains:

Leeds (City)	9-17 a.m.	N. Allerton	10-05 a.m.	Please check train times as present time-table only runs till 12th June.
Harrogate	9-55 a.m.	Thirsk	10-20 a.m.	
Ripon	10-11 a.m.	Ripon	10-40 a.m.	
Return:				
Ripon	6-15 p.m.	Ripon	6-42 p.m.	
Harrogate	6-36 p.m.	Thirsk	7-03 p.m.	
Leeds	7-07 p.m.	N. Allerton	8-47 p.m.	

FLOWERING PLANTS.—Over 70 species were recorded here in 1939, and the list is by no means exhaustive. The area is rich in carices, 22 species being recorded. Members should look for *Carex acuta* and *C. elata*, recorded by Lees but not found in 1939. In and around the Dubbs, *Catabrosa aquatica*, *Hottonia palustris*, *Potamogeton crispus*, *P. perfoliatus* and many carices should be found. The Dubbs are worthy of special study as each tends to have its own characteristic flora. *Primula farinosa*, *Crepis paludosa*, *Schoenus nigricans*, *Menyanthes trifoliata* and *Parnassia palustris* should be looked for in marshy places. The drier limestone areas should produce an interesting calcicolous flora, including *Rosa spinosissima*, *Centaurium minus*, *Ophrys apifera*, and *Gymnadenia conopsea*. It is hoped that the botanical section will make use of the B.S.B.I. record cards.

ORNITHOLOGY.—Mallard, Heron, Kingfisher, Redshank, Snipe, Coot and Moorhen frequent the Dubbs, and a pair of Oyster Catchers were nesting on neighbouring farm land in May. Common Sandpiper nest on the shingle beds of the river. Reed Bunting and Sedge Warbler should be found near the marshy ground and the woods and scrub should produce a good crop of warblers, including both Common and Lesser Whitethroat, as well as Redstart and Redpolls. All three Wagtails may be expected.

CIRCULAR No. 552

Yorkshire Naturalists' Union.

President:
E. WILFRED TAYLOR, Esq., C.B.E., F.R.S., M.B.O.U.

Joint Hon. General Secretaries:
Mrs. J. APPLEYARD, 98 Moore Avenue, Bradford, 6.
K. G. PAYNE, West Dene, Manor Heath, Copmanthorpe, York.

Hon. Treasurer:
J. D. HARTLEY, Esq., Lynton Avenue, Boston Spa.

Hon. Assistant Treasurer:
G. A. SHAW, Esq., The Department of Botany, The University, Leeds, 2.

Divisional Secretary:
Miss C. M. ROB, F.L.S., Catton, Thirsk.

BRYOLOGICAL MEETING

There will be a Bryological Meeting in Upper Teesdale, September 17th-18th, 1955. **Headquarters** will be at The High Force Hotel, Middleton-in-Teesdale, where members should meet on Friday evening, 16th September. Mrs. Walton, Rose Tree Farm, Forest-in-Teesdale, Middleton-in-Teesdale, has limited accommodation and there is a Youth Hostel at Langdon Beck. Members are advised to book their accommodation early. In case of difficulty apply to Mrs. J. Appleyard (address above).

The 548th Meeting

WILL BE HELD AT

CARPERBY, WENSLEYDALE

V.C. 65

On Saturday JULY, 9th, 1955

HEADQUARTERS.—The Wheatsheaf Hotel, Carperby. Mrs. B. Furlong. Tea with sandwiches, 2/6.

MEETING PLACE.—Meet at Headquarters, 11-0 a.m. Word will be left as to the route being followed.

TRAVEL FACILITIES.—The Wensleydale Railway has been closed to passenger traffic and members attending the meeting will have to rely on buses and

private cars. Carperby is on the Ripon-Hawes bus route (United Service 127), the times given below should be checked as the summer time table is not yet to hand.

Harrogate	8-35 a.m.	Darlington	9-0 a.m.	Northallerton	9-0 a.m.
Ripon	9-15 a.m.	Leyburn	10-27 a.m.	Leyburn	10-13 a.m.
Leyburn	10-27 a.m.				
		Leyburn	dep. 10-30 a.m.		
		Carperby	arr. 10-59 a.m.		
		Carperby	dep. 6-12 p.m.		
		Leyburn	arr. 6-40 p.m.		
Leyburn	6-46 p.m.	Leyburn	6-45 p.m.	Leyburn	6-45 p.m.
Ripon	7-58 p.m.	Darlington	8-10 p.m.	Northallerton	8-0 p.m.
Harrogate	8-35 p.m.				

PERMISSION.—Lord Bolton has given permission for the Union to visit the Bolton Estate. It is requested that members will see all gates are shut and care is taken regarding fire precautions, especially in the Woodlands. No dogs allowed.

PREVIOUS VISITS.—The Carperby district has been visited by the Union on many occasions the last being in 1940, when Headquarters was at Redmire. Members can find the report of the meeting in *The Naturalist* for that year. Additional reports can be found in *The Naturalist* for 1884, 1914, 1919 and 1934.

ROUTE.—Leave Headquarters, 11-0 a.m.: proceed to Locker Tarn by the track and return to Carperby (if time permits) via Blue Scar and Woodhall.

Members arriving after lunch will be able to join up with the main party at Locker Tarn.

The Botanical Section will be mapping the Flora for the B.S.B.I. Maps scheme and records cards for this purpose will be available at Headquarters.

MAPS.—Sheet 90, New Popular Edition, Ordnance Survey one-inch map covers the area.

Carperby is on the north side of Wensleydale about a mile from Aysgarth Falls and the Yoredale rocks form ' Scars ' along the escarpment to the north of the village. Locker Tarn is a small lake at 1,100 ft., well known to naturalists and surrounded by moorland with scars to the high side.

Woodhall has extensive lead workings and here is one of the finest shows of Thrift in any inland station. Grass of Parnassus is also abundant.

The whole district is interesting and members who do not wish to make the rather strenuous trip up to Locker Tarn will find plenty of good country within easy reach of Headquarters.

Tea will be at the Wheatsheaf at 5-0 p.m. followed by a meeting for the presentation of reports and the election of new members.

Next Meeting.—Keyingham, for Kelsey Hill Gravel Pits, V.C. 61, July 16th.

CIRCULAR No. 553

Yorkshire Naturalists' Union.

President:
E. WILFRED TAYLOR, Esq., C.B.E., F.R.S., M.B.O.U.

Joint Hon. General Secretaries:
Mrs. J. APPLEYARD, 98 Moore Avenue, Bradford, 6.
K. G. PAYNE, West Dene, Manor Heath, Copmanthorpe, York.

Hon. Treasurer:
J. D. HARTLEY, Esq., Lynton Avenue, Boston Spa.

Hon. Assistant Treasurer:
G. A. SHAW, Esq., The Department of Botany, The University, Leeds, 2.

The 549th Meeting

WILL BE HELD AT

KEYINGHAM

for the Kelsey Hill Gravel Pits
V.C. 61

On Saturday JULY, 16th, 1955

HEADQUARTERS.—The School, Keyingham. Drinks of tea will be provided at the school at tea-time. PLEASE BRING SANDWICHES. Arrangements kindly made by Mr. W. A. Butterfield, B.Sc.

TRAVEL FACILITIES.—Times given below should be verified as summer time-tables were unavailable at the time of going to press.

Train Service:

Hull	9-52 a.m.	Leeds	8-24 a.m.	York	7-53 a.m.
Keyingham	10-27 a.m.	Hull	9-46 a.m.	Hull	9-26 a.m.

Bus Service (East Yorkshire Motor Services, Limited):

Hull	9-15 a.m.	9-45 a.m.	10-15 a.m.
Keyingham (Memorial)	9-56 a.m.	10-26 a.m.	10-56 a.m.

Return Services:
Train Service:

Keyingham	6-21 p.m.	7-51 p.m.	Hull	7-10 p.m.	Hull	7-35 p.m.
Hull	6-55 p.m.	8-26 p.m.	Leeds	8-34 p.m.	York	9-10 p.m.

Bus Service:

Keyingham	5-28 p.m.	5-58 p.m.	6-28 p.m.	6-58 p.m.
Hull	6-12 p.m.	6-42 p.m.	7-12 p.m.	7-42 p.m.

MEETING PLACE.—Keyingham Memorial at 11-0 a.m.

MAP.—One-inch Ordance Survey, New Popular Edition, Sheet 99.

PERMISSIONS.—Have kindly been given by Mr. A. S. Whittaker to visit pits by roadside and near Keyingham; by Sangwin Ltd. to visit pits near Kelsey House; and by J. A. Powell, Esq. to visit pits near Burstwick. We have of course given an assurance that every care will be taken not to disturb machinery.

DISTRICT.—The Yorkshire Naturalists' Union's only visit to Keyingham was in August 1892.

Local naturalists have, however, paid a great deal of attention to the area, particularly with regard to its geology. The terrain, particularly the site of two old pits near the railway line has been greatly changed in the last ten years and there is a need for an up-to-date survey of the natural history of the area. Some species of plant and animal will have disappeared but the indications are that pits in the vicinity of Kelsey House and nearer to Burstwick are reaching an interesting state and may well repay careful investigation.

GEOLOGY.—J. B. Fay: The gravel at Kelsey Hill has yielded numerous remains of mammoth, walrus, ox, seal and similar species, together with a varied molluscan fauna of an Arctic type, doubtless dragged from the bed of the North Sea during the passage of the ice in its journey from Scandinavia; erratics from that country as well as from Scotland, the Lake District, Teesdale and the north-east coast of Yorkshire are all plentiful, giving some indication of the direction of the ice movements, which culminated in the range of gravel mounds stretching across Holderness.

Further information concerning the geology of the area is contained in: ' The Geology of Yorkshire ' by Phillips, 1829; ' The Geology of Holderness ', by C. Reid, 1885; ' The Content and Origin of Gravels around Hull ', Hull Scientific and Field Naturalists' Transactions, Vol. 1, No. 2, 1899; ' Geology of Yorkshire ', Kendall and Wroot; ' Proceedings of the Yorkshire Geological Society ', Vol. XVI, Part 11, 1907, Sheppard and Stather; ' Proceedings Yorkshire Geological Society ', 1929, Stather. These references were obtained from an unpublished paper on ' The Geological History of Kelsey Hill ' given to the Hull Geological Society by the late T. Stainforth, B.A., B.Sc.

FLOWERING PLANTS.—F. E. Crackles, B.Sc.: The area has been well worked by Hull naturalists but chiefly prior to the disturbance of the old pits about eight years ago. Many xerophilous plants are found on the gravels. Species recorded include: *Erophila verna* L., *Cardamine flexuosa* With., *Arabidopsis thaliana* (L.) Heynh., *Cerastium arvense* L., *Malva moschata* L., *Linum catharticum* L., *Melilotus officinalis* (L.) Lam., *Poterium sanguisorba* L., *Pimpinella saxifraga* L., *Myosotis hispida* Schlecht, *Echium vulgare* L., *Carduus nutans* L., *Centaurea scabiosa* L., *Alopecurus myosuroides* Huds.

Ophrys apifera Huds. and *Saxifraga granulata* L. were present in some quantity between the old pits before the area was bulldozed but the species may now be absent from the area.

Aquatic and marsh plants which have been recorded include: *Myriophyllum spicatum* L., *M. alterniflorum* DC., *Samolus valerandi* L., *Alisma ranunculoides* L., *A. plantago-aquatica* L., *Hydrocharis morsus-ranae* L., *Potamogeton pusillus* L., and *Typha angustifolia* L.

Ornithogalum umbellatum L. was established by the railway at any rate up to 1946 and *Chaenorrhinum minus* is common along the track.

During a visit paid in 1953 *Carex serotina* Mérat was found to be plentiful between pits near Kelsey House; the only other V.C. 61 station for the species being Skipwith Common. *Schoenoplectus tabernaemontani* (C. C. Gmel.) Palla was found to be frequent and may have been previously overlooked.

ORNITHOLOGY.—H. O. Bunce: The following species have been recorded in previous years, at the time of the present visit: Great Crested Grebe, Little Grebe, Mallard, Sheld-duck, Red-legged Partridge, Water Rail, Moorhen, Coot, Green Woodpecker, Sand Martin, Reed Warbler, Sedge Warbler, Goldfinch, Corn Bunting, Reed Bunting, Tree Sparrow. Renewed gravel digging within the last five years has completely destroyed two fine overgrown old pits, and some of the listed birds no longer breed. Information on the following would be welcome: Turtle Dove, Kingfisher, Whinchat, Lesser Whitethroat, Yellow Wagtail.

ENTOMOLOGY.—(Coleoptera): For a number of records of beetles taken here by the late T. Stainforth, B.A., B.Sc., and notes on frequency see Y.N.U. Annual Reports for 1943 and 1944 (*The Naturalist*, Nos. 804 and 808) and ' Reed Beetles of the Genus Donacia and its allies in Yorkshire ' *The Naturalist*, Nos. 810 and 811.

MEETING to elect new members and to receive reports of the day's findings will follow tea at 5-0 p.m. at the school.

Circular No. 554

Yorkshire Naturalists' Union.

Sectional Meetings, 1955

for consideration of the Annual Reports and to nominate Officers for the Sections and their Committees.

All Members and Associate Members of the Union are eligible to attend.

SUBSCRIPTIONS.—If there are any subscriptions for 1955 still unpaid, will the members responsible please forward them (£1 for Full Members and 5/- for Family Members), without delay, to Mr. Shaw at the address given above.

October 8th.—**The Botanical Section** will meet in the Botanical Department, Leeds University, at 2-30 p.m. Entrance is *via* the Baines Door, from University Road.

After tea there will be an exhibition of specimens, to which members are invited to contribute.

The **Conchological Section** will meet in the Geological Department, Leeds University, at 2-30 p.m. (*N.B.:* **NOT October 15th** as on the Member's Card).

October 22nd.—**The Vertebrate Section** will meet in the **St. John's Parish Room, Mark Lane, Leeds, 2** (behind **Lewis's Ltd.**), at 3-15 p.m. Prior to this the **Protection of Birds Act Sub-Committee** will meet at 2-15 p.m. the **Ornithological Division** at 2-45 p.m. (for the election of officers) and the **Mammals, Reptiles, Amphibians and Fishes Division** at 3-0 p.m. (for the election of officers).

The business from 3-15 onwards will include the following:

Report of Mammals, Reptiles, Amphibians and Fishes Division—Mrs. E. Hazelwood.
Interim report of Spurn Observatory—G. H. Ainsworth.
Interim report of Ornithological Division—R. Chislett.
Election of Officers.

Open discussion on observed effects of Myxamatosis—*Chairman:* J. C. S. Ellis.
Distribution of Freshwater Fish in Yorkshire Rivers by R. W. Ward, Fishery Officer to the Yorkshire Ouse River Board.

It is hoped to arrange an item additional to the above, but details are not yet available.

October 29th.—**The Entomological Section** and **The Freshwater Biology Committee** will meet together in the Committee Room at The Leeds Church Institute, Albion Place, at 2-0 p.m. Tea will be available at a small charge; members should bring sandwiches, etc. There will be an exhibition of specimens to which members are asked to contribute. Notes should be sent to the appropriate Recorders in time for inclusion in the reports.

November 5th.—**A Meeting of the Executive** will be held at 3-0 p.m. in the Large Committee Room on the first floor of the Parkinson Building of Leeds University. Entry is *via* the main entrance to the University from Woodhouse Lane.

December 3rd.—The **Annual Meeting of the Union** will be held at the **Tolson Memorial Museum, Huddersfield.**

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October 1st, 1955

THE

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Natural History for the North of England

EDITED BY

W. A. SLEDGE, Ph.D., B.Sc.,

THE UNIVERSITY, LEEDS,

with the assistance as referees in special departments of

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Mrs. A. HAZELWOOD.
W. D. HINCKS, D.Sc., F.R.E.S.
Mrs. ELSIE M. MOREHOUSE.
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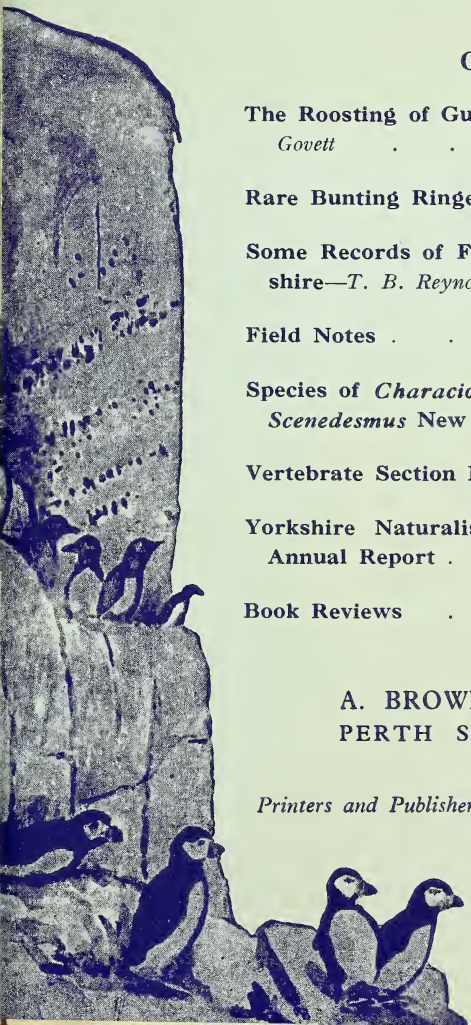

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Copies of Mr. A. A. Pearson's Papers Mycena, The Genus Lactarius, and The Genus Inocybe, and second editions of British Boleti and The Genus Russula may be obtained, price 2/6 each, and Mr. P. D. Orton's Cortinarius (Part 1) price 7/6, from the Editor of *The Naturalist.*

ENTOMOLOGIST'S MONTHLY MAGAZINE. Published Monthly at 4/- per issue (except special issues) Annual Subscription 25/- post free. Nathaniel Lloyd & Co., Ltd., Burrell Street, Blackfriars, London, S.E.1.

FOR SALE. *Mosses and Hepatics of North Yorkshire* by Matthew B. Slater, 1906. 5/- obtainable from the Editor of *The Naturalist.*

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Nobody has ever before attempted to produce an Encyclopedia such as the present one, which has condensed into one volume, arranged in alphabetical order, all the subjects on which those interested in bird life—from the amateur bird watcher to the serious student of ornithology—are likely to require information.

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[OVER

THE NATURALIST

FOR 1956

THE ROOSTING OF GULLS AT ECCUP RESERVOIR
(Winter of 1953-1954)

J. R. GOVETT

INTRODUCTION

Eccup Reservoir is a large reservoir of the Leeds Corporation approximately a quarter of a square mile in area and situated to the north of the city of Leeds between the valleys of the Aire and Wharfe rivers. It was decided that observations on the gulls roosting at the reservoir should be made as regularly as possible. This decision was prompted by the fact that large numbers had been observed on various occasions at the reservoir by other watchers and myself in previous winters. Also owing to flight lines being noted from several directions and large numbers flying to the reservoir after dark, it was suspected that the full extent of the roost had not been realised.

It was found that because large numbers of the gulls came in to roost as light was fading or after dark, a more accurate estimate of the number present could be obtained if the visits were made before dawn and the flight-off watched.

ESTIMATED NUMBERS AND PROPORTIONS OF THE SPECIES

Date	*Time*	*Total*	*B.H.**	*H.**	*L.B.B.**	*C.**
1953						
Sept. 12th	Dusk	20,000	30%		30%†	40%
Sept. 20th	Dusk	4,000	40%		20%	40%
Sept. 26th	Dusk	8,500	60%		30%	10%
Sept. 29th	Dusk	*c.* 9,000	Black-h. and Common present			
Oct. 11th	Dawn	10,000	80%		15%	5%
Oct. 11th	Dusk	30,000	80%		15%	5%
Oct. 17th	Dusk	15,000	49%	1%	25%	25%
Oct. 18th	Dawn	12,000	B.H. in majority, also C. & H/L.B.B. present.			
Oct. 18th	Dusk	4,000	45%		40%	15%
Oct. 25th	Dusk	15,000	58%		40%	2%
Nov. 1st	Dawn	10,000	50%		40%	10%
Nov. 7th	Dusk	4,000	79%		20%	1%
Nov. 8th	Dawn	6,000	90%	1%	5%	2%
					2% (imm.)	
Nov. 15th	Dawn	9,000	65%		30%	5%
Nov. 22nd	Dawn	8,000	45%	20%	25%	10%
Nov. 28th	Dusk	12,000	90%		9% (incldg. imm)	
						1%
Nov. 29th	Dawn	4,000	90%		5%	5%
Dec. 27th	Dawn	12,000	60%	3%	35%	2%
1954						
Jan. 3rd	Dawn	12,000	99%	1% others		
Jan. 10th	Dawn	15,000	95%		3%	2%
Jan. 16th	Dusk	4,000	93%	2%		5%
		(+ others coming in later)				
Jan. 17th	Dawn	18,000	80%	15%	5%	
Jan. 24th	Dawn	7,000	55%	35%	10%	
Jan. 30th	Dusk	12,000	60%	30%	20%	
Jan. 31st	Dusk	8,000	80%	4%		16%

* BH = Black-headed H = Herring LBB = Lesser Black-backed C = Common
† Bracketed means either immature Herring/LBB or the species counted together.

GREAT BLACK-BACKED GULLS.

Great Black-backed Gulls occurred fairly frequently. Below are listed the numbers recorded.

Sept. 20th	one adult	20.00 hrs.
Oct. 11th	two adults	06.30 hrs
Oct. 11th	four adults	15.00 hrs.
Oct. 17th	two adults	18.30 hrs.
Oct. 18th	four adults	17.30 hrs.
Nov. 15th	four adults	06.30 hrs.
Nov. 15th	ten adults	16.30 hrs.
Nov. 28th	twelve adults	16.15 hrs.
Nov. 29th	two adults	06.30 hrs.
Nov. 29th	three adults.	16.30 hrs.
Dec. 27th	three adults	06.30 hrs.
Jan. 3rd	one adult	07.00 hrs.
Jan. 10th	fifteen adults, seven immature	06.30 hrs.
Jan. 16th	one adult	16.30 hrs.
Jan. 30th	fifteen adults	16.30 hrs.
Jan. 31st	ten adults and ten immature	15.00–sundown.
Feb. 7th	two adults	11.45–12.15 hrs.
Feb. 20th	two adults, two immature	15.00–16.00 hrs.
Feb. 21st	four adults	18.15 hrs.
April 19th	three adults	18.15 hrs.

It will be seen from the figures quoted above that the numbers of birds roosting on the reservoir are large; larger in fact than would be expected by consulting previous records and comments in the county reports. I think the reason for this is that the numbers of gulls inland are definitely increasing. However, it should be emphasised that the full extent of a roost cannot be discovered unless the observer is present both as late and, more important, as early as possible.

In the period under review there seemed to be no marked build up of numbers; indeed they are remarkably fluctuating.

The Black-headed Gull is the most common species, overall at the roost never constituting less than 30 per cent. of the numbers and usually over 60 per cent.

ROOSTING

12*th Sept.* At 20.30 hours the first movement was noticed. Prior to this about two hundred Black-headed Gulls and about 120 Common Gulls were on the water. Gulls streamed in over the dam from the east and an estimate at 21.00 hrs. was 13,000. At dusk most of the birds were on the water, numbering about 20,000.

There is always much calling and excitement at dusk as the birds are settling into their roost, and this continues on into the night. There are then periods of definite calm but excitement grows again at about two hours before dawn.

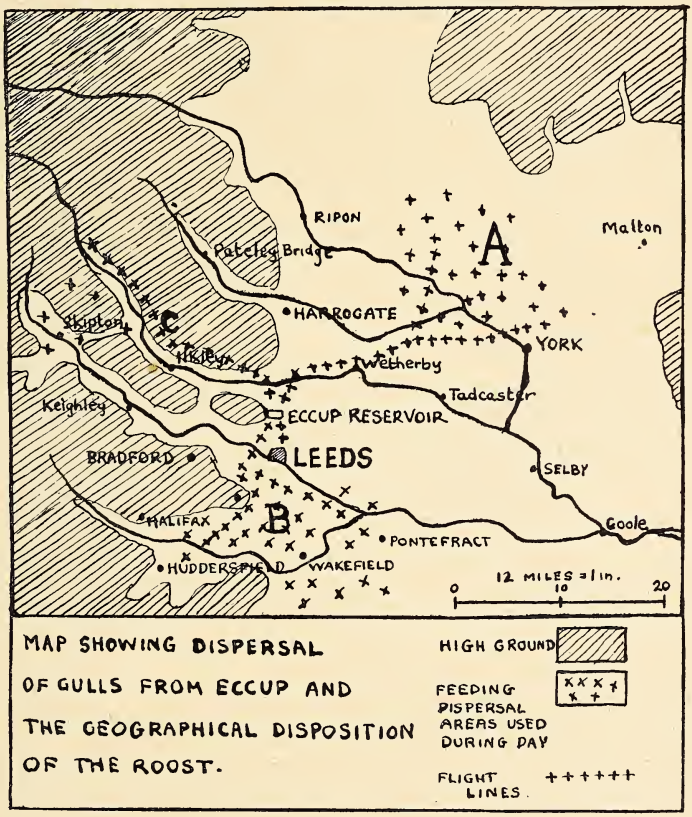
20*th Sept.* A few gulls started to drift in at 20.00 hrs. Total at dusk numbered only about 4,000.

23*rd Sept.* About 2,000 present at 17.30. One in three appeared immature amongst those flying to a gathering in a field. This was in a field near to the N.W. corner of the Reservoir and increased to about a thousand birds. The birds returned to this roost after several ' flight-ups '. A newly ploughed field to the west attracted attention but the gulls did not remain there. Few of the Herring Gulls appeared on the land roost; three to four thousand on the water increased later to about 5,000 with arrivals from the east and north-east. A general flight-up occurred after a Heron had flown over the ' raft '. About a thousand moved off north to a field about half a mile north and a shuttle movement developed between this group and those on the water. On this particular evening (light west wind) most birds came in from the east with a few coming from the south-east and a small number from the south and south-west. It appeared that incoming birds nearly always alighted on the water, and rarely flew direct to any land gathering. The arrival was maintained from the east throughout the period and incoming parties consisted mainly of one species.

Black-headed and Common Gulls have a habit of giving a wild Lapwing-display kind of flight on arrival in the roost area. This seems to be seen more frequently on windy days than on calm ones.

The size of incoming parties or flocks increased towards sundown. Several large flocks arrived from the east just prior to sunset, and the influx declined rapidly after sundown.

The roost to the north was apparently disturbed ten minutes after sundown, when about a thousand birds flew in low from the north. Their arrival disturbed those on the water, most of which took to the air with much calling. All then settled back on the water, with no sign of any returning to the land. The gulls were again disturbed by a Heron going over about twenty-five minutes after sunset, but they quickly returned to the water.



26*th Sept.* Incoming birds started to join the few birds already on the water (there always being a few gulls present throughout the day) at about 15.00 hours. At 18.30 the number was about 200, mostly Black-headed, this slowly built up from birds coming in steadily from the east and north-east to about 4000 at 2030 hours and a total of 8,500 at 21.30 hours.

27*th Sept.* Incoming birds started arriving at 15.00 hours. Lesser Black-backs were coming from the south and south-west and approached at a greater height. By 15.30 a small gathering of about a hundred had formed on a ploughed field half a mile to the north of the water but did not settle as a tractor and dog were present. The weather was fine with a light southerly breeze. Birds were slower to come in by 17.00 which possibly confirms that the observations of the 23rd showed an increase following S.W. gales. These excess birds may have dispersed by the 27th. The sporadic peaks of the Eccup roost point to an irregular use of the area as a roost

by most gulls. Gulls do not seem to have well-marked routines in their roosting habits and they may 'change their plans' quite frequently. This is especially noticeable in the use of certain fields, near the writer's home at Winn Moor, by gulls for roosting. A flock of Herring Gulls may frequent a certain field for three or four nights, then change to various other fields in the vicinity, eventually coming back on the first field to roost. This changing about does not, as far as can be seen, seem to be influenced by weather conditions.

11*th Oct.* First arrivals at about 15.00. At 16.10 hrs. about 2,000 gulls were on the water, about 40 per cent. of all species being immature. By 16.45 about six to seven thousand were congregated on the north shore ploughed fields and about two thousand were on the water. At 17.45 a large number came from the north shore fields on to the water. There was much flighting-up and wheeling around, the various species being well mixed. From 16.00 to 17.45 quite a lot of Black-headed Gulls and a few Lesser Black-backed Gulls came in from the south-west. At 17.45 the total roost was about thirty thousand in number.

25*th Oct.* Birds were already arriving at 14.00 hours in small numbers from the east. The majority of the early arrivals were Common Gulls, but as the afternoon passed Black-headed Gulls became by far the most numerous. The numbers from the east grew in strength with a slight trickle from the south and south-west. A slight influx occurred shortly from almost due west before the birds from the south came. This was almost certainly an offshoot of the main south and the south-west stream. A land roost of any size did not develop until 16.00, when about 250 birds gathered on the grass meadows in the N.W. corner. When this party was disturbed by human intrusion on the north shore the birds moving from the water in that direction returned to settle back there. At sundown a gathering on another field (the earlier one having dispersed) had built up to about 800, and following a silent flight-up this transferred to a neighbouring field. A movement then developed again from water to the land with a steady progression of the birds. About 150 Lesser Black-backs present however showed no inclination to join this movement. Towards dusk flocks of about fifty were coming in steadily from both south and east. Birds seen arriving were again noted to go straight on to the water, and none were seen to go direct on to the land. The land gathering started breaking up into flocks of about 500, some birds then returning to the land, but the majority moved down to the water. Three of these dispersals took place within about ten minutes when darkness had almost fallen, leaving about 250 birds on the land. By dark the number present was about ten thousand (17.15).

1*st Nov.* At 15.30 hrs. about 600 gulls were already present, with three small land gatherings established. About 200 were in a meadow on the north shore with about fifty in the neighbouring field. Conditions were poor with a fresh southerly wind and periods of driving rain, and on this occasion by far the majority came in from the south-west or due west (earlier in the afternoon about 150 had been seen in a ploughed field about a mile to the west of the reservoir). A few gulls came in from the east over the dam. Many arrivals, particularly those birds arriving with the wind, came in at a fair height and spiralled down on to the raft of gulls on the water. As usual there was much adjustment in the temporary land gatherings both in numbers and position. Eventually three parties combined in the field closest to the reservoir and at 16.45 numbered about a thousand. Most adjustments were made after flight-ups by one or more of the land gatherings. Arrivals continued more numerous from the south-west and west until about 16.30, when there was a rush from the east and this continued until dark. The land gathering on this occasion was not seen to come on to the water by dark, and another roost or gathering of about 400 located in a field at the west end and sheltered from the wind by a belt of trees, was still there although restless at nightfall.

15*th Nov.* The majority of the birds flew up the valley from the Harewood direction against a fresh wind (force 5 to 6) and came in low over the dam. No land gathering took place at all.

28*th Nov.* From 15.30 until 16.00 gulls were coming in continually from the east and north-east; also some from the north. At 16.00 about 4,000 came off the land on the north shore on to the water. The total roost of over 12,000 birds at 16.15 were in a large raft in the centre of the water.

16*th Jan.* At 16.00 hours gulls were streaming in from the east over the east lodge and collecting there on the water below the dam, with much drifting and resettling. Most came in at a moderate height, but a few Lesser Black-backed Gulls

came in at a great height. At 16.15 about 4,000 gulls were on the water. Whilst cycling back home through the Alwoodly and Shadwell district, parties of gulls were still seen moving towards Eccup at 17.00.

31*st Jan.* Gulls arriving from 16.00 to 16.30 from the south and south-west. Some influx from the east at sundown and many gulls were standing on the embankment of the north shore.

Morning Flight-off

11*th Oct.* 05.25 hrs. A large roost, Black-headed and Herring/Lesser Black-backed Gulls heard calling. First birds move off east and north with the main stream of continuous movement towards the sector east to north-east. The majority

FIG.1.

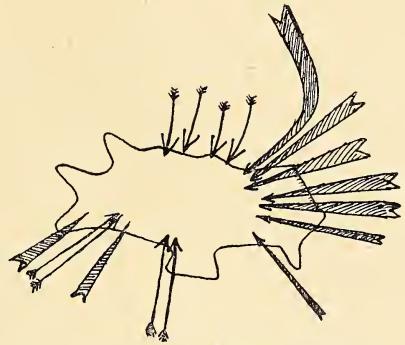
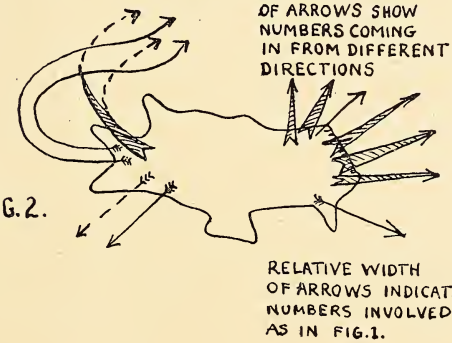


FIG.2.



made off in an east-north-east direction. The exodus was made by a series of flocks of medium size (*c.* 200) leaving at intervals of about four or five minutes. In fact, this was found to be the case nearly always. By about 06.10 only a hundred birds (mostly Black-heads) were remaining on the north shore in two parties, and another 250 on the water. The hundred on the shore then left easterly, the birds on the water leaving at 06.30.

18*th Oct.* At 05.30 the first gulls were noted moving off easterly. At 05.45 small parties of Black-heads went off, also easterly. At 05.50 the calling became much subdued, and silent flight-ups and wild chasings were noticed. By 06.00 there was a constant ' trickling ' off east and north, and restlessness had grown considerably; also gathering was occurring on the north shore beach. At 06.15 three thousand moved off independently or in small groups forming flocks of bigger proportions high up in the air when at about half a mile to a mile away from the reservoir. At 06.25 only two flocks of *ca.* 150 on the north shore and about a hundred on the water were all that remained, and by 06.30 all the gulls had gone except fifty at the west end of the water.

1*st Nov.* First movement was seen at 05.30, when a Lesser Black-backed Gull took off from the water and went away in an easterly direction over the dam. About a hundred gulls moved off at 05.40 towards the north-west, and by 06.30 a stream of birds was moving out. Movement continued until 07.05, when only 40 Black-heads remained on the water.

8*th Nov.* A very dark morning with a strong south-westerly wind blowing. At 05.00 hours Black-head and Herring/Lesser Black-back calls could be heard on the water. By 05.30 the calling had increased considerably. It was just beginning to get light when the first leavers went off E.N.E. at 06.40. The majority went at about 07.00 and by 07.15 all had left except ten Black-heads. The direction that most took was E.N.E. or North, bearing easterly. Just a few went south-west.

15*th Nov.* First movement was noted at 06.10. Majority left easterly and north-easterly.

22*nd Nov.* At 07.00 the first gulls left whilst it was not really light. From 07.00 gulls left continuously and mostly independently towards the north-east sector, the majority making in an E.N.E. direction. Much spiralling was noticed. At 07.15 about 3,000 were present, and at 07.30 most had gone.

29*th Nov.* At 06.30 (dawn just breaking) a strong south-westerly gale was blowing and only about 4,000 gulls were on the water, some were leaving over the dam at the east end of the water flying very low. At 07.00 movement occurred low over the water to the west end of the reservoir. The birds veered round when over the fields and finally departed in a northerly direction with much swinging and wheeling. All had gone by 07.40, when it was light but very dull.

27*th Dec.* The first movement was noted at 06.45. Dawn broke at 07.05, when most of the gulls had congregated to the dam. At 07.10 about seven thousand gulls all rose in the air together and moved off north-east over the dam. Between 07.10 and 07.40 some 5,000 gulls moved out in smaller parties (*c.* 600).

3*rd Jan.* Small numbers were moving out at 07.00 over the dam in an easterly direction. From 07.05 there was continuous trickling away of small numbers of Blackheaded Gulls in the direction between E.N.E. and E.S.E. At 07.25 restlessness developed with much movement up and down the reservoir low over the water, rather reminiscent of a wader flock, in packs of about five hundred each. A distinct concentration developed at the east and west ends of the water with a general movement to the east end. At 07.35 there was movement out in large numbers with erratic and spiralling movements. The main movement was as usual to the easterly quarter, with some between N.E. and S.E. About a third of the roost left about this time, and about a half of the roost left at 07.55. The remainder left in small numbers between 07.05 and 07.55.

17*th Jan.* At 07.25 the first movement was noticed when about 500 Black-headed Gulls slid out over the dam in a blinding snowstorm. The majority of the gulls congregated near the dam, presumably for shelter, and spiralled upwards, gaining height in the stormy wind, and then slipped down the Harewood valley.

24*th Jan.* The first gulls moved out at 07.05, when twenty Herring and seven Black-headed Gulls left over the dam to the east. The main roost had congregated in the bays at the west end and did not leave until it was well light (07.50), when they flew up the reservoir low over the water. At 07.50 about a thousand had congregated on the ploughed land on the north shore, and these moved off at 07.52. By 08.10 the whole roost had departed.

To summarise observations made so far we can say:

(1) Birds when coming in to roost tend to approach the roost mostly from the east, and they also leave for that direction in the morning.
(2) On arrival the birds land usually on the water joining any flocks already gathered, and later some disperse to temporary land gatherings.
(3) These temporary land gatherings are in a state of flux, with movement developing after ' flight-ups '.
(4) The land gatherings are mainly composed of Black-headed and Common Gulls; Lesser Black-backs and Herring Gulls showing a distinct tendency to remain on the water.
(5) The size of the arriving flocks show a marked influx at sundown; this is to some extent caused by the arrival of gatherings formed on fields at a mile or more distance from the reservoir.
(6) The land gatherings break up before dark and the birds finally roost on the water.

(7) Arrivals are usually first noticed about four hours before sundown. Both incoming and outgoing birds often exhibit excited spiralling behaviour, but this is most prevalent in the Black-headed Gull.

(8) The height of flight depends largely on the strength of the wind, a high wind and the birds fly low, skimming over the waves, a light breeze or calm day and the gulls fly at heights usually exceeding 200 feet.

(9) The species mix fairly freely but distinct tendencies as to preference of companions was noted. Black-headed Gulls tend to keep themselves apart or else mix with Common Gulls, but they are not keen on mixing with the larger species. Common Gulls mix the most freely of the species although, of course, 'pure' flocks are often seen. Black-backs and Herring Gulls mix quite freely as would be expected.

Origin of Gulls at Eccup in Winter

Some indication of the origin of gulls roosting at the reservoir in the winter is given by the ringing results quoted below:

Black-headed Gull found dead 30th January, 1954, had been ringed as a young bird on 8th June, 1952, at Barker, near Vasteras, Sweden. A Black-headed Gull found at Harewood Park (borders Eccup) on 26th February, 1934, had been ringed at the breeding place at Vik near Helsingfors, Finland, on 4th June, 1933. Other Black-headed Gulls ringed in Denmark and north and north-east thereof have been recovered in various parts of Yorkshire. A Herring Gull ringed off the Murmansk coast in July was shot in Leeds on 16th February, 1940.

An example of the Herring Gull race, *Larus argentatus omissus* Pleske was found dead at the reservoir on 21st November, 1948, by K. Brown. Scandinavian Lesser Black-backs *Larus fuscus fuscus*, turn up in most winters at the reservoir, and on 10th November, 1946, A. Gilpin saw about seventy there.

Regarding the immediate origins of the gulls coming into roost I can say something. I have kept records of flighting gulls in the area now for some years, and an examination of these, added to discussion with local bird watchers, has thrown some light on this aspect. The predominant direction of flight when the gulls come in at evening is from the north-east quarter. Whatever the weather or wind conditions, the majority of the birds come from the direction of the York Plain. The accompanying diagrams summarise the observations of the winter's watches, and the main directions of entry and exit are indicated by the relative thicknesses of the direction arrows. The map shows origin of the roosting gulls in the area. As has already been said, the birds converge in the evening to the roost from three main directions: north, north-east, and south or south-west. The birds from the north-east have come from their diurnal hunting grounds on the agricultural lands of the York Plain (area A). The majority appear to converge on the Wharfe in the neighbourhood of Wetherby and then make their way to Eccup along the Wharfe, cutting over Harewood. This northerly and north-easterly stream is augmented by birds which have spent the day in area C, the upper Wharfe Valley, and perhaps even the Skipton area, although this is not definitely established. Most of the gulls which spend the day in the industrial area B to the south of Leeds also roost in that area on the many flashes and reservoirs there, but a certain small proportion make their way north to roost at Eccup. The numbers that do this fluctuate considerably, and the reasons for their coming to Eccup in preference to roosting nearer to their feeding grounds, is obscure.

Acknowledgements

The writer wishes to thank Messrs. R. V. Jackson, K. G. Spencer, and A. H. B. Lee, together with many others who have helped with producing this paper.

A British Section of the International Union for the Study of Social Insects has now been formed. Membership is open to all those interested in any aspect of the study of gregarious or social insects. The subscription is ten shillings a year, which includes the membership fee for the International Union. Further information can be obtained from the Secretary, Dr. C. G. Butler, Bee Department, Rothamsted Lodge, Hatching Green, Harpenden, Herts., to whom application for membership should also be made.

RARE BUNTING RINGED AT SPURN

ROY CROSSLEY

The first Ortolan Bunting (*Emberiza hortulana*) to be ringed in Yorkshire was trapped at Spurn Bird Observatory on September 9th, 1955; this constitutes the seventh ringing record for the British Isles. Chislett in *Yorkshire Birds* (1952), and subsequent Y.N.U. annual Ornithological Reports, lists 13 records for the species in Yorkshire, of which five have been from the Spurn area. These Spurn records are all of single birds and occurred on the following dates: October 9th, 1944; September 15th, 1945; September 2nd, 1946; May 9th, 1947, and October 3rd, 1954. To the British Isles as a whole, the Ortolan is quite an uncommon visitor although it is regularly recorded, especially in autumn, on the east and south coasts.

The species is widely distributed throughout much of Europe and Asia, extending from the far north in Norway to the Mediterranean. It extends as far east as the Urals and Altai Mountains and in winter it occurs in North Africa.

We were unfortunate in not being able to watch the Ortolan at Spurn in the field. It was not noticed until caught in the Wire Dump trap along with a Dunnock and Tree Pipit and, at first glance through the glass of the trapping box, it was thought to be a Tree Pipit. Upon release, the bird flew strongly away and was not seen again.

In size the Ortolan approximates to the Reed Bunting but in colouring it is quite different. The Spurn bird was most probably a young female and so did not look like the usual paintings which appear in books and which are usually of adult birds. The dominant plumage colours were grey-brown and creamy buff and the head plumage closely corresponded with that in the *Handbook's* plate of bunting heads (*Handbook of British Birds*, Witherby et al. Vol. I, Plate 12). Along the crown, nape, mantle and rump, the feathers were generally grey-brown, streaked dark brown and russet, the striations becoming fainter on the rump. The wings were dark brown but white edgings to the median coverts and buff and white edgings to the scapulars created a pleasing pattern. The predominant colour of the underparts was a creamy buff, the chin being pale buff with dark brown streaks down each side and a broad, but short, cream moustachian stripe about 7 mm. long immediately above them. The upper breast was buffish streaked with dark brown, shading to a clear cream-buff on the belly. On the lower breast there was an orange tinge to the feathers. The flanks and under-tail coverts were sparsely streaked with dark brown. The tail feathers were dark brown, the outer and penultimate pairs having a white diagonal band across them extending upwards from the tip and forming an attractive pattern on the opened tail. The most striking features of the bird were the bright yellow orbital ring easily visible at seven yards distance, and the flesh-coloured beak. The legs also were flesh coloured.

Other details of plumage, measurements, and of wing formula were taken, and were recorded in the Spurn Observatory log and I am grateful to the Observatory Committee for permission to publish this article.

Certain features of the recent weather (and movements of other species caused thereby) may be of interest. During the first few days of September at Spurn, the wind had been mainly in a westerly quarter, but during the 6th it swung through north to east at force 2-3. The 7th was clear and mild with an easterly wind during most of the day, and the 8th was again clear and sunny, with an east wind force 2-5 veering to the south during the afternoon, becoming chilly and cloudy later. On the 9th the wind was again back to a westerly quarter increasing to force 7 in the evening with dark clouds but sunny periods.

Trapping and visible migration of passerines had been at rather a low ebb on the 6th and 7th, but after the east wind, which had lasted for over 36 hours, a definite increase in passage birds was noted on the morning of the 8th. During that day at the Warren trap the following birds were caught and ringed: four Pied Flycatchers, two Redstarts and one each of Sedge, Reed, Garden and Willow Warblers, Whitethroat and Bluethroat (*Cyanosylvia suecica*). On the 9th, trapping figures dropped, and only five birds were ringed during the day. The Ortolan, as noted above, was trapped at the Wire Dump along with a Tree Pipit and Dunnock, whilst at the Warren trap a Willow Warbler and Whitethroat were the only birds caught.

It would appear, therefore, that an influx of birds, some of them obviously of Continental origin, occurred during the night of the 7th/8th September after over 24 hours of light easterly winds and clear skies. The Ortolan and associated Tree Pipit also probably came in with that influx, and moving south, perhaps had not reached the area of Spurn Peninsula until about mid-day on the 9th.

SOME RECORDS OF FRESHWATER TRICLADS IN YORKSHIRE

T. B. REYNOLDSON
Zoology Department, University College of N. Wales. Bangor.

As part of an extensive survey of the pond and lake triclads of the British Isles several water-bodies in Yorkshire have been examined. Since there have been changes in nomenclature for the group and recent additions to the British fauna it was thought that freshwater biologists in the area may be interested in these records.

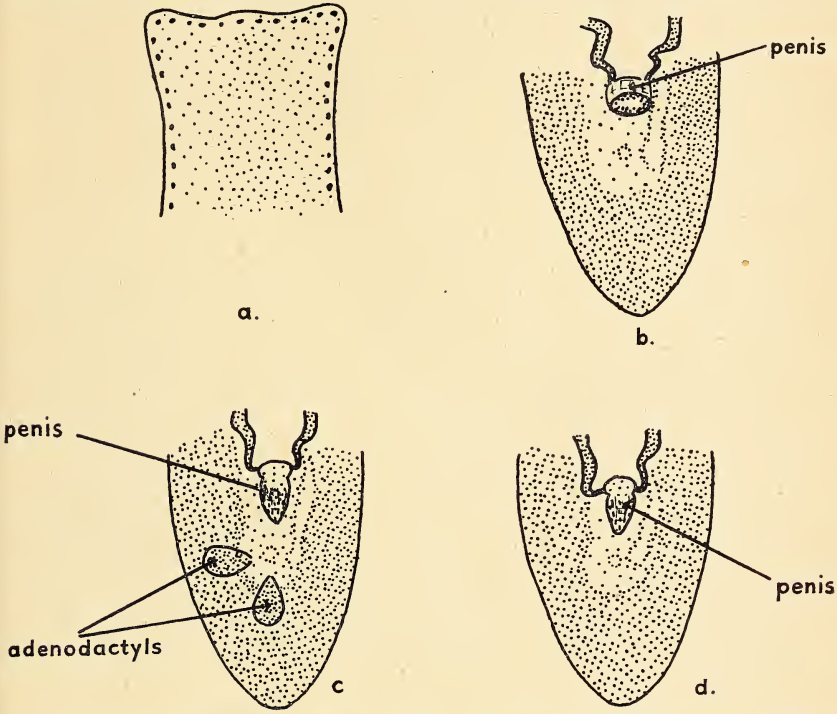


FIG. 1 *a*, Head of *Polycelis nigra*, *tenuis* and *hepta*. *b*, *c*, *d*, schematic drawings of the posterior reproductive organs of *nigra*, *tenuis* and *hepta* respectively.

Using Whitehead's list (1921–23) of freshwater triclads as a basis, changes in nomenclature are as follows:

Whitehead	Current
Polycelis cornuta (Johnson)	*Polycelis felina* (Dalyell)
Planaria alpina (Dana)	*Crenobia alpina* (Dana)
P. lugubris O. Schmidt	*Dugesia lugubris* (O. Schmidt)
P. polychroa O. Schmidt	*D. polychroa* (O. Schmidt)
P. gonocephala (Dugès)	*D. subtentaculata* (Draparnaud)
P. vitta Dugès	*Phagocata vitta* (Dugès)

It now seems improbable that *Dugesia subtentaculata* occurs in Britain (Dahm, 1955; Reynoldson—in press), but a superficially similar American triclad *D. tigrina* (Girard) has been recorded recently from four localities, two of them in Yorkshire. *Phagocata vitta* was first recorded from Britain by Carpenter (1926) under *Planaria albissima* Vejd. later corrected to *vitta* by Ullyott (1932). Actually, it is now proving to be common in Britain when searched for in the correct habitat.

It is now clear that species formerly identified as *Polycelis nigra* Ehrenb. may belong to one of three species, namely, *P. nigra*, *P. tenuis* Ijima, a species recognised recently in Britain (Reynoldson, 1948), or *P. hepta* E. H. and Y. Melander, a recently announced new species proving to be common in Britain (Melander, Melander and Reynoldson, 1954). Since all three species are superficially similar (Fig. 1a) it is

necessary to examine squashes of the posterior reproductive organs under the microscope for identification. Living material should be used for this and preparations are easily and quickly made by severing the posterior end immediately behind the mouth and gently squashing it under a cover glass with the ventral surface uppermost. The distinguishing features are the shape of the penis and the presence or absence of adenodactyls (=musculo-gland organs) as shown in Fig. 1.

The position of *Dugesia lugubris* and *D. polychroa* awaits clarification. Recently, Italian workers (Funaioli, 1951) have reached the conclusion on morphological and ecological grounds that they are one and the same species. However, there is evidence that there are differences in chromosome numbers and that the two types behave as good species in the laboratory (Dr. Y. Melander—private communication). The status of these two triclads in Britain is being studied. Thus the changes in the British fauna since Whitehead's publication can be summarised as follows:

Additions	Deletions
Polycelis tenuis Ijima	*Dugesia subtentaculata* (Draparnaud)
P. hepta E. H. and Y. Melander	
Dugesia tigrina (Girard)	
Phagocata vitta (Dugès)	

Six Yorkshire lakes have been searched for flatworms, four in the Malham area and two in the Leeds area. Since so few habitats are involved it seems more convenient to deal with each as a unit. In most cases the flatworms were collected from the undersurfaces of stones at the water's edge. Observations on the epizoic, peritrichous ciliates found on the flatworms, particularly on the genus *Polycelis* are also noted.

Five of the lakes tend to eutrophy and have a relatively high Ca content (>45 mgm/l.), the Eccup Reservoir water has not been analysed.

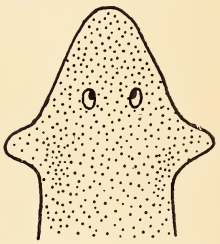
1. Tenley Lake (nr. Hellifield)—April 1951.
   Polycelis nigra—common
   P. hepta—common.
   Both species carried the epizoites *Trichodina steinii* C. & L. and *Urceolaria mitra* Von Sieb.
   Dugesia tigrina
2. Malham Tarn—April 1951.
   Polycelis nigra—common, carrying *T steinii.*
   Bdellocephala punctata (Pallas)—not collected by the author but recorded by Mr. P. F. Holmes usually from deeper water among *Chara* but occasionally inshore underneath stones just outside the splash zone.
3. Coniston Hall Lake (Coniston Cold, nr. Hellifield)–April 1951.
   Polycelis hepta—common.
   P. tenuis—common.
   Both carrying *T. steinii* and *U. mitra.*
   Dugesia tigrina
4. Eshton Tarn (between Eshton and Airton)—April 1951.
   Polycelis nigra—common on stems of emergent plants. Carrying *T. steinii.*
   A single specimen of *Dugesia lugubris* or *D. polychroa* collected from inflowing stream.
5. Harewood Hall Lake (Harewood)—August 1950.
   Polycelis nigra—common, with *T. steinii.*
   P. hepta—common, with *T. steinii* and *U. mitra.*
   P. tenuis—common with *T. steinii* and *U. mitra.*
   Dendrocoelum lacteum(Müll.)—common.
   Planaria torva M. Schultze—common.
   These five species were collected near the boat landing stage on the Hall side of the lake.
6. Eccup Reservoir (nr. Leeds).
   Two specimens of *Polycelis*, one of which was mature and identified as *P. hepta.*
7. Specimens almost certainly referable to *Ph. vitta* have been found in the Malham area by Mr. P. F. Holmes inhabiting a small calcareous stream on Great Close Mire, half a mile from the Tarn. They occur in the actual spring heads where the water is bubbling up and are probably most numerous underground. It is not possible to

be definitive about identification because they do not occur in a sexually mature state. However, the habitat is typical for *vitta*, and this species is also known to occur in polyploid races which cannot produce viable gametes (Dahm, 1949). Additionally, *Ph. albissima*, which is superficially similar, is reputed as very local in its distribution on the continent and unknown outside Central Europe and the Balkans (see Gislén, 1946, for references). Specimens almost certainly referable to *Ph. vitta* have been recorded previously from Yorkshire, near Leeds and at Pateley Bridge under *albissima* by Percival and Whitehead (1926).

The following species are new records for the county:

Polycelis tenuis
P. hepta
Planaria torva
Dugesia tigrina
Bdellocephala punctata.

The two *Polycelis* species will certainly prove to be widespread in Yorkshire when looked for in eutrophic ponds and lakes. *Planaria torva* is a rather infrequent member of the triclad fauna. Examination of more than a hundred lakes in various parts of the British Isles has shown it to occur in only three. One in England (Harewood), one in Scotland and one in N. Ireland. Additionally, Dr. Y. Melander has found a single specimen in a sample of triclads from Lake Windermere (private communication). It is fairly easily distinguished from other two-eyed planarians by the square, truncate anterior end and the possession of pigment. The very characteristic American species *Dugesia tigrina* (Fig. 2) has been known on the Continent for more than fifty years (Dahm, 1955), and it seems probable that the only two British records of *D. subtentaculata* (=*gonocephala*) by Whitehead (1914) and Ritchie (1915) refer to *tigrina* (Reynoldson—in press). It seems likely that introduction into Britain was by aquarists for *tigrina* is often seen in warm water aquaria. Its ability to survive in Britain is probably rather low since it thrives best at relatively high temperatures with an optimum in the region of 19–20° C. Dahm (1955) has found that it is relatively sensitive to rapid change in temperature. This may account for its disappearance from the E. London Waterworks (Whitehead, 1914) and from Beith (Ritchie, 1915) if their records were applicable to *tigrina*. The only other known occurrences of *tigrina* in Britain are distant, viz., R. Thames (nr. Reading) and R. Wye (nr. Whitchurch). It is interesting to note that all European (including British) records refer to an asexual, probably polyploid race of *tigrina* (Dahm, 1955). *Phagocata vitta* is probably widespread in Yorkshire and has been overlooked or confused with the similarly pigmentless species *Dendrocoelum lacteum*. It favours small streams on high ground formed by percolation, also springs and wells. *Bdellocephala punctata*, the largest of the British triclads, seems to be locally distributed and is only known to the author from some of the lakes in Cumberland, e.g. Blelham, Windermere and Esthwaite, and Wicken Fen. It seems to favour large water bodies. I am indebted to Mr. P. F. Holmes, M.A., for permission to quote his triclad records for the Malham area.



Head of *Dugesia tigrina*.
Fig. 2

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FIELD NOTES

Scarlet Grosbeak at Spurn.—A bird new to Yorkshire.—On September 16th, 1955, a Scarlet Grosbeak (*Carpodacus erythrinus*) was caught in one of the Spurn Bird Observatory traps. Whilst it was clinging to the netting of the trap it was seen to be of a general light brown colour with two conspicuous whitish wing bars and a very stout bill. Detailed measurement and plumage examination in the hand confirmed its identification as a female, probably adult, of this species. It is the first confirmed identification of this species in Yorkshire.

Force 3-5 north-westerly winds had been blowing for the two previous days and on the morning on which it was caught a Fieldfare (*Turdus pilaris*) was seen and a Ring Ouzel (*Turdus torquatus*) caught. Other migratory species seen or caught on the same day were Whinchat (*Saxicola rubetra*), Redstart (*Phoenicurus phoenicurus*), Willow Warbler (*Phylloscopus trochilus*) and Pied Flycatcher (*Muscicapa hypoleuca*). —Miss A. E. Leach, H. G. Brownlow, J. K. Fenton and M. M. B. Philpott.

An Albino Field Vole (*Microtis agrestis*).—It seems worthy of a note recording the fact that a pure albino specimen of the Common Field Vole (*Microtis agrestis hirtus*) was caught near Askern, Yorks., in November, 1955. A cat brought the specimen in from the fields and it was eventually brought into the Doncaster Museum, after having possibly been thought to be some boy's escaped pet mouse. The specimen was a male, with body measuring 8·7 cm. in total length, and the tail 15 cm. The specimen was not, therefore, quite fully adult. Records of albino or even piebald specimens in this species of mammal appear to be extremely rare.—E. F. Gilmour.

An addition to the Yorkshire Diptera List.—While collecting diptera on the Y.N.U. Excursion to Queen Mary's Dubb, Ripon (V.C. 64), on June 25th, 1955, I came across a single specimen of *Calobata ephippium* Fab., a member of the Tylidae (=Micropezidae). This subsequently proved to be new to the County List. Members of the family are often referred to as ' Stilt-legged Flies ' owing to their long, thin legs, which gives them a rather awkward gait.

Tylidae (=Micropezidae) are usually to be found on low vegetation on the banks of rivers and streams or in marshy places generally, where they are predatory upon other insects. *Trepidaria* species (of which *T. petronella* L. is common around Leeds) are recorded as preying on aphids and small Tipulidae. Very little appears to be known of the immature stages, but certain foreign species of the family are said to develop in rotten wood or decaying vegetable matter.

I am indebted to Mr. J. E. Collin of Newmarket for confirmation of my identification of *Calobata ephippium* Fab.—H. M. Russell.

Spiders at Allerthorpe Common.—During a visit to Allerthorpe Common on 21/8/55 by the Hull Scientific and Field Naturalist Club, several specimens of spiders were brought back for identification. Included within a batch was *Araneus marmoreus* Clerck which is usually very rare. According to Mr. Wade who was leader of the visiting party, the spider was present in some numbers. Also occurring frequently was *A. marmoreus* var. *pyramidatum* Clerck, which though by no means as rare, is generally uncommon.

It is curious that apparently *A. marmoreus* may occur frequently in one or two localities near York, but elsewhere in Britain is either an extreme rarity or is possibly absent. It differs from the variety in that there is no dark band on the dorsal folium of the abdomen, which otherwise is characteristic.—T. A. Geyer.

Field Work in Animal Biology, by **M. A. Besly and G. R. Meyer**. Pp. 68 with 7 text figures. Methuen & Co. 4/6.

Intended for high school and first-year university students in Australia, this small book will serve as a useful introduction to the animal ecology of freshwater streams, of rocky shores and of estuarine sand and mud flats. For each environment there are short sections of general application dealing with the physical conditions and the adaptations of the animals for feeding, respiration, attachment, the avoidance of desiccation and so on; these are followed by lists of the common Australian species or genera together with notes on their location and aids to their identification. Methods are suggested for studying the relationships between animals, and between animals and plants; for sampling populations and making surveys; and for correlating body form with habitat. Finally the authors suggest investigations which can be made in gardens, some with the emphasis upon direct observation of the animals.

J.R.L.

SPECIES OF *CHARACIOPSIS*, *PSEUDOSTAURASTRUM* AND *SCENEDESMUS* NEW TO BRITAIN

J. W. G. LUND
Freshwater Biological Association, Ambleside

Characiopsis curvata (? G. M. Smith) Skuja. Fig. 1, A–M.

The mature cells (to 12μ l and 4μ br) are lunate to reniform though one end is commonly broader than the other and may also lie in a different plane. At or close to one end, usually the wider one, there is a delicate broad stalk (to 4·5μ l. and 3μ br) in shape resembling a sack though the base may be shortly and irregularly

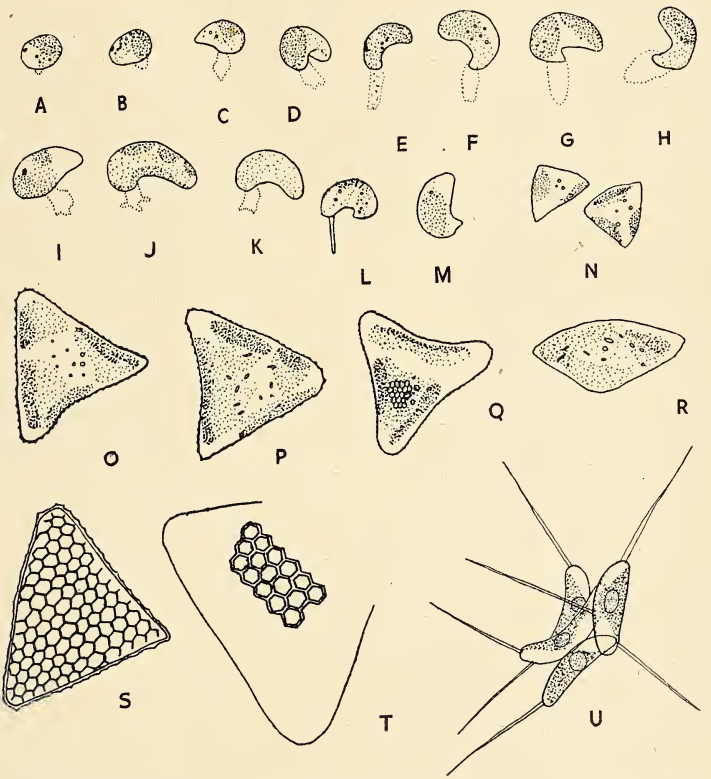

FIG. 1. *A–M. Characiopsis curvata* (? G. M. Smith) Skuja. *N–T. Pseudostaurastrum sculptum* (Geitl.) Bourr.; *N–Q, S, T,* seen from the broad and *R* from the narrow sides, *U. Scenedesmus anomalus* (G. M. Smith) Tiff. *S* and *T* mounted in 1 : 1 antimony bromide-piperine, the rest alive. *S* × 1580, *T* × 2400, the rest × 1250.

lobed (fig. 1, I-K) when it is reminiscent of the rhizopodial outgrowths produced by many of the naked motile Chrysophyceae. The smallest cells, presumably arising from zoospores, are ovoid to oblong with only a minute stalk (fig. 1, A, B). There are one to three pale greenish-yellow parietal chromatophores without pyrenoids. Oil is stored. There are no contractile vacuoles but occasionally a small reddish body which is presumably a stigma (fig. 1, A, B).

C. curvata is epiphytic on *Coelosphaerium naegelianum* Unger and rarely on other plankton algae in Loweswater, Cumberland. Though *C. naegelianum* is widespread in the English Lake District, this epiphyte has never been seen in any other body of water. It is sometimes abundant in Loweswater and has been observed every

year since 1944, though not on every occasion of sampling, and irrespective of whether *C. naegelianum* is abundant or rare.

The British specimens agree closely with the Swedish ones (Skuja 1948), though they are generally somewhat plumper and the stalk is neither of such a regular sacklike shape nor does it always narrow markedly close to the apex (e.g. Skuja 1948, Taf. 36, figs. 15-18). There can be no doubt, despite the absence of any knowledge of the zoospores or the presence of cysts, that this alga belongs to the Xanthophyceae. Skuja (1948) points out that *Characium curvatum* G. M. Smith (1918, 1920 c.f. also Teiling 1944, p. 51, fig. 125) is probably the same as *C. curvata* for the cells are of similar shape and size and also occur commonly on *Coelosphaerium naegelianum*. It is possible, therefore, that Smith's record of a pyrenoid and belief that his alga belonged to the Chlorophyceae are incorrect.

Pseudostaurastrum sculptum (Geitl.) Bourrelly 1951, p. 667 (*Goniochloris sculpta* Geitler, 1928). Fig. 1, N-T.

The broad faces of the discoid cells are triangular (12–16μ across from an angle to the opposing side) with plane, slightly convex or concave and serrate margins and angles varying from narrow and acute to broad and rounded (fig. 1, O–Q), while the narrow faces (*circa* 6–7μ br.) are more or less elliptic (fig. 1, R). The cell wall is regularly but shallowly pitted, the margins forming an hexagonal meshwork (fig. 1, S, T.) In old cells, the wall may be impregnated with iron or manganese or even more or less strongly silicified, it is also possible that it consists of two equal halves. There are two to four parietal and pale olive green chromatophores. Reproduction is by zoospores (not seen in the present material) or autospores. The young cells have delicate walls and usually more acute angles.

Occasional specimens were found on the dead leaves of ornamental grasses in a garden pond at Ellerhow, Ambleside.

Pascher (1937–38, pp. 607–32) has described several species, some of which do not differ very markedly from one another. In the present material there were specimens (e.g. fig. 1, Q) which may perhaps belong to *P. pulchrum* (Pasch.) Bourr. (*Goniochloris pulchra* Pascher 1938, p. 623), though there seemed to be no clear demarcation between cells with concave sides and widely rounded apices and those typical of *P. sculptum*. In general, the English specimens vary in shape to a similar degree to those in the original material (Geitler, 1928).

Scenedesmus anomalus (Smith) Ahlstrom and Tiffany in Tiffany, 1934, p. 69. (*Tetrastrum anomalum* G. M. Smith, 1926, p. 187), fig. 1, U.

The colonies contain two to eight, rarely sixteen, arcuate to lunate cells (10-12μ l.; 2·5–4·5μ br.) with widely rounded poles usually all lying in the same plane but sometimes (fig. 1, U) rather irregularly arranged. The cells are in pairs with the median part of the convex sides in contact (' back-to-back ') and two such pairs may be in one row, the adjacent cells of each separate pair with their poles touching or apart, but, in either case, opposing one another like two stomatal guard cells. In four-celled colonies, the two pairs are in two rows (Smith, 1926, pl. 15, fig. 27). When there are two rows of cells those of one usually lie directly above and may slightly overlap those of the other. The exterior cell of each row generally has a long spine (10–14μ) arising from one or both poles, rarely there is a second spine located to one side of the pole. Spines are more often present on exterior than on interior poles, and the same applies to the cells in the colony. The interior cells may all lack spines and rarely this is also so for one or two of the exterior cells. The parietal chromatophore lies on the concave side of the cells with a prominent medianly located pyrenoid.

A few specimens were found in August 1954 in an old gravel pit near Rickmansworth, Middlesex, used as a swimming pool (Rickmansworth Aquadrome). The cells were nearly always less regularly arranged than in Smith's (1926, pl. 15, figs. 21–27) American specimens which were always in the same plane. However, the size and shape of the cells, their arrangement in pairs, the spines and the type and location of the chromatophore with its large pyrenoid are all such that there can be no doubt as to the identity of this alga.

Though the colonies of *S. anomalus* may seem to be rather different from those typical of *Scenedesmus*, there are several species with curved cells and with colonies consisting of two rows of cells which are usually in the same plane though there too some irregularity may occur (e.g. Smith, 1926, Pl. 17, figs. 5–18, Chodat, 1926).

The suppression of the spines in the inner cells of a row is a common feature in *Scenedesmus* and, as here, the cells of two-celled colonies generally have the ornamentation of the outer cells of four to sixteen celled colonies. *Tetrastrum* Chod. (Ahlstrom and Tiffany, 1934) differs in that only four-celled colonies are formed. More than one group of four cells may of course be seen for a time after the mother colony has undergone reproduction, but it appears that they always separate later so that the compound colonies seen in species of *Crucigenia* Morren do not arise. Since Smith (1926) himself observed that up to sixteen autospores may be produced in his *Tetrastrum anomalum* so that the largest colonies are not compound, Ahlstrom and Tiffany's (Tiffany, 1934) transfer to *Scenedesmus* seems justified.

Scenedesmus helveticus Chodat, 1926, p. 206 (*S. quadricauda* (Turp.) Bréb. var. *helvetica* Dedus.—Scz.). (Fig. 2.)

The four cells of the colony (22-28μ l.; 14-18μ br.) are arranged in a single row. Each outer cell has a narrow wing or ridge (*circa* 1μ broad) directed outwards and running from pole to pole; it is finely and transversely striated and generally brown in colour. The inner two cells also have a ridge which is a more or less plicate and forms a continuous or discontinuous median longitudinal girdle round the cell. There is a long spine at each pole of each outer cell and sometimes also a short supplementary one. The poles of the inner cells generally have a short (1-3μ l.)

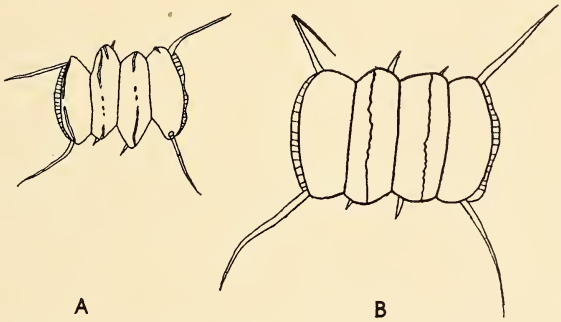

Fig. 2. *A, B. Scenedesmus helveticus* Chod. *A* × 640, *B* × 1250.

spine though occasionally this is absent or two may be present. The wall may have a few minute granules (see below).

This species was present in the same sample as *S. anomalus* described above.

S. helveticus differs from all other species except *S. oahuensis* (Lemm.) Smith (1916, p. 428) in the transversely striated wing to the outer cells. Dedusenko-Sczegoleva (1949) reduces *S. helveticus* to a variety of *S. quadricauda* but, quite apart from the general difficulty in classifying the taxa in this genus, the presence of longitudinal ridges is a difference which is easily seen and is quite as marked as those separating many of the generally recognized species.

Chodat (1926, p. 207) records and figures a few scattered granulations on the walls. In some of the cells of the present material a few minute brownish granules were seen, but I was unable to determine whether they were part of the wall or deposits of iron or manganese compounds.

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VERTEBRATE SECTION MEETINGS IN 1955

Some 80 members of the Union and Affiliated Societies attended the spring meeting of the Vertebrate Section in St. John's Parish Room, Leeds, on March 26th. This was preceded by meetings of the Wild Birds and Eggs Protection Acts Sub-Committee and the Ornithological Committee. The main business of the full meeting, which was presided over by the President of the Section, Mr. Rex Procter, was preceded by an appeal by the Secretary of the Ornithological Division for support for a protest to be sent to the Home Secretary against his proposal to remove protection from the eggs of some common species. A telegram was sent from the meeting to Whitehall in the Section's name.

The Annual Report for 1954, of the Spurn Bird Observatory and Ringing Committee was given by Mr. G. H. Ainsworth. The year's ringing results and details of outstanding observations were summarised. Mr. Ralph Chislett presented the 1954 Ornithological Report for the County, and commented on various aspects of the year's records.

A discussion on ' The validity of some British Races ' was introduced by Mr. Alfred Hazelwood, who brought skins along to illustrate his points. This was followed by a talk by Mr. G. K. Yeates, illustrated with slides, on his 1954 visit to Iceland in search of nesting Pink-feet. To close the meeting, Mr. Edward Skinner reported on the 1954 Ornithological Congress in Switzerland, which he had attended as the Union's representative.

Photographs by Arthur Gilpin, F.R.P.S., and paintings by Kenneth Dawson were on display.

The autumn meeting of the Section on October 22nd, 1955, was primarily devoted to other vertebrates. It was preceded by meetings of the Wild Birds and Eggs Protection Acts Sub-Committee, and the Ornithological Division. The Mammals, Reptiles, Amphibians and Fishes Division did not meet as there was no business to be taken. Over 60 members of the Union, and affiliated members, then heard Mr. Ainsworth give an Interim Report for 1955 on Spurn Observatory, and a similar Report from the Ornithological Division given by Mr. Chislett. The election of officers was considered and Mrs. E. Hazelwood was elected President of the Vertebrate Section for 1956.

Mr. J. C. S. Ellis took the Chair for an open discussion on ' The observed effects of myxomatosis '. Added interest was provided by the first-hand observations of Mr. Adam Gordon of Duncombe Park, Helmsley. ' The distribution of Freshwater Fish in Yorkshire Rivers ' was dealt with by R. W. Ward, Fishery Officer to the Ouse River Board, and a talk on ' Mammalian Skin ' by Dr. Jean Brust of Leeds University, concluded the meeting.

On this occasion, photographs by John Armitage, F.R.P.S., and paintings by John R. Govett were displayed.

Numerous questions indicated the interest aroused by the different topics at each of the meetings.

A. H. B. Lee,
Hon. Sec., Vertebrate Section.

THE YORKSHIRE NATURALISTS' UNION: NINETY-FOURTH ANNUAL REPORT

The Ninety-third Annual Meeting was held in The University of Sheffield on December 4th, 1954, by kind permission of the Vice-Chancellor and at the invitation of the Sorby Natural History Society.

The Presidential Address was delivered by the Rev. T. Basil Kitchen, F.R.E.S. on ' Byways in the Study of British Coleoptera '.

The Presidency for 1956 has been offered to and accepted by J. Grainger, B.Sc., Ph.D.

V.C. 61. Thixendale or Warterdale, July 14th.
V.C. 62. Pickering for Newtondale, June 30th-July 1st.
V.C. 63. Wentbridge, June 2nd.
V.C. 64. Grantley Hall, Ripon (Whitsun), May 19th-21st.
V.C. 65. Richmond, June 16th.

The Membership List.

The list of members published in 1954 contained a considerable number of errors and those known to the Assistant Treasurer and General Secretary are corrected below. At the same time, members joining over the last year, or who have resigned, are listed, together with changes of address.

At the time of writing membership of the Union comprises 2 Honorary Members, 17 Life Members, 368 Ordinary Members, and 30 Family Members.

Additions to the List of Members.

1955 Arveschoug, F., Wyville House, The Lawns, Slingsby, York.
1954 Bartolome, J. F. M. de, 405 Fulwood Road, Sheffield 10.
1955 Bates, S. S., 311 Huddersfield Road, Stalybridge.
1949 Baxter, G. V., 2 St. Peter's Street, Huddersfield.
1955 Blackwell, Miss L. M., ' Woodsome Lees,' Kirkburton, nr. Huddersfield (Family Member).
1955 Bland, Miss B. H., Green Tree Cottage, Strensall, York.
1955 Borrett, J. A. S., 16 Newlands Drive, Beckfield Lane, Acomb, York.
1943 Bradfer-Lawrence, H. L., Sharow End, Ripon (has appeared under Lawrence).
1955 Brierley, F., 62 Ramsden Street, Huddersfield.
1955 Brown, G., 29 Hermitage Road, Bridlington.
1955 Burley, J., 16 Harewood Road, Doncaster.
1949 Crawshaw, A. R., 10 Fairfield Road, Toller Lane, Bradford (Family Member).
1948 Davis, Peter E., ' Croyde,' Layton Road, Horsforth, nr. Leeds.
— Doncaster Art Gallery and Museum, Waterdale, Doncaster.
1955 Dufty, Miss Ethel, 86 Jubilee Road, Doncaster.
1955 Elliott, Mrs. G., M.Sc., Penn House, St. Mary's, York.
1955 Fenton, J. K., 78 Moorland Road, Thornbury, Bradford.
1955 Fletcher, Mrs. H. E., Garden Cottage, 62 Slaithwaite Road, Meltham, Huddersfield.
1955 Garnett, Mrs. E. L., Whitby Gate, Thornton-le-Dale (Family Member).
1955 Geyer, T. A., 84 Wolfreton Lane, Willerby, E. Yorks.
1955 Grayson, A. L., 17 St. John's Square, Wakefield.
1954 Green, Mrs. M. I., Grange Cottage, Grindleford, Sheffield.
1952 Greensmith, L. A., 24 Woodland Drive, Anlaby, E. Yorks.
1947 Griffith, F. C., 12 Park Avenue, Sprotbro', Doncaster.
1955 Hague, J. B., 170 Doncaster Road, Mexborough.
1955 Harrison, F. E., 2 St. Peter's Grove, York.
1955 Hirst, Mrs. E., ' Monrovia,' Woodhouse Lane, Brighouse (Family Member).
1955 Houseman, Mrs. F., 115 Bradford Road, Otley.
1955 Jackson, E. E., Market Place, Masham, nr. Ripon.
1955 Jackson, Mrs. Marjorie, Thorpfield, Thirsk.
1955 Jefferson, P., M.Sc., ' Farndale,' Simkin Lane, Mapperley, Nottingham.
1955 Johnson, A., 61 Guildford Avenue, Hull.

1955 Kitchen, Mrs. T. B., The Vicarage, Howden (Family Member).
1955 Lee, Anthony H. B., 25 Church Wood Avenue, Far Headingley, Leeds 16.
1947 Leefe, Raymond A., Langton Road, Norton, Malton.
1948 Malham Tarn Field Centre, Settle.
1945 Payne, Mrs. K. G., West Dene, Manor Heath, Copmanthorpe (Family Member).
1955 Pashby, B., 3 St. Ann's Place, Napier Terrace, Norfolk Street, Hull.
1955 Pickard, B. C., The Chapel House, Highbridge, East Leigh, Hants.
1955 Pickup, Dr. J. D., Surrey House, Carleton, Pontefract.
1929 Sheffield City Museum, Weston Park, Sheffield 10.
1955 Sterne, E. C., 4 Howard Avenue, Leeds 15.
1955 Tannett, P. G., 16 Gledhow Wood Avenue, Leeds 8.
1955 Waters, Miss Dorothy, 17 South Crescent, Topcliffe Road, Thirsk.
1955 Watson, T., Jessamine House, Aberford, Leeds.
1955 Watson, Miss Pauline, B.Sc., Botany Dept., University, Durham.
1955 Werth, Miss Irene, M.A., Zoology Dept., University, Leeds 2.
1956 Wilkinson, G., 26 Cavendish Street, Harrogate.
1951 Wilson, Miss A. B., ' Ridgemont,' Hartley Avenue, Leeds 6 (Family Member).
1955 Wrigley, T. C., 3 West Avenue, Dairy Lea Lane, Huddersfield.

Changes of Address and Corrections.

Andrews, Miss M., County of Stafford Training College, Nelson Hall, Stafford.
Appleyard, Mrs. J., 49 Fore Street, Budleigh Salterton, Devon.
Blakey, Miss R. S., Sunny Croft, Huddersfield Road, Brighouse.
Bradfer-Lawrence, H. L. (not Lawrence, Bradfer, H. L.).
Fearnley, W. F., ' Foyle,' King's Road, Ilkley.
Goodin, A. W. (not Goodwin).
Gilmour, E. F. (not Gilmoor).
Hemingway, G. E. C., Gwernyfed Park, Three Cocks, Brecon.
Imrie, Miss J. L., The Hall, Cononley, Keighley.
Jackson, E. W., F.G.S., ' Woodhill,' Saltburn-by-the-Sea.
Kennedy, Mrs. M. M. (formerly Miss M. M. Bartle), 'Deepdale,' Westville Avenue, Ilkley.
Leach, J. H., M.B.O.U., 8 Elm Grove, Bare, Morecambe and Heysham, Lancs.
Lewis, R., ' Nant-y-glyn,' Henryd Road, Gyffin, Conway, Caers.
Mainprise, S. L. F. (not Mainprize).
Martin, S., Add Westfield Park, Brough, to address.
Mellor, Miss J., Itteringham Mill, Itteringham, nr. Norwich, Norfolk.
Morrison, A., ' Meadowcroft,' Froggatt, Sheffield.
Nicholas, W. W., 1 The Mount, West Ayton, Scarborough.
Norris, J. R., 22 Hessle Mount, Leeds 6.
Phillips, Mrs. McGregor, 42 Ann Street, Edinburgh 4.
Pinder, Miss B. J., 6 Hyde Park, King Cross, Halifax.
Russell, H. M., 113 Hollyshaw Lane, Whitkirk, Leeds 15.
Shaw, R. M., c/o Falkland Island Co., Ltd., Port Stanley, Falkland Islands.
Sheffield City Library (not Central Free Library).
Slater, F., 3 Whitewall Wood, Walmersley, Bury, Lancs.
Smith, A. H. U., 206 Psalter Lane, Brincliffe, Sheffield 11.
Stubbs, F. B., B.Sc., F.R.H.S., ' St. Aubyns,' Wheatley Lane Road, Barrowford Road, Nelson, Lancs.
Thwaites, W. A., 6 Endor Crescent, Burley-in-Wharfedale.
Walker, D. F., 7 Glen View Drive, New Close, Shipley.
Wildblood, T. J., 5 Holt Close, Adel, Leeds 16.
Williamson, H. J., ' Bankfield,' Victoria Avenue, Ilkley.
Wilkinson, Mrs. T. is a Family Member.

Members who have resigned, or whose names have been retained in error.

Airey, A. F., Windermere.
Allison, F. R., Leeds.
Axon, Sydney, and Mrs., Grassington.
Baggaley, J. W., Sheffield.
Brown, J., Sheffield.
Burch, Miss D. V. (formerly of Ripon).
Carr, Mrs. L., Sheffield.
Clayson, D. B., Mr. and Mrs., Leeds.
Donnan, Mrs. J. V. (formerly of Leeds).
Eastwood, Dr. J.,Queensbury.
Filmer, A. W., Hull.
Flint, Dr. E. A. (formerly of Hull).

Frost, Miss L. W., Salford.
Haigh, J. A., Goole.
Hall, R. H., Buxton.
Hancock Museum, Newcastle.
Hazelhurst, Mrs. M., Bradford.
Hepworth, N. M., Thirsk.
Hewett, P. D., North Harrow.
Hillaby, A. E., Driffield.
Hillas, Col. K. N., Willerby.
Holmes, P. F., Malham (enter instead Malham Tarn Field, Centre).
Howarth, H., Wakefield.
Hull University Library.
Hutchinson, W. H. H., and Mrs., Cottingham.
Iles, D. B., Guiseley.
Jackson, H. E., Hull.
Kenyon, P. S., Donegal.
Lapper, Miss M., Malham.
Legge, Miss C. M., Rotherham.
Lovett. Mrs. M. Leeds.
Macmillan, W. E. F., Danby (deceased).
McAllister, A. S., Hull.
Merton, L. H. F., London.
Miller, J. R., Arthington.
Mitchell, C. A., Mytholmroyd.
Morpeth, Lord, Coneysthorpe.
Morten, Mrs. M. (*nee* Norris), Leeds.
Murgatroyd, J. H., Bournemouth.
Odgers, M., Bridlington.
Potter, C. H., Thirsk.
Rimington, F. C., Scarborough.
Rushforth, D. A., Drighlinton.
Scorer, K., Shipley.
Shires, G. L., Sheffield.
Skinner, J. C., Bradford.
Smedley, N., Doncaster.
Spark, L. C., Dr., Leeds.
Sunderland, N., Leeds.
Taylor, F. T., Leeds 6.
Tetley, Miss F. N., Boston Spa.
Unne, Miss E., Harrogate.
Urquhart, Little Weighton, Hull.
Walker, C. S., West Ella.
Walsh, Dr. A. D., Adel.
Wilson, A., Inverness.
Wood, J., Keighley.
Wood, Miss Mabel, Eston.

Affiliated Societies—Additions.

1955 Otley Naturalists' Society: Mrs. F. Houseman, 115 Bradford Road, Otley.
Scarborough Philosophical and Archaeological Society.

Corrections.

Austwick and District Field Club. Secretary now Miss D. Harrison, Wharfhouse Farm, Austwick.
Barnsley Naturalists and Scientific Society.
Bradford Microscopical Society: S. C. Mitchell.
Darlington and Teesdale Naturalists' Field Club, Secretary now F. N. Scaling, 17 West Auckland Road, Darlington.
Halifax Scientific Society: M. J. Copley, 20 Park View, Hopwood Lane, Halifax.
Harrogate and District Naturalist and Scientific Society. Secretary now J. C. A. Rathmell, 9 Hyde Park, Knaresborough.
Hull Scientific and Field Naturalists' Club. Secretary now C. Porter, ' Halcyon,' Ganstead Lane, Bilton, Hull.
Keighley Natural History and Literary Society: Miss M. Greenwood, 5 (not 6) Otterburn Street, Keighley.
Sorby Natural History Society: T. L. C. Bottomley, 23 Ryegate Crescent, Sheffield 10.
Wharfedale Naturalists' Society: Secretary, Mrs. M. M. Kennedy (formerly Miss M. M. Bartle), Withybush, Manley Road, Ben Rydding, Ilkley.
Whitby Naturalists' Club. Secretary now P. Hickman, 18 Love Lane, Whitby.
York and District Field Naturalists' Society. Secretary now B. Dale, ' Dunnock,' Bransdale Crescent, Osbaldwick.

GENERAL REPORT

During the year an effort was made to distribute information about the Union to the members of Affiliated Societies. This arose out of a suggestion made at the Annual Meeting in Sheffield that for this year only the Associate Members' cards should be sent directly to those members by the Union. This matter was dealt with by a sub-committee of the Executive appointed ' to make the Union known among the Affiliated Societies.' To facilitate the work of this sub-committee a preliminary letter of enquiry was sent to the Secretary of each of the 36 Societies affiliated to the Union. The Secretaries of 21 Societies replied to this letter and of them five Societies supplied lists of their members and 16 others requested Associates' Cards

and copies of the letter mentioned below for distribution to their members through their usual channels. Four hundred and seventy cards and letters were sent to members of the above five Societies and for carrying out the work involved in this we are indebted to Rev. T. Basil Kitchen. In all, 1,500 copies of the letter and 1,500 extra cards were distributed.

The letter accompanying each card reminded associate members of their right to attend all sectional meetings, all excursions and the annual meeting and invited them to submit reports on their observations and collections to the appropriate Union recorders.

The whole of the cost of printing involved in this effort to spread information about the Union has, most generously, been paid for by our President, Mr. E. W. Taylor, and so the cost to the Union has been very little.

The response to the question put to the Secretaries of Affiliated Societies as to how the Y.N.U. might make itself more useful to their members was disappointing. Only five replies were received.

It is not easy to assess the effect of the effort ' to make the Union known ' on the attendances at the summer meetings. No figures seem to have been kept prior to this year, but it appears that there were rather better attendances than usual throughout the summer. This was particularly evident at Carperby where 50 members assembled.

During the year a second sub-committee was appointed by the Executive, its terms of reference being ' to report on the organisation of the Union into Sections and Committees and on Representation on the Executive '. The function of this Committee was purely to report on the present position—not to propose or oppose changes. The sub-committee presented its report to the Executive meeting of November 5th. Consideration of action to be taken on points arising from this report was deferred until a later meeting.

A valuable library of books on natural history has been offered to the Union by Mrs. K. E. Formby of King's Copse House, Blackfield, Hants. They belonged to her husband the late Commander Hesketh Formby, R.N. The offer was received through the President, Mr. E. W. Taylor, and Mr. T. B. Kitchen called to see the library while in the south of England. The Executive has accepted Mrs. Formby's generous offer on behalf of the Union and negotiations are in progress for the housing of this collection in Leeds.

SECTION A—GENERAL BIOLOGY

Freshwater Biology (E. Thompson).—With the loss of two very active workers little is being done at present on the freshwater fauna of our county, and very few records are at hand.

Mention must be made of the very important paper by Mr. G. Fryer which appeared in the July number of *The Naturalist*. This paper on the Crustacea of the Huddersfield District is most welcome, and will be valued and read far beyond the borders of Yorkshire.

During the year the writer of these notes spent a few days at Ripley where conditions were good. The Angler's Curse, *Caenis macrura* Stephens was most common. The duns of *Ephemerella ignita* Poda were out by June, most of the big hatchings taking place at dusk. *Baëtis rhodani* Pictet was for the taking on most days. *Heptagenia sulphurea* Mueller at Ripley seems more numerous in the slow-flowing stretch of the Nidd before it reaches the weir.

Knowledge of the distribution of the Crayfish is still not complete as far as our county is concerned, and it was most pleasing to find them in huge numbers at Ripley. They favour a small stream that enters the Nidd below Killinghall Mills.

Around Dewsbury the usual freshwater insects have been numerous. The caddis *Agapetus fuscipes* Curtis was most abundant at Coxley, where specimens could be swept all the way upstream.

SECTION B—VERTEBRATE ZOOLOGY

Ornithology: Interim Report (Ralph Chislett): At the meeting on March 26th, after the Report for 1954 had been approved, Alfred Hazelwood spoke on ' The Validity of some British Records ' and G. K. Yeates described his experiences with the Pink-footed Goose and other species, illustrating his remarks with a superb

collection of photographic slides. The 1954 report was reprinted and circulated after publication in the April *Naturalist.*

The early months of 1955 were severe, and more Whooper and Bewick's Swans appeared in the southern half of the county than usual. Heavy snow compelled hasty departure from Grantley Hall on January 16th where many members attended a week-end meeting organised by the B.T.O. Those who travelled by road to a B.T.O. meeting at Kent's Bank (March 19th-21st) found Pennine roads still lined by dritted snow. Spring frosts occurred into June causing desertion of some nests, and with small families produced by other pairs of birds.

Single pairs of Raven and Peregrine Falcon reared young. Several pairs of Buzzards produced two young. Myxomatosis reached the moorland Rabbits in lower Wensleydale in spring, and became rife higher up the dale in the summer. The disappearance of the smaller of two Buzzard chicks from one nest could have been caused by food-shortage. Absence of Rabbits will have many repercussions.

Little or no rain fell over wide areas after early July, and water-levels were still falling in late October. Immigrant summer passage waders found no flooded fields this year; but more mud was available around half-empty reservoirs. Several Spotted Redshanks were recorded. A Red-necked Phalarope occurred in south Yorkshire in late September, and a Grey Phalarope on Chelker Reservoir in late October.

The Spurn Bird Observatory is completing a good year. The need always to have a competent person in charge has been met fairly well except for short periods. Over 2,000 birds have been ringed. Additions to the list of species ringed included a Jack Snipe, a Long-eared Owl, a Storm Petrel, and an Ortolam Bunting. To add a new species to the county list seems to be becoming a habit: this year it was a Scarlet Grosbeak, a female of which was fortunately caught, ringed, and examined in detail.

An area of the upper Humber has been declared a sanctuary for birds and it is hoped the Geese will benefit. The Humber Wildfowl Refuge Committee is composed of six representatives each from wildfowlers' and from naturalists' organisations in Lincolnshire and Yorkshire. The meetings were attended by our officials. Our thanks are due especially to Mr. E. M. Nicholson, the energetic Director of the Nature Conservancy.

Arrangements for an area in central Yorkshire to be declared a Nature Reserve are well advanced.

Members are requested to send in any notes of importance for use in the 1955 Annual Report well before the year end, and any later ones by the end of the second week in January.

SECTION C—CONCHOLOGY

Conchology (Mrs. E. M. Morehouse): The drought this year has been disastrous from the point of view of records of terrestrial Molluscs. Among the few records received is one of a colony of *Helix aspersa* Müll. in Coxley Valley. Mr. A. Smith found *Acme lineata* Drap. and *Lauria anglica* Fér. and says that *Paludestrina jenkinsi* Smith is prolific in the county. Mr. E. Robinson noted *Helix hortensis* Müll. on May 21st in Shelf Woods from the sub-soil near a small area of tufa limestone but no live specimens were seen. In the past, some of the *Xonitidae* have been seen here. Mr. E. Thompson says *Driessensia polymorpha* Pallas is well established in New Miller Dam, Newton Ings, where ' huge numbers ' of *Physa fontinalis* L. were seen. Mr. H. Lumb found *Limnaea stagnalis* (L.) var. *variegata* Hazay. The animal as well as its shell was banded. Mr. Robinson says that though in previous years *Ancylus fluviatilis* Müll. and *Limnaea pereger* Müll. have been found in the streams of Royds Hall Woods, none were seen this year and he thinks that an abundance of Leeches may account for this. K. Lloyd found a shell of *L. pereger* L. 46 mm. high in the lake at Byram Park. All the *Limnaea* seen had egg capsules on them.

SECTION D—ENTOMOLOGY

Coleoptera (Rev. T. B. Kitchen): Owing to circumstances arising from the recent change of recorder and from other causes this report will appear later.

Lepidoptera (E. Dearing and F. Hewson): All who sent in reports are agreed that the first half of the year was a very poor one for Butterflies, and it was not until July that numbers approached normal.

W. Beck, of Knaresborough, writes that all local Butterflies were much less numerous apart from *Euchloe cardamines* L. (Orange Tip), which was plentiful in its several localities. W. G. Bramley reported from Pickering that most insects were late in appearance in the early part of the year, only one *Hamearis lucina* L. (Duke of Burgundy Fritillary) had been seen by Whit Sunday, May 29th. *Vanessa io* L. (Peacock) was scarce throughout the season, but *V. atalanta* L. (Red Admiral) has been more observed this autumn than for some years. Considerable numbers of 'Whites' frequented a field of lucerne in late August and September but *Brassicas* in gardens have not suffered.

R. S. Pollard, Recorder for the Scarborough Field Naturalists' Society, states: 'In the Scarborough area the late spring, marked as it was by recurring spells of cold and wet weather, had a marked effect on the successful spring emergence of insects, and even our common species were remarkably scarce in early summer. *Pieris rapae* L. (Small White), *Aglais urticae* L. (Small Tortoiseshell) and *Dira megera* L. (Wall) were not recorded until June 1st and then only in small numbers. *Vanessa io* and *Pieris brassicae* L. (Large White) were very scarce and there were only four reports of *Vanessa atalanta* and two of *Augiades venata* Br. & Gr. (Large Skipper). Late summer hatchings, coupled with immigrations, showed a marked improvement and from the end of July *A. urticae* and *Pieris rapae* began and continued to appear in immense numbers. From the middle of August there were swarms of *Dira megera*. From the end of August to mid-October *Vanessa atalanta* was in greater numbers than I ever remember them. *Maniola jurtina* L. (Meadow Brown) was very plentiful from 21/7 to 16/8 and *Lycaena phlaeas* (Small Copper) fairly common from 15/8 to 30/8.'

H. Foster, in a report from Halifax, mentions that there had been a large influx of *Pieris brassicae* and that from the last week in August *Vanessa atalanta* and *Aglais urticae* abounded. No *Vanessia io* had been noted during the season. W. Greaves, of Halifax, reports that he has never seen so many 'Whites' as have occurred in his garden this autumn.

The outstanding feature of the year has been the occurrence of *Celerio galii* von Rott. (Bedstraw Hawkmoth), which has been nation-wide, but whereas almost all our previous county records are of the moth all those to hand for this year are of larvae.

On September 2nd a fully-fed larva was found in the grounds of the Bradford Grammar School by Peter Falkingham and taken to the Cartwright Memorial Hall Museum.

On September 2nd a fully-fed larva was found in the grounds of the Bradford larvae from the yard of Farnley Fireclay Works, Leeds, and these pupated shortly afterwards. Another big larva reached the Museum on September 30th, found by J. Abbott in the yard of Clayton's Ironworks, South Leeds. Two days later Mr. John Armitage, Keeper of Biology at the Museum, visited the yard but failed to find anything on the herbage. However, upon being directed to some weed-grown ground near the firm's sports field he found six half-grown larvae, obviously from a different brood. It is interesting to note that the six were lying conspicuously on the tips of secondary shoots, basking in the early afternoon sunshine. Mr. P. Forder also visited Clayton's yard that afternoon and succeeded in finding a big larva, another was sent to him a few days later, and on October 14th he found two more. A total of eleven larvae from Clayton's yard yielded ten pupae.

Mrs. Watson, of Wakefield Girls' High School, told Mr. Armitage that a yellow spotted hawkmoth larva found in Silcoates Street had since pupated. S. Rowntree reports that two larvae had been taken to the Scarborough Natural History Museum, and Mr. John Seago has a pupa resulting from a larva found at Darfield, near Doncaster. This brings the total to seventeen pupae from eighteen larvae found in the county.

In all cases where the foodplant has been noted (twelve larvae, three localities) it is reported as being *Epilobium angustifolium* L. (Rosebay Willowherb) and since this is now so much more widespread than at the last 'Galii Year' of 1888 it is interesting to speculate as to whether *galii* may now become established here.

Fully-grown larvae of *Acherontia atropos* L. (Death's Head Hawk) were found wandering at Pudsey (August 17th), at Armley (August 17th) and near Pudsey (August 20th), these were taken to the City Museum, Leeds, and two moths emerged towards the end of September. Two larvae found at Stanningley on September 1st were taken to the Cartwright Memorial Hall Museum.

G. E. Hyde informs us that exhaustive searching in one area near Doncaster resulted in the finding of five larvae of *Hemaris fuciformis* L. (Broad-Bordered Bee Hawk). This was in July, and the larvae varied in size from about one-third grown to nearly mature. He has also seen one half-grown larva of *Smerinthus ocellata* L. (Eyed Hawk) but made no special effort to find more. Mrs. M. Robertshaw reports a *Macroglossa stellatarum* L. (Humming-Bird Hawk) at Haworth on September 20th.

Captures with a Mercury Vapour Light-trap at Knaresborough by W. Beck include *Plusia bractea* Schiff. (Gold Spangle), July 7th; *Zeuzera pyrina* L. (Leopard), July 22nd and 25th; and *Thalpophila matura* Hufn. (Straw Underwing), July 29th.

J. Briggs continues to run a Mercury Vapour Light-trap at Little Horton, Bradford, taking weather data and making exact counts of species and specimens, and his most interesting record is of one *Heliothis peltigera* Schiff. (Bordered Straw) on August 26th. We have only three previous records. He took one *Chloroclystis rectangulata* L. (Green Pug) on July 12th (also six at Askham Bog on July 24th). His other captures include two *Panolis griseovariegata* Goeze (Pine Beauty) at Bishop Wood on April 29th, *Dasychira pudibunda* L. (Pale Tussock) at Bishop Wood on June 12th, *Zeuzera pyrina* at Bishop Wood on July 14th, and one *Actebia praecox* L. (Portland), regarded as a coastal species, was taken at Skipwith Common on August 14th.

C. R. Haxby's captures include one *Hygrochroa syringaria* L. (Lilac Beauty) and one *Leucoma salicis* L. (White Satin) at Bishop Wood on July 14th, and one *Thalpophila matura* resting on grass near the Mercury Vapour Light-trap in Askham Bog on July 24th.

By kind permission of the Director of the Tolson Museum, Huddersfield, F. Hewson has been able to make three copies of the late Ben Morley's record books, which contain much interesting information upon both macro- and micro-lepidoptera, and these are available to anyone who wishes to examine them.

Odonata (J. H. Flint): It has been a good year for Dragonflies. Large numbers of the small damsel flies were seen in the warm sunshine on the Union's meeting at Queen Mary's Dubbs, though these were all the common species. Nothing unusual has been reported except the occurrence of *Sympetrum scoticum* Don., seen by Mr. P. G. Tannett at Kilnsea on 28/9/55. *Aeshna juncea* L. was very abundant at Malham Tarn, particularly around the Tarn Fen, in August. One individual was attracted to the mercury vapour lamp at midnight on a rather cool night: it was seen to pass over the lamp once and then disappeared into the darkness. October 13th was the last date on which an *Aeshna* was seen in flight (by Mr. J. Armitage at Adel, Leeds). Very few records have been received and more reports, where identification is certain, are much needed.

Hemiptera (J. H. Flint): The year has only been an average one for Hemiptera though the later part of the summer was exceptionally fine. The dry conditions of August and September seemed to reduce the numbers of plant-feeding bugs of the *Miridae*, but species of *Anthocoris* were plentiful and I was bitten more frequently than usual by *A. confusus* Reut. which seemed to find the hot, dry conditions to its liking. Drought on the moors affected many species. On Rombald's Moor where I had previously found numbers of *Salda mülleri* Gmel. and *S. morio* Zett., together with the ubiquitous *Saldula saltatoria* L., prolonged search among the vegetation that bordered the dried bed of what had been a large pool revealed only a single specimen of *saltatoria*. *Corixids* were similarly affected, though plentiful in pools that remained in such places as Malham Tarn Moss. The abundance of hoppers varied according to species. *Philaenus leucophthalmus* L. was not so common as in some years, but *Neophilaenus lineatus* L. was very abundant where the grasslands were not too parched. Species of *Typhlocybidae* were as abundant as usual on trees and shrubs.

The list of records appended is brief, much of the material collected during the year being as yet undetermined, and with one exception, is compiled from the work of the Recorder:

HETEROPTERA

Stygnocoris pedestris Fall. (*64). Gledhow Valley, Leeds, 8/54.
Hydrometra stagnorum L. (*64). Monk Fryston, 8/55. J. Horsman.

HOMOPTERA

Mocydia crocea H.-S. (*64). Thorner, 5/53. Harewood, 14/9/55.
Cicadula aurantipes Edw. (64). Golden Acre, Leeds, 8/53.
Cicadella collina Fl. (*64). Harewood Bridge, 8/54.

Neuropteroid Orders (W. D. Hincks): There is very little to report this year in regard to the several small Neuropteroid orders. The few species collected during the season have all been recorded previously many times from the county.

Although our knowledge of the vice-comital distribution of some species is still incomplete it is probable that few additional species will be found to occur in Yorkshire as considerable proportions of the total British species of each order are already recorded. The actual totals are as follows:

PLECOPTERA (Stoneflies).	28	out of	34	British	species.
EPHEMEROPTERA (Mayflies).	35	,,	45	,,	,,
PSOCOPTERA (Book lice).	37	,,	68	,,	,,
NEUROPTERA (Lacewings, etc.).	47	,,	64	,,	,,

Since the last report Drs. I. W. B. Thornton and E. Broadhead (1954, *Journ. Soc. Brit. Ent.* **5** : 47-64) have published an interesting paper on the results of their taxonomic studies of all stages of three species of the genus *Elipsocus* (Psocoptera) from Malham.

Hymenoptera (W. D. Hincks): The long winter and cold spring of 1955 must have had a very adverse effect on the Aculeate Hymenoptera though, unfortunately, it has been possible to make very few observations. Bumble-bees were individually very plentiful at Malham in August and they at least, the hardiest of the Aculeates, appear to have suffered little as a result of the climatic conditions. Solitary bees (*Andrena*, etc.) on the other hand appear to have been very much affected, especially the early species, and some colonies were probably completely wiped out.

During the year Dr. I. H. H. Yarrow of the Natural History Museum has published (*Trans. Soc. Brit. Ent.*, **12** : 1-48) a very interesting revision of the British wood ants, the *rufa* group of the genus *Formica*. He recognises four British species and *Formica rufa* L. is now regarded as a southern and western species which does not occur in Yorkshire. All our county records belong to *F. lugubris* Zetterstedt.

Perhaps the most interesting progress during the year is coupled with the visit of Mr. R. B. Benson of the Natural History Museum to Malham in May. With the Recorder's captures at Malham in June 1954 and August 1955 Mr. Benson has been able to assemble a list of 85 species of sawflies for the area, several of which are very interesting additions to the county list. Perhaps the most interesting species is *Hoplocampa ariae* Benson of which I took a single female in Tarn Fen on June 18th, 1954. Hitherto this species, which feeds on *Sorbus*, has only been found in Scotland. Other species of sawflies which have been confirmed during the year with Mr. Benson's help include *Pamphilius histrio* (Latr.) from Allerthorpe, 28/6/42 (W. D. Hincks), previously recorded only from southern England, Glamorgan and Inverness, and *Cephus cultratus* Eversm. from the same locality and date, previously known only south of the Humber-Severn line. A full list of the sawfly additions will be published at a later date.

The Parasitica appear to have been little affected by the cold spring and during the warmth of the summer and autumn were present in great numbers in suitable localities; for instance, several hundred specimens were collected at Malham in August during the Section's visit. Among the several additions to the county list may be mentioned the distinctive Chalcid *Platymesopus tibialis* Westwood, so appropriately named, from Tarn House Plantation, 14/8/55.

Several of the additions to the county list made during the present season inevitably consist of recently identified or confirmed species captured in previous years. One of the most interesting is the Encyrtid *Homalotyloidea dahlbomii* (Westwood) from Spurn 21, 22/7/33, regarding which Mr. G. J. Kerrich has contributed a paper to the *Ent. mon. Mag.* The Recorder originally determined this species as *H. latiscapus* Masi, a species unrecorded from Britain but suspecting that one of the old and largely unrecognisable names published under *Encyrtus* might apply to it he asked Mr. Kerrich to examine the types in the British Museum with the result that it has proved to be identical with *Encyrtus dahlbomii* Westwood, 1837. Masi's genus *Homalotyloidea* will stand and must be added to the British List.

It is inevitable that much of the material collected during the season is yet undetermined and a full list of the county and vice-county additions therefore must be deferred to a later date.

Diptera (K. G. Payne): In the spring and early summer the Diptera appear to have shared in the scarcity which was widespread among insects. Species which have been very common in other recent years were scarce and species normally scarcer could not be found. These latter were not necessarily absent, but probably were so reduced in numbers as to make capture improbable. Mr. Russell considers that, later, the year became a good one from the Dipterists' point of view.

With two exceptions the list below is compiled solely from the records of Mr. H. M. Russell and the writer. During the year, 44 additions to the county list and 30 additions to the vice-county lists have been made. Six of the county additions and two of the vice-county additions are from Mr. Russell's work and, with two exceptions, the rest from that of the writer.

This total of additions to the Yorkshire list is considerably greater than recorded in other recent years, but its significance is mainly that work has been done on certain families of small flies (especially Sphaeroceridae) which, apparently, did not attract previous collectors in Yorkshire. From a purely distributional point of view an addition to a local faunal list is only of particular interest when:

(a) the species has been collected sufficiently widely elsewhere in the country for its distribution to be known at least in outline;

and

(b) the known distribution elsewhere in Britain is not such that its occurrence in the particular area could be forecast with reasonable certainty.

There seems no reason to suppose that any of this year's additions would, by these criteria, qualify as of particular interest. In fact, only a small proportion of British Diptera could qualify under (a) alone.

Those additions to the county and vice-county lists which have not already appeared in *The Naturalist* are given below. The records are those of the writer except where stated otherwise.

Scatopsidae

Scatopse fuscipes Mg. (†64). Copmanthorpe, on window of house 26/4/55 and many subsequent dates during the spring and summer.

Empididae

Wiedemannia bistigma Curt. (64). Streams about Austwick and Gordale, August 1955, where Mr. Russell found it quite common.

Dolichopodidae

Micromorphus albipes (Zett.) (†64). ♂Queen Mary's Dubbs, Ripon, 24/6/55.

Sepsidae

Enicta annulipes (Mg.) (*62). Strensall Common, 14/5/55. (*61). Kelsey Hill Pits, 16/7/55.

Themira superba Hal. (†64). Acaster Malbis, muddy edge of river, 21/5/55.

Sciomyzidae

Pteromicra glabricula (Fln.) (*61). Kelsey Hill Pits, 16/7/55.

Anthomyzidae

Anthomyza bifasciata Wood (†61). Kelsey Hill Pits, 16/7/55. Collin (1944) states that he has only taken this species in Herefordshire, from which Wood described it. He mentions that Oldenburg bred it from Typha stems. Typha was present at Kelsey Hill Pits.

Ephydridae

Pelina nitens Lw. (†62). Ghyll running into Runswick Bay, 29/5/55.

Scatella paludum (Mg.) (†61). Spurn, seashore, 13/7/52.

S. lutosa (Hal.) (†61). Spurn, Humber shore, over Fucus and Enteromorphus covered rocks, 17/7/52.
Stictoscatella quadrata (Fln.) (*62). Castle Howard, 11/4/52. (*65) Leckby Carr, 28/6/52. (*61) Filey, 29/9/53.
S. fallax (Cz.) (†64). Acaster Ings, muddy ditchside, 24/6/55.
Scatophila caviceps (Stenh.) (*61). Muddy cliff slopes between Hunmanby and Reighton Gaps, 2/8/51. (*62) Castle Howard, 11/4/52.

Canaceidae

Xanthocanace ranula (Lw.) (†61). Spurn, about a pool on seashore, 13/7/53.

Sphaeroceridae

Sphaerocera curvipes Latr. (*62). Filey, dung on sea cliffs, 2/7/55.
Crumomyia nigra (Mg.) (†64). Knaresborough, horse dung, 3/4/55.
Stratioborborus fimetarius (Mg.) (†64). Healaugh, under fallen leaves, 17/11/51. (*61). Skipwith Common, rotting *Lactarius turpis*, 17/9/55.
S. roseri (Rond.) (†62). Bell Bottom Wood, Coneysthorpe, 13/3/55. (*64) Knaresborough, under *Polystictus versicolor* at ground level, 3/4/55. (*61) Skipwith Common, rotting *Lactarius turpis*, 17/9/55.
Borborillus vitripennis (Mg.) (†64). Companthorpe, light trap, 9/9/50.
Collinellula lutosa (Stenh.) (†64). Acaster Ings, muddy ditchside, 24/6/55.
Paracollinella fontinalis (Fln.) (*61). Skipwith Common, Birch scrub, 17/9/55.
Pteremis nivalis (Hal.) (†64). Copmanthorpe, on surface of a puddle, 16/9/51. Richards (1930) associates this Brachypterous species with the runs of mice.
Spinotarsella humida (Hal.) (†64). Copmanthorpe, a female to light trap in garden, 8/10/55. This species has frequently been taken about Yorkshire by the writer in its normal habitat—the surfaces and edges of areas of water—but this occurrence at night at least 150 yards from a place wherein one would expect to find it is interesting. It may have a bearing on its normal method of distribution from one area of water to another.
Limosina flaviceps Zett. (†62). Shaw Wood, Castle Howard, about rotting *Armillaria mellea*, 16/10/55.
L. mirabilis Collin (†62). Kingthorpe Wood, Pickering, on or about a dead rook or carrion crow. Richards (1930) does not consider this a carrion species.
L. claviventris Strobl. (†64). Copmanthorpe, garden, under sack of grass cuttings, 12/9/55.
L. manicata Richards (†64). Colton Wood, a large number (probably not less than 100) found running in fallen leaves and giving impression of scattering from one point when disturbed, 15/5/55.
L. parapusio Dahl (†64). Colton Wood, alive, 9/10/49, bred from *Phallus impudicus* collected 20/9/49. Also alive 22/9/53 from *Amanita rubescens* and *Russula* sp. collected 30/8/55, Copmanthorpe Wood.
L. heteroneura Hal. (†62). New Earswick, York, in factory, 1/10/51. (*65) Leckby Carr, 28/6/52.
L. pullula Zett. (†62). Strensall Common, sheep dung, 14/5/55.
Halidayina spinipennis (Hal.) (†64). Copmanthorpe, to light from a ' muck heap ', 11 p.m., 16/8/55.
Coprophila ferruginata Stenh. (†64). Data as last sp.
C. lugubris (Hal.) (†64). Copmanthorpe, cow dung, 1/9/55.
C. pseudolugubris Duda. (†64). Copmanthorpe, to light from a ' muck heap ', 11 p.m., 16/8/55.

Diastatidae

Diastata unipunctata Zett. (†62). Castle Howard, 11/4/52. (*64) Askham Bog, 26/4/53.

Drosophilidae

Drosophila funeris (Fabr.) (†64). Askham Bog, bred from *Polyporus lacteus*, July 1954, P. A. Buxton per W. D. Hincks.
D. phalerata Mg. (†64). Askham Bog, bred from *Hypholoma candoleanum*, July 1954, P. A. Buxton per W. D. Hincks.

Chloropidae

Calamoncosis minima (Strobl.) (†64). Askham Bog, alive in numbers, 15/7/53, bred from galls of *Lipara lucens* Mg. collected the previous spring.
Oscinella frit (L.) (*64). Copmanthorpe, 22/5/55.

Cordyluridae

Amaurosoma brevifrons Zett. (†62). Pickering, beckside, 19/5/51. (*64) Colton Wood, 10/5/55.
A. flavipes Zett. (†64). Askham Bog, 1/6/51.

Hippoboscidae

Ornithomyia avicularia L. (64). Mr. Russell took specimens of this species away from their hosts at Scarcroft, Leeds, 25/7/55 and Chapel Allerton, Leeds, August 1955.

Plant Galls (E. F. Gilmour): Owing to extreme pressure of other work, I have had little time for collecting this year. Miss C. M. Rob has once again provided the bulk of the specimens and plant identifications.

Only a selective list from those found is given here.

	Agent	*Plant*
Hymenoptera	*Pteronidea salicis* (Linn.) (64). Ripon, –/6/55; C.M.R.	*Salix purpurea* Linn.
	Aylax papaveris (Perris) (62). Heeley, 3/7/55; C.M.R.	*Papaver dubium* Linn.
	Andricus fecundator Hartig. (62). Catton, 29/6/55; C.M.R. (64) Ripon, 25/6/55; C.M.R.	*Quercus robur* Linn.
	A. curvator Hartig. (65). Tanfield, –/5/55; C.M.R.	*Quercus robur* Linn.
	Cynips divisa Hartig. (64). Ripon, 25/6/55; C.M.R. Harlow Moor, Harrogate, 23/6/55; Miss D. Walker.	*Quercus robur* Linn.
Diptera	*Pegohylemyia signata* (Brischke) (62). Sutton-on-Forest, 3/7/55; C.M.R.	*Dryopteris austriaca* (Jaeg.)
	Dasyneura sisymbrii (Schrank) (62). Clifton Ings, 2/7/55; C.M.R.	*Barbarea vulgaris* R. Br.
	Taxomyia taxi (Inchbr.) (62). Ashbery, nr. Rievaulx, 26/3/55; C.M.R.	*Taxus baccata* Linn.
	Wachtliella persicaria Linn. (64). Ripon, –/6/55; C.M.R.	*Polygonum amphibium* Linn.
	Contarinia quercina Ruebs. (65). Tanfield, –/5/55; C.M.R.	*Quercus robur* Linn.
Homoptera	*Hyperomyzus lactucae* (Linn.) (*ribis* Koch) (65). Tanfield, 24/5/55, C.M.R. (64) Ripon, –/6/55; C.M.R.	*Ribes rubrum* Linn.
	Rhopalosiphum crataegellum (Theobald) (65). Tanfield, –/5/55; C.M.R.	*Crataegus monogyna* Jacq.
	Doralis viburnii (Scop.) (65). Tanfield, 24/5/55; C.M.R.	*Viburnum opulus* Linn.
	D. Ulmariae (Schr.) (64). Ripon, –/6/55; C.M.R.	*Filipendula ulmaria* (Linn.) Maxim.
Acari	*Eriophyes macrorrhynchus* Nalepa (64). Ripon, –/6/55; C.M.R.	*Acer campestre* Linn.
	E. tetanothrix Nalepa. (64). Ripon, –/6/55; C.M.R.	*Salix aurita* Linn.
	E. tetanothrix Nalepa. (64). Ripon, 25/6/55; C.M.R.	*Salix atrocinerea* Brot.
	E. laevis Nalepa. (65). Tanfield, –/5/55; C.M.R.	*Alnus glutinosa* Gaertn.
	E. viburnii Nalepa. (65). Tanfield, –/5/55; C.M.R.	*Viburnum opulus* Linn.

SECTION E—BOTANY

(C. M. Rob): Reports on the effects of the weather on the vegetation in the past year have come in from Austwick, Doncaster, Harrogate, Halifax, Hull, Scarborough, Sheffield and Thirsk. All agree that the cold weather in the early part of the year retarded growth, and that the spring flowering plants were about a month later than usual. Primrose flowered on March 9th at Scarborough and March 25th at Austwick; hawthorn not until the end of May in the Harrogate district. All districts experienced frost in late May, and Scarborough which had an exceptional show of flower on the bilberry reports a failure to fruit. The dry weather affected plants on the shallower soils in the Halifax district. Round Austwick the hills were brown by mid-August except where bracken-covered Plants of the deeper soils suffered less. Bracken and rosebay were said to be taller than usual round Doncaster. Rosebay flowered well everywhere, near Thirsk where woodland has been felled the colour was visible for more than three miles. Some other plants have flowered better than usual, sundew (*Drosera rotundifolia*), has been very fine, flowering rush (*Butomus*) and arrowhead (*Sagittaria*) were flowering abundantly in the almost dry river at Danby Wiske. In all districts the flowering period was short and many plants, notably arum and bittersweet, fruited early. Halifax had a good crop of fruit on oak, round Scarborough it was poor, in the Vale of York patchy, in some parts good in others very poor.

It would help to make future reports more comprehensive and an assessment of the effects of the season's weather on plants more exact if members would pay particular attention to and forward notes on the following:

1. First observed flowering dates of: coltsfoot, celandine, hawthorn, ash, hazel, wood anemone.
2. Leafing dates of: oak, ash, hawthorn. The same tree to be observed each year.
3. Fruiting of: oak, ash, hawthorn, hazel, beech, bramble.

Myxomatosis.—In view of the spread in the county of the rabbit disease, observers were asked for notes on the effects (if any) of this on the vegetation, and it is hoped to have a fuller report for the coming year. Members in all parts of Yorkshire are asked to make particular notes for their areas. The following short notes give some idea of the present position:

Austwick, Harrogate, Thirsk.—No effects so far. Myxomatosis has only come during 1955.

Doncaster, Scarborough.—Nothing to report so far.

Halifax.—No myxomatosis in district, but rabbits have not yet recovered from effects of severe winter of 1947.

Sheffield.—Effects marked on limestone grassland. Areas where the turf was short formerly had a sward about a foot high; grasses on acid moorlands very little change evident.

Hull.—In the Spurn district one area usually covered with *Potentilla anserina* is being invaded by other species. Professor Good reports a very conspicuous increase in growth of the grasslands of the wold valleys about Warterdale.

Lower Wensleydale.—Myxomatosis arrived in early spring, by May no rabbits were seen. Here there was a marked increase in the amount of cowslips especially on an island in the Ure. Disused quarries in the Tanfield district had a growth of over a foot where in past years short turf prevailed. The low-growing plants were quite invisible, and seedling hawthorns were abundant.

Observers are particularly asked to note changes in vegetation in selected localities due to myxomatosis the effects of which may be expected to show with increasing clearness next year. The approximate date of arrival of the disease where known should be stated and information as to the establishment and relative abundance of trees and shrub seedlings would be especially welcomed.

Plant Records (G. A. Shaw): A few of my regular correspondents have, for various reasons, been unable to do a great deal of field work during 1955, and as a result the list of plants is rather shorter than the average for recent years. The only plant new to the County is the hybrid *Cirsium eriophorum* (L.) Scop. × *C. vulgare* (Savi) Ten., found in V.C. 61 by Dr. Sledge. There are, however, quite a number of interesting recorcs, as the following list shows.

†New to Yorkshire. *New to Vice-County.

Asplenium adiantum-nigrum L. (63). Stonework of Hirst Lock, Saltaire, Shipley; G. A. Shaw.
Dryopteris borreri Newm. (64). Spa Gill, near Ripon; Miss D. Walker.
D. spinulosa (Müll.) Watt (63). Crag Vale, near Turvin, Halifax; F. Murgatroyd.
Trollius europaeus L. (65). Still at Tanfield; C. M. Rob.
Clematis vitalba L. (64). Near Markington, very well established; Miss D. Walker.
Thalictrum flavum L. (64). Staveley Marsh, near Knaresborough; Miss D. Walker.
Ranunculus sardous Crantz (61). Kelsey Hill gravel pits; Y.N.U. Excursion.
Nymphaea alba L. (64). Staveley Marsh, near Knaresborough; Miss D. Walker.
Nuphar lutea (L.) Sm. (64). With the last.
Ceratophyllum demersum L. (62). R. Foss, York, between Monk Bridge and Yearsley Bridge; D. H. Adams. (63). Canal at Mytholmroyd; F. Murgatroyd.
Diplotaxis tenuifolia (L.) DC. (62). Coatham, by Redcar; Miss D. Walker.
Cardaria draba (L.) Desv. (64). By Killinghall Mill, near Harrogate; Miss D. Walker.
Sisymbrium altissimum L. (62). Coatham, by Redcar; Miss D. Walker.
Teesdalia nudicaulis Br. (63). Sandpits at Blaxton and West Moor, Hatfield; Wm. and Anne Bunting.
Chenopodium polyspermum L. (not in Supplement) (64). Near the Gas Works, Settle, 1931, and as a garden weed, Settle, 1955; J. N. Frankland; garden weed, Headingley; W. A. Sledge.
Impatiens noli-tangere L. (63). Rockly End of Worsborough Reservoir; L. Magee (given for Rockly Woods in Lees's Flora).
I. capensis Meerburgh (63). With the last.
Euonymus europaeus L. (64). Two trees near Shipley Glen: G. A. Shaw.
Lathyrus tuberosus L. (64). Cornfield near Grantley; Miss R. Kilby.
Astragalus glycyphyllos L. (65). Rocky stream, Tanfield; C. M. Rob.
Ribes alpinum L. (64). Lower end of Spa Gill, near Ripon; Miss D. Walker.
**Epilobium adenocaulon* Hausskn. (det. G. M. Ash) (63). By the stream, Goit Stock, near Bingley; G. A. Shaw.
E. pedunculare Cunningham (64). By Corporation greenhouse, Harlow Hill, and by stream, Valley Gardens, Harrogate; Miss D. Walker.
Foeniculum vulgare Mill. (63). Roadside near Wortley Church, near Sheffield; F. W. Adams.
Oenanthe lachenalii (63). Edge of Thorne Moor; Wm. and Anne Bunting.
Rumex tenuifolius (Wallr.) Love (62). Near Huby, York; (*64) Dallowgill; C. M. Rob.
×*Vaccinium intermedium* Ruthe (64). Pinewoods west of Harlow Moor Road, Harrogate; Miss D. Walker.
Trientalis europaea L. (64). Hoodstorth Wood, Washburndale; Miss D. Walker.
Hottonia palustris L. (64). Staveley Marsh, near Knaresborough; Miss D. Walker.
Mentha smithiana R. Graham (63). Streamside, Ecclesall Woods, near Sheffield; F. W. Adams.
Sambucus ebulus L. (63). Near Dewsbury; Eric Thompson.
Dipsacus fullonum L. (64). Waste ground near Thomas's Farm, Oakdale, Harrogate, and in Cayton Gill, near Ripley; Miss D. Walker.
Erigeron canadensis L. (63). Railway Bank, Thorne; Wm. & Anne Bunting.
†*Cirsium eriophorum* (L.) Scop. × *C. vulgare* (Savi) Ten. (61). Field between N. Grimston and Wharram Percy; W. A. Sledge. A former record by J. F. Pickard from Etchell Crags near Thorner V.C. 64 was based on a misnomer.
Lactuca virosa L. (63). Don bank near Thorne; Wm. & Anne Bunting.
Cicerbita macrophylla (Willd.) Wallr. (64). Thorner; D. J. Taylor.
Leontodon leysseri (Wallr.) Beck (64). Two localities on Newby Moor, near Ingleton, and two near High Bentham; G. W. Garlick.
Centaurea cyanus L. (62). Near Helmsley; Miss R. Kilby. (65) Ainderby Steeple; C. M. Rob.
Orchis purpurella Steph. Conf. J. Heslop-Harrison (63). Sykehouse, near River Went; Wm. & Anne Bunting.
Potamogeton alpinus Balb. (64). Ripon; Y.N.U. Excursion.
Juncus conglomeratus L. var. *subuliflorus* Drejer (64). Trollers Gill, Appletreewick; D. Grant & T. Schofield.
J. subnodulosus Schrank (61). Kelsey Hill gravel pits; Y.N.U. Excursion.

J. kochii Schultz (64). Brimham Rocks; D. Grant & T. Schofield.
Crocus nudiflorus Sm. (63). In two new localities near Halifax: on right bank of the River Ryburn above Old House Mill, near Sowerby Bridge; on the right bank of the Ryburn above Stansfield Mill, Triangle; also in a locality known to Mr. H. Walsh, probably previously unrecorded, on the left bank of the Calder between Mytholmroyd and Brearley; F. Murgatroyd.
Carex pendula L. (64). South bank of Ure between Roecliffe and Bishop Monkton; Miss D. Walker.
C. riparia Curt. (64). With the last; Miss D. Walker.
C. serotina Mérat (61). Kelsey Hill and Burstwick gravel pits; Y.N.U. Excursion.
Glyceria declinata Bréb. (64). Skirfare Bridge, near Kilnsey; D. Grant and T. Schofield.
Tolypella intricata Leonh. Det. G. O. Allen (63). Low Ing, Fishlake, near Thorne; W. Bunting.

I wish to thank all those who have sent in records since I took over the recordership for the Plant Records Committee. This will be my last year in this office, and all future records should be sent to Miss C. M. Rob, F.L.S., Catton Hall, Thirsk.

Bryology (J. Appleyard): Two meetings of the Bryological Section were held, the one at Knaresborough being well attended. Support for the week-end meeting in Teesdale was disappointing. Reports of the meetings will be found elsewhere in *The Naturalist*.

Some vice-county records and several others of interest have been made although few members have contributed records. Interesting discoveries resulted on all the general field meetings except the one to Lindrick Common. *Camptothecium nitens* (Hedw.) Schp. and *Amblystegium compactum* (C.M.) Aust. were found at Queen Mary's Dubbs, a new station for each of these rare mosses. *Moerckia flotorviana* (Nees) Schiffn. near Locker Tarn, *Tortula subulata* Hedw. var. *graeffli* Warnst. and *Hygrohypnum luridum* (Hedw.) Jennings var. *subsphaericarpum* (Schleich.) C. Jens. were the highlights of the Carperby excursion.

Brachythecium salebrosum (Web. & Mohr) B. & S. and *Eurhynchium speciosum* (Brid.) Milde from the gravel pits near Keyingham redeemed an area not conspicuous for its interesting bryophytes.

Hepatics

Marchantia polymorpha L. forma *aquatica* Nees (64). Golden Acre Park, near Leeds; J.A.
**Moerckia flotowiana* (Nees) Schiffn. (65). Locker Tarn; K.M. and J.A. (64) Norber Syke Field, Austwick; K.M.
Pellia fabbroniana Raddi var. *lorea* Nees (64). Golden Acre Park; J.A.
Eucalyx obovatus (Nees) Breidl. (63). Catty Well Clough, near Halifax; J.A.
E. hyalinus (Lyell) Breidl. (64). Near Silsden; J.A.
**Aplozia atrovirens* (Schleich.) Dum. var. *sphaerocarpoidea* (De Not.) Massal. (64). Near Silsden; J.A. (subject to confirmation).
Lophozia badensis (Gottsche) Schiffn. (62). Runswick Bay; J.A.
L. bicrenata (Schmid.) Dum. (63). Hipperholme and Thackley; J.A.
Plagiochila spinulosa (Dicks.) Dum. (65). Below High Force; J.A.
Hygrobiella laxifolia (Hook.) Spruce (65). Below Winch Bridge; J.A.
Scapania aequiloba (Schwaegr.) Dum. (65). Below Winch Bridge; J.A.
S. gracilis (Lindb.) Kaal. (65). Cronkley Pastures; J.A.
Cololejeunea calcarea (Lib.) Schiffn. (65). Below High Force; J.A.

Mosses

Polytrichum alpestre Hoppe (65). Locker Tarn; J.A.
Fissidens viridulus (Web. & Mohr) Wahl. (64). Knaresborough; J.A.
F. crassipes Wils. (62). Deepgrove Beck, near Sandsend; J.A.
Blindia acuta (Hedw.) B. & S. var. *trichodes* (Wils.) Braithw. (63). Catty Well Clough, near Halifax; J.A.
Dichodontium pellucidum (Hedw.) Schp. var. *fagimontanum* (Brid.) Schp. (65). Locker Tarn; J.A.
Campylopus flexuosus (Hedw.) Brid. var. *paradoxus* (Wils.) Husnot (64). Moorland near Silsden; J.A.

Tortula subulata Hedw. var. *angustata* (Wils.) Limpr. (64). Goldsborough Mill near Knaresborough; Y.N.U. Bry. Exc. (confirmation of old record).
T. subulata Hedw. var. *graeffii* Warnst. (65). Near Carperby; K.M.
T. muralis Hedw. var. *aestiva* (P. Beauv.) Brid. (63). Old quarry, Sprotborough; J.A.
Aloina brevirostris (Hook. & Grev.) Kindb. (63); Quarry at Warmsworth; J.A.
A. rigida (Hedw.) Kindb. (63). Quarry, Warmsworth; J.A.
Pottia recta (Sm.) Mitt. (63). Near Warmsworth; J.A.
Barbula tophacea (Brid.) Mitt. (61). Keyingham; J.A.
Gymnostomum calcareum Nees & Hornsch. (64). Near Knaresborough; J.A. (confirmation of old record).
Trichostomum crispulum Bruch (64). Jackdaw Crag Quarry and near Ripon; J.A.
Weissia controversa Hedw. var. *densifolia* Wils. (65). Woodhall, near Carperby; J.A.
**W. crispa* (Hedw.) Mitt. (64). Jackdaw Crag Quarry; J.A.
Tetraplodon mnioides (Hedw.) B. & S. (65). Cronkley Scars; J.A.
**Bryum alpinum* With. var. *viride* Hum. (63). Hardcastle Crags; H. Walsh.
B. inclinatum (Brid.) Bland (63). Near Shireoaks. (64) near Ripon; J.A.
**Philonotis fontana* (Hedw.) Brid. var. *adpressa* (Ferg.) Limpr. (63). Leeming, near Keighley; J.A.
P. caespitosa Wils. ex Milde (64). Golden Acre Park; J.A.
Campylostelium saxicola (Web. & Mohr) B. & S. (62). Stonegate Gill, near Sandsend; J.A.
Orthotrichum stramineum Hornsch. (62). Mulgrave Woods; J.A.
Fontinalis antipyretica Hedw. var. *gracilis* (Lindb.) Schp. (63). Leeming, near Keighley; J.A.
Thuidium delicatulum (Hedw.) Mitt. (64). Knaresborough; G.A.S.
Cratoneuron commutatum (Hedw.) Roth. var. *virescens* (Schp.) Rich. & Wall. (65). Locker Tarn; J.A.
Hygroamblystegium tenax (Hedw.) Jennings (63). Wall of fishing pond, Low Moor; J.A.
Amblysteguim compactum (C.M.) Aust. Queen Mary's Dubb,; J.A.
Drepanocladus aduncus (Hedw.) Warnst. *c. fr.* (62). Kettleness; Y.N.U. Excursion.
Acrocladium cordifolium (Hedw.) Rich. & Wall. (64). Golden Acre Park; J.A.
Camptothecium nitens (Hedw.) Schp. (64). Queen Mary's Dubb, near Ripon: J.A.
Brachythecium salebrosum (Web. & Mohr) B. & S. (61). Keyingham; J.A.
Eurhynchium speciosum (Brid.) Milde (61). Keyingham; J.A.
Rhynchostegiella pallidirostra (A.Br.) Loeske (62). Deepgrove Beck, near Sandsend; J.A.
Ctenidium molluscum (Hedw.) Mitt. var. *fastigiatum* (Bosw. ex Hobk.) Braithw. (65). Fossdale Gill, near Hawes; J.A.
**Hygrohypnum luridum* (Hedw.) Jennings var. *subsphaericarpum* (Schleich.) C. Jens. (65). Locker Tarn; J.A. (subject to confirmation).
*New V.C.R. K.M.: Miss K. Mattinson. G.A.S.: G. A. Shaw. J.A.: J. Appleyard.

Mycology (Miss J. Grainger): The Mycological Section has had a very successful year. The spring foray at Wrea Head yielded some interesting species of microfungi and the autumn foray was the most successful of recent years. Twenty-seven people attended. There had been sufficient moisture after the hot summer to start many species into fructification at least in the ghylls and cloughs. A dozen species of Boletus were found including *Boletus calopus* and *B. parasiticus* and other noteworthy species gathered included *Elaphomyces granulatus* and *E. muricatus, Cordyceps ophioglossoides* and *Microglossum viride.*

Our Chairman, Miss E. M. Blackwell—only the third woman to hold the office—has spent much time delving into the history of the Mycological Committee and the biographical details of bygone mycologists, and she had been instrumental in preserving many items of interest from destruction. Her very informative and entertaining address on 'Mycology and Mycologists in Yorkshire' was much appreciated by all present. These included our former President and Committee Chairman, Mr. E. W. Mason, to whom congratulations were tendered on his receiving the O.B.E.

The publication in *The Naturalist* of three more mycological monographs in the past year has given great satisfaction to the Committee. The Committee is making a collection of photographs of former foray groups and mycologists, and would be glad if anyone having such photographs of more than twenty years ago would donate them or send on loan to Miss Blackwell.

YORKSHIRE NATURALISTS' UNION

INCOME AND EXPENDITURE ACCOUNT for the Year ended 20th November, 1955

EXPENDITURE

	£ s. d.	£ s. d.
GENERAL PRINTING:		
Circulars	60 14 6	
Members' and Associates' Cards	42 3 11	
		102 18 5
"THE NATURALIST":		
Members' and Exchange Copies	288 14 2	
Extra pages	8 17 6	
Binding	0 14 0	
Editorial Expenses	5 0 0	
		303 5 8
SUNDRY EXPENSES:		
Bank Charges	2 2 0	
Rent of Rooms	0 15 0	
Stationery, etc.	19 12 0	
Secretaries' and Treasurers' Expenses	22 7 3	
		44 16 3
SURPLUS of Income over Expenditure carried to Accumulated Fund	5 19 3	
		£456 19 7

INCOME

	£ s. d.	£ s. d.
MEMBERS' SUBSCRIPTIONS:		
Allocated to *The Naturalist*	290 2 6	
,, General Purposes	104 3 6	
	394 6 0	
Less Arrear brought forward from 1954	50 0 0	
Deduct payments in advance—1954 ..	11 6 0	
	38 14 0	
	355 12 0	
Add Arrears at 20th Nov., 1955, after making necessary reserve	50 0 0	
Deduct Payments in Advance up to 20th November, 1955 ..	11 19 0	
	38 1 0	
		393 12
LEVIES FROM AFFILIATED SOCIETIES	22 9 11	
Add Amounts due 20th Nov., 1955	7 5 0	
	29 14 11	
Less Amounts due 20th Nov., 1954	12 3 6	
		17 11
SALE OF PUBLICATIONS		0 15
,, ,, ,, (Special Mycological Papers, Russula, etc.)		6 12
DISCOUNTS RECEIVED		12 18
INTEREST ON INVESTMENTS		21 7
INTEREST ON DEPOSIT ACCOUNT—Westminster Bank (from Amount allocated to General Purposes)		4 4
		£456 19

BALANCE SHEET as at 20th November, 1955

LIABILITIES AND FUNDS

	£ s. d.	£ s. d.
INVESTED FUNDS:		
Booth Fund	100 0 0	
Cheeseman Fund	100 0 0	
W. W. Nicholas (Ornithological) Fund	100 0 0	
		300 0 0
ACCUMULATED INTEREST ON W. W. NICHOLAS (ORNITHOLOGICAL) FUND:		
Amount as at 20th November, 1954	4 12 3	
Add Amount during year ended 20th November, 1955 ..	3 0 0	
		7 12 3
ACCUMULATED INTEREST ON MYCOLOGICAL FUND:		
Amount as at 20th November, 1954	6 18 8	
Add Amount during year ended 20th November, 1955 ..	4 4 3	
		11 2 11
OTHER FUNDS (Legacy of late R. C. Fowler-Jones):		
Allocated to General Purposes		250 0 0
Allocated to Mycological Purposes	250 0 0	
Less cost of Mycological Papers published in *The Naturalist* as extra pages Oct./Dec., 1954, and April/June, 1955 .. .. £101 8 0		
Cost of Mycological reprints (Inocybe and Mycena) 12 4 1		
	113 12 1	
Less receipts from Sale of Mycological Papers (Inocybe, Mycena and Cortinarius) .. 22 13 0		
	90 19 1	
		159 0 11
LIFE MEMBERS' ACCOUNT as at 20th November, 1954 ..		477 0 0
		£1,204 16 1

ASSETS

	£ s. d.	£ s. d.
INVESTMENTS OF FUNDS (NOMINAL VALUES):		
£100 3½% Conversion Stock ..	100 0 0	
£100 3½% War Stock	100 0 0	
£100 3% British Transport Stock 1978/88	100 0 0	
		300 0
GENERAL INVESTMENTS (NOMINAL VALUES):		
£200 4% CONSOLS (Bank of England)	200 0 0	
£159 10s. 11d. 4% Consols (P.O.)	159 10 11	
		359 10
SUBSCRIPTIONS AND LEVIES OUTSTANDING (*less* Reserve) ..	57 5 0	
Less Subscriptions and Levies paid in advance	11 19 0	
		45 0
WESTMINSTER BANK, LTD.:		
Deposit Account	508 8 7	
Current Account .. Dr.	89 9 4	
		418 19
ACCUMULATED FUND:		
Amount as at 20th November, 1954 .. .. .. Dr.	86 19 2	
Surplus for year from Income and Expenditure Account ..	5 19 3	
		80 19
		£1,204 16

Audited and found correct,

W. BENNETT } *Hon. Auditors.*
W. A. WILSON }
J. D. HARTLEY, *Hon. Treasurer.*

BOOK REVIEWS

Birds Fighting, by **Stuart Smith and Eric Hosking.** Pp. 128 with 62 photographs on 32 plates. Faber & Faber, London, 1955. 18/-.

The subject and scope of this remarkable book are defined in its sub-title which reads: ' Experimental Studies of the Aggressive Displays of Some Birds '. These studies were carried out with extraordinary efficiency by a team of three well-known ornithologists. Stuart Smith describes, in his skilful and lucid manner, the planning and results of the experiments and the deductions to be drawn from them; Eric Hosking's sensitive camera, with its electronic flash, records the more dramatic scenes, the displaying of birds and their vivid ' expressions '; while George Edwards carries out very exacting preparatory field work. The authors originally set out with a limited objective; that of recording the behaviour of certain passerine birds when faced with an intruding cuckoo, in this case a stuffed one, during the breeding season. In the course of their experiments many interesting and surprising facts emerged, and they passed on to the substitution of other stuffed birds for the cuckoo. They then turned to study the reactions of certain species of waders, when breeding, to the presence of stuffed specimens of their own species and, finally, to the effect on a breeding bird of a mirror reflection of itself.

The intensive study of bird behaviour is comparatively new but during the last few years it has attracted much attention from ornithologists. This book shows that merely the fringe of the problem has yet been lifted and that much yet remains to be discovered. The many bird-watchers who will be encouraged to follow in the footsteps of this team will find that it has set a very high standard for work of this character. Knowing the authors, readers will eagerly pick up this volume and they will not put it down until they have read every word.

G.W.T.

Birds and Mammals of Shetland, by **L. S. V. Venables** and **U. M. Venables.** Pp. 391. Oliver & Boyd, Edinburgh. 30/-.

While many of the English counties have in recent years had their bird-histories brought up to date by a resident, practising ornithologist, the remoter parts of Britain have not been so fortunate. Resident ornithologists, with the necessary qualifications, are too often non-existant, and the records of visitors have an inevitable bias towards an unbalanced emphasis on the breeding season. Since the war Shetland has cast an ever-increasing spell upon the bird-watching public. On every sailing in June from Aberdeen to Lerwick the steamer will be found to include many ornithologists on its passenger list. This is most understandable when it is remembered that Shetland is the chief British breeding-station of such fine species as the great and arctic skuas, and of such rarities as the red-necked phalarope and whimbrel. Yet the visitor of to-day, except for a few discursive and general books has had to rely for his background information on Evans and Buckley's *Vertebrate Fauna of Shetland,* published in 1899, or on Saxby's *Birds of Shetland,* dated 1874. Both these books are excellent and have stood much of the rigourous test of time, but the increasing popularity of Shetland for ornithologists has long made an up-to-date account very desirable.

Mr. and Mrs. Venables have admirably filled this need, for the mammals as well as the birds, and their eight-year residence in the islands, much of which was devoted to natural history research, has fully qualified them for their task. Moreover, residence has meant that they have avoided the pitfall of the southern visitor, a natural, but deceptive, emphasis on the rarities in the Shetland avifauna at the expense of such interesting colonists as the rook and jackdaw or of such marginal species as blackbird and song thrush. This bias is very properly corrected by the Venables in this book.

In the present reviewer's own experience of the islands, as widely separated as 1932 and 1946, it was apparent that changes were taking place. It is on these changes of status that this book concentrates, just as did Mr. Chislett's similar work for Yorkshire. The Venables findings are discussed not only under each species individually, but in a most interesting general chapter. Yet, although the struggle to colonise or to exist of these generally common species in an outlying group of islands halfway between Britain and Norway is understandably of great interest and especially to a resident biologist to whom a skua is as familiar as a sparrow, Shetland is part of Great Britain, and in that perspective is of tremendous importance in providing us with our only regular breeding station of whimbrel, our chief phalarope colonies and a headquarters for the bonxie. It is good to know that the first is

increasing, the second holding its own, and the third flourishing to such an extent that it has become a mixed blessing.

The story of these varying fortunes, in species rare and common, is told by the Venables clearly and without the bewildering list of obituary dates from which books of this sort so often suffer. For the visitor to Shetland who wishes to see his birds there with a sound, fundamental background this book is a *necessity*, and Mr. and Mrs. Venables are to be congratulated, and thanked, for putting to such good use their residence in the islands.

G.K.Y.

A Guide to the Birds of Ceylon, by **G. M. Henry.** Illustrated by the author with 30 half-tone plates of which 27 are coloured, and 124 black-and-white drawings. Pp. 432. Oxford University Press. London: Geoffrey Cumberlege. 42/-.

In recent years a number of illustrated handbooks have appeared dealing with the birds of different parts (or former parts) of the British Commonwealth, and that of Mr. Henry on the birds of Ceylon, in which he is responsible for both the text and the illustrations, is among the best of these. His main purpose is to assist the recognition of birds in the field; a purpose which is admirably achieved. His introduction contains useful advice on field work and a short account of the avian geography of the region, where he laments the rapid decline in numbers of certain species, due not only to the disappearance of the forests but also to the ' opening up of the country by roads and modern means of transport; the ever-increasing availability of firearms; and the breaking down, through spreading materialism, of religious aversion to the taking of life '—the story which is being repeated all over the world. The written descriptions of the different species are presented in an easy, somewhat colloquial, but extremely vivid style, and the excellence of the author's field notes is a clear testimony to many years' careful and intelligent observation. The coloured plates, rather in the manner of the late Archibald Thorburn, are accurate as well as aesthetically pleasing, although it is not always clear on what principle the species have been selected here. Thus the Black-naped Oriole (pl. 6) is handsome to look at, but has only occurred once in the island, while many commoner species have to be content with black and white: and four out of six of the ducks depicted on plate 30 appear in coloured illustrations in many other books. Now that colour reproduction is so costly, it would perhaps have been more valuable to include instead species less widespread in their distribution. The talented text drawings in black and white are, however, first class and full of fresh spontaneity. The map is clear and sufficient. Mr. Henry's *Guide* combines the merits of pleasant appearance, accuracy and usefulness.

M.F.M.M.

The London Bird Report for 1954. Edited by **F. H. Jones** with the help of a Records Committee of seven. Pp. 50. Published October, 1955, by the London N. H. Society. 3/6.

This regional report covers a radius of 20 miles from St. Paul's Cathedral (or slightly more than one quarter of the area of Yorkshire) and is probably served by more observers than any other. The systematic list includes numerous interesting items, e.g. a maximum of 115 Ruffs in spring at Perry Oaks Sewage Farm against 29 in autumn. Two items called for excellent illustrations of Little Bittern and Pomarine Skua. The Dungeness Bird Observatory (40 Swifts captured in August roosting at the lighthouse !) has brief mention, but for a detailed account see the Kent Bird Report. The Report will be useful to the serious student as well as to the inhabitants of the area.

R.C.

Letters to a Young Naturalist, by **Maxwell Knight.** Pp. 192, with drawings by Patricia Lambe. Collins. 10/6.

This book ranges over a wide field, from bird-watching to freshwater biology, and butterflies to badgers. The aim is to teach the young naturalist how to observe wild life and to stimulate the desire for knowledge by suggesting methods of study and further reading. All this is very laudable, and the information given is quite sound so far as it goes. Unfortunately, the form of the book—an exchange of letters between a naturalist and his schoolboy nephew—makes for a tiresomely diffuse style and a very disjointed treatment of the many subjects touched upon. One cannot help feeling that the author could have produced a much more informative and readable book if he had chosen a more straightforward method of presentation.

C.S.

A Bibliography of the First Editions of Philip Henry Gosse, F.R.S., by **Peter Stageman,** with introductory essays by Sacheverell Sitwell and Geoffrey Lapage. Pp. xii+88 with frontispiece and five plates. The Golden Head Press, Ltd. Limited to 50 copies in ¼ leather at 4½ guineas each and 430 copies in cloth at 2 guineas.

Philip Henry Gosse is a name which all naturalists hold in esteem. He was born at a time when the growth of our modern cities had cut off their inhabitants from the life of the shore and countryside—so much so that a reviewer could seriously doubt whether some of the quite common animals described in one of his books could possibly exist !—and Gosse by his writings and his practical instructions for maintaining marine aquaria was one of the main influences in popularising a return to these endlessly fascinating studies. The present book is not addressed particularly to naturalists, although it does have charming assessments of his illustrations and of his scientific work, but rather to book collectors; both, however, must feel a strong link in Leeds to the older Gosse through the admirable Sir Edmund Gosse Collection in the Brotherton Library.

When Badgers Wake, by **Eileen A. Soper.** Routledge & Kegan Paul, London, 1955. Pp. 220. 15/-.

The study of mammals is showing signs of re-emerging over a wider circle than the handful of zealots who have kept it alive during the great bird-watching vogue.

The badger has recently had a good share of attention, mainly perhaps on account of its relatively unsuspecting behaviour and the easy location of the ' set ' from which it is bound to come forth in time, if due caution is observed by the watcher. Miss Soper's book is reportage, with little evaluation, of the nightly doings of badgers she has watched over the past four years. Skilled, *very* skilled, with a pencil, she has enlivened almost every page with a spirited drawing of badgers and their neighbours. I say ' enlivened ' advisedly, for her drawings do what no camera can, in the circumstances in which these creatures of the dawn and dusk are to be met with. They show us badgers romping and racing, at play and at toilet, curious and nonchalant and convey that beneath his shaggy overcoat, the animal has a body not only muscular and vigorous but even lithe.

That most of the families she watched were extirpated by gassing must have caused the author much pain but her regret is tendered without rancour although, as she concludes her prologue: ' Poor Brock gets little peace . . . He is beneficial to agriculture and his way of life is clean and harmless. In fact he is a grand animal, a valuable part of our country heritage; surely it is time we gave him the protection he deserves.' Amen to that.

A.H.

British Poisonous Plants, by **A. A. Forsyth.** Bulletin No. 161 of the Ministry of Agriculture and Fisheries. Pp. vi+116 with 8 monochrome and 2 coloured plates. H.M.S.O., 1954. 6/6.

This replaces Bulletin 75, *Poisonous Plants on the Farm* by H. C. Long, last issued in 1938. The change in title is justified by the extended range of plants, but 106 pages of text is inadequate to do justice to over 100 species. Written by a former Principal of Glasgow Veterinary College, the work naturally has a veterinary bias and leaves something to be desired from the botanist's standpoint and also from that of those interested in human plant-toxicology. Is the spelling of jalop (p. 41) for jalap an example of the veterinary approach or one of the very few typographical errors ?

The author has overlooked a contradiction on p. 57 where he states that the toxic principles of green potatoes withstand ordinary cooking or boiling and later states that green potatoes ' are said to be safe for pig-feeding after adequate boiling '.

The eight black and white plates (16 species) are well produced, with the exception of a ' soot and whitewash ' henbane; the two coloured plates (4 species) are, as is all too frequent nowadays, ruined by maladjustment of the separates. Plants seldom pose satisfactorily *in situ* but surely a better setting of celery-leaved buttercup could have been found.

An admirable book for the farmer, perhaps too for the veterinary surgeon, but disappointing for botanist, school teacher and the interested layman.

G.A.N.

Photograms of the Year, 1956: The Annual Review of the World's Photographic Art. 61st year of issue, published on November 16th, 1955, for *Amateur Photographer* by Iliffe and Sons Limited. Size, 10¾ in. by 8¼ in. 8 pp. full colour letterpress plates, 16 pp. monochrome letterpress plates, 96 pp. monochrome photogravure plates, 32 pp. text. Price 17/6 net, in Linson binding (postage 8d.).

It is always a pleasure to open the current year's edition of Photograms. The pictures it contains never fail to arouse admiration for their technical mastery or to give aesthetic satisfaction from the contemplation of beautiful landscapes, interesting portraits or striking and unusual designs; and though the photographer well knows that the beauty and the interest lie more in the skilful presentation than in the choice of subject, the aesthetic appeal is there for all who are not insensitive to art and beauty, to enjoy. The pictures set the contemporary standard in artistic photography, and photographers—both experienced and inexperienced—will find much to ponder on both in the pictures themselves and in the technical evaluation of them by R. H. Mason. An article on colour photography is contributed by Ernest M. Heimann and Margaret F. Harker reviews the year's work and progress of photography in many countries throughout the world.

The Vanishing Prairie by **Jane Werner** and the Staff of the Walt Disney Studio. Pp. 124 with numerous coloured illustrations. Rathbone Books, Adprint House, Rathbone Place, London, W.1. 9/6.

The second volume to accompany Walt Disney's great series of nature films upholds worthily the remarkable standard achieved in *The Living Desert*. At first sight less spectacular in content than its predecessor, it records none the less a phase of wild life on the vast American Continent which was formerly an integral and essential part of it but which is far more vulnerable to the encroachments of modern man than the desert. To record and preserve it from total extinction are two projects, both of which are admirably served by this volume. It is written in simple language with an excellent illustrated glossary of the animals recorded. Its main feature is, however, as before, the wonderful assemblage of coloured photographs of wild life—buffalo, prairie dog, crane, swan, sage-grouse, wild sheep, antelope, mountain lion, to name only a few—most of which have never been recorded before in any comparable manner and which collectively convey to the ordinary reader, whether junior or adult, the illusion of intimate contact with an entirely new world. That the colours are somewhat suggestive of Technicolor rather than nature is only a very minor criticism where there is so much to praise. It is greatly to be hoped that the book will have the wide circulation that its low price permits.

Filmstrip. Life on the Seashore. 25 frames in colour. Order No. 6135. **Common Fungi.** 31 frames in colour. Order No. 6175. Educational Productions Ltd., East Ardsley, Yorkshire. 25/- each (including notes by Dr. J. H. Elliott).

The first of these film strips is scarcely up to the usual standard of the series. Definition is sometimes poor, especially in the frames of seaweeds. Colour is reasonable and the notes are good but the attempt to arrange the frames in an ecological sequence is not wholly successful. The inclusion of Annelids and shore fish would have been desirable. There seems to be a lack of clear purpose behind this production. If it is intended for young children then generic names might well have been omitted, the sequence clarified with sub-titles to be more representative, and the shore more strictly adhered to; if for older children then all generic names should be included, some of the more general frames omitted and the rest perhaps arranged in systematic order.

The colour reproduction in *Common Fungi* is good but if one can trust those depicting *Russula emetica* and the Sulphur Tuft then it is doubtful if these specimens are correctly determined. The frame of *Polystictus versicolor* is wrongly oriented and the inclusion of the rare *Gyromitra esculenta* is somewhat surprising. The far commoner and beautiful *Peziza aurantia* would surely have been a better choice. The notes supply all the information required and in an entirely suitable form for their intended purpose though *Russula ochroleuca* is consistently spelled incorrectly.

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The NATURALIST

A QUARTERLY JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND

Edited by

W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

with the assistance as referees in special departments of

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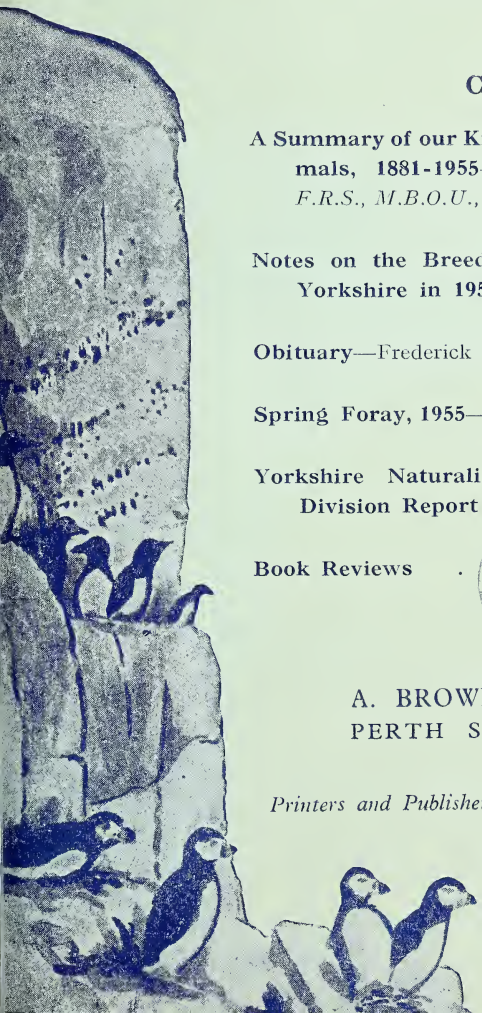

Contents

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Copies of Mr. A. A. Pearson's Papers Mycena, The Genus Lactarius, and The Genus Inocybe, and second editions of British Boleti and The Genus Russula may be obtained, price 2/6 each, and Mr. P. D. Orton's Cortinarius (Part 1) price 7/6, from the Editor of *The Naturalist.*

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A SUMMARY OF OUR KNOWLEDGE OF YORKSHIRE MAMMALS, 1881-1955

E. WILFRED TAYLOR, C.B.E., F.R.S., M.B.O.U., F.R.M.S.

Presidential Address to the Yorkshire Naturalists' Union, Huddersfield, December 3rd, 1955.

THE Yorkshire Naturalists' Union, fast approaching its centenary, is an old-established Society with a fine record of field work to its credit and it is an honour to be elected to occupy the Presidential Chair and to have the privilege of addressing you at this 94th Annual Meeting. The Presidential Address should by custom deal with some larger issue, transcending in importance the field experiences of any individual, and as my main interest is in vertebrate zoology it is in this field that I have sought my subject.

In the year 1881 the Joint Secretaries of the Yorkshire Naturalists' Union, Messrs. Wm. Eagle Clark and Wm. Denison Roebuck, collaborated to produce a *Handbook of Yorkshire Vertebrata* and this dealt of course with the Mammals, Birds, Reptiles, Amphibians and Fishes. The authors set themselves to gather together all the information relating to Yorkshire Vertebrates forthcoming at that date and I have felt for some time that something should be done to cover the intervening threequarters of a century. In the meanwhile, Mr. Ralph Chislett has brought Aves up to date in a volume entitled *Yorkshire Birds* and done it with the thoroughness we expect from him.

The Fishes, marine and freshwater, have less claim for attention as Mr. W. J. Clarke, who was a tireless worker in this field, published a supplementary list in 1944, not long before his death. The Mammals, Reptiles and Amphibians have not received similar attention and had time permitted I should have liked to have dealt with these three classes, especially as I have, during the last twelve months, found time—or perhaps I should say made time—to extract all that is pertinent from copies of *The Naturalist* extending over these 74 years. The field is, however, too large to cover in a single address and for this reason I propose to confine myself to the terrestrial mammals and to tell you, without going into great detail, what changes have taken place in our knowledge of their county distribution and what new information has come to light during the last threequarters of a century.

For some reason, perhaps because they are for the most part diurnal, the Aves have received much the most attention during this period. In contrast the Secretary of the Mammals, Reptiles, Amphibians and Fishes Division has found it difficult to get together an adequate annual report and after a gallant fight has almost given up the struggle. One object of this address is to try to stimulate an interest in the more neglected branches of vertebrate zoology.

The mass of uncollated information I have collected, relating to vertebrate zoology in Yorkshire over this long period, is very considerable and my aim on this occasion must be to deal with general trends; so, having introduced my subject, let us open the *Handbook of Yorkshire Vertebrata* and make a start. On page 3 we find Class I Mammalia, Order Chiroptera and Family Rhinolophidae; in short the Horse-shoe Bats.

The Lesser Horse-shoe Bat. *Rhinolophus hipposideros.*

In the year 1881 there were no Yorkshire records of the Lesser Horse-shoe Bat but it is now known that an example was taken at Eavestone near Ripon in January, 1876, and that it has been since identified in caves in the Pateley Bridge area and in the Washburn Valley. Both the late H. B. Booth and myself have, with the assistance of Mr. Adam Gordon, found it in the Helmsley area at different times and it may exist anywhere in Yorkshire where caves are to be found, that is to say in the limestone districts.

Time will not permit me to say much of a detailed nature in this address but when at rest the suspended inverted body of the Lesser Horse-shoe Bat is so neatly enveloped by the wings as to resemble a cocoon and on the approach of an intruder it indicates its awareness of his presence by oscillating in a most curious and characteristic manner.

The Greater Horse-shoe Bat. *Rhinolophus ferrum-equinum.*

Both Horse-shoe Bats are cave dwellers and there appears to be no reason why the Greater should not also be found in the Yorkshire limestone caves. A single

specimen from Carperby, previously reported as a Noctule, is now known to be of this species as Roebuck himself confirmed in 1886.

The Barbastelle. *Synotus barbastellus.*

We come now to the family Vespertilionidae and in the year 1881 there were no Yorkshire records of the first member of this family. The first Yorkshire record of the Barbastelle was due to Messrs. Adam Gordon and H. B. Booth who reported an example from Helmsley in October, 1920, and the discovery of two large colonies in Helmsley Castle in 1921. In November, 1934, I picked up a dead specimen from the road through Castle Howard Park and this is now in the Natural History Museum. Since then, with the indispensable help of Mr. Adam Gordon, we have found a colony in a hollow tree and with the knowledge now acquired of its habits, Mr. Gordon can obtain specimens on his own premises at short notice. It is difficult to believe that this bat, now known to be plentiful in the Helmsley area, is absent from the north of Yorkshire. It is found in trees and old buildings.

The Long-eared Bat. *Plecotus auritus.*

This small but easily recognised bat is well distributed throughout the county and plentiful in many areas.

The Serotine. *Vesperugo serotinus.*

This rare south-country bat has not yet been recorded in Yorkshire nor is it probable that it does occur in the county.

The Noctule. *Vesperugo noctula.*

The Noctule is well distributed in the county. It is a large bat with a powerful flight and may sometimes be seen flying high with the Swifts in the evening sky. It is not uncommon in the plain of York and has been recorded from many parts of the county.

The Hairy-armed Bat. *Vesperugo leisleri.*

In 1881 this bat, better known as Leisler's, had only once been recorded for Yorkshire where three specimens were obtained from an old factory chimney-shaft at Hunslet near Leeds, about the year 1840. Then in 1890 it was reported that several had been shot at Mexborough and it was thought that a mistake had been made and that they were in fact young Noctules. In 1905 four were recorded from Barnsley and their identity was then confirmed by the British Museum. Others were recorded from the Stainborough district, Monk Fryston, Oulton near Rothwell (from a cottage roof), Rockley near Barnsley (where a colony of 19 was located in a hollow tree) and so things continued until 1915. In all some 40 specimens were identified, mostly by Arthur Whitaker and one must assume that the bat still occurs in the Barnsley district but that there is now no Arthur Whitaker to note the fact. It probably occurs elsewhere in Yorkshire as well.

Pipistrelle. *Vesperugo pipistrellus.*

This species is still abundant throughout the county and has on occasions formed very large colonies in the roofs of old houses.

Daubenton's Bat. *Vespertilio daubentonii.*

In the year 1881 this bat had not been recorded in Yorkshire. It is a water-loving species and the first record was from Masham in November, 1891. Other records followed and it is probably to be found in the upper reaches of most of the Yorkshire rivers and in the vicinity of lakes. It favours a quickly-flowing stretch of river over the surface of which it hawks for flies at a height of a foot or less and I can see it on any summer evening on some of the quieter stretches of the Rye above Helmsley. Two that I kept in captivity became very tame and would fly down and take moths from between the fingers.

Reddish-Grey Bat. *Vespertilio nattereri.*

This species, more commonly known as Natterer's Bat, had been only once recorded in 1881, a pair being taken from an old tree in Oakwell Wood, Birstall, in

June, 1840. The next Yorkshire example came from Harefield Wood, Pateley Bridge, in May, 1884, and since then it has been reported from Bingley, Thorp Arch, Birstall, Barnsley, Keighley and Helmsley. It is by habit a cave bat and the Helmsley examples have been taken from the Castle.

Beckstein's Bat. *Vespertilio bechsteinii* and
The Mouse-coloured Bat. *Vespertilio murinus.*

Have both been recorded in the South of England but it is most improbable that either species will find its way as far north as Yorkshire.

The Whiskered Bat. *Versperticio mystacinus.*

Denison Roebuck added the Whiskered Bat to the Yorkshire list, the first example coming from a church at Great Mytton. Further examples followed from Harrogate, Ripon, Ben Rhydding, Pateley Bridge, etc., and it is now recognised as well distributed in the county. I have several times come across it in the plain of York and think that it prefers old buildings and ivy-covered walls to caves.

Few naturalists study the habits of bats and it is not coincidence that out of the ten species known to occur in the county, no less than eight are present around Helmsley. It is just that Mr. Adam Gordon and others have studied the bats in this area. Similarly, it is doubtful if Leisler's Bat would have been recorded from the Barnsley area if Arthur Whitaker had not resided near there.

Before leaving the bats I should refer to the work done by D. R. Griffin and others in the U.S.A. on the methods used by bats when hunting insects at night. It is now known that they locate their position and their prey, not by sight, but by the echoes received from pulses of ultrasonic vibrations emitted orally at regular intervals. This no doubt accounts for the remarkable nasal developments of the Horse-shoe bats and the elaboration of the structures of the ears. Work has also been done on the local migrations of the cave bats in Somerset, Derbyshire and the Pennines.

We come now to the Order Insectivora and I will pass over the first three species which are abundant in most parts of the county. They are the Hedgehog (*Erinaceus europaeus*), the Mole, (*Tapla europaea*) and the Common Shrew (*Sorex tetragonurus*), and come to the smallest of the British mammals:

The Lesser Shrew. *Sorex minutus.*

This species, which was believed not to be uncommon in certain localities, is now known to be well distributed over the county.

The Water Shrew. *Crossopus fodiens.*

Is known to inhabit most of the quieter upper reaches of many if not all of our Yorkshire rivers and streams.

Of the Order Carnivora it should be recorded that of the family Felidae

The Wild Cat. *Felis catus.*

Figures in the Churchwardens' Accounts for Shipley, four being killed there between the years 1676 and 1680.

Of the family Canidae no new evidence is forthcoming regarding the Wolf (*Canis lupus*).

The Fox. *Canis vulpes.*

Is extremely well represented in the county. Although a native it is most probable that but for hunting it would have gone the way of the Wild Cat. During the late war foxes became so plentiful that they had to be shot in large numbers. The numbers killed by the Dales Fox Fund reached the impressive total of 350 in 1945 and there were several such county organisations.

We come now to the family Mustelidae and the

Marten. *Martes sylvestris.*

Roebuck was able to cite only four Yorkshire records. They were from Lees Head near Whitby about 1860 and 1877, Cannon Hall Park, Barnsley, 1878, and Buckden in Wharfedale, 1880.

One might have thought at this date (1881) that little more would be heard of

the Marten in Yorkshire but in fact a number of later records have been established and one cannot yet say that the Marten will not turn up again in the county. Subsequent records are:

Buckden, 1880.
Hebden, Bridge 1882.
Kexby, near York, 1883.
Ripley, 1886.
Swainby in Cleveland, 1900.
Littondale, 1910.
Hebden Bridge, 1912.
Burnsall, 1914.
Barmston, 1920.
Levisham, 1920.
Swainby in Cleveland, 1921.
Simons Fell at 1,800 ft., 1924.
Broomhead Estate, Sheffield, 1927.
Skelmanthorpe, 1936.
Swaledale, 1938.
Ingleton, 1946.

It is known that a male escaped from captivity in Duncombe Park in 1936 but one is puzzled to account for these intermittent records over so long a period, especially as the species is just as rare in the bordering counties. Is it possible that a few still survive in the wilder parts of the county ?

The Weasel. *Mustela vulgaris.*

Is a common animal throughout the county and calls for little comment, though reference should be made to observations of the weights and measurements of Yorkshire specimens made by R. J. Flintoff in 1935. He found that the heaviest adult male may weigh two and a half times as much as the lightest male and that the heaviest female may be three times as heavy as the lightest, hence perhaps the country belief that there are two species of this animal.

A white specimen was reported from Kildwick in 1883, an albino in 1912 and a white specimen that was not an albino from Sedbergh in 1943.

The Stoat. *Mustela erminea.*

This animal is still ubiquitous and white examples have been reported from Bedale, 1911; Keyingham, 1922; Glusburn, 1950, and partially white examples from Howden, 1905. Stoats also vary much in size and according to R. J. Flintoff's records the males vary between 8 and 15¾ ozs. and the females between 5 and 9½ ozs, a 2 : 1 ratio.

In 1928 Mr. Adam Gordon of Helmsley discovered a race of Stoats at Harome of a golden fawn colour and characterised by the absence of black hairs at the end of the tail. Specimens were sent to the Natural History Museum where they were regarded as unique.

The Polecat. *Mustela putoria.*

Denison Roebuck referred to the Polecat in Yorkshire as irregularly distributed, extremely rare and fast becoming extinct. Since 1881 a number of new records have been reported. They are:

1. Several trapped on Clowes Moor, 1861-1878.
2. Strangely Wood, Elland, 1874.
3. A pair trapped on Marsden Moor, 1884.
4. Two or three trapped near Wilstrop, 1886.
5. Hatfield Chase, 1887.
6. Near Louth, 1899.
7. One shot at Darley, Nidderdale, 1903.
8. One trapped, Fylingdale, 1903.
9. Still present in the Ramsdale district, 1907.
10. North of Wassand, 1910.
11. One seen near Cayton, 1939.

From Churchwardens' Accounts it is clear that Foumarts were once plentiful in the following parishes—and no doubt many more:

Manningham, Horton and Bolling, 1680.
Scarborough, 1774-1776.
Cottingham, 1664.
Skipton, 1808-1827.
Terrington, 1802-1827.

Records of the Polecat are not always reliable as they may be confused with escaped ferrets which have Polecat blood in their ancestry and which may closely resemble the wild animal.

The Otter. *Lutra vulgaris.*

The status of the Otter in Yorkshire is probably much as it was in 1881. It may still be encountered wherever the rivers and streams are unpolluted and the records

from many parts of the county are numerous. The most I can do here is to single out a few records of special interest:

One devours a Drake near Masham, 1891.
One killed in Swinegate, York, 1927.
One seen in the outskirts of York, 1923.
Otters killing and eating S. H. Smith's tame ducks, York, 1923.
Otters seen swimming in the Ouse near Skeldergate Bridge, York, 1928.
A fight between a seal and two otters witnessed above Ruswarp Dam on the Esk, 1942.
One killed by a car on the York-Dringhouses road.

For many years a pair of Otters regularly raised a family inside the York City boundary, making use of an old drain near Ouse Bridge. Another pair had their holt on the River Foss near Monk Bridge when they could frequently be heard whistling after dark.

The Badger. *Meles taxus.*

Roebuck referred to the Badger in the following terms: ' Very local and extremely limited in numbers. Its present haunts seem to be restricted to calcareous formations.' This interesting animal is possibly not so persecuted as formerly, although it is not popular with the Forestry Commissioners, since it objects to having its movements restricted by rabbit netting. It is reported from so many parts of the county and one sees so much evidence of its activity in suitable areas that it must I think be more plentiful than it was in 1881.

Unusual records are the Castle Hill, Tadcaster, 1899, and Flambrough.
One was run over in the Chesterfield Road, Sheffield, 1939.
One was killed by a train near Linton, 1944.
One was shot in an air-raid shelter in Middlesborough, 1947.
One was killed at Bramham crossroads, 1947.
One was run over on the Leeds-Selby road, 1948.
Two have been killed by cars near York in the last few years and there is to-day an inhabited sett within five miles of York Minster.

We have nothing to add to Roebuck's notes regarding the Brown Bear (*Ursus arctos*), and the Wild Boar (*Sus scrofa*).

We come now to the family Cervidae and passing over the Reindeer must consider

The Red Deer. *Cervus elaphus.*

It is believed that wild herds of Red Deer at Barden and Bolton were walled in about 1654 and that they continued there until 1924. It is possible that there are now no enclosed Red Deer in Yorkshire but there are still small unenclosed parties in Nidderdale and in the districts of Wass, Winterburn, and in Flashby Wood. Long may they persist !

The Fallow Deer. *Cervus dama.*

Prior to 1939 Fallow Deer were enclosed in parks all over the county as at Castle Howard, Aldby Park, Duncombe Park and Sand Hutton in the York area. At the present time the only enclosed herd I know of is the one at Swinton near Masham though there may be others. Nevertheless, small parties of Fallow Deer may be encountered along the southern edge of the Cleveland Hills where they may be able to maintain themselves for many years. Two years ago I encountered a small herd near Rievaulx.

The Roe Deer. *Capreolus capraea.*

Roebuck refers to the Roe Deer as domesticated in a few parks only. ' Through the work of the Forestry Commission environmental conditions are more favourable than ever before for the increase and distribution of these delightful animals ' (Henry Tegner). To date I have a single unproved record of a Roe Deer from the Ampleforth area.

We will pass over the family Bovidae as there are now no descendants of the wild White Cattle in Yorkshire and come to the Order Rodentia and the family Sciuridae.

The Red Squirrel (*Sciurus vulgaris*) and the Grey Squirrel (*Sciurus cinereus*).

Of the former Roebuck states ' generally distributed and common in woods and plantations ' and so I remember it in the plain of York. It was nevertheless very subject to epidemics and in 1886 its numbers were reported as much reduced in Nidderdale—similarly in 1913 it was reported as absent from the area around Plumpton.

Turning now to the Grey Squirrel, *The Naturalist* reports that three dozen were released near Malton in June, 1906, but gives no details. A further 30 were released by W. H. St. Quintin in Scampston Park in October, 1914, and others at Upwood near Bingley in 1915. Further specimens are said to have been released at Bedale in 1913, Hebden Bridge in 1921 and Darlington around 1914-15. By 1923 the Grey Squirrel was reported as well established at Scampston, Bingley and Bedale. It has now spread over nearly the whole of Yorkshire and simultaneously the much more attractive native Red Squirrel has disappeared except towards the borders of the county to the south, east and west.

Quite recently, Miss Monica Shorten has made an intensive study of these two mammals and come to the conclusion that the Red is much less hardy and much more subject to coccidiosis and mange. She thinks that the ancestral habitat of the Red was the dense coniferous woodlands with old trees and that it was at some disadvantage in the mixed woodlands such as characterised most of the county. There was evidence of widespread disease between 1904 and 1926 but in some parts of Yorkshire its numbers increased up to 1930 in spite of the presence of greys which by then had spread over some 10,000 square miles of Britain.

Accounts of Greys attacking and killing Reds are not numerous and in some areas the two species live amicably together but nevertheless by 1945 Reds had disappeared from 66% of the area occupied by Greys.

A census taken during the years 1944-1945, which covered over 1,000 Yorkshire parishes, showed that in the North Riding Reds still occupied about 18%, in the East Riding 26%, and in the West Riding 70%.

It is many years since I saw a Red Squirrel in Yorkshire and yet when I visit the great Scottish Pine Forests I find the Reds as plentiful as ever they were. It is in fact doubtful if the Grey can adapt itself to this particular environment.

Of the family Castoridae I have little further information regarding the Beaver (*Castor fiber*), except to say that remains have been found in the county and that several place names such as Beverley probably derive from it. '

The Dormouse. *Muscardinus avellanarius.*

Belongs to the family Myoxidae and is described by Roebuck as ' generally but very thinly distributed over the county; more abundant in densely wooded districts'.

County records of this species are few and have now ceased altogether. It occurred at Lofthouse near Whitby around 1884, and at Headlam between Darlington and Barnard Castle about 1870. In 1884 a nest with young was found at Brimham Woods. It occurred in the banks of the Hodder around 1865 and at Markington about 1875. In 1891 it was said to occur sparingly at Wilstrop, Wetherby, Bilton, Thorp Arch, near Bransby and Skelmanthorpe and increase was reported in 1910.

My experience with this species in Yorkshire was due to a gamekeeper—James Patterson of Goathland—who in 1910 came across a curious ball-shaped nest, composed of grass and built in Hazel scrub. Oxley Grabham and myself visited the site and on touching the nest out popped three young half-grown Dormice. The latter climbed up the nearest shoots, anchored themselves and went fast to sleep. After a little while one of the parents climbed up to the nest, found it empty and set off to find the family. Having found the first one she took it by the scruff of the neck and forcibly returned it to the nest before proceeding to impound the other two.

In June of the following year we again found an occupied nest of a Dormouse in the same part of the plantation and this was perhaps the last nest seen and certainly the last reported for the county. A few years ago I took Mr. Adam Gordon along to the same wood and we made an intensive search for the species without success but it may still survive in the Goathland area.

The Harvest Mouse. *Mus minutus.*

Is the first member of the family Muridae and was described by Roebuck as very irregularly and thinly distributed and scarce '. During the intervening three-

quarters of a century not a single record has come to light and in 1916 Riley Fortune wrote: ' I question whether the Harvest Mouse ever inhabited the county.'

The Long-tailed Field Mouse, *Mus sylvaticus*, and House Mouse, *Mus musculus*.

Both these species are well distributed and abundant throughout the county.

The Black Rat. *Mus rattus*.

This species still maintains itself on the coast at Middlesborough and Scarborough where its numbers are augmented by the arrival of migrants brought by ships. In 1929 no less than 95 specimens were killed in Scarborough but inland records are few though one was killed in York in 1947.

The Brown Rat. *Mus decumanus*.

This destructive animal still thrives in the county and one 25 ins. long and weighing 20 ozs. was reported from Malton in 1893—also a nest with 15 young was reported from the banks of the River Hull in 1905. In the year 1946, 69,177 were killed and counted in the North Riding where it was thought that at least half a million were actually destroyed. An unusual incident was the drowning of a Brown Rat by Water Hens in 1948.

The Water Vole. *Arvicola amphibia*.

Of the sub-family Arvicolinae the Water Vole is still found haunting the less rapid streams throughout the county, though, so far as my experience goes in somewhat reduced numbers. Forty years ago melanic specimens were not uncommon along the course of the Ouse above York but this variety has now completely disappeared in this area.

The Common Field Vole. *Arvicola agrestis*.

This little animal is ubiquitous and becomes at times an absolute pest as its numbers periodically rise to a peak after which an epidemic sets in and the numbers rapidly decline to a sub-normal level.

The Red Field Vole. *Arvicola glareolus*.

Commonly called the Bank Vole, this animal is now known to be much more widely distributed than was the case when Roebuck published his book.

We now come to the Family Leporidae and

The Common Hare. *Lepus europaeus*.

Though known to be subject to cycles this animal is as plentiful as ever and is fortunately not affected by the myxomatosis virus.

The Varying Hare. *Lepus variabilis*.

Roebuck cites no Yorkshire records for this animal though it was introduced on Marsden Moor in 1880. Fifty were also introduced to the Pennines by Colonel Joseph Crompton Lees at Greenfield near Oldham and an even earlier introduction was by R. H. Remington Wilson of Balsterstone Hall, Penistone, in 1870. In 1929 its range extended from Greenfield to Sheffield and to between Buxton and Macclesfield—even to Eyem Moor. Since then it has extended northwards and is now on Rishworth Moors (1935). In short the Alpine, Scottish or Varying Hare is now firmly established on the Pennines.

The Rabbit. *Lepus cuniculus*.

And lastly we come to the humble Rabbit whose numbers have been reduced to vanishing point in many parts of the county. They have for instance completely disappeared from the great Duncombe Park Estate where not long ago 22 rabbit catchers were regularly employed. There are still areas that the disease of myxomatosis has not penetrated, as was shown by the recent Y.N.U. excursion to Carperby, but the Ministry of Agriculture believes that with the numbers so reduced it will be possible to completely exterminate it in the North Riding. My own view is that Bunny may still have the last word !

In the course of going through 74 years of *The Naturalist* I have extracted notes on the non-avian vertebrates covering more than 100 sheets of foolscap. Many

well-remembered names are appended to the notes extracted in this connection and I gratefully mention the following, a few of whom are still with us: Jasper Atkinson, James Backhouse, George Bolam, Harry Booth, W. G. Bramley, Ross Butterfield, Eagle Clark, W. J. Clarke, John Cordeaux, Fred Edmondson, R. J. Flintoff, Riley Fortune, Oxley Grabham, Walter Greaves, Fred Lawton, T. H. Nelson, Charles Procter, W. H. St. Quintin, Denison Roebuck, Thomas Sheppard, Sydney Smith, F. Snowdon, Thomas Stephenson, E. W. Wade, E. R. Waite, Arthur Whitaker and, last but not least, Mr. Adam Gordon and Mrs. Hazelwood.

Will the same assistance be forthcoming when in the year 2030 someone refers back through the 75 years of *The Naturalist* commencing with the year 1955 for evidence let us say of the spread of myxomatosis through the county ? This is an event of more than ordinary importance but unless we do something quickly the future worker will find no reference whatsoever to the Yorkshire incidence of this unique epidemic and he will wonder why and how the study of our Yorkshire Mammals suffered this most serious eclipse.

In the reference to species the Latin names used by Clarke and Roebuck have been retained.

Realms of Water, by **P. H. Kuenen.** Pp. 327, with 16 photographic plates and 190 text figures. Cleaver-Hume Press Ltd., London, 1955. 35/-.

Geology is less well supplied than many other branches of natural history with books in which aspects of the subject are expounded by specialists in a manner intelligible to the lay reader. The author of this book is Professor of Geology at the University of Groningen, and in it he gives a scientific and lucid yet largely non-technical account of the facts pertaining to the cycle of water in nature and the all-important part which it plays in shaping climate and landscape. It may be that some professional geologists might cavil at some features of his account, but to the reviewer—and it is perhaps appropriate that a non-expert, for whom the book is intended, should review the work—his theme and his treatment of it make stimulating reading of absorbing interest. Professor Kuenen writes fluently and has been well served by his translator. Not all parts of the book are easy reading, for scientific accuracy is never sacrificed to popularity of exposition, yet throughout the book he contrives constantly to transmit to his reader a vivid awareness of the great geological pageant in which water has played such a dominant rôle.

The book is divided into five main chapters. The first deals with water in the oceans. In this oceanography and submarine geology are followed by accounts of the origins and nature of tides, currents and waves and their effects on the earth's crust. Water in the atmosphere deals with the physical forces which determine the movement and condensation of water vapour, with clouds and cloud types and the forms and distribution of precipitation. The chapter on water in the solid state gives much interesting information about glaciers, the mechanics of glacial movement and the action of glaciers as landscape architects. Water in the ground deals with the origins and movements of subsoil water, with springs and water supply and with the more spectacular manifestations of underground water provided by geysers, cave deposits and weathering due to freezing of subsoil water. The fifth chapter devoted to water on the surface deals with the evolution of rivers and lakes and the many aspects of erosion phenomena. In the final chapter on the 'balance sheet' of terrestrial water consideration is given to the problems of whether there is any variation in the total amount of terrestrial water in circulation, whether the salinity of the oceans is increasing with time and if so the bearing which such changes have on the estimation of geological time, and whether alterations in the distribution of water occur within the grand cycle of its changes.

The book is copiously illustrated with sketch-maps, block diagrams, drawings and photographs which add greatly to the pleasure and instruction afforded by the text. As background reading for geological and biological students its value will be considerable while to the much wider public interested in landscape and the countryside it can be wholeheartedly recommended as a graphic account of one of the great aspects of nature.

W.A.S.

NOTES ON THE BREEDING OF WOODLARKS IN SOUTH YORKSHIRE IN 1955

JEFFERY S. TRIMINGHAM

In view of the extreme paucity of nest records of the Woodlark (*Lullula arborea*) in Yorkshire in the last fifty years, it may be of interest to describe in some detail the breeding of a pair of this species in 1955, in the south of the county. The habitat was an area of stony waste ground on sandy soil, with coarse grass and a little bracken. There were a few trees and bushes along the edges. This area is hereafter referred to as ' the heath '. A pair of Woodlarks had a nest with four young, about four feet from a main railway line adjoining this land in 1954 (see *The Naturalist*, April–June, 1955, p. 85).

In 1955 Woodlarks were first seen in the district on March 19th, and on April 16th a pair were seen feeding quietly together on the heath. They were again seen together on the 23rd, but on April 30th only the male could be found at first. After about three hours of observation, the nest was found containing four eggs. It was sited in short grass, close to an isolated patch of dead bracken near the edge of the heath. Its position was thus easy to ' fix '. The eggs were all hatched between May 7th and 14th, and on the latter date, both parents were watched feeding the young. On May 19th, when the nest was approached, both birds got up from within a few feet of it, but it was found to contain three young, all dead, and the fourth was found dead nearby. Presumably they perished as a result of the severe weather of the previous few days, which had produced very cold winds and heavy rain, hail and sleet.

By May 28th it was evident from the birds' behaviour that the hen was sitting again. It was possible to judge the position of the nest to within a few yards, but as the birds seemed reluctant to return, the nest was not actually located until a subsequent visit, two days later, when the hen was flushed from another clutch of four eggs. This second nest was in longer grass than the first one, and in a rather deeper depression, well sheltered by a large tussock of grass. In common with the first nest, it was sited near to the edge of the heath, among scattered patches of dead bracken. The eggs were inspected again on June 4th, 5th and 9th, but the writer was then unable to visit the place again until June 27th. By this time the nest was empty, but there were a number of droppings in and around it, and when the heath was searched, at least three Woodlarks were located. It would thus appear that the second brood was successful in some degree.

Some aspects of the birds' behaviour when with eggs seem worthy of mention. When the nest was approached with the male in the vicinity, the female would leave the nest while the observer was still some distance away, as if called off by the male (although no call was noticed that would seem connected with her departure). However, if the nest was approached when the male was absent, the female would sit extremely tightly, until the observer was standing within two feet of her. On two occasions, when actually flushed from the eggs, the female feigned injury. After fluttering off the nest, the bird shuffled along, quite slowly, in a crouching attitude, with the head held close to the ground. The wings were fluttered in a half-open position, and the tail was fanned and depressed. This performance was continued over a distance of about a dozen yards from the nest, after which, the bird got up and flew off. This description agrees with that in *The Handbook of British Birds*, Vol. I (Witherby, H. F. et al (1938) London), but when R. J. Rhodes visited the first nest, he witnessed a rather different display. When he had approached to within about three feet of the nest, the female ' jumped off the eggs and ran *rapidly* along the ground, with wings trailing loosely and tail depressed, making a swishing sound as she passed through the grass.' R. J. R. adds that the bird ran in an almost straight line for fifteen yards, until reaching a slight mound, on which she stopped, turned round to look at him, and then flew to join the male.

When returning to the nest the female was always accompanied by her mate. The two birds would alight together, some distance from the nest, and the male would then escort the female, on foot, to within a few feet of it. He would then perch on some elevated spray of dead bracken nearby, and would wait until she had settled down, before flying off, often singing as he went. On three consecutive visits to the second nest, the eggs were found uncovered. One visit was made immediately after a spell of heavy rain, and the eggs were cold and wet. They were again unattended on the following day, and it was some time before the birds were

located, a considerable distance from the nest. It was thought that the eggs were deserted, until later in the same day, when the female was seen incubating.

A feature worth stressing is the apparent absence of the species once the female had begun incubating. The male was in the habit of feeding in a field some quarter of a mile away from the nest when the female was settled on the eggs, and as she sat so closely when her mate was not present, it would be possible to make quite a thorough search of the area without even suspecting the presence of the species. Thus, on the first visit after the laying of the second clutch, the writer searched the heath for fully an hour before a Woodlark was seen.

Singing Woodlarks were noted in two other localities in the same district, during the breeding season of 1955. At one of these, a family party was seen on June 25th and on July 2nd and 9th. The party comprised the adult pair and four juveniles, and on the last date a second male was singing near the first. Whilst the family party was under observation, some distinctive calls were heard from the juveniles. When the birds were approached too closely, the adults gave the familiar anxiety note, ' titlooeet ', but the young birds constantly uttered a call quite distinct from this. Their call was higher-pitched, and can be quite accurately rendered as ' pewdik-peedik '. Another call, heard several times from juveniles when flushed, was a soft ' sisisisi '. *The Handbook of British Birds* does not mention the voice of the juvenile Woodlark.

My thanks are due to Mr. R. J. Rhodes, for permission to publish his notes on injury-feigning.

Obituary

FREDERICK HIRD EDMONDSON
(1881—1956)

THE more senior members of the Y.N.U. will be sorry to learn of the death of Fred Edmondson at Southend on January 20th. He joined the Union in 1910 and retained his membership until the end. His interests lay mainly in the Vertebrate Section and he took a particular interest in the work of the Wild Birds Protection Committee of which he was a member from 1914-1948, Hon. Secretary from 1922 to 1935 and Chairman from 1941 to 1948, when he left Yorkshire to retire to Essex. He took a special interest in the eyries of the Yorkshire Peregrine Falcons and did all in his power to further their protection.

Fred Edmondson belonged to the group of sportsmen-naturalists, now fast disappearing, whose knowledge of wild birds and animals was general rather than specialised. In company with the late H. B. Booth he would make lengthy excursions to see some unusual animal or bird or to attend an International Congress. In 1912 he was one of a small team who, under the direction of the late Dr. F. Heatherley, kept continuous watch on the eyrie of a Peregrine Falcon in Scilly for 13 days and nights as is recorded in Dr. Heatherley's subsequent book entitled *The Peregrine Falcon on the Eyrie* (1915). Although anxious to bestow protection when this was needed, he was a keen sportsman and in spite of a ' game leg ' enjoyed all forms of legitimate sport whether directed against fur, feather or fin.

F.H.E. possessed a great friend in the person of Sir Harry Smith, with whom he travelled through some of the wildest parts of Africa studying the wild life, including the pygmies of the Belgian Congo. On his return he lectured to the Vertebrate Section and showed some remarkable photographs of some of the more dangerous animals which he had ' snapped ' through the window of his car. He was a very regular attender at meetings of the Vertebrate Section, where his bluff and friendly personality made him popular with all. The broad accents of his native Keighley never left him and when he joined in the discussions he did it with an economy of words and was always much to the point.

Following his retirement to the south, F.H.E. still retained his interest in the Y.N.U. and kept in touch with many of his old friends. He was last seen by some of the Y.N.U. members at the field meeting of the B.O.U.-cum-B.T.O. at Bambury in 1952 when he sought eagerly for his old friends.

E.W.T.

SPRING FORAY, 1955

W. G. BRAMLEY

Some twenty members and friends attended a very enjoyable and successful foray held at Wrea Head College by courtesy of the Education Committee of the North Riding County Council.

Amongst new visitors we welcomed Mr. Reid, of the Royal Botanical Gardens, Kew, and profited by his knowledge, especially of the resupinates.

Friday was spent in the Forge Valley area, first at Throxenby Mere and then working down the valley to Ayton, sampling likely-looking parts on the way. Hackness was visited on the following day. This area was much drier but a good amount of material was collected. Small groups also made sorties to Broxa and Silpho, though with very little advantage. Most members spent Sunday morning working through the collections already gathered, or collecting in the immediate vicinity of headquarters. In the afternoon part of the Duchy of Lancaster Woods at Cloughton were visited, adding to the material already collected.

Without the co-operation of Mr. Reid for most of the Basidiomycetes, C. Booth for Pyreno- and Hyphomycetes, and A. C. Collinge for Myxomycetes, the following list of the more outstanding species could not have been compiled. To these and all other members who helped to collect, our thanks are due.

NOTES

Oospora microsperma. This was first described by Berkeley and Broome in 1873, and has apparently only been noted once since until the present collection. This was at the 1936 Autumn Foray of the Y.N.U. at Buckden.

Gnomonia needhami. Another species which has not apparently been collected since its first publication by Massee and Crossland and in *The Naturalist,* 1904, p.3. Besides the present collection the writer has again found it in the Dalby Forest at Thornton-le-Dale. Easily overlooked, it only seems to occur on pine needles still attached to cut or fallen branches, but more or less in contact with the ground where they do not dry out for considerable periods.

Enchnoa lanata. This seems to be a rare species in Yorkshire where Birch has been extensively collected on in recent years. The only other record is from Pilmoor, Thirsk: *The Naturalist,* 1948, p. 159.

Nectria cucurbitula. Not recorded previously from Yorkshire, and Petch (1938) only lists two localities from Scotland. Only one large branch was infected but plenty of material was on this to satisfy most members.

†=Not in Mason & Grainger. *=Not in Mason & Grainger for V.C. 62.

C.=Cloughton. F.=Forge Valley.
T.=Throxenby Mere. H.=Hackness.

Numbers are Accession Nos. in Herb. C.M.I.

MYXOMYCETES

Diachaea leucopoda Rost. T.
†*Diderma globosum* Pers. H.
**Lamproderma echinulatum* Rost. T.
Trichia favoginea Pers. H.

BASIDIOMYCETES

Marasmius esculentus (Wulf. ex Fr.) Karst., ssp. *pini* Singer, on Pine cones. Silpho.
**Pholiota blattaria* Fr. sensu Ricken. H.
Psathyrella spadicea-grisea (Schaeff. ex Fr.) A.H.Sm. H.F.
†*Corticium fusco-stratum* Burt. F.
†*C. galzini* Bourd., on *Larix* bark. C.
†*Exidia thuretiana* (Lev.) Fr., on *Fraxinus.* H.
Grandinia granulosa (Pers. ex Fr.) Fr. H.C.
†*Mucronella aggregata* Fr., on wood. H.
†*Odontia bicolor* (Fr.) Bres. H.
**O. papillosa* (Fr.) Bres., on *Sambucus.* F.

†*Peniophora leprosa* Bourd. & Galz. Silpho.
†*P. nuda* (Fr.) Bres., on *Fraxinus*. H.
P. violacea-livida (Sommerf.) Massee, on *Acer* twigs. T.
†*Puccinia cirsii-lanceolata* Schroet. Ol. H.
†*Ustilago vaillantii* Tul., on *Scilla bifolia* and *Chionodoxa*. Wrea Head gardens.

DISCOMYCETES

Ciboria amentacea (Bolt. ex Fr.) Fuckel. Scalby.
**Dasyscypha apala* (B. & Br.) Dennis, on *Juncus*. T.
†*D. carneola* (Sacc.) Sacc., on *Digraphis*.
†*Hyaloscypha dermatiicola* (B. & Br.) Nannf. 60256. Conidial on *Alnus*. 59882.
**H. leuconica* (Cooke) Nannf., on Larch cones. C.
†*H. stevensonii* (B. & Br.) Nannf., on conifer wood. C.F.H. (Though not in M. & G. this species is common on coniferous wood.)
†*Tapesia melaleucoides* Rehm, on *Quercus*, F. (det. W. D. Graddon).

PYRENOMYCETES

**Calonectria ochraceo-pallida* (B. & Br.) Sacc., on *Arctium*. 59879.
†*Nectria cucurbitula* (Tode ex Fr.) Fr., on conifer. 59891.
†*Ophionectria cerea* (B. & Curt.) Ellis & Everh., on *Diatrype stigma* on wood. 60253.
†*Acrospermum compressum* Tode ex Fr., on *Urtica*. F.
†*Calosphaeria wahlenbergii* (Desm.) Nits., on *Betula*. C. 59907b.
†*Ceratostomella leiocarpa* Sacc., on wood. 59896.
†*Chaetosphaeria innumera* (B. & Br.) Tul., on *Acer*. 59908. On *Quercus*. F. 60187.
†*Enchnoa lanata* (Fr.) Fr., on *Betula*. C. 59907a.
**Gnomonia needhami* Massee & Crossland, on *Pinus* needles. C. 60190.
†*Helminthosphaeria malacotricha* (Niessl) Kirsch, on *Pinus*. 59885.
†*Lasiosphaeria strigosa* (A. & S.) Sacc., on wood. H.
†*Nummularia lutea* (A. & S.) Nits., on *Corylus*. H. 59895. On *Sambucus*. H. 59903. (Has been listed previously as *Camarops tubulina*.)
**Quaternaria dissepta* (Fr.) Tul., on *Ulmus*. 59906.
†*Zignoella pulviscula* (Curr.) Sacc., on *Sambucus*. 59897a.

HYPHOMYCETES

Bisporomyces chlamydosporis van Beyma. F.
†*Brachysporium britannicum* Hughes, on *Quercus*. F. 60187.
†*B. masonii* Hughes, on wood. 60260d.
†*Cheiromycella gyrosa* (Cooke & Massee) Mason & Hughes, on *Larix*. 60259.
†*Graphium calicioides* (Fr.) Cooke & Massee. F.
†*Oospora microsperma* (B. & Br.) Sacc. & Vogl., on conifer bark. 60290.
†*Podoconis* (*Brachysporium*) *alta* (Preuss) Mason & Hughes, on *Sambucus*. 59897b.
†*Speira toruloides* Corda, on grass stems. F.
**Sporoschisma mirabile* B. & Br., on *Alnus*. 60255.
†*Tetraploa aristata* B. & Br., on straw. F.
†*Triposporium cambrense* Hughes, on *Ulmus*. 60258b.
†*Volutella roseola* Cooke, on *Pinus* needles. C.

Just Elephants, by **William Bazé.** Pp. 244, with 24 photographic plates. Elek Books, London, 1955. 21/-.

Although there is no biographical thread to this account of elephants in Indo-China, the author appears to have settled early in life in that turbulent country, as a hunter and trapper. He attained the confidence of the Emperor, Bao Dai, and the Imperial resources put at his disposal enabled him to extend his hunting experience in the most extravagant ways.

His story of elephants, wild and tamed, may have been told before but seldom with such breadth and aplomb. Elephants are watched at birth, at play, mating, bathing and fighting; elephants are shot, others are captured, trained and obviously loved by a man who writes of them with modesty, understanding and a gift for description, which loses nothing by an adroit translation, of the people and animals of a country of which much has been heard lately but which remains little known.

E.H.

YORKSHIRE NATURALISTS' UNION (VERTEBRATE SECTION) ORNITHOLOGICAL DIVISION

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Spurn Bird Observatory: G. H. Ainsworth, 144 Gillshill Road, Hull.

Report for 1955

Reports of field and indoor meetings during the year have been published in *The Naturalist.*

A year's report is never complete without brief reference to the weather conditions that have affected so many of the interesting records made. Northerly and easterly winds prevailed in January and February, most of which were ice- and snow-bound except for a fortnight from January 23rd unto February. Lakes and reservoirs showed large areas of ice up to mid-March, and the 24th was the first mild spring day at Masham. In January and February thrushes, larks and pipits, probably immigrants, searched for food on the tide line at Teesmouth.

Heavy snow fell again in mid-May; Sheffield had its record coldest day of May on the 17th. At this time there were large concentrations of hirundines and Swifts over lowland inland waters. This period produced a striking example of the value of the co-ordination of individual records, when Ringed Plovers and Turnstones appeared in the Dearne Valley, and farther east by the Calder and Aire rivers, and still farther east by the Humber at Cherry Cobb, indicative of cross-country migration by coastal species. North-east winds blew in the first half of June and there were some late frosts.

In early July a period of drought began which lasted through the autumn, except for a few slight showers. Reservoirs became very low. From mid-summer waters that were less affected by the drought were especially favoured by duck; those that showed unusually big margins of mud, by waders. On December 11th Roundhill and Leighton reservoirs were lower than ever. Winter arrived in earnest on December 20th with heavy snowfalls over most of the county, especially on the eastern side, and replenishment of reservoirs began.

The full effect on some species of bird of the virtual disappearance of the rabbit from the hill-country where it bred in thousands has yet to be seen. Myxomatosis spread rapidly up the Dales in spring and by July the warrens smelled of decay and hundreds of carcases lay about. Carrion Crows and Jackdaws were seen to feed on such meat.

The Spurn Bird Observatory
(G. H. Ainsworth and R. Chislett)

Considerable damage done by storms in the winter months was made good. A new Heligoland-type trap was erected on a site selected by the builder as more convenient than the place originally intended; it proved a little more productive than first thought likely, and has caught some warblers, thrushes, finches and a Sparrow Hawk.

Observation and trapping were undertaken on 12 days in January, 10 days in February, 21 in March, 28 in April, 22 in May; and from July 12th to October 31st inclusive, on 22 days in November and 12 in December. Snow-Buntings were the main objective in January and late December and 87 were caught.

Some 200 people stayed at the cottage for periods varying from one or two days to three or four weeks, to learn about and enjoy our birds and to help with our work. Included was a study group of R.S.P.B. junior members, under the guidance of G. R. Edwards who came for a week in August. Several parties from schools and training colleges with their tutors paid short visits. Many of our visitors were

Birds Ringed at Spurn

	Total to 31/12/54	Ringed in 1955	Total 31/12/55
Storm Petrel		1	1
Mallard	1		1
Long-tailed Duck	1		1
Common Scoter	1		1
Sheld-Duck	2		2
Sparrow-Hawk	17	1	18
Merlin	2		2
Kestrel	9	3	12
Red-legged Partridge	23	1	24
Common Partridge	5		5
Corncrake	1		1
Water-Rail		1	1
Moorhen	5	5	10
Oystercatcher	1		1
Lapwing	3		3
Ringed Plover	69	1	70
Turnstone		1	1
Common Snipe	1	1	2
Jack Snipe		1	1
Woodcock	4		4
Green Sandpiper	1		1
Redshank	7	1	8
Dunlin	7		7
Common Gull	3	2	5
Little Tern	54		54
Razorbill	2		2
Little Auk	1		1
Guillemot	4	2	6
Puffin	2		2
Wood Pigeon	1		1
Turtle Dove	1	1	2
Cuckoo	85	5	90
Little Owl	4	1	5
Long-eared Owl	3	1	4
Short-eared Owl	1		1
Swift	2		2
Hoopoe	1		1
Greater Spotted Woodpecker	1		1
Wryneck	12		12
Skylark	81	24	105
Swallow	198	47	245
Sand-Martin	34		34
Carrion Crow		2	2
Rook	2	2	4
Jackdaw	6	3	9
Magpie	11		11
Jay	1		1
Great-Tit	47	4	51
Blue-Tit	79	7	86
Coal-Tit	1		1
Willow-Tit	2		2
Long-tailed Tit	3		3
Tree-Creeper	2		2
Wren	147	19	166
Mistle-Thrush	1	2	3
Fieldfare	21	13	34
Song-Thrush	411	43	454
Redwing	101	35	136
Ring-Ousel	10	1	11
Blackbird	1942	364	2306
Wheatear	91	19	110
Carried forward	3528	614	4142

	Total to 31/12/54	Ringed in 1955	Total 31/12/55
Brought forward	3528	614	4142
Stonechat	21		21
Whinchat	113	19	132
Redstart	353	33	386
Black Redstart	32	3	35
Nightingale	6		6
Bluethroat	3	2	5
Robin	1027	24	1051
Reed-Warbler	2	5	7
Sedge-Warbler	138	3	141
Icterine Warbler	3		3
Blackcap	38	7	45
Barred Warbler	9	1	10
Garden-Warbler	92	14	106
Whitethroat	764	187	951
Lesser Whitethroat	41	4	45
Willow-Warbler	982	145	1127
Greenish Warbler	1		1
Chiffchaff	57	4	61
Wood-Warbler	11	1	12
Yellow-browed Warbler	3	1	4
Goldcrest	205	15	220
Spotted Flycatcher	95	12	107
Pied Flycatcher	420	52	472
Red-breasted Flycatcher	7		7
Hedge-Sparrow	375	61	436
Meadow-Pipit	510	114	624
Tree-Pipit	8	1	9
Rock-Pipit	4		4
Pied Wagtail	2		2
White Wagtail	1		1
Yellow Wagtail	5		5
Waxwing	1		1
Great Grey Shrike	4	2	6
Woodchat Shrike	1		1
Red-backed Shrike	5		5
Starling	547	123	670
Greenfinch	1234	100	1334
Goldfinch	12	13	25
Siskin	3		3
Linnet	1661	205	1866
Redpoll, Lesser	5	3	8
Redpoll, Mealy	9		9
Bullfinch	1	1	2
Scarlet Grosbeak		1	1
Crossbill	4		4
Chaffinch	1058	42	1100
Brambling	289	26	315
Yellowhammer	61	2	63
Corn-Bunting	6	5	11
Ortolan Bunting		1	1
Reed-Bunting	349	72	421
Snow-Bunting	108	87	195
House-Sparrow	1239	267	1506
Tree-Sparrow	21	2	23
Total	15474	2274	17748

qualified ringers and recorders, and the general standard of efficiency was high, if once or twice it dropped for a day or two. Several little things that add to the difficulties of preparing a report could be remedied.

At least once the ' roll-call ' did not include a species that had even been handled ! The roll-call is in the nature of an index and a graph, and an omission may cause a species to be overlooked. As a graph, and for comparison with previous years, it has not been improved by the unbracketted inclusion of numbers of birds that have occurred north of Kilnsea. Again, a figure ' one ' is hardly a scientific record even if placed in the proper column and line, and if it refers to an important item should be amplified in the log. Too often at the head of a day's entries appears a string of initials, not always all familiar and not always complete, and sometimes without discoverable mention of the owner's name. The words ' as yesterday ' have appeared for several consecutive days and it has been difficult quickly to ascertain who was present from either log or roll-call. When anyone has seen something unusual, if the log shows who was responsible, it helps the writer of the report and enables him to make an acknowledgement.

One last grumble, when reading the numbers of rings on re-trapped birds, over which there is no check by virtue of sequence, especial care must be taken to read the figure correctly, which should then be put down immediately; if carried in the head even for a few seconds, it is so easy to get figures reversed. When the recordings of numbers of rings on re-trapped birds fail to correspond as to species with the original ringing entry, neither record may be quite reliable and both have to be ignored. Unless everything is recorded accurately ringing is a waste of time and our money.

The year's total of birds ringed was 2,274, covering 71 species. One, the Scarlet Grosbeak, was a new bird for Yorkshire. Recoveries include 14 birds from Europe, four from Ireland, and eight in other parts of Britain. Details will be found under the headings of the species concerned, viz.: Ringed Plover, Sparrow Hawk, Blackbird, Redwing, Robin, Whinchat, Garden-Warbler, Reed-Warbler, Starling and Brambling. Numerous birds were re-trapped and a table follows showing those that had been ringed in previous years: some of them had been caught in several years. In addition two birds were caught that had been ringed elsewhere—a Blackbird in Germany and a Chaffinch in Ireland; and a Bass-ringed Shag was found dead. Seven species had not been ringed at Spurn before: Storm Petrel, Jack Snipe, Turnstone, Water-Rail, Carrion Crow, Scarlet Grosbeak, and Ortolan Bunting.

BIRDS OF 1955 THAT WERE RINGED IN PREVIOUS YEARS

	Years when Ringed				
Re-trapped in 1955	1954	1953	1952	1951	1950
43 Linnets	26	7	6	3	1
11 Reed-Buntings	3	5	—	2	1
6 Blackbirds	6	—	—	—	—
3 Whitethroats	1	1	—	1	—
6 Meadow-Pipits	1	2	2	1	—
13 Hedge-Sparrows	9	3	1	—	—
8 Greenfinches	5	2	1	—	—
8 Skylarks	4	4	—	—	—
2 Snow-Buntings	2	—	—	—	—
16 House-Sparrows	2	1	8	3	2
116	59	25	18	10	4

These are the broad results of ringing achieved in a year when easterly winds, which frequently drift tired birds to Spurn to alight on arrival, were less helpful than in some years. The year produced no invasions like those of 1951 and 1954. Very few birds dropped on some days on which there was much passage migration. Nevertheless some of the more striking events of the year were associated with winds from an easterly direction; as when 46 birds were ringed on April 30th, a very large number for spring. The occurrences of Bluethroat, Barred Warbler and Hoopoe in the period August 22nd to 27th coincided with winds from north-east, and with good business at the traps. A couple of days of easterly currents from September 6th to 8th produced a Bluethroat and a Reed-Warbler in the traps on the 8th.

The most successful trapping period in the autumn, October 27th to 29th, during which winds were mainly north-west, was preceded by a short period when the wind was from the north-east on the 26th.

A reason for the increase of 258 in the total of birds ringed over the figure for 1954 can be found in the resumed ringing of House-Sparrows. Otherwise, increases in ringing of warblers, buntings, Starlings, Meadow-Pipits, etc., slightly more than balanced the decreases in Blackbirds and finches.

We have to thank friends of Spurn for welcome gifts of blankets, cutlery, china, books, photographs, paintings and seed for bait. Volunteers for hard work on trap maintenance have usually been available when needed. A considerable number of ringers have gladly given of their time. We hope to have their help again in 1956.

To comply with the new regulations under which rings are obtained from the B.T.O., it becomes now necessary for all ringing to be done under the responsibility of holders of permits. Many of us already hold permits; others qualified should take steps to obtain them. Those without permits may ring under supervision of permit-holders, who must accept responsibility for their work.

Students at training colleges and elsewhere who sometimes wrote asking us to supply details of birds and of our work for use in essays and theses must be informed that we have not the time to do more than refer them to this and former reports, copies of which can be obtained from the Editor.

The High Royd Trap (Roy Crossley)

Among the 438 birds ringed in 1955 are 94 Willow-Warblers, 49 Yellow Wagtails, 18 Pied Wagtails and 61 Tree-Sparrows. The remainder cover 25 species of which the most interesting was a male Wheatear caught on May 1st. The wing (103 mm.) and other measurements and the brown tips to the crown and mantle feathers suggested this bird was of the ' Greenland ' race. Among the 63 species recorded have been Jack Snipe, Greenshank, Green Sandpiper and Little Stint. Messrs. Keeler, Ridsdale, and Whitaker gave their services, and the manager and staff of the Sewage Works are thanked for their co-operation.

Wharfedale Naturalists' Trap (W. F. Fearnley)

With 1,745 birds ringed of 55 species in 1955, Mr. Fearnley and his friends can feel they had a very good year. Since the beginning in 1948 birds of 72 species totalling to 4,392 have been ringed. New birds in 1955 were Blackcap, Pied Flycatcher, Jay, Fieldfare, and Nightjar. Additional to local recoveries an Ilkley-ringed Kestrel was recovered in Sussex, and a Blackbird in France, the latter being especially interesting.

To all our contributors I tender the thanks of my colleagues and myself. Of necessity I have to be selective; but I do my best to use and to correlate everything that seems of importance. That so many should send their notes at intervals during the year, and in December, and before mid-January, without so much as a postcard to remind most of them, testifies to keenness and to appreciation of these reports. Each year brings new contributors, and the loss by removal from Yorkshire of others. The loss by death during the year of C. Derek Robinson was greatly deplored. For some years I have considered him as one of our most able young contributors, comments from whose questing mind made his records additionally valuable. News of the death of Frederick H. Edmondson reached me whilst writing; since his removal to Essex some years ago his interest in our proceedings had not waned.

Omission of the following species from the Classified List did not mean their absence from Yorkshire, rather that their status remained unchanged: Red Grouse, Common Partridge, Stock-Dove, Rock-Dove, Tawny Owl, Kingfisher, Jay, Coal-Tit.

CLASSIFIED LIST

1. Black-throated Diver (378).—One occurred at Semerwater on January 9th (P.J.S.). The coastal passage of divers included some of the larger species at Spurn and elsewhere but often the distance was too great for certain identification. One was at Teesmouth on December 7th (P. and D.R.S.), and 4th (P.J.S., A.B.), and one at Hornsea Mere from December 10th to 27th (G.R.B., M.K.T.).

2. Great Northern Diver (376).—P. J. Stead identified one off the South Gare on September 11th, and one on November 12th; other records are in the 'probable' category—one north of Hornsea on May 29th (J.R.G.); and one at Fairburn at dusk on December 18th.

4. Red-throated Diver (379).—From early January birds were often noted at Spurn. A concentration of *c.* 30 divers on April 9th were still in 'practically complete winter plumage and most appeared to be Red-throated Divers' (J.C.). Sixty-seven divers were on the sea north of Kilnsea on April 30th; those examined being of this species, two having attained red throats (R.F.D., J.C.). The last of spring at Spurn occurred on May 14th, at Hornsea on May 16th (M.K.T.), and there were two at Teesmouth on May 28th (P.J.S.), and one at Atwick on May 31st in breeding plumage (K.R.S.). A bird at Spurn on August 13th was the first of autumn, with the main body from September 11th, after which few days passed without 'divers' being recorded. On September 3rd there was one at Hornsea (S.M.), others occurring later, and on the same date two immature birds flew north at Teesmouth where the species was numerous in November and later (P.J.S.). Six oiled birds were found dead at Hornsea Mere between March 12th and April 2nd (R. Girling). Inland records were: one at Semerwater on January 2nd (the late C.D.R., D.G.R.); one at Thrybergh Reservoir on February 26th (J.C.H.L.); and one at Derwent Reservoir on January 9th on the spit of shore that is in Yorkshire (D.R.W.).

5. Great Crested Grebe (370).—On 23 waters, *c.* 60 pairs produced 62 young, of which more than half were hatched in the Fairburn/Brotherton area. The long drought caused most nests by the reservoirs to be stranded, some birds making three attempts. Some birds that turned up in the late summer on some reservoirs had probably moved from others, and some were unsuccessful again. A bird sitting on a nest at Brotherton on April 24th was in winter plumage with a mate in breeding dress (A.H.B.L.). In late August and September young were still being fed by adults on some waters when most other birds had dispersed from their home waters.

6. Red-necked Grebe (371).—A bird seen on the sea at Spurn on January 10th was probably of this species (F. Cooke, R. Gill, M. Lund). One occured at Hornsea Mere on April 3rd in nearly full summer plumage (R. Harrison). The yellow bill was seen of one at Teesmouth on September 27th (P.J.S.), which might have been the one seen fishing close to the South Gare on October 23rd (P. and D.R.S.).

7. Slavonian Grebe (373).—One at Gouthwaite Reservoir on January 9th fed close inshore on minnows (A.F.G.W., E.C.D.). One occurred at Eccup Reservoir on February 12th (R.V.J., A.H.B.L.). One was picked up in the centre of Bradford on February 27th and its skin went to the Cartwright Hall Museum (D.F.W.). One that stayed for *c.* 10 days on the Peasholm Lake, Scarborough, from April 3rd was still in winter plumage (A.J.W., H.M.F.). There was one on Melton Ponds on March 30th (S.M.), two on Stocks Reservoir on August 7th (J. K. F.), and one at Wintersett Reservoir on November 15th (K.S.).

8. Black-necked Grebe (374).—Birds seen on Hornsea Mere on January 1st, 8th, 9th and 30th were probably the same individual (F.E.C., G.R.B.). The possibility that four grebes at Melton Ponds on January 13th and 14th were of this species is interesting: 'the head had black down to the level of the bill' but light was bad (S.M.). There was one at Fairburn on February 6th (R.F.D.); and two at Swillington Ing on August 1st, and one on the 28th (A.H.B.L., K.D.). Two birds appeared on a Dearne valley flash in summer plumage on June 11th (T.M.C., C.E.B.).

9. Little Grebe (375).—At Fairburn six pairs had nests in close proximity on June 22nd when seven pairs already had broods. When all the broods had grown the species was really numerous. On August 21st K. Senior counted 75 birds there, one pair still feeding downy young. As dabchicks at Fairburn began to decrease numbers at Swillington Ing increased. On September 18th, with 68 counted at Fairburn (R.F.D.) (and 33 on October 2nd (K.S.)), 95 were counted at Swillington Ing which fell to 34 by October 30th (K.S.). The species also did well on some other waters, and appeared to suffer less from the effects of the drought than the Great Crested Grebe, although reduction in suitable waters at dispersal time may have contributed to numbers on remaining waters. There were 50 at Bottomboat also on September 18th (E.G.).

12. Leach's Petrel (351).—At Teesmouth on October 22nd, after 36 hours of N-N-E gales, one gave good views from South Gare at ten yards range of its forked

tail and grey centre to white rump (P.J.S.). After being attacked by a few Common Gulls it disappeared out to sea.

14. Storm Petrel (350).—On October 20th at 7.45 p.m. a Storm Petrel was seen fluttering in the beam of my torch against the front of the ' Crown and Anchor ' at Kilnsea, and using his height to good effect B. C. Stergold caught it. Had the bird followed a ship into the Humber, and then turning seaward, mistaken the inn lights for those of another ship ? After being ringed and released it fluttered to the ground. Placed on the edge of the full tide, it fluttered its wings for a second then rose strongly into the air and flew beyond the power of my beam watched by A.J.W., M. H. Ness, C. W. F. Hirst, B.C.S. and R.C. One was watched flying southward on the sea side at Spurn some 50 yards from shore on December 28th (G.C., J.C.G., C.E.A.).

16. Manx Shearwater (355).—Two black and white Shearwaters flying N-W off Redcar in a N-E gale on February 12th were probably of this species (P. and D.R.S.); as were two that flew north near Bridlington on July 31st (J.C.H.L.). The species was reported at Spurn: two on September 14th and four on September 15th (H.G.B., J.K.F.); one on September 28th, several on October 1st, three on October 6th, two on the 7th, one on the 9th, and two on the 15th which were probably Manx from size. S. Martin reported four in Bridlington Bay on August 27th.

[19/20. Great Shearwater; Cory's Shearwater (360/362).—At Teesmouth on November 19th two shearwaters seen at *c.* 400 yards range were large, had upper parts dark brown and underparts off-white, without clear line of demarcation between upper and underparts, and were probably Cory's Shearwaters (A.F.G.W.). A shearwater recorded at Spurn on August 31st could have been either of these species.]

[21. Sooty Shearwater (363).—Nine shearwaters in three parties of three flew offshore southward at Spurn on September 17th. No contrast was apparent between upper and lower parts. They were seen at *c.* 1,200 yards range.]

26. Fulmar (368).—One circled over Forge Valley woods, *c.* four miles inland on April 13th (H.M.F.). One flew N-E over Knaresborough S.F. on April 20th (J.R.M.). One flew along the Flamborough cliffs on December 27th (S.M.), and seven were on the cliffs on January 6th (A. Williams). Several pairs nested on tipped slag on the cliff at Skinningrove (P. and D.R.S.). A few birds were noted at Spurn in April and early May.

27. Gannet (349).—Three young were reared at Bempton (H.O.B.). On July 9th a third-year bird and an adult were ' bill-sparring ' on a ledge some distance from the breeding ledge (P.J.S.). An immature couple frequented a possible site. South of Bridlington during September four adults, four dark juveniles and an intermediate were often seen fishing (J.C.H.L.). Numerous Gannets off the Tees Estuary from August 13th through September were 95% immature birds (P. and D.R.S.). Often numerous off Spurn from August 6th with maximum of *c.* 100 on September 11th. One came down to a farm near Keighley in early July with a fish-hook embedded in its beak which was removed with difficulty (J. Ogden). An oiled bird was found in a field near Bingley on December 29th; it died (Bradford N.S.).

28. Cormorant (346).—Two or three Cormorants at Eccup Reservoir on April 10th had white heads, with white extending down the neck and showed the green gloss of the southern race (H.W.). A similar bird was close inshore at Marske on April 3rd (J. D. Scott). On April 11th two Cormorants came to Eccup Reservoir from N-E and continued south-westerly without alighting (H.W.). The colony on Boulby Cliffs appeared normal (*c.* 40) on July 17th (P. and D.R.S.). Other occurrences inland were—one at Lindley Wood Reservoir on January 16th (H.J.W., O.M.P.); two at Bretton Park on April 21st (T.D.B.); four at Gouthwaite Reservoir on May 8th (A.F.G.W.); and a juvenile there on August 25th (E.C.D.), 28th (A.F.G.W.), and 30th (A.P.); and two at Ulley Reservoir on September 13th (D.R.W.).

29. Shag (348).—Thirty-seven were near the South Gare on January 2nd and 8th (P.J.S.) but had become five on the 15th; and single birds on January 30th (A.B.), and on September 3rd (P.J.S.). Single birds were north of Filey Brigg on March 27th and October 16th. No proof of breeding at Flamborough was obtained, but birds were seen at the usual places and two possible further sites located. On September 10th on one rock were 17 adults and 31 immature birds, some of the latter being birds of the year still being fed by adults (H.O.B.).

The following ringed birds were recovered in Yorkshire.

Ringed Bass Rock as young 4/7/54; found on Spurn beach 22/3/55 (H.G.B.).
Ringed I. of May as young 27/6/53; near Harrogate 30/1/54 ' B. Birds '.
Ringed I. of May as young 16/7/53; near Redcar 8/2/54 ' B. Birds '.
Ringed I. of May as young 10/7/53; near Filey Brigg 16/2/54 ' B. Birds '.

A Shag was at Fairburn on May 26th, 1955 (R.F.D.).

30. Heron (289).—Presumably because the B.T.O. Heron enquiry had ceased our heronries were not all visited. At Gargrave there were only four nests occupied some having been robbed (A.P.). At Harewood seven nests were occupied but some of the trees were felled; assurance was given that the remaining trees would be left (R.V.J., A.H.B.L.). One pair bred at Ripley (A.F.G.W.); three at Fadmoor (A.G.), and a pair near Haroam (A.G.). There were 14 pairs at Scampston (R.M.G.) and 25 at Hornsea Mere (B.S.), and seven at Sleningford (R.C.). Average numbers appeared by the usual waters, and a few birds appeared at Spurn but I searched the log in vain to see if any came off the sea or *vice versa*. One was on Redcar rocks on October 4th (P. and D.R.S.).

38. Bittern (297).—Reports of the species having bred in South Yorkshire remain unconfirmed. Bitterns occurred at Hornsea Mere on February 2nd (B.S.), 20th (F.E.K.), September 11th and November 13th (M.W., G.R.B., M.K.T.), and December 4th (B.S.). There was one near Cliffe on March 9th (E.B.B.), a farmer had caught it in his garden *c.* 400 yards from the Market Weighton Canal; and one at Fairburn on August 2nd (J.K.F.).

45. Mallard (317).—Activities of duck-totters continue to increase on many waters; only maxima and salient features of the year can be cited here which are quite uncommensurate with the work done. At Eccup Reservoir Mallard numbered 976 on January 19th and then fell gradually to the few of summer (H.W.). Numbers were also highest in January on other inland waters—Castle Howard, *c.* 400 on the 29th (Bootham School); Roundhill and Leighton Reservoirs, *c.* 1,000 on January 11th (P.Y.). Gouthwaite's *c.* 364 on January 9th was the largest number there in five years (A.F.G.W.). Eccup reached its autumnal maximum with *c.* 1,230 on October 5th (R.V.J.), and *c.* 1,200 on December 18th (H.W.). The big waters are mainly day-time refuges and much depends on the time of counting; and in winter on the ice conditions at smaller waters.

Hornsea Mere with its coastal proximity (some were seen coming in from sea) is a special case and numbers were estimated at *c.* 2,000 on January 2nd (G.R.B.) and on the 8th (F.E.C.); by April 2nd only *c.* 30 were visible (G.R.B.). In autumn numbers had risen to *c.* 3,000 on November 20th and 27th (G.R.B., M.K.T.). On the upper Humber *c.* 1,500 were estimated on January 26th (D.B.P.), and on August 1st (S.M.). Spurn maxima were *c.* 150 on February 20th and *c.* 200 on December 4th. Remembering the large number of waters with smaller though still considerable maxima, and the many Humberside resorts, the Mallard is evidently still the Common Wild Duck. C. R. Shoesmith watched a few Mallard in two to three feet of water at Fewston on December 18th, some of which dived for periods of two to nine seconds and reappeared three to four yards distant from the spot of submergence. On May 21st P.Y. saw a nest of eggs in an old crow's nest *c.* 30 feet up in an oak beside Leighton Reservoir.

46. Teal (319).It is evident that the upper Humber region harbours more Teal than any other in the county, the great majority of which are immigrants—*c.* 750 late April (S.M.); *c.* 1,600 near Broomfleet, September 3rd (S.M.); *c.* 2,750, Whitton Sands, September 6th (S.M.); *c.* 3,500 between Brough and Broomfleet, September 24th, and *c.* 3,000 October 23rd (D.B.P.). At Hornsea Mere, *c.* 600 on January 8th (F.E.C.) (with nil on February 26th); *c.* 75 on October 9th and 23rd, and up to 300 from October 30th (M.K.T.) are revealing selected figures. Autumnal maxima at Spurn occurred in late September (*c.* 130 on the 24th) and then fell. Knostrop S.F. showed the largest numbers inland—*c.* 1,000 November 13th, *c.* 600 December 25th (A.H.B.L.). Other waters on which numbers exceeded 100 were—Thrybergh Reservoir, February 26th (J.C.H.L.); Denaby Ings, February 5th (J.S.T.); Gouthwaite Reservoir, October 16th, *c.* 200 until November 6th then fell to winter normal (50-80) by the end of November (A.F.G.W.); Fairburn, December 11th, usually fewer than 30 (R.F.D.).

47. Garganey (322).—Almost confined to the Fairburn-Bottomboat, and the Dearne Valley to Doncaster areas from March onward. Pairs were seen and display, and five eggs were laid. After the breeding season up to 12 were noted in the Dearne

Valley (July 4th to 20th) (J.C.H.L., J.S.T., J.B.H.); and 11 were at Fairburn on August 27th (J.C.). Further occurrences at the two areas were correspondingly similar.

49. Gadwall (318).—One stood on ice at Eccup on February 20th (A.H.B.L.); and one was at Bottomboat on January 9th (E.G.). Five were at Denaby Ings on April 2nd (R.J.R.). Pairs occurred at Bottomboat on various dates in April and May into June; and on May 2nd at Swillington (P.G. B.R.), and on April 24th at Fairburn (J.D.P.), and April 26th at Altofts (R.F.D.). Later records were two at Eccup on September 11th (R.V.J.); one at Swillington Ing, August 28th to 30th (K.S.), one at Fairburn on September 6th (P.G.R.B.), two Harewood, August 31st, and one on October 16th (D.B.I.) which had moulted there. One occurred at Ogden Reservoir on October 12th (C. Williamson).

50. Wigeon (323).—Six eggs were trodden by sheep in the North Riding; on June 18th it was thought the birds had a new nest somewhere, and a pair were seen in another area (K.B.). In the area of Central Yorkshire where breeding has occurred, a pair, or the male alone, were seen through the season without evidence of successful breeding (R.F.D.). In another West Riding area where a pair had been seen in May (K.C.C.), a duck with one ducking was seen later (E.S.S.). An East Riding flood-water showed two pairs on May 22nd. The usual waters maintained average winter numbers. Two at Gouthwaite on September 4th were early (A.F. G.W.). The maximum at Spurn was 450 on September 23rd when many ducks passed south; at Hornsea Mere, *c.* 500+ on January 11th (S.M.), and *c.* 200 on December 18th (M.K.T., G.R.B.). There were *c.* 700 at Cherry Cobb Sands on October 27th (G.R.B.) and *c.* 250 on December 3rd (H.O.B.).

52. Pintail (325).—A few occurred on 16 inland waters in January to April, and from August to December, with maximum of 32 on April 10th at East Cotting-with flood-waters (B.D.); also occurred at Teesmouth, 13 on September 24th (P. and D.R.S.). Sixteen passed south at Spurn also on September 24th, on which day, and on the 23rd, much migration of ducks was observed. There were 31 at Cherry Cobb Sands on October 27th (G.R.B.).

53. Shoveler (326).—Several pairs bred in the lower Aire and Dearne valleys; and a pair at Gouthwaite (A.F.G.W.). Occurred at various times on some 18 waters with maximum of *c.* 40 at Eccup on October 23rd (A.H.B.L.); and 35 at Harewood on October 4th and 16th (D.B.I.). Hornsea Mere showed a maximum of 30 on November 20th (G.R.B., M.K.T.).

55. Scaup (331).—Noted at Wintersett, January 18th (K.S.), Brotherton Ing, January 9th (A.H.B.L.); and Fairburn Ing on February 12th (J.C.); and Swillington Ing on April 5th (G.C.), all single birds. A pair off Bridlington on May 27th (J.C.H.L.) and a female at Grimwith Reservoir on July 31st were unusual as to dates. Single birds were at Fairburn on October 5th (A.F.), and Malham Tarn on October 11th (A.P.). At Eccup on August 14th (H.W.), and October 28th (J.R.G.); on a pond at Barnby Dun on November 13th (R.J.R.), and at Swillington Ing on December 4th (K.S.) were two birds respectively. Five at Hornsea Mere on January 8th (F.E.C.) and 11th (S.M.); nine on February 26th (F.E.C.), and five on the sea off Hornsea on November 27th, complete the records except for odd occurrences at Spurn, and 17 there on December 27th.

56. Tufted Duck (330).—Nested on a number of lakes and flashes. Maxima on inland waters were—155 Fairburn, January 9th (A.H.B.L.) and 195 November 27th (K.S.); Wintersett, 59 on January 7th; Hornsea Mere, *c.* 100, December 26th (M.K.T.).

57. Pochard (328).—Bred at Fairburn successfully, 12 broods being reared. Fairburn also showed the largest winter numbers with *c.* 209 on February 13th; but from September to December 31st birds seldom exceeded 75 (R.F.D.). The Gouthwaite maximum was 24 on January 9th (A.F.G.W.), and Thrybergh Reservoir showed 35 on February 19th (J.S.T.). At Hornsea Mere, *c.* 150 on January 2nd was matched by *c.* 140 on December 27th (G.R.B.).

60. Goldeneye (332).—Recorded from over 25 waters and rivers in all five vice-counties inland, and from the coast at several places. More birds were seen than usual in the southern half of the county in the early months, probably the result of the severe weather. Maxima were: at Stocks Reservoir, 36 on March 31st (J.K.F.); at Fairburn, 37 on March 27th (K.S., A.H.B.L.); on the Hornby Lakes, 33 on February 20th (G. R. Potts); at Gouthwaite, 26 on March 20th. Numbers in autumn were smaller. Fifteen were at Harewood on May 10th when display was

watched; and five on May 16th (R.V.J.). The first of autumn inland was a male at Gouthwaite on October 6th (H. E. Holmes). At Hornsea Mere *c.* 50 occurred on January 8th (F.E.C.), and one on May 15th (G.R.B.); the first of autumn were ten on September 11th (M.K.T., G.R.B.), and numbers built up to *c.* 40 on December 10th (G.R.B.).

61. Long-tailed Duck (334).—Four were near Faxfleet on February 13th (E.C.J.S.); and one at Ingbirchworth on November 12th and 13th (J.C.S.E.). Single birds appeared off South Gare on January 8th (P.J.S., C.J.H.), November 19th (P.J.S., D.R.S.) and 26th. A party of ten were off Hornsea on November 20th (G.R.B., M.K.T.).

62. Velvet Scoter (340).—Birds at Redcar on July 8th (P. and D.R.S.), at Hornsea on July 24th (G.R.B.), at Atwick (five) on August 5th (L.S.), at Spurn on August 9th, and at Atwick, August 14th (W. Wright) were rather unusual as to date. Velvet Scoters were also recorded in autumn and winter at South Gare on eight days, at Spurn on 11 days, at Atwick on one and at Hornsea on two days. Twenty flying south at Spurn on September 15th were the most seen in a day.

64. Common Scoter (339).—Near Teesmouth seen regularly up to May 16th, no more until July 8th (one), and August 14th (four) after which 30-40 occurred daily; maximum *c.* 250 on January 29th (P. and D.R.S.). At Spurn a few seen on a few days in the early months; then from July 24th seen regularly with maxima *c.* 145 on July 25th, *c.* 120 August 9th, *c.* 200 September 15th and *c.* 400 on the 25th. Three parties off Hornsea on July 24th (G.R.B.) totalled to 125 birds; *c.* 150 were off Atwick on August 4th (H.O.B.) and *c.* 200 off Filey on December 27th (G.R.B.). Occurred on at least 12 inland waters in numbers up to eight at Stocks Reservoir on June 16th (C.N.); and up to 83 at Gouthwaite on August 21st—78 males and five females (A.F.G.W.), of which 17 drakes and the five ducks were there next day (R.C.). None were recorded inland between April 21st (six, Fairburn (J.D.P.)) and June 16th; eight at Stocks (C.N.) which was an unusually early date for a moorland reservoir.

67. Eider-Duck (337).—Too many records of both sexes to enumerate, in January to April and September to December, near Teesmouth, Scarborough, Flamborough, Bridlington and Spurn. Four drakes and two ducks at South Gare from November 20th (P. and D.R.S.) made up the largest party.

69. Red-breasted Merganser (343).—Single birds were near Redcar on April 14th, October 11th and 30th, and near South Gare on May 1st, with two on October 23rd (P. and D.R.S.). Near Filey Brigg were three on January 8th (J.S.T.). Single females were at Hornsea on February 26th (M.K.T.), December 11th (F.E.K.) (and two (G.R.B.)), December 26th (K.K.T.), 27th (G.R.B.), and three males were on the sea at Auburn on December 4th (H.O.B.). Inland were three at Eccup on February 27th and seven on December 18th (H.W.): two males at Gouthwaite on October 8th (M.R.S., A.F.G.W.), and a redhead on November 13th, when there was also one at Leighton (J.P.U., R.C.).

70. Goosander (342).—Recorded on more than 20 waters in the northern half of Yorkshire with maxima at Eccup Reservoir, 64 on March 13th (J.R.G.), and at Stocks Reservoir 82 also on March 13th (J.K.F.). Display was noted in March/April at several places. Seven immature birds near Ingbirchworth was unusual on July 9th (J.C.S.E.). At Hornsea Mere numbers reached maxima of *c.* 30 on January 11th (S.M.) and *c.* 35 on December 11th (G.R.B.). Oh February 13th at Gouthwaite Reservoir a duck robbed a drake of a seven inch grayling (A.F.G.W.).

71. Smew (343).—Occurrences were: a male at Copgrove on January 25th; a male at Gouthwaite that left when frozen out after February 19th (A.F.G.W.); a female at Fairburn on February 6th and two on February 12th (J.C.) and 13th (before the freeze up), and on March 13th (after the thaw (R.F.D.)). There was one at Roundhill on November 13th (J.P.U., R.C.), and a similar but unidentified bird there on December 4th. A female was at Hornsea Mere on March 20th (F.E.K.).

73. Sheld-Duck (315).—Spurn was not watched in the first half of July so that the moult-migration was probably missed, otherwise the species was recorded on most days (40, May 28th to 30th), with numbers in autumn fewer than in spring. Higher up Humber in the Brough to Broomfleet area, *c.* 200 were recorded on February 20th (D.B.P.), *c.* 300 July 24th (D.B.P.), and August 1st (S.M.); *c.* 350 in early September (S.M.), *c.* 500 September 24th (D.B.P.), six October 23rd, *c.* 120 December 2nd and five December 11th (D.B.P.). Sheld-ducks at Teesmouth were few and seldom. Fifteen inland waters ranging from near Sheffield, to Semerwater

and Ure flood-waters, showed up to three birds on various dates. A pair produced eight young at Swillington Ing; seen July 4th (J.R.G.).

78. Bean Goose (306).—Nineteen geese seen near Eston Nab on February 27th were considered to be a party that numbered 20 in December, before one was shot by J. Beasley, at Greatham Creek (Durham side) in late December, 1954, which proved to be a Bean Goose (P.J.S.).

75/78. Grey Geese (mostly Pink-footed) (303/307).—Were recorded inland in January to March and mid-September to December on very many days. Early January was a time of much activity with flight directions mostly northward. Flocks numbered up to *c.* 150 in the early months and in autumn. Six birds were on the Humber by September 6th (Humber Conservancy per S.M.), and the first skein over South Cave was seen on the 16th (E.B.B.). On September 24th there were *c.* 300 at Broomfleet, and on October 16th the evening flight near Brough was estimated at *c.* 9,600 (D.B.P.) an unusually large number. The Wildfowl Trust caught and ringed 279 on the Wolds on October 23rd and 25th (W.T.). Only comparatively small numbers fed in the Wolds areas used for at least three years previously, more widely separated areas being preferred; and a tendency was shown to use fields in the low country near to the Humber (G.R.B., C.E.K., M.W., H.O.B.). In some of the flocks of Pink-feet odd specimens of other species were probably included.

A Pinkfoot ringed in Yorkshire 25/10/52 was in Iceland (64.15 N., 20,20 W.) on 5/5/54.

A Pinkfoot ringed in Yorkshire 18/10/53 was in Jutland 6/12/53 (*British Birds*).

Coastal records include *c.* 60 in from sea at Saltburn on October 9th (A. E. Felgate), and two flocks flying south at Redcar at 10.30 a.m. of the same day (P. and D.R.S.). At Spurn the only sizeable flocks occurred on January 12th (43) and October 13th (84). A Pinkfoot first seen on Peasholm Lake, Scarborough, on October 16th remained until the year end feeding on scraps with the ducks and becoming very tame (A.J.W.).

[79. Snow Goose (308).—Four white geese with black wing-tips over Ilton on January 16th, and five on January 19th, reported to P. Young, could have been Snow Geese.]

80. Brent Goose (312/13).—Nine flew N-E over Whitby Scaur on October 23rd (A.B.W.). One fed with Mallard at Hornsea Mere on November 13th (M.K.T., G.R.B., M.W.). On February 13th four dark-breasted Brents were at Faxfleet (E.C.J.S.), on February 19th one pale-breasted at South Gare (P.J.S., K.B.), and on the 27th eight pale-breasted at Redcar (D.R.S.).

82. Canada Goose (314).—Although robbed on their first appearance at Castle Howard in 1954, a pair produced three young in 1955 (P.J.S.), and four birds were there on December 18th (E.W.T.). A few pairs bred on a number of waters, and more at Swinton whence 60 goslings were disposed of to the Wildfowl Trust. One bird prospected for a few days around April 30th at Hotham Carrs (E.B.B.). More (401) were at Harewood on January 23rd than previously recorded (D.B.I.), many dispersed later following the frosts.

Leighton Reservoir showed 209 on September 17th (M.R.S.), and Golcar Reservoir *c.* 200 on December 12th (E.C.J.S.). Canadas at Eccup in July/August was new, up to 40 grazed on the banks (H.W., A.H.B.L.).

84. Mute Swan (302).—The herd at Fairburn on December 11th numbered 79, including broods of seven and four cygnets intact and two others (R.F.D.). At Bretton Park only one was reared out of four hatched (H.H.). Another brood of seven appeared on the Wharfe near Otley on July 2nd. Melton Ponds showed 72 on August 23rd and 40 on September 21st (S.M.). Near Brough were *c.* 50 on August 8th (J.B.H., C.I.B.).

85. Whooper Swan (300).—E. Battye reported that *c.* 100 visited Diggle Reservoir in late January and a keeper had shot three illegally. On the 30th two were there, one apparently winged (T.D.B.). There were 40 on the Humber below Brough on January 24th (D.B.P.) and at Faxfleet on February 13th (E.C.J.S.). Eighteen flew west near Catterick on January 26th (G. R. Potts). Two that flew into Gouthwaite on February 6th (A.F.G.W.) were seen *en route* from Fewston by E.S.S. Seventeen were at Agden Reservoir near Sheffield on January 23rd (D.R.W.). Small numbers occurred in the Dearne and Don valleys and in lower Airedale; and again in autumn, 13 being near Wath on December 31st (J.C.H.L.), two having been in the area as early as October 8th (T.M.C.). Almost empty reservoirs may have discouraged

Whoopers in October/November in moorland areas where few were seen. Three of 24 swans seen at Spurn on January 23rd were definitely Whoopers, and so probably the rest; and eight occurred on February 19th (R.F.D.).

86. Bewick's Swan (301).—Three Bewick's Swans were at Spurn on March 20th and remained for some days (H.G.B.). Eighteen were at Allerton Bywater on *March 27th* in company with two Mutes and one immature Whooper (R.F.D., K.S.). Other records were: one, Thrybergh Reservoir on January 16th and December 23rd (C.I.B., J.C.H.L.); nine, Lindley Reservoir, January 22nd (J.C.L., J.B.N., H.H.); one on the Ure near Ripon, March 3rd (R.C.); two, Cadeby Flash, March 12th (A.E.P., J.S.T., J.C.H.L.); two, Halnaby Lake, March 19th (K.B.), and at Cowton Bottoms on the 24th and 27th (A.B., P.J.S.), and one at Fairburn on April 30th which did not seem well (D.G.R.).

91. Buzzard (269).—Four pairs were known to nest in the north-western hills, and each pair produced two eggs which hatched; the smaller of the two young disappeared from one nest. The breeding season was well advanced before rabbits began seriously to be affected by myxomatosis at the upper ends of the Dales. Over the northern half of the county Buzzards have been generally more in evidence than usual and there are records of birds seen at many places.

92. Rough-legged Buzzard (268).—A. Gordon reported two north of Helmsley on March 26th. Single birds near Gouthwaite on January 30th (H. Booth), and in the Ewden area on August 29th (H.H.) had basal parts of tail white with black tips. (I have known a juvenile Common Buzzard to have a white rump in September (R.C.)).

93. Sparrow-Hawk (277).—Status normal. Occurred at Spurn on six days in April; on August 14th, September 8th, 10th, 24th, and 28th, and on October 23rd. One ringed Spurn 8/9/55 was at Bullock Wood, Earls Colne, Essex, 30/10/55.

99. Marsh Harrier (271).—One that quartered reed-beds at Fairburn on April 21st had buff head, shoulders and tail (G.C., A.F.). A cream-crowned bird was at Hornsea Mere May 13th to 15th (M.W., G.R.B., M.K.T.). A similar bird was also seen at Hornsea Mere on September 11th (M.W., G.R.B.); 18th (M.K.T.); November 27th (M.W., G.R.B., M.K.T.); December 11th (G.R.B.); December 26th and 27th (G.R.B.); and on the 31st (F.E.C.); some close-ups views were obtained.

100. Hen Harrier (273).—A. Gordon saw two, apparently a pair, north of Helmsley in March. A female flew over Farndale Moor on October 9th (A.B.W.). Hen Harriers were noted near Ilton on January 11th (P.Y.), over Midhope Moor on March 19th (D.R.W.), over Blakey Ridge on October 1st (J.P.U.), at Stocks Reservoir on December 4th (G. H. Acklam). A 'large blue-grey hawk' near Hornsea on December 9th was almost certainly of this species (B.S.).

102. Montagu's Harrier (272).—A female was seen clearly in the air and standing on slag at Fairburn on August 31st (G.C., A.F.); and the species was seen twice on north-eastern moors in August (M.A., P.J.S.); and at Spurn on August 19th (H.G.B.). Harriers that could have been this or the preceding species were at Swillington Ing on April 14th (P.G.R.B.); over Blakey Ridge on May 19th (O.C.H.); near Laneshaw Bridge on June 11th (F. E. R. Peach); near Scaling Dam on September 10th (P. and D.R.S.); at Spurn, April 29th to May 2nd (R.F.D., R.C.); at Tunstall on September 11th (A.C. and N. Batchelor); at Sunk Island on September 17th (A. Credland). There was no evidence of breeding.

103. Osprey (284).—One came in to roost in Low Dalby in mid-June and was reported to R.M.G. by W. Hoggard; and seen at close range on June 15th standing on the leading shoot of a spruce (R.M.G., A.J.W.). N. Yule and two friends, all aged 14, members of the Cleveland Naturalists' Field Club (Junior Section), claimed as Osprey and described a bird seen on August 31st including 'kink in wings very noticeable' with black patch on underside of wing joints; barred tail, whitish underparts and head white. The bird flopped heavily over channels in Seal Sands and then disappeared over Grangetown (P.J.S.).

104. Hobby (261).—A small Falcon at Knaresborough S.F. on October 1st when first seen had a Blackbird or Starling in its talons which seemed too heavy for it and struggled free as J. R. Mather and J. A. S. Borrett watched it. It was seen on a fence at five yards range; then on two mounds down to *c.* 60 yards range, and examined through a telescope. Slightly smaller than a Kestrel, its upper parts including head were dark chocolate, chin white, belly and breast whitish-cream streaked heavily with dark brown, had a thin white supercilliary eye-stripe and a dark moustachial streak; tail barred greyish and dark brown, bill pale brown tipped

black, legs yellowish. J.A.S.B. had seen Hobbies in Germany and claimed that species with which J.R.M. agreed after he had seen Lord Alanbrooke's film.

On October 3rd at Spurn a Falcon briefly seen at 20-25 yards range by J.C. was Kestrel-sized, dark brown above with darker crown and moustachial streak, with underparts paler and streaked. J.C. considered it to be a juvenile Hobby.

105. Peregrine Falcon (259).—Pairs were seen on the three known breeding cliffs and two young were reared on at least one of them. Also seen on another crag amid the fells. One harried Knots at Coatham on February 27th and pursued Starlings on March 6th and 7th (P. and D.R.S.). One flew northward over Locker Tarn on March 19th (G.E.A.); and the species was recorded at a number of other places, including Spurn on February 18th and October 8th, Bempton on April 17th, and near Filey on October 16th (H.O.B.).

107. Merlin (262).—Seen in the breeding season on a number of moors; and bred, or made the attempt, on several. On one moor five young were taken for falconry; and the eggs were destroyed on another; but broods elsewhere were known to fly. Single birds occurred at Spurn from February 21st to May 14th on several dates, and from August 23rd to the year end. A few were seen inland in the winter months. Skelder Moor, January 9th (A.B.W.), Horbury Bridge, January 17th (E.G.); at Ossett S.F. (A.F.), and on Ogden and Fly Flatts Moors (D.G.R.) on January 30th; near Cantley, Doncaster, and on Hatfield Moor on November 26th and December 31st (J.S.T.); at Gouthwaite, November 27th (A.F.G.W.) and December 4th (C.R.S.); Cloughton, December 3rd (R.S.P.); and on Ilton Moor when snow-covered on December 21st and 24th (P.Y.).

110. Kestrel (103).—One ringed as young Haverah Park 18/7/55; Formby, Lancs. 27/8/55 (A.F.G.W.). One ringed Ilkley 27/6/54 by Wharfedale Naturalists; Lancing, Sussex, 9/1/55. At Spurn, there was discernible southward passage from September 18th for a month, maximum 12 birds on September 25th. One came in from sea at South Gare on July 16th (P.J.S.).

113. Black Grouse (513).—Noted in the Buckden area in spring (D.F.W.); above High Force on June 1st (Julian Holdroyd and D. Ashford); and tail feathers of a male above Lartington July 2nd (P.J.S.).

115. Red-legged Partridge (519).—A pair on Silpho Moor August 14th (H.O.B.). Bred north of Leeds (J.R.G.). A pair at Fisby March 24th (E.C.J.S.). North of York a covey of nine in autumn (C.W.F.H.).

117. Quail (520).—A pair and brood in a Wolds area in September (Lord Middleton in *The Field*). Nested near Ulley (Rotherham) but reaping caused desertion (D.R.W.).

118. Pheasant (517).—Hen leading newly-hatched chicks near Yearsley on October 2nd (E.W.T.).

120. Water-Rail (509).—Recorded at Fairburn on July 17th (A.B., P.J.S.). One struck tele-aerial at Dormanstown in night of October 11th (O.C.H.). One Scarborough Mere April 8th (A.J.W.). One caught at Spurn October 29th. The other several records referred to the winter months at Chevet, Bretton Park, Fairburn near Doncaster, Hornby Lakes, Spenborough and near Middlesbrough.

121. Spotted Crake (505).—One seen near Bentley, Doncaster, February 28th, March 4th and 5th (J.S.T., R.J.R.).

125. Corncrake (504).—Said to have bred near Scruton (J.P.U.). Reported calling at *c.* 25 places so that probably bred at some of them. In the Whitby area A.B.W. heard more than for some years.

126. Moorhen (510).—No evidence of migration; one called over Doncaster at 23.30 G.M.T. on August 27th (J.S.T.)

127. Coot (511).—Estimated that *c.* 80 pairs nested at Fairburn so that the maximum number there on October 16th of *c.* 1,000 birds (R.F.D.) could have been purely the local population with a double-brooded species. The Hornsea Mere Coots numbered *c.* 100 on August 17th (H.O.B.); and *c.* 400 on December 26th (M.K.T.).

131. Oystercatcher (452).—It is not known if the pair on the Rye near Helmsley in summer attempted to nest (A.G., E.W.T.). I ringed two large young by the Swale on June 22nd (R.C.). Also nested by the Ure; and most probably by the Wharfe, Aire, Ribble, and Hodder, and elsewhere to judge from the times when pairs were recorded as present at several places. There were none at Redcar in summer until July 13th (30); the maximum afterwards was *c.* 130 on September 8th (P. and D.R.S.). Always present at Spurn with maximum of 59 on August 29th; the period mid-June to mid-July showed the fewest.

133. Lapwing (449).—There was much movement in late January, between two severe spells, especially at Teesmouth where on January 30th, *c.* 2,000 were estimated to cross the coast (Tees or sea) southward between Redcar and Middlesbrough, the culmination of smaller but similar movements of the previous few days (A.B., P.J.S., C.J.H.). At least 570 of the birds came in 28 flocks between 10.45 and 4.0 p.m., mostly off the sea between Redcar and South Gare. There was steady movement down the Aire at Fairburn on January 30th (R.F.D.); and S-E movement over Doncaster on the 29th and 30th (J.S.T.); and some movement in other places. The flock wintering near Hangthwaite, Doncaster, reached *c.* 2,000 in January (R.J.R.). At Eccup were *c.* 2,700 on February 12th and 650 on March 7th (R.V.J.). The February cold period lasted until early March; fields at Masham showed a few clear patches on March 4th when the first 15 Lapwings arrived. The breeding season requires little comment, but J.P.U. reports increase on lowlands but decrease on moors in the late cold spring, and J.R.G. says birds about Winn Moor have become much fewer in recent years. Post-breeding flocks were large—*c.* 200 at Roundhill Reservoir on July 2nd when a few still had walking young; *c.* 300 Lindley Reservoir on August 7th; *c.* 650 Blackmoorfoot Reservoir, September 18th (E.C.J.S.). Waters were contracting and birds congregated about muddy margins. At Gouthwaite, *c.* 1,000 on August 22nd fell to *c.* 600 on October 9th and to *c.* 80 on October 16th (A.F.G.W.).

From mid-September Lapwings were coming in from sea at Redcar—216 on October 8th, 70 on November 3rd (P. and D.R.S.); and on October 24th 106 flew northward low over the sea then turned landward (O.C.H.). The largest winter concentration numbered *c.* 2,000 at Bottomboat on December 11th (G.C.).

The late January period was not watched at Spurn. On February 22nd small parties passed southward totally to *c.* 100. On October 8th *c.* 154 came in off the sea between 10.20 and 10.55 a.m.; and *c.* 150 on October 24th. In the morning of October 29th up to *c.* 1,000 came off the sea and over to the north-west or north, some following the sea-coast northward. On November 3rd *c.* 200 passed south and *c.* 300 on the 4th. A chick ringed at Gouthwaite 23/5/54 was shot in Co. Waterford, Eire, 18/1/55 (A.F.G.W.). A chick ringed Washburndale 17/6/51 was recovered Port Isaac, Cornwall, 22/2/55 (R.F.D.).

134. Ringed Plover (435).—A few pairs bred near Teesmouth, and at Spurn. In May up to 20 (22nd) occurred in the Dearne Valley (T.M.C.), which might have connection with west-east passage and the *c.* 125 at Cherry Cobb Sands on May 18th and the *c.* 500 there on May 21st (G.R.B.); as might ten at Knostrop S.F. on May 15th (A.H.B.L.). Passage of Ringed Plovers at Cherry Cobb in May is not unusual (H.O.B.). Many waters with mud and sand visible showed a few in August (Gouthwaite, six on the 29th) and later. The only day with a large number recorded at Spurn in spring was April 8th (154). There were two curves in the graph of the autumnal passage at Spurn, the apex of the first touched 400 on September 2nd, and the curve fell to *c.* 25 on September 24th; then rose again to *c.* 150 October 8th to 9th and fell to *c.* 6 on October 17th, and to an odd bird or none in November. Coatham Sands showed *c.* 100 on September 4th. One ringed Spurn as young 24/7/54 was at Rhyl, N. Wales, 4/2/55.

135. Little Ringed Plover (438).—At least three broods were produced; and birds were seen in two other areas. One breeding bird bore aluminium and blue rings as placed on a young bird in 1953.

139. Grey Plover (444).—This species is unusual inland. One occurred at Gouthwaite on October 2nd (A.F.G.W.); and one at Thornton Moor Reservoir on October 15th (D.G.R.). Maximum recorded at Spurn *c.* 500 on September 30th. On December 27th when *c.* 130 were on Coatham Sands (A.B., P.J.S.), the Spurn total was 14.

140. Golden Plover (440/443).—A flock of *c.* 657 were by the freshwater stream on the beach at Redcar on January 15th when fields were under snow. On the 23rd *c.* 100 were there; and on February 18th (fields snow-covered again) *c.* 220, which were the last until March 28th when *c.* 200 came (P. and D.R.S.). Flocks of up to *c.* 450 occurred in the winter months at a number of places.

At Hangthwaite (Doncaster area) on April 9th were *c.* 500 which number had been built up gradually during the winter, and of which more than half had black bellies, and *c.* 50 were in full Northern breeding plumage (R.J.R.). At Pool-in-Wharfedale the flock was estimated at 700-800 on October 2nd (P. Swallow). Shall we ever know why one field suits them so much better than others when the choice

is so wide ? A bird ringed as young on Morton Moor 13/6/54 was dead there on 24/4/55 (J.C.L.).

143. Turnstone (446).—Normal on the coast with maximum at Spurn *c.* 100 on September 1st. There was a surprising number of occurrences inland. This species provides further evidence of a possible west-to-east movement of waders in mid-May. On May 15th Turnstones occurred—five at Knostrop S.F., and two at Fairburn (A.H.B.L., P.C.Q., R.F.D.); one by a Dearne Valley flash (T.M.C.); one at Wintersett (G.C., K.S.); with them all were Ringed Plovers or Dunlin or both. On May 18th six were at Cherry Cobb Sands (G.R.B.) (and see under Ringed Plover). Later records were: one, Swillington Ing, July 30th (A.H.B.L.), and three on August 22nd (P.G.R.B.), and three on August 28th (A.H.B.L., J.C.); and four Fairburn on August 21st (R.F.D.).

145. Common Snipe (395).—A nest at Hotham Carrs held six eggs (E.B.B.). The large expanse of mud at Gouthwaite produced by the drought, which no doubt dried up many marshes and drove waders elsewhere, showed *c.* 100 to 170 Snipe from mid-July to end of August (A.F.G.W.). At Fairburn *c.* 140 were flushed from one area on August 7th (K.S.). Fairly numerous at Spurn from early August to late September maximum 49 on August 17th.

[146. Great Snipe (394).—At Farnley Gravel Pits on August 18th a 'largish rather stocky' Snipe with white on sides of tail, flew straight and level, with wing-beats that seemed slower and heavier than Common Snipe's, and bill that seemed proportionately shorter (P.G.R.B.).]

147. Jack Snipe (398).—Ones and twos were recorded at *c.* 20 places in the autumn and winter, and at Hornsea Mere; and at Spurn (six October 8th/9th) where one occurred on April 11th and one on October 4th. Two were at Goldsborough on April 13th (J.R.M.); and one at Bentley on October 3rd (R.J.R.).

148. Woodcock (393).—Unusual numbers were about Cloughton in the early months (R.S.P.). Ten to 12 were in a small area of Nutwith Common on December 10th (P.Y.).

150. Curlew (388).—There were *c.* 2,000 at Stocks Reservoir on August 7th (J.H.I.L.). Tendency to breed on the lower ground increasing, as about York (C.W.F.H.), and Hotham Carrs (E.B.B.) and to winter inland, as at Almholme for three winters past—24 on November 13th (R.J.R.). Winter maximum at Gouthwaite *c.* 90 on January 30th, and *c.* 110 November 13th (A.F.G.W.), numbers being reduced during severe periods; 36 were there on December 18th (I.G.B.). Up to 20 were at Swinsty Reservoir on several dates in December (V.S.C., I.M., H.H.). Maximum at Spurn, where always present, *c.* 100 January 23rd.

151. Whimbrel (389).—Main spring passage at Spurn from April 30th to May 3rd; and some noted daily from July 24th to late September; maximum 23 on September 4th and a few earlier and later. There was one on Coatham Sands on March 19th (I. Lawrence); otherwise records from the Teesmouth were similar to those at Spurn. Inland records were: one, Malham Tarn, April 23rd (P. and D.R.S.); one, Bottomboat, May 12th (A.F.); one, Gouthwaite, May 15th; two, Settle S.F., July 24th (A.P.); one near Swillington Ing, August 28th (J.C.); three, Rishworth Moor, October 10th (I.M.).

154. Black-tailed Godwit (387).—One occurred Settle S.F. on April 19th (A.P.; and two at Fairburn, August 7th to 30th (J.C., I.G.B., R.Cr.). At Cherry Cob Sands Blacktails occurred—one on August 18th and September 1st (H.O.B., G.R.B.); two on September 4th (F.E.K., J.M.L.); and three on the 14th (H.O.B.). One was at Spurn on October 11th.

155. Bar-tailed Godwit (386).—At Spurn, *c.* 80 on February 19th was the maximum of the year, the last of spring on May 2nd, and the first of autumn on July 17th; after which birds remained few until November 1st (30) with maxima of 70 on November 19th and December 4th. At Cherry Cobb were *c.* 50 on May 18th and four on May 21st, 15 on August 18th (G.R.B.); and *c.* 20 on October 29th at Faxfleet (H.O.B.). At Coatham Sands maxima were *c.* 350 on February 6th and 20th (P. and D.R.S.); and very few in autumn until *c.* 13 on December 27th when the tide probably drove them from their usual Durham side roost (P.J.S.). One occurred at Swinsty Reservoir on December 11th (H.H.).

156. Green Sandpiper (424).—Occurred at Almholme Flash near Doncaster, one January 2nd, three January 8th, one March 16th (R.J.R.). Two near Leven, January 22nd and occurred up to April 20th (J. T. Beal). One flew over the Tees at Langdon Beck on April 24th (A.B., P.J.S.). Near Staveley occurred in the early

months, singly and paired up to May 15th and not again until July 13th (2) and on to August 20th when disappeared (C.W., J.C.A.R.). There were two at Swillington Ing on July 4th (J.R.G.) after which a few birds occurred by many waters. Late dates were: December 3rd, one near Barnby Dun (J.S.T., R.J.R.); December 4th, two at Walton Park (H.H.); December 11th, one Knostrop S.F. (R.F.D.), and December 17th, one at Waddington S.F. (G. H. Acklam). A few occurred at Spurn in August and September.

157. Wood Sandpiper (423).—Records I feel I can accept are: one at Fairburn July 2nd (R.F.D.); one at Knaresborough S.F., June 21st (J.R.M., W.H.J.); at Denaby Ings, one, August 11th (R.J.R.), and 18th (J.S.T., C.I.B.), September 10th to 13th (J.C.H.L., J.S.T., J.B.H., C.I.B.); one, Swillington Ing, August 23rd to 31st (K.S., G.C., A.F.). At Spurn, one on August 18th and two on the 21st and 25th.

159. Common Sandpiper (421).—April 8th at Barnoldswick S.F. (A.P.) and April 13th at Ogden Reservoir (C. Williamson) were the earliest recorded. One ringed at Abberton Reservoir, Colchester, Essex, as adult on 1/8/54 was found dead at Pateley Bridge on 4/5/55 (R.F.D.). In spite of the foregoing early records birds generally were on the late side. At Gouthwaite on July 27th *c.* 35 were estimated and in the evening a flock of ten calling continuously were flying in line astern (A.F.G.W.). One or two were at Spurn, May 2nd to 4th and on May 15th; and from July 31st to October 9th on most days; October 9th being also the latest date at Hornsea Mere, and at Gouthwaite.

161. Redshank (428/30).—Maxima at Spurn *c.* 140 on April 8th and *c.* 250 on September 11th and October 13th; *c.* 200 was recorded on a number of days including November 25th to 27th. Twenty were at Fairburn on June 26th and a few more on July 17th (R.F.D.).

162. Spotted Redshank (431).—Between August 13th when the first appeared at Spurn to October 4th when the last was noted there, Spotted Redshanks were recorded at Swillington Park from August 14th (A.H.B.L.); Fairburn, Gouthwaite Reservoir, Chelker Reservoir, near Penistone, Cold Edge Dams, Cherry Cobb Sands, and at Spurn frequently. Mostly in ones and twos, there were four at Swillington on September 4th, and five at Fairburn on August 28th/30th (K.S.). As usual the same birds were frequently seen on several days, the Chelker bird being there for at least a fortnight (W.F.F., O.M.P.), and others might have made protracted stays. At Cherry Cobb the three on August 28th (H.O.B.) became two on the 31st, and one on September 4th to 14th (G.R.B., K.N., S.M., J.M.L.), and there was one on October 1st (R.J.R.). Belated birds occurred at Spurn on October 30th and on November 1st, 12th and 26th; and December 31st (G.C.).

165. Greenshank (432).—Spring records were: one, Eccup, April 11th (H.W.); one, Bubwith-on-Derwent, April 24th (H.O.B.); two, Redcar, May 21st (P. and D.R.S.). A bird at Denaby Ings on July 5th was the first of autumn (C.I.B., J.B.H., J.C.H.L.). From August into October Greenshanks were unusually frequent; I had reports from 30 places, many covering most of the period. Thirteen were at Swillington Ing in one party on August 29th (A.H.B.L.), and 14 on the 31st (G.C., A.F.); nine at a time in the Penistone area (J.C.S.E.). Not usually very frequent at Spurn, Greenshanks were present from August 12th to October 9th (ten on August 22nd). At Gouthwaite a bird lingered through November and was last seen on December 4th (A.F.G.W., C.R.S.).

[168. Terek Sandpiper (420).—Paul Walker on September 15th, on the Esk at Glaisdale, saw what he first thought was a rather grey Common Sandpiper to which he got near enough to see it had a long, up-curved bill. Without glasses further details could not be seen (A.B.W.).]

169. Knot (403).—Maxima on Coatham Sands *c.* 4,500, February 6th, *c.* 2,500 December 27th (A.B., P.J.S.). On December 11th, with *c.* 2,000 Knots there the sand was wet enough to take footprints, and where the flock had stood was covered with faint imprints; at *c.* nine inch intervals among the faint prints were much deeper single prints all facing into the wind and each with a dropping just behind where the birds had rested on one leg. ' The regularity of the spacing was amazing and made quite an attractive design ' (P. and D.R.S.).

A remarkable movement south-eastward across the Humber was described at Spurn on January 7th by Misses M. R. and H. C. M. Jellicoe; only numbers were abnormal. From 2.30 to 3.30 p.m. numerous flocks of Knots passed at short intervals, being joined by birds from the estuary; most were flying high and fast. ' It was difficult to estimate the numbers before one group had been replaced by another,

but there must have been close on 20,000.' Spurn maximum late in the year *c.* 7,000, December 30th/31st. Knots occurred inland—at Knaresborough S.F., one, April 8/9th (J.R.M.); Gouthwaite Reservoir, one, January 9th, four, August 28th, three, October 8th, one, October 23rd (A.F.G.W., E.C.D., C.R.S.); Fairburn, one, March 6th (R.F.D., A.H.B.L.) and one, September 5th to 6th (R.F.D.), and one on the 12th (T.K.); one at Wath Ings (Dearne Valley) September 24th (J.S.T.).

170. Purple Sandpiper (415).—A very tame bird was watched on October 19th at six yards range on the edge of Chelker Reservoir (W.F.F., H.J.W., O.M.P.). Odd birds occurred at Spurn in March/April and in September/October; and in the Redcar to South Gare areas September to December. Winter status in usual haunts normal.

171. Little Stint (407).—One recorded Denaby Ings, July 19th (A.E.P., C.I.B.); and one at Eccup on July 24th (H.W.); one at Wath Ings, September 2nd to 4th (A.A., T.M.C.), one at High Royd, September 4th (R.Cr.), one, Cherry Cobb Sands, October 27th (G.R.B.), and one, Broomhill Marsh, October 29th (R.J.R.). In the Fairburn area up to three Little Stints were recorded on a number of days from September 27th to October 16th (A.H.B.L., M.N.R., R.F.D., K.S.). The figure ' one ' inserted in the ' roll call ' at Spurn on September 20th is insufficient as a record in the absence of a note in the log.

173. Temminck's Stint (409).—R.F.D., who records a Temminck's Stint at Fairburn on May 21st, knows the species in Sweden and elsewhere. Two were also recorded at Fairburn on several days in the last week of September.

178. Dunlin (404/5).—Breeding status normal, and numbers average on the coast with no day at Spurn on which numbers were recorded as exceeding 1,000; and fewer on Coatham Sands. May records inland were: 16 on May 8th in the Dearne Valley (T.M.C.); one, May 10th; two, May 15th at Wintersett (K.S.); two, May 13th near Doncaster (R.J.R.); six, May 15th at Knostrop S.F. (A.H.B.L., R.F.D.); three, May 15th near Fairburn (A.H.B.L.). Ten displaying at Gouthwaite on May 1st were most likely to be Yorkshire breeders (A.F.G.W.). In the Dearne Valley were 21 on September 17th (J.S.T., R.R.); on the 18th 21 at Fairburn, and 23 on the 25th (R.F.D.); which might be connected if all the facts were known. Occurred on these and a number of other inland waters on various dates in smaller numbers; and 32 were at Gouthwaite on October 8th (A.F.G.W.). One shot in the Dearne Valley, 23/10/55, had a wing-measurement of 121·9 mm.; it was a female and considered of the northern race (T.M.C.).

179. Curlew Sandpiper (406).—Up to ten occurred at Spurn on a number of days in September, and the first half of October. Occurred inland—one on September 12th at Fairburn (T.K.) and 15th, and five on the 25th (R.F.D.), and one on the 27th (K.S.), and on October 2nd (K.S. and Drs. Pickup and Burnett). One at Ilton Reservoir on October 6th showed curved bill and white rump at close quarters (P.Y.).

181. Sanderling (416).—Maxima at Redcar *c.* 300, March 12th (P. and D.R.S.), and on September 4th (A.B., P.J.S.); not seen between June 1st (two) and August 13th (15) (P. and D.R.S.). Maximum at Spurn *c.* 75 on October 1st. Seen inland at Gouthwaite Reservoir on August 27th and 30th (A.F.G.W., A.P.); and at Knaresborough S.F. on August 28th (J.R.M.).

184. Ruff (417).—A male coming into breeding plumage was seen at Warrenby Marsh on April 3rd (P. and D.R.S.). One at Knostrop S.F. on July 10th was the first for the autumn (A.H.B.L.); and one at Gouthwaite on August 21st was the first recorded for Gouthwaite Reservoir (A.F.G.W.). Occurred on various days in August and September and early October at Settle S.F., Swillington Ing, Fairburn, Knaresborough S.F., Knostrop S.F., in the Dearne Valley, Cherry Cobb Sands and elsewhere on Humberside, on the coast south of Bridlington, and at Spurn, and Redcar; with maximum 12 at Cherry Cobb on September 4th (H.O.B.). One at Knostrop on December 11th and 18th (R.F.D., A.H.B.L.) showed the aberrant tail pattern of a continuous, horseshoe-shaped white patch across instead of two oval patches on the sides (see *British Birds*, 1955, p. 88). R.F.D. had seen one similar at Spurn in September. T. A. Coward called the species ' our most variable bird '.

185. Avocet (451).—Two seen on September 30th by F. Hastings on the North Sands, Scarborough, were reported to R. S. Pollard; from the clear description taken at close range there seems to be no doubt about the identification (A.J.W.). One reported east of Paull in mid-August (A. Credland) was probably correct—other wildfowlers had seen the same bird (H.O.B.).

187. Grey Phalarope (400).—A Grey Phalarope at Ben Rhydding filter beds on October 22nd remained for a week and was seen swimming at five yards range by Wharfedale N.S. members. One floated buoyantly at Wintersett on November 8th (K.S.).

188. Red-necked Phalarope (401).—One at Wath Ings (Dearne Valley) on September 24th was seen at ranges down to 20 yards, wading, swimming, and flying (J.S.T., T.M.C., A.A., and four others). At 6.0 a.m. next morning the bird had gone.

193. Arctic Skua (493).—A dark-form bird caused a great uproar among Black-headed Gulls at Summer Lodge Tarn on May 21st (K.B.). Very common this autumn about Teesmouth; 40 counted on both sides of the river on September 3rd (P.J.S.); last seen November 12th (D.G.B.). First noted at Spurn on July 23rd, many birds from August 7th on to mid-October; maxima 16 on September 4th, *c.* 30 October 1st in conjunction with passage of Kittiwakes. A few chased terns near Bridlington in September (J.C.H.L.); and others were seen in the neighbourhood in August-September.

194. Great Skua (491).—Recorded at Spurn in August and September on several occasions, Skuas are often too far out for sure identification and probably more occurred. And seen from South Gare, two on September 6th (P.J.S.); and on October 22nd (P.J.S.); October 15th (D. G. Bell); 22nd, one (P. and D.R.S.); and November 20th (P. and D.R.S.).

105. Pomarine Skua (492).—Probably occurred at Spurn but not identified with certainty. On October 15th at Teesmouth a large-scale movement occurred, described by P. J. Stead as unapproached in scale since Nelson's time at Redcar. A NNE gale was blowing. D. G. Bell (Durham University) has supplied a detailed description of parties of up to 30 Skuas, totalling to *c.* 80 to 100, of which 30 were definitely adult Pomarines and 20 were most probably immature Pomarines; both Arctic and Great Skuas were also included. A light phase bird passed north at South Gare on October 30th (P. and D.R.S.) which was almost certainly the same bird seen a quarter of an hour later from North Gare by P.J.S.

196. Long-tailed Skua (494).—A Skua, smaller than Arctic, with long tail streamers, was recorded at Spurn on September 21st as it pursued a Sandwich Tern. Two similar birds were seen there on September 25th (T.D.B., A.H.B.L.).

198. Greater Black-backed Gull (486).—Maximum at Spurn, *c.* 1,500, October 6th; and *c.* 1,000-*c.* 1,500 were resting north of Staithes on September 10th (P. and D.R.S.). Continues to become more frequent inland in winter and a few were seen about many waters. *C.* 50 roosted at Ardsley Reservoir on November 19th (J.C.); and 14 were at Gouthwaite on December 10th (A.F.G.W.). In the Roeburndale colony of Lesser Black-backs were three pairs of this species on June 17th, at least one pair breeding (C.N.).

199. Lesser Black-backed Gull (484/5).—One ringed as young near Slaidburn 21/7/51 by D.B.I. was shot at Ilton 18/5/55 (P.Y.); and one ringed as young 7/7/51 was found dead near Gargrave 31/5/55 (D.B.I.). One ringed Roeburndale 6/7/52 as young was near Monmouth 29/5/55 (R.F.D.). *C.* 700 pairs were at Roeburndale on June 17th of which less than 100 were in Yorkshire (C.N.). At Eccup *c.* 133 mostly adults on May 7th (A.H.B.L.) were possibly *en route* for Roeburndale. Smaller numbers were on several waters before the breeding season and after. At Eccup on July 3rd were *c.* 20 adults and *c.* 100 immature birds (A.H.B.L.). A pair were nesting among Herring Gulls on Hunt Cliff on May 28th and a pair were near Kettleness on May 30th (P. and D.R.S.). On August 23rd, 182 flew in parties eastward over Bentley Common following the Don towards a gull roost at Almholme. At Wintersett were *c.* 1,100 (90% adults) on September 23rd, *c.* 675 on October 9th, and *c.* 630 on the 23rd; on November 20th there were only 52 adults; on the 19th at Ardsley had been *c.* 120 (J.C.). There were *c.* 20 at Worsborough Reservoir on December 31st (A.A.), and a few on other waters.

200. Herring Gull (482).—Breeding status normal; several pairs appeared to be nesting among the Lesser Black-backs at Roeburndale on June 17th (C.N.). A field near Dewsbury S.F. showed *c.* 154 on May 11th (A.F.). Maximum roosted at Eccup *c.* 4,000, January 12th; *c.* 7,500, November 5th; at Wintersett Reservoir, *c.* 1,100, December 31st (A.A.). Between 13.45 and 14.20 on December 18th birds were passing southward at Hornsea at the rate of *c.* 500 an hour (M.K.T., G.R.B.). A Gull at Hornsea Mere on September 11th size as Herring Gull that showed ' all white plumage ' which showed a pinkish bill and legs on close examination was considered as an albino Herring Gull (G.R.B.). A similar bird to the foregoing at

Spurn on September 24th, also with a pink bill, was described in the log as an albino Herring Gull.

201. Common Gull (481).—One ringed Bremanger, Co. Sogn and Fjordane, Norway, 2/7/54; recovered Sutton Road Bridge, Hull, 24/7/55. A single egg was laid in a nest on a rock in a Pennine tarn; the birds sat from June 23rd and hatched in late July but did not rear (P.F.H.)—the first breeding record for Yorkshire. A few of this species were about other waters in June. At Winn Moor were *c.* 300 on ploughed land on September 10th (J.R.G.); and *c.* 275 were on Harrogate Stray on October 23rd (A.F.G.W.). Over 200 were at Spurn on August 8th, August 31st-September 1st, and October 31st. Eccup maxima—*c.* 2,700, January 12th; and *c.* 6,700, October 7th (R.V.J.).

202. Glaucous Gull (487).—A number of immature birds, without black on primaries, sized as Greater Black-backed Gull, have been recorded: one, Spurn, January 8th (G.H.A.) and one, South Gare, January 8th (P.J.S.); two, South Gare, March 17th (A.B.); one, Hull Docks, March 6th (R. L. Bland who had recently seen the species in Iceland); one, South Gare, May 1st (P. and D.R.S.); one, Scarborough Harbour, February 27th (A.J.W.); one, Spurn, September 12th (H.G.B., J.K.F.); one, Wintersett Reservoir, April 10th (G.C.); one, Ardsley Reservoir, February 5th (J.C.); one, Scarborough Harbour, October 6th (R.S.P.); one, Hornsea Mere, November 13th and 20th (G.R.B., M.K.T.); one found north of Kilnsea on April 7th had been dead some time (T. Gillett).

203. Iceland Gull (488).—An immature bird came in from sea to South Gare on January 30th (D.R.S., P.J.S., A.B.); a gull at Ardsley Reservoir on January 8th (K.S.) was probably this species. A gull in juvenile plumage Bridlington Harbour on April 24th and 25th, sized as Herring Gull, with wings extending well beyond the tail, and comparatively slender bill (F.E.C.) was probably of this species, as was one at Scarborough on November 20th (H.M.F.). A gull at Hornsea Mere on September 26th without black on wing, with pale grey mantle, a ' long-looking gull ' but of which ' relationship of wing-length to tail was not clear ' was considered to be an Iceland Gull (W.A.B.).

207. Little Gull (477).—Thirteen is a generous allowance of the species. Most were in the easily recognised plumage of immaturity, and could be compared with ' black-heads ' for size, and were described in detail by competent people. Six were in the Teesmouth area (P.J.S., D.R.S., etc.) in January (two), March (one), July (two) one on the 28th being an adult in breeding dress, and September (one); one in Scarborough Harbour on February 19th (A.J.W.); one in Whitby Harbour on April 13th (I.L.); birds at Spurn on April 5th (J.C.L.) and May 14th (J.C.); one at Swillington Ing, August 21st/22nd (A.H.B.L., P.G.R.B.); and one at Bottomboat on September 3rd (H.H.).

208. Black-headed Gull (478).—

Ringed as juvenile, Heptonstall Moors, 28/6/53; Bowden, Cheshire, 15/1/55 (R.F.D.).

Ringed as juvenile, Heptonstall Moors, 22/6/52; dead in a gullery near Keighley, ca. 16/6/55 (F. E. R. Peach).

Ringed as juvenile, Swillington Ing by W. D. Holmes, 27/6/52; Rabat, Morocco, 11/3/54, the most southerly recovery for the species.

Ringed as juvenile, Heptonstall Moors, 22/6/52; Tring, Herts., 6/6/54.

Ringed as juvenile, Swillington Ings, 11/7/51; Silsden, Keighley, 24/5/55 (D.B.I.).

Ringed as juvenile, Swillington Ings, 20/7/49; Heptonstall Moors, 19/6/55 (D.B.I.).

Ringed as juvenile, Brotherton Ing, 22/6/55; near Chester-le-Street, Durham, 24/8/55 (R.F.D.).

Ringed as juvenile, Brotherton Ing, 22/6/55; Omagh, Co. Tyrone, 30/11/55 (R.F.D.).

Ringed as juvenile, Heptonstall Moors, 28/6/53; near Bantry, Co. Cork, 22/11/55.

Some large concentrations were reported: *c.* 10,000, Eccup, January 29th, at dusk, and *c.* 4,000 in afternoon of September 10th at Eccup (A.H.B.L.); and *c.* 15,000 in early morning of October 12th with *c.* 21,000 in the evening (R.V.J.). At Wintersett *c.* 3,500 in afternoon of November 20th (J.C.); and *c.* 3,000 on December 18th (H.H.).

211. Kittiwake (489).—One ringed Vestfold, S. Norway, 9/7/54; found dead Whitby Harbour, 10/1/55 (A.B.W.). A bird ringed on Lundy Island 19/7/53 was at

Scarborough 28/8/54 (*British Birds*). A juvenile flew over Mexbro Ings 1/1/55 (J.C.H.L. and F. Horner). All breeding colonies well up to average or above. There are various reports of northerly movement from September to November—October 22nd *c.* 1,000 passed N at Teesmouth in a NNE gale; the South Gare lightkeepers said the beams had attracted large numbers of small gulls in the night (P.J.S.).

212. Black Tern (462).—Occurred in spring—at Fairburn, one, May 14th (D.G.R.) and two, May 26th (R.F.D.), and two, June 13th (J.K.F.); at Fly Flatts Reservoir, two, June 3rd (R.Cr., I.G.B.); at Newton Ing, one, June 11th (A.H.B.L.); at Summer Lodge Tarn, one, June 16th (C.G.desF., R.C.). In autumn up to three occurred on various dates from August 13th to September 25th at Fairburn, Swillington Ing, Redmires (Sheffield), Gouthwaite, Teesmouth, near Bridlington, Hornsea Mere, Spurn, and Sunk Island, and one at Ben Rhydding on October 1st (E.S.S.).

I am told by Mr. J. Armitage that a Mr. L. C. Ballard claims to have seen on May 28th, 1950, three heavily blotched eggs of this species in a nest on a rotting mass of reed-mace in a marsh in Central Yorkshire, and that the birds were there up to the end of June, 1950. Word was sent to the B.T.O. who gave Mr. Ballard my address but he never communicated. The claim is probably correct but it is too late to prove it.

217/18. Common and Arctic Terns (469/470).—Breeding in the Teesmouth area of Common Tern was suspected (P.J.S.). First seen at Spurn, four on April 9th flying south; no more until April 30th. At Coatham Sands *c.* 250 September 4th, all Common (P.J.S.) and at Spurn *c.* 250 September 7th were maxima. Terns at Redcar in August were mainly Sandwich and Arctic (P. and D.R.S.). Most of those identified inland were Common Terns. Six occurred in May in three areas—Fairburn (R.F.D.), Bottomboat (A.F.) and the Dearne Valley (T.M.C.); and one on June 26th over Birkdale Tarn (K.B.); directions of flight were westward; thereafter 12 occurred on nine waters inland. Late records were October 9th at Walton Lake (J.C.), five at Redcar on October 13th (P. and D.R.S.), and one at Spurn on October 18th, one having occurred at Filey on October 16th (H.O.B.).

219. Roseate Tern (468).—Farne Island bred birds doubtless pass along our coast yearly, mostly unrecognised, even by those who sort out passing Terns frequently. A Roseate Tern on July 18th clearly showed its black bill, scarlet legs, rosy flush, and long white streamers, and called typically (P.J.S.). There were odd probables on adjacent days seen farther away.

222. Little Tern (471).—Four reached Spurn on April 25th; up to *c.* 40 recorded in May-June. A few pairs laid eggs at the Point and north of Kilnsea, no young were found. Departed in early August; one recorded September 4th. Courtship seen on Coatham Sands on May 1st—at least three birds (P. and D.R.S.); last seen, one on September 24th (P.J.S.).

223. Sandwich Tern (467).—A few noted at Spurn from April 25th; few until August 8th, autumn maximum *c.* 500 on September 11th; latest a belated bird on October 26th. Seven were off Redcar on April 30th (P. and D.R.S.) and two were off S. Gare, April 9th (M.A.). ' Strangely scarce at Teesmouth in late July and early August '; but *c.* 150 August 13th (P.J.S.). Possibly breeding was late. Two flew in to Gouthwaite Reservoir on August 28th (A.F.G.W.).

224. Razorbill (496).—Occurrences at Spurn were normal. Several small parties off South Gare in September and numerous in Tees Bay up to the third week in October (P.J.S.).

226. Little Auk (502).—One found *c.* three miles inland on January 22nd was released at Filey next day (A.J.W.). A few occurred in the early months, mainly dead on beaches; and one or two in September to early October. Thereafter Little Auks became unusually frequent. On October 21st two flew north at Hornsea (M.K.T.). On October 22nd at least 98 crossed the Teesmouth northward after gales from the north on October 21st. On the 23rd eight (possibly 10-12 more) occurred at Spurn, and two off Easington on the 22nd; and a few were seen at Spurn on a number of days afterwards, with 11 on November 13th and five at Hornsea on November 20th (M.K.T., G.R.B.). There was no real ' wreck ' of birds inland—one was on Eccup Reservoir on October 16th (H.W.), and one on Ilkley Moor on November 1st (O.M.P.), on which date one was brought to G.H.A. in Hull, where one was found in a street on November 10th, and one at Brandesburton on November 17th also reached G.H.A. Two were dead at Scarborough about November 1st (A.J.W.). At Redcar on December 12th one was washed ashore until stranded on soft wet sand, where after trying to stand several times and flapping its wings,

it ran a few steps and took off flying strongly out to sea (P. and D.R.S.). One was fishing off Redcar on December 30th (D.R.S.). One that died at Redcar on November 16th provided lice for Mr. G. B. Thompson who identified three species of Mallophaga—*Saemundssonia merguli* (Denny), *Quadraceps obliquus* (Mjöberg) and *Austromenopen* sp. A number of other records would add little to the picture if listed. Auk spotting became quite popular.

227. Guillemot (498/9).—Fairly considerable oiling at Teesmouth and elsewhere mainly affected this species, with smaller numbers of Razorbills, Scoters and Gulls. With the new Protection Act in force ' climming ' for eggs ceased; and it is believed the birds did better than in any recent year. Three chicks were on one ledge where there was none last year, and there were more chicks visible elsewhere. Visitors in summer to the cliffs should count eggs and young birds visible and estimate the possible increase, which will be slow probably to become generally visible.

230. Puffin (503).—' More, I thought, than in 1954 ' at Bempton (G.C.). One was picked up alive near Terrington on October 25th (E.W.T.).

235. Turtle Dove (383).—April 24th at Skipwith was the earliest date (H.O.B.); one was at Dalby on the 28th; all others were in May. A nest was found on June 11th at Hayburn Wyke (R.S.P.). A bird was on the cliff edge near Staithes on July 17th (P. and D.R.S.). Bred in the Huddersfield area (E.C.J.S.). Evidently the species is still spreading.

237. Cuckoo (240).—Noted April 10th at Scotton (Harrogate area) (A. E. Winter). Rather scarce this year. One called at Ilton on July 7th where an adult was still about on August 12th (P.Y.). A juvenile was at Swillington on September 11th (K.S.).

241. Barn Owl (254).—One ringed as young near Clitheroe, Lancashire, 27/6/54, was at Dent 28/9/54. Status unchanged.

246. Little Owl (249).—Birds were at Cloughton on April 30th and August 17th (R.S.P.). One at Ilton (P.Y.) (high ground) was the only other evidence of spread.

248. Long-eared Owl (250).—Two at Spurn (one caught) on November 2nd presumed migration. No proof of breeding. Two in the Doncaster area on April 5th (R.J.R.) and three disturbed from one tree on December 17th (J.S.T.).

249. Short-eared Owl (251).—Nested at Ilton and grouse formed a part of the food supply (P.Y.). Bred in a few other areas; and seen fairly frequently in autumn and winter in others, including Spurn except between April and mid-August.

252. Nightjar (227).—One found in a Guiseley mill shed on May 10th (E.S.S.) was the earliest reported by nine days. Occurrences normal mainly recorded by ear.

255. Swift (225).—One at Keighley S.F. on April 17th was the earliest (the late C.D.R.), the next being on the 23rd at Hornsea Mere (T. J. Wildblood), and there were six other records in April. The first concentration was on May 1st, *c.* 35 at Fairburn (K.S.). On May 5th *c.* 50 flew NW at Shipley (J.B.N.). On May 7th Swifts were in force at Bridlington (H.O.B.), and large numbers were in Wharfedale and Washburndale (D.G.R.), *c.* 100 at Ripley; and *c.* 30 at Fairburn, which became *c.* 500 on passage on the 8th, when *c.* 100 were at Gouthwaite (A.F.G.W.), *c.* 150 at Wintersett (K.S.), and several thousands at Knostrop S.F. (R.F.D.). Large numbers hawked round ' The Moorlands ', York, on May 11th (E.W.T.); and concentrations diminished as Swifts dispersed from above the waters where they had sought food temporarily, and to which some would return for a day or two during cold and wet spells in summer—*c.* 200, Fairburn, June 19th (R.F.D.), and tremendous gathering at Knostrop July 4th (J.R.G.).

August 28th, Mexbro was the latest inland date (J.B.H., C.I.B.); but up to six passed at Spurn on 12 dates in September and three on the 25th. A pair evicted Starlings from a hole with an observation door at Scarborough on May 8th and reared two young (ringed by A.J.W.), vacating the box on August 13th (H.M.F.).

261. Hoopoe (232).—One occurred at Masham on April 25th and 26th (see E. E. Jackson in *The Naturalist*, July, 1955, p. 130). Descriptions of birds seen by two German schoolmasters near Glasshouses on April 22nd and several days after (per S. Dennison), and near Fountains Abbey on the 27th (per G. R. Wilkinson) could only have been this species. I have notes of Hoopoes seen April 23rd to 26th in Kent, Wiltshire, and Strathnaver (Scotland). One occurred at Spurn on August 27th and 29th.

262. Green Woodpecker (235).—Status normal. A bird on Ilton Moor, snow-covered on January 20th, one and a half miles from nearest tree, was unusual (P.Y.). Four at the upper end of Colsterdale on July 25th could have been a family party looking for ants (P.Y.).

263. Great Spotted Woodpecker (236/7).—Rather less in evidence. One ringed Apperley Bridge 14/6/50 by R.F.D. was found one and a half miles away 16/1/55.

264. Lesser-spotted Woodpecker (238).—Reported from 11 areas in the West Riding, and from two in the North Riding. Bred near Keighley (F.E.R.) and Doncaster (J.S.T.).

[269. Short-toed Lark (66).—At Spurn on May 14th, a small Lark came from south to alight in Clubley's field. When approached it flew with three Skylarks than which it was smaller. It had a sandy appearance with a darker tail and with paler underparts. The call, heard three times, was harsh with some suggestion of a rattle. John Cudworth, who knew the species in Egypt, considered the bird to be a Short-toed Lark, but did not see it nearer than *c.* 60-70 yards.]

271. Woodlark (69).—Bred in the Doncaster area, two nests of one pair found, and a family party of two adults and four juveniles seen on June 25th and later (J.S.T., R.J.R., I.G.B., etc.) see *Naturalist*, pp. 45-46, 1956. Heard singing in one East Riding area in June (K.F., H.O.B., J.A.).

272. Skylark (70).—Much movement near Teesmouth in February attributable to weather conditions. On February 18th, with the beach snow-covered above the high-tide line at Redcar, *c.* 200-250 were on the beach (P. and D.R.S.). On February 19th *c.* 2,100 passed N at South Gare between 09.30 and 13.00 hours, and *c.* 200 in the afternoon, and *c.* 70 flew S in a snowstorm (C.J.H.). At Milnthorpe near Wakefield on January 18th four flocks totalled *c.* 1,000 birds (K.S.). On February 24th *c.* 70 flew SE over Doncaster. In September/October movement of Skylarks over Doncaster was mainly NNW (J.S.T.). Skylark movement at Spurn is more continuous than concentrated and maxima were reached with *c.* 100 on September 24th and November 12th, and *c.* 300 on October 29th when birds were crossing the peninsula from the sea (J.C.). Fairburn had *c.* 400–500 on October 1st (E. Grainger).

273. Shorelark (72).—Two were seen about ' Sammy's Point ', Kilnsea, from March 12th to 27th. One on Redcar Promenade on November 1st was an adult male (P. and D.R.S.). Two were on seaweed recently washed up below Sewerby Cliffs on November 9th (Mrs. J. E. Kitchen), and two near S. Gare on December 27th (A.B., P.J.S.).

274. Swallow (220).—Ringed as young near Sedbergh 23/7/53 by Sedbergh School; Benouville (Calvados), France, 10/5/54. Single birds, the first, were at Harrogate S.F. (M.R.S., A.F.G.W.) and at Spenborough S.F. (H.H.) on April 1st. The first at Spurn on April 7th flew north: but right up to early June all but about a dozen passed south. The peak came with *c.* 5,000 on May 13th, all but *c.* five travelling south as most do in autumn. On April 25th *c.* 30 passed west up Humber near Melton in two hours (S.M.); I have known many more do that in September (R.C.). At Redcar the problem is set in the reverse direction. Passage at Redcar in July was the same as in spring, viz., NW (P. and D.R.S.)—steady movement along the coast NW on May 3rd (O.C.H.) and the same flight line used all the month; and the same course followed in September. At what northern point do the spring Spurn birds turn south ? Have they come down the curve of the Humber ? At what point do the birds passing Redcar in spring and autumn turn north ? They have perhaps followed the coast from (say) Boulby ? Whitby ? Scarborough ? Flamborough ? Sleuths are needed.

There were *c.* 1,000 at Wintersett on May 10th (K.S.); and of *c.* 250 there on May 17th many were exhausted (wind cold NE with rain). Autumn maximum at Fairburn *c.* 2,000 on September 6th. Late dates were: several October 27th to 31st and one, Guisborough, November 5th (N. Harwood); and one, Great Ayton, December 17th (B.S. Cran).

276. House Martin (222).—The earliest were nine at Swillington Ing (K.S.), and several at Otley (T. R. Tyson), on April 8th. First seen Spurn, one on April 26th; maximum 156 September 18th; last two on October 25th. Numbers are much fewer than of the Swallows but the same questions arise at Spurn and Redcar. Young were still being fed in two nests at Little Blakey on October 1st; and the last inland was at Romanby on October 20th (J.P.U.).

277. Sand-Martin (223).—Ringed as young, Copgrove, 24/8/55; recovered 25/9/55 at Aigurande, Sur Bouzanne (Indre), France (J. A. S. Borrett). One at Worsborough Reservoir on March 27th (T.M.C.); and one at Knaresborough S.F. on March 29th (J.R.M.) were the earliest. About 100 were over Castle Howard Lake on April 8th (E.W.T.), *c.* 1,000 were at Fairburn on July 17th (H.H.) which was early for so many but cold easterly winds prevailed. At Fairburn on August 27th 4,000 to 5,000 hirundines, mostly this species but *c.* ten per cent. Swallows included, appeared suddenly in large parties between 19.30 hours and 20.00 hours (B.S.T.) (J.C.); and *c.* 1,500 were there on the 30th settling on reed-mace at dusk (K.S.). There was marked passage along the Upper Humber on September 1st, *c.* 400 going east, *c.* 60 going west, and *c.* 30 going north; and for five days previously a fairly steady small stream had mainly passed westward (perhaps towards Fairburn), but occasionally southward (S.M.). Maximum at Spurn, *c.* 200, September 18th; last one on October 6th, ten days later than any inland record sent in.

279. Raven (1).—Three young reared in a nest in the NW were on the wing by April 25th (H.W.B., J.P.L.). The adults were killed at another nest (A.P.). An adult dead in a gin set for crows on Ilkley Moor was unusually small and might have been mistaken for a Carrion Crow but for the heavy bill—length 20 in., wing 325 mm. (the late C.D.R.). The specimen is in the Keighley Museum. There are several records of birds seen in the hill country.

280. Carrion Crow (3).—On April 30th, a party of 18 circled high over Flamborough (H.O.B.). At Bretton, with calls of this species, *c.* 50 were in a flock on November 26th (H.H.); as were *c.* 70 on Goathland Moor on December 28th (A.B.W.).

281. Hooded Crow (2).—Only a few single birds at Spurn in the early months; from October 23rd up to ten were recorded. Three and a hybrid were at Sewerby on January 30th (H.O.B.); and one on Seamer Moor on March 27th (A.J.W.); and one near Cloughton on October 31st (R.S.P.). Two were on Goathland Moor on December 28th (A.B.W.), and three at Flamborough on December 18th (H.O.B.).

282. Rook (4).—One near Huddersfield on January 11th had a long, fine decurved bill and a white patch on the primaries of each wing (E.G.). There was some evidence of migration at Spurn from April 9th to 11th, September 18th (40) to 20th, and in early November. Of *c.* 160 on April 9th, 102 flew southward (J.C.).

283. Jackdaw (5).—Maximum at Spurn *c.* 30 on April 10th.

284. Magpie (7).—At St. Ives on January 30th *c.* 59 in stubble was an unusually large assembly.

285. Nutcracker (8/9).—Three flew out of a plantation at Eccup on November 1st showing conspicuous white under tail coverts, and white edges and tip to black tail. One settled on the top of a tree. Through X10 glasses at 20 yards range the mottled brown plumage and almost black wings were quite clear (H.W.).

288. Great-Tit (98).—Four dropped into bushes near dunes near Redcar on October 9th apparently coming in from sea (P. and D.R.S.). Maximum at Spurn, four on March 25th, only noted on nine days.

289. Blue-Tit (100).—Some occurred at Spurn October 1st to 10th, maximum ten on the 9th, and a few on several other days. Ringed Esholt 18/1/55; dead Ilkley 6/4/55 (J.B.N.). Ringed Frizinghall, 6/1/53; Beckett Park, Leeds, in June, 1955 (J.C.L.). One ringed Harrogate 18/3/51 recovered a mile away in 1955 (C.S.).

292. Marsh-Tit (107).—One at Spurn, September 25th (J.C., E.G.).

293. Willow-Tit (108).—More in evidence than usual in the Barnsley area, party of six at Worsborough Reservoir on June 27th (T.M.C.). Four at Chevet on November 6th, where and when all five other species of Tit were noted (G.C.). Two were in birch scrub in Hornby Park on December 18th (G.R.P.). Also reported in Birk Crag Woods, Harrogate (E.C.D.). Nested on Strensall Common (C.W.F.H.), and in the usual places.

294. Long-tailed Tit (111).—Two fed on suet at a Harrogate bird table on February 21st (E. Goodall). One at Spurn on October 23rd.

296. Nuthatch (96).—One in a Fulwood Road garden, Sheffield, on April 1st (T.M.C.); a pair Cusworth Hall, Doncaster, in April (R.J.R.); and one Kirkdale, April 24th (O.C.H.). Nested near Bingley, Roundhay Park, Bolton Abbey, and in haunts with which we are familiar, including Thornton-le-Dale probably (R.M.G.). One, Bretton Park, October 9th (G.C.).

298. Tree-Creeper (93/4).—One sang at least two phases of song near Blaxton on December 27th (J.S.T.).

299. Wren (213).—None seen at Spurn from June 12th to September 1st; up to four in the early and late months.

300. Dipper (218).—Two broods reared under the mill bridge at Thornton-le-Dale (R.M.G.). General status normal.

301. Mistle-Thrush (174).—Odd birds occurred at Spurn on nine days from February to June; and up to three on 11 days from September 20th to December. On November 26th three circled the lighthouse area and flew away to the SW. Fifteen to 20 were at Hornsea Mere on September 25th (G.R.B.). Four were coasting NW at Redcar on October 9th, a day of much migration, ' the first we have seen here ' (P. and D.R.S.). On Ilton Moor were *c.* 30 on September 19th; and *c.* 20 flew S. over Ilton on September 30th just before dusk (P.Y.). An adult ringed Harrogate 11/2/55 was at Worcester 5/12/55 (M.R.S.).

302. Fieldfare (173).—Fed ravenously on turnips at Ilton on January 19th (P.Y.); and on January 30th numbered *c.* 1,200 at Faxfleet (A.G.). Last at Spurn one, May 1st, inland *c.* 1,000 near Merwith, Darley, April 28th, and three, Scar House Reservoir on April 30th (D. Swindells). In autumn Fieldfares were numerous at Spurn over longer periods than usual. First recorded on September 16th; main passage occurred October 16th to 17th, and 23rd to mid-November, with maxima on several days of *c.* 300; and parties continued to feed on buckthorn berries and to move south, north and west until mid-December. On October 17th, John Lord saw birds coming into Spurn in the morning continuously, many flying up Humber; and on his journey by road to Birmingham continued to see Fieldfares still moving as far as Bawtry, then no more. On October 16th up to *c.* 300 passed up the Aire/Calder valleys at Fairburn (R.F.D.); and flocks occurred at Ilton (P.Y.), at Chevet (G.C.), on the Ilkley Moors and over Shipley (D.R.G.). At Doncaster movement from October 18th continued mainly NW until November 2nd, when after two nights of frost direction became mainly south (J.S.T.). Flocks of up to *c.* 300 occurred near Masham and Middleham on October 25th (J.R.G.), which may have been connected with the *c.* 500 that flew in and on near Redcar on the 24th (O.C.H.). ' Literally thousands ' came on to the Wolds near Kilburn on November 3rd, a week later they had gone (E. S. Firth); large flocks were flying west over Ilton Moor on November 2nd, and there were large flocks in the fields there on November 14th (P.Y.). There are numerous other records that confirm the general picture. In December I saw very few Fieldfares in and about Wensleydale; they seemed to have moved, possibly farther west.

303. Song-Thrush (175/7).—Ringed as juvenile, Ilkley, 3/8/52; Foxdale, St. Johns, Isle of Man, 9/1/54 (Wharfedale N.S.). Maximum at Spurn *c.* 30, October 10th, which indicates that passage was small.

304. Redwing (178/9).—Ringed, Spurn, 3/10/54; Langoiran, near Caddillac (Gironde) France, 19/11/55. Up to *c.* 200 passed south down the Spurn peninsula in the morning of February 21st. Six were caught, one of which with dark upper parts and throat feathers might conceivably have been of the Icelandic race. Last at Spurn one on April 23rd; and not seen again until six on September 17th. Was at Spurn in numbers October 5th to 8th (*c.* 100 near Whitby, October 6th (A.B.W.)); 16th to 17th; 22nd to 30th (*c.* 100, Sutton, October 22nd (G.R.B.)); and November 4th to 5th; with maxima *c.* 250 on October 16th and 23rd. Birds and movement inland corresponded with the foregoing dates; and with those for the Fieldfare but in much smaller numbers. Can the ringing record cited above be indicative of a reason for the many fewer Redwings in the autumn of 1955 as compared with the autumn of 1954 both on the coast and inland; viz., that they mainly migrated elsewhere ? Forty flew in from sea at Hornsea on October 23rd; and *c.* 50 on the 30th (G.R.B.).

307. Ring-Ousel (182).—Ringed as nestling, Morton Moor, 8/5/54; near Monzanera (Terval), Spain, –/12/54 (J.C.L.). One at Spurn on September 16th and October 7th were the only evidence of passage migration there of the species. The earliest summer residents were at Morton Moor and at Gorple on March 29th. A lot of broods probably suffered in May; but second broods did well.

308. Blackbird (182).—

Ringed Thornaby-on-Tees, 1/3/55; Zelengrad, Kaliningrad, U.S.S.R., 13/4/55 (54·57 N, 20·29 E); formerly East Prussia (P.A.R.).

Ringed Heligoland, 12/4/55; Spurn, 1/11/55 (R.C.).

Ringed Spurn, 6/11/54; Listowel, Co. Kerry, Eire, 4/2/55.

Ringed Spurn, 6/11/54; Knocknahur, near Sligo, Eire, *c.* 1/2/55.

Ringed Spurn, 6/11/54; Phillipstown, Co. Louth, Eire, 1/3/55.
Ringed Spurn, 6/11/54; Ludborough, Louth, Lincs., 3/3/55.
Ringed Spurn, 6/11/54; Cleethorpes, 10/2/55.
Ringed Spurn, 13/10/52; Blofield, Norfolk, mid-February, 1955.
Ringed Spurn, 4/11/53; Skellingthorpe, Lincoln, 26/2/55.
Ringed Spurn, 6/12/54; Bishop Burton, 22/2/55 (per Miss J. P. Brook, E.R. Inst. of Agriculture).
Ringed Spurn, 20/11/54; Donington, Spalding, Lincs., 22/3/55.
Ringed Spurn, 22/10/53; Rendsburg, Holstein, Germany, 12/3/55.
Ringed Spurn, 17/11/54; near Kalmar, Sweden, 4/4/55 (K.B., Sandbäck).
Ringed Spurn, 7/11/54; R. Krus, Halböl, Denmark, 30/7/55 (H. F. Bojskov).
Ringed Spurn, 15/1/55; near Linköping, SE Sweden *c.* 7/8/55.
Ringed Spurn, 1/4/53; Naunestad, near Hurdalsjden, Norway, 6/8/55. (60·12 N.)
Ringed Spurn, 18/10/53; near Konsmo, Mandal, Norway, 8/8/55.
Ringed Spurn, 9/7/54; Brotton, Saltburn, N. Riding, 5/9/55.
Ringed Spurn, 2/11/54; Odskölt, Dalsland, Sweden, summer, 1955.
Ringed Spurn, 12/11/54; Ballygowan, Belfast, N. Ireland, 10/12/55.
Ringed Shipley, 4/2/54; Cockfield, Durham, 30/10/55 (J.C.L.).
Ringed Ilkley, 17/10/55; Hossegor (Landes) France, 19/11/55 (Wharfedale N.S.).

Spring passage at Spurn was evident March 25th to mid-April. The main autumnal passage showed from October 10th to mid-November, maximum *c.* 200 on October 23rd. At Ossett Spa S.F. on October 8th *c.* 20 were all juvenile males (G.C.). Partial albinos were noted at Hull on May 10th (T. Gillett); and near Doncaster in the early months for its second winter (R.J.R.).

311. Wheatear (186).—Noted in seven areas in March, the first being at Batley on the 23rd (H.H.). Passage noted at Redcar April 30th to May 1st when at least one was a probable ' Greenlander ' (P. and D.R.S.). Occurred at Spurn from March 25th, with spring maximum on May 9th to June 1st. Odd Wheatears appeared on a few days from July 17th and more daily from August 4th to October; last—two on the 23rd. Maxima were *c.* 20 August 18th and 19th, up to *c.* 25 August 28th to September 4th, after which numbers fell. One on slag near Fairburn on October 9th (A.H.B.L.) was doubtless on passage.

317. Stonechat (198).—Present at Spurn in January-February (four on January 7th). One on October 1st and 2nd, and two on December 27th were all that were seen in autumn. Two were reported on Ilkley Moor on July 12th (F. E. R. Peach). No more records were received; the paucity is disappointing.

318. Whinchat (197).—Ringed Spurn, 31/8/55; recovered Lagoa, Algarne, Portugal, 23/9/55. Present at Spurn on a few days from April 29th to May 14th and one May 28th to 30th, and present August 13th to October 1st and one October 15th; maxima up to 14 September 3rd to 6th. Six were in a bean-field on Filey cliffs on September 12th (H.M.F.). A bird was on Pilmoor on April 20th (J.P.U.).

320. Redstart (201).—First recorded on April 9th near Coniston Cold (the late C.D.R.); and at Priestfield near Dewsbury (Batley N.S. per H.H.). At Spurn up to three from April 23rd to May 11th, and from August 10th in ones and twos until September 9th (six) and 10th, with odd birds on some of the days following until October 10th to 13th (ten on the 11th, and one on the 23rd).

321. Black Redstart (202).—At Spurn a single bird noted March 22nd and 25th to 27th, and on April 18th and 22nd, and one on October 13th. There was one near Gorple Reservoir October 11th to 18th (J.Cr.).

322. Nightingale (203).—Bred successfully in the Doncaster area (J.S.T., R.J.R., I.G.B.), and sang in another place (R.J.R.). A bird reported near Goathland was not reliably confirmed.

324. Bluethroat (205).—One at Spurn August 23rd and 25th (trapped on both days); and one on September 8th also trapped. One was seen and described on October 12th (B. S. Milne).

325. Robin (207/8).—A Robin with white wings and tail occurred in Bransdale during December (A. Gordon). One ringed at Spurn 4/10/51; recovered Rouillac (Charente) France, 3/1/55—another result from the record trapping of Robins in early October, 1951. At Esholt a bird ringed 19/12/51 was recaptured 26/2/55 (J.B.N.). Six at Spurn on March 28th was evidence of movement; otherwise only odd ones occurred on a very few days in spring. The first reappeared on September

5th, only ones and twos thereafter until October 22nd (ten), October 23rd (*c.* 100), 24th (*c.* 30); after which fell away to the odd bird occasionally seen in December. Three were at South Gare on October 23rd (P. and D.R.S.).

327. Grasshopper-Warbler (145).—A nest with three eggs near Bramhope on May 18th was empty on June 15th (P. Swallow). Nested in an overgrown allotment garden in Sheffield (D.R.W.). Was heard singing in 20 places, seven of them in the Barnsley-Dearne-Doncaster area; four in the Leeds-Airedale district, seven in the Dales country (west and east); and at Skipwith and near Whitby. In an all-night vigil, T. M. Clegg found a bird sang from 9.30 p.m. to 8.0 a.m. ' and probably longer '; one burst of song lasted 10·25 minutes with *c.* 10 pauses of less than a second.

333. Reed-Warbler (149).—Ringed Spurn, 8/9/55; recovered near Lisbon Airport, Portugal, 13/10/55. Small colonies continue to be found in lower Airedale. A pair nested in Rose-bay Willowherb growing on a bank of slag, three-four yards from water (R.F.D.); one sang as early as April 21st (G.C., A.F.). Of six recorded at Spurn on six days from August 25th to October 11th, five were ringed, otherwise probably they would not have been seen.

337. Sedge-Warbler (153).—Noted at Fairburn (A.H.B.L.) and Chevet (G.C.) on April 24th; and at Spurn from April 28th; where the species was seen almost daily (maximum eight on April 30th) until autumn, but in numbers too small to indicate passage migration at a place where one or two pairs breed. Present Hornsea Mere September 18th (M.K.T.) and one at Spurn on October 4th.

343. Blackcap (162).—Only noted at Spurn April 29th to May 1st and 8th; and on September 23rd, November 1st and 24th. One was near Beverley on April 7th (T.G.). A male was about a Kirkella garden during most of March (E.B.B.), and one in a wood at Elland on November 12th (R.Cr.). One fed on yew-berries in November-December in the garden of Richmond rectory (Rev. P. Beresford-Pierce in *Yorkshire Post*). A female visited a Sleights bird-table during the snow of December 18th to 20th eating bread, cheese, etc. (A.B.W.).

344. Barred Warbler (159).—Occurred at Spurn on August 25th and 26th.

346. Garden-Warbler (161).—Ringed Spurn, 21/8/54; recovered, Heligoland, Germany, 16/5/55. April 24th at Chevet (G.C.) was the earliest date. Occurred Spurn, April 30th, May 1st and 30th, June 11th/12th and July 14th; and a few odd birds in autumn from August 22nd to September 24th.

347. Whitethroat (163).—One near Ilkley on April 14th was a very early bird (O.M.P.). Present at Spurn from April 19th to September 25th, and odd birds in October to the 7th; maxima *c.* 40 on April 30th, *c.* 30 May 8th to 10th, 20 to 30 August 15th to 17th, *c.* 40 August 31st and September 1st.

348. Lesser Whitethroat (164).—Occurred Spurn May 20th and 21st; on three days August 25th to 31st; on September 20th, and on October 18th. Noted in several areas near Doncaster (J.S.T., R.J.R.); and about York from May 5th (F.J.); and in late June at Esholt (J.B.N.); and at Knaresborough S.F. on August 17th (J.R.M.). Apparently very scarce this year; I did not come across one.

354. Willow-Warbler (132).—One sang at Killinghall Bridge on April 1st (A.F.G.W.). Noted at Spenborough on the 4th (H.H.), at Ilkley on the 6th (O.M.P.), at Dowley Gap on the 7th (W.G.) and at Fairburn and Knaresborough (R.F.D.); but another few days had passed before it became generally distributed. A bird sang near Harrogate as late as September 25th (M.R.S.). A nest found in July near Ramsgill was sited $4\frac{1}{2}$ ft. above ground in a hawthorn hedge (A.F.G.W.). Noted at Spurn two on April 6th (one caught), and on to May 14th with a bird on May 28th to 30th. Maxima *c.* 50 April 26th, *c.* 40 April 30th one of which was trapped and thought to be of a northern form. At Spurn in autumn from July 31st to September 23rd, maximum *c.* 20 on August 31st; and one on October 10th.

356. Chiffchaff (129).—A grey *phylloscopus* with dark legs near Sowerby Bridge on January 5th was probably of another race of this species than ours (B. Mitchell). One at Chevet on April 1st was the earliest reported (A.F.). I caught one in my garden on September 23rd (R.C.). At Spurn was one on April 11th; and single birds on September 25th, 28th and October 1st. Commoner about Scarborough than for many years (A.J.W.); and ' seems to be increasing about Ilkley ' (E.S.S.). A very early nest had six eggs on April 24th (H.R.L., A.G.).

357. Wood-Warbler (135).—One sang at Bolton Abbey on April 18th (J.B.N.). In the Mashamshire Woods on May 15th, more Wood-Warblers were heard singing than any other species (J.P.U., R.C.). At Spurn, one only recorded, on August 22nd.

360. Yellow-browed Warbler.—One was caught at Spurn and described in detail on October 11th, and was there for two more days.

364. Goldcrest (126/7).—Occurred at Spurn on April 7th and 12th (two) and from April 17th to 26th, up to three. Two were in bushes near Bempton on April 12th (G.C.). No more at Spurn until September 28th, whereafter seen in very small numbers on to November 4th; October 23rd (*c.* 100) and 24th (*c.* 30) were the only days when numbers exceeded ten. On October 23rd one was at South Gare, Teesmouth (P. and D.R.S.). Nested in Duncombe Park after lapse of several years (A.G.).

366. Spotted Flycatcher (121).—A bird at Spenborough S.F. on May 10th (H.H.) was the earliest inland. On May 9th were five at Spurn, and six on June 12th, with odd birds between at intervals. Numbers in autumn were even fewer—up to two August 24th to 26th; odd ones on the 30th and September 1st, and three on September 23rd.

368. Pied Flycatcher (123).—A male sang near Grewelthorpe on April 17th (T.D.B.), the earliest noted. Three pairs nested in Kildale Woods, a new locality (P.J.S.). Bred in the Bingley area (S.L., C.N.). Near Helmsley arrived late in diminished numbers and some usual holes unoccupied (A.G.); but normal in some other breeding areas. Three were at Spurn on April 30th; and single birds on three other dates in spring. Seen daily from August 10th to 31st (maximum 15 August 23rd to 25th); and on some days after; one on September 29th was the last. One was at Bempton on August 27th (H.O.B.).

371. Hedge-Sparrow (210/11).—A white-winged bird, with white on outer tail feathers, occurred on Mexborough Ings on January 1st (J.C.H.L., F. Horner). At Spurn spring maxima were 12 on January 12th, ten March 13th to 14th, and on April 1st. The normal daily numbers increased in autumn to *c.* 20 to 25, October 7th to 14th; and *c.* 20 were estimated on November 5th and 16th.

373. Meadow-Pipit (76).—Large numbers were moving up Nidderdale on March 29th—*c.* 100 at Bewerley Park (R.F.D.). Fairly well distributed on Ilton Moor on March 29th, *c.* 30 came on to the moor in a snow shower and dropped into heather (P.Y.). Passage at Spurn on March 25th to 26th and from April 4th to 10th; and at Redcar on March 28th, 29th, 31st and April 2nd and 3rd was probably unconnected with Yorkshire (or perhaps British) breeding. This was the real migration; previous movements had been temporary caused by weather conditions. The local breeders at Spurn began to be augmented from July 23rd; but numbers dropped to normal again on August 18th; and the maximum passage took place from September 17th to 26th, continuing in smaller numbers into October. There were *c.* 100 at Fairburn on September 18th (R.F.D.). On September 18th J. Cudworth's count at Spurn of birds passing southward from 06.55 hours to 11.00 hours produced 886 Meadow-Pipits; and 1,156 on the 19th over the same period, when Pipits were passing before it was light enough to see them. About 2,000 were estimated to pass on the 24th, and *c.* 1,000 on the 25th. Passage of Pipits over Doncaster came to the peak in late September and continued into October; birds were numerous west of Doncaster on September 24th and October 1st which coincided with the peak movement over the town (J.S.T.). A concentration of *c.* 150 at Rodley S.F. on December 21st occurred when the fields were frozen and snow-covered (D.B.I.); but even on December 20th an odd Pipit was on Ilton Moor (P.Y.).

[375. Tawny Pipit (74).—A large Pipit on April 12th at Knostrop S.F. with light unmarked breast and underparts was possibly of this species (P.G.R.B.).]

376. Tree-Pipit (75).—One in song near Leighton Reservoir on March 28th (P.Y.) was remarkable; the next was recorded near Doncaster on April 11th (J.S.T.). Recorded at Spurn, four on April 30th, and odd birds on May 14th and 15th, and on several days in September.

379. Rock-Pipit (81).—A few occurred at Spurn in March; and more from October 1st to 19th than have been noticed before; maximum 12 on October 16th; and a few in November. Breeding was proved near Scarborough (R.S.P.) and Sandsend (P. and D.R.S.). G. Carr saw *c.* 20 on one part of the Bempton Cliffs on April 12th. One was at Redcar on October 17th and several thereafter. Mrs. Kitchen reported *c.* 50 feeding on masses of seaweed recently washed up below Sewerby Cliffs on November 9th.

380. Pied/White Wagtail (90/91).—Single birds of the continental race were recorded in April from the 14th (Batley, Knaresborough, Knostrop, Barnoldswick), and two at Gouthwaite on April 24th (A.F.G.W.), and Knaresborough on the 23rd

(J.R.M.), and Redcar on May 13th (P. and D.R.S.) who also recorded one at Marske on September 12th. Congregations of Pied Wagtails occurred at Scarborough, *c.* 30 roosting in reeds April 8th (A.J.W.); at Denaby Ings with maximum 50 on August 18th (J.S.T.); Rodley *c.* 50 May 18th and *c.* 50 December 21st (D.B.I.); and at Fairburn *c.* 50 on September 25th (R.F.D.) had been coming in to roost for some weeks; *c.* 75 foreshore near Brough on September 17th (S.M.); and Bottomboat where 122 came to roost in reed-mace on November 19th (H.H.).

More were recorded at Spurn than usual mainly in autumn; maximum ten on October 3rd.

381. Grey Wagtail (89).—Unusual at Spurn; an odd bird occurred on eight days in September and on four in October with two on October 4th. Status normal in the species' usual habitats.

382. Yellow Wagtail (88).—About 20 were noted at Spurn on April 30th, and a few on several other days. First recorded at Riffa, Wharfedale, on April 6th (H.M.). Bred in good numbers especially about the headwaters of the rivers of the Dales country. Two birds were noted with blue-grey heads; one at Knaresborough S.F. on April 14th which eventually reached Alfred Hazelwood who was able to accept it as *flava flava* although not quite typical, and the other above Carperby on July 9th (R.C.) about which I made no claim. There was an albino with a normal bird at Malham on August 2nd (A.P.). More passed at Spurn than usual in August-September, maxima 21 on August 20th, 15 on September 7th; last seen there September 24th; last inland at Fairburn on October 4th (Dr. Pickup), where of *c.* 40 on September 5th some moved off westward at dusk. There is still no evidence of passage from the inland colonies down the Humber to Spurn.

383. Waxwing (120).—In Whitby Park were 24 on January 11th (A.B.W.). Small parties occurred—Locke Park, Redcar, in late October (H. E. Ingram), in the Great Ayton area in November and early December; and near Saltburn (T. H. Gladders). One fed on Siberian crabs at New Earswick on November 20th (F.J.), one at Pickering Marishes in late November (R.M.G.); and one at Sleights on December 12th (Miss H. M. Hatfield).

384. Great Grey Shrike (114).—One at Gouthwaite on January 2nd was seen carrying a Blue-Tit and later feeding on an impaled Robin (C.S., D.F.W.). Three occurred at Spurn on October 23rd and one October 25th to 27th, two were caught. Was seen at Gouthwaite on several days from November 6th (A.F.G.W.), at Ilkley on November 13th (O.M.P.), and near Ben Rhydding F. Beds on the 26th (E.S.S.). There was one by Stocks Reservoir on December 18th (J.H.I.L.).

388. Red-backed Shrike (119).—A male on Bentley Common near Doncaster on August 8th (R.J.R.) was the only one recorded.

389. Starling (14).—The pertinacity of Mr. and Mrs. P. A. Rayfield in continuing to trap up to 1,800 Starlings after rings had given out at 425, in bitter weather, compels admiration and won its reward:

Ringed Darwin Reserve, near Rybinsk, Russia, (58·30 N., 37·30 E., *c.* 200 miles north of Moscow), 8/5/53 and 15/5/54; trapped, Thornaby-on-Tees, 24/2/55 (P.A.R.).

Ringed by K. Holdsworth, Liverpool, 12/2/53; trapped Thornaby-on-Tees, 21/2/55 (P.A.R.).

Ringed Thornaby-on-Tees by P. A. Rayfield, 29/12/50; recovered near Dusetai, Lithuania (55·45 N., 25·52 E.), 30/4/53.

Ringed Thornaby-on-Tees by P. A. Rayfield, 22/11/53; West Hartlepool, 9/2/55.

Ringed Thornaby-on-Tees by P. A. Rayfield, 31/1/54; Scarborough, 11/12/55.

Ringed Thornaby-on-Tees by P. A. Rayfield, 4/10/53; Great Broughton, N.R., 6/3/55.

Ringed Spurn, 22/10/53; Tanpere (Hawe), Finland, 29/8/55.

Ringed Knaresborough S.F., 13/2/55 by J. R. Mather; Klassarod, Sweden, 11/4/55.

Ringed Knaresborough S.F., 28/9/54 by J. R. Mather; Presteigne, Radnorshire, 16/6/55.

Ringed Harrogate, 23/1/53 by A. F. G. Walker; Selby, 3/2/55.

Ringed near Shipley, 23/10/52 by J. C. Leedal; Barnsley, 19/6/55.

Many thousands roosted at Warrenby Steel Works, especially during March (P. and D.R.S.); and on buildings in Huddersfield in the autumn-winter (E.C.J.S.). At Hornsea Mere *c.* 100,000 roosted on November 3rd (F.E.K.). The peak day of

immigration at Spurn was October 22nd with 13.15 hours to 15.15 hours as the rush period. The estimate was of *c.* 4,000 birds that, coming in low over the sea, passed up the Humber.

391. Hawfinch (18).—Bred east and probably south of Doncaster (J.S.T.); and near Greta Bridge (A.B.). Noted in the North and West Ridings in the areas named in the 1954 Report. A male fed on yew-berries in Harrogate during January to March. At Ripley were *c.* 15 on October 31st (A.F.G.W.).

393. Greenfinch (25).—Ringed as nestling at Denton (Ilkley), 2/8/54; Leeds, 16/3/55 (D.B.I.). At Spurn passed in good numbers October 9th to 16th (maximum *c.* 400 on the 9th) and on October 29th and a few days in November. On November 19th *c.* 450 were seen at Thornhill; and at Woolley Moor *c.* 380 came into roost in young oak and alders in just over an hour on November 20th (H.H.). Big flocks fed on seed of dog's mercury and *persecaria* at Marley S.F. in autumn (S.L.); and *c.* 300 were on stubble on December 31st near Danby where such a flock is unusual (J.L.).

393. Goldfinch (20).—A flock of *c.* 150 occurred near Melton ponds (upper Humber) in mid-September (S.M.). Such a flock is of course exceptional, but smaller ones and breeding pairs were noted in a number of places. Occurred at Spurn at intervals throughout the year; maxima 14 on October 14th and 12 on October 29th.

394. Siskin (21).—One was near Bempton on April 12th (G.C.). A pair was seen preening on an alder and later going to a spruce plantation on June 9th in Low Dalby, subsequent search was unsuccessful (R.M.G.). Five occurred at Spurn on October 23rd, three on November 12th and odd ones on four days. Siskins occurred in parties inland in a number of places in the early and late months.

395. Linnet (30).—In J. Cudworth's watch at ' The Narrows ', Spurn, from 05.15 to 06.55 hours on April 9th *c.* 173 Linnets passed south. Breeding birds at Spurn were again fewer than formerly. Maximum numbers occurred on passage on September 1st (*c.* 350), 25th (*c.* 350), 28th to October 5th (up to *c.* 500), October 9th (*c.* 1,000), 14th (*c.* 750), 15th (*c.* 550), and fewer afterwards—some always present. Flocks occurred of *c.* 250 on thistles at Winn Moor, Leeds, on September 10th (J.R.G.), and *c.* 400 on Emley Moor, near Huddersfield, on October 3rd (E.G.).

396. Twite (28/29).—Ringed as nestling near Hebden Bridge 20/6/54 by J. C. Leedal; caught and released by Major-General Wainwright at Colchester, Essex, 19/3/55. Status unaltered.

397. Redpoll (23/25).—Normal in breeding season. On April 26th a flock numbered *c.* 100 in pines near Harrogate (E.C.D.). At Spurn, in spring, one on January 8th and two on May 21st. In autumn a few on several days, October to November. Occurred in small flocks in a few places in winter.

401. Bullfinch (32/33).—Occurred at Spurn, October 23rd (two). Often seen in the Skelton (York) area (C.W.F.H.). Although said to be on the decrease, I often detect it about bushy places in woods.

402. Scarlet Grosbeak (34).—A female caught at Spurn on September 16th, 1955, had a very stout bill and conspicuous whitish wing-bars; and was the first recorded for Yorkshire. Those involved were H. G. Brownlow, J. K. Fenton, Miss A. E. Leach and M. M. B. Philpot. For details see *British Birds* for January, 1956, and *The Naturalist* for January to March, 1956.

407. Chaffinch (40/41).—At Spurn, a few odd ones in winter, increased from April 8th to 12th, maximum 12 on the 11th, disappeared from May 15th to August 1st, and only single birds on a few days until September 29th. Numbers rose October 9th to 14th, and from the 23rd; maxima *c.* 60 October 10th, *c.* 50 October 23rd and November 13th. Inland status normal in summer and winter. One caught at Spurn 3/11/55 had been ringed at Sandy Mount, Dublin, on 5/3/52.

408. Brambling (42).—Ringed Spurn, 31/10/54; Wanfercee-Baulet (Hainhault) Belgium, 22/10/55. Last at Spurn on April 21st; and first of autumn five on September 28th. Good passage October 5th (*c.* 60) and 9th (*c.* 77); peak period October 23rd-24th (*c.* 200); and up to 100 October 25th to 29th. Inland flocks, usually with Chaffinches, were average. A flock of up to 200 at Knaresborough on December 18th decreased to *c.* 100 towards the month end; included was a male with white primaries (J.R.M.). Many flew south over Hornsea on December 20th, and north on the 23rd (M.K.T.).

409. Yellow Hammer (44).—More passage migration was noticed at Spurn than usual, *c.* 50 mostly passing birds on October 9th was remarkable; and *c.* 20 were recorded on November 4th and 6th. Inland status normal.

410. Corn-Bunting (43).—No more in evidence at Spurn than the usual pair or two of local breeders could account for until about 6.45 p.m. on September 26th when five parties totalling to 60 birds flushed between the ' Blue Bell ' and the ' Crown and Anchor ' and flew over fields to north (A.H.B.L., T.D.B.); after which numbers up to *c.* 30 were recorded until October 18th, afterwards numbers were small. I can find no evidence in the log that the local cocks were ever counted, or if any had more than one mate. Flocks of *c.* 30 to 40 are fairly common inland in autumn, and are possibly each the post-breeding population of a scattered colony.

415. Cirl Bunting (415).—At Beckwithshaw, the Rev. A. Moss states a pair bred and were watched gathering food in the vicarage garden. Mr. Moss knows the species in the west country (A.F.G.W.).

416. Ortolan Bunting (416).—A good description was taken of an Ortolan caught at Spurn on September 9th, from which the bird may have been a first-winter male.

421. Reed-Bunting (55).—Spring maximum at Spurn *c.* 25 on April 5th. Main autumnal passage October 1st to 18th with peak on the 9th (*c.* 100). One or two were present in January and December. At Bottomboat on December 11th a party numbered *c.* 20 and other smaller parties were there (G.C.).

422. Lapland Bunting (58).—A bird at Spurn on March 5th was possibly of this species (J.C.L.). Occurred in autumn on eight days from September 19th, when J. Cudworth flushed one at five yards range at the top of Beacon Lane. On October 3rd (J.C.) and again on the 4th (B. S. Milne) three birds flew south at the Narrow Neck during the early morning watch. Two were watched and heard at the Point on October 9th. The last were three on December 31st. Occurred at South Gare, one on October 23rd (P.J.S.).

423. Snow-Bunting (59).—Numerous at Spurn in January and February, maximum 220 on January 12th; last seen two on March 14th. A small flock fed in stubble by the Malton Road from York on February 20th (B. Dale). Flocks at South Gare and Coatham Sands varied in numbers up to *c.* 290 in January and February (P.J.S., A.B., C.J.H.). On January 8th *c.* 100 consorted on Filey Brigg (J.S.T.). Single birds were at Fly Flatts Reservoir on January 9th (D.G.R.) and on Ingleborough on March 19th—a fine male (E.C.S.); and one there October 23rd (D.G.R.). On March 17th only *c.* 35 were left near South Gare. From October 30th when ten appeared at South Gare, numbers increased on Coatham Sands until on December 11th they reached *c.* 100, with many more among the marram grass, on the stalks of which they perched eating the seeds (P. and D.R.S.). There was a small flock on the Westmorland side of the Wemmergill Moors on November 25th (P.Y.). Two were at Filey on October 16th (H.O.B.) and *c.* 150–200 on December 11th (T.M.C.); 26 at Atwick on October 30th, and *c.* 50 on November 13th (M.K.T., G.R.B.); and 16 at Barmston, December 4th (H.O.B.). At Spurn odd birds appeared from October 4th on a few days, increasing from the 29th, and then after November 13th apparently passing on, with more coming on November 25th; and the maximum was reached of *c.* 400 on December 27th, of which 56 were trapped to December 31st.

424. House-Sparrow (61).—Ringed Conisborough by A.E.P. 2/1/51; at Cudworth *ca.* 7/2/54 (ten miles N-W). A male ringed Roundhay, 5/11/51, retrapped 6/9/55 (R.V.J.). There were two albinos at Thorner (P.B.).

425. Tree-Sparrow (62).—Occurred at Spurn at intervals only from October 1st, with maxima of *c.* 25 on the 2nd, 9th and 24th. First seen Redcar, October 9th, at least four (P. and D.R.S.). In nesting boxes at Knaresborough S.F. 12 pairs nested, and two other pairs built domed nests in hawthorn. All were double-brooded, and three broods were reared in some cases (J.R.M.).

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BOOK REVIEWS

Living with Birds, by **Len Howard.** Pp. 256 with 33 photographs on 24 plates and 10 drawings. Collins. 15/-.

All those who were charmed by Miss Howard's previous book, *Birds as Individuals,* will welcome this most interesting volume in which she relates the life-histories of more of her bird companions. The reader is again introduced to the now familiar ' Bird Cottage ' with its ever open doors and windows, where bird visitors fly fearlessly in and out all day long and many roost at night. Just as a shepherd knows by sight every individual sheep in his flock, however similar they may appear to the ordinary observer, so Miss Howard knows each of her many birds and can recognise them immediately and follow closely their movements and behaviour both indoors and out. It is this unique power that enables her to study the individual wild bird, its actions and reactions, in a manner which very few indeed have hitherto succeeded in doing.

Once more one is impressed by the very wide differences in ' character ' and behaviour which distinguish from one another even birds of the same species living under the same conditions. The bird biographies related show that even in such normal activities as territory maintenance and mating there are no set patterns of conduct. Though there may be certain codes of behaviour which help to regulate the bird's actions, any generalisations about them are impossible, for these codes are kept only if they suit the circumstances and will of the individual bird. It may be argued that the conditions at ' Bird Cottage ' are unnatural and that a bird's response to them cannot be considered to be typical; but the conditions are freely accepted by the birds themselves and their relationship to the human tenant is quite different from that of a caged bird to its owner.

Among the many birds which showed extraordinary initiative and capability was a female Great Tit which, though not living in the ' Cottage ', entered it almost daily for food. This bird developed such an ' interest ' in repeating, by pecking on a wooden screen with its bill, the number of taps made by Miss Howard with a pencil on her table, that it would regularly fly to the top of the screen and wait there expectantly for the tapping to begin. Not only could it repeat unhesitatingly tapped numbers up to nine, but later it learnt to respond to vocal sound, so that a call for

any number from ' two ' to ' eight ', unaccompanied by tapping, was followed by the correct number of pecks. Even though this bird was absent for weeks together during each nesting season, it would return each autumn from its breeding territory to resume its practice in arithmetic just where it had left off, showing its wonderfully retentive memory for an action which was very far from being instinctive.

Though Great Tits are the chief characters in the book, the biographies of other visitors to ' Bird Cottage ' are related, among them being those of Blue Tits, Robins, Blackbirds and Nuthatches as well as of some of the summer migrants to the garden. All of them demonstrate very clearly the versatility displayed by individual birds.

In a chapter entitled ' Training and attracting Birds ' Miss Howard gives many valuable hints and some much-needed warnings which will be most helpful to those who would attempt to establish intimate relations with wild birds.

The excellent photographs very admirably illustrate the subjects dealt with and the plans of the cottage and its garden enable the reader to follow the movements of the birds both indoors and out. Unfortunately, perhaps by an oversight, the plates are not numbered, so that, when one is referred to in the text, the reader has to turn to the list of illustrations to discover where the plate may be found.

G.W.T.

Bird Life and The Painter, by **R. B. Talbot Kelly.** Pp. 160, with 51 plates (12 in colour). Studio Publications, London, 1955. 30/-.

Bird paintings fall into at least three main categories. There are the purely depictive which serve to illustrate works of reference and recognition and call for consummate craftsmanship but little artistry; there are the nostalgic, mainly for sportsmen, which recall incidents of the outdoor world to the gun-room and study, and finally there are the decorative and evocative pictures which are pure artistry and in which the birds are but components.

Most British bird painting belongs to the first two categories and is all too often divorced from artistry, from a sensitive comprehension of the essential nature of a bird and its relationships with its particular world. This is surprising, because the Chinese have for centuries been adept at expressing this nature and this relationship and the vogue for ' chinoiserie ' coincided almost exactly with the beginnings of bird portraiture in this country.

Talbot Kelly turns to the Chinese, as did his acknowledged preceptors, Crawhall, Alexander and Pirie. The true artist teaches us to see with a wider, sometimes a different, vision and in the text of this book Talbot Kelly endeavours, successfully I think, to explain first of all the synthesis of artistic perception through the ages and then the form of his own personal pilgrimage from depiction, which is necessary for acquaintance with the subject, through the narration of incident to the evocative painting of birds which selects and organises colour and form, light and movement, and distils from them an arrangement which is the quintessence of the bird and its world.

The illustrations are selected and annotated as much to explain the artist's mood and method as to display his virtuosity. They serve demonstratively in a work capably designed to enhance our enjoyment of the sight of birds and to help us to see them through the eyes of one who is that rare combination in the western world, an observant field naturalist and a sensitive artist.

A.H.

The Pocket Guide to Wild Flowers, by **David McClintock** and **R. S. R. Fitter.** Pp. xii + 340, with 112 plates, 64 in colour, 28 pages of line drawings, numerous text-figures and end-paper maps. Collins, 1956. 25/-.

The authors say that the purpose of this book is to enable anyone to name any flower, grass, sedge, tree or shrub that he or she is reasonably likely to see in the British Isles, no particular botanical knowledge being required. In the opinion of the reviewer, the present book offers a much greater hope of achieving this aim than any comparable popular pocket-sized flora yet issued, although one must expect occasional errors in genera such as *Salix* or *Carex*. The first step recommended is comparison of the unknown flower with the pictures (the plates being arranged according to flower colour), followed by reference to the text. The reader is warned that no plant should ever be named solely by reference to the plates. There are also general keys, in which characters such as spurred flowers, spotted stems, white juice, etc., can be used as clues, and there are helpful text-figures of features such as

the fruits of *Carex, Veronica,* Umbellifers, etc.; but there are no dichotomous keys as these would demand botanical knowledge. The illustrations are a most noteworthy feature of the book, since over 600 species are reproduced in colour and 700 more in black and white, and all but about fifty, were drawn from fresh material in a single summer by a team of seven artists. The colouring and clarity of the drawings are very satisfactory and the scale is indicated on each plate by a common daisy head. The text basically follows the order in Clapham, Tutin and Warburg's *Flora of the British Isles*; five or six lines are devoted to each species, giving English and Latin names, general characteristics, habitat, time of flowering, a page reference to the *Flora* and an indication of rarity by a nought-to-three star rating. For the serious student, the present work is no substitute for the *Flora*, but he may well desire to have this pocket guide as well for the sake of the plates, especially as about fifty species shown are not illustrated in the works of Fitch and Smith, Butcher and Strudwick, or Ross-Craig. This arises as the present authors have not hesitated to include a considerable number of escapes and aliens (e.g. *Galinsoga, Amaranthus, Carpobrotus,* three species of *Oxalis,* etc.). In addition to the 1306 species illustrated, the text also describes a further 400 and indicates points of difference from the closely-related species illustrated. As a result, allowing for some drastic ' lumping ' in genera such as *Alchemilla* and *Hieracium* (inevitable in a pocket guide), a very considerable proportion of the British flora is covered, and room is found to illustrate and describe some exciting rarities which the average reader (or many professional botanists for that matter) are unlikely to be lucky enough to see, such as *Epipogium, Cypripedium, Diapensia* (discovered since the *Flora* was published) or even the Pitcher plant, *Sarracenia,* which is naturalised in certain bogs in central Ireland.

An English name is given for every plant, and while all would wish to keep alive familiar names handed down as a part of our folklore and botanical heritage, the value might be questioned of seeking out obscure English names, or actually coining new ones for the sake of completeness; after all, quite awkward names as *Antirrhinum* and *Rhododendron* have been readily assimilated. (A suggested party game for botanists: identify Cambridge Parsley, Shaggy Soldier, Gingerbread Sedge, Perri-perri bur, Green Pigweed, etc.).

This book is well produced, is crammed with information and is excellent value for money. It is most warmly recommended to the beginner, in the belief that it will give him much pleasure, and success in its use should encourage his enthusiasm for field botany and maybe create a desire for more advanced knowledge and specialised books. This guide would be very valuable in school science libraries. It is anticipated that it will earn at least the same well-deserved success as the companion volumes on *British Birds* and *Nests and Eggs.*

B.A.K.

Species Studies in the British Flora, edited by **J. E. Lousley.** Pp. 190, + 2 half-tone plates and 24 text-figures. Obtainable from B.S.B.I., Dept. of Botany, British Museum (Natural History), Cromwell Road, London, S.W.7. 20/-.

This book consists of the collected papers given at a conference on 'The species concept in its relation to the British Flora', organised by the Botanical Society of the British Isles in April 1954. Though primarily devoted to vascular plants there are papers dealing with species problems in mycology, phycology and bryology and Dr. Hamshaw Thomas contributes a paper on the stability of some specific characters as shown by the fossil record. The other papers—about a score—deal with species problems in particular genera, including Callitriche, Erica, Salicornia, Euphrasia, Caltha, Stellaria, Arum, Asplenium and Dryopteris, or with the more general taxonomic problems relating to speciation.

A notable point about this symposium is that practically every contribution to it appears to have been made by academic or professional botanists. Discussion of the papers as reported in the book also seems to have been largely confined to the same section of the gathering. Whilst the general quality of the papers is not open to criticism, the suitability of some of them for presentation to a predominantly amateur gathering is; and the wisdom of allowing a society with a long history in the best traditions of amateur natural history to become so largely a forum for discussion and publication between professional botanists may be questioned.

W.A.S.

Pioneers in Gardening, by **Miles Hadfield.** Pp. 240, illustrated by the author. Routledge & Kegan Paul. 15/-.

If you have ever idly wondered about the men whose names have found a shadowy immortality in Tradescantia, Goodyera, or Forsythia, this book will satisfy your curiosity. The stories of the men who created our gardens are surprisingly dramatic and exciting. Few men have lived more adventurously or with such zest as Douglas, who introduced the Douglas Fir and Monterey Pine. He was even reduced to eating his botanical specimens to avoid starvation, but though, as he put it, 'greatly reduced' by this experience, his enthusiasm never abated. There is the fairy tale life of Paxton, a lad of humble farming stock, who became gardener, then friend, of the Duke of Devonshire, and later Sir Joseph Paxton, M.P., man of affairs, and designer of the Crystal Palace. The herbalists, the great landscape gardeners, who permanently transformed our countryside, the founders of Kew, the plant-hunters and plant-breeders, and the Victorian pioneers of gardening journalism—their stories are all here and make pleasant reading. Even those who shudder at the sight of a spade will find much to interest them in this untroubled by-way of social history.

C.S.

A Guide to Earth History, by **Richard Carrington.** Illustrated by Maurice Wilson. Pp. 256. Chatto and Windus. 21/-.

To compress the story of 3,000 million years into less than 300 pages is an ambitious task. Many of the questions that puzzle the layman about the history of the earth and the evolution of life have to be answered lest the story be regarded as nothing more than science fiction on the grandest scale. But it is not, for the author sets out to explain, as well as to describe, the facts and how they have been ascertained.

Part I begins with the place of the earth in the universe and the various theories of its origin, and then turns to its internal structure, the age and evolution of the surface rocks, and the evidence provided by fossils for the way life has developed. Part II traces the succession of life throughout geologic time. A remarkably clear picture is given of the biological and physical changes, the appearance and extinction of great groups of animals and plants, and the rhythmic geological cycle accompanied by associated climatic fluctuations by which so much of the direction of the line of evolution has been determined. Part III gives a brief outline of the origin and development of man as an animal, showing how evolution has moved from a predominately physical to a predominately mental plane, culminating in the co-operative experiment known as civilisation. The final chapter suggests how science, art and religion may occupy a place in the history of the earth and life.

The author leaves no stone unturned, and the book is tightly packed with information, including many fascinating stories of fossil discoveries (authentic and faked) by palaeontologists, both amateur and professional. Many plates and excellent line-drawings and maps accompany the text. Only one minor criticism must be made. The reconstruction of *Archaeopteryx*, 'the first bird', in Plate 10a, ought to have shown the characteristic teeth.

A.W.

Geology of the Country between Burton upon Trent, Rugeley and Uttoxeter. by **I. P. Stevenson** and **G. H. Mitchell.** *Mem. Geol. Surv.*, pp. 178. H.M.S.O., 1955. £1 1s.

The main interests in this area lie in a concealed northern extension of the South Staffordshire Coalfield where there is a considerable reserve of coal, the value of the Triassic rocks as sources of water and glacial deposits of both north-eastern and north-western derivation. A useful appendix gives the results of varied geophysical investigations in the area.

Bulletin of the Geological Survey of Great Britain, No. 9. H.M.S.O., 1955. 6/-.

Of the six papers in this Bulletin, two are of more particular northern interest. Messrs. Earp and Magraw demonstrate the importance as a marker band in the Lancashire Coalfield of Tonge's Marine Band which separates the Crutchman Sandstone from the Darwen Flags. Messrs. Poole and Whiteman describe how the

Collyhurst Sandstone round Manchester show variations in thickness related to the unevenness of the Pre-Permian floor.

H.C.V.

Some Aspects of Life in Fresh Water, by **E. J. Popham.** Pp. 123, with 37 text figures. Heinemann, London, 1955. 6/-.

This little book belongs to a ' Scholarship Series in Biology ' and is presumably intended for the more competent type of sixth-former. It is no ' cram ' book; the author is clearly intent on teaching the student how to study the subject, and his account is everywhere readable and interesting.

The physical properties of water as they concern living organisms are first dealt with, e.g. solution of gases and salts, pH determination, surface tension, current velocity, viscosity, and temperature considerations. Various types of aquatic habitats are then described and the plants which characterise them are considered. A most interesting chapter deals with the osmotic relationships of aquatic animals to salt and fresh water and the evolutionary problems to be overcome in transference from one habitat to the other. Considerable attention is paid to anatomy in relation to locomotion and to other features relating to wetting or resistance to wetting. The account of respiration in aquatic insects is up-to-date and lucid. The chapters on fresh water communities are obviously by an author who knows his subject well and they should certainly stimulate pupils with any enthusiasm for their subject.

The reviewer finds nothing to criticise adversely in this book. It has the material, the right approach, and is admirable in every way.

H.H.

Plants and Animals of the Seashore, by **W. J. Prud'homme Van Reine.** Pp. vi + 138 with 34 plates, 4 in colour. Murray, London, 1956. 8/6.

The author clearly has a wide knowledge of marine biology and has attempted to produce a handy and concise guide which will enable the reader to identify littoral animals and plants ' on the spot '. As such this book cannot be recommended. Many of the diagrams lack sufficient detail (see ' Worms ', p. 77) and the descriptions frequently make no mention of those very features by which a species can be identified (see *Corophium*, p. 90). Some groups such as the Nudibranch Mollusca and the littoral Tunicates are completely omitted. There are no keys and the author makes no mention of the existence of many other littoral species, which might be confused with those he has described and illustrated. The author would have been more successful if he had restricted himself to the identification in the field of marine animals as far as families. The bibliography could be improved by the addition of standard taxonomic works of a number of the phyla.

E.J.P.

Wild Life of Australia and New Guinea, by **Charles Barrett.** Pp. 229, with 35 photographs and 48 line illustrations. Heinemann, 1955. 21/-

Well known in Australia for his popular Sun Nature Books from which the colour frontispiece of Crimson Rosella parrots has been borrowed, Charles Barrett has produced a delightful natural-history volume which covers a vast field, including New Zealand. First-hand accounts and anecdotes concerning kangaroos and possums, bats, rodents and various animals of the sea provide the reader with a feast of information on many remarkable mammals, followed by chapters devoted to a vast range of birds and concluding with fascinating details about crocodiles, lizards, snakes, fishes, insects and spiders. An invaluable work for libraries, colleges, and schools, strongly recommended both to adults and young people thirsting for knowledge and authentic information on the wild life of Australasia which includes such unique animals as the Koala, platypus, emu, water-dragon and lung-fish.

J.A.

Wild Life of the World, edited by **Dr. Maurice Burton.** Pp. 380, with numerous photographic illustrations. Odhams Press Ltd. 13/6.

This volume deals with the creatures found in the upper limits of the animal kingdom and excludes insects and fishes. It is a collective work and the eleven writers are all experts in their respective fields. It is not an easy book to review as it covers a very wide field but the information it contains is reliable, well presented and profusely illustrated.

The authors, in addition to the Editor, are Lt.-Col. C. H. Stockley, Prof. S. Zuckerman, Dr. H. Bergmann, Dr. L. Harrison Matthews, R. W. Hayman, Capt. C. W. R. Knight, Dr. Bruce Campbell, T. H. Gillespie, C. S. Webb and Dr. Malcolm A. Smith—an impressive list.

It is remarkable that this excellent book can be produced at such a low price and all interested in the warm-blooded animals should find a place for it on their shelves.

E.W.T.

Forestry Commission Publications. H.M. Stationery Office. Leaflets 9d. each, Booklet 2/6.

Recent publications include leaflets dealing with *Pine Looper Moth* (Leaflet No. 32); *Badgers in Woodland* (Leaflet No. 34); *The Crossbill* (Leaflet No. 36); and *Rusts of British Forest Trees* (Booklet No. 4).

During the last two or three years the depradations of the Pine Looper Moth have increased to such an extent that it is now recognised to be one of the most dangerous threats to pine plantations in this country. The leaflet gives clear, accurate descriptions of the stages in the life cycle of the insect, so that it may easily be identified, and outlines its life cycle and relationship to the pine. A simple key is included which will enable the observer to differentiate the caterpillar from similar caterpillars commonly found on pine.

The well-illustrated leaflet on the badger has been written by Mr. E. G. Neal, author of the New Naturalist monograph 'The Badger'. A description of the animal and its habits is followed by a discussion of its effect on the work of the forester. The chief fault to be found with the badger is its habit of breaking through or digging under rabbit-proof fences where they cross established tracks. This can be prevented by the use of a heavy swinging trap-door at these points which will enable the badger to pass but not rabbits. On the other hand the badger does much good by destroying woodland pests such as young rabbits and voles and, on the whole, should be a tolerated and even welcome inhabitant of our woods.

Bruce Campbell's account of the Crossbill deals very usefully with the bird's yearly cycle and its periodic variations.

About a score of rust species, mostly affecting conifers both native and introduced, occur in Britain. Fortunately few are really serious pests in this country. This booklet by J. S. Murray, Assistant Forest Pathologist to the Commission, gives a short account of the symptoms, parts affected, and appearance and time of development of sori for each species. It is prefaced by an account of the life cycle of *Coleosporium senecionis* and includes twelve photographic illustrations showing the characteristic appearance of diseased shoots and leaves.

General Science Biology, by **Alan Dale.** Pp. 291, with 197 diagrams and 8 plates. William Heinemann Ltd., London, 1955. 10/6.

In *General Science Biology*, Alan Dale has written a book which can be read and enjoyed. Most of the facts necessary for the G.C.E. ordinary level in Biology are presented in such a friendly manner that the reader feels he is sharing the book with the author. As he suggests, 'the book is truly a study of living things and not merely a study of text-book examples.' Five consecutive chapters are devoted to the rabbit which is studied in great detail, with good clear drawings. Flowering plant structure and physiology are adequately covered, with the inclusion of a few original experiments. There are excellent chapters on Soil, Decay, Bacteria and Man, and Parasitism.

There are, in a few cases, variations between nomenclature in text and diagrams, and in common with many text-books there is the usual confusion between half-flower and longitudinal section, and zygote and zygospore. These, however, are minor defects which in no way detract from the general excellence of the book. I can see many Biology teachers changing over to it.

Tree Tops, by **Jim Corbett,** with an Introduction by Lord Hailey: illustrated by Raymond Sheppard. Pp. xiv+30. Oxford University Press. London. Cumberlege. 6/-.

Jim Corbett was an experienced naturalist with considerable talent for descriptive writing about wild life. In this slim and inexpensive but charmingly produced gift book he gives a graphic, first-hand account of the fateful day before her

accession when H.M. the Queen and the Duke of Edinburgh watched elephants, rhinos, baboons and many other wild animals from the famous hunting lodge perched high in a tree in the Kenya forest.

Outdoor Hazards, Real and Fancied, by **Mary V. Hood.** Pp. 242, with numerous text figures. New York and London: The Macmillan Company, London Branch, 10 South Audley Street, W.1. 1955. 27/6.

One sometimes feels envious of those whose way lies among a wider variety of animals and plants and it is reconciling to realise that at least we in this country are spared the perils and discomforts of rattlesnakes and poison ivy, lethal scorpions and spiders, Rocky Mountain fever from tick-bite, turalaemia from the fur of rabbits and kindred consequences of too intimate contact with our subjects. Mrs. Hood does not confine herself to suggesting ways of avoiding and mitigating these and many other dangers but also seeks to demolish the still more abundant imagined horrors which spring from unreliable folk-lore and urban ignorance. There is also much valuable advice on outdoor behaviour.

E.H.

The Boys' Country Book edited by **John Moore.** Collins, London, 1955. Pp. 352. 15/-.

This is a symposium of 39 articles by a number of authors, written by adults for children. They include a number devoted to outdoor activities and to natural history pursuits. Since each article averages less than nine pages, such subjects as Bird Watching, Watching Mammals, Reptiles and Amphibians, are so brief that they are compelled to be cursory. Some are correspondingly perfunctory, others seek to make the most of their limited space and offer a tantalising prospect. But, by and large, there is a condescension about the whole book and a failure to communicate that sense of zest, fun and adventure which should permeate the work.

A generous aunt who may consider the book a suitable Christmas present should be warned that the cost of the recommended minimum equipment for the variety of enterprises dealt with will far exceed the pockets of the most abundantly provided nephew, although ' Rifles are cheaper than shot-guns and you can get a reliable single-shot .22 for as little as £15.'

E.H.

Animals All, A selection of animal stories, edited by **Peter Skelton.** Pp. 210. The Harvill Press, London. 15/-.

These 16 stories about animals include classic tales by Jack London and Maeterlinck, but many of them are sentimental and few show any genuine understanding of the animal mind. To the naturalist they make poor reading compared with the work of a Lorenz or an Ernest Neal, who, through patient observation, have been able to unlock some of the secrets of the animal's world and whose work demonstrates that the truth can be stranger, more exciting and altogether more marvellous than fiction.

The Singing Forest, by **H. Mortimer Batten.** Blackwood, Edinburgh, 1955. Pp. 197. 12/6.

This is a story in the author's accustomed vein, with an animal as hero. ' Corrie ' is a red deer, brought up as an orphan by the children of the laird, liberated to become the Monarch of the Glen in a life packed with adventures. A Wise Woman, rapacious eagles, forest fires, floods, rogue stags, wild cats, poachers and a Hard Winter make up a hectic scenario in which ' Starpoint ' is the leading lady.

ERRATA

Line one, paragraph 6, page 22, should read:

On September 26th J. T. Jones brought to the City Museum, Leeds, two fully-fed

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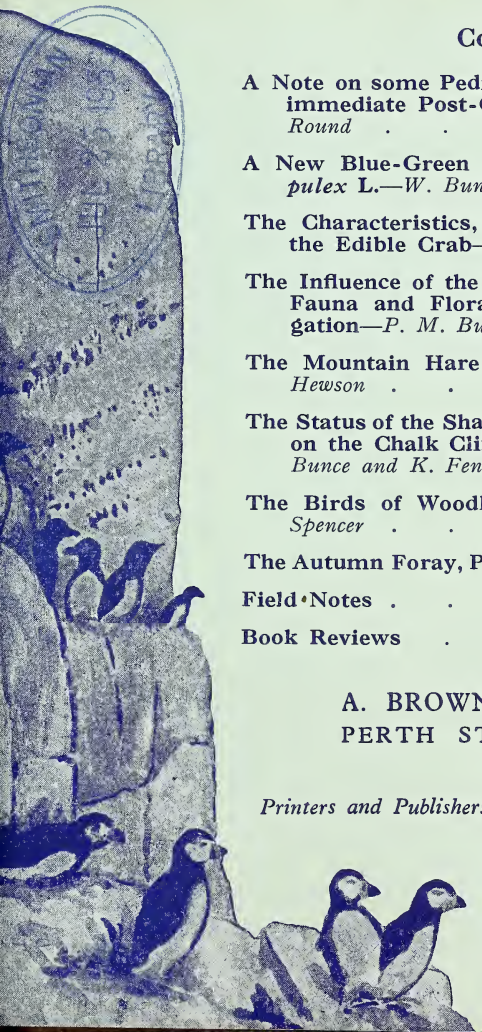

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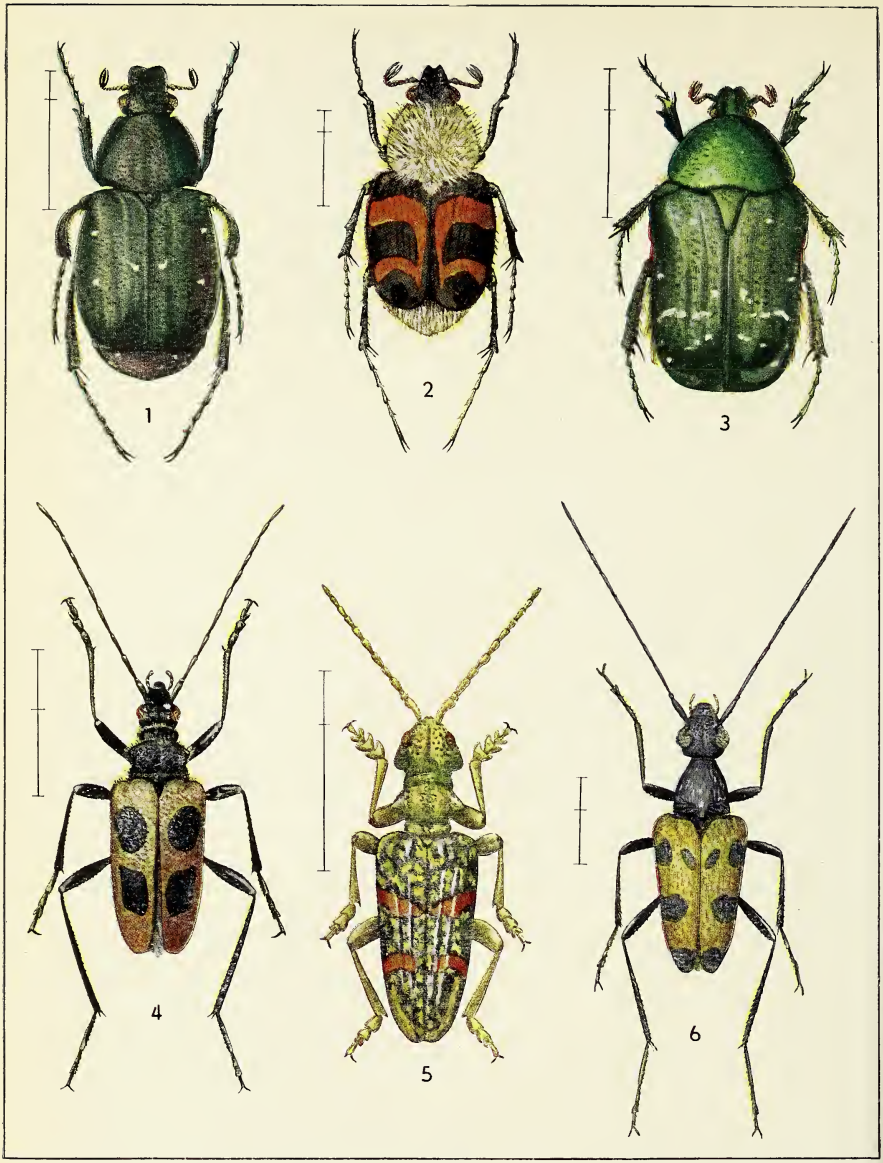


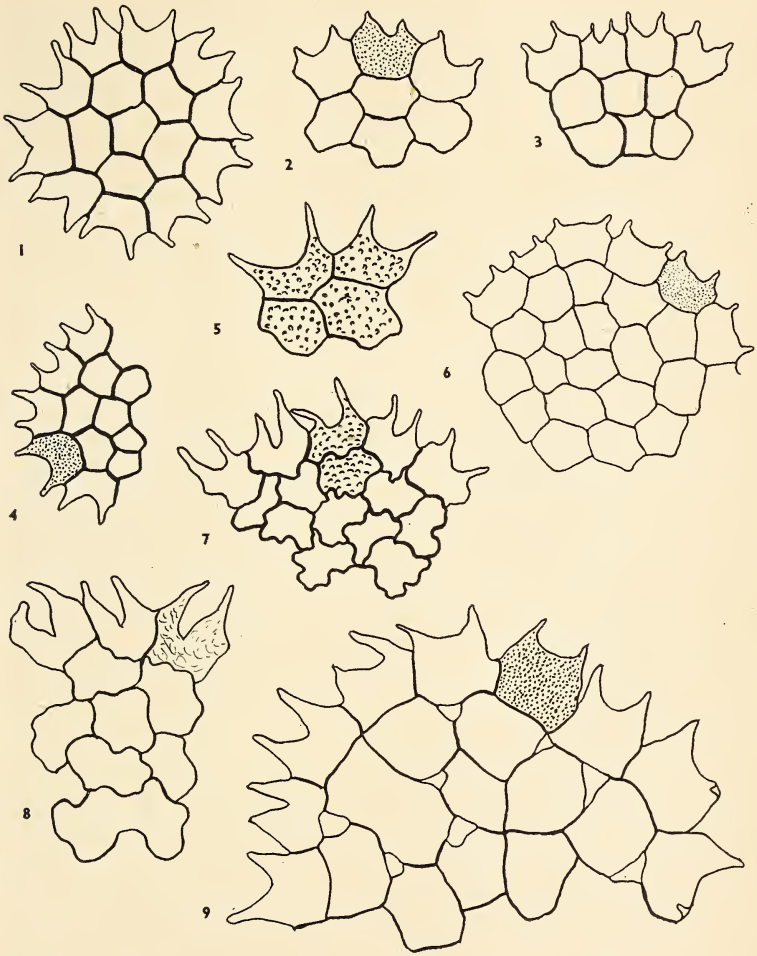
Colour Plate IV

1 *Gnorimus nobilis* L., p. 114; 2 *Trichius fasciatus* L. (Bee Beetle), p. 116; 3 *Cetonia aurata* L. (Rose Chafer), p. 112; 4 **Pachyta 4-maculata* L., p. 118; 5 *Rhagium sycophanta* Schr., p. 117; 6 *Judolia cerambyciformis* Schr., p. 118.

A NOTE ON SOME PEDIASTRUM SPECIES FOUND IN AN IMMEDIATE POST-GLACIAL PEAT DEPOSIT

F. E. ROUND
Botany Department, University of Birmingham[1]

On slides prepared for pollen analysis Dr. I. Strachan, of the Geology Department, University of Birmingham, observed coenobia of the alga Pediastrum (Meyen) and



kindly drew my attention to them. The samples were obtained from the base of a shallow peat deposit at Penkridge, Staffs., from an horizon which is assumed to be of early post-glacial age. The dominant pollen in the samples is birch and pine. Higher samples yielded few or no Pediastrum colonies. The slides were remarkable for the diversity of forms of this common alga and the complete absence of any other members of the Chlorophyceae. The peat was examined for remains of Diatoms but only an odd frustule of *Navicula radiosa* was found. The commonest species

[1] Now at Botany Department, University of Bristol.

present was *P. boryanum* (Turpin) Meneghini (Fig. 1) which was represented by several forms (Figs. 2-8). Bigeard (1933) comments on the frequent occurrence of this species in post-glacial deposits and also discusses its variability. Apart from the smooth wall, Fig. 1 represents the typical *P. boryanum* var. *boryanum* (*P. boryanum* var. *genuinum* Kirchner). The 16-celled coenobium is built up of 10 outer cells, 5 middle and one central cell. Bigeard (1933) mentions features such as punctation of the cell wall, shape of spines, clathration of the coenobium, number of cells in the colony, length of spines and depth of indentations which may be extremely variable within a single species and of no value in defining varieties. To these may be added thickness of intercellular walls, and crenulation of intercellular walls. Figs. 2 and 4 show specimens of a finely punctate form of *P. boryanum* var. *boryanum*. For ecological studies it may be advisable to retain some of the finer distinctions such as presence or absence of punctae, until more is known about the variability of the species, both in nature and in culture. The creation of distinct varieties after the fashion of some of the early workers (e.g. Lemmermann 1897 and Brunnthaler 1915) is perhaps unwise and at the most these minor variants might be termed ecological forms. Fig. 3 is again part of a larger colony, probably assignable to *P. boryanum* although, according to Brunnthaler (1915), this cannot belong to var. *boryanum* since he clearly states that this species consists of 15-celled colonies. Bigeard, however, allows much larger coenobia. It is possible that the description requires emendation on this point, but the present author is disinclined to make alterations with the present scanty material of post-glacial origin.

Fig. 5 illustrates another specimen which most probably must be assigned to *P. boryanum*, but here the presence of scrobiculations rather than punctae on the cell wall plus outer cells with widely divergent horns indicates a variety. It resembles *P. boryanum* var. *divergens* Lemmermann, and although showing slight variation from this variety is best placed here.

Fig. 6 is probably a 32-celled (14+11+6+1) coenobium again within the section *boryanum*, but with short horns arising some distance from the intercellular walls of the marginal cells and with flat unexcavated wall between the horns. The only variety recorded by Brunnthaler is var. *integriforme* Hansgirg. Figs. 7 and 8 illustrate specimens with longish horns and deep excavations between these. In addition they both have crenulate cell walls (8 especially so) and scrobiculations. The cell markings are clearly disposed in concentric rings in specimen Fig. 7 whilst in Fig. 8 the cells are indistinctly rugulose—this may be due to variation in weathering of the specimens in the sediment or actual variation in wall sculpturing. These specimens do not fall easily into any variety of *P. boryanum* except on the crenulate character of the cell walls, which suggest *P. boryanum* var. *undulatum* Wille. but in this variety the excavation between the horns is not so acute.

The complete exclusion of varieties of this common alga by Bigeard (1933) is, I think, too drastic since many of the forms observed in these samples (Figs. 1-8) are present in appreciable quantity and without intergradations. Since this deposit was undoubtedly formed over a considerable period of time one would expect to encounter such gradations if they existed.

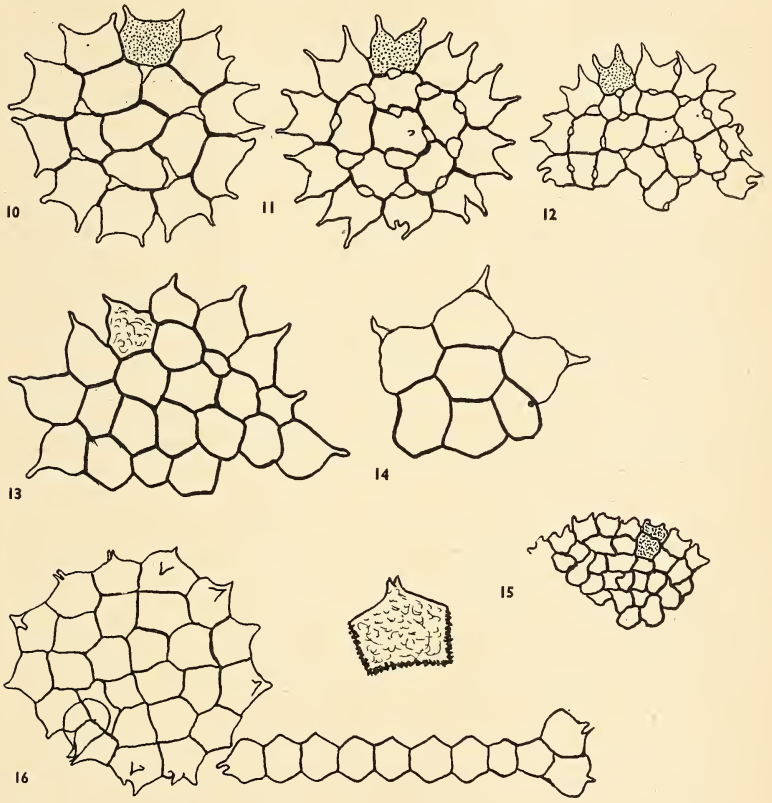
The presence of clathrate forms of Pediastrum in the section *boryanum* upsets the system of segregating these forms into separate species. However, the position of the intercellular spaces may be of importance, e.g. in the only clathrate var. of *P. boryanum* described in Brunnthaler (1915) var. *perforatum* Raciborski (suppressed by Bigeard 1933) the intercellular spaces occur at the angles between four cells, and not midway along the basal wall of the marginal cells as in *P. duplex* Meyen. Specimens Figs. 9 and 10 from Penkridge tend, however, to be intermediate between these two thallus types. In addition, specimen Fig. 10 has the arrangement of cells in the coenobium as in *P. boryanum* var. *boryanum* plus the type of marginal cell approaching that of specimen Fig. 6. This type of marginal cell is not found in the more typical *P. duplex* found in the Penkridge sediments (Figs. 11 and 12). This in all probability these (specimens Figs 9 and 10) are both clathrate forms of *Pediastrum boryanum*, although specimen Fig. 9 is larger than any other coenobium from this sediment which can be assigned to *P. boryanum*.

Specimens Figs. 11 and 12 are almost certainly forms of *P. duplex* Meyen although not the var. *genuinum* Al. Braun, as recorded in Brunnthaler (1915). They are rather uncommon in the deposit.

Specimens Figs. 13 and 14 are rare forms with a single spine on the marginal cell which, according to Bigeard (1933) must all be grouped as *P. simplex* Meyen. The

present specimens, however, do not resemble the illustrations of this species in Brunnthaler (1913) or Bigeard (1933) but are close to *P. sturmii* Reinsch (merged in *P. simplex* by Bigeard 1933). Bigeard (1933) mentions and figures (Fig. 66, p. 48) a var. *depauperata* Wille of *P. boryanum* which also resembles my specimens, Figs. 13 and 14, but which is considered by Bigeard to be a mere abnormality. These present forms are so unlike the majority of illustrations of *P. simplex* that it is possible that they may have to be considered as a variety.

Specimen Fig. 15 is a rare small rather crumpled form which may belong either to *P. muticum* Kützing or *P. angulosum* (Ehr.) Meneghini. Although it is not possible to estimate accurately the number of cells in the coenobium it is likely to be more than 64, which excludes the former species, unless the size limits can be greater than that given in Brunnthaler (1915). Within the species *P. angulosum* it is difficult



to place the present form although it appears to be closest to *P. angulosum* var. *rugosum* Raciborski. Only *P. angulosum* is recognised by Bigeard (1933).

The specimens illustrated by Fig. 16 are by far the most interesting found within this deposit and next to *P. boryanum* are the commonest forms in the deposit. The coenobia vary in size from 16 cells to over 60. The striking feature of these colonies is the small double horns which are often superimposed on one another or one bent back on to the marginal cell. In large coenobia the central cells are distinctly hexagonal as shown by the series across such a colony (Fig. 16). The cells themselves are marked as illustrated and the intercellular walls are thickened but with what appear to be frequent indistinct ' pits ' through the thickenings (Fig. 16). The number of cells, 26 (13+9+4) of the coenobium figured in Fig. 16 is an unusual

number for Pediastrum and not recorded by Bigeard (1933) for *P. kawraiskyi* Schmidle, which is the nearest Pediastrum to this form. *P. kawraiskyi* is as far as I know the only recorded species with superimposed horns, and hence I assign the present form to this species. It is possible that it is nearer the var. *brevicorne* of Lemmermann rather than the species which it certainly does not resemble. The var. *brevicorne* is considered to be a benthic or aged form by Bigeard (1933). The distribution pattern of this species is interesting for, according to Bigeard (1933), its main centres of distribution are in and around the Baltic and in Central Asia. Dr. Lund (personal communication) informs me that it also occurs in English ponds. Bigeard (1933) notes that this is the rarest of the Pediastrum spp. From his drawings, Figs. 127-133, p. 333, it would appear that my specimens, if assignable to this species, are very old coenobia since the length of the species are reduced with age. Bigeard considers that Lemmermann's var. *brevicorne* is merely based on the form of old colonies.

Bigeard (p. 74) illustrates ' coelastroide ' coenobia of *P. boryanum* i.e. coenobia which have formed into partial or complete spheres, and in the process have lost or reduced their appendages. His Fig. 108 of this type very much resembles my Fig. 16. However, with fossil material such as the Penkridge samples, it is impossible to decide on a final identification of this form.

The above illustrations and comments indicate something of the remarkable diversity of form within the genus Pediastrum and are worthy of record since they all originate in a restricted zone of a shallow peat sample. Such accumulations of Pediastrum have been recorded by other workers, notably Fjerdingstad (1955) in sediments from Denmark. It is interesting to note that he also found a large peak of Chlorococcalean growth in the immediate post-glacial period, including *P. kawraiskyi* which is tentatively identified from the Penkridge deposit. This suggests that the genus and the latter species in particular may be of help in dating lake and peat deposits. Pediastrum species are nowadays more common in eutrophic habitats and their confinement to the early post-glacial period in sediment is further indication of the eutrophic nature of these (Round—unpublished data).

Bigeard (1933) frequently figures and comments on the abnormal growth of Pediastrum in benthic habitats. The author, however, in six years sampling of such habitats has never found such abnormal forms as those figured by Bigeard.

I wish to thank Dr. I. Strachan for the loan of his preparations and samples and Dr. J. W. G. Lund for his valuable comments on the manuscript.

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Lemmermann, E. (1897). Beitrag zur Algenflora von Schlesien. *Abhand. d. Naturw. Ver. z. Bremen* XIV.

Figs. 1-16.—Forms of Pediastrum found in the Penkridge deposits. All magnifications ×350 except the single cell in Fig. 16 which is ×800.

A NEW BLUE-GREEN ALGA EPIZOOIC ON *DAPHNIA PULEX* L.

W. BUNTING[1] AND J. W. G. LUND[2]

Lyngbya thornensis n. sp. The unbranched filaments may be over one millimetre but are usually less than half as long; they are 1-2μ broad. The very thin colourless sheath becomes bluish in chlor-zinc-iodide. The filaments are so pale a blue-green that their colour is often scarcely detectable. They are commonly somewhat narrowed close to the base (fig. 1, B, E, I). They are attached to the antennae of *Daphnia pulex* L. by a cushion-shaped disc which is about twice as broad as the basal cell (fig. 1, B, E, I). The disc is almost invisible in unstained material and of a range of

[1] "Periplaneta," 8 Silver Street, Thorne, via Doncaster.
[2] Freshwater Biological Association, Far Sawrey, Ambleside.

dyes tested the best was 1% aqueous cotton red. The cells (1-2μ broad) are from half to three times as long as broad. The cross-walls are also difficult to see, especially in material in formalin. They are most prominent near the base of the trichome; near the apex the filaments may be constricted at the cross-walls (fig. 1, A, F, G, J, K)

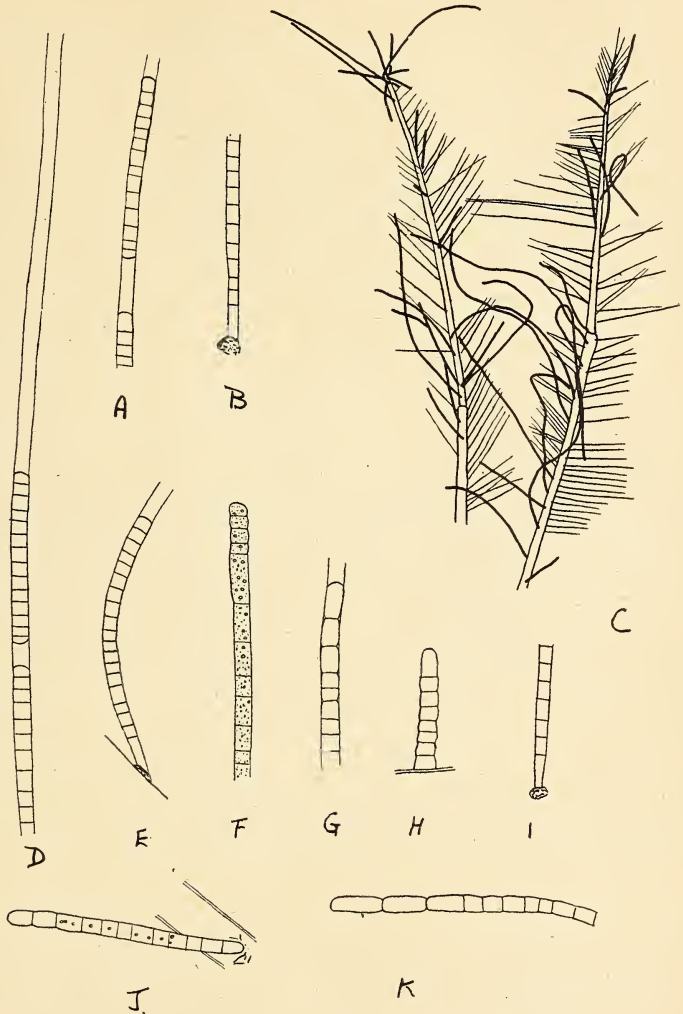

Figure 1. *C*, filaments on parts of the antennae of *Daphnia pulex*, in 4% formalin, the longer ones more twisted than in life. The rest, single filaments or parts thereof; *B*, *E*, *I*, in 1% aqueous cotton red to stain the basal disc; *A*, *F*, *G*, *J*, *K*, threads with the distal cells constricted and *D*, *E*, unconstricted, *H*, short filament with all the cells constricted *C* × 120, the rest × 1250.

and sometimes in short filaments, this is so throughout (fig. 1, H). The apical cell is rounded, of similar breadth to the rest, and has no thickened apex or calyptra. There are no regular rows of granules to either side of a cross-wall but scattered ones may be present elsewhere. Reproduction is presumably by hormogonia and the

constricted cells forming the apex of some trichomes may well form these hormogonia for some of the shortest threads observed consist wholly of such cells (fig. 1, H). Further, filaments whose sheaths project well beyond the apical cell commonly contain only unconstricted cells (fig. 1, D) and constricted ones have never been seen near the base of long filaments.

L. thornensis has only been found on *D. pulex* L. in nature and is restricted to the antennae[1] and even there is absent on the fine bristles lining them (fig. 1, C) and also, apparently, from the basal segments. The basal disc of the filaments is wider than the bristles of the antennae. Type material is partly in the possession of the first author and partly deposited in the British Museum of Natural History, London.

This alga was first observed on September 22nd, 1954, at Clay Pits, Thorne, near Doncaster (V.C. 63). It has only been found in one of these pits though there are several others as well as ponds in this area. Moreover, the pit in which it occurs is in direct contact with neighbouring ones and, in all, many other invertebrates as well as twigs and water plants have often been examined. It seems unlikely that it was present in any appreciable quantity before September, 1954, for the *D. pulex* there has been examined frequently for some eight years. When present in quantity this alga gives the antennae of *Daphnia* a shining appearance, and it was the remarkable sight of what appeared to be hosts of luminous wings dancing in the water which first drew the attention of the first author to it. *L. thornensis* is not present throughout the year, its 'season' extending from May till it disappears in mid-winter, apparently in relation to the first ice-cover.

When material of *D. pulex* bearing this alga was left in a tank to which were added many other invertebrates such as ostracods, copepodids, *Asellus*, *Gammarus* and beetle larvae, the only other hosts on which it ever appeared were *D. obtusus* (Kurz) and *Simonococephalus exspinosus* (Koch). When the exoskeleton is cast or the *Daphnia* dies, growth of *L. thornensis* ceases.

This species belongs to a group characterised by very narrow more or less widely spaced filaments attached to a substratum. It differs from all in the combination of the basal disc, the presence and absence of constrictions at the cross-wall of the cells in a single filament and in being an obligate epizooic form restricted in nature to the antennae of *D. pulex* L. An unnamed variety of *L. kutzingii* Schmidle described by Margalef (1953, p. 247, fig. 4j) is recorded on the crustaceans *Cyclops furcifer* and *Acanthocyclops bicuspidatus*. Here all the filaments are short (50-125μ l.) and there appears from his figure to be a colourless basal portion which doubtless functions as an attaching organ. This is, however, scarcely wider than the filaments which themselves have unconstricted cells which are only one-half to one-third as broad as long and are not narrower at the base than elsewhere in the trichome. *L. fontana* (Ktz) Hansg. appears to be quite distinct judging from Hansgirg's (1892, p. 86) description but Krieger (1933) figures it with a colourless attaching portion which is narrowed above the base. The species itself is not epizooic but often forms dense growths in streams, etc. Since the cells are 2·5-3·5μ broad and equally long or shorter and the trichomes are not constricted at the cross-walls it does not seem that the present alga is so nearly related to be merely a variety of it.

DIAGNOSIS

Fila antennae *Daphniae pulicis* insidentes; vaginis angustis hyalinis; trichomatibus 1-2μ crassis, apicem versus, non attenuatis, basem versus attenuatis, per discum $\pm$ hemisphaericum substrato affixo, ad genicula constrictis vel non constrictis; cellulis 0·5-5·5μ longis, contentu pallide aeruginoso, homogeneo aut granulis sparsis; cellula apicula superne rotundata sine calyptra vel membrana incrassata.

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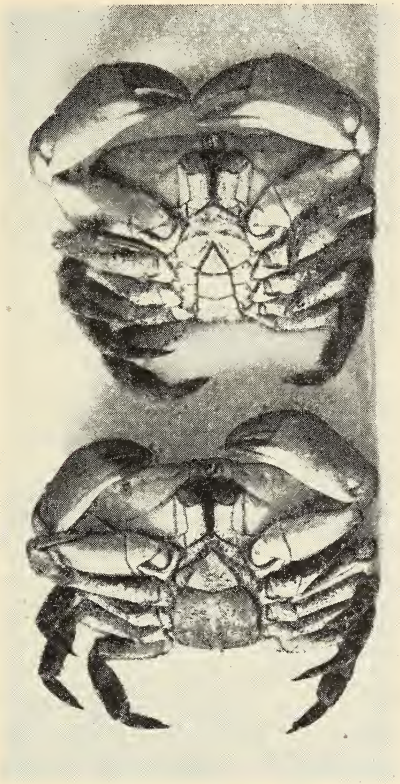
[1] *Amoebidium parasiticum* Cienk. which often accompanies it is present on all the appendages.

THE CHARACTERISTICS, HABITS AND LIFE HISTORY OF THE EDIBLE CRAB

ELLIOT B. DEWBERRY

THE edible crab, which is one of the most important and interesting members of the crustacean family, was well known and esteemed a delicacy by our ancestors. It was mentioned in the writings of the ancient philosophers, Aristotle, Ovid and



Male (above) **and Female Crab.**

Pliny and was doubtless the species referred to by the Romans under the name of ' Carabus '.

There are several species of crab but the European and American are the most valuable and economical. The European crab (*Cancer pagurus* Linn.) inhabits the coastal waters around the British Isles and the Western coasts of Europe to the Mediterranean as far as the Black Sea. In England the largest numbers are landed on the North East and East coasts, but crabs are also taken from the waters off the South coast, at Selsey, Wyke Regis, Brixham, Dartmouth, etc. Crab fishing in Scotland takes place in the waters off Berwickshire, East Lothian, Fifeshire, Aberdeenshire, Caithness, Ross-shire and Angus.

The Norwegian fisheries extend along the whole of the coastline as far north as Tromsoe. Large catches are made in the Bergen, Aalesund and Trondheim districts.

In America three species are landed commercially. These are the Pacific or Dungeness crab (*Cancer magister*), the Blue crab (*Collinectes sapidus*), caught off the

Atlantic coast, and the Deep Sea crab (*Paralithodes camtschatica*), taken in the Gulf of Alaska and the Bering Sea. The latter differs considerably from the other species, having a small body but very long legs. They have been caught measuring 6 feet from tip to tip of the legs, but the average size is about 3½ to 4 feet.

Characteristics and Habits

The adult European crab is a cautious, shy and cunning animal, with keen senses of smell, sight and touch. It lives in situations where the sea bed is sandy or rocky and the nooks and crannies afford hiding places to which it can retire when not seeking food. Its colour blends with that of the surroundings, making its presence difficult to detect.

The crab is extremely sensitive to noise and a gun fired nearby may cause it to shed some of its claws. The same effect is sometimes produced by thunder. It is mainly carnivorous, but at times has cannibalistic tendencies. The fighting of crabs is not confined to their enemies, but they fight amongst themselves, losing claws and legs in the fray. Being a night feeder and not very nimble in its movements its captures are achieved more by strategy and cunning than by activity. Hiding in the shadows of the rocks with the large claws extended it grips all comers; or buried in the sand with the exception of its eyes and tips of nipper claws, it lies in wait for wandering small fish, etc.

When travelling over the sea-bed, the crab walks on the tips of its slender legs or moves with a characteristic sidelong gait, the nipper claws being extended or folded close under the shell. As each leg terminates in a spike it can climb amongst the rocks. If frightened, it moves backwards presenting the powerful nippers, its only means of defence.

The general colour of the European crab is reddish-brown on top to yellowish-white underneath, the legs are dark red and the nippers of the large claws black. The body of the crab is in two parts, the cephalothorax and the abdomen; the covering to the former is termed the carapace. The body and limbs are encased in a strong shell-like armour (chitin) which consists of three layers pierced by delicate microscopic channels and possessing all the necessary conditions of a true skin. The armour, which is hardened by the deposition of salts of lime, is thin and soft at the joints, allowing free movement of the parts. The helmet-shaped granulated shell protects and gives support to the internal organs and affords points of attachment for the muscles. A membranous lining covers the viscera, including the large liver, known in the trade as ' the cream of crab '. Attached to the body are the four pairs of angular-shaped walking legs, on which grow numerous stiff red hairs. The legs are used for digging and swimming. In front of these are the large powerful pair of nipper claws (chelae), one larger than the other and armed with rows of spines. The crab has the interesting power to cast voluntarily its limbs (autotomy) and should one of these become injured or seized during a fight, by spasmodic contraction of the muscles separation takes place at a constricted portion of the joint, termed the ' fracture plane '. At this point the blood vessels are small and excessive bleeding is unlikely. After a time a new limb commences to grow and further growth takes place at each moult, until finally a new limb is formed. Occasionally, however, malformation occurs.

Hairs which are connected with the nervous system are prevalent on various parts of the body. The eyes are set on moveable stalks and can be turned in any direction or withdrawn into the sockets.

The crab is furnished with short antennae in the forehead and small antennules or feelers situated near the angle of each eye. These are connected with the senses of taste and smell and doubtless enables it to guide itself. Breathing is accomplished by means of gill chambers situated beneath the shell.

The crab can live for a considerable time out of water provided the gills are kept moist. Exposure on a hot day or to a drying wind, however, soon causes death.

The crab's blood is bluish in colour and is pumped by the heart through the arteries to all parts of the body, and returns through a system of sinuses to the paired set of gills. In the latter the blood gives up waste carbon dioxide, exchanging it for the oxygen in the sea water, which is drawn through each gill chamber by a paddle-shaped organ termed the scaphognathite.

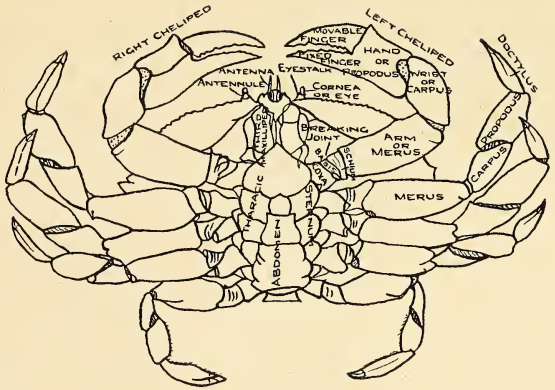


DIAGRAM OF MALE CRAB, SHOWING UNDERSIDE.

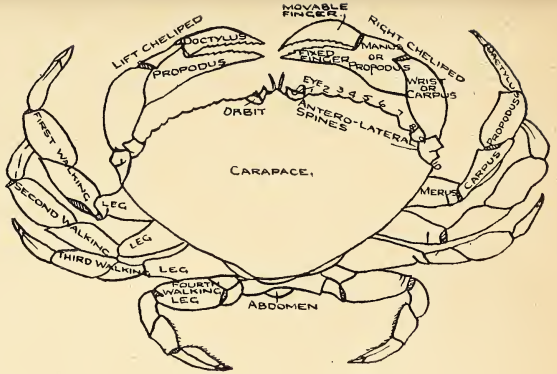


DIAGRAM OF MALE CRAB, SHOWING UPPER SURFACE.

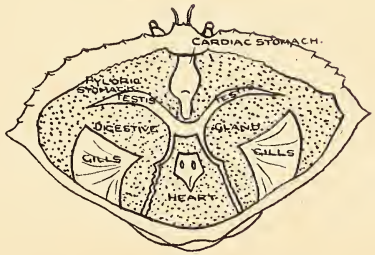


DIAGRAM OF MALE CRAB SHOWING SOME OF THE ORGANS WHEN CARAPACE IS REMOVED. IN THE FEMALE, THE LARGE OVARIES ARE LOCATED IN APPROXIMATELY THE POSITION OCCUPIED BY THE TESTES.

Food Requirements

The adult crab appears to prefer fresh to stale food, such as small fish, marine worms, mussels, cockles, oysters and other shell-fish, crushing them with its pincer-like claws. The food is torn in pieces, passed to the mouth openings and there ground up by a pair of mandibles or jaws, and then to the stomach where it is further broken up by bony tooth-like structures, afterwards becoming mixed with the digestive juices. The crab's keen sense of smell and voracious habits probably account for it being so easily caught in baited traps.

Sexes

The sex of crabs can be easily distinguished. The male, or cock, has large claws in proportion to the body. The apron or flap on the underside is narrow, hairless and lies close to the body. The female, or hen, has a broad bee-hive shaped corrugated apron fringed with hair. The shell is more convex than that of the male, which is nearly flat. The abdomen of the hen is two-thirds as wide as it is long, while that of the cock is twice as long as it is broad.

Moulting

The hard rigid shell does not increase in size, consequently it becomes necessary for the crab to shed its shell periodically, a new soft one forming underneath. Crabs 3 to 4 inches in size moult (ecdysis) about once a year, smaller ones more frequently. Very large crabs do not always moult yearly as two-year-old oysters have been found attached to their backs.

Moulting takes place during the months of June, July or August and is under the chemical control of two small glands situated at the base of the eye stalks. As the time approaches, the crab becomes uneasy and seeks shelter. The shell loses its bright colour and opens up on each side at a seam-like articulation. The latter is plainly visible in the full-grown crab. The shell acts like a lid, the soft membrane between the shell and abdomen splits and it is through this opening that the crustacean gradually extricates itself. The process is so complete that every limb is drawn out of its hard sheath, also the delicate feelers and gills and even the cuticular lining of the stomach is cast off. After moulting, the crab appears as a purple-coloured mass, later changing to brick red, with the under surface white. The flesh is soft and flabby and rapidly increases in size, due to absorption of water, and the crab is inactive and hides itself in the sand. It looks considerably larger than the old shell, which appears perfect and unbroken like a dull live crab.

At this soft stage it is feeble and defenceless and liable to be attacked by numerous enemies, which include the conger eel, cod, dogfish, halibut, skate, rays and nurse hound sharks. The sea bream and wrasse feed on the remains of the slaughter. Its greatest enemy, however, before and after moulting, is the octopus. The newly-formed shell gradually hardens by the deposition of lime salts, but it is some months before it is really hard. When moulting is recent it is known as a ' soft ', ' white footed ', ' caster ' or ' glass ' crab. Research has shown that the lime salts in the body are absorbed in the blood stream and deposited in a pair of sacs termed the ' gastroliths ' which are situated in the stomach walls. After moulting this reserve of lime is used for hardening the shell.

Length of Life

A crab may live as long as nine years and at maturity is usually about $4\frac{1}{2}$ inches across the broadest part of the shell. When it is too old to moult or breed it is termed a ' collie ' by fishermen and regarded as useless.

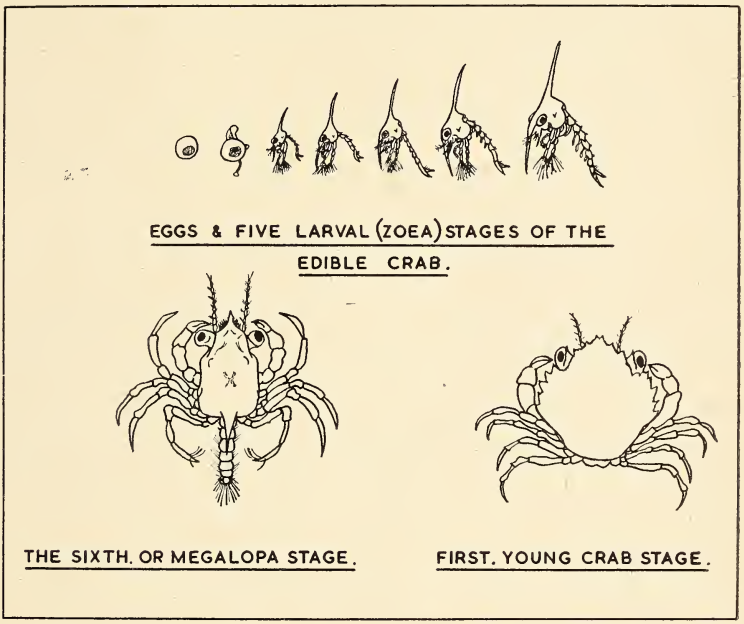
Migratory Habits

The migratory movements of crabs are characteristic of both sexes, hard or soft shelled, and may be grouped into a general off-shore trend in the autumn and an in-shore movement in the spring. This is governed to a certain extent by abundance of food and the temperature of the water. From December to February they usually occupy the off-shore waters and it is there the females spawn. The movement in-shore, where the eggs hatch, begins in February and is completed in May. A crab 1 inch across the back passes into the beach group; when 2 inches it leaves the beach for the littoral waters beyond low-tide mark. When 4 inches it joins th meature group and takes part in the seasonal migration

Breeding Habits

Sexual maturity usually occurs when the hen crab is about $3\frac{1}{2}$ to 4 inches in width, i.e. the fourth or fifth year of her life, and as far as is known she only mates once. The cock crab is polygamous and will breed with several hens. Mating takes place as a rule on the tidal flats and occurs only between a soft-shelled female and a hard-shelled male. Mating crabs become almost completely buried in the mud and sand or covered with seaweed. During that time enough spermatozoa from the male are deposited in the sperm sacs of the female to fertilize all the eggs that are laid. Unlike most animals the spermatozoa remain active for many months before fertilizing the eggs.

The eggs develop within the ovaries where they undergo changes in size and colour, viz.: white to pink and salmon to reddish-orange. Previous to spawning



these are carried in or immediately under the shell for about eight or nine months and afterwards are extruded and fertilized.

On the underside of the apron of the hen crab is a series of moveable finger-like processes termed the ' swimmerets ' which are trimmed on each side with a delicate hair-like substance. It is to the inner branches that the eggs are attached; they are constantly washed by the sea-water and undergo development. A hen crab carries about eight bunches of eggs (the coral) and the number may be anything up to 2,000,000 according to her size, and is termed a ' berried hen ' or ' hen in berry '. She eats little and is sometimes partially buried in the sand.

Spawning

The eggs hatch during the summer months in the in-shore waters, which provide warmth and food for the larvae. The newly-spawned globular egg, which is about 0·32 mm. to 0·40 mm. in size, is at first orange in colour, later changing to turkey-red and when ready to hatch turns greyish-black. The eyes of the embryo can be easily seen. Hatching lasts several hours and is assisted by the crab moving its abdomen backwards and forwards, the hind legs helping to detach the larvae. The latter when first escaping from the eggs are termed protozoea, a stage of short duration. Attracted by the light they swim rather ineffectively by active contortions (somewhat like mosquito larvae) towards the surface of the water, helped

by the antennae and feathered spines on the posterior parts of their abdomens. The protozoea soon moults into the zoea which is very active and presents a curious shrimp-like appearance. It is orange to reddish in colour and has large staring black eyes marked with yellow and orange. The body is hemispherical, a long beak projects from the lower surface of the head and the back is prolonged upwards into a horn-like prominence with a segmented tail. The feet are scarcely visible except the last two, which are feathery and used in swimming. The zoea swims by rowing movements, often in a peculiar inverted position, with the head down and the dorsal spine forward. It feeds on microscopic plants and minute forms of marine animals.

There are five zoeal stages lasting over some months, each successive moult showing new developments. During the period it is exposed to many dangers. Its conspicuous colour and fairly large size makes it an easy prey for a host of enemies, such as the herring, pilchard, mackerel, salmon and codfish. The final zoeal stage is followed by the ' megalopa ' which is much larger and has an average width of about $\frac{3}{32}$ inch and a length of $\frac{1}{4}$ inch. It has a different shape and resembles the young lobster rather than the crab. Pigmentation is more pronounced, the eyes are pedunculated, the dorsal spine is smaller and the tail is flat. At this stage of development respiration is carried out by the anus, but in later stages by gills. There is a full complement of legs and claws and it still retains its swimming abilities. The megalopa is a fearless, voracious little animal with cannibalistic habits; it preys upon small crustaceans, devours crabs' eggs and dying or dead planktonic life. Later, it loses its swimming abilities, moults and sinks to the sea-bed as the young crab. The megalopa gradually assumes the appearance and habits of the adult and continues throughout its life to pass through one moult to another, growing approximately $1\frac{1}{2}$ inches in width each year.

The small crab seeks the protection of stones and small rocks or burrows under the sand and mud to hide from the attacks of enemies. It will feign death when in difficulties and continues in this state for some little time; in fact it either fights or mimics the departed.

The nutritive value and chemical composition of the European crab:

	Nutritive Value per 100 grm. (edible portion)	Nutritive Value per oz. (edible portion)
Energy value, *Calories*	116·00	33·00
Protein, *grms.*	20·00	5·70
Fats, *grms.*	4·00	1·10
Calcium, *mgm.*	45·00	13·00
Iron, *mgm.*	1·00	0·30
Vitamin 'B', *mgm.*	0·14	0·04
Riboflavin, *mgm.*	0·06	0·02
Nicotinic Acid, *mgm.*	2·70	0·76

The indication of a good and fresh condition in the crab is a bright hard clean shell with the flesh plump and firm and heavy in the hand according to size. The joints are rigid and the large claws tucked away beneath the body. When shaken no sound or movement of liquid should be heard. The meat of the cock crab is considered more delicate in flavour and in greater quantity than in the hen, especially the large claws. Boiled crabs do not keep in good condition many days, especially in warm weather. This is shown by the discolouration of the apron or tail, from which an objectionable smell issues. The claws are sticky and wet. A faded appearance of the crab is indicative of staleness.

Cry of the Heart, by **Mary Patchett.** Pp. 256. Collins, London, 1956, 12/6.

This is the story of a lonely child, growing up in the harsh Australian outback, with a neurotic stepmother to add to the natural miseries provided by drought, mouse plague, and bush fire. It is also the story of a cat, gone wild, and of her many fearsome battles with members of the native fauna. The link between the two stories is tenuous and the result is a rather disjointed novel of no great merit.

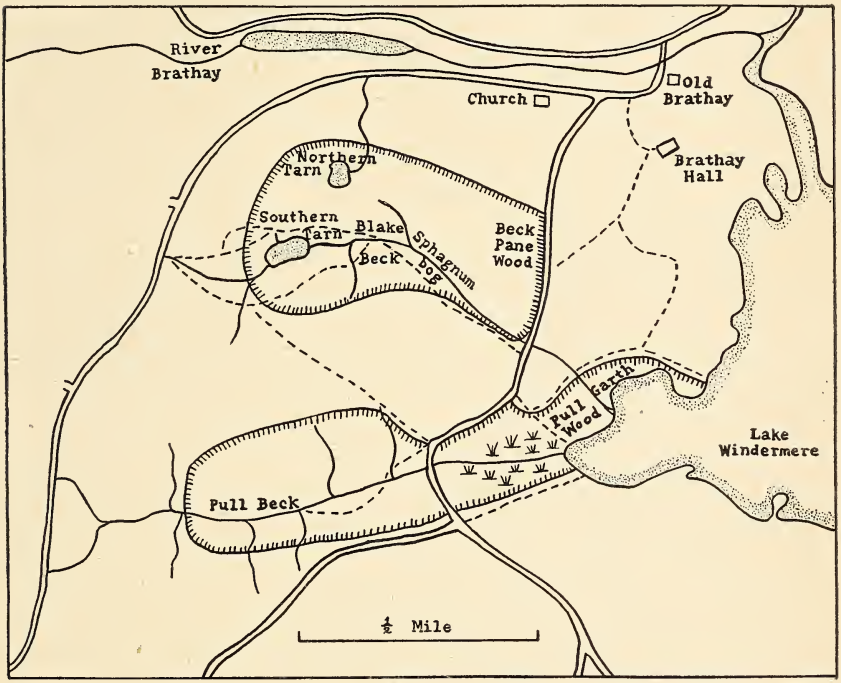
C.S.

THE INFLUENCE OF THE CONISTON LIMESTONE ON THE FAUNA AND FLORA. A PRELIMINARY INVESTIGATION

(Report of the Whitsuntide Excursion of the North-Western Naturalists' Union, 1955)

P. M. BUTLER, M.A., PH.D.

THAT the lime content of the underlying rocks influences the flora and fauna of a district is an idea long familiar to naturalists. Most of the studies of this phenomenon have been made on the Carboniferous Limestone and the Chalk, which are the two most important limestone formations of Britain. There are, however, other formations containing lime, among them the Coniston Limestone Series of Ordovician



age, which stretches as a band running east and west across the Lake District. When the North-Western Naturalists' Union visited Brathay Hall on May 27th-30th, 1955, it was decided to investigate what effect the Coniston Limestone might have on the fauna and flora.

The district studied is situated on the north-western shore of Lake Windermere (Lancashire, V.C. 60). Flowing into the lake at Pull Wyke Bay are two streams, Pull Beck and Blake Beck, which runs over different rock formations: Pull Beck follows the exposure of the Coniston Limestone, while the more northerly Blake Beck runs over rocks of the Borrowdale Volcanic Series, except near its mouth, where it traverses the limestone. Two areas were therefore chosen, one comprising the Pull Beck valley, and the other including that part of the Blake Beck valley which is situated on the Volcanic Series.

Samples of rocks collected were studied lithologically by Dr. G. D. Nicholls. The rocks of the Borrowdale Volcanic Series are mainly grey or greenish andesites, formed of compacted volcanic ash, with occasional exposures of pink rhyolite. Their calcite content is on the whole low, but in some bands it is appreciable. Passing southwards into the Pull Beck valley the calcite content increases, but the Coniston Limestone Series does not consist entirely of limestone: bands of limestone are

exposed on the northern shore of Pull Wyke Bay, but much of the series is made up of volcanic ash, not very different from the Borrowdale Volcanic Series. In broad terms it may be said that the calcium content of the rocks increases from north to south, but it reaches a high level only locally. The differences between the two areas are therefore not as striking as might have been expected. Differences do exist, however; for example, the most definitely calcicole plants are found mainly near Pull Wyke Bay, while the most calcifuge plants occur in the Blake Beck valley on the Volcanic Series.

Perhaps owing to its poverty in lime, part of the Blake Beck valley forms a *Sphagnum* bog where acid conditions prevail. In the Pull Beck area there are some patches of grassland, and towards Pull Wyke Bay there is an open, swampy area. Otherwise the greater part of the areas studied is wooded. The largest trees are mainly oaks, but extensive felling must have taken place in the past, because the majority of oaks were judged to be only about 50 years old. Birches predominate throughout the area. Below the oaks and birches there is a growth of smaller specimens of these species, together with much hazel. In the wetter parts of the valleys there are mainly birches and alders. Two tarns occur in the Blake Beck area, one (here called the southern tarn) on the course of Blake Beck, and the other (the 'northern tarn') with a northerly outflow to the River Brathay. The upper Blake Beck valley, including the two tarns, forms the grounds of a house (Beckmire Rigg), now demolished, and a few ornamental trees and other plants have been introduced in the vicinity. The woods are at present managed by a timber company, and some felling is in progress.

Pull Beck is a small, shallow, clear stream with a bed of small stones and a few boulders. For much of its course it is shaded by woodland, but for about half a mile it runs through open fields where it is canalised. Nearer the lake it passes through a marshy area where it contains more detritus and aquatic vegetation. The water of Blake Beck is distinctly acidic, owing to drainage from the large patches of *Sphagnum* bog along its course. Its bottom is also stony, but there is more detritus, especially in the boggy area. Probably owing to its greater acidity, Blake Beck contains fewer species of aquatic animals than Pull Beck.

Flowering Plants

One hundred and sixty-five species of flowering plants were recorded from the area, but space does not permit the mention of more than a selection of these.

The commonest trees are oak, birch, hazel and alder as already mentioned. With these are associated several species of trees and shrubs, including the following:

Juniper (*Juniperus communis* L.), common on the high ground between the two valleys, a few elsewhere; Rowan (*Sorbus aucuparia* L.), guelder rose (*Viburnum opulus* L.) and holly (*Ilex aquifolium* L.), a few generally; Bird Cherry (*Prunus padus* L.), frequent in Pull Beck valley, one (perhaps planted) in Blake Beck valley; *Rhododendron ponticum* L., a calcifuge, has been planted in some of the woods, mainly in Blake Beck valley, and has become naturalised.

The ground flora naturally consists mostly of shade-loving plants. Of these, the commonest species throughout the area were:

Wood anemone (*Anemone nemorosa* L.), Lesser celandine (*Ranunculus ficaria* L.); Bittercress (*Cardamine flexuosa* With.); Red campion (*Melandrium rubrum* (Weig.) Garcke); Stitchwort (*Stellaria holostea* L.); Wood sorrel (*Oxalis acetosella* L.); Honeysuckle (*Lonicera periclymenum* L.); Dog's mercury (*Mercurialis perennis* L.); Wood loosestrife (*Lysimachia nemorum* L.); Bluebell (*Endymion non-scriptus* (L.) Garcke).

In addition to these species the following may be mentioned, as occurring only or mainly in Pull Beck valley:

Garlic mustard (*Alliaria petiolata* (Bieb.) Cavara & Grande), requiring a base-rich soil; Wood avens (*Geum urbanum* L.); Wood sanicle (*Sanicula europaea* L.), preferring base-rich soil; Moschatel (*Adoxa moschatellina* L.), a calciphile; Primrose (*Primula vulgaris* Huds.), common in Pull Beck valley; Purple orchis (*Orchis mascula* L.), preferring base-rich soil; Twayblade (*Listera ovata* (L.) R.Br.), in Pull Garth Wood; Garlic (*Allium ursinum* L.), common in Pull Beck valley; Lily of the valley (*Convallaria majalis* L.), in Pull Garth Wood; Herb Paris (*Paris quadrifolia* L.), in Pull Garth Wood. The last two species are calciphiles.

Associated with these characteristically woodland plants are a number of species which also occur commonly in more exposed situations, in grassland or by roadsides. The most widely distributed of these are:

Creeping buttercup (*Ranunculus repens* L.), on disturbed ground; Dog violet (*Viola canina* L.); Wild strawberry (*Fragaria vesca* L.), preferring base-rich soils; Lady's mantle (*Alchemilla vulgaris* agg.), common in the *Sphagnum* bog area of Blake Beck valley; Marsh thistle (*Cirsium palustre* (L.) Scop.), in damp places; Nettle (*Urtica dioica* L.).

The distribution of the following species is of interest:

Salad burnet (*Poterium sanguisorba* L.), a calciphile, was found occasionally in Pull Beck valley only; *Angelica sylvestris* L. occurred on marshy ground in both valleys, and was common in the *Sphagnum* bog; Cross-leaved heath (*Erica tetralix* L.) and bilberry (*Vaccinium myrtillus* L.), both calcifuge, were confined to Blake Beck valley; Foxglove (*Digitalis purpurea* L.), a calcifuge, occurred in the flood-plain of Pull Beck and also in Blake Beck area; Wood sage (*Teucrium scorodonia* L.) was common in Pull Garth and Beck Pane Woods; Bugle (*Ajuga reptans* L.) was much more common in Pull Beck valley than in Blake Beck valley; Black bryony (*Tamus communis* L.) was seen only at the edge of Pull Garth wood.

The following species, common in grassland in Pull Beck valley, were also found in the more limited open areas of the Blake Beck valley:

Milkwort (*Polygala vulgaris* L.), in drier situations; Mouse-ear chickweed (*Cerastium arvense* L.); Tormentil (*Potentilla erecta* (L.) Räusch); Earthnut (*Conopodium majus* (Gouan) Lor. & Barr.); Ground Ivy (*Glechoma hederacea* L.); Ribwort plantain (*Plantago lanceolata* L.); Sorrel (*Rumex acetosa* L.); Field woodrush (*Luzula campestris* (L.) DC.); Heath bedstraw (*Galium saxatile* L.); Sweet vernal grass (*Anthoxanthum odoratum* L.).

Other open ground species were found mainly or entirely in Pull Beck valley:

Silverweed (*Potentilla anserina* L.), common; Thyme (*Thymus sepyllum* agg.); Mountain poppy (*Meconopsis cambrica* (L.) Vig.), on stone walls, perhaps introduced; Columbine (*Aquilegia vulgaris* L.), one plant, calcicole.

A number of species were found only in Blake Beck valley, on rocks and stone walls:

Thale cress (*Arabidopsis thaliana* (L.) Heynh.), calcifuge; Dove's-foot cranesbill (*Geranium molle* L.); Cut-leaved cranesbill (*G. dissectum* L.); Stonecrop (*Sedum acre* L.), prefers basic soils; Three-leaved saxifrage (*Saxifraga tridactylites* L.), prefers basic soils; Field madder (*Sherardia arvensis* L.); Wall lettuce (*Lactuca muralis* (L.) Rchb.).

Many species of aquatic and marsh plants occurred in and near the streams and tarns, including:

Water crowfoot (*Ranunculus fluitans* Lam.), forms large masses in rapid parts of Pull Beck, near the lake; Lesser spearwort (*R. flammula* L.); Marsh marigold (*Caltha palustris* L.), common; Water-lily (*Nuphar luteum* (L.) Sm.), in the tarns; Water-cress (*Nasturtium officinale* R.Br), in Pull Beck; Meadow-sweet (*Filipendula ulmaria* (L.) Maxim.), common; Marsh cinquefoil (*Potentilla palustris* (L.) Scop.), near Pull Beck; Water milfoil (*Myriophyllum alternifolium* DC.), in Pull Beck, prefers peaty water; Marsh valerian (*Valeriana dioica* L.); Hemp agrimony (*Eupatorium cannabinum* L.); Bog-bean (*Menyanthes trifoliata* L.); Brooklime (*Veronica beccabunga* L.); Water mint (*Mentha aquatica* L.); Shoreweed (*Littorella lacustris* L.); Sweet gale (*Myrica gale* L.), near the northern tarn; Water plantain (*Alisma plantago-aquatica* L.), in slow and stationary water; Pondweed (*Potamogeton natans* L.), in slow and stationary water; Bulbous rush (*Juncus bulbous* L.), curiously tufted, non-flowering form; Reed grass (*Phalaris arundinacea* L.); Bladder sedge (*Carex vesicaria* L.).

Cryptogams

Of 20 species of Pteridophyta, the commonest are:
Bracken (*Pteridium aquilinum* (L.) Kuhn), in woods and by roadsides; Hard fern (*Blechnum spicant* (L.) Roth.), commonest in *Sphagnum* bog; Maidenhair

spleenwort (*Asplenium trichomanes* L.), on walls; Lady fern (*Athyrium felix-foemina* (L.) Roth.), moist areas in woods; Male fern (*Dryopteris felix-mas* (L.) Schott), woods and walls; Broad-leaved buckler fern (*D. austriaca* (Jacq.) Woyner), woods and walls; Narrow-leaved buckler fern (*D. spinulosa* (Müll.) Watt), abundant in *Sphagnum* bog; Beech fern (*Thelypteris phlegopteris* (L.) Slosson), and oak fern (*T. dryopteris* (L.) Slosson), though calcifuge, are found in Pull Beck area as well as Blake Beck area; Water horse-tail (*Equisetum fluviale* L.), frequent near the lake.

Twenty-nine species of bryophytes were found. They may be arranged according to habitat as follows:

(a) Species which are usually confined to woodland habitats.
Always on acid substratum: *Mnium hornum* Hedw. Both valleys.
Typical of mountain oakwoods: *Dicranum majus* Turn., *Plagiothecium undulatum* (Hedw.) B. & S. These were found near the lake.
Tolerant of very deep shade: *Eurhynchium praelongium* (Hedw.) Hobk. On soil and rocks in both valleys.
Found in a wide range of woodland types: *Atrichium undulatum* (Hedw.) P. Beauv., *Thuidium tamariscinum* (Hedw.) B. & S., *Dicranum scoparium* Hedw. The first was found in both areas, the others only on the limestone series.

(b) Species which, though found in woodland during the present survey, grow in a wide variety of situations elsewhere.
Polytrichum commune Hedw., indicative of strongly acid soils, occurs in both valleys, on the ground.
Fissidens adianthoides Hedw., on shaded rock, in both areas.
Hypnum cupressiforme Hedw., on soil under trees, *Fissidens taxifolius* Hedw., on shaded clay banks, and *Acrocladium cuspidatum* (Hedw.), by side of stream; these species were found in the Pull Beck area.
Ctenidium molluscum (Hedw.) Mitt., strongly calcicole, was found in Pull Garth wood.

(c) Species characteristic of damp, shaded rocks.
Mnium punctatum Hedw., in both valleys.
Metzgeria furcata (L.) Dum., near Pull Beck. Found also on tree trunks.
Conocephalum conicum (L.) Dum., near Pull Beck. Favours limestone though not strictly calcicole.

(d) Marsh species.
The species of *Sphagnum* in the boggy area along Blake Beck were not identified.
Climaceum dendroides (Hedw.) Web. & Mohr, found at the edge of the lake, is usually found at lake margins in hilly districts.
Trichocolea tomentella (Ehr.) Dum., which is usually found on calcareous soils, was present in large patches in Pull Garth wood.

(e) Aquatic species, found in fast-flowing streams.
Hylocomium flagellare B. & S., usually calcifuge, is confined to Blake Beck.
Chiloscyphus polyanthus (L.) Corda, common in both streams.
Fontinalis antipyretica Hedw. and *Scapania undulata* (L.) Dum., occurred in both streams, but were commoner in Pull Beck.
Eurynchium riparioides (Hedw.) Jennings and *Thamnium alopecurum* (Hedw.) B. & S. were found only in Pull Beck; the second species is characteristic of wet shaded rocks by streams and waterfalls.

Owing to the time of year, few species of fungi were found. *Mitrula paludosa* Fr. was common on dead leaves at the edges of Blake Beck in the *Sphagnum* bog. *Galerina sphagnorum* (Pers. ex Fr.) Kühn., *Ombrophila clavus* (A. et S.) Cooke (on *Juncus*), and *Vibrissea truncorum* (A. et S.) Fr. (on dead wood) also occurred in the *Sphagnum bog. Polyporus betulinus* (Bull.) Fr. was common on dead birch trees, *Reticularia lycoperdon* Bull. occurred on dead sycamores, *Daedalea quercina* (Linn.) Fr. was found on oak, *Armillaria mellea* (Vahl.) Fr. on a beech log, and *Stropharia semiglobata* (Batsch ex Fr.) Quel. in a dry meadow in Pull Beck valley.

The stonewort *Nitella flexilis* Ag. occurred in large patches in the southern tarn.

Of the algae, species of *Batrachospermum* were found in both streams, in the *Sphagnum* bog and in the tarns. *Chaetophora* sp. occurred on decayed roots in and

near Pull Beck, with *Lemanea* sp., *Rhodochorton violaceum* Kutz. and *Nostoc* sp. *Dreparnaldia glomerata* (Vauch.) Ag. was frequent in the *Sphagnum* bog.

Insects

So many species of insects were collected that it is not possible to mention more than a small proportion. A list of the rare or local species is included as an appendix. In the time available it was hardly possible to obtain a clear picture of the distribution of most of the species within the area studied. The impression of the entomologists was that little difference existed between the insect faunas of the two valleys, although some species had a restricted distribution: for example, the *Sphagnum* bog on Blake Beck had a distinctive fauna, and the distribution of a few species was limited by that of their food-plants. Owing to their powers of flight, adult insects are often found far from their breeding grounds, especially those species which feed as adults. Except in the case of some of the aquatic groups, little information was obtained about the developmental stages.

Eight species of mayflies were found as nymphs or adults in and near Pull Beck, the commonest being *Rhithrogena semicolorata* (Curtis) and *Baetis rhodani* (Pictet) in rapid currents, and *Siphlonurus lacustris* Eaton, in pools and the slowly running part of the stream near the lake. In Blake Beck only two species were found, *Baetis rhodani* (Pict.) and *Ephemerella ignita* (Poda), of which the latter was not found in Pull Beck. *Cloeon dipterum* (L.) was common in the tarns.

Stoneflies were equally common in both becks, but there were differences in the species found. *Leuctra inermis* Kpny. and *Nemoura variegata* OL., abundant in Blake Beck, were not recorded from Pull Beck. Of 13 species, only 6 were recorded from both areas.

The commonest dragon-fly was *Pyrrhosoma nymphula* (Sulz), which occurred in both areas. Seven species were found near the tarns, including nymphs of *Cordulegaster boltonii* (Don.), which occurred in the small outflow stream from the northern tarn, barely covered by the water.

The only Orthopteran found was the grasshopper *Omocestus viridulus* (L.), the nymphs of which were common on dry grassland in Pull Beck valley.

The pond-skater *Velia caprai* Tam. occurred on both streams, and *Gerris gibbifer* Schum. was found on the tarns. *Corixa distincta* (Fieb.) was present in the lower part of Pull Beck, with *C. falleni* (Fieb.), as well as in the tarns, where *C. falleni* was not obtained. *C. striata* (L.), *C. nigrolineata* (Fieb.) and *C. scotti* (Fieb.) were found only in the tarns.

Of the numerous species of beetles, mention may be made of only a few. The carnivorous ground-beetle *Carabus problematicus* Herbst was common in woodland in Pull Beck valley. *Cychrus rostratus* (L.), which feeds on molluscs, was found in dry woodland in Blake Beck area. At the edges of the streams occurred the ground-beetle *Bembidion tibiale* (Duft.) and the rove-beetle *Lesteva pubescens* Mann. The silphid *Xylodrepa quadripunctata* (L.), which feeds on the larvae of Lepidoptera, was emerging from the ground in dry woodland in Blake Beck area. The soldier-beetle *Rhagonycha limbata* Thoms. was common in Pull Beck valley. Several species of click-beetles (Elateridae) were found: *Athous haemorrhoidalis* (F.) and *Dalopius marginatus* (L.) were common in woodland in both valleys, but *Agriotes pallidulus* (Ill.) and *Corymbites incanus* (Gyll.) were confined to grassland in Pull Beck valley, and *Melanotus rufipes* (Herbst) was found in a beech log in Blake Beck area. *Anaspis frontalis* (L.) was common on flowers of bird cherry in Pull Beck valley. The Chrysomelid, *Clytra quadripunctata* (L.) was found in nests of the wood ant (*Formica rufa* L.) in Blake Beck area. A number of aquatic Donacine beetles were found in the Blake Beck area: *Plateumaris discolor* (Panz.) was confined to the *Sphagnum* bog, while *P. sericea* (L.), *Donacia aquatica* (L.) and *D. obscura* (Gyll.) were obtained from the northern tarn. *Helodes marginata* (F.) occurred in both becks. In Pull Beck was found *Oreodytes rivalis* Gyll. and *Hydraena gracilis* Germ.; *Agabus bipustulatus* occurred in side pools. In both becks occurred *Ag. guttatus* Payk. and *Anacaena globulus* (Payk.). The whirligig beetle *Gyrinus natator* var. *substriatus* Steph. was found on Blake Beck, and *Cyphon variabilis* (Thunb.) and *C. paykulli* (Guer.) were obtained from vegetation at the margins of the tarns.

The scorpion-flies *Panorpa germanica* L. and *P. communis* L. were common in Pull Beck valley, with the dusky lacewing *Hemerobius humulinus* L., whose larva feeds on aphids. The alder-fly *Sialis fulignosa* Pict. was found in Blake Beck, and *S. lutaria* (L.) occurred in the southern tarn.

Thirteen species of caddis-flies were found in Pull Beck, where the pupal shelters of *Glossosoma boltoni* Curt. were abundant on the larger stones. After this, the commonest species were *Rhyacophila dorsalis* (Curt.) and *Halesus radiatus* (Curt.). Only six species were found in Blake Beck, where *G. boltoni* was scarce and *H. radiatus* was absent. *Triaenodes bicolor* (Curt.) was found in the tarns.

Among the Lepidoptera, larvae of the winter-moth (*Operophtera brumata* (L.)) and mottled umber (*Erannis defoliaria* Clerck) were common on trees, particularly birch. Other species which attack oak and other trees were obtained at light in the grounds of Brathay Hall, and almost certainly occur in the area studied: the oak pug (*Eupithecia dodoneata* (Guen.)), *Notodonta anceps* (Goeze), *Colocasia coryli* (L.) and *Drymonia ruficornis* (Hufn.). Larvae of *Ysolophus xylostella* (L.) were obtained from honeysuckle, and those of *Yponomeuta evonymella* (L.) from bird cherry, both in Pull Beck valley. Pupae of *Leucoptera spartifoliella* Hueb. occurred on broom in Pull Beck valley. Three species of *Micropteryx* (*M. mansuetella* Zell., *M. aureatella Scop.* and *M. calthella* L.) were found in both areas; their larval food is considered to be bryophytes. *Adela reaumurella* L. and *Nematopogon swammerdamella* (L.), whose larvae feed mainly on fallen leaves in woods, were obtained from Blake Beck area. The orange-tip (*Euchloe cardamines* L.) occurred near its food plant, lady's smock, in marshy places. On open ground were found the treble-lines (*Meristis trigrammica* (Hufn.)) which feeds on *Plantago major*, and the green-veined white (*Pieris napi* L.), which feeds on Cruciferae. On grassland in Pull Beck valley occurred the small heath (*Caenonympha pamphilus* (L.)), *Crambus praetellus* L. and larvae of the yellow underwing (*Triphaena pronuba* (L.)), all of which feed on grasses.

Among the Diptera the crane-flies (Tipulidae) were prominent, 25 species being obtained. *Limnophila squalens* (Zett.) and *L. meigeni* Verr. were confined to the *Sphagnum* bog. The shade-loving *Dolichopeza albipes* Stroem. was common near damp ground in both areas. An adult of *Tipula pabulina* Mg. was seen ovipositing in moss in woodland on the side of Pull Beck valley. The hover-fly *Cheilosia maculata* Fall., whose larvae feed on garlic, was confined to Pull Beck valley. Clouds of Empids were flying over both becks, mainly *Hilara interstincta* Fall., with *H. maura* F. In Pull Beck valley a pair of *Empis tesselata* (L.) was caught *in cop.*, of which the female was carrying a dung-fly, *Scopeuma suillum* (F.). The Ephydrid *Hydropota griseola* (Fall.) was abundant at the sides of Pull Beck; its larvae mine aquatic and marsh plants. Other common Diptera were the Dolichopod *Dolichopis popularis* Wied. and the Stratiomyids *Beris vallata* (Forst.) and *B. chalybeata* (Forst.), found on open ground in Pull Beck valley. The predaceous snipe-fly (*Rhagio scolopacea* (L.)) was common on tree trunks. Larvae of *Dixa* sp. were common in Pull Beck.

Several species of sawflies were obtained, of which the following may be listed (larval food in brackets): in both areas, *Strombocerus delicatulus* (Fall.) (ferns); in Pull Beck area, *Rhogogaster viridis* (L.) (alder), *Tenthredo perkinsi* (Morice) (*Trifolium*), *Dolerus brevitarsus* Hartig (grasses) and *Pachyprotasis rapae* (L.) (polyphagous); in Blake Beck area, *Strongylogaster lineatus* (Christ) (ferns), *Brachythops flavens* (Klug) (*Carex*), *Dolerus aeneus* Hartig (grasses) and *Tenthredo atra* L. (polyphagous). Common ichneumon-flies were *Agrypon flaveolatum* Grav., found near bird-cherry in Pull Beck valley, and parasitic on larvae of *Yponomeuta; Ophion impressus* (Thunb.), on flowers of crab-apple in Blake Beck area, and parasitic on Lepidoptera; *Diplason albosignatus* (Grav.) and *D. tricinctorius* (Thunb.), in woodland in Pull Beck valley, and parasitic on Syrphidae and other Diptera.

The commonest ants were *Myrmica ruginodis* Nyl. and *Lasius flavus* (F.), the hillocks of the latter being particularly common in grassy areas. The wood of dead birches was used as a nesting site by *Leptothorax acervorum* (F.). A few nests of the wood ant (*Formica rufa* L.) were found in Blake Beck area.

Invertebrates Other than Insects

Earthworms were not systematically collected, and only six species were recorded. *Eiseniella tetraedra* (Sav.) was common along the edge of Pull Beck, and probably occurs in other marshy places. *Lumbricus rubellus* Hoffm. was common in both areas. *Allolobophora caliginosa* (Sav.) and *A. chlorotica* (Sav.) which prefer basic soils, were found in Pull Beck valley. *Bimastus eiseni* (Levins.), characteristic of acid conditions, was found in a dead beech log in Blake Beck area. *Dendrobaena octaedra* (Sav.), another acid-tolerant species, was common in woodland soil in Blake Beck area, but also occurred in Pull Beck valley.

A leech, probably *Herpobdella octoculata* L., was found in Blake Beck.

Eleven species of terrestrial mollusca were found. Of these, all are widely distributed on both acid and basic soils, except *Zonitoides excavatus* (Bean), a calcifuge species which was found in Blake Beck area. The commonest species appeared to be *Arion ater* (L.), *A. hortensis* Fér., *Agriolimax reticulatus* (Müll.), *Discus rotundatus* (Müll.) and *Oxychilus alliarius* (Müll.). The only aquatic mollusc found was the freshwater limpet (*Ancylastrum fluviatile* (Müll.), which was common in Pull Beck.

The freshwater Amphipod, *Gammarus pulex* L. was common in both becks. The common woodlice in both areas were *Oniscus asellus* L., *Porcellio scaber* Latr. and *Trichoniscus pusillus* Brandt.

Fifteen species of Myriapods were found. The commonest centipede was *Lithobius variegatus* Leach, but *L. forficatus* (L.) was noticeably absent. Other common centipedes were *L. crassipes* Koch, *L. calcaratus* Koch, *Geophilus carpophagus* Koch and *Brachygeophilus truncorum* (B. & M.). The pill-millipede (*Glomeris marginata* (Villers)), which prefers calcareous soil, was fairly common in Pull Beck valley but only a few specimens were found in Blake Beck area. *Polydesmus denticulatus* Koch was confined to Pull Beck valley. Common millipedes in both areas were *P. angustus* Latzel, *Iulus scandinavius* (Latzel), *Proteroiulus fuscus* (Am Stein) and *Cylindroiulus punctatus* (Leach).

Spiders were not intensively collected, and only ten species were recorded. Hunting spiders (Lycosidae) were commonly seen running over the ground. *Lycosa lugubris* (Walck.) was common in Blake Beck area, and *L. pullata* (Clerck) on grassland in Pull Beck area, both species carrying egg-cocoons. A single specimen of *L. pratinvaga* Koch was obtained from woodland in Pull Beck area. *Pirata hygrophilus* Thorell was common in marshy places in Blake Beck area. The nocturnal *Trochosa terricola* Thorell was found hiding under bark in both areas. The Agelenid *Amaurobius atropos* (Walck.) was common under stones, where it spins its sheet web. Species of *Clubiona* occurred on trees and shrubs; *C. terrestris* Westr. in Blake Beck area and *C. compta* Koch in Pull Beck valley; these are nocturnal species which do not spin webs. The orb-spinner *Meta segmentata mengei* (Blackwell) was common in dry woodland in Blake Beck area. *Tetragnatha montana* Simon occurred in Pull Beck valley. The only harvestman identified was *Platybunus triangularis* Herbst, which matures early in the year.

Vertebrates

Young trout occur in Pull Beck, and in the lower part of the stream were found minnows and sticklebacks. No fish were recorded from Blake Beck.

Amphibian tadpoles were found in small pools near Pull Beck. In the northern tarn were large numbers of toad tadpoles.

Forty-five species of birds were observed within about half a mile of Brathay Hall, of which 29 were seen within the area specially studied. Time did not permit a careful analysis of the distribution of the species, and no significant difference between the areas was observed. The species may be arranged as follows :

(a) Species which feed mainly in trees and bushes.

Willow-warbler (especially common in birch woods), Wood-warbler (well-grown oaks), Whitethroat (bushes and hedges), Garden-warbler (thick, shrub-layer under trees), Wren (undergrowth near ground), Blue tit and Great tit (in tree canopy), Long-tailed tit (seen in birches in *Sphagnum* bog), Greenfinch (a few), Cuckoo, Great spotted woodpecker (nests in holes in dead birches).

(b) Species which occur in woods, but feed mainly on the ground.

Robin, Blackbird, Song-thrush, Chaffinch, Tree-pipit, Wood-pigeon, Tawny Owl, Pheasant (a pair seen in Blake Beck area), Woodcock (a pair flew over Blake Beck area in the evening).

(c) Marsh or aquatic species.

Curlew (frequently heard; seen by Blake Beck), Moorhen (on Pull Beck), Mallard (a flock of seven on the northern tarn), Heron (feeds in Pull Beck).

(d) Species which flew over the area.

Swallow and Swift (feed in the air), Jackdaw and Carrion crow (flying to roost in evening), Raven (one, probably from the hills).

Several other species, which were noticed just outside the area, probably occur within it, at least as visitors:

Redstart, Chiffchaff, Spotted flycatcher, Hedge-sparrow, Goldcrest, Coal tit, Grey wagtail, Pied wagtail, Rook, Magpie, Starling, House-martin.

To these may be added four species which were observed on the shore of the lake:

Oystercatcher, Common sandpiper, Lesser black-backed gull, Black-headed gull.

Only three species of mammals were observed: rabbits were common; a fox was seen, carrying a rabbit; moles burrow in the meadow along Pull Beck.

Conclusions

This report is based on only three days' intensive investigation, and any conclusions drawn from it cannot be other than tentative. It is hoped that naturalists who have the opportunity to do so will visit the district in order to check and extend the preliminary observations recorded here. All we have been able to do is to present a first impression which we hope will provide a basis for future work.

The object of the investigation was to discover whether the geological difference between Pull Beck valley, on the Coniston Limestone, and Blake Beck valley, on the Borrowdale Volcanic Series, was reflected in the fauna and flora. It was found that the differences in lime content of the rocks of the two formations were less clear-cut than had been expected: some lime occurred locally in the Blake Beck area, while many of the rock samples from the Pull Beck valley contained little lime. The differences are therefore quantitative rather than qualitative, and for the most part the resultant differences in fauna and flora are not such as could be established by a short period of general collecting.

Nevertheless, thirteen species of plants which prefer soils of basic character or high calcium content were confined to the Pull Beck area, and five species which are calcifuge or characteristic of acid soils were found only in the Blake Beck area. As would be expected from the geological findings, some calcicole species were found on the Volcanic Series and some calcifuge species on the Limestone. The great majority of the species of plants occurred in both areas, and their distribution appeared to be controlled by other factors than the lime content of the soil, for example the degree of shading and the moisture content of the soil. Some of the floristic differences between the two areas reflect differences in physical conditions, notably the greater importance of dry grassland in the Pull Beck valley and the presence of the *Sphagnum* bog and the tarns in the Blake Beck area.

The distribution of soil-inhabiting animals is in some cases influenced by the acidity or lime content of the soil, for example, some millipedes, molluscs and earthworms. In these groups some differences between the two areas were noted, although comparatively little collecting was done. The absence of definitely calcicole molluscs even in Pull Beck valley was striking. The two streams differed in their aquatic fauna, apparently due to the greater acidity of Blake Beck, but this may have been influenced more directly by the *Sphagnum* bog than by the lime content of the underlying rock. Many species of animals are influenced in distribution by the plants on which they feed, and a few species of insects were confined to Pull Beck valley for this reason. The majority of animals, however, like the majority of plants, were found in both valleys, or were distributed in relation to such factors as the presence or absence of tree cover, marshy ground and the *Sphagnum* bog.

The influence of the Coniston Limestone on the flora and fauna therefore appears to be slight, compared with that of some of the other limestone formations of Britain.

This investigation has been possible only because of the co-operation of many naturalists who have specialised in different fields. Advice on geology was given by Dr. G. D. Nicholls, who also analysed rock samples. Miss E. Swale gave valuable help in the writing of the botanical section of the report, and contributed records of bryophytes and algae. Miss B. Harthan, Miss N. Carbis, Mrs. D. Overend and Mrs. M. Cowring recorded the flowering plants. Dr. W. D. Hincks provided records of ferns and fungi, and gave considerable assistance with the entomological section of the report. Several other entomologists sent their records: Dr. G. W. R. Bartindale, Mr. A. Brindle, Mr. S. Charlson, Miss P. Dutton, Mr. C. H. Wallace Pugh, and Mr. H. Mansfield. The collection and identification of fresh-water animals was carried out by Dr. E. J. Popham, Mr. H. H. Huxley and Mr. D. Scott. Mr. J. G. Blower

kindly identified the spiders and myriapods, and Mr. A. Ripley provided records of birds.

Faunal Appendix (W. D. Hincks)

A number of additions to the faunal list of Insects (excluding Lepidoptera) of Lancashire and V.C. 60 (North Lancs.) were made during the week-end May 27th-30th as a result of the co-operation of a number of entomologists. The following list has been prepared by comparison with the Lancashire records of the late Mr. H. Britten, now in the Manchester Museum. Where no initials follow the record the collector is W. D. Hincks (W.D.H.). Other abbreviations used are P.B.=Pull Beck; B.B.=Blake Beck woods; G.W.R.B.=Dr. G. W. R. Bartindale; A.B.=A. Brindle; P.M.B.=Dr. P. M. Butler; P.D.=Miss Patricia Dutton; E.J.P.=Dr. E. J. Popham; C.H.W.P.=C. H. Wallace Pugh; †=New to Lancashire; *=New to V.C. 60.

Odonata

Cordulia aenea (L.) B.B., Southern Tarn, 1♂ on oak trunk, just emerged from nymphal exuvia. Almost colourless when found and died almost immediately on placing in bottle but developed full mature colour in about two hours. Previously recorded only from Blelham Tarn.

Trichoptera

†*Adicella reducta* (McL.) B.B., Southern Tarn (A.B.)
Mystrophorella intermedia (Klap.) P.B. 1♂. Only known previously from Coniston, in Britain.

Coleoptera

**Oreodytes rivalis* (Gyll.) P.B. (G.W.R.B.)
**Agabus guttatus* (Payk.) P.B. (G.W.R.B.)
**Hydraena gracilis* Germ. P.B. (G.W.R.B., E.J.P.)
**Xylodrepa quadripunctata* (L.) B.B. (P.M.B.)
**Lesteva herri* Fauv. P.B. (G.W.R.B.)
**Stenus nitidiusculus* Steph. P.B. (G.W.R.B.)
**Lathrobium terminatum* Grav. P.B. (G.W.R.B.)
**Sipalia circellaris* (Grav.) P.B. (G.W.R.B.)
**Atheta* (*Metaxya*) *hygrotopora* (Kr.) P.B.
**Ocyusa incrassata* (M. et R.) P.B. (G.W.R.B.)
**Oxypoda longiuscula* (Grav.) P.B. (G.W.R.B.)
†*Brachygluta fossulata* (Reich.) P.B. (G.W.R.B.)
**Cantharis paludosa* Fall. P.B. (G.W.R.B., P.D.)
†*Malthodes guttifer* Kies. B.B. 1♂
**Helodes marginata* (F.) B.B.
**Donacia aquatica* (L.) B.B. Northern Tarn, faily common on marginal vegetation (W.D.H., P.D., G.W.R.B.)
†*D. obscura* Gyll. with above, a few spns.
**Plateumaris sericea* (L.) with above, abundant and variable in colour (W.D.H., P.D., G.W.R.B.)
P. discolor (Pz.) B.B., 1 spn. in *Sphagnum* bog.
Clytra quadripunctata (L.) B.B. 1 spn. in runs of *Formica rufa* L. (P.D.)

Hymenoptera

**Tenthredo perkinsi* (Morice) P.B. 1♂
**Dolerus brevitarsus* Htg. P.B. 2♀♀
**Monosoma pulverata* (Retz.) B.B. 1♂
†*Empria excisa* (Thoms.) B.B. 1♂
**Strongylogaster mixta* (Klug) B.B. 1♀
Brachythops flavens (Klug) B.B. 1♀. One previous record for V.C. 60.
†*Pontania pedunculi* (Htg.) B.B. 1♀ (det. R. B. Benson)
Pachynematus vagus (F.) B.B. 1♀ (det. R. B. Benson). Previously recorded from Grange.
†*Trioxys auctus* (Hal.) P.B., B.B.
†*Cratichneumon albilarvatus* (Grav.) B.B. 1♂

**Exochus flavomarginatus* Holmgr. P.B. 1♂
**Diplazon tricinctorius* (Thunb.) P.B. 1♂ 1♀
**D. albosignatus* (Grav.) P.B. 1♀
**Promethes dorsalis* (Holmgr.) P.B. 1♂
**Ophion impressus* (Thunb.) B.B. Common flying round branches of crab apple.
**Agrypon flaveolatum* (Grav.) P.B. 1♀
†*Trigonaspis megaptera* (Pz.) B.B. Southern Tarn, a single gall on oak trunk.
†*Synergus thaumacerus* (Dalm.) Pull Garth wood 1♂, 15/7/55 (det. S. Shaw).

DIPTERA
**Tipula variipennis* Mg. P.B.
**T. luna* Westh. Common P.B., B.B. (W.D.H., A.B.)
**Nephrotoma cornicina* (L.) P.B. 1♂
**Dolichopeza albipes* (Stroem) Common in shady places along streams, P.B., B.B.
**Cylindrotoma distinctissima* (Mg.) P.B. 1♂
**Limonia macrostigma* Schum. P.B., B.B. (A.B.)
**Pedicia immaculata* (Mg.) P.B.
†*Hexatoma fuscipennis* (Curt.) B.B. (A.B.)
**Limnophila meigeni* Verr. B.B. Common (C.H.W.P., A.B.)
**L. squalens* (Zett.) B.B. (G.H.W.P., A.B.)
**L. submarmorata* (Verr.) P.B., B.B. (A.B.)
**Dixa aestivalis* Mg. B.B. Southern Tarn (A.B.)
†*Atherix marginata* (F.) Brathay, R. Brathay 12/7/55.
†*Neoitamus cyranurus* (Lw.) B.B. Southern Tarn (A.B.)
**Hilara interstincta* (Fall.) P.B., B.B. Common (C.H.W.P.)
**Dolichopus popularis* Wied. P.B.
**Renocera strobli* Hend. P.B.
**Tetanocera silvatica* Mg. P.B. Common
**Norellisoma flavicorne* (Mg.) B.B.

Gammarus zaddachi (Sexton) (Crustacea-Amphipoda) at Thorne, V.C. 63, in Acid Peat Waters.—Both *Gammarus pulex* L. and *G. zaddachi* Sexton are to be found in this area. *G. pulex* is widely distributed, but so far *G. zaddachi* has only been found at two stations, viz.: Thorne Quay, which owing to alterations to the course of the River Don is now only a drainage reservoir cut off from the new course of the river by sluice gates, and in Durham's Warping Drain and Pond which lead from the River Don to the edge of Thorne Moors. At this second station *G. zaddachi* has shewn a remarkable amount of adaptability to fresh habitats in that the waters are definitely acidic, ranging from pH 6·0 to pH 7·0. Dr. B. M. Hynes suggested to me that *G. zaddachi* might occur in this area, no doubt basing his opinion on the fact that the River Don is tidal at Thorne. Mrs. Sexton (1942) informs us that *G. zaddachi* varies considerably in its habitats from pure sea water to fresh water, but is most common in brackish water, and is a good salinity indicator. The Thorne Quay station would fit Mrs. Sexton's description of habitat in that at most times the waters are neutral, but occasionally brackish when high tides have caused leakage through the sluice gates. Durham's Warping Drain and Pond indicate a complete change of habitat.

Durham's Warping Drain and Pond were constructed about 1870 to facilitate the warping of agricultural lands on the outskirts of Thorne Moors. It has not been used for this purpose for 70 years and I have never known the sluice gates to be opened for any purposes. From sluice gate to moor edge is about two miles, the drain then runs along the moor edge for about one mile, terminating at the Warping Pond. The last mile and a half are over peat and many small drainage ditches from the peat moor proper now drain into the pond or warping drain. *G. zaddachi* occurs commonly along the whole length of the drain, and is very abundant in the pond. The specimens sent for confirmation of species were taken at the point where the Marshland road crosses the drain, i.e. about one mile from the River Don. Here the pH was 6·3 when the specimens were taken; a test taken a month later gave a reading of pH 6·0. A test made by the sluice gates after a high tide gave pH 7·0. No test has been made at the pond, the waters of which are undoubtedly very acidic.

Acknowledgements are due to Dr. Hynes for advice and confirmation of species.
—BEATRICE ANNE and WM. BUNTING.

THE MOUNTAIN HARE IN ENGLAND AND WALES

R. HEWSON

About the middle of the nineteenth century the mountain hare (*Lepus timidus scoticus*) was introduced from the Scottish Highlands, where alone it is indigenous, to various parts of the Lowlands, to the Hebrides, Mull, Orkney and other Scottish islands, and to England and Wales. The earliest recorded introduction into England, at Greenfield, Yorkshire, about 1860, was unsuccessful (Coward, 1910) but a successful introduction was made here later. The earliest Welsh introduction was prior to 1830 and this appears to have been successful. It is probable that a number of unrecorded introductions have also been made.

Following the colonisation of the Scottish Lowlands from introductions in Ayrshire between 1834 and 1862, mountain hares reached Cheviot in 1889, probably spreading from Manor Parish, near Peebles, between 1850 and 1860 (Ritchie, 1925, 1929). Assuming that this extension in range was not materially aided by further introductions, and the records cited suggest otherwise, the mountain hare spread over about 75 miles in 30 years. Beyond Cheviot the furthest records—south of Auchope, 1923 and west of Harbottle, 1925 (Ritchie, 1929)—are only a few miles inside the Northumberland border, but there was a successful introduction from Perthshire to Falstone, Northumberland, about 1910 (M. Philipson, *in litt.*). There may have been an introduction to Skiddaw (Macpherson, 1892), but there is no satisfactory record of the mountain hare on the Lake fells (E. Blezard, *in litt.*). Occurrences on the Bewcastle Fells may refer to immigrants from Scotland. In Lancashire there was an introduction to the Rusland Moors, near Ulverston, between 1903 and 1911 (Coward, 1918).

The only really successful introductions into England and Wales took place in Yorkshire; at Greenfield about 1880 (Coward, 1910), near Saddleworth about 1876 (J.A.L., 1906), and near Penistone about 1870 (Stubbs, 1929). About 50 mountain hares were released at Greenfield, and 20 at Saddleworth. At Greenfield in March, 1893, a gamekeeper, using binoculars, counted 50 hares in sight from one place; by 1908 they were abundant in the hills of north-east Cheshire (Coward, 1910) an extension of range of about 25 miles (from Penistone or Greenfield to the upper Dane) in 28 years or less. An introduction into North Staffordshire in 1894 failed although a few may have existed there until 1914 (Masefield, 1914).

In 1929 the mountain hare was described (Stubbs, 1929) as ' abundant generally . . . from Greenfield eastwards by Woodhead, Penistone and Hathersage towards Sheffield. Southwards its range reaches the moors between Buxton and Macclesfield. In 1927 . . . Alpine hares appeared for the first time on Eyam Moor ' [south-west of Sheffield]. It was at that time an occasional visitor to Blackstone Edge where 20 years earlier it had been unknown. In 1937 mountain hares were numerous on Derwent Edge (Boyd and Monkhouse, 1937). There is no evidence of the violent fluctuations in numbers common to this species in most parts of Scotland.

Introductions into Wales appear to have fared badly, perhaps after a successful start. Mountain hares from Scotland were released near Bangor about 1885 and 20 years later up to 40 or 50 were being killed in a day's shooting on the Snowdon range. The Irish hare (*Lepus timidus hibernicus*) was also introduced, unsuccessfully, into Caernarvonshire (Millais, 1906). There were other introductions of mountain hares at Dolwyddelan, Yspytty, and near Bala Lake. In the '80s they were introduced, unsuccessfully, at Llanllugan in Montgomeryshire (Matheson, 1932).

DISTRIBUTION IN 1955

The mountain hare is rare in Cumberland and Northumberland, and is probably restricted for the main part to the high ground of north-east Cumberland and south-west Northumberland, north of the Tyne gap (E. Blezard, *in litt.*), and around the River Irthing (M. Philipson, *in litt.*). These hares may be the descendants of the Falstone introduction or stragglers from over the Border. There is an unconfirmed report of a mountain hare on Cross Fell. No information is available of the Rusland Moors introduction, but one was seen nearby on Coniston Old Man in 1954 (E. J. Wilson, *in litt.*).

In the south Pennines the position is not unlike that of 1929. On June 18th, 1952, I searched part of the ground between Kinder Scout and the Snake Inn without seeing a mountain hare or finding any hare tracks or burrows in peat; nor did I see

any hares on Shelf Moss, Bleaklow Head, or the area down to North Reaps. This apparently presented a misleading picture although there was at that time a marked shortage of cover to the north of the Snake Inn. An appeal to readers of the *Manchester Guardian* in March, 1955, brought in a good deal of information on the distribution of the species in the Peak area, and other enquiries were then made.

The mountain hare was described as common or abundant on the following moors: Swineshaw Moor, Black Hill, Holme Moss, Cooks Study, Ramsden Clough, Langsett Moors, Howden Moors, Bleaklow Hill, Ranksley Moor, Alport Moor, Birchinlee Pasture, Rowlee Pasture, Derwent Edge, Blackley Hey and the Kinder Plateau. Between 12 and 20 were seen on Bleaklow Moors on April 19th, about 30 on Langsett Moors on the afternoon of April 16th, 17 between the upper Derwent Valley and the Snake Inn on May 1st, 5 and 12 on Derwent Edge on dates in March and April, 8 on Swineshaw Moors on April 9th, 6 in the upper Derwent Valley in April, and 4 on Howden Moors on May 15th.

At the northern limits of its range there were records from Blackstone Edge, Rishworth Moor, Denshaw and Greenfield; at the southern limit there were mountain hares on Eyam Moor (W. Ingledew, *in litt.*) and on Goyts Moss and Combs Moss near Buxton (J. Armitage, *in litt.*). The North Staffordshire Field Club has no note of any recent occurrences in that county. From the numbers seen by various observers it seems likely that the mountain hare was more numerous in the Peak area in 1955 than it was in the Northern and Western Highlands of Scotland four years earlier, and probably more numerous than in much of South-western and Lowland Scotland (Hewson, 1955). Several observers said that the severe winter of 1946-7 brought about a decline in numbers, followed by an increase since then. Some shooting is done but the bags are not particularly high, nor apparently have they ever been so high as over comparable areas in Central or Northern Scotland.

The position in Wales is a little obscure. They are said to occur on the Carneddau, Migneint Moor, and the Berwyns (Campbell, 1949). In September, 1954, I visited the Berwyns and found no trace of mountain hares which were unknown to local sheep farmers. The gamekeeper in charge of Migneint Moor during the last 32 years said that he had only seen one in the area and that was in about 1920. The head gamekeeper in charge of the Carneddau area, who has covered this ground since 1928, thought that there were few, if any, about, and that there had never been many. The estate game books, going back to 1908, were said to show no records of mountain hares.

A few mountain hares have, however, been seen during recent years; one on Creigiau Gleiston, above Llyn Cowlyd, in October, 1953; one or two on the Carneddau and the Glyders (Evan Roberts), and a young one on the Glyders in April, 1953 (John Morris). In short visits in September, 1954, I saw none on the Glyders or Carneddau, but there were two in an apparently well-established and much shot at colony at Dolwyddelan, on an isolated scrub and bracken-covered hill at an altitude of about 700 feet. Near Tal-y-fan, a few miles south-west of Conway, I saw a brown hare at 1,500 feet, but no mountain hares. The general impression I obtained was that the mountain hare is now rare in Wales; certainly as rare as in those parts of the Northern and Western Highlands of Scotland where the smallest indigenous populations are found.

As this survey of the distribution of the mountain hare took place when the rabbit population was either affected by myxomatosis or had died out, some extension of its range might now occur, although the two species do not usually share the same ground. Grouse preserving, with its attendant heather burning and predator destruction, appears to provide favourable conditions for the species, which is most numerous on grouse moors in the drier eastern parts of the British Isles.

ACKNOWLEDGEMENTS

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THE STATUS OF THE SHAG (*PHALACROCORAX ARISTOTELIS*) ON THE CHALK CLIFFS OF THE EAST RIDING

H. O. BUNCE AND K. FENTON

Summary

Since the early part of the nineteenth century the Shag has been reputed to be a non-breeding bird on the Yorkshire chalk cliffs. It has now re-established itself in this area, breeding first being proved in 1952, although it may well have been doing so for a few years prior to that date.

Historical Note

According to Nelson (*Birds of Yorkshire*, 1907) Pennant saw Shags in small flocks at Flamborough in 1769, and in 1770 stated in his *British Zoology* that the Shag was very rare there. Nelson also states that, according to Allis (1844), A. Strickland said that the bird used to breed in considerable numbers some years before. Cordeaux's *Birds of the Humber District* (1873) records that immature birds occur in the autumn not infrequently on passage. W. Eagle Clarke (*Handbook of Yorkshire Vertebrata*, 1887) states that it is a periodical visitor on passage only, being most numerous in autumn when immature birds are not infrequent. In the *Victoria County History* of Yorkshire, according to Cordeaux a pair tried to nest at Flamborough in 1893, but were shot by fishermen. E. W. Wade's paper on the breeding birds of the Bempton cliffs (*Trans. Hull Scientific and Field Naturalists Club*, 1903) makes no mention of the bird, and there appears to be a gap in the published records known to us until Wade saw two or three immature birds at Flamborough on 11th July, 1925 (R. Chislett, *Yorkshire Birds*, 1952). R. Chislett also records two exhausted birds seen at Bridlington in 1947 by Miss F. E. Crackles.

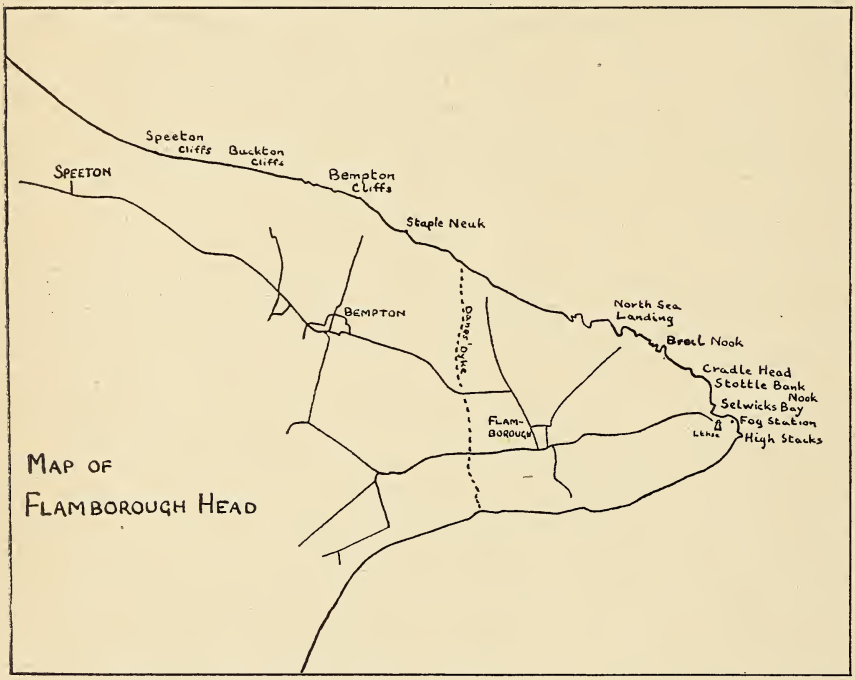
Recent Records

In 1949 one of us (K.F.) with H. A. Goodall saw an adult on Breil Nook on May 19th and, on June 29th, eight adults and twenty immature birds on rocks exposed at low tide in the gap immediately to the west of Cradle Head. Some, at least, of the immature birds had pale underparts and white chins. H.O.B., on February 19th, 1950, saw at least fourteen fishing between the Fog Station and High Stacks, being at the time unaware of the previous year's records. In view of these records we both visited the area independently on a number of occasions, including every month of the year, until 1953, and noted small numbers at various points along the whole stretch of cliffs from Stottle Bank Nook to Speeton.

During the period 1949 to 1953 the following also appeared in the annual reports. In 1949, A. J. Wallis recorded odd birds at Bempton all the summer and in 1950

he and H. Hodgson also reported birds there. In 1951 F. Wilcock saw eight at Bempton on April 18th, and others were reported about Bempton and Bridlington all through the spring and summer, including nine seen at Flamborough on March 28th by E. Grace. W. H. Jousey and J. C. A. Rathmell saw Shags at Bempton on May 17th, 1953. B. W. Brownsey and D. V. Peakall ('Breeding Sea-birds of Flamborough Head', *Nat.*, p. 149, 1953) state that Shags were seen by them on June 21st-23rd, 1952.

Up to this time no conclusive proof of breeding had been obtained in recent years, although there were reasonable grounds for assuming that the birds might actually be breeding. Therefore, in early 1953 we decided to carry out more intensive observations in what appeared to be the most suitable area, namely the stretch of cliffs between Breil Nook and Stottle Bank Nook. We visited these cliffs independently on various dates during 1953 from April 19th to October 3rd. Shags were present on every occasion, about 20 always being present during the summer months; and adult birds were frequently seen entering caves in the first half of



this period. Immature birds were seen on rocks or on the sea on July 7th (7), July 18th (3), August 11th (6) and September 5th (3). The largest total numbers of Shags seen were 19 on July 11th, 22 on July 18th, 21 on August 11th, and 25 on September 5th. Late in the 1953 season it was realised that a section of the cliff foot was accessible for a time at low water of spring tides.

During 1954 we again visited the same area, as well as stretches of the Bempton range, both independently and together on dates from January to December. Shags were seen on all visits. On June 20th we entered and examined five caves between Stottle Bank Nook and Cradle Head. Two Shags flew out of one cave as we entered, and in another a bird was seen sitting, apparently on a nest, on a high ledge. The same caves were examined again on July 18th. Two Shags flew out of one cave, and in another three birds were on ledges high up in the interior. One flew out from one of the other caves, leaving a further bird high up on a ledge. A Shag was also seen to leave, and later re-enter, a hole about twenty feet up the cliff-face.

The caves were not revisited after this, but a position was found from which the cliff-face hole could be observed. On July 31st the heads of two young could be seen moving inside, and two adults were making frequent visits to the nest. This nest was also seen on this date by A. Williams, S. Martin and Laidlaw Williams. It was curiously appropriate that the last-named gentleman, an American visitor with very little time to spare, should have made a special journey to Flamborough in the hope of seeing the species, a member of a group of birds in which he is especially interested. Birds of the year were seen in August and September, eight being the maximum at any one time. A maximum count of 35 birds of all ages was made by A. Williams on August 17th.

At Bempton in 1954, birds were noted at various points, including what appeared to be a small colony in the bay immediately to the south of Staple Neuk. Four possible nest-sites were located by watching adults flying in and out of three crevices and a cave. On August 8th this bay held 19 Shags, of which eight were young and still being fed by adults.

However, the above breeding records do not hold priority. Early in 1955, G. J. Brown reported to Mr. Chislett that he had proved breeding at Bempton in 1952, with two nests in a cave and containing two and three young respectively. G. J. Brown later told H.O.B. that he had climbed down the cliff and worked his way along the face far enough to be able to see into the cave, which is situated a little to the south of the Gannet ' colony '.

W. Waines, one of the Flamborough climbers, obtained in 1953 at the request of egg-collectors, eggs of either Cormorant (*Phalacrocorax carbo*) or Shag from one of the caves examined by us in 1954. Apparently neither the Flamborough nor Bempton climbers distinguish between the two species.

During 1955 a less intensive watch was kept at the selected Flamborough area. The most significant event was a group of Shags on one rock on September 10th, comprising 17 full adults and 31 immatures, some of which were undoubtedly birds of the year still being fed by adults. No evidence of breeding was obtained at Bempton in 1955, but birds were seen in the usual places and two possible new sites located.

Comments and Conclusions

Distinction of juveniles. Satisfactory distinction between birds of the year and others not fully adult has not always been obtained, and we have only considered as birds of the year those which have actually been seen in the nest or, if out of it, being fed by adults. Closely knit groups of up to four immature birds have been seen both on rocks and on the sea several times from July to September, and these may well have been family parties, adults being present, presumably in attendance, on some occasions.

Nest Sites. All appear to be in caves, holes or crevices, and no open ledge sites have been seen. Particularly in the case of the cave sites, where water enters the caves at high tides, the possibility of nest destruction in rough weather seems to be considerable. Some at least of the nest sites are accessible without the use of ropes, but within the caves examined by us the actual nests appeared to be inaccessible. The climbers admit to having taken eggs which, from the description, were those of either Shag or Cormorant, from the most easterly of the caves we examined, where we thought, a skilled and determined man might have been able to reach the ledges.

In conclusion, we consider that, although concrete proof of breeding in recent years was not obtained until 1952, such evidence as we have suggests that a breeding colony was already established in the Cradle Head area in 1949. No significant evidence is forthcoming, however, concerning the actual date of commencement of breeding, nor of the origin of the initial breeders. In August, 1954, an immature bird (considered by H.O.B. to be a second-year bird) at Bempton bore a dull aluminium ring on its right leg, and at Cradle Head an immature bird was seen with an apparently new aluminium ring on the right leg. Such recoveries of ringed birds as have been published suggest that young birds from the Farnes, Bass and Isle of May are scattered southwards down the East Coast in winter, but as the birds are said not to breed until their third year the way in which the East Yorkshire colonies have been established must remain a matter for conjecture.

One factor may be that birds are apparently not now subject to such intense persecution as they were at the turn of the last century.

Two sources of failure in the making of observations are suspected. Firstly, the presumed lack of observation, especially during the war years; secondly, the psychological resistance which may have affected observers as a consequence of the reputed non-breeding status of the Shag in this area, with the result that birds may have been misidentified. Cormorants, we find, are present in small numbers at points along the cliffs between Stottle Bank Nook and Speeton, though the small numbers of young seen suggest that breeding birds are less numerous than the Shags.

Finally, it should be noted that Shags were seen in 1955 on the cliffs north of Filey Brigg. Further investigation of this stretch of coast, as well as of any areas in the North Riding where Cormorants are known to breed, would be desirable.

Rockall, by **James Fisher.** Pp. 200, Geoffrey Bliss, 1956. 18/-.

The many who are acquainted with the work of this author will anticipate that any task to which he sets his hand will be well and competently done and in this they will not be disappointed.

This book includes all that is known of the history and the wild life of this barren rock situated so far out in the Atlantic Ocean. The many attempts to land thereon since it was first charted not less than four hundred years ago make most interesting reading; it is probably because of its remote position and inaccessible nature that Rockall is so well known and excites such great interest, helped by the fact that it is included in the B.B.C. weather reports and that it became part of Great Britain when on September 18th, 1955, possession of the island was taken in the name of Her Majesty Queen Elizabeth.

This book is mainly, then, an exciting historical account both of the many unsuccessful attempts that have been made to effect a landing on Rockall and of the successful attempts of 1811, 1862, 1921, and 1955. In the last instance H.M. Survey Ship *Vidal* carried a helicopter and it was possible to land from above and to make a detailed survey of the geology, plant life and zoology, of which particulars are given in the Appendices. A fourth Appendix deals with the birds but apart from a small colony of Guillemots, which probably nest on one of the few ledges, it is evident that the rock is used as a resting place and not as a breeding station.

The book is well produced and illustrated by sixteen plates and a coloured frontispiece in addition to a number of charts and a bibliography.

E.W.T.

Horse Psychology, by **Moyra Williams.** Pp. xvi + 194 with numerous diagrams and drawings. Methuen & Co. 16/-.

Anyone who has ever kept a horse of their own or had anything to do with horses will appreciate the value and common-sense outlook of this book. In describing the psychology of the horse emphasis is laid on the necessity of correlating a horse's reactions to a particular situation with its basic needs, instincts and physical capabilities as well as interpreting them in the light of animal, and human, behaviour in general. The author supports her theories by many practical illustrations drawn from her own experience and also discusses more controversial subjects such as the relationship between colour and other physical characteristics, and temperament and intelligence. She throws new light on many problems and may perhaps help horse-lovers to deal more understandingly and successfully with their charges. The book provides fascinating reading and is enlivened throughout by many humorous touches and by Sylvia Treadgold's charming drawings.

The Nature-Lover's Recognition Book, by **Brian Vesey-Fitzgerald.** Pp. 192, with 8 plates and numerous illustrations in the text. Odham's Press, London, 1956. 12/6.

Within the restricted space at his disposal, the author has attempted to provide enough textual information and recognition tables of the commoner sorts of animals and plants to enable the average rambler to identify his chance finds. To this end it will serve well enough on the whole but one hopes the inadequacies, which I am sure its author would be the first to admit, will persuade some of its owners to equip themselves with more specialised and comprehensive recognition manuals; then it will have done even better service.

E.H.

THE BIRDS OF WOODHOUSE MOOR, LEEDS

K. G. SPENCER

Woodhouse Moor, Leeds, is no moor in the generally-accepted sense of the word, but simply a rather depressing island of greenery less than two miles from the city centre. In the spring of 1950—chiefly during University lunchtime breaks—I made a simple bird-population study on its western side (*c.* 53 acres). At that time the greater part of the area was given over to allotments, the majority of which have since been cleared away and replaced by open grassland. Shrubs, occurring mainly as undergrowth, covered no more than two acres; now, following recent alterations, they cover even less. There are occasional sparse groups of trees. The rest of the Moor is taken up by bowling greens, a playground, tarmac tennis courts and tree-lined paths. The whole is entirely public: scores of people on their way to and from work cross it daily, children trample over at will, and knockabout football matches are held there.

The following birds were apparently resident on the Moor in mid-March, 1950: House-Sparrows (plentiful), Hedge-Sparrows (6 pairs), Robins (4 pairs), Blackbirds (3 or 4), Song-Thrushes (3), Pied Wagtails (1 or 2 pairs), Blue-Tits (at least 1 pair), Chaffinches (at least 2♂♂), Greenfinches (at least 2♂♂), Mistle-Thrushes (1 pair), Wrens (1 pair), and at least 1 Skylark (♂).

The House-Sparrows nested abundantly in a variety of sites on the Moor and very many, of course, bred on the houses round about, as did Starlings. Until March 14th, 1950, the sparrows roosted communally in an old bandstand. On that day complete demolition of the building took place, and its absence at dusk was the cause of great bewilderment to the incoming birds: individuals and little parties would repeatedly sally out to the spot in mid-air where their roosting-places used to be, and then veer back again to the surrounding bushes. They finally settled down to sleep in these, and by the next evening were evidently resigned to the new position, for no more ' force of habit behaviour ' was observed. (*British Birds*, **44,** 92.)

The Hedge-Sparrows dwelt chiefly where there was undergrowth. Their territories were contiguous, each managing to include within its bounds a ' cut ' of the available cover: their approximate acreages were ¾, 1, 1, 1½, 1¾ and 2. Incidental query: When does pair-formation take place with Hedge-Sparrows ? Not, I think, in early spring as with most passerines.

The Robins, likewise, kept away from the more exposed parts of the Moor. Three of the four territories were contiguous; acreages I estimated as 1, 1½, 1½ and 2. These figures tally well with others obtained elsewhere by myself (see *British Birds*, **42,** 184) and by Dr. Lack (*The Life of the Robin*), but at the same time I feel I must stress their very approximate nature. Territories, both with Hedge-Sparrows and Robins, although obvious enough in a general way, seem often only vaguely defined.

The Wrens held an area of about 2½ acres and, though they had no neighbours to hem them in, I never saw them outside that zone; which lay entirely within the allotments. I think they probably nested in one of the ramshackle huts there. Absence of rivals did not stop the male from singing, though his output was probably lower than that of birds more frequently challenged.

The Wagtails also kept to allotment-parts of the Moor, and may have attempted nesting in a site similar to the Wrens.

The Mistle-Thrushes ranged over the whole area. They eventually nested —successfully—in a small tree near the centre.

Magpies breed annually on the Moor. In one year (1952) they commenced operations as early as March 4th and, dismantling an old nest, constructed a new one in an adjacent tree, completing it, at least externally, by the 11th. Apart from a nest near Halifax in 1955, begun by February 21st, the Woodhouse Moor one is the earliest of which I have record. I think Magpies may make a practice of almost completing the nest (perhaps just leaving out the inner lining) and then abandoning it for some days—or maybe weeks—before commencing to lay. They seem to do most of their building in the first few hours of daylight.

There may have been more than the single Skylark. The individual that I noted was often to be heard singing over the allotments: to one more used to larks above the Pennine hills, it appeared pleasingly incongruous.

I made no observations on the Blackbirds, Song-Thrushes, Chaffinches, Greenfinches or Blue-Tits, beyond noting that the latter seemed to travel without limits in the trees on the area.

The following are miscellaneous notes concerning birds on the Moor: Fifteen Yellowhammers were present on March 8th, 1950, at 14.00 hours, but had moved on by 17.00 hours. One of them sang a little during its brief visit. A Wheatear turned up on the morning of April 19th in the same year, but was likewise away within a few hours. In mid-May I heard, but did not see, a Yellow Wagtail and also a Great-Tit on the Moor. Several Chaffinches made a temporary halt there on March 4th, 1952. Meadow-Pipits also came in occasionally. Incidentally I once (February 8th, 1952), saw a Meadow-Pipit feeding on a strip of sooty lawn alongside the Infirmary, only a few hundred yards from the very centre of the city. In mid-March, 1952, I noticed an influx of Greenfinches on the Moor: almost all passage-birds, I think. I have no record of Willow-Warbler occurrences in spring. I think the species rather favours banks on which to nest, and the Moor is very flat. I recall having heard Willow-Warblers in song on the area between about July and September, however. In suburban gardens of even the most industrial towns of the north, a late-summer infiltration of them is an annual feature. Kestrels occasionally hunt over the Moor, and by night Tawny Owls frequent it habitually.

I have not been living in Leeds for some time, and my visits there recently have been few, but from them I have gained the impression that it is not now unusual to see Common Gulls on the Moor. Formerly, with all the allotments, gulls of any kind rarely alighted. I have chosen to publish these notes, casual and meagre as they are, because they do in some measure depict the bird-population of the Moor as it was in 1950 and perhaps will never be again. With the passing of most of the allotments, have the Wrens and Wagtails survived ? How have the Robins and Hedge-Sparrows fared against the recent drastic eradication of shrub-cover ? And have larks profited at all from the extended grassland ?

Immature—Adult Proportions and Behaviour in Black-headed Gull Flocks.—Casual observations on Black-headed Gulls (*Larus ridibundus*) at Grange-over-Sands, Lancashire, on September 27th, 1955, indicated that the proportion of immatures was higher in flocks frequenting the lake in the ornamental gardens than in groups on the remoter parts of the shore. More careful investigation during the next few days, and again in November and December, and in January 1956, confirmed this impression.

	Samples	*Adult*	*Imm.*	*Imms. as approx. per cent. of total*
Ornamental Gardens				
Sept. 27th to Oct. 1st	22	159	135	46
Nov. 24th–29th	3	98	32	25
Dec. 25th–28th	13	292	99	25
Jan. 27th–28th	7	119	51	30
Shore near Kents Bank				
Sept. 27th to Oct. 1st	12	408	58	12
Nov. 24th–29th	3	56	3	5
Dec. 25th–28th	3	30	2	7
Jan. 27th–28th	3	39	2	5

Now the gulls in the ornamental gardens are very frequently fed by passers-by. It would seem, therefore, from the figures, that immatures are more inclined than adults to take advantage of 'charity'. They are, moreover, rather tamer: in a mêlée after bread, often the nearest ten or twelve individuals would all be immature.

Perhaps the main interest of these observations lies in their application to questions of survival in relation to age (cf. Lack, *British Birds*, Vol. xxxvi, pp. 193-197, 214-221, and *Proc. Xth I.O.C. Uppsala*, pp. 409-448). Dr. Lack has demonstrated from the ringing returns that in Black-headed Gulls the expectation of further life is less for those in their first year than for those in their second and several subsequent years, and our findings nicely support the view that this may be largely due to the younger birds' greater tameness rendering them especially liable to fall victim in those regions abroad where gull-shooting still goes on. And that immatures are more inclined than adults to migrate (confirming Lack, *British Birds*, Vol. xxxvii, pp. 122-130, 143-150) is indeed a further point brought out by our figures.—K. G. Spencer and A. Welch.

THE AUTUMN FORAY, PATELEY BRIDGE
September 23rd-27th, 1955

W. G. BRAMLEY

ENTIRELY new ground was visited for the 1955 Autumn Foray. Nidderdale has never been visited by the Union solely for mycological research. Many of the thirty members and friends who attended did so with the expectation of finding little after the exceptionally dry and warm summer with little rain from early July. No sooner were we in Ravens Gill on the Saturday than this expectation was proved to be groundless and before the end of the day baskets were well filled. Although most species were not in quantity there were in the genera *Russula, Lactarius* and *Boletus* fifteen, ten and twelve different species collected and named. Other genera, however, were generally restricted to one or two species. Whilst specimens were often few in number the exception was *Clitocybe aurantiaca* which was in great profusion both in Ravens Gill and also at Wath, both in the woods and also in the surrounding moorland pastures.

Enough material was available to keep most of the workers busy during the evening and the following morning. The afternoon was spent again in Ravens Gill after the discovery of truffles by one or two members during the morning.

On the Monday a visit was paid to Wath, but here the ground was much drier and the larger fungi were not so common. *Boletus parasiticus* was found and though recorded from two vice-counties no member had seen it before in Yorkshire. Special attention was paid here by Mr. Collinge and Dr. Hincks to the genus *Mycena* resulting in ten species being added to the list.

Headquarters proved somewhat disappointing. The promised workroom had been converted into bedrooms. On the Friday evening this looked like being disastrous, but enquiries the same evening brought forth an excellent room in the centre of the town with enough tables and chairs to give most of the party room to work and some to spare for the exhibition of specimens. Without this the meeting could not have been carried to a successful conclusion. The Chairman's Address was given here and the audience was well rewarded by Miss Blackwell's very lively and informative talk on ' Mycology and Mycologists in Yorkshire '.

Thanks are due to all those who helped with the collecting and afterwards with the naming and detailed examination of material. Miss Watson, of Durham, supplied the list of Russulas and gave help with other genera. Mr. Bates listed the few Myxomycetes found. To Mr. Collinge, as already indicated, is due the list of Mycenas and to Mr. W. D. Graddon I am indebted for most of the records of Discomycetes. Pyrenomycetes and Hyphomycetes were somewhat neglected, but Mr. C. Booth of C.M.I. has furnished the few he collected and one or two others submitted afterwards. Resupinates were not in quantity, but Mr. R. Watling has sent a list of those collected by him and which are now in his herbarium.

Amanita phalloides was present in fair quantity and a few specimens of *A. verna* were also collected. *Inocybe hystrix* was new to most and is a very characteristic species. *Leptonia* is a genus which is not often recorded, but beautiful specimens of the two species were much admired. *Mycena salicina* is the first record for Yorkshire. *Paxillus panuoides* is apparently uncommon. *Anthostoma microsporum* has now been found in three widely separated localities. *Hypocrea lactea* is also new to Yorkshire. *Ciliaria hirta* has been confirmed by Mme. Le Gal. No doubt we often tend to pass all red ' Lachneas ' as *L. scutellata*. *Ramularia punctiformis* on *Epilobium montanum* is apparently rare.

* Not recorded for V.C. 64 in Mason & Grainger's *Catalogue of Yorkshire Fungi.*

† Not in Mason & Grainger's *Catalogue of Yorkshire Fungi.*

R. = Ravens Gill. W. = Wath.

MYXOMYCETES

Arcyria incarnata Pers., R.
Diderma effusum Morg.
Fuligo septica Gmel., R.
Physarum compressum Alb. et Schw.
P. sinuosum Weinm.
P. viride Pers. var. *incanum* Lister

PLECTASCALES

Elaphomyces granulatus Fr., R.
E. variegatus Vitt., R.

DISCOMYCETES

Ascophanus ochraceus (Cr.) Boud.
†*Calycella sulphurina* (Quél.) Boud., R.
Ciliaria hirta (Schum.) Boud.
C. scutellata (Linn.) Boud., R.
C. setosa (Nees) Boud.
Coryne sarcoides (Jacq.) Tul., B., W.
Cudoniella acicularis (Bull.) Schroet., R., W.
Dasyscypha apala (B. et Br.) Dennis, R.
D. ciliaris (Schrad.) Sacc.
D. virginea (Batsch.) Fuckel, R.
Galactinia badia (Pers.) Boud.
Helotium scutula (Pers.) Karst.
Helvella crispa Scop.
Hyaloscypha hyalina (Pers.) Boud.
†*H. leuconica* (Cooke) Nannf., R., W.
Leotia lubrica Scop., R.
Microglossum viride (Pers.) Gill., R.
†*Mollisia ramealis* (Karst.) Karst.
†*Orbilia curvatispora* Boud.
O. leucostigma Fr.
**O. luteo-rubella* (Nyl.) Karst.
O. xanthostigma Fr., R.
Pseudopeziza ranunculi (Wallr.) Fuckel, R.
**Psilopeziza babingtonii* (B. et Br.) Le Gal (in M. & G. *Humaria oocardii* Sacc.)
**Rutstroemia luteo-virescens* (Rob.) Karst.
R. sydowiana (Rehm.) White

PYRENOMYCETES

(Numbers refer to specimens at C.M.I.)

†*Anthostoma microsporum* Karst., on *Alnus*, W. 61212.
Cordyceps forquignoni Quél., on Flies (*Musca* sp.), W.
C. militaris (Linn.) Link
C. ophioglossoides (Ehrenb.) Link, on *Elaphomyces*, W.
†*Hypocrea lactea* Fr., on Conifer, R. 61554
Hypoxylon fuscum (Pers.) Fr., on *Corylus*, R.
H. serpens (Pers.) Fr., on *Quercus*, W.
Melanconis stilbostoma (Fr.) Tul., on *Betula*, W.
**Valsa ceratophora* Tul., on *Sorbus*, W. 61211
†*V. pruinosa* (Fr.) Defays, on *Fraxinus*, W. 61214

UREDINALES

Coleosporium tussilaginis Tul., R.
Puccinia centaurea DC., R.
P. chondrillae (Pers.) Corda, R.
P. cirsii Lasch, R.
P. hypochaeridis Oud., R.
P. leontodontis Jacky, R.
P. obtegens Tul., R., W.
Puccinia poarum Niels., OI. R.
P. variabilis Grev.
P. violae (Schum.) DC.
Uromyces dactylidis Otth, R.
U. rumicis (Schum.) Wint., R.
Ustilago anomala Kunze, on *R. hydropiper*, W. (in Herb. W.G.B.)

TREMELLALES

Calocera cornea (Batsch) Fr.
**C. stricta* Fr.
Calocera viscosa (Pers.) Fr.
Tremella foliacea (Pers.) Fr.

AGARICALES

Amanita phalloides (Vaill.) Fr.
A. rubescens (Pers.) Fr.
A. verna (Bull.) Fr.
Amanitopsis vaginata (Bull.) Roze
A. fulva (Grev.) Rea
Anellaria semi-ovata (Sow. ex Fr.) Pearson & Dennis
Armillaria mellea (Vahl) Fr.
Bolbitius fragilis (Linn.) Fr.
Cantharellus cibarius Fr.
**C. tubaeformis* (Bull.) Fr.
Clitocybe aurantiaca (Wulf.) Studer.
Collybia butyracea (Bull.) Fr.
**C. longipes* (Bull.) Berk.
C. maculata (Alb. et Schw.) Fr.
Coprinus comatus (Fl. Dan.) Fr.
C. micaceus (Bull.) Fr.
C. plicatilis (Curt.) Fr.
C. radiatus (Bolt.) Fr.
Cortinarius cinnamomeus Fr.
C. elatior Fr. (sensu stricto)
Crepidotus variabilis (Pers.) Fr.

AGARICALES—*continued*

Entoloma ardosiacum (Bull.) Fr.
**Flammula gummosa* (Lasch) Fr.
Galera hypnorum (Batsch) Fr.
Hebeloma crustuliniforme (Bull.) Fr.
Hygrophorus eburneus (Bull.) Fr.
H. psittacinus (Schaeff.) Fr.
Hypholoma fasciculare (Huds.) Fr.
H. hydrophilum (Bull.) Fr.
H. sublateritium Fr.
Inocybe fastigiata (Schaeff.) Quél.
**I. hystrix* (Fr.) Karst.
Laccaria amethystina (Vaill.) Cooke
L. laccata (Scop.) Cooke
Lactarius blennius Fr.
L. camphoratus (Bull.) Fr.
L. fuliginosus Fr.
L. glyciosmus Fr.
L. pallidus (Pers.) Fr.
L. plumbeus Fr.
L. quietus Fr.
L. rufus (Scop.) Fr.
L. subdulcis (Pers.) Fr.
L. vellereus Fr.
Lepiota procera (Scop.) Fr.
Leptonia chalybea (Pers.) Fr.
L. sericella (Fr.) Quél.
Marasmius androsaceus (Linn.) Fr.
M. confluens (Pers.) Karst.
M. dryophilus (Bull.) Karst.
M. peronatus (Bolt.) Fr.
M. rotula (Scop.) Fr.
Mycena amicta Fr.
M. ammoniaca Fr.
M. epipterygia (Scop.) Fr.
M. galericulata (Scop.) Fr.
M. galopus (Pers.) Fr.
**Mycena inclinata* Fr.
†*M. polygramma* (Bull.) Fr. var. *pumila* Lange
†*M. salicina* Vel.
M. sanguinolenta (A. & S.) Fr.
M. tenerrima Berk.
Naucoria escharoides Fr.
Omphalia umbellifera (Linn.) Fr.
Panaeolus campanulatus (Linn.) Fr.
P. papilionatus (Bull.) Fr.
Paxillus involutus (Batsch) Fr.
P. panuoides Fr.
Pholiota mutabilis (Schaeff.) Fr.
Pleurotus ostreatus (Jacq.) Fr.
Pluteus cervinus (Schaeff.) Fr.
P. nanus (Pers.) Fr. var. *lutescens* Fr.
Psathyrella atomata Fr.
**P. pennata* (Fr.) Pearson & Dennis
Psilocybe semilanceata Fr.
Russula atropurpurea Krombh.
R. cyanoxantha (Schaeff.) Fr.
R. delica Fr.
R. densifolia (Secr.) Gill.
R. emetica (Schaeff.) Fr.
R. fellea Fr.
R. foetens Fr.
R. fragilis Fr.
R. grisea (Pers. ex Secr.) Fr.
†*R. laurocerasi* Melz.
R. lutea Fr.
R. nigricans Fr.
R. ochroleuca Fr.
†*R. versicolor* J. Schaeffer
R. vesca Fr.
Stropharia semiglobata (Batsch) Fr.
Tricholoma terreum Fr.

BOLETALES

Boletus badius Fr.
**B. calopus* Fr.
B. chrysenteron (Bull.) Fr.
B. edulis (Bull.) Fr.
B. elegans (Schum) Fr.
**B. erythropus* Pers. non Fr.
Boletus felleus (Bull.) Fr.
**B. parasiticus* (Bull.) Fr., W.
B. scaber (Bull.) Krombh.
B. subtomentosus (Schaeff.) Fr.
B. versipellis Fr.
**Porphyrellus porphyrosporus* (Fr.) Gilb.

APHYLLOPHORALES

Daedalia quercina (Linn.) Fr., W.
Fomes annosus Fr.
Irpex obliquus (Schrad.) Fr.
Merulius lacrymans (Wulf.) Fr.
M. rufus (Pers.) Fr.
**Polyporus adiposus* B. & Br.
P. betulinus (ull.) BFr.
P. caesius (Schrad.) Fr.
P. giganteus (Pers.) Fr., W.
P. radiatus (Sow.) Fr.
P. squamosus (Huds.) Fr.
P. sulphureus (Bull.) Fr.
**Polystictus hirsutus* (Wulf.) Fr.
Polystictus versicolor (Linn.) Fr.
Stereum gausapatum
S. rugosum (Pers.) Fr.
S. sanguinolentum (A. & S.) Fr.
Odontia arguta (Fr.) Quél.
†*O. bicolor* (A. & S.) Bres.
Pelicularia pruinata (Bres.) Rogers, W.
†*P. subcoronata* (v Hohn) Rogers.
Peniophora pubera (Fr.) Sacc.
Phylacteria terrestris (Ehrenb.) B. & G.
Clavaria cinerea (Bull.) Fr.
**Typhula gracilis* Berk., W.

GASTEROMYCETALES

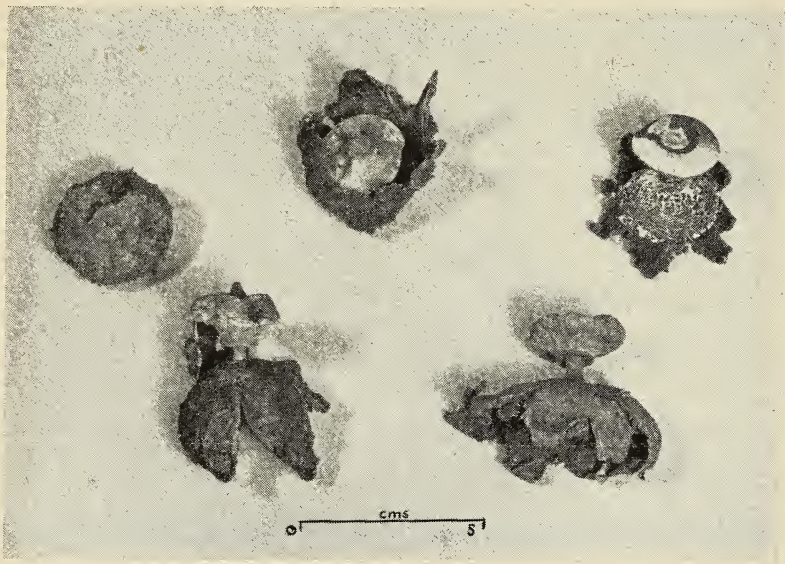
Mutinus caninus (Huds.) Fr.
Phallus impudicus (Pinn.) Pers.
Lycoperdon perlatum Pers.
Scleroderma aurantium Pers.
Sphaerobolus stellatus (Tode) Pers.

HYPHOMYCETES

†*Bisporomyces chlamydosporus* van Beyma, W.
†*Ramularia punctiformis* (Schlecht.) v. Höhn., on *Epilobium montanum*, R.

FIELD NOTES

A second Yorkshire record of *Geastrum bryantii* Berk.—On Sunday, January 8th, the writer had been fishing along the south bank of the Wharfe below



Harewood and, whilst sheltering under a hawthorn hedge, noticed what appeared to be a small ' toadstool ' apparently growing on a piece of dry bark. Closer examination showed that the specimen was, in fact, a geaster with a stalked endoperidium on the reflexed exoperidium. A search of the area provided several more specimens, including an egg stage and a partly-opened specimen. All were dry and well preserved and one of them readily emitted small clouds of brown spores when tapped.

The specimens collected were submitted to Dr. C. J. P. LaTouche who identified them as *Geastrum bryantii* Berk. and this was later confirmed by Dr. W. A. Sledge and by Mr. J. T. Palmer, who very kindly supplied some further information about this species in his paper ' Lancashire and Cheshire Earthstars ' (*Proceedings of the Liverpool Naturalists Field Club*, 1952, 28-31). The striated conical mouth on the endoperidium and the collar around the stalk are very characteristic.

The fungi were growing in very light sandy soil which appears to be a typical habitat. The species is of infrequent distribution, but would appear from accounts to reappear regularly in the same spot, so that it is hoped to see more in the future. Massee's record from Castle Howard, quoted in the *Fungus Flora of Yorkshire* (1902, 10) appears to be the only other Yorkshire record.

I am indebted to Dr. LaTouche for permission to use the photograph which he took and which is reproduced with this note.—John H. Elliott.

Observations on *Wiedemannia bistigma* Curtis (Diptera: Empididae).—While collecting specimens of the above species from moss growing on the sluice gate, Malham Tarn, on June 16th, 1954, it occurred to me that a search of similar habitats in the area might yield information on distribution and feeding habits.

During August 1955 I spent a week at Austwick and thoroughly examined the becks in the vicinity for this species. In all those containing boulders with a growth of moss it was possible to find specimens. In the lower reaches of Kickersghyll and Austwick Beck specimens were abundant. Soon after my visit to Austwick I spent half a day at Gordale Beck near Malham, and again found specimens in abundance.

The Malham Tarn habitat is situated on the stone walls of the sluice gate, and the moss glowing thereon is subjected to a moderately swift flow of water which finds its way through cracks in the masonry. During more normal conditions (drought conditions prevailed at Austwick and Gordale Beck was extremely low) the becks visited would contain moving water of the order of that obtaining at Malham Tarn sluice gate.

Turbulent water conditions do not appear to interfere with mating and pairs were seen *in copula* on the moss and on clumps of filamentous alga floating on the surface of the water.

Feeding was observed to take place on clumps of alga on the water surface and occasionally at the water's edge, the food consisting of dead drowned *Scatophaga* (Cordyluridae), *Limonia* and *Tipula* (Tipulidae). Dead Trichopteran adults were often seen with a large number of specimens feeding thereon.

The habit of feeding on dead insects is a surprising one for a member of the Empididae and is approached, so far as is known, only by the peculiar habit of females of *Microphorus crassipes* Macq. of feeding on prey on spiders' webs (Laurence, *Ent. mon. Mag.*, 1948, **84,** 282-283). All other described Empid feeding habits are those of active predators, in some of which (*Hilara, Empis* and *Rhamphomyia*) the capture of prey is associated with courtship behaviour (Hamm, *Ent. mon. Mag.*, 1908, **44,** 181-184; *ibid.*, 1909, **45,** 157-162; *Proc. Roy. Soc.* (B), 1928, **102,** 334-338; Parmenter, *Ent. mon. Mag.*, 1950, **86,** 255-256; Smith, *Ent. Rec.*, 1949, **61,** 39-42).

Diptera taken at Gordale Beck near Malham (in addition to *Wiedemannia bistigma* Curtis) included *Hydrodromia stagnalis* Haliday, *Wiedemannia rhynchops insularis* Collin, *Chamaedipsia lota* Haliday, and the Dolichopodid *Campsicnemus curvipes* Fln.—H. M. Russell.

Clusiaria facialis Collin (Diptera, Clusiidae) new to Yorkshire, with Notes on other Additions to the Yorkshire Diptera List.—On May 30th, 1955, while collecting Diptera in the woods at Terry Lug, Wothersome (V.C. 64), I took a single male specimen of *Clusiaria facialis* Collin on a much-decayed fallen tree trunk. This species was described by Mr. J. E. Collin in September, 1953 (*J. Soc. Brit. Ent.*, **4,** Part 7) from specimens of both sexes taken in Chippenham Fen (Cambridgeshire) in July, 1940, but previously known from two males taken by Col. J. W. Yerbury at Golspie (Sutherland) in June, 1904, and others as follows: one taken by Canon L. W. Grensted at Wilmslow (Cheshire) in August, 1930, and others by Mr. H. Britten at Cotterill Clough and Rostherne (Cheshire) in July, 1942. Dr. W. D. Hincks collected two males in the woods at Burton, Wirrall, Cheshire, during June, 1952.

The Y.N.U. meeting at Queen Mary's Dub, Ripon (V.C. 64) on June 25th, 1955, has yielded two further additions to the county list. These are *Notiphila supposita* Collin, an Ephydrid associated with damp situations, such as the borders of ponds, streams and marshes, and the Dolichopodid *Chrysotus microcerus* Kow. The latter is a sparkling metallic green species with iridescent wings, and is usually to be found on sunlit foliage.

Another addition is the Empid *Platypalpus major* Zett., a single specimen of which I took in Tarn House Plantation, Malham, on August 14th, 1955. The mid-legs of this species are adapted for holding prey, the tibiae folding back upon the femora like the blade of a pocket-knife upon its handle.—H. M. Russell.

Earthworm Notes and Records.—(i) *Allolobophora arnoldi* Gates. In 1952 *Allolobophora arnoldi* was separated from *A. caliginosa* Savigny (1826) by G. E. Gates ('New Species of Earthworm from the Arnold Arboretum, Boston', *Breviora,*

No. 9, 1-3, 1952; ' On the Earthworms of New Hampshire ', *Breviora*, No. 10, 1952. See also his paper ' On the Earthworms of the Arnold Arboretum, Boston ', *Bull. Mus. comp. Zool. Harvard*, 107, 10: 499-534, 1953). His specimens of *A. arnoldi* from Boston, Massachusetts, New Hampshire and other localities in the eastern United States differ from *A. caliginosa* Sav. in the segmental distribution of the genital tumescences, extent of the clitellum and greater number of segments as follows:

	A. caliginosa Sav.	*A. arnoldi* Gates
Genital tumescences .	9, 10, 11, (27), 30, 32, 33, 34	9, 10, 11, (26), 30, 32, 34
Clitellum . . .	$\frac{1}{2}$28, 29–34	$\frac{1}{2}$27, 28–$\frac{1}{2}$35
Number of segments (normal range) . .	120–168	140–194

A. arnoldi Gates was reported for the first time in Great Britain near Bristol by H. Davies in 1954 (two adults) (' On the occurrence in England of the Earthworm *Allolobophora arnoldi* Gates, 1952,', *Ann. and Mag. Nat. Hist.*, **7,** 12th series, No. 77, pp. 351-52, 1954). Recently a further five specimens have been identified (confirmed by the British Museum) in material collected in September, 1953, and October, 1955, at the Sports Turf Research Institute, Bingley, Yorkshire. These specimens are more robust than *A. caliginosa* Sav., the number of segments ranges from 141-181, genital tumescences are absent on segment 33 and the clitellum covers segments 27, 28–$\frac{1}{2}$35.

The elevation of *A. arnoldi* to species rank mainly on the segmental distribution of the genital tumescences—a relatively new criterion in Lumbricid taxonomy—is open to question and to determine the true status of *A. arnoldi* Gates, cytological studies and breeding experiments are now being undertaken.

(ii) *Bimastus tenuis* (Eisen). Several specimens (length 20-27 mm.) were recorded from moist sandy soil near the Arboretum pool, Nottingham, in December, 1955, and January, 1956 (Jefferson, P., and Vaughan, A.).

(iii) *Allolobophora icterica* Sav. *f. typica.* One adult and several juveniles of this local earthworm were identified in material collected in July, 1952, from sandy soil in the Arboretum, Nottingham.—P. Jefferson.

Y.N.U. Bryological Meeting, Bolton Abbey, May 5th, 1956.—The first meeting of the year was, by bryological standards, very well attended, a total of sixteen being in the party.

The district has been frequently visited by this Section in recent years and it was not to be expected that anything new would be discovered. The most important work accomplished at this meeting was the interest which it is hoped was stimulated in a number of beginners in bryology, and I trust that this interest will be maintained. I wish particularly to thank Miss Scott for her invaluable assistance in naming bryophytes in the field, and also those who assisted with transport.

I had requested that special search be made to confirm the following old records, and I again draw attention to them so that bryologists visiting the district may look out for same. They are: *Discelium nudum* (Dicks.) Brid., *Tetraphis browniana* (Dicks.) Grev., *Dicranodontium denudatum* (Brid.) E. G. Britton, *Ptychomitrium polyphyllum* (Sw.) Fürnr. (on conduit, Barden, 1915), *Hedwigia ciliata* (Hedw.) P. Beauv. (Barden Tower—B. Carrington), *Grimmia orbicularis* Bruch (on rocks by Strid, 1898), *Trichostomum sinuosum* (Wils.) Lindb. (1915), *Antitrichia curtipendula* (Hedw.) Brid. (Barden Tower and near Strid—Nowell), *Pylaisia polyantha* (Hedw.) B. & S. *Eucladium verticillatum* (With.) B. & S. (which is not given for Bolton in either the Register or the Transactions) was seen fruiting abundantly on the East bank of the Wharfe by the writer.

The next meeting of the Section will be at Hackfall, near Masham, on September 22nd, 1956, details of which will be published in due course.—G. A. Shaw.

BOOK REVIEWS

Trees, Woods and Man, by **H. L. Edlin.** Pp. 272 with 27 colour photographs, 30 photographs in black and white, and two line drawings. The New Naturalist, Collins, London, 1956, 30/-.

This book is a mine of information about our woodlands, past, present, and future, and contains much to interest all naturalists. In tracing the history of British woodlands from prehistoric times, Mr. Edlin convincingly explodes a good many hoary legends as, for instance, that Early Man more easily destroyed the best woodlands, there being fewer trunks to hack down and fewer stumps to be hoed round; or that broad-leaved forests will not burn, not even when showered with modern incendiary bombs; or that charcoal for smelting can and was produced from well-managed coppices indefinitely. This changes the character of woodlands, but does not destroy them. It is not even true that extensive tracts of forest were destroyed to rid the country of bandits or wolves. So much for the fables of our history books. Mr. Edlin shows that our forests have fallen less to deliberate assault than to grazing pressure and neglect.

What of the future ? Here in the north we are perhaps wont to think that the Forestry Commission only grows conifers for quick profits, planting them in close-packed and hideous uniformity. It is therefore reassuring to know that in 1954, 10 per cent. of new forest and 30 per cent. of replanted woodland was devoted to our native hardwoods. If we see few of these in the north it is because new forests are being developed here and only marginal land is available for them. But a considerable variety of species is being used and we have to remember that these forests of the future are still very young. They will look very different when grown up and will provide a much greater variety of habitats for plants and animals than the young plantations. On the whole, therefore, Mr. Edlin is hopeful about our future British forests and demonstrates that there is real vision behind their planning and development.

In the last section of the book he deals with each of our major forest trees, whether native or introduced, its history, future, and usage. He has a wide knowledge of woodland crafts, past and present, which greatly adds to the interest of this section.

This book is a notable addition to the New Naturalist series. One wonders, however, how much of the high cost is due to the inclusion of 27 atrocious colour photographs, with crude, hideously distorted colour and poor definition. They add nothing of real value and there are no page references to help the hapless reader to find them. On p. 175 there are references to plates II and Va. One is opposite p. 160 and the other opposite p. 84. It is high time the publishers and general editors of this series revised their policy about plates, which is a source of irritation to the reader and an imposition on his pocket.

C.S.

The World of Plant Life, by **Clarence J. Hylander.** Second Edition. Pp. xvi+653 with 190 full-page photographs and over 700 line drawings. New York and London. The Macmillan Co. 62/6.

The first edition of this book appeared in 1939 and the call for a second edition is a measure of its popularity and of its success in meeting the demand for a non-technical and comprehensive survey of the plant kingdom designed primarily for the lay reader. Though all the cryptogamic groups are covered in the earlier chapters the greater part of the book is devoted to the seed plants. These are dealt with family by family, the examples quoted being mostly familiar American wild flowers or plants of economic or horticultural importance. The author's intention is to provide the sort of information which the lay reader is most likely to be interested in and want to know yet at the same time to give him some awareness of taxonomic botany by arranging the information on a family or systematic basis. Much historical and geographical information is included about plants of commercial importance as well as a fund of information on uses, habitats, relationships and biological peculiarities of the many hundreds of plants to which reference is made. The very fine photographs and copious drawings add greatly to the value and attractive appearance of the book. Its price, however, though not unreasonable for so beautifully produced a work, coupled with the fact that it is primarily addressed to American readers and hence includes many plants which will be unfamiliar to British readers, will considerably reduce its appeal to readers in this country.

W.A.S.

Man and the Underwater World, by **Pierre de Latil** and **Jean Rivoire.** Pp. 400 and 108 figures. Jarrolds, London, 1956, 25/-.

The French are, without doubt, the leaders in underwater exploration and Pierre de Latil their chronicler-in-chief. With the major part of the land surface reasonably well known and documented so that surface exploration is more or less limited to expensive ' mopping-up ' operations which aim to study rather than to discover, the sea-bed offers an outlet to those who would penetrate ahead of their fellowmen. The interest which has been aroused by these newly opened vistas has prompted the authors to delve back into the whole history of human activity and interest in the submarine world.

The naturalist will be particularly absorbed by their comparisons of the nomenclature of Linnaeus and Aristotle, by way of the Middle Ages. Returning to the present day, they make it plain that no methods of exploration from the surface can do more to sample the animal life of the deep seas than a blind man might achieve in the realms of entomology by blindly swinging a net. It is made manifest that the study of the vast fauna and the not inconsiderable flora of the deep seas will yield only to study by men who have mastered the techniques of prolonged submersion or, more likely, by the magic eye of the television camera.

A.H.

Kingdom of the Beasts, by **Julian Huxley** and **W. Suschitzky.** Pp. 80 with 175 photogravure plates, 3 coloured. Thames & Hudson, London, 1956. 50/-.

This—for these days—lavish picture-book is mainly a vehicle for the very accomplished photographs, by Suschitzky, of mammals taken for the most part in the zoos of Europe. The text by Dr. Huxley comprises a fairly casual commentary on adaptive radiation as exemplified by the main mammalian orders and there is a terse anonymous annotation of the photographs themselves. The plates in photogravure are bound at the end of the book, numbered but uncaptioned, and it will be vexatious to have to refer back to the text to identify the less familiar subjects.

Perhaps the most successful portraits are the close-ups of heads, very reminiscent of the work of Gambier Bolton, not only of the larger carnivores but also of tapir, wild sheep and lesser-known mammals. On the other hand, the perception, and thus the art, of the photographer emphasises the essential qualities of some of the more specialised creatures by utilising the distortions of perspective and angular approach. Manatee, mongoose and many others are portrayed in this manner where the camera records not only the subject but also the percipient, evaluating mind which controls the representation.

It is to be regretted that the need for brevity has led the commentary on the animals portrayed to convey in a didactic manner statements which are arguable, as for instance the feral origin of white ' wild ' cattle, or demonstrably false as where the guinea-pig is said to produce but a single young one at a time.

E.H.

Sold for a Song, by **Clare Kipps.** Pp. 58 with 17 illustrations by L. R. Brightwell. Frederick Muller Ltd. 5/-.

Mrs. Clare Kipps is one of the very few people whose sympathetic understanding and deep love of animals has enabled her to live on terms of intimacy and friendship with unusual pets. Her previous book *Sold for a Farthing* (which incidentally has sold by the thousand, and very rightly so) was a remarkable account of the high degree of attachment to and faith in a human being which a house-sparrow is capable of forming. In this book she tells a similar story of an earlier experience with an Arabian Mongoose bought out of pity for its wretchedness in captivity and kept in her London flat for three years. Patience and kindness gradually allayed fear, and growing trust and confidence transformed a cringing and pathetic creature into a friendly, vivacious and highly entertaining pet which eventually manifested a degree of devotion to its keeper akin to that of a dog.

This is a little gem of a book. It has the dual merit of being both an acute analysis of animal behaviour and psychology and also a charmingly—indeed, beautifully—written study. The attribution of motives to explain the reactions of animals is a subject fraught with difficulty, and it is the author's awareness of this coupled with her sensitive and entertaining yet unsentimental manner of recording her observations and deductions which makes this book worthy to rank with similar studies by Miss Howard and Konrad Lorenz.

W.A.S.

Fontana Bird Guide, by **R. S. R. Fitter.** Pp. 192 with 8 plates. Collins. 2/6.
Interesting British Birds, by **Kathleen Daly.** Pp. 144 with 24 plates, illus. in text. Blackie & Co., 1956. 7/6.
Bird Watching, by **Bruce Coleman.** Pp. 94 with 8 plates. Foyles' Handbooks, London, 1956. 2/6.

The post-war vogue for bird-watching has led to a great increase in the number of books about birds, many reflecting the wider approach to ornithology as a popular science. In their wake has followed a medley of manuals of varying value which purport to do nothing more than to assist or enable the beginner to identify birds in the field. This difficult and prolonged task is set about most optimistically in a variety of ways, but almost all agree in abandoning any pretence of conveying relationship, categorising birds according to size, plumage or habitat. As the first and last cannot strictly be delimited and as the second is subject to infinite variation according to age, sex and season, all are doomed to failure in any but the most obvious cases. To attempt a determination by a concatenation of imponderables is to discard all scientific integrity and to swell the ranks of those unreliable observers whose undisciplined reports are the list-makers' anathema. Small wonder that recent activities have involved the chivying of some luckless bird over adjacent county boundaries ' for the record ', reducing comital listing to the level of the recording of the registration numbers of motor-cars.

Of the three books under review the first is a cheaper version of the author's *Pocket Guide to British Birds* with fewer illustrations, none coloured. A publisher's note claims that the '. . . book makes bird identification *easy* for *anyone* ' (their italics) although the author does not do so. Recognition is arrived at through a key based upon a number of criteria of which the principal one is size (length). The arrangement of the birds in the text is on a basis of size/habitat/season, which brings the Peregrine face to face with the Ring-Dove, the Buzzard with the Blackcock. It is odd to find the Roseate Tern in a higher category for size than the Black-headed Gull, the Shag than the Greater Black-back. But when the male Peregrine is said to be ' little bigger than . . . a female hobby ' at times and the Storm Petrel to fly ' fast and direct low over the surface of the sea ' the text is more than inferentially misleading.

Of the second book I would contest the publishers' note that ' There is a great demand for a clear and concise book of this sort . . .' The four dozen birds portrayed in colour reflect the work of nineteenth-century taxidermists in hues which suggest races as yet undescribed. The text concerning 128 species of apparently random choice is, on the whole, accurate as far as it goes, but around sixty words is not enough adequately to delineate a species.

Never before have I come across a book so replete with grammatical calamities as the final one under review and many of its mis-statements are grotesque. ' You will notice that a bird has eyelashes ', ' The tail steers the bird as the rudder of a ship ' and penguins' eggs ' are fitted into a kind of feathered pocket on the leg ' are quotations indicative of the value of this strange manual.

A.H.

Beetles, by **Jan Bechyně.** Translated and edited by C. M. F. von Hayek. Illustrated by B. Bechyně. Pp. 158. Open Air Guides. Thames and Hudson, 1956, 18/-.

' This book is intended to help all who are interested in beetles to identify the specimens they find ' (preface), and by this intention the book must be judged. It is a translation from a German work, and the selection of species illustrated is based on the German fauna, the classification following Reitter. The result is that 49 of the 255 species illustrated are not British while some of the remainder are very rare in Britain. Introductory chapters deal competently with structure, habitats, collecting and naming, and the work then passes on to the systematic dichotomous keys. It must be said that these are often quite unnecessarily difficult and cannot fail to put off the beginner for whom the work is intended. The separation of *Adephaga* and *Polyphaga* based on underside characters will immediately defeat the novice, while in the keys instances of obscure detail are too frequent. It is quite unnecessary, for example, to characterise the genus *Amara* in such a work by the number of setae on the penultimate segment of the labial palpi. Identification will certainly be attempted in the first case by searching through the illustrations and then checking with the brief description in the keys. The illustrations are of a very high standard

indeed, 48 splendidly coloured, and allowing for the German bias depict a fair cross-section of our beetles. How unfortunate that the numbering on the figures on colour plate I has been thoroughly confused !

A good popular introduction to the beetles on the lines of the familiar *Wayside and Woodland* series has long been needed. This book does not adequately meet the need, but goes some way toward it and will encourage and assist the beginner to name approximately a selection of the more distinctive species while gaining a knowledge of the beetles in general that will facilitate his approach to the standard works which he must ultimately use. Its attractive presentation should stimulate the enthusiasm of those who have found the beetles a difficult order to tackle, but it is a pity so many of the species selected for illustration and description are those which the novice (or experienced coleopterist) is unlikely to meet to the exclusion of so much that is common.

J.H.F.

Insect Communities, by **Harold Bastin.** Pp. 142, frontispiece and 20 plates. Hutchinson, 1956. 15/-.

This is a popular account not only of those insects which are found in what we normally consider communities, the termites and the social bees, wasps and ants, but also of a much wider range of species. The gregarious insects, the whirligig beetles whose swarms gyrate on the ponds in the sunshine, the mating swarms of midges and mayflies, the tortoiseshell butterflies and ladybirds that often hibernate in associations, and many others; the solicitous parents, the burying beetles, the earwig, the solitary wasps and bees and their cuckoos; the true social insects, and their parasites and various hangers-on; these, and a large number of other insects are briefly described and their ways recounted.

The author speculates briefly on the origins and development of these communities, but it is the great variety of insect life and habit to which the reader is introduced that will really engage his interest. Mr. Bastin has little recourse to those anthropomorphic terms that so often mar popular works of this nature. He is informative and reliable. The book is illustrated by a number of very good photographs by the author, some of which we have seen before. The half-hearted attempt at an index could well have been omitted and the glossary of popular and scientific names will hardly be used by the readers for whom the book is intended. A few mis-spellings of names occur but will not detract from the pleasure that the book will give to the general reader.

J.H.F.

The Observer's Book of Pond Life, by **John Clegg.** Pp. 128, with 32 colour and 16 monochrome plates by Ernest C. Mansell and 16 photographs by the author. Warne, 1956, 6/-.

What a pleasure to welcome this little book. The emphasis is on identification with a brief account of habitat and function, and he who takes a net to a few ponds and streams and uses this book will quickly acquire a knowledge of the main forms of aquatic life. Identification is achieved by comparison with the illustrations and the brief descriptions on the page facing each plate, and there is a useful key on the end plates. The illustrations are good. The work is a masterpiece of compression, the maximum of useful information having been condensed into the restricted space. The scope of the book is very wide and includes flowering and non-flowering plants, protozoa, worms, leeches, sponges, insects, snails, mites, fishes, frogs and newts. The selection has been made with excellent judgement and he would be a captious critic who would complain of inclusions or omissions.

One does not expect specific identification of beetles, sedges, diatoms, etc., in such a book, and the naturalist who turns to these pages will often only reach an approximation but this will usually satisfy its user. It might be possible to criticise small points (the name *Agabus uliginosus* is likely to be misapplied to the common water beetle *Ilybius fuliginosus,* for example) and to remark that *Velia currens* has been replaced on the British list by two other species, but these are matters that concern those whose studies take them to other books. Warmly recommended to all naturalists and would-be naturalists of any age. It should be in all libraries to which children have access.

J.H.F.

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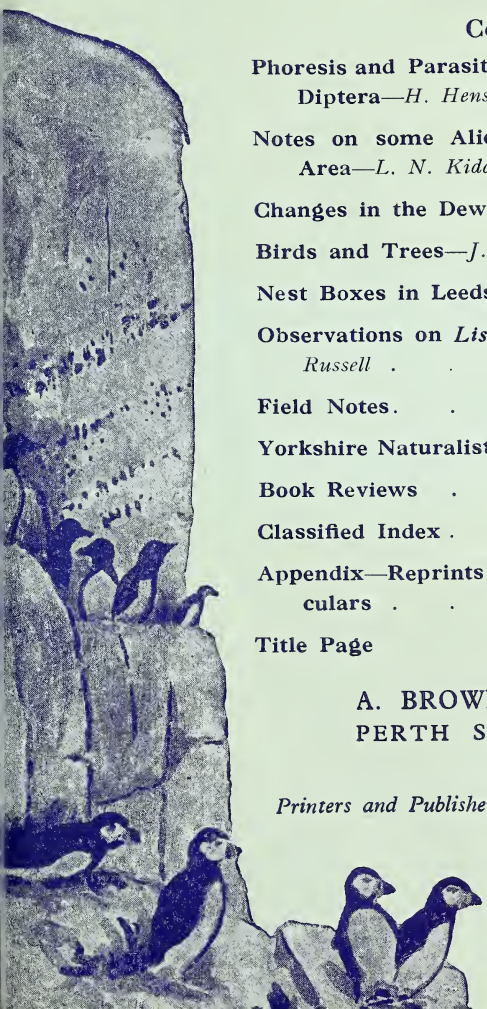

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Copies of Mr. A. A. Pearson's, Papers Mycena, The Genus Lactarius, and The Genus Inocybe, and second editions of British Boleti and The Genus Russula may be obtained, price 2/6 each, and Mr. P. D. Orton's Cortinarius (Part 1) price 7/6, from the Editor of *The Naturalist.*

PHORESIS AND PARASITISM IN EPHEMEROPTERA AND DIPTERA
A Review

H. HENSON

THE term ' parasitism ' is well known and, although very difficult to define, can be used by most naturalists in a manner comprehensible to their listeners. Usually it implies a small animal living at the expense of a larger one. There are other animal associations in which a larger species carries the smaller about with it but suffers no apparent harm. Such associations are often described as phoretic and their

FIG. 1. A larva of *Simulium* (after Smart (1944)).

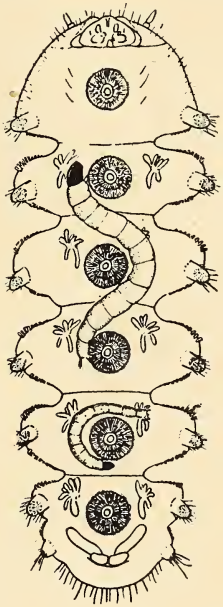

FIG. 2. *Dactylocladius commensalis* larva attached to suckers of *Neocurupira hudsoni* larva (after Tonnoir (1922)).

study is of some interest in that they grade into truly parasitic associations and reveal how these latter could have arisen by an evolutionary process.

In 1922 P. W. Claasen discovered in the United States a species of Chironomid fly whose larva was parasitic upon the nymphs of a mayfly. Since then there have been a number of reports of associations between flies and mayflies, some of which have been classed as parasitic and others as phoretic. In recent years the subject has been much stimulated by the discovery in Africa of phoretic species of *Simulium* or ' Black Fly ', one at least of which is a carrier of onchocerciasis. This is a rather revolting skin disease caused by heavy infection by nematode worms. In serious cases the worms often penetrate into the eyeball and produce ' river blindness ".

Simulium

The larvae of the various species of *Simulium* (fig. 1) are grub-like sedentary creatures attached by a posterior sucker to sticks or stones in running water. The mouth has long bristles which act as strainers, sieving off small organisms and other food particles from the water. Several species are common flies of our own countryside. In 1950 Van Someren and McMahon recorded from the Sagana River, Kenya, a *Simulium* larva which was to be found only on mayfly nymphs of the genus *Afronurus*. The larva is attached at the base of the hind leg of the nymph with its head pointing backwards over the gills. The larva pupates on the dorsum of the

nymph with the pupal filaments trailing backwards. The *Simulium* always pupates after the last moult of the mayfly; an obvious essential if the pupa is not to be swept away on a cast skin, and the fly emerges simultaneously with the mayfly during the hours of darkness. It seems never to be more than about two hours out of step with its host. The mode of oviposition and the first steps in setting up the phoresis are unknown.

In 1952 L. Berner discovered in the Dayi River, Gold Coast, another *Simulium* larva which was always attached to mayfly nymphs of the genus *Elassoneuria*. The larva sits on the ventral side of the head and thorax of the nymph with its mouth bristles protruding. When fully developed it spins a cocoon on the dorsal side of the nymph with its opening facing backwards. Several larvae and pupae occur on a single nymph. No other details are known. The river in this locality was two to three feet deep, with sandy bottom, moderately swift flowing, and without vegetation. Berner regards this association as related to the paucity of normal habitats suitable for the *Simulium*. The latter is not known otherwise than from the *Elassoneuria* and was described as a new species by Freeman (1952).

It is difficult to draw firm conclusions from these accounts but it seems probable that in both cases the *Simulium* has precise adaptations towards its partner and that the phoresis is obligatory. Since the mayfly sub-imago emerges successfully no degree of parasitism has been established. The intriguing problem is the precise manner in which the emergence of the fly and the mayfly are so closely synchronised.

McMahon (1952) following up the earlier observations, showed that the fresh water crab (*Potamon niloticus*) acts as host to at least three phoretic species of *Simulium*. One of these, *S. neavei*, is the intermediate host of onchocerciasis in Western Kenya. Eradication of the fly has been achieved in some areas by treatment of the river with massive quantities of D.D.T.

Dactylocladius

Dactylocladius commensalis Tonn. is a chironomid fly found only in New Zealand. Its larva has phoretic associations with another fly larva (*Neocurupira hudsoni* Lamb) belonging to a different family, the Blepharoceridae (Tonnoir (1922)). The host is found clinging by means of suckers to rocks in very fast water, even waterfalls. Wrapped around the suckers is the chironomid larva (fig. 2) which is thereby enabled to maintain itself in almost impossible conditions. Its food is unknown but is probably detritus. Later it pupates on its host in a gelatinous cocoon but the emergence of the adult has not been observed. Since empty cocoons have been found only on full grown larvae of the *Neocurupira* and since these latter have only one generation a year so also must the Chironomid. This assumes of course that the association is necessary for the development of the *Dactylocladius*. It is again obvious that the phoretic species must time its pupation according to the extent of development of the host and that subtle relationships are again involved.

Hydrobaenus

Hydrobaenus is another genus of Chironomid flies. It contains a large number of species divided into many sub-genera. One of these sub-genera, *Smittia*, is composed of a few species of very small flies about 2 mms. in wing expanse. *S. ephemerae* (Kief.) is a phoretic species closely associated with the nymphs of the common mayflies *Ephemera danica* Muell. and *E. vulgata* L. The case was first reported by Sülc and Zavrel (1924) from Czecho-Slovakia, but since then it has been found in Latvia, Germany, Roumania and England. It is probably fairly widespread in this country but it has actually been recorded only from Cheshire, by the late H., Britten and from Meanwood Beck near Leeds by P. M. Glover, both of these about 1927. It still occurs in this last locality and also at Scarcroft.

Fig. 3 shows nymphs of the two species of mayflies one of which, *E. danica*, is depicted as harbouring three specimens of the *Smittia*. It will be noticed that the dark markings on the dorsal side of the abdomen are much more prominent anteriorly in *E. vulgata* than in *E. danica* and that the markings are different in form. If readers should make new recordings of *S. ephemerae* the species of mayfly nymph involved should be carefully checked. Further details may be found in a convenient form in Henson (1955).

The larva is abundant on the mayfly nymphs, as many as 11 occurring on one specimen. The life history is imperfectly known; the eggs for instance have never

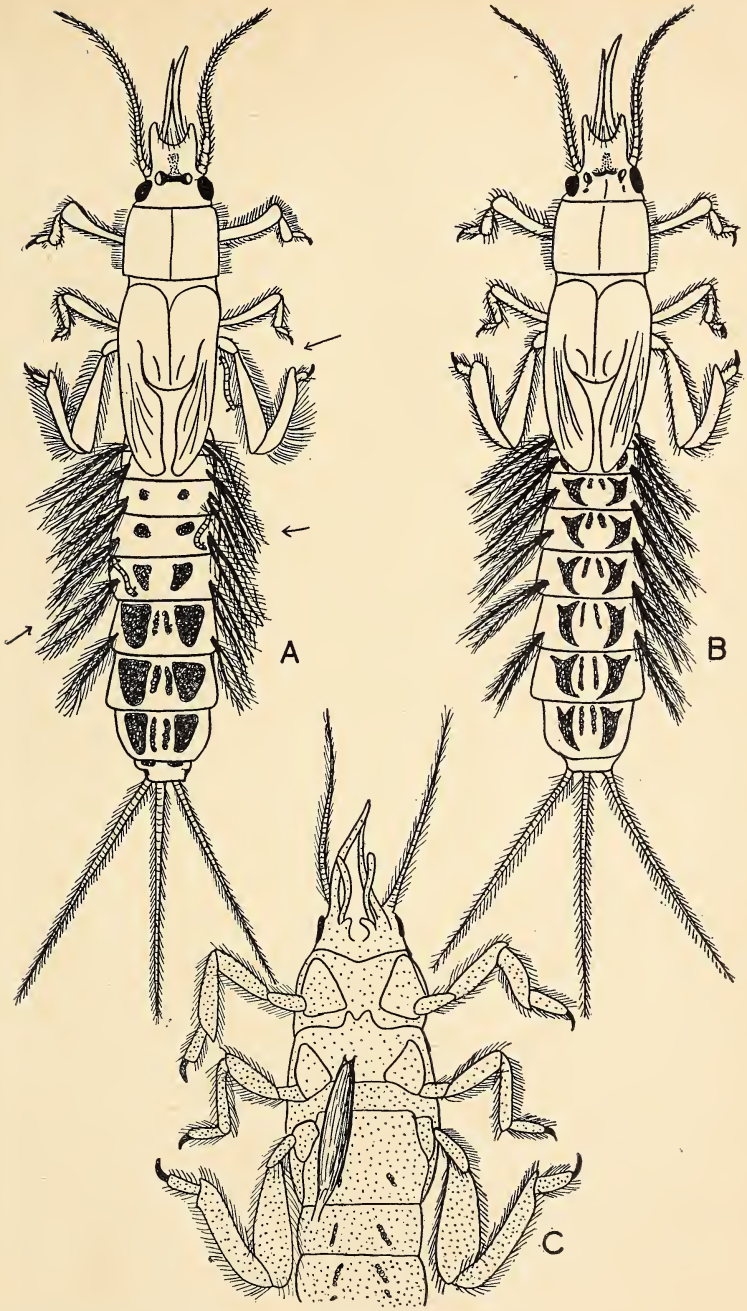

FIG. 3. A, Larvae of *H. ephemerae* on nymph of *E. danica*.
B, Nymph of *E. vulgata*. C, nymph with cocoon of *H. ephemerae*. (From Henson (1955)). (Partly after Percival and Whitehead (1927)).

been seen, nor is anything known of the mode of egg laying. Since the young larvae have been found only on the mayfly nymphs there is clearly a problem to be solved as to how they get there. The tiny midge, only 2 mms. in wing expanse, is susceptible to wetting so that it is not conceivable that, like the fairy flies, it can descend into the water to lay its eggs directly upon the nymph. The alternative seems to be that the larvae are scattered in the stream after hatching. If so, there must surely be some sort of deliberate compensatory upstream movement at some phase in the life history. Perhaps the mayfly nymph, faced with the same problem, has an inherent tendency to move against the current and thus to provide one of the advantages gained by the fly from the association.

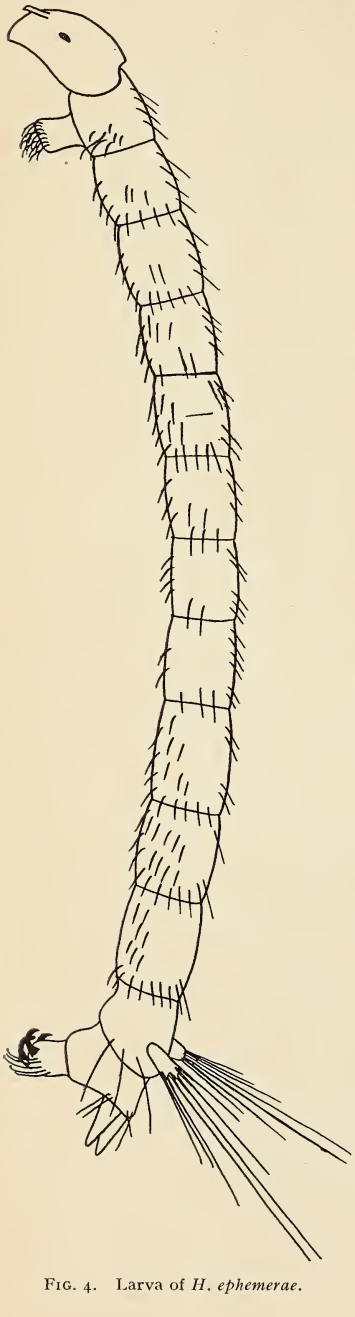

Fig. 4. Larva of *H. ephemerae*.

There are four larval stages, all living on the gills, legs and bristles of the mayfly nymph (fig. 3). They possess truly wonderful hooks on their front and hind legs and use them most efficiently to move about on the nymph. No doubt the two great bunches of bristles present at the hinder end of the body are also useful in preventing rotation during movement (fig. 4). The hooks on the front leg are retractable, an attribute which enables the front of the body to thread its way through the mass of gill filaments before taking a fresh hold and bringing up the rear foot. The jaws are clearly suitable for biting but not for chewing, the lower lip is a scoop with a comb-like edge, but the nature of the food has not been discovered. The stomach contents have not yet been identified, they remind one of extremely finely divided sand but no structure of any kind has been observed. It is not impossible that they are parasitic on the nymphs but they do not seem to cause any serious harm and certainly do not prevent the ultimate emergence of the mayfly.

Just before pupation the larva spins a gelatinous cocoon on the under side of the nymph and therein passes through its transformations (fig. 3). After two days the pupa emerges from the cocoon, swims to the surface of the water and there breaks open to release the adult fly. Up to the present two periods of emergence have been noted, one in late May and one in late July. In the adult fly the head has the usual compound eyes, antennae and palps; the thorax has one pair of wings, with characteristic venation, a pair of ' balancers ', and three pairs of slender legs. The ground colour is yellow with a very few slightly darker markings in the male. There seems little hope of being able to make critical observations of this midge in the field. It is very small and needs close examination for a proper identification; perhaps some day someone may have the luck to encounter a large swarm and make pertinent observation of them.

Here again the phoretic midge larva seems to pass through to the adult condition just before the mayfly itself emerges. Even in the July emergences the cocoons are found only on large nymphs, suggesting a definite process of timing.

Symbiocladius

The final stage in the development of these midge-mayfly associations is seen in the linking up of *Symbiocladius rhithrogenae* with mayfly nymphs of the genera *Heptagenia* and *Rhithrogena*. In this instance the phoresis has become parasitic and Codreanu, who investigated the case, gives abundant details of the relationship between them. The mayfly nymphs (fig. 5) are of the flattened type found on the larger stones in fast-moving streams. The chironomid has not yet been recorded

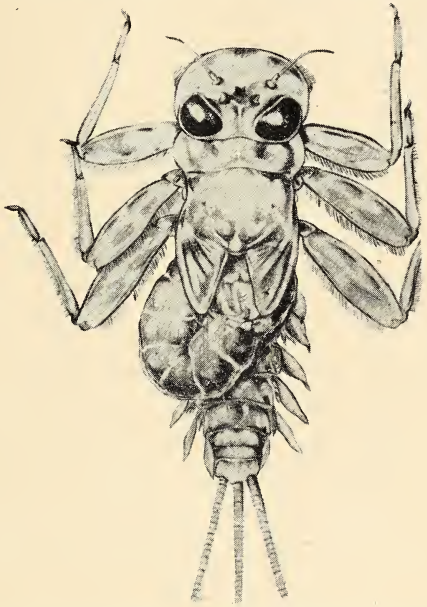

FIG. 5. Larva of *Symbiocladius rhithrogenae* attached to nymph of *Heptagenia lateralis* (after Codreanu (1939)).

from this country but identical or closely similar forms are known from Roumania, France, Czecho-Slovakia, Japan and the United States.

The eggs are probably laid in a mucilaginous mass on a stone in the water and infection of the host is achieved by the young larva. Once having established contact it moves over the nymph until it reaches the wing cover. Here it secretes a gelatinous capsule within which it lives (fig. 5). It feeds by making very tiny wounds in the membrane between the thorax and abdomen of its host and imbibing the blood by active suction. When full grown the larva transforms to the pupal stage within the capsule; five or six days later the pupa emerges, swims to the surface and releases the fly. The host never recovers from the effects of the parasitism and although its total duration of life is not diminished it never succeeds in passing through its metamorphosis to the adult stage.

In cases cited previously in this article mention has been made of certain biological relationships between the host and its phoretis associate. Some of these relationships are far from being explained. Codreanu has dealt in detail with certain aspects of the case investigated by him but it is manifestly impossible to quote evidence or to make critical analysis in an article of this kind. The more interesting of his results are commented upon below.

The larva is not greatly unlike that of *Smittia ephemerae* although it seems to be much more transparent, to have much shorter posterior bristles and to differ in

other details. There are four larval stages all of which differ from one another sufficiently to be easily recognised.

The first stage larva (I) can infect a nymph of almost any size but if it attaches to one less than 4·5 mms. in length it waits in stage I until its host has reached this size. Under identical conditions of temperature the first stage is passed through in 4-6 days on a large host but takes 10-20 days on a small one. The development to the fourth stage larva (IV) takes place just before the mayfly moults into its own last nymphal phase. These time relationships seem to be very close but Codreanu does record a rare exception. Usually if a last stage nymph is attacked by a larva it is able to throw it off but occasionally even a first stage larva can establish itself. In such a case its own development is very rapid and that of the mayfly is greatly retarded, its last stage being extended to 33 days as against the normal 8, and as usual it never passes beyond this phase.

The effects of the parasite on the host are such that these time relationships could be linked with the nutritional condition of the host. For instance it is only after the mayfly nymphs reach a length of 4·5 mms. that they contain an abundance of fat. Furthermore the parsite induces a peculiar condition of the host blood in which blood cells become greatly increased in numbers, a reaction which presumably is to the advantage of the parasite. This condition is greatly accentuated during the last nymphal stage. Codreanu gives a detailed analysis of changes in blood components and asserts that they are neoplasic, that is they partake of the nature of cancer. The entire paper is described as an account of an ' Ectoparasite " cancérigène " des Ephémères torrenticoles ', an indication of the importance which Codreanu assigns to this aspect of his work. The nutritional condition of the host is thus closely linked with the presence of the parasite and might well result in some correlation between their phases of development.

Another effect which seems to be established is that the larger the host nymph the larger the parasite fly bred from it. This also could be a nutritional effect but such cannot be established and certainly does not logically follow.

There is no correlation between the sex of the host and the sex of the parasite, males and females occurring equally often on male and female nymphs. The sex of the parasite is however linked to size of host. Nymphs infected when smaller than 4·5 mms. in length produce an excess of male flies; nymphs infested when between 4·5 mms. and 7 mms. produce equality of sexes, and nymphs over 7 mms. when infected produce an excess of females. Codreanu considers this to be an effect of the length of the first larval stage. As mentioned above larvae do not pass from stage I to stage II until their host is 4·5 mms. in length and may therefore have a prolonged stage I or a short stage I according to the size of the host at the time of infection. In the former case they are presumed to have a tendency towards maleness and in the second towards femaleness. The same phenomenon is shown by an ichneumon fly (*Pimpla*). It is said that if it deposits its eggs in small caterpillars an excess of males results whilst if the eggs are deposited in large caterpillars an excess of females is produced. These results are very extraordinary on two counts. Firstly the sex of insects is generally held to be fixed by their genetic make up and to be unalterable by any environmental conditions which permit a full development. Secondly no intersexes (composite individuals partaking of the characters of both sexes) are produced from larvae which have settled on nymphs of intermediate size, although such would be expected if environmental factors were impressing themselves on a basic genetic constitution. As Codreanu implies, no fundamental realistic explanation of these results can be put forward.

Conclusion

Much of the recent work on insect growth has shown that one and the same species of insect can undergo somewhat different development cycles, and so produce different morphological types, according to the conditions in which the development takes place. Cases in point are the gregarious and solitary forms of locusts, the seasonal varieties of butterflies, and many other types of polymorphism. Dr. V. B. Wigglesworth, in *The Physiology of Insect Metamorphosis*, has brought larval forms and metamorphosis itself into line with this notion, although in these cases the ' environmental ' variation is internal. Physiological and experimental analysis seem to indicate that each stage of an insect's development is an independent cycle, modified in one direction or another by the internal or external environment. The writer showed some years ago (*Biol. Revs.*, 1946) that a similar conclusion could be

drawn on morphological grounds so that in this field at least morphological and experimental analysis point in the same direction.

Perhaps time will show that analysis of development and morphogenesis have been the principal contribution of the twentieth century to the science of biology. Certainly many fields of endeavour tend to gravitate towards such an analysis. Equally certainly the investigation of the relations of host and parasite has something to contribute to the solution of the problem.

Acknowledgements

All figures are reproduced by kind permission of the publishers to whom grateful acknowledgements are made. For fig. 1 to the Freshwater Biol. Association, for fig. 2 to the proprietors of *Ann. de Biol. Lacustre*, for fig. 3 to the editor of *The Entomologist*, and for fig. 5 to the proprietors of *Arch. de Zool. Experimentale.*

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Filmstrips: How Insects Fly. 30 frames. Order No. 5162. Notes and photographs by **John Warham. Grey Owl.** 35 frames. Order No. 5156. Educational Productions Ltd., East Ardsley, Yorks. 15/- each (including Notes).

The 24 photographs and six diagrams which make up the first of these strips should be of considerable value to teachers for illustrating the mechanism of insect flight as, even with living and set specimens available for examination, high-speed photographs are necessary to demonstrate the changes in position of the wings during the different phases of their beats. The notes accompanying the strip, in addition to providing a commentary on the individual frames, give a good general account of the subject and of the main variations in wing arrangement displayed by different groups of insects. Unfortunately one (frame 22) of the three photographs illustrating the sequence of wing beats in the Yellow Shell Moth is represented upside down. The two frames of the White Plume Moth are also more likely to confuse than to aid understanding. Does frame 25 really represent what it is claimed to do ?

The filmstrip dealing with Grey Owl consists of a series of drawings illustrating the life of the Englishman who was adopted by and spent the greater part of his life with Indians in the North Canadian wilderness and became well known through his writings on natural history and his foundation of the Beaver Reserve in Canada. It is a story likely to capture the imagination of children and a very suitable introduction to nature study in junior school classes.

NOTES ON SOME ALIEN PLANTS OF THE OLDHAM AREA

L. N. KIDD

I FIRST became acquainted with *Galinsoga ciliata* (Rafn.) Blake in August 1952, when a specimen was brought to the local Natural History Museum for determination. The specimen in question was one of several found growing in an Oldham garden by Mr. R. Rigby, who told me that he had first noticed the plant the year previously. Mr. J. E. Lousley (*Watsonia* 1 (4): 238-41, 1950) points out that *G. ciliata* was first recorded for Britain in 1939, and Clapham, Tutin and Warburg (*Flora of the British Isles*, 1952) record it as a casual recently recognised in S. England and S. Wales. This species would appear to be spreading rapidly, and a number of records from some of the more northern counties have been given during the last year or two in the publications of the Botanical Society of the British Isles, and in *The Naturalist*.

The other species of *Galinsoga* found in Britain as an alien is *G. parviflora* Cav., which like the former plant is a native of S. America. This latter plant has been known from the vicinity of Kew Gardens since 1861 and has long been a common weed in gardens in the London area and elsewhere. It would appear that it has been known from some of the northern counties for some considerable time also. It is for instance recorded in Lord de Tabley's *Flora of Cheshire* as occurring in a deserted arable patch near a cotton-mill at Micklehurst, 1874, as a casual on cotton-waste manure. Mr. T. W. Holt (1913, *Lancs. Nat.* 6: 326) points out that *G. parviflora* grew in Snipe Clough (Oldham) about ten years ago, but was probably an escape from the Oldham Field Naturalists' garden which abutted on to the Clough. There is also a record from Gambrel Bank, Lancs., 11th July, 1913, in *Lancs. Nat.* 6: 252. Mr. D. E. Allen has apparently known it as a weed in Hesketh Park, Southport, for over 15 years, and fairly recently it has been recorded by J. R. Cadman as an abundant weed in allotments at Sefton Park, Liverpool. Only the other day I received a specimen which was one of a number growing outside accountants' offices in the centre of Oldham.

Another introduced casual which appears to be maintaining itself in the district is Canary Grass, *Phalaris canariensis* L., an annual which I first noticed in a waste place near Alexandra Park, Oldham, eight years ago. In August this year Mr. F. Wrigley and I visited this same locality and found fine examples of this grass growing on waste ground, and on a tip which covers quite a considerable area. According to Hubbard's *Grasses* (1954) it is a native of the western Mediterranean, and is widely cultivated in warm-temperate countries for its fruits, which are used as food for cage-birds. In this country it is found mainly in the south, where wasted seeds germinate and come to maturity on cultivated and waste land; in some places persisting for a few years.

During a brief botanical excursion to the Oldham area recently, the Rev. C. E. Shaw and Dr. Brian Fox found several interesting plants, perhaps the most impressive being a large clump of Giant Knotweed, *Polygonum sachalinense* Schmidt. This was growing near a stream in a moorland field at Saddleworth, Yorkshire. According to Clapham, Tutin and Warburg (1952) it is a native of Sakhalin, is sometimes cultivated and is occasionally naturalised. The plant is figured in McClintock and Fitter's *Pocket Guide to Wild Flowers* (1956) although the Saddleworth specimen before me, has the leaves more decidedly cordate at the base than the one illustrated in the above book. I have since visited the above area myself, and enquiries made locally have revealed that the plant has been known to occur there for at least 12 years. It is, however, highly probable that it has some connection with plants of the same species which were pointed out to me growing in the nearby vicarage garden. Near the stream the plants extend over an area of some 20 yards or so, and I am informed that they appear to be spreading.

The Japanese Knotweed, *Polygonum cuspidatum* Sieb. & Zucc., is quite common in the area on waste ground, on railway embankments, and in some gardens. It has apparently thrived in the district for at least 70 years, for Mr. Charles Walters (Silvio) in a letter on ' The Park Flora ', published in *The Journal of The Oldham Microscopical Society and Field Club* for 1887, points out that ' it turns up unexpectedly in nearly every piece of cultivated ground ———.'

CHANGES IN THE DEWSBURY FLORA

ERIC THOMPSON

During the year 1877 the ' Flora of Dewsbury and Neighbourhood ' compiled by Phineas Fox Lee who resided in the town at that time, was published in the first volume of *The Botanical Transactions of the Yorkshire Naturalists' Union.* This work amounted to 24 pages with a later supplement of 14 pages. In those years Dewsbury had a thriving Natural History Society, and the district was well worked by P. Fox Lee and his friends. Enthusiasm for natural history is now very low in the district, and few people are interested in any section of the study, but it may be of interest to compare briefly the old flora with conditions now prevailing in the district.

Though Dewsbury is a busy industrial town much remains of interest to the naturalist, and many plants mentioned in the Flora are still in their old stations. The whole of the area lies on the Coal Measures. This formation rules out many plants, but taken on the whole the species of flowering plants are rather numerous and the flora is of some interest. Since 1877 the town has spread, ponds have been filled in, and the open-cast workers have been busy in places. In spite of these changes, Coxley Valley, Stocksmoor, and many of the old haunts visited by P. Fox Lee remain.

Stocksmoor is the only piece of natural heath left in the area and was, in Lee's time, much wetter. Very wet patches still survive on the moor and here many of the old plants exist. In 1877 *Hydrocotyle vulgaris* L. was abundant but now it is confined to one small corner. Along with *Hydrocotyle* our old botanist came to the moor to collect his species of *Carex*, and even to-day there are fine stands of *Carex nigra* (L.) Reich., *C. flacca* Schreber, and *C. ovalis* Good. A few plants of *Eriophorum vaginatum* L. at present grow on the moor, but there is no mention of this sedge in the Flora. With the species of *Carex* grow *Achillea ptarmica* L., *Stachys palustris* L. and a good colony of *Hypericum tetrapterum* Fries. The last-named plant was unrecorded in 1877.

Writing of *Cardamine amara* L., Lee states that the plant is very rare, found only on the margins of Coxley Dam. Here it still grows. Two years ago the writer discovered another station in North Wood. In 1877 *Centaurium minus* Moench grew sparingly at Coxley; to-day its position is still unchanged, one or two plants occurring most years on the rough ground bordering the golf links.

An interesting plant is *Doronicum pardalianches* L. first recorded in this district by Mr. Theodore Taylor of Batley. Mr. Taylor who died a few years ago was a remarkable man living to the great age of one hundred and two. He came from a family of mill owners, and was a local historian. In later years he often lamented the disappearance of local plants amongst them *Doronicum pardalianches* L. It seems the plant never became quite extinct for it still grows in a copse at Batley.

For his record of *Sambucus ebulus* L. Lee had to journey to the very edge of the Dewsbury district where he found it in the Spen Valley. To-day a thriving colony exists well inside the Dewsbury boundary. A meadow bank in Coxley Valley and a waste place at Horbury were the only stations 76 years ago for *Malva moschata* L. At present only a single plant remains at Coxley.

Five orchid's grew within the area at one period, but of these only *Epipactis helleborine* (L.) Crantz survives. In the opinion of the writer this plant seems more numerous than Lee thought, for in addition to the Bretton and Coxley stations given in the old Flora three more must be included.

Several plants of the Dewsbury area though present in Lee's time have enlarged their range. For instance, *Claytonia alsinoides* Sims, then only a garden stray, is now well established along stream sides and in many places throughout the district. *Corydalis claviculata* (L.) DC. is no longer a rarity, it now grows in profusion in Coxley Valley and North Wood. Here and there along the Calder banks a few good colonies of *Inula helenium* L. now exist and here again we have seen the plant increase.

In common with other parts of Yorkshire our cornfields are much cleaner than those Fox Lee knew, and plants like *Agrostemma githago* L. and *Centaurea cyanus* L. have gone. Some fields on the other hand are of poor quality land and here many cornfield weeds grow in huge numbers, amongst these are *Papaver dubium* L., *Fumaria officinalis* L., *Viola tricolor* L., *Anagallis arvensis* L. and *Sonchus arvensis* L.

The greatest botanical mystery of the district is the presence in Liley Wood of *Actaea spicata* L. This is a very old station and is included in the *Flora of West*

Yorkshire where R. Leyland is credited with the first record in 1812. J. E. Lousley mentions this locality in his book, *Wild Flowers of Chalk and Limestone*. The presence of this strictly limestone plant in a coal measure district is most surprising, and one can only presume it to be a very ancient introduction.

From the above notes it seems that many plants that were rare in Lee's time are still in that category, others have become more numerous, and only the orchids have suffered to any great extent. Plants like *Hottonia palustris* L. found in only one station by Lee could never have been very common in this district, and on the whole the present day flora is very like the one that Lee knew.

BIRDS AND TREES

J. P. UTLEY

RECENTLY it was my privilege to attend a course on Forestry held at Wrea Head College near Scarborough, under the auspices of the North Riding Education Committee, in order to answer any questions relative to the birds living with the trees. The areas visited included private woodlands which ranged from nurseries to old woods of eighteenth century date and hundreds of acres of pure and mixed conifers varying from seed beds to plantations about 40 years old, all belonging to the Forestry Commission.

For some time the weather had been dry and except for a few short hot spells, rather on the cool side. The arrival of summer visitors had been desultory and on the whole somewhat late. Since in many areas the resident bird population was low there were few of any species in some localities.

On the opening day tours were made first through a dry valley with grass slopes on which were patches of bracken and birch scrub. Here it was hoped to get an ultimate crop of timber, chiefly hardwoods, by natural regeneration. In this area the most common bird was Tree-Pipit of which there was a number of pairs. The nest of a Blackbird was found in a bundle of pea sticks. Green Woodpeckers were heard ' laughing ' in adjacent mature hardwoods which I am glad to say were being left for amenity value. The disturbance of a Woodcock with two quarter-grown young was the most interesting sight of this day. Succeeding perambulations were through larch, spruce and pine plantations; in these very few birds were evident, Coal-Tit and Goldcrest being most frequently heard and seen. Only one small patch appeared to be used by Wood-Pigeons and there were signs of a number of these birds having been shot. At one place there was a quite large Badger sett but Brock very wisely kept underground. The woodman said there were no objections to these animals particularly since myxomatosis had exterminated the rabbits, as the only black mark against the Badgers was their ability to tear down protective wire netting. A dead Teal was found near a track in the valley bottom; how it got there remained a mystery for there was no stretch of water in the vicinity.

The second day was spent in the coniferous plantations of the Forestry Commission, the oldest of which was about 35 years of age. Throughout the day very little bird life was seen for this type of woodland rarely carries a substantial avian population. Except where the edges of the plantations touched an open moorland Coal-Tits and Goldcrests had scores of acres to themselves. Where the plantations encroached on the moors, Blackbirds, Thrushes and Chaffinches occupied certain areas; but at lower levels where agricultural land bordered the woods bird life was more plentiful. Here were many of the Passerine birds and the song of Willow-Warbler was constantly coming over the air. Whitethroat, Hedge-Sparrow, Spotted Flycatcher, Greenfinch, Yellow Hammer with a few Goldfinch and Bullfinch were there too.

From a birdman's point of view the third day was the most profitable. The morning was spent in private woodlands of considerable age and the afternoon in older plantations of the Forestry Commission. On this day 57 species were observed which included Lesser Redpoll, Tree-Creeper, Nuthatch, Wren, Chiffchaff, Wood-Warbler, Grasshopper-Warbler, Great-Spotted Woodpecker, Little Owl, Tawny Owl, Long-eared Owl, Barn Owl and Turtle Dove. Also a fine sight was that of a Heronry of nine nests, all in old Scots pine; every nest appeared to hold young. Pheasant and Partridge were present, too.

No Redstart or Whinchat was seen during the week-end and Titmice were not as numerous as was expected. No members of the Falconidae were seen and a Sparrow-Hawk observed but once. Extensive questioning of foresters and woodmen

revealed no antipathy towards any birds but Wood-Pigeon, though dislike was expressed about Carrion Crow, Rook, Jackdaw, Magpie and Jay because of the harm they did to the smaller, beneficial birds. Resentment was voiced against Starlings when they made a roost in woodland resulting in extensive fouling of the ground.

The erection of nest boxes was contemplated in the area visited on the first day; the Forestry Commission had installed a number in their plantations which were used by Titmice. The putting up of nest boxes in the area visited on the third day was not considered necessary because of the number of available natural nesting sites.

There was general agreement amongst all concerned with the management of forests and woodlands that bird life was practically essential to their well being. They may not clear an infestation of any particular insect pest but they do lessen the damage that could be caused especially as such plagues usually occur about the same time as many newly-hatched birds are craving for food.

Where bird life is not plentiful, particularly in the coniferous woods, efforts should be made to entice them there by the provision of scattered clumps of broad-leaved trees and the erection of nest boxes in suitable sites.

NEST BOXES IN LEEDS CORPORATION PARKS

Early in 1954 it was proposed at a meeting of the Leeds and District Bird Watchers' Club that the possibility of erecting nest boxes in the public parks should be investigated. When approached, the Corporation Parks Department readily granted permission and generously agreed to provide a supply of timber for the manufacture of the nest boxes.

As the Club was, and is, anxious to encourage an interest in bird life, it was suggested that this aim would be furthered if school-children could assist in the preparation of the boxes. The Education Department agreed to circularise all schools under their jurisdiction to the effect that the Club would welcome their help. Seven schools offered their services in the first year and the Parks Department arranged for the timber to be forwarded to the schools concerned. The boxes were made to plans provided by the Club, and during 1954, 109 boxes were constructed. As the reactions of the public to these boxes could not be foreseen, and the scheme was then only experimental, it was thought prudent to erect only boxes of the non-observational type—that is, with the roof fastened down. It is hoped to erect observational type boxes in the future if it is felt that it is safe to do so.

Four Public Parks—Roundhay, Templenewsam, The Hollies (Weetwood) and Golden Acre—were chosen in 1954 and there were few cases of interference. Three boxes were destroyed by deliberate stoning, and one or two others damaged. The majority of these boxes were erected, by Club members, in time for the 1954 nesting season, and the results were thought to be very encouraging. Thirty-three per cent. were known to have been occupied in their first year. Of these Blue-Tits took all but one, which was occupied by Great-Tits.

In view of the fact that some writers have stated that it is necessary to put up boxes in time to allow the birds to get familiar with them before the nesting season, it is of interest that one pair of tits was inspecting the inside of a box only four days after its erection, and another pair had actually commenced to build within six days.

The remainder of the 1954 boxes and some new ones were erected in 1955. In most cases the internal measurements were 4 in. by 4 in. by 7 in. front/8½ in. back, and they were placed at heights varying from 12 ft. to 18 ft., facing between north and east to avoid the worst of the weather. The holes varied a little in size from 1⅛ in. diameter to 1½ in. but early in 1955 it was noticed that in some cases these holes had been considerably enlarged. It was first suspected that woodpeckers were to blame but after chippings had been examined it was thought that grey squirrels were responsible.

In addition to the non-observational boxes some of the open-fronted type were placed in Roundhay Park but met with no success. However in 1956, further boxes of this type were placed in Templenewsam and The Hollies. A Spotted Flycatcher was seen in occupation of one of these boxes at Templenewsam in June 1956, but did not complete a nest.

Further non-observational boxes were placed in Templenewsam in the spring of 1956 when the scheme was assisted by some additional schools, and ten were erected in Rodley Park for the first time, but too late for occupation.

In mid-July a total of 141 boxes (of both types) had been placed in five Parks during the three years the scheme has been running, and a considerable stock of boxes remains in hand to be placed before the 1957 breeding season.

Templenewsam and Roundhay Parks at present hold most boxes but the latter Park has not been carefully observed. At Templenewsam there are now 59 boxes in place, including the new ones erected in the spring of 1956, and of these 33 were known to have been occupied this year, 31 being Blue-Tits and 2 Great-Tits. In 1955 one box was occupied by a Marsh-Tit.

Further damage by grey squirrels has been noted and in one case the hole had been opened to approximately 2½ in. diameter. In June 1956 it appeared that woodpeckers had attacked three boxes, drilling into the face of the boxes at the level at which the nest was made inside, possibly in an attempt to get to the young tits.

Interference with the boxes has varied, the highest proportion of damaged boxes having been reported from The Hollies where 4 out of 19 have been destroyed, either by stoning or deliberate removal from the trees. Other parks report small losses from similar causes, and in Templenewsam some boxes were brought down by tree-felling or gales. In most cases the Parks Superintendent kindly arranged to have them repaired, and they have since been re-erected.

The quality of most boxes received from the schools has been high but one or two batches required a little attention, possibly due to damage incurred in transit. Some schools have shown a great interest in the location of their boxes, but none who received an offer from the Club to show pupils round the Parks have so far responded.

The interest shown by the public, the most encouraging and ready co-operation of the Corporation Parks and Education Departments and their employees, and the results, are considered by the Club to be ample reward for the trouble taken.

Transactions of the N.H. Society of Northumberland, Durham and Newcastle-on-Tyne. Vol. XI, Nos. 8 and 9. (2/6 each.) No. 8 comprises the *Ornithological Report for* 1955 by G. W. Temperley, M.Sc., in which there is a great deal that is interesting to compare with items in the Yorkshire Report. Items of special interest include: up to 2,500 Brent Geese on the Holy Island slacks during the cold weather of February to March; a Kite near Berwick on September 22nd; breeding of Montagu's Harrier; unusual numbers of Pomarine and other Skuas; a Bonaparte's Gull at Seaton Sluice on July 1st—a new species for Northumberland; at least 10 Long-eared Owls in osiers in Gosforth Park on December 26th; Desert Wheatear in Co. Durham for the first time; Lapland and Snow Buntings at Teesmouth and elsewhere. The Report has been as carefully compiled and presented as we have learned to expect from Mr. Temperley. It would make for convenience of reference if the Farne Island records were included under the specific headings.

No. 9 includes the *Ornithological Report on the Farne Islands for* 1955 by Grace Hickling, M.A. The status of both breeding birds and of migrants is given; and there are several pages of ringed birds recovered, which include some of interest to Yorkshire.

The Grey Seals of the Farne Islands (Miss Grace Hickling, M.A., A. W. Jones, B.Sc., and I. M. Telfer, M.B., B.S.) is also included in No. 9 on 14 pages. The animal was studied intensively in the late autumn despite inclement weather. Several visits resulted in the marking with 'tags' of 200 calves. These are listed with dates, names of islands where 'tagged', sex, state of coat, and approximate age. A great piece of work.

The Capercailzie. Pp. 12, Fig. 8. Forestry Commission Leaflet No. 37. H.M. Stationery Office. 9d.

Written by C. E. Palmar of the Glasgow Museum, this leaflet summarises the history, distribution, habits and food of the Capercailzie and discusses its significance in the economics of forestry. ' Provided it does not become unduly numerous in the younger plantations this interesting bird may be tolerated and even encouraged.'

OBSERVATIONS ON *LISPE TENTACULATA* DEG. (DIPTERA–LISPINAE)

H. M. RUSSELL

MEMBERS of the *Lispinae* are rather undistinguished-looking flies, of greyish-brown or brownish-black colouring. They are predatory in both adult and larval stages, the adults running about actively on waterside plants, while the larvae either live in the water or develop in the flowers of aquatic plants. Among the distinguishing characters of the genus are the possession of a stout proboscis and very dilated, spoon-shaped palpi. According to Colyer and Hammond *Flies of the British Isles*, several species, including *Lispe tentaculata* Deg. are to be found on the seashore.

The capture of a single male of this species at the sluice gate, Scarcroft Fish Pond, near Leeds, during the summer of 1955, led to my discovering a small colony in the vicinity. Owing to drought conditions prevailing throughout the summer months of 1955 it was almost impossible to make any observations on the feeding

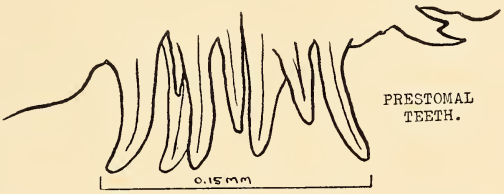

Fig. 1

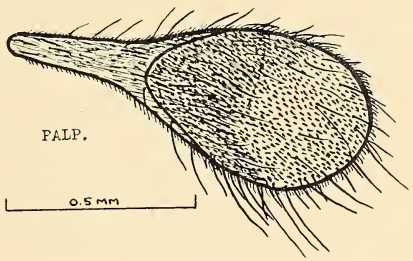

Fig. 2

habits of the species. However, the exceptionally wet summer of 1956 has provided ideal conditions for observations to take place, there being plenty of flood water coming over the sluice gate with its attendant debris containing insect larvae, pupae and dead and drowning adults.

Commencing in early June I have kept the sluice gate and its immediate surroundings under observation for periods of 30–35 minutes each day (except at week-ends and holidays) and have captured a number of specimens either in the act of feeding or searching for prey. When predator and prey have been available, the remains of the latter have been collected and preserved, but in most cases relatively little remains of the prey owing to abrasion by wave action on the sluice gate grill, followed by the feeding activities of *L. tentaculata*. When freshly killed material is being consumed it is most difficult to capture predator and prey together, owing to the fact that the prey is not adhering (due to being damp) to the surface on which it is resting. The only really successful method of collecting this species is to stalk individual flies with a large (3 in. × 1 in.) glass tube. By adopting this method of collecting it is usually possible to obtain first of all the predator and then to collect carefully the remains of the prey by means of a brush moistened in 70% alcohol and to transfer them to a tube containing the same strength of alcohol.

On a number of occasions I have been able to tempt these flies out of the nearby vegetation simply by means of collecting a handful of grass, pounding it with a stone, thoroughly wetting it and then spreading it on the sides of the sluice gate.

After being in position for some 5–10 minutes specimens would fly down and commence searching for prey.

Dissection of the mouth parts of both male and female specimens shows that, although of the usual Muscoid type, they are of particular interest; the discal sclerite being well developed and containing four pairs of strong prestomal teeth (Fig. 1). The palpi (Fig. 2) are quite large, being nearly 1 mm. long and covered with numerous bristles and hairs. Anteriorly the palpi are somewhat yellowish and become silver grey in the middle and then brown towards the base.

Prey recorded during the three months June, July and August 1956, are listed below:

MYCETOPHILIDAE. *Sciara sp.* Freshly caught specimens observed on two occasions during August.

BIBIONIDAE. *Dilophus febrilis* L. Both drowned and freshly caught specimens during July and August.

Bibio marci L. Feeding on drowned specimens during June.

SIMULIIDAE. *Simulium sp.* Drowned specimen—July.

RHYPHIDAE. *Anisopus sp.* Drowned specimens—August.

LONCHOPTERIDAE. *Lonchoptera lutea* Pz. Feeding on freshly killed specimens during June and July.

In addition to the above I have noticed on a number of occasions specimens feeding on red *Chironomid* larvae which they pull out of the flood debris. Prolonged observation at the above locality will, no doubt, add further to the list of prey of this interesting species.

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Vol. 1, part 5. Dermaptera and Orthoptera, by **W. D. Hincks,** revised edition, July, 1956, 24 pp., 83 figs., price 6/-.

Vol. 1, part 10. Odonata, by **F. C. Fraser,** revised edition, July 1956, 49 pp., 210 figs., price 10/-.

The two first-published parts of this series have been out-of-print for some time and are now replaced by revised reprints. Part 5 has been modified by the addition of a number of fmore imported species introduced in fruit, etc. Additional figures include the genital armatures of several Dermaptera and some necessary changes have been made to the nomenclature in the Orthoptera. The various modifications and additions have involved an extra four pages.

In the part dealing with the Odonata seven casual immigrants have been added and the name *Cordulia aenea* Linn. has been replaced by *C. linaenea* Fraser, in accordance with Col. Fraser's recent paper (1956, *Ent. mon. Mag.*, **92,** 20). *Sympetrum nigrescens* Lucas becomes the valid name for the form previously referred to as *S. striolatum nigrifemur* Selys, following the work of Mr. A. E. Gardner (1955, *Ent. Gaz.*, **6,** 86-108). We note that *Oxygastra curtisii* and *Cordulegaster boltonii* of the first edition now become *C. curtisi* and *C. boltoni*.

W.D.H.

Killing, Setting and Storing Butterflies and Moths, by **L. W. Siggs.** A.E.S. Leaflet No. 28, 1956. West Ham Lane, E.15. 10½d. post free.

An excellent publication of 13 pp. and ten line drawings, not claimed to be original but brought up to date for those devoted to the ever-popular study and collection of the larger Lepidoptera. There are orderly chapters on killing the insects, transporting specimens, relaxing, setting, storage, repairing, and equipment necessary for this indoor work. Microlepidoptera are covered with leaflets Nos. 13 and 14 which deal with collecting and setting. Strongly recommended.

J.A.

FIELD NOTES

Curlew apparently feeding on young Skylark.—On May 27th, 1956, near Fewston, Yorkshire, I had a Curlew (*Numenius arquata*) under observation at approximately 100 yards through x8 binoculars. I noticed it had something in its bill apparently too large for it to swallow, and which it proceeded to shake apart. It had difficulty in swallowing the first portion, eventually walking away, leaving the remainder. On investigation I found a headless nestling Skylark (*Alauda arvensis*) but being unable to find the nest returned to my observation position. The Curlew returned after a brief period and I saw the parent Skylark rise and attempt to attack the Curlew. Returning to the site, flushing both birds, I found one live nestling Skylark lying outside the empty nest, aged two to three days.—J. H. I. Leach.

Early Appearance of Grey Phalarope.—A Grey Phalarope (*Phalaropus fulicarius*) was seen on Fryston Colliery pond, near Castleford, on the evening of July 16th, 1956; an unusually early date. The bird appeared to be losing a little of its breeding plumage as there were a few greyish markings visible on the chestnut breast. The white cheeks and dark crown were noted as was the dark tipped, and comparatively thick, yellowish bill. Seen down to 10 yards in good light by 17 members of the Leeds and District Bird Watchers' Club on an evening outing, the bird picked food from the surface of the water. Occasionally it flew round the pond, showing a whitish wing-bar, and settled again in a matter of seconds. It was not present on the following day.—A. H. B. Lee.

***Craspedacusta sowerbyi* Lankester and its Hydroid *Microhydra ryderi* Potts in Lancashire.**—*Craspedacusta sowerbyi* Lankester is a freshwater medusa which according to Russell (*The Medusae of the British Isles*: Cambridge Univ. Press, 1953) was found orginally in 1880 in the giant water-lily (*Victoria regia*) tanks of the Royal Botanical Society's Gardens in Regent's Park, London. Since then it has been recorded from tanks or aquaria at Sheffield, Birmingham, Boscombe and Edinburgh. It has also been recorded from the Exeter Ship Canal in 1928, 1929, and 1948, a colliery reservoir in Monmouthshire, and Whitcombe Reservoir in Gloucestershire.

About the beginning of May 1952 I received a visit from Mr. W. F. Edwards of Oldham, who brought with him to the museum a bottle containing water from a tropical aquarium in which he was keeping Guppies (*Lebistes reticulatus* (Peters)) and other live-bearing fish, at a temperature of 77° F. He had recently noticed in his tank a large number of small, colourless, semi-transparent objects, which he had decided to bring in for determination. It was with the greatest interest that these were discovered to be *Craspedacusta sowerbyi*. During the next few days it was possible to exhibit the living specimens to members of the Oldham Microscopical Society and Field Club, and an attempt was made to take photomicrographs of narcotised specimens. The results of the latter experiment were unfortunately not good enough for publication with this note. None of these medusae developed in Mr. Edwards' aquarium to any size, the largest being about 3 mm. in diameter. Russell (*loc. cit.*) states that in mature specimens the diameter of the umbrella is 10-20 mm.

Enquiries were made as to the source of the plants growing in the above tank, and Mr. Edwards informed me that he had recently introduced some *Elodea* from a section of the Rochdale Canal which passes near to Oldham, although plants from another source were also present. It was decided to make a search for the hydroid stage which is known as *Microhydra ryderi* Potts, and Mr. Edwards kindly allowed me to remove some of the *Elodea* from his tank for this purpose. Upon examining the *Elodea* under a dissecting microscope, I was greatly pleased to find a number of the hydroids attached to the weed. One specimen consisting of two polyps, each about 0·5 mm. long was kept under observation for some time, and it was with interest that I was able to watch one of the polyps capture and dispose of a small nematode. The ' worm ' was grasped about midway between the ends, and was drawn into the mouth of the polyp whilst bent in the form of a U. Within four minutes the ' worm ' was completely inside the polyp, and within a quarter of an hour was barely visible. After 25 minutes it had completely disappeared.

Later in the season Mr. Edwards and I visited the Rochdale canal in the hope of finding *Craspedacusta* under natural conditions. Our quest was not successful, and as there appeared to be evidence of some pollution, and little or no *Elodea* we concluded that this might in part account for the absence of the medusae. Mr. R. Vallentin (' Occurrence of *Craspedacusta* (*Limnocodium*) *sowerbii* in the Exeter Ship Canal ', *Nature*, **125** : 15-16, 1930) who recorded medusae for the first time under natural conditions in Europe, found them to be plentiful in the Exeter Ship Canal in late July, and they were present in varying numbers from that date until October 14th. He points out that on September 5th the surface temperature was 72° F. and the medusae were present in such numbers that they could be seen with the naked eye.

Some time later my companion had to dismantle his tank on account of removing to another house, and *Craspedacusta* was for the time being forgotten. It was therefore with some surprise that I learned in July this year, that he had found what appeared to be the hydroid *Microhydra ryderi* on *Elodea* which he had again collected from the Rochdale Canal. This was soon confirmed, and as the weed was this time examined before being introduced into the aquarium, there was no doubt as to the source of the original medusae and polyps in 1952. Although other plants growing in the aquarium have been examined, hydroids have only been found on *Elodea*.

Russell (*loc. cit.*) gives a description of the adult and the hydroid, notes on the developmental stages, structural details and habits, and gives excellent text figures and a plate. He also includes a bibliography on *Craspedacusta* which extends to over four pages.—L. N. Kidd.

Animals in Fur, by **Clarence J. Hylander.** Pp. 206 with numerous illustrations in the text. New York and London: The Macmillan Company, 1956. 24/6.

Written primarily for American schoolchildren, this book is intended to be an introduction to mammalogy rather than a field guide. Despite the activities of trappers and hunters who loom larger on the American scene than in this country, it still needs to be said by the author that ' we know much less about mammal life than we do, for example, about birds or insects '.

Strictly a primer, the opening chapters deal with the definition of a mammal, brief accounts of the various orders and their distribution in the United States. There follows a terse account of a number of the commoner and more noteworthy species, a chapter on ' Mammals at Home ' which includes a brief reference to hibernation, a brief bibliography and an index. The illustrations are on the whole poor, most of the mammals figured being obviously captive, some even stuffed. If there is a need for this sort of elementary guide then at the present rate of exchange the price seems inordinately high and, at least in that regard, British children are better served.

E.H.

Tragic Safari, by **Albert Mahuzier.** Pp. 144, with 16 plates. Elek Books, London, 1956. 16/-.

The translator of this French account of a hunting-cum-photographic expedition into the Chad territory, north of the Belgian Congo, has contrived to retain both a panache and a naivete which would better accord with a nineteenth century account than with the present day. Unfortunately he is not so happy with his translations of the names of the animals encountered by the author and his companions. One of these, referred to in the text as a *potamocherus* is explained in a footnote as ' one of the *suidae*, hence allied to the hippopotamus. From another angle it might be described as a riverine version of the *phacocherus* or wart hog. In other words it is a wild pig of the swamps.' Presumably it was a Red River Hog.

Half-way through the trip the white hunter was killed in an encounter with lions, an unhappy affair in more ways than one since a preoccupation with photography during the following up of a wounded lion seems to have occasioned needless calamity.

The photography seems to have largely taken place after the hunting as the animals in the plates are mostly dead (they include a wart hog captioned ' Dead rhinoceros ') except when they are members of the expedition or the more shapely bipeds, African and European, some of which are obviously selected for their manifest mammalian characteristics.

E.H.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1956

We were not as fortunate with the weather for our meetings as during 1955, the V.C. 61 and V.C. 65 meetings both being held on wet days and some rain occurring during the week-end meeting in V.C. 62. In spite of this, the total attendance at the five meetings was just about the same as last year—170 to 180—and about the same number of societies was represented. This may well be considered encouraging. Ornithology has been represented regularly by Mr. Chislett and others and reports appear below. Active work on flowering plants has proceeded at all the meetings, and reports also on the larger Lepidoptera appear below. Diptera have been collected at the meetings except Grantley Hall and Thixendale but lack of time has prevented the production of any worthwhile notes on them yet. It is hoped to include such notes in the Annual Report. On the debit side it must be noted that we have had no notes on Bryology at the Union's general field meetings since Mrs. Appleyard left Yorkshire and the reports from at least six committees listed on the members' card are conspicuous by their absence. As was noted in the preamble to the excursion reports for 1955, it would be of the greatest value if more members would get to know the less studied groups of animals and plants so as to increase the range of reports on our field meetings and gradually to build up knowledge of the distribution of such groups in Yorkshire, where at present it may largely be lacking. The value of studies of the precise distribution of single species, or of small groups of species, must not be overlooked.

GRANTLEY HALL, V.C. 64, Whitsun, May 19th—21st

Over 20 members were resident at Grantley Hall, Ripon, throughout the week-end and on Whit Monday about 40 members, representing 14 societies, were present. A keen frost and some snow on Friday evening did not appear to augur well for the meetings, but in fact we enjoyed excellent weather throughout the week-end. However, the cold, late spring had left its mark, particularly upon insect life.

There was a marked absence of rabbits in the area and this probably accounts for the fact that seedling trees were noted in unusual numbers, especially near Eavestone Lake. Here, and at Picking Gill, there were many traces of the very severe gale which hit this district so hard earlier in the spring. Many fine specimen trees were also down in the grounds of Grantley Hall.

The district, partly on Millstone grit and partly on magnesian limestone, proved a very fruitful one for all sections, affording, as it does, such a wide variety of habitats, and it was particularly regretted that no freshwater biologists attended the meeting to examine the lakes, ponds and streams.

Thanks are due to Sir John Barran, Bt., for permission to visit Picking Gill, and to the Studley Royal Estate Office for permission to visit the Eavestone and Spa Gill areas.

Mammals (E. Wilfred Taylor): Pipistrelle Bat: one was noted flying near the Hall. Water Shrew: a dead specimen was picked up in the grounds and one live example was seen. Fox and Badger: recent evidence of both species was reported by Mr. Beck from Picking Gill. Fallow Deer: one was seen on the Fountains side of Grantley Park. Grey Squirrel: four were seen in Skelldale and obviously their numbers have been much reduced. Hare: two were seen near the Hall. Rabbit: one adult was seen at the head of Skelldale and two young near the main gates.

Ornithology (Ralph Chislett): With so many interesting birds in the Hall grounds and just outside, it was a pity that all the accommodation available for members was not booked in time. From my bedroom windows I saw Dippers, Grey and Pied Wagtails, Redstarts, Nuthatches, and watched Spotted Flycatchers building, and heard Chiffchaffs and Willow-Warblers. Pied Flycatchers were singing in a number of near-by places, as were Blackcaps, Garden-Warblers, Wood-Warblers and Goldcrests. Bullfinches and Lesser Redpolls occurred. D. F. Walker recorded a Hawfinch. The week-end provided a golden opportunity for learning songs. A Chiffchaff had eggs and a Wood-Warbler was seen building.

On the moors, Lapwings and Golden Plover's chicks were found; Curlews were still sitting eggs. The first broods of Ring-Ousels were apparently fledged and the second clutches not yet laid. Red Grouse had small chicks.

The total of 75 species identified included also Jay, Tree- and Meadow-Pipit, Marsh-Tit, Long-tailed Tit, Sedge-Warbler, Whitethroat (numerous), Wheatear,

Whinchat, Kingfisher, Green and Great-spotted Woodpeckers, Tawny Owl, Kestrel and Sparrowhawk, three species of dove, Redshank and Snipe, as well as more generally common species.

Lepidoptera (F. Hewson): Our list of species is not long, but lepidopterists do not expect many butterflies and moths so early in the year as Whitsuntide and we can say that the meeting was an interesting one.

On Saturday, on the way to Eavestone Lake, Mr. W. Beck and I took a Holly Blue butterfly (*Celastrina argiolus* (L.)); a few Green-veined Whites (*Pieris napi* (L.)) were seen and a number of larvae taken from various situations.

On Sunday in Picking Gill and Hebden Wood the Green-veined White was quite common and Mr. Beck took a Green Hairstreak butterfly (*Callophrys rubi* (L.)), of which species he found three strong colonies; also a Small White butterfly (*P. rapae* (L.)) and a Small Copper (*Lycaena phlaeas* (L.)), whilst I made a short but unsuccessful chase after a male Orange Tip butterfly (*Euchloe cardamines* (L.)). Upon leaving in the late afternoon some friends and I spent a short while on Skelding Moor and Master C. Turner and I took three cocoons of the Ruby Tiger moth (*Phragmatobia fuliginosa* (L.)), one larva of the Northern Eggar moth (*Lasiocampa callunae* Palmer) and one of the Beautiful Yellow Underwing (*Anarta myrtilli* (L.)). Larvae of the latter species are usually found in late summer and autumn and only occasionally in spring.

On five occasions in Spa Gill Wood on Monday morning I had good views of male Orange Tip butterflies (*E. cardamines* (L.)), saw a few Large White (*P. brassicae* (L.)), and took a Ruby Tiger (*P. fuliginosa* (L.)) and a Brown Silver Lines moth (*Lithina chlorosata* (Scop.)). Mr. D. F. Walker informs me that lower down, in Skell Bank Wood, Orange Tips were quite common and that he saw one Large Skipper butterfly (*Augiades venata* (Brm. & Grey)). Three Small Tortoiseshell butterflies (*Aglais urticae* (L.)) had been seen. Down at Fountains Abbey during the afternoon my only addition was a Silver-ground Carpet moth (*Xanthoroe montanata* (Schff.)). Mr. R. Chislett reported that in Dowley Gill he had seen a newly-emerged Emperor moth (*Saturnia pavonia* (L.)) and that a number of Fox moths (*Macrothylacia rubi* (L.)) were flying. By the Upper Laver Mr. E. W. Taylor had seen a butterfly which probably was the Duke of Burgundy Fritillary (*Hamearis lucina* (L.)).

None of the species mentioned is rare but the district is extremely pleasing and would certainly repay further investigation.

Coleoptera (A. E. Winter): Owing to frost during the night of May 18th, on the 19th beating and sweeping proved of little use. Thirty-five species were found, all common and to be expected in the area. On May 21st the weather was much warmer on our visit to Skell Gill. The sheltered banks of the Skell produced most of the beetles, all common species. Among them were: *Elaphrus riparius* (L.), *E. cupreus* Duft., *Nebria gyllenhali* (Schoen.), *Bembidion atrocoeruleum* Stephens, *B. lampros* (Herbst), *B. tibiale* (Duft.), *Notiophilus aquaticus* (L.), *Clivina fossor* (L.), *C. collaris* (Herbst), and *Loricera pilicornis* (Fab.).

Hymenoptera (A. E. Winter): Visiting the colony of the Wood Ant in the secluded Picking Gill, I was surprised to find that the large pine needle hill above the nests had vanished. I assume that during the great gale on March 1st of this year the hills had been swept away to ground level. I found a number of nests and that the ants were busily bringing new nest material and steadily building up the mounds over the nests.

Flowering Plants (Miss D. Walker and Miss C. M. Rob): The botanical section concentrated on mapping, using the Botanical Society's record cards. Of the three areas covered, two, Eavestone Lake and Picking Gill, were mainly on the Millstone Grit, the third, Fountains Abbey and Spa Gill, on the Magnesian Limestone.

One of the interesting things the mapping of a district brings to light is the absence of common species in some areas e.g. *Alliaria petiolata* (Bieb.) Cavara and Grande (Jack-by-the-Hedge) and *Lamium album* L. (White Dead-Nettle) in the Eavestone area. Mapping also highlights the difference in the flora of the Limestone and Millstone Grit.

Points of special interest noted included the exceptional flowering of most trees, Beech and Ash which flowered very sparingly in 1955 were covered with bloom; Oak, Holly and Bird Cherry were well above average.

In Picking Gill many of the ferns were brown and appeared to have been damaged either by frost or the cold wind. In Spa Gill this was not noticeable.

Both at Eavestone and Picking Gill *Viola palustris* L. was noticed in great profusion. At Fountains Abbey several Hornbeam trees were in good fruit. Plants had suffered from the very dry spring, but in Spa Gill the effects of the drought were not so noticeable.

Some of the more interesting plants noted on the three days were: *Menyanthes trifoliata* L. (Bogbean) at Brinbray and How Hill Ponds and *Botrychium lunaria* (L.) Sw. (Moonwort), *Ophioglossum vulgatum* L. (Adder's Tongue), *Ribes alpinum* L. (Mountain Current) at Spa Gill and Fountains Abbey. *Lathraea squamaria* L. (Toothwort), *Paris quadrifolia* L. (Herb Paris), *Helleborus foetidus* L. (Stinking Hellebore), *Dianthus plumarius* L. (Common Pink), *Minuartia tenuifolia* (L.) Hiern (Fine-leaved Sandwort), *Stellaria nemorum* L. (Wood Stitchwort) and *Galanthus nivalis* L. (Snowdrop) were among the other plants noted.

Fungi (Dr. J. Grainger): The larger Agarics generally appear in September or October, when there are sufficient amounts of soil nitrogen and soil moisture, with suitable soil temperature. There is, however, a spring maximum of soil nitrogen, and a few species should be found then. This faint spring maximum was represented in the environs of Grantley by the St. George's mushroom (*Tricholoma gambosum* Fr.), the Morel (*Morchella esculenta*), *Entoloma jubatum* Fr. and *Coprinus comatus* Fr.

Galera hypnorum (Schrank) Fr., *Panus stipticus* (Bull.) Fr., and the Jew's Ear (*Auricularia auricula-judae* (L.) Schroet.) were also found, but, growing on mosses or wood, are not so much at the mercy of soil conditions as are the ground species mentioned above.

The following rust fungi were found: *P. fusca* Wint., teleutospores on *Anemone nemorosa* L. (Wood Anemone); *Puccinia obtegens* Tul., uredospores on *Cirsium arvense* (L.) Scop. (Creeping Thistle); *Puccinia pimpinellae* (Strauss) Mart., uredospores on *Pimpinella major* (L.) Huds. (Greater Burnet Saxifrage); *Uromyces alchemillae* Lév., uredospores on *Alchemilla vulgaris* agg. (Lady's Mantle); *Uromyces ficariae* (Schum.) Lev., teleutospores on *Ranunculus ficaria* L. (Lesser Celandine). Aecidia on *Ranunculus repens* L. (Creeping Buttercup) and *Allium ursinum* L. (Ramsoms) could not be identified accurately without inoculation, and uredospores on *Taraxacum officinale* agg. (Dandelion) were most probably those of *Puccinia taraxaci* Plowr.

Another smut (*Ustilago violacea* (Pers.) Tul., on *Melandrium rubrum* (Weig.) Garcke (Red Campion) was found at Fountains Abbey.

Virus infections were recorded on *Mercurialis perennis* L. (Dog's Mercury), *Arum maculatum* L. (Lords-and-Ladies) and *Rumex obtusifolius* L. (Broad-leaved Dock).

WENTBRIDGE, V.C. 63, June 2nd

The Permian Limestone of South Yorkshire has long been known for its flora which includes plants not occurring or very scarce in other parts of Yorkshire. That our botanists were not disappointed at this meeting can be seen from the reports below. It was unpleasant though to see the disturbance of ground carrying so fine a flora, which presumably is only the beginning of work intended to bring considerable further areas under cultivation. The weather was fine, partially sunny and warm where sheltered from the breeze. We had the advantage of guidance by Mr. F. Morris who has a detailed knowledge of the area but, of course, those who wished to engage in the collection of insects and such pursuits could not cover much ground. At the meeting following tea at the Wentbridge Garage Café Mr. Chislett was in the chair and 34 members representing 14 societies were present, or had been with us earlier in the day.

Ornithology (R. Chislett): Since our last visit in 1939 the wide expanse of Stapleton Park has been cultivated and only Skylarks abounded there. Yellowhammers and Jackdaws were plentiful on the verges. The lake showed Coot (nest found), Moorhen, and a Mallard with brood. Recently, breeding Mute Swans had been stoned by boys and their eggs taken. The Dabchick was absent. Nests of Greenfinch, Linnet and Whitethroat were found. Many Willow-Warblers sang, and Blackcap and Garden-Warbler. A Hedge-Sparrow's nest held five young, and other usual members of the Thrush family were fairly plentiful. A Green Woodpecker was heard. The list of species totalled 32. The woods showed little change, but someone, probably connected with the Bramham Moor Hunt, had filled in the holes

to a well-known Badger sett. What a shame—in Broc-o-Dale! Two entrances seemed to have been re-opened by Brock.

Lepidoptera (J. H. Seago):
Dira megera (L.) (Wall), several.
Pararge aegeria (L.) (Speckled Wood), fairly common but badly worn.
Coenonympha pamphilus (L.) (Small Heath), several on West Hill and Stapleton Park.
Lycaena phlaeas (L.) (Small Copper), one at Went Hill.
Pieris brassicae (L.) (Large White)
P. rapae (L.) (Small White) } fairly common.
P. napae (L.) (Green-veined White)
Euchloe cardamines (L.) (Orange Tip), a few only but Mr. Hewson reports that it was common in the district a week earlier.
Pyrgus malvae (L.) (Grizzled Skipper), a single specimen was seen near Went Hill. (Some three years ago, this species was not uncommon in a restricted part of Stapleton Park, but none were seen there during the ramble.)
Drepana falcataria (L.) (Pebble Hooktip), one taken of two seen.
Lomaspilus marginata (L.) (Clouded Border), one.
Abraxis sylvata (Scop.) (Clouded Magpie), two seen.
Gonodontis bidentata (Clerck) (Scalloped Hazel), one.
Cabera pusaria (L.) (Common White Wave), one.
Hydrelia flammeolaria (Hufn.) (Small Yellow Wave), one.
Epirrhoe alternata (Mueller) (Common Carpet), present.
Larvae of *Philudoria potatoria* (L.) (Common Drinker) were particularly active on Went Hill.

Flowering Plants (Miss C. Shaddick): I regret that Miss L. I. Scott and Mr. Adams, who both attended the meeting, had to leave before the presentation of the sectional reports. Most botanists present filled in B.S.B.I. cards and about 200 species were recorded. It proved impossible to cover the whole of this very rich and interesting area in the time available and virtually no water, bog, or streamside plants are included in this total.

The limestone ledges proved particularly rewarding and a considerable stand of *Carex ericetorum* Poll. was seen in one place, along with *Potentilla tabernaemontani* Aschers (Spring Cinquefoil) and *Astragalus danicus* Retz. (Purple Milk-vetch). It was regrettable to see that there had been considerable disturbance on a section of grassland where many interesting species were formerly recorded. Here over quite a wide area *Ophioglossum vulgatum* L. (Adder's Tongue) was found in very large quantities following disturbance to the old turf.

Perhaps on account of the dry, late spring, fewer orchids were noted than one would expect in an area like this. There was, however, no lack of other interesting species. *Dipsacus pilosus* L. (Small Teasel) is here seen in one of its most northerly stations and *Minuartia tenuifolia* (L.) Hiern. (Fine-leaved Sandwort) is another very rare species in Yorkshire which was noted here. *Cynoglossum officinale* L. (Hounds' Tongue) was flowering well and in some quantity in the woods. Other noteworthy plants of the magnesium limestone were: *Asperula cynanchica* L. (Squinancy Wort), *Atropa belladonna* L. (Deadly Nightshade), *Campanula glomerata* L. (Clustered Bellflower), *Carlina vulgaris* L. (Carline Thistle), *Cerastium arvense* L. (Field Mouse-ear Chickweed), *Conium maculatum* L. (Hemlock), *Helleborus foetidus* L. (Stinking Hellebore), *Hypericum montanum* L. (Mountain St. John's Wort), *Lithospermum officinale* L. (Gromwell), *Poa nemoralis* L. (Wood Poa), *Reseda lutea* L. (Mignonette), *Verbascum thapsus* L. (Aaron's Rod).

Mr. F. W. Adams had to leave before the meeting but has contributed the following additional notes.

The area is floristically rich, as might be expected from having several different habitats such as woodland, grassland and streamside in a Magnesian Limestone area.

Several different areas in the region were visited and were carefully examined.

On short-grazed *Festuca ovina* turf on a cliff-top on the side of the valley opposite to Castle Hill were the following: *Arabis hirsuta* (L.) Scop. (Hairy Rock-cress), *Arenaria serpyllifolia* L. (Thyme-leaved Sandwort), *Asperula cynanchica* L. (Squinancy Wort), *Astragalus danicus* Retz. (Purple Milk-vetch), *Carex ericetorum* Poll. (Heath Sedge), *Desmazeria rigida*, *Erophila verna* (L.) Chev. (Whitlow Grass), *Helianthemum chamaecistus* Mill. (Rockrose), *Koeleria gracilis* Pers. (Crested Hair-grass), *Lotus corniculatus* L. (Birdsfoot-trefoil), *Potentilla tabernaemontani* Aschers.

(Spring Cinquefoil), *Prunella vulgaris* L. (Self-heal), *Thymus drucei* Ronn. (Wild Thyme) and *Bromus erectus* Huds. (Upright Brome).

Nearby, on a scrub-covered scree-slope, were: *Arabis hirsuta* (L.) Scop. (Hairy Rock-cress), *Asperula cynanchica* (L.) (Squinancy Wort), *Brachypodium sylvaticum* (Huds.) Beauv. (Slender False-brome), *Bryonia dioica* Jacq. (White Bryony), *Campanula latifolia* L. (Giant Bellflower), *Clematis vitalba* L. (Traveller's Joy), *Cynoglossum officinale* (L.) (Hound's Tongue), *Desmazeria rigida*, *Festuca rubra* L. (Red Fescue), *Helianthemum chamaecistus* Mill. (Rockrose), *Helleborus foetidus* L. (Stinking Hellebore), *Hypericum montanum* L. (Mountain St. John's Wort), *Inula conyza* DC. (Ploughman's Spikenard), *Lithospermum officinale* L. (Gromwell), *Melica uniflora* Retz. (Wood Melick), *Poa compressa* L. (Flattened Poa), *Rubus caesius* L. (Dewberry), *Tamus communis* L. (Black Bryony), *Cornus sanguinea* L. (Dogwood) and *Verbascum thapsus* L. (Mullein).

The woodland south of Stapleton Park was, however, not very interesting, consisting mainly of Ash and Elm (*Ulmus glabra* Huds.).

The scrub-layer was poorly developed. *Mercurialis perennis* L. (Dog's Mercury) was the abundant plant of the herb-layer. *Sanicula europaea* L. (Wood Sanicle), *Viola hirta* L. (Hairy Violet), and *V. riviniana* Rchb. (Common Violet) were frequent. *Galeobdolon luteum* Huds. (Yellow Archangel), though present, was scarce. At the margin of the woodland were *Aquilegia vulgaris* L. (Columbine) and *Atropa belladonna* L. (Deadly Nightshade).

Along woodland paths, and occasionally in the woodland itself, were *Clematis vitalba* L. (Traveller's Joy), *Lithospermum officinale* L. (Gromwell) and *Hypericum montanum* L. (Mountain St. John's Wort).

Listera ovata (L.) R.Br. (Twayblade), *Orchis mascula* L. (Early Purple Orchis) and *Poa nemoralis* L. (Wood Poa) were also seen, but in small quantity.

Below the woodland, in the alluvial region, by the stream, was a luxuriant stand of *Urtica dioica* L. (Stinging Nettle), and nearby, *Allium scorodoprasum* L. (Sand Leek) and *Dipsacus pilosus* L. (Small Teasel) were seen. The former species is found almost exclusively in Scotland and the north of England, and is here (for England) at about its southern limit, whereas the latter is usually found in the south, and is here at about its northern limit. *Conium maculatum* L. (Hemlock) and *Arctium vulgare* (Hill) Evans (Burdock) were also present.

Above the woodland was an area of broken ground, only partially colonised, whose appearance suggested ploughing after deforestation. Here, *Campanula glomerata* L. (Clustered Bellflower) and *Ophioglossum vulgatum* L. (Adder's Tongue) were abundant with occasional plants of *Bryonia dioica* Jacq. (White Bryony), *Centaurea scabiosa* L. (Greater Knapweed), and *Leontodon leysseri* (Wallr.) Beck (Hairy Hawkbit).

On the south-facing slopes of the valley of the River Went are grasslands. These are of two types; pasture, where the soil is deep enough to plough, and the slopes not too great; pro-climax natural grassland of *Brachypodium pinnatum* (L.) Beauv. (Heath False-brome) and *Bromus erectus* Huds. (Upright Brome) with sparse *Ulex europaeus* L. (Gorse) scrub where the soil is either too shallow or too steep to plough. The latter type of grassland appeared to be subject to periodic, and perhaps frequent burning. *Astragalus danicus* Retz. (Purple Milk-vetch), *Cerastium arvense* L. (Field Mouse-ear Chickweed) and *Filipendula vulgaris* Moench (Dropwort) were present in quantity, with occasional patches of *Campanula glomerata* L. (Clustered Bellflower) and *Potentilla tabernaemontani* Aschers. (Spring Cinquefoil) in the shorter grassland.

Helictotrichon pubescens (Huds.) Pilger (Hairy Oat), *Reseda lutea* L. (Wild Mignonette), and *Trisetum flavescens* (L.) Beauv. (Yellow Oat) were locally abundant, but *Helictotrichon pratense* (L.) Pilger (Meadow Oat) appeared to be infrequent. *Carex ericetorum* Poll. (Heath Sedge), *Circium eriophorum* (L.) Scop. (Great Wolly-headed Thistle) and *Scabiosa columbaria* L. (Small Scabious) were also present.

In regions of small patches of limestone outcrop in the grassland were: *Arenaria serpyllifolia* L. (Thyme-leaved Sandwort), *Cerastium arvense* L. (Field Mouse-ear Chickweed), *C. glomeratum* Thuill. (Sticky Mouse-ear Chickweed), *C. vulgatum* L. (Common Mouse-ear Chickweed), *Carlina vulgaris* L. (Carline Thistle), *Erophila verna* (L.) Chev. (Whitlow Grass), *Anthyllis vulneraria* L. (Kidney Vetch) and *Minuartia tenuifolia* (L.) Hiern. (Fine-leaved Sandwort).

In crevices, and on the tops of cliff outcrops were *Asperula cynanchica* L. (Squinancy Wort), *Anthyllis vulneraria* L. (Kidney Vetch), *Arenaria serpyllifolia* L. (Thyme-leaved Sandwort) and *Potentilla tabernaemontani* Aschers (Spring Cinquefoil).

Ballota nigra L. (Black Horehound) and *Malva sylvestris* L. (Common Mallow) were on the pathside above the grassland.

Past records from the area contain many species still present; others however like *Anemone pulsatilla* L. (Pasque Flower) would appear to be extinct.

Mycology (Miss E. M. Blackwell): At the meeting five specimens collected during the day were exhibited, all Basidiomycetes, viz. *Tricholoma gambosum* Fr. (St. George's Mushroom), *Pleurotus ostreatus* Fr., *Puccinia obtegens* Tul., *Ustilago violacea* (Pers.) Tul., and *Urocystis violae* (Sow.) Fisch v. Wald. Miss Shaddick reported seeing *Morchella esculenta.*

RICHMOND, V.C. 65, June 16th

Conditions had looked unpromising in the morning and rain started while the party was waiting outside the Fleece Hotel prior to moving off. Cars were used to take us a mile west towards Whitcliffe Wood and then the main party followed the track contouring the north side of the dale to Applegarth. Intermittent rain—mostly light—continued through the day with one or two longer dull intervals without it during the afternoon. The poor weather was unfortunate, for the north side of the dale upstream from Richmond is very fine, though the views are a little spoilt by the big caravan site near the river. It was surprising how many insects—largely Diptera Nematocera—were flying under the cover of trees in Whitcliffe Woods, though difficult to see owing to poor light and worse to capture owing to this and wet vegetation. Sufficient material was taken to show that these woods must be very rich, at least in this order of insects. Most of the party returned to Richmond earlier than originally intended owing to the poor conditions. The General Secretary, on the other hand, disgraced himself by inadvertenly staying out collecting flies till the indoor meeting had been practically completed in his absence. From the choice of country and the arrangements made this meeting should have been another in the run of very successful ones organised by Miss Rob. We had a good attendance of members but it was unfortunate that the weather went wrong.

Ornithology (Ralph Chislett): Old woodland, with some more open land on the steep slopes between the Scar and the Swale, of Whitcliff Woods showed 38 species on a damp day. Included were numerous Jackdaws, Starlings, Wood-Pigeons, Jay and Magpie; numerous Chaffinches and Willow-Warblers; fairly numerous Tree-Pipits and Redstarts; several Nuthatches; Great-, Blue-, Marsh- and Long-tailed Tits; Goldcrests near some of the yews, some Whitethroats, a Blackcap, a Wheatear and family, Green Woodpecker (several holes, new and old, seen); Cuckoo and Tawny Owl. Curlew, Lapwing, and Skylark were heard beyond the crags. Others noted were Rook, Carrion Crow, Greenfinch, Yellowhammer, Tree-Creeper, Song-Thrush, Blackbird, Robin, Wren, Swallow and Swift by the river, Black-headed and Lesser Black-backed Gulls and Pheasant. Song was diminishing and the Pied Flycatcher was not located.

Mammals (Ralph Chislett): A Grey Squirrel was seen. The Rabbit was not seen, although it is recovering in some parts of the Dales.

Flowering Plants (W. A. Sledge): Whitcliffe Wood is a mixed deciduous wood of Ash, Elm, Oak, Sycamore and Rowan with Hazel, Hawthorn, Bird Cherry, Goat Willow, Dog Rose and Bramble as the chief accompanying shrubs. The ground flora is typical of such a type of woodland, the most notable species—long known from here and still in fair numbers in one limited area—being *Dipsacus pilosus* L. (Small Teasel). This station is its northern limit in Britain. *Lathraea squamaria* L. (Toothwort) was seen and *Atropa belladonna* L. (Deadly Nightshade) was also reported at the meeting as having been seen. Beyond the wood, on the flank of the open hillside the chief feature of interest was the occurrence in close proximity of communities indicative of base-deficient and relatively base-rich soils due to the alternating shales and limestones of the Yoredale rocks. In such areas *Helianthemum chamaecistus* Mill. (Rockrose), *Polygala vulgaris* L. (Milkwort), *Thymus drucei* Ronn. (Wild Thyme) and *Galium pumilum* Murr. (Slender Bedstraw) could be seen growing close to areas of *Nardus stricta* L. (Mat-grass), *Galium hercynicum* Weigel (Heath Bedstraw) and *Polygala serpyllifolia* Hose (Milkwort). This part of the route covered was not notable for any rarities but on one sandy slope it was instructive to see growing together and to compare plants of *Geranium molle* L. (Dove's-foot Cranesbill),

G. pusillum Burm. f. (Small-flowered Cranesbill) and *G. dissectum* L. (Cut-leaved Cranesbill). *Viola lutea* Huds. (Mountain Pansy) occurred in the turf at the crest of the ridge. A total of 178 species was recorded on the B.S.B.I. distribution cards, a fairly high total having regard to the fact that the route did not include any bog, marsh or riverside.

NEWTONDALE, V.C. 62, June 30th—July 1st

A week-end meeting in addition to that held at Whitsun is a revival of a pre-war practice, though then the August Bank Holiday week-end was that chosen. The Newtondale week-end was certainly enjoyed by the members who attended. Eleven members (and four children) stayed over the week-end, some at the White Swan in Pickering and some in Thornton-le-Dale. An additional 16 members came for the day on Sunday and altogether 12 societies were represented at the meeting at which Dr. Hincks was in the chair. A few additional members were present on Saturday. Stormy weather threatening on Friday evening cleared and we had a warm and mainly sunny day on Saturday, though vegetation was wetter than desirable for the collection of insects. There was some rain on Sunday morning but it lasted less than an hour and then the day became sunny.

Saturday was devoted to Gundale and the Haugh Rigg Woods and the quarries in that area. On Sunday, most of the party started from the Fox and Rabbit on the Whitby Road and went down into Newtondale. Two of the few present interested in insects examined the strip of woodland on the north edge of the Kingthorpe Estate and, later, the beckside in Thornton Dale near High Dalby. The success of the week-end was in no small degree due to the help of our local members, Mr. W. G. Bramley and Mr. R. M. Garnett.

Ornithology (Ralph Chislett): Observation was confined to Gundale as far as the old quarries and up to Keld Farm; and to Newton Dale as far as Keldgate Wood, with brief passage across the higher ground above. Considerable sections of hillside woodlands felled during the war are now replanted. Species identified numbered 51; and included five *Corvidae*, Lesser Redpoll, Bullfinch (scarce); numerous Greenfinches, Chaffinches, Yellowhammers, Tree-Pipits and Common Whitethroats; Grey Wagtail, Long-tailed Tit and the four usual tits, Goldcrest, Spotted Flycatcher, three *Phylloscopi*, Blackcap and Garden-Warbler, Whinchat, Redstart, Green and Grey-spotted Woodpeckers, Cuckoo, Tawny Owl, Kestrel, Turtle Dove and Pheasant. Sand-Martins nested in a quarry, House-Martins were rather scarce, and Swallows and Swifts more numerous. The three common Thrushes, and Robin, Hedge-Sparrow and Wren were normal. Skylarks, Lapwings and Curlews, and some immature Common Gulls were in the fields above the dale. The list could have been increased without difficulty by extension of the areas worked to other sides of Pickering. A Red-legged Partridge's egg was an unexpected find.

Mammals, etc. (Ralph Chislett): Badger burrowings were noted. No rabbits were seen. The Grey Squirrel occurred in the area. An adder was seen at the top of the slope on the west side of Thornton Dale at Dalby and the remains of a Sloe-worm were found.

Entomology (W. D. Hincks): Collecting was restricted during both excursions to very limited areas; on June 30th in Gundale (G) from the limestone quarry to the slopes of Haugh Rigg and on July 1st in Newtondale (N), a hundred-yard stretch of green lane, near the ' Fox and Rabbit ', giving access to the dale. I am grateful to other members for picking up some specimens and particularly to Mrs. J. H. Flint for considerable assistance in collecting. Gundale proved to be extremely interesting entomologically and it was unfortunate that the vegetation in both collecting areas was too wet for sweeping, consequently material could only be collected by hand and by using a light fly-net. It is inevitable therefore that many interesting species were not collected and that generally only the larger insects were obtained. During the visit to Gundale it was a melancholy satisfaction to rediscover several of the interesting beetles found on Haugh Rigg before the war by the late M. D. Barnes.

Coleoptera. The following were the most interesting species met with. *Strangalia quadrifasciata* (L.), a longhorn-beetle of which I took a male off umbells in an old quarry (G), a fine female being collected by Master C. Bramley (N) on meadow-sweet, is a rare species which has been recorded only two or three times in the county.

The last record was from Thornton-le-Dale (*Nat.* 1954: 17). A related species, *Leptura sexguttata* F., was captured at Haugh Rigg by Barnes (*Nat.* 1940: 41). Another longhorn taken by Barnes was *Strangalia melanura* (L.) which he recorded from dogwood blossoms (*Nat.* 1940: 55), having been reported previously in the county only from Doncaster. It has since been noted from Forge Valley (*Nat.* 1954: 17) and I took several specimens on the slopes of Haugh Rigg on the flowers of *Rubus*, Umbelliferae, and *Rosa spinosissima*. A single specimen of *Cryptocephalus aureolus* Suffr. was captured by Miss Lord on a cat's-ear flower (G). It was only known in Yorkshire from York until Barnes captured three specimens on *Hieracium* flowers at Haugh Rigg (*Nat.* 1941: 50). Since then I have taken a specimen at Hackness (*Nat.* 1955: 20). Barnes also reported adults of *Pyrrhalta viburni* (Payk.) as abundant on *Viburnum opulus* in the same locality (*Nat.* 1941: 51). No adults were seen during our visit but the leaves of the *Viburnum* were very heavily attacked by the larvae of this beetle. Other interesting beetles were *Oxyporus rufus* (L.), one on the fungus *Agrocybe praecox* (Pers. ex Fr.) Fay. and another flying (G), *Cneorrhinus plumbeus* (Msh.), a single, very wet and rubbed example on a grass stem (G), and the little *Malthodes pumilus* (Bréb.) (G), so often overlooked because of its small size and drab colouration. The most interesting beetle however was collected by Mrs. Flint, in Gundale, probably having fallen from an oak. This is the very rare *Dirhagus pygmaeus* (F.) of which the only previous Yorkshire record is also from Pickering (sweeping bracken, A. Smith, *Nat.* 1947: 53) perhaps from the identical locality. This species does not appear to be recorded from any other northern county, indeed the few localities are all in the south of the country. Little is known of the habits of this species. Horion (1953, Faunistik der Mitteleurop. Käfer 3: 315) states that it is widespread in North and Central Europe, though often rare, being found in old oak woods, in decaying branches, on undergrowth, and sometimes beaten from thickets under oaks. He also records having found it in Germany in the rotten trunk of a copper beech, lying on the ground, the wood being so decayed as to be easily broken up with the fingers. Mrs. Flint also reports *Scymnus nigrinus* Kug., beaten from larch (G); *Bruchidius unicolor* (Ol.) (previously taken by Barnes, *Nat.* 1941: 51) swept from *Helianthemum* (G); *Aphidieta obliterata* (L.) (G); *Clytus arietis* (L.) (G); *Cerylon ferrugineum* Steph. (N); *Haliplus wehnckei* Gerh. (G).

Neuropteroid Orders. Several lacewings and dusky lacewings were common but the only Neuropteron of interest was the powder-wing *Coniopteryx tineiformis* Curt., which was common on hawthorn (N). Mrs. Flint reports that the only dragonfly seen was *Agrion virgo* (L.) which was plentiful in Newtondale.

Hymenoptera. Symphyta (Sawflies): Thirty-one species of sawflies were taken and one or two other species were seen but not captured. The list is quite a long one for the time of the year since, normally, the spring broods should be over and the summer ones not yet emerged. Perhaps the late season accounted for several species still being on the wing. Individuals of most species however appeared to be scarce. The following list includes all but three Nematines which await confirmation. The larval food plants where known are enclosed in brackets.

Cephus pygmaeus (L.) G (Gramineae); *Arge cyanocrocea* (Fst.) G (*Rubus*); *A. nigripes* (Retz.) G (*Rosa*); *A. ustulata* (L.) N (*Salix, Betula, Crataegus*); *Tenthredo ferruginea* Schr., G (polyphagous); *T. livida* L., N! (polyph.); *T. velox* L. N; *T. temula* Scop. N; *T. mesomelas* L. N! (polyph.); *T. perkinsi* (Mor.) N! (*Trifolium repens* L.); *Rhogogaster punctulata* (Kl.) N! (polyph.); *R. viridis* (L.) N (*Alnus*, etc.); *Tenthredopsis nassata* (L.) G, N! (Gramineae); *T. litterata* (Gf.) G (Gramineae); *Macrophya annulata* (Gf.) G (*Potentilla reptans* L.); *Dolerus picipes* Kl. G, N (Gramineae); *D. niger* (L.) N (Gramineae); *D. aeneus* Htg., N! (Gramineae); *D. gonager* (F.) N (Gramineae); *Allantus cinctus* (L.) G (Rosaceae); *A. cingulatus* (L.) N (*Fragaria* and *Rosa*); *Blennocampa pusilla* (Kl.) G! (*Rosa*); *Athalia glabricollis* Thoms., G. N. (Cruciferae); *A. bicolor* Lep. G; *A. lineolata* Lep. G! (polyph.); *Aneugmenus padi* (L.) G (Filices); **Hoplocampa pectoralis* Thoms., N. (*Crataegus*); *Nematus lucidus* Pz., N.

Parasitica (Ichneumon-flies, etc.): Parasitic Hymenoptera were very plentiful, especially in Gundale and it is regrettable that conditions made it possible only to collect the larger species individually by means of a fly-net or by picking them off the vegetation. The following are the Braconidae and Ichneumonidae so far identified.

Braconidae: **Spathius exarator* (L.), Thornton-le-Dale (*D. Walker*); **Agathis*

clausthaliana (Ratz.) G, N!; **Eubadizon extensor* (L.) N; *Ischneutes reunitor* Nees, G, N; **Dacnusa petiolata* (Nees) N.

Ichneumonidae: *Cratichneumon fabricator* (F.) N; *Ichneumon confusorius* Grav. G, N; *Ambyteles armatorius* (Fst.) N; *Alomya debellator* Pz., N; **Agrothereutes migrator* (F.) G; *Tryphon obtusator* (Thunb.) N; **Pion* (*Catoglyptus*) *crassipes* (Hlmgr.) G, N; **Eustiphrosomus antilope* (Grav.) N; *Diplazon deletus* (Thoms.) G. N; **D. annulatus* (Grav.) N; * *D. biguttatus* (Grav.) N; *Agrypon flaveolatum* (Grav.) N!; *Campoplex nitidulator* Hlmgr., G; *Paniscus testaceus* Grav., N.

Aculeata (Bees, Wasps, etc.): Few Aculeates were noted due to the generally dull weather. The most interesting was **Sapyga clavicornis* (L.), a rare species, only once previously recorded in Yorkshire, at Wakefield, as long ago as 1852 (*Nat.* 1930: 365). A single male was extracted from a burrow in an old post at the foot of Haugh Rigg. In the same post the ruby-tail, **Chrysis cyanea* (L.) was occupying some of the burrows. The bee **Prosopis communis* (Nyl.) occurred on flowers in Newtondale.

Hemiptera (Mrs. J. H. Flint): Heteroptera: Few bugs were taken but *Tingis cardui* L. was found on thistles, and *Heterocordylus leptocerus* Kirsch., on broom, both in Newtondale. Homoptera: Damp conditions prevented much sweeping for Homoptera but the following were among those taken in Gundale: *Centrotus cornutus* L., *Thamnotettix subfusculus* Fall., *T. prasinus* Fall., *Cicadella atropunctata* Gze., *Cixius nervosus* L.

Lepidoptera (F. Hewson): On the first day Haugh Rigg was worked and on the second the wood near Levisham and that beside Pickering Beck just a little north of Pickering.

Species noted were: *Dira megera* (L.) (Wall.), *Maniola jurtina* (L.) (Meadow Brown), *Coenonympha pamphilus* (L.) (Small Heath), *Aphantopus hyperantus* (L.) (Ringlet), *Argynnis selene* (Sch.) (Small Pearl-Bordered), *A. euphrosyne* (L.) (Pearl-Bordered), *Aglais urticae* (L.) (Small Tortoiseshell) (larvae), *Polyommatus icarus* (von Rott.) (Common Blue), *Lycaena phlaeas* (L.) (Small Copper), *Pieris* spp. (the three Whites), *Euchloë cardamines* (L.) (Orange Tip), *Augiades venata* (Brem. & Grey) (Large Skipper), *Spilosoma lubricipeda* (L.) (White Ermine), *Parasemia plantaginis* (L.) (Wood Tiger), *Cosmia trapezina* (L.) (Dunbar) (larvae), *Griposia aprilina* (L.) (Merveille du Jour), *Ectypa glyphica* (L.) (Burnet Companion), *Plusia gamma* (L.) (Silver Y), *Epirrhoë alternata* (Muell.) (Common Carpet), *Euphyia bilineata* (L.) (Yellow Shell), *Mesoleuca albicillata* (L.) (Beautiful Carpet), *Xanthoroë montanata* (Sch.) (Silver-Ground Carpet), *Odezia atrata* (L.) (Chimney Sweeper), *Opisthograptis luteolata* (L.) (Brimstone), *Bupalus piniarius* (L.) (Bordered White), *Cabera pusaria* (L.) (Common White Wave) and *Zygaena filipendulae* (L.) (Six-Spot Burnet).

Hamearis lucina (L.) (Duke of Burgundy Fritillary) was looked for, being well established here, but none were seen. A tiny larva which Mrs. Payne found on the underside of a cowslip leaf was quite likely of this species. A number of *Polyommatus icarus* (Common Blue) were seen, though, curiously, few males were about. No doubt the most interesting capture was the *Griposia aprilina* (Merveille de Jour) by Miss Angela Walker.

Plant Galls (W. D. Hincks): Galls were mainly searched for in Gundale where there were fewer than might be expected, perhaps due to the inhibitory effect of the lime dust forming a thin coating on the vegetation in the vicinity of the quarry. At least galls appeared to be much more plentiful on the slopes of Haugh Rigg some distance away from the quarry. The following list includes all the species noted except for a few unidentified nematode galls.

Acarina (Mites): *Phytoptus centaureae* Nal., Greater Knapweed G; *P. avellanae* Nal., Hazel G!!; *P. goniothorax v. typicus* Nal., Hawthorn G; *P. thomasi v. origani* Nal., Marjoram G; *P. aceris v. typicus* Nal., Sycamore G; *P. aceris v. cephaloneus f. aceris campestris* Nal., Maple G; *P. similis* v. *pruni-spinosae* Nal., Sloe G; *P. laevis v. typicus* Nal., Alder N; *P. brevitarsus v. typicus* Nal., Alder N.

Hemiptera: *Psyllopsis fraxini* (L.) Ash G!!

Diptera (Gall-midges): *Wachtliella rosarum* (Hardy) Rose G; *Dasyneura fraxini* (Kf.) Ash G!; *Macrodiplosis dryobia* (Lw.) Oak G; *Jaapiella veronicae* (Vall.) Birdseye Speedwell G!!

Hymenoptera (Gall-wasps, etc.): *Biorhiza pallida* (Ol.) Oak, one only G, several Howldale; **Trigonaspis megaptera* (Pz.) Oak, a few G. Mr. W. G. Bramley showed me a number of these galls in Howldale. Adults commenced to emerge the day after collection. It appears to have been recorded only from V.C. 63. *Andricus*

kollari (Htg.) Oak, noted on one tree only G; *A. testaceipes* Htg., oak G., * *A. quercus-corticis* (L) oak, one new and several old galls, Howldale; *A. fecundator* (Htg.) oak, one old gall G; *A. marginalis* (Schl.) oak, G; †*Callirhytis glandium* (Gir.) oak, one old gall, G; *Cynips quercus-folii* L. oak, a single gall, G; *C. divisa* Htg., oak, G; *Neuroterus albipes* (Sch.) oak, G; *N. quercus-baccarum* (L.) oak, a few G, plentiful in Howldale; *N. numismalis f. vesicator* (Schl.) oak, G; *Harmolita hyalinipenne* (Wlk.) a few old galls on *Agropyron*, G; *Blennocampa pusilla* (Kl.) Rose, G.

Flowering Plants (M. M. Sayer): This meeting was a great success from a botanical point of view and it was soon clear that the two days allotted were quite inadequate to cover so rich an area. On the Saturday the ground covered consisted of Haugh Rigg and a quarry just off the road. The latter has been spoilt by tipping and was relatively disappointing; few species being found which were not also seen at Haugh Rigg.

As foretold in the circular this limestone area is particularly rich in orchids and one field yielded no fewer than eight species out of the thirteen found during the meeting. These included several not mentioned in the circular. The best were *Platanthera chlorantha* (Cust.) Rchb. (Greater Butterfly Orchid), *P. bifolia* (L.) L. C. Rich. (Lesser Butterfly Orchid), *Ophrys insectifera* L. (Fly Orchid), *Gymnadenia conopsea* (L.) R.Br. (Fragrant Orchid), and *Orchis ustulata* L. (Dark-winged Orchid)—the last a very satisfactory find. All these were in fair quantity. A single plant of *Neottia nidus-avis* (L.) L. C. Rich. (Bird's-nest Orchid) was seen in the woods and one plant only of *Coeloglossum viride* (L.) Hartm. (Frog Orchid) in the quarry.

Other plants included *Aquilegia vulgaris* L. (Columbine), *Rubus saxatilis* L. (Stone Bramble), *Euonymus europaeus* L. (Spindle-tree), *Cirsium eriophorum* (L.) Scop. (Woolly-headed Thistle), *Paris quadrifolia* L. (Herb Paris), and *Melica nutans* L. (Mountain Melick).

On the Sunday we went by car to the Fox and Rabbit on the Whitby Road and from there descended to Newtondale where we worked upstream. Here the ground was far more acid and there were several marshes, providing a good contrast with the ground covered on Saturday. The most notable species seen, including several not mentioned on the circular were: *Ranunculus arvensis* L. (Corn Crowfoot), *Trollius europaeus* L. (Globe Flower), *Cirsium dissectum* (L.) Hill (Meadow Thistle), *C. heterophyllum* (L.) Hill (Melancholy Thistle), *Orchis strictifolia* Opiz, *Scirpus sylvaticus* L. (Wood Club-Rush) and *Carex paniculata* L. (Panicled Sedge).

The main disappointment was the failure to find *Pyrola media* Sw. (Intermediate Wintergreen).

In all about 290 species were recorded on the B.S.B.I. card.

Fungi (W. G. Bramley): At this time of the year little is to be expected in the way of larger fungi, but about a dozen species turned up. Some of these were, however, not named. Amongst the others were the common Mushroom (*Psalliota campestris*), *Lycoperdon coelatum*, *Marasmius peronatus* and Birch Polypore (*Polyporus betulinus*) with its parasite *Hypocrea citrina*. At least four species of *Coprinus* were seen but only *C. comatus* was determined. Rusts were not abundant and several species known to occur were not observed, but *Puccinia angelicae* was found in some quantity at Farnworth. Most attention was given to Discomycetes and the weather of the previous weeks had been suitable for their development.

The following list gives some of the more noteworthy finds.

G. = Gundale. F. = Farnworth.
† Not in Mason & Grainger's *Catalogue of Yorkshire Fungi* for V.C. 62.
* Not in Mason & Grainger's *Catalogue of Yorkshire Fungi*.

**Plasmopara pusilla* (de Bary) Schroet., on *Geranium pratense*, F.
Apostemidium guernisaci (Cr.) Boud., G.
†*Dasyscypha clandestina* Fuckel, on *Epilobium angustifolium*, F., G.
†*D. controversa* (Cooke) Rehm., on *Phragmites & Phalaris*, F., G.
**D. crucifera* (Phill.) Sacc., on *Myrica*, F.
**D. grevillei* Mass., on *Heracleum*, G.
†*D. palearum* (Desm.) Sacc., on grass stems, F., G.
Helotium (*Ombrophilla*) *clavus* (A. & S.) Gill., on submerged wood, G.; on *Epilobium angustifolium*, Howldale.
†*Micropodia pteridina* (Nyl.) Boud., on Bracken, F.
**Microscypha grisella* (Rehm.) Syd., on Bracken, F.

†*Mollisia millegrana* (Boud.) Nannf., on *Spiraea*, F., G.
**Pezizella parile* (Karst.) Dennis (=M. & G. sub *Helotium emergens*), G.
Phialea cyathoidea (Bull.) Gill., on several hosts, F., G. f. *albidula* Rehm. on *Centaurea nigra* with spores up to 15μ and deeply staining in Cotton Blue, G.
†*Pyrenopeziza lychnidis* (Desm.) Rehm., on *M. dioicum*, Kingthorpe.
**Tapesia evilescens* Karst., on *Phragmites*, F.
**T. retincola* (Rab.) Karst., on *Phragmites*, F.
†*T. strobilicola* Rehm., on Larch cones, Howldale.
Lophodermium arundinaceum (Schrad.) Chev., on *Phragmites*, F.
†*Lophiotrema semiliberum* (Desm.) Sacc., on *Phragmites*, F.
†*L. rubidum* Sacc., Rous & Bomm., on *Epilobium angustifolium*, F.
†*Leptosphaeria derasa* (B. & Br.) Auersw., on *Senecio jacobea*, F., G.
Dilophospora alopecuri Fr., on grass (living), F.
†*Mastigosporium rubricosum* (Dearn. & Bark.) R. Sprague, on *Dactylis*, G.

THIXENDALE, V.C. 61, July 14th

It was pleasing that in spite of difficulty of access and of a depressing weather forecast which proved only too accurate, 35 members and other adults (and six children) made the journey to Thixendale. Among them were a party of 11 students from Lady Mabel Training College under the guidance of Miss Blackwell, and members from as far away as Halifax, Huddersfield and Middlesborough. The vegetation was all very wet from heavy rain earlier in the morning and light rain persisted intermittently throughout the day. The grass on the steep sides of Water Dale was quite long and waders rather than gum boots would have been necessary to keep dry. The time of tea was advanced from 5-30 to 4-0 p.m. and at the crowded meeting which followed it our Treasurer, Mr. Sayer, was in the chair and nine societies answered to the roll-call or were known to have been present. The period before lunch was spent examining the slopes on the north side of Water Dale. The upper parts were well-sprinkled with Clustered Bellflower and with Dropwort, but most interesting was an abundance of Horse-shoe Vetch (*Hippocrepis comosa* L.) all in one stretch of 50 yards or so round the slope near the top. Previously it was only known in V.C. 61 from Langton Wold. After lunch a field on Gritts Farm which had carried fodder crops was examined and then chalk slopes on the north side of Thixendale itself, about half a mile west of Burdale station. It was a great pity that the weather was such as to make difficult appreciation of the slopes covered with Rockrose and Thyme and other plants of the chalk flora.

Ornithology (B. Pashley): As the day was to be a short one two woods were concentrated upon, one a mile east of the village, of pines, the other of mixed deciduous trees. In the pine wood a pair of Redstarts were feeding young, perched on the wire at the edge of the wood. The Marsh-Tit was seen and heard at the fringe of the wood. The bushy slopes in Water Dale were of particular interest, Tree-Pipits and Whinchats, especially the latter, being fairly common. Young Whinchats were seen being fed. Spotted Flycatchers, Willow-Warblers, Chaffinches and Greenfinches were seen in both woods, as was a Tawny Owl in each. The deciduous wood held Song-Thrush, Tree-Creeper, Wren, Great- and Blue-Tit, Whitethroat, Robin, Dunnock, Yellowhammer, Blackbird, Partridge, Starling and House-Sparrow. Carrion Crow, Rook and Jackdaw were seen in the fields and, all flying, a single Swift, Swallows and House-Martins, Wood-Pigeon and Lapwings.

A Pheasant was reported by the botanists and a Turtle Dove seen on the road about half way between Thixendale and Fridaythorpe brought the total of species seen to 32. Visibility had been very bad—all day a mist hung about the woods, which would probably reveal other birds not recorded at this meeting if explored in better weather.

Lepidoptera (F. Hewson): Little could be done in the dripping vegetation and the few species disturbed were common ones.

Flowering Plants (Miss F. E. Crackles): In spite of the weather, a number of botanists attended the meeting and worked enthusiastically in a most interesting area. Thanks are due to Mr. K. Payne for leading us to three most profitable localities.

The first locality to be visited was a hillside in Water Dale. Here the most notable plant was *Hippocrepis comosa* L., the Horse-shoe Vetch which Mr. Payne had

located earlier. Very fine specimens of the Woolly Thistle, *Cirsium eriophorum* L. were also seen. Other species recorded here included *Arabis hirsuta* (L.) Scop. (Hairy Rock-cress), *Brachypodium pinnatum* (L.) Beauv. (Heath False-Brome) (frequent), *Campanula glomerata* L. (Clustered Bellflower) (frequent), *Carduus nutans* L. (Musk Thistle), *Centaurea scabiosa* L. (Greater Knapweed), just coming into flower, *Crepis capillaris* (L.) Wallr. (Smooth Hawk's-Beard) (common), *Filipendula vulgaris* Moench. (Dropwort), *Helianthemum chamaecistus* Mill. (Rockrose) (common), *Hieracium pilosella* L. (Mouse-ear Hawkweed) (common), *Knautia arvensis* (L.) Coult. (Field Scabious), *Leontodon hispidus* L. (Rough Hawkbit), *Myosotis arvensis* (L.) Hill (Common Forget-me-not) (frequent), *Ononis repens* L. (Restharrow), *Pimpinella saxifraga* L. (Burnet Saxifrage), *Phleum nodosum* L. (Cat's Tail), *Plantago media* L. (Hoary Plantain) (common), *Potentilla erecta* (L.) Räusch (Tormentil), *Polygala vulgaris* L. (Milkwort), *Poterium sanguisorba* L. (Salad Burnet) (fr.), *Scabiosa columbaria* L. (Small Scabious) (frequent), *Stachys officinalis* (L.) Trev. (Betony) (fr.), *Trisetum flavescens* L. (Yellow Oat) (fr.) and *Veronica officinalis* L. (Common Speed well).

On marshy ground in the bottom of the dale *Caltha palustris* L. (Kingcup), *Cardamine pratensis* L. (Lady's Smock), *Eleocharis palustris* (L.) R.Br. (Common Spike-Rush), *Lychnis flos-cuculi* L. (Ragged Robin), *Ranunculus flammula* L. (Lesser Spearwort) and *Juncus effusus* L. (Soft Rush) were noted. *Carex ovalis* Good. (Oval Sedge) was frequent here.

During the afternoon, a most profitable time was spent in a field on the Fridaythorpe road. Perhaps the most interesting species on this disturbed ground were *Onobrychis viciifolia* Scop. (Sainfoin), *Trifolium incarnatum* L. (Crimson Clover), *Torilis nodosa* (L.) Gaertn (Knotted Hedge-Parsley) (frequent) and *Petroselinum segetum* (L.) Koch. (Corn Parsley). Other species recorded here included *Acinos arvensis* (Lam.) Dandy (Basil-Thyme), *Aphanes arvensis* agg. (Parsley Piert), *Carduus nutans* L. (Musk Thistle) (very frequent), *Chaenorrhinum minus* (L.) Large (Small Toadflax), *Daucus carota* L. (Wild Carrot), *Erodium cicutarium* agg. (Common Storksbill), *Geranium molle* L. (Dove's-foot Cranesbill), *G. pusillum* Burm. (Small-flowered Cranesbill), *Linaria vulgaris* Mill. (Common Toadflax), *Reseda lutea* L. (Mignonette). *Galeopsis angustifolia* Ehrh. (Narrow-leaved Hemp Nettle), *Sherardia arvensis* L. (Field Madder), *Torilis japonica* (Houtt) DC (Upright Hedge-Parsley), *Viola arvensis* Murr. (Field Pansy), *V. tricolor* L. (Wild Pansy), *Veronica persica* Poir. (Buxbaum's Speedwell), and *V. polita* Fries. (Grey Speedwell); also *Lolium multiflorum* L. (Italian Rye-grass).

A hillside along the road to Burdale yielded the following additional chalk-loving species: Carline Thistle, *Carlina vulgaris* L. and Field Mouse-eared Chickweed, *Cerastium arvense* L.

BOOK REVIEWS

Learning and Instinct in Animals, by **W. H. Thorpe, F.R.S.** Pp. 493 with nine plates. Methuen & Co., London, 1956. 55/-.

Although the study of animal behaviour as a scientific discipline is barely leaving its infancy, its literature is scattered through the journals of two continents and its ordered synthesis will aid the specialist as well as be of the utmost interest to the amateur zoologist. This is all the more needed because of an unfortunate dichotomy of approach, European workers on the one hand having derived from the school of field-naturalists who have carried their observations, especially on birds, into the realms of comparative behaviour while American work has been mainly carried out by investigators concerned with human psychology who have attempted to unearth the foundations of behaviour by the study of animals, especially rats, in the laboratory. The author, well known for his direction of the Madingley Ornithological Field Station at Cambridge University, is primarily an ornithologist but his acquaintance with the work of his American colleagues at first hand combines to fit him pre-eminently for this work of masterly integration which only the most careful selection and summation could have provided.

His opening chapters are of necessity definitive since words like ' instinct ' have been subject to such varied interpretations and nuances of meaning as to become meaningless outside their immediate context. It is understandable that the need for precision of definition has given rise to an ethological jargon which has developed

its own ambiguities; it is an outstanding part of Dr. Thorpe's contribution that wherever possible he eschews it.

In a consideration of the term *innate releasing mechanism* in which only a given set of circumstances can give rise to the appropriate and unlearned act it may have been unfortunate that the author cites Tinbergen's instance of the building of the nest of a Long-tailed Tit. In this, the choice of territory is the *releaser* for the act of selecting a nest site; the nest site itself releases the urge to seek the *appropriate* materials in the appropriate order, to form the nest according to a prescribed method to a characteristic and limited pattern. That such a concatenation devolves upon the operation of nest-building is without doubt, but that a very great measure of divergence is permitted to many birds is well known to every field ornithologist. The Lesser Redpoll which, in the suburbs of a cotton town substitutes cotton threads for twigs and bents and employs a lining of cotton waste from a mill warehouse is employing at least some materials and some technique which are not innately prescribed, a type of learning which Dr. Thorpe reserves for a later chapter.

This adjustment of fixed automatisms is any creature's protection against environmental fluctuations. That it is difficult to distinguish at times between the maturation of instinctive behaviour patterns as they are called into play during the growth of the young and those alterations in behaviour which are learned adaptations of an innate pattern calls for considerable experimental analysis. Thus a number of young pigeons reared in narrow tubes alongside controls which were allowed to fly every day flew just as well as their companions when they were eventually released, their instinctive behaviour pattern of flight having matured efficiently without practice.

It is impossible to do adequate justice to a scientific milestone such as this work in what must be a relatively brief appraisal. Its digestion is likely to occupy your reviewer during the greater part of the coming winter and confessing readily to much less learning ability than that of the author he feels that such aspects as the impact of the theories of cybernetics upon those of neurology may well defeat him entirely.

It is primarily evident that zoologists and philosophers alike will stand eternally in debt to Dr. Thorpe who has done for ethology what the Huxleys have done for evolution.

A.H.

The Technique of Bird Photography, by **John Warham.** Pp. 199 with numerous photographs and drawings. Focal Press Ltd. 25/-.

This latest of several books dealing with the subject in recent years covers the practical problems involved in workmanlike fashion, from ' Choice of Equipment ' to its use in the field for various types of species, situation, climate, etc. The uses of high-speed flash, and many other useful gadgets are described. The author's tents all seem to be rectangular with guy-ropes; but if the supports and cover at base are double the width of the roof, guy-ropes are often unnecessary and more floor-space available. Whilst in general agreement with Mr. Warham's methods, I am doubtful of the wisdom of beginning with passerine birds when the eggs are on the point of hatching and preferred to wait a day or two longer. When discussing ' gardening ' he omits to point out that good portraits can be got of many species on suitable perches provided near to the nest, and ' gardening ' avoided entirely.

The excellent collection of bird photographs, covering 62 species, include many by the author (some taken in Western Australia where he now lives) and some by other photographers (British, American, etc.). The book ends with 23 pages for the beginner entitled ' A Guide to British Birds,' covering 69 species in brief, succint, reliable paragraphs, but which give ' light brown legs ' as diagnostic of the Willow Warbler, which is not quite correct.

R.C.

Summer Migrants. 32 colour photographs by **Eric Hosking** with notes by **P. E. Brown.** From Educational Production Ltd. or from The Royal Society for the Protection of Birds. 3/6.

The reproduced colour photographs are on sheets of gummed and perforated poster-stamps for removal and sticking in the blank spaces provided. An unusual booklet for children who may be further led to fill in the 32 spaces provided for dates when they first see each species in the field. Mr. Brown's notes and some of the reproductions are very good.

Infancy in Animals, by **Maurice Burton.** Pp. 226 with 16 pages of photographs and 35 text figures. Hutchinson & Co., 1956 18/-.

In this book the author sets himself the task of summarising what is known of the processes of reproduction of birds and animals and of the subsequent training of the young up to the time when they become independent. He deals, therefore, with the biological significance of infancy and the impact of the offspring on the lives of the parents.

All vertebrate life has its beginnings in the fertilised ovum and much is known of the processes of cell division that result in the development of the young, whether located in the egg of a bird or the womb of a mammal. Much less is known of the exchanges that take place between the embryo and the parent to bring about, at the right moment, a number of complicated instinctive actions such as those which control nest building or nursing behaviour. At a later stage they also control the protection of the young and, in the case of the higher animals, their training for an independent life.

In this book Dr. Burton, who is Deputy Keeper of Zoology at the Natural History Museum, has brought together facts gathered over a wide field by himself and others and woven the whole into a most interesting and readable volume.

E.W.T.

Old Fourlegs: The Story of the Coelacanth, by **J. L. B. Smith.** Pp. 260. Longmans, Green & Co. Ltd., 21/-.

In this rather oddly-titled book Professor Smith tells, with characteristic vivacity and certainly no false modesty, of the fascinating discovery of the Coelacanth (*Latimeria*) in 1939, and of his efforts to find further specimens, culminating in the 2,500-mile flight to the Comores, where a second fish had been found by local fishermen. Later it appeared that, though rare, Coelacanths were not entirely unknown to the natives of these islands off the north-west coast of Madagascar; the French authorities have now taken over the search, and the scientific study lies with Professor Millot of Paris. Professor Smith gave the second specimen the generic name *Malania,* but probably it was an abnormal or mutilated specimen, and *Malania* will turn out to be a synonym of *Latimeria.*

The book does not aim at morphological detail (which appeared in the *Trans. Roy. Soc. S. Africa*) but even so the structural relations between *Latimeria* and the Cretaceous *Macropoma*—up to 1939 believed to have been the last of the Coelacanths —might have been made clearer; it would also have been useful to refute more precisely the mistaken notion, not due to the author, that the Coelacanths are very like the ancestral stock of the tetrapods and hence of man himself. They have, in fact, many highly specialised characters of their own.

The book is therefore the story of a biological treasure hunt rather than the detached record of a scientific discovery; indeed, Professor Smith would probably not rate detachment very high (he heads one of his chapters ' Obsession '), but his energy and profound knowledge of modern fishes served him well while unravelling this exciting and important problem.

D.H.R.

Salamanders and Other Wonders: still more adventures of a romantic naturalist, by **Willy Ley.** Pp. x + 293, with 43 drawings by Olga Ley. Phoenix House, London, 1956. 21/-.

Mr. Ley has won a considerable reputation and popularity in the field of scientific journalism. The present work follows a similar pattern to two of his previous books. In it he traces the history of a series of biological facts and fables. Amongst the dozen cases dealt with, the opening chapter on cave salamanders tells of the rôle these animals have played in genetical controversy. Others describe the discovery of *Archaeopteryx* and related fossils and the proof they afforded of the origin of birds from reptiles; the history of discovery, exploitation and extinction or near extinction of the giant land tortoises of the Mascarene and Galapagos Islands; and the evidence for and possible explanation of the 'Abominable Snowman'. The botanical chapters deal with the fabulous stories and properties of the poisonous *Antiaris toxicaria* (Upas tree) and the remarkable *Lodoicea seychellarum* (Coco-de-mer). The element of sensationalism in the title and sub-title belies the considerable merit of the essays themselves which are judiciously stated and well documented.

Adventuring with Beebe, by **William Beebe.** Pp. 283 with 8 pages of photographic illustrations. The Bodley Head, London, 1956. 18/-.

The scientific activities of the late Director of the Department of Tropical Research of the New York Zoological Society took him to many out-of-the-way places both on land, on sea and under the sea, and his ability to describe vividly his jungle and submarine experiences has deservedly earned for him a high place amongst writers on natural history. This book consists of a selection of writings taken from his best known popular works, describing journeys and observations in Bermuda, British Guiana, the Pacific shores of Central America and the Pacific Islands. In it he ranges from 'black inchling fish which live in the eternal darkness of ocean's abyss to thirty-five-foot whale sharks in full sun at the surface . . . from the all but flightless hoatzin to wandering albatrosses with wingspread of eleven feet.' Though birds and fishes are Dr. Beebe's special interest the breadth of his natural history interests and his enthusiasm are well reflected in these essays which communicate to the reader his own great pleasure and excitement derived from the patient observation of living animals in their natural surroundings. But it is unfortunate that the chapter on 'Cahows and Longtails' taken from *Nonsuch: Land of Water* is reproduced without alteration, for later observations showed that the Cahows there described and illustrated were in fact Audubon Shearwaters.

W.A.S.

Six-Pointer Buck, by **David Stephen.** Pp. 256, Lutterworth Press, London, 1956. 12/6.

Novels which take the shape of animal biographies have developed an extremely conventional pattern: the birth, escape from a variety of infant hazards, adolescence and growth to maturity, never uneventful, until the animal fights to supremacy among his own kind. All this is fair enough, for the pruning hook of disaster cuts annual swathes in the ranks of all species or they must die of starvation, and the yearly crop is normally just that which will provide, after the winnowing, sufficient stock to replace those adults which die from accident and disease. This sifting and selecting of the more viable material is dramatic but drama is not tragedy. In these heroic biographies, however, the author takes sides. Identification with his subject makes him compassionate where the naturalist must remain dispassionate or cloud his observation with sentimentality. Within these limitations this story of a roebuck is well told though with a wealth of detail which leaves elision to the reader. It is to me a handicap to have personal names for every creature—' Kiki ' the sparrow-hawk, ' Tufter ' the long-eared owl, etc.—and Mr. Stephen's vocabulary in Lowland Scottish so far exceeds my own that I would have been glad of a glossary.

A.H.

A Short History of the Earth, by **C. A. W. Guggisberg,** translated and adapted by J. M. Eyles. Pp. 80.

The Bee, by **Gertrud Hess,** translated by W. Gossling. Pp. 65.

Mammals, Reptiles and Amphibians, translated by A. Leutscher. Pp. 65. Hallwag Pocket Library, 6 × 4¼ in., boards. Stanford Ltd., 5/- each.

The first of these pocket booklets gives an account of the composition of the earth, its minerals and rocks, the processes which shape the landscape and the sequence of earth history from earliest geological to modern times. It covers basic facts and beliefs about the earth's structure and history and introduces the reader to the many forms of life which characterised the different periods of geological time.

Gertrud Hess's concise account of the biology of the honey-bee summarises the details of its life, structure and senses and includes such recent work as that of von Frisch on the ' dances ' by means of which bees indicate to the community sources of nectar.

The book on mammals, reptiles and amphibians is factually adequate and as a pocket guide to the animals in these classes for the use of a short-term visitor to Central Europe it may serve well enough. Asterisks denote the species which occur in Britain, but these are not sufficiently numerous to allow the book to serve as a recognition manual in this country.

The Private Life of Fishes, by **M. Constantin-Weyer.** Pp. 150 with 18 full-page photographs and 14 line drawings. Translated from the French by Ray Turrell. Richard Bell, London. 15/-.

This book is easily comprehended by the lay reader and by the angler, but some of the general zoology seems to be somewhat inaccurate. There are chapters on the nature of fish habitats, mating and breeding behaviour, hatching and growing, migration, and fish breeding. The author's style is light and enlivened by humorous gibes at currently accepted theories and concepts. The book can be recommended for entertaining reading but would not 'wear well' from the point of view of reference.

H.H.

A New Course of Plants and Animals—Book I, by **M. A. Grigg.** Pp. 216. Cambridge University Press. 7/6.

Many teachers and text-books adhere rigidly to the G.C.E. syllabus and the wonders of Nature are lost to most young students. The author of this book has made a successful attempt to guide the studies by boys and girls of all ages of plants and animals which they may meet for themselves in their natural surroundings or which they can take back to the classroom for closer observation. Two chapters are devoted to animals found in fresh water (27 examples), one to garden animals (20 examples) and one to animals of the countryside, with two chapters on the structure of the flowering plant and flowers, including seed structure and germination and fruit dispersal.

The descriptions of the animals, including life histories, are thorough and all are accompanied by good drawings, so that there should be no difficulty for the young naturalist in identifying the various insects found.

How to Draw Pond Life, by **Vere Temple.** Pp. 64. **More Birds to Draw,** by **Raymond Shepherd.** Pp. 64. Studio Publications Ltd. 5/- each.

The pencil and brush drawings of pond animals and plants which illustrate Miss Temple's book have all the simple elegance and artistic merit which one would expect from so accomplished an artist. The text contains information about the creatures depicted but there is scarcely any advice on the practical aspects of drawing such as the title would lead the would-be purchaser to expect.

Mr. Shepherd's *How to Draw Birds* was the third volume in this series. In this sequel there are 64 more pages of line and shaded drawings. The ability to sketch accurately is a useful ornithological accomplishment. This book goes further than its predecessor and should help sketchers to produce more finished drawings, even of species such as the Stilt-Sandpiper which they may not have seen before.

Close Range Photography, by **C. H. Adams.** Pp. 186, with numerous diagrams and photographic illustrations. The Focal Press, London. 21/-.

A slender though expensive volume devoted mainly to the making at home of the necessary equipment for the job. It is written by a practical man, and to anyone skilled in the art of woodworking with time to devote to the building and assembling of bulky cameras, accessories and electrical gear, the book with its complete series of diagrams is invaluable. The author's fine photographs of stamps, coins, prints, table-top work and insect-details indicate that his system yields results.

J.A.

All About Photographing Insects, by **George E. Hyde.** Photo Guide 73. Pp. 56, with 20 illustrations. The Focal Press, London. 2/-.

This is a handy booklet by a Yorkshire lepidopterist who is also a competent insect photographer. Examples to illustrate the author's points have been culled from British and continental sources, and two pages of sketches show methods of approach and insect control. Equipment, from simple camera with supplementary lenses to precision miniature with accessories, is described and practical advice is given on finding suitable subjects and portraying them at large and indoors by natural and artificial light. Apart from a slip connected with vapourer moth, it is an accurate and stimulating guide to a fascinating branch of nature photography.

J.A.

CONTRIBUTORS

CLASSIFIED INDEX

COMPILED BY G. A. SHAW

CIRCULAR No. 556

Yorkshire Naturalists' Union.

SUBSCRIPTIONS

Will all members please note that subscriptions for 1956 are now due and should be sent to Mr. Shaw at the address given above.

SPRING ENTOMOLOGICAL MEETING.—The Entomological Section will meet at 2-30 p.m. on Saturday, March 3rd, in the **Central Public Library, Leeds.** There will be an exhibition of entomological literature organised by the **City Librarian** and the usual meeting for the display of specimens, to which members are asked to contribute. Tea and light refreshments will be provided. All interested members and associates will be welcome.

BRYOLOGICAL EXCURSION TO BOLTON ABBEY, V.C. 64 ON SATURDAY, MAY 5th, 1956.

MEETING PLACE.—Barden Tower at 11-30 a.m.

TRANSPORT.—A bus departs **Ilkley, Brook Street** (under the railway bridge) at 10-55 a.m. and is due **Barden** 11-25. To connect with this bus it will be necessary to leave **Leeds, Cookridge Street,** on the 9-15 bus, or **Bradford, Chester Street,** on the 9-45 bus. Return from **Bolton Abbey P.O.** at 4-45 p.m., due in **Ilkley** 5-5 p.m. Members should carry lunch and tea.

For any further information members should apply to **Mr. G. A. Shaw,** Botany Department, The University, Leeds 2.

ANNUAL MEETING, 1956

It is hoped to hold this at **BARNSLEY,** at the invitation of the Barnsley Naturalists' Society.

CIRCULAR No. 557

Yorkshire Naturalists' Union.

The 12th Spring Foray
OF THE MYCOLOGICAL COMMITTEE

WILL BE HELD AT

BURNSALL
From APRIL 19th to 23rd, 1956

Chairman: Mr. A. C. COLLINGE, Halifax.

Secretary: Miss J. GRAINGER, Wilshaw, Meltham, Huddersfield (Tel. Meltham 352)

Recorders: Miss E. M. BLACKWELL, Woodsome Lees, Kirkburton, Huddersfield.
Mr. W. G. BRAMLEY, East Villa, Eastfield Road, Pickering.
Dr. J. GRAINGER, West of Scotland Agricultural College, Auchincruive, Ayr.

HEADQUARTERS.—The Manor House, Burnsall, Wharfedale (via **Skipton**). Tel. **Burnsall 231.**

Terms: £1 per day. Members should write direct to **Mr. Eric Lodge** at the Manor House saying whether they are willing to share a room. It should be possible to accommodate the whole party at Headquarters but if any members have difficulty they should get in touch with **Miss Grainger.**

SHEFFIELD MEETING
OF THE
BRITISH MYCOLOGICAL SOCIETY

Members of the Yorkshire Naturalists' Union are invited to attend this meeting from **September 6th-12th.** Those wishing to attend the whole or part of the meeting should write to **Dr. J. Webster, Dept. of Botany, The University, Sheffield, 10,** for particulars.

The Autumn Foray

WILL BE HELD AT

RICHMOND

From

Friday evening, SEPTEMBER 28th to Tuesday, OCTOBER 2nd, 1956

HEADQUARTERS.—The Fleece Hotel, Richmond, Yorks. (Tel. **Richmond 3381.**)

Terms: 25/- per day. Members should write direct to **Mrs. Milburn** at the **Fleece Hotel,** stating whether they are willing to share rooms. A flask and a sandwich tin should be brought for the packed lunches on Saturday and Monday.

An excellent workroom is available.

The **Richmond** area has been little visited by the Committee.

CIRCULAR No. 558

Yorkshire Naturalists' Union.

The 550th MEETING

WILL BE HELD AT

GRANTLEY HALL near RIPON

V.C. 64

From Friday evening, 18th MAY to Monday, 21st MAY, 1956

HEADQUARTERS.—Grantley Hall Adult College, near Ripon. This lovely eighteenth century house is situated in the Skell Valley near Fountains Abbey. It is very well appointed and the catering is excellent. A few single and double rooms are available but most of the accommodation is in private cubicles. Only 35 vacancies are available and applications should be made early and in any case *not later than March 31st,* direct to the Bursar, Mr. Aspinall.

Fees.—(1) For residents in the West Riding Administration area: £1/15/- for the first two days and 15/- per day for each additional day. (2) For people from other areas: £2/10/- and 17/6. Residents of West Riding county boroughs can apply for remission of fees to the West Riding level. Residents from other Ridings may be able to obtain similar remission on application to their own local authorities. It is well worth making this application and Mr. Aspinall will supply further details if requested at the time the booking is made.

TRAVEL.—There are excellent bus and train services to Ripon from the north-east, York, Leeds, Bradford, etc. It is impracticable to give times prior to the publication of the summer time tables. The College bus will pick members up in Ripon at certain times. (Details from the Bursar at the time of booking.) Members unable to use the college bus and requiring transport from Ripon to the college are asked to notify the Divisional Secretary, Miss Shaddick (address above) not later than May 12th.

MAP.—Ordnance Survey 2½ inch map, No. 44/26.

PROGRAMME.—It is particularly hoped that new members and beginners will attend this meeting as there will be special facilities for giving them help and advice in their chosen subjects. A course on the Flora and Fauna of the Skell Valley will be held at the same time and we anticipate that it will be possible for Y.N.U. members and members of this course to work together. The course continues until Tuesday evening and anyone wishing to stay over until then is cordially invited to do so. We hope to arrange some short illustrated lectures on the Saturday evening. Details of the field programmes will be announced at the meeting. There is plenty of excellent ground near at hand, including Fountains Abbey.

FLOWERING PLANTS.—Miss C. M. Rob, F.L.S.: The country round Grantley has been little worked by the Union apart from the Mycological Spring Foray in 1954. The high ground between the valleys of the Nidd and Ure is largely heather moor, with its typical Calluna-Empetrum associations. *Rumex tenuifolius* occurs in a number of places and may well prove to be the common ' Sheep's Sorrel ' of the higher ground. *Listera cordata, Equisetum sylvaticum* and *Potentilla palustris* occur in one very wet spot on Galphey Moor.

Among plants recorded by the Rev. H. Slater in his *Flora of Ripon*, published as a Transaction of the Union in the 1880's, are *Pyrola rotundifolia* near the waterfall at Lord Grantley's lake on Sawley Moor, *Vinca minor, Primula farinosa* and *Narcissus pseudo-narcissus* (Grantley district), *Helleborus viridis* and *Aquilegia vulgaris* (Fountains Abbey), *Convallaria majalis* and *Calamagrostis epigeios* (Aldfield), *Parnassia palustris* (Cowmire) and *Genista anglica* (Brimham Rocks).

The *History of Ripon*, published in 1806, lists *Ophioglossum vulgatum* (Fountains Abbey), *Carex curta, C. binervis, Empetrum nigrum, Corydalis claviculata, Listera cordata* and *Gymnadenia conopsea*, all from near Lord Grantley's lake. Two records from this list which need confirmation are *Carex oederi* (*C. serotina*) from near the lake, and Beech Fern (in the wood leading from the second spa at Aldfield).

Apart from the published records, there are the usual plants of the Pennine foothills, *Cardamine amara, Geum intermedium, Myosotis sylvatica, Prunus padus* and the like. *Ribes alpinum* grows in Spa Gill and *Atropa belladonna* at Fountains Abbey. It is hoped to map the plants for the B.S.B.I. Distribution Maps Scheme. Particular notice should be paid to the Barbareas growing by the Skell, as the herbarium of the Ripon Training College contains a specimen of *B. stricta* from this area and confirmation is desirable.

ORNITHOLOGY.—Mr. A. F. G. Walker states that the Pied Flycatcher, Redstart, Nuthatch and Dipper all breed in the grounds of Grantley Hall and there should be plenty to interest ornithologists at this time of the year. All the common leaf warblers are present, the Blackcap and Garden Warbler, Grey and Pied Wagtails, Green and Greater-spotted Woodpeckers, Treecreepers, Goldcrests and Great, Blue, Cole and Marsh Tits; also the Woodcock.

ENTOMOLOGY.—Mr. A. E. Winter draws attention to the very large wood ants' nest in the neighbourhood which should be well worth investigation and states that the area should prove rich in beetles and dragonflies. Mr. Jesper has recorded the following Lepidoptera in and around Grantley, though not all will be on the wing at the time of the meeting: Holly and Common Blue, Dark Green Fritillary, Small Heath, Large Skipper, Eyed and Poplar Hawk Moths, Puss Moth, Poplar Kitten and Herald. There is also an isolated colony of the White Letter Hairstreak in Spa Gill.

FRESH-WATER BIOLOGY.—The Skell, the lakes at Fountains Abbey, and Eavestone Lake should give plenty of scope to members of this section.

MEETING.—It is hoped that most members will arrive in time for dinner on Friday evening. A meeting will be held at about 5 p.m. on Monday, May 21st, to receive reports from the various sections on the week-end's work and to elect new members. High tea can be provided for non-resident members joining the Excursion for the Monday at an approximate cost of 3/-. Please book beforehand direct to Mr. Aspinall. Prior notice **must** be given if tea is required by non-resident members.

NEXT MEETING.—Wentbridge, V.C. 63, June 2nd.

CIRCULAR No. 559

Yorkshire Naturalists' Union.

The 551st Meeting

WILL BE HELD AT

WENTBRIDGE

V.C. 63

On JUNE 2nd, 1956

HEADQUARTERS.—Wentbridge Garage Cafe. Proprietor, Mr. H. Hargraves. Telephone: Wentbridge 314. Tea will be served at 5-0 p.m.: Ham and Salad, 4/-; Fruit with Cream, 3/3; Fruit with Ice-cream, 2/9. Members requiring tea should order it from Mr. Hargraves by May 26th.

MEET at 11-0 a.m. at the bottom of the road leading to the church. Mr. F. Morris, of 146 Pontecraft Road, Purston Featherstone, has kindly agreed to act as guide.

BUSES.—Wentbridge is on the Leeds to Doncaster route of the West Riding Green buses. There is an hourly service from Leeds bus station at 44 minutes past the hour arriving at Pontefract at 33 minutes past the next hour. The whole journey takes about an hour.

There are return buses at 54 minutes past the hour to Leeds and 46 minutes past the hour to Doncaster.

PERMISSION—We are indebted to WAKEFIELD No. 10 GROUP HOSPITAL MANAGEMENT COMMITTEE for permission to visit BROCODALE and other parts of the STAPLETON PARK ESTATE.

PREVIOUS MEETINGS.—Of recent years the Union was at Wentbridge in August, 1937, and May, 1939, and members should consult the accounts on pages 258-264 of *The Naturalist* for the former year and 215-219 of that for the latter year. Writing on botany in these, Dr. Sledge notes that the Magnesian Limestone pasture flora reaches the best development in the county in the Smeaton and Broc-o-dale areas and that a larger number of the rarer calcicolous species are to be seen than elsewhere in the Permian Tract. *Reseda lutea* L. (Mignonette), *Helianthemum chamaecistus* Mill. (Rockrose), *Cerastium arvense* L. (Field Mouse-ear Chickweed), *Astragalus danicus* Retz. (Purple Milk-vetch), *Filipendula vulgaris* Moench (Dropwort), *Potentilla tabernaemontani* Aschers (Spring Cinquefoil), *Inula conyza* DC. (Ploughman's Spikenard), *Dipsacus pilosus* L. (Small Teasel), *Campanula glomerata* L. (Clustered Bellflower), *Blackstonia perfoliata* (L.) Huds. (Yellow-Wort), *Clinopodium vulgare* L. (Wild Basil) and *Ophrys apifera* Huds. were among the species mentioned. In addition, *Vinca minor* L. (Lesser Periwinkle) was mentioned as present in great quantity in Broc-o-dale Woods and *Clematis vitalba* L. (Traveller's Joy) as being in profusion on the outskirts of Stapleton Park. Of the above plants it is interesting to note that *Clematis vitalba* is here approximately at the northern limit of its range in England.

ORNITHOLOGY.—Ralph Chislett: Wentbridge was last visited by the Y.N.U. on May 6th, 1939 (*The Naturalist*, August, 1939). The meeting is well remembered for the strategic retreat led by the late H. B. Booth to avoid an encounter with a bull. Among the birds found nesting were Coot, Moorhen, Dabchick, Green Woodpecker, Jay, Long-tailed Tit, Jackdaw and Stock-Dove in the same tree. Other species noted included Tree-Pipit, four species of Tit and three of Warbler, Little and Tawny Owls, and others that might be expected in an area comprising parkland with water, some woodland, farmland, etc. Exploration of the low-lying land about the river would probably have added several species. It will be interesting to see if the fears expressed by the late C.A.C. in 1939 concerning the continuance of the area's attractiveness have been justified.

CONCHOLOGY.—Mrs. E. M. Morehouse: Wentbridge and Broc-o-dale being on the limestone, there is a considerable number of molluscs species to be found. The River Went some years ago was polluted and the freshwater species have never really recovered, but one or two are to be found. The following should be seen: *Vitrina pellucida* Müll., *Vitrea crystallina* Müll., *V. cellaia* Müll., *V. Rogeri* B.B. Woodward, *V. alliaria* Mill., *V. Pura* Alder, *Limax maximus* L., *Agriolimax agrestis* L, *Arion acer Pyramidula rotundata* Müll., *Helicella virgata* da Costa, *H. caperata* Montagu, *Theba cantiana* Montagu, *Hygromia hispida* L., *H. rufescens* Pen, *Vallonia pulchella* Müll., *V. costata* Müll., *V. excentrica* Sterke, *Arianta arbustorum* L., *Helix aspersa* Müll., *H. nemoralis* L., *H. hortensis* Müll., *Ena obscura* Müll., *Cochlicopa lubrica* Müll., *Caecilloides acicula* Fér., *Jaminea anglica* Fér., *J. cylindracea* Fér., *Clausilia laminata* Montagu, *C. bidentata* Ström., *Succinea putris* L., *S. elegans* Risso, *Carychium minimum* Müll., *Ancylus fluviatilis* Müll., *Limnaea peregra* Müll., *L. stagnalis* L., *Planorbis vortex* L., *Anadonta cygnea* L.

LEPIDOPTERA.—F. Hewson: According to Mr. G. E. Hyde and the Circular for 1939 we may see the Speckled Wood (*Pararge aegeria*), the Brimstone (*Gonepteryx rhamni*), the Small Pearl-Bordered Fritillary (*Argynnis selene*), and the Large Skipper (*Augiades venata*). My choice will be for searching trees and bushes for ova or larvae of the Eyed Hawk (*Smerinthus ocellatus*), the Broad-Bordered Bee Hawk (*Hemaris fuciformis*), the Poplar Kitten (*Cerura hermelina*), the Swallow Prominent (*Pheosia tremula*), the Iron Prominent (*Notodonta dromedarius*) or the Pebble Hooktip (*Drepana falcataria*). Howover the district appears to have been little worked and other interesting species may be observed.

COLEOPTERA.—It may be recalled that on two seperate occasions Mr. E. G. Bayford has reared *Dictyopteris* (*Pyropteris*) *affinis* (*Paykull*) from larvae from rotting birch in Broc-o-dale Woods.

NEXT MEETING.—June 16th, Richmond, V.C. 65.

CIRCULAR No. 560

Yorkshire Naturalists' Union.

The 552nd Meeting

WILL BE HELD AT

RICHMOND

V.C. 65

On Saturday, 16th JUNE, 1956

HEADQUARTERS.—The Fleece Hotel, Reeth Road, Richmond (opposite Greyfriars Tower). Mrs. Milburn. High tea, 5/6. Afternoon tea, 2/6. Members are asked to notify the Divisional Secretary before the party starts out which meal they require.

MEET.—Headquarters, 11-0 a.m. for 11-30 a.m. start.

TRANSPORT.—The summer time tables are not available at the time of the Circular going to press. Members are advised to check all times given below.

TRAIN.

Richmond can be reached by train from Darlington but the service is not good, the only possible train leaves Darlington 10-45 a.m., and arrives Richmond 11-15 a.m.

BUS.

There is a good bus service from Darlington to Richmond. Buses leave every half hour, on the hour, and half hour, taking 40 minutes.

ROUTE.—The route proposed is through Whitcliffe and Applegarth Woods to Willances Leap, returning by the Old Race Course. Permits have been obtained for other areas in case any member should wish to visit them.

PERMISSION.—Permission for Applegarth and Whitcliffe Woods has been given by the Zetland Estate Office, for Colburn Woods by R. D'Arcy Hilyard, Esq., for the Easby Woods by the Easby Abbey Estate Office, and for the W.D. Lands by the War Dept. Land Agents. It is requested that members should see all gates are shut, no fences damaged, and that there is no disturbance of game. **No dogs are allowed.**

THE AREA.—Richmond lies at the lower end of Swaledale and is a well-known beauty spot. The National Trust owns a large area of Woodland on the South Bank of the River Swale including Billy Bank Wood and Round Howe. The country is very beautiful with numerous woods and large areas of moorland on the Fell tops, the area to be investigated includes woodlands, marginal grassland, and heather moor and should provide good ground for all sections of the Union.

TEA.—Tea at Headquarters at 4-45 p.m. will be followed by a meeting for the presentation of reports and the election of new members.

PREVIOUS MEETINGS.—The Union visited Richmond in 1881, 1895 and 1928 and reports of the 1881 and 1928 meetings are to be found in *The Naturalist* for those years. As regards botany these reports convey very little and since there have been many changes in the district since the last visit of the Union no lists of species are given here except in a short note on the Lepidoptera. Four pages of the 1928 report are devoted to an account of insects (mainly Hemiptera and Gall insects) by the late J. M. Brown. The area covered then was more extensive than will be possible during this year's one-day meeting, though.

The 1881 meeting was held on the August Bank Holiday Monday and it is interesting to note that the attendance of thirty members (mainly from Leeds and Halifax) apparently was considered small. Eighty members had been at the Thorne meeting earlier in the year.

It is hoped that as many Sections and Committees of the Union will be represented at this 1956 meeting as possible, and that their reports will help to bring up to date plant and animal records for this area.

LEPIDOPTERA.—F. Hewson: Species already recorded include the Silver-Washed and Pearl-Bordered Fritillaries (*Argynnis paphia* and *A. euphrosyne*), the Brown Argus (*Aricia agestis*), the Spectacle moth (*Abrostola tripartita*), the Clouded Buff (*Diacrisia sannio*), the Grey Pine Carpet (*Thera variata*), the Thyme Pug (*Eupithecia distinctaria*) and the Ash Pug (*E. fraxinata*). A beautiful greenish form of the Coronet (*Craniophora ligustri*) was at one time said to be common there and should be looked for at rest on tree trunks. Larvae of the Swallow Prominent (*Pheosia tremula*), the Lesser Swallow Prominent (*P. gnoma*), the Ochreous Pug (*Eupithecia indigata*), the Minor Shoulder Knot (*Bombycia viminalis*) or of the Waved Umber (*Hemerophila abruptaria*) may be found. Whitcliffe Wood is likely to be the most productive.

NEXT MEETING.—Newtondale, V.C. 62, week-end, June 29th—July 1st.

Circular No. 561

Yorkshire Naturalists' Union.

The 553rd Meeting

WILL BE HELD AT

PICKERING, for NEWTONDALE

From Friday Evening, 29th JUNE, till Sunday, 1st JULY, 1956

HEADQUARTERS.—The White Swan Hotel, Pickering. Proprietor: Mr. G. Bennett. Terms are about 23/6 per day including packed lunch and high tea. Dinner at night is not provided. Will members please book directly with Mr. Bennett as soon as possible. It will be a help if any members willing to share rooms would mention it at the time of booking. Alternatively, members can stay at Warrington House, Thornton-le-Dale, which has been the headquarters for the Mycological Committee on a number of occasions. Terms are 15/6 per day with full board and members should book directly with Miss K. M. Maidment as soon as possible.

Any member in difficulty with accommodation should get in touch with the General Secretary, telephone York 66358 (address above).

TRANSPORT.—Pickering is readily accessible by both road and rail from York, Leeds and Bradford, being on both the road and rail routes to Whitby. Members should consult current bus and train time-tables.

THE AREA.—The country about Pickering is of considerable beauty and variety. Pickering itself is built partly on the gravels of the delta where the river which cut the gorge of Newtondale entered the extensive lake occupying what is now the Vale of Pickering. This flat area south of Pickering remained marshy into historical times and, in fact, owes its present agricultural use to the drainage system. The impressive scenery of Upper Newtondale (well known to those who travel to Whitby by rail) bears witness to the work of water flowing down from the lake occupying

Eskdale during some of the period of the Quaternary glaciations. Fen Bog (the best bog in north-east Yorkshire and a very interesting place) lies at the head of Newtondale just south of the place where the Pickering-Goathland road crosses the railway. Another important and most striking geological feature, the Hole of Horcum, lies just short of Saltersgate on the road to Whitby and is the well-known locality for *Chamaepericlymenum* (*Cornus*) *suecicum* (L.) Aschers. and Graebn. (Dwarf Cornel). Nearer to Pickering and about a mile north of it, on the limestone, lie the Hough Rigg woods. The limestone quarries about here and elsewhere in the district are specially interesting from the botanists' point of view, and perhaps particularly to the lover of orchids. To the lepidopterist this area is very rich, the calcareous slopes and flora providing a good fauna and also many spots well sheltered from the wind.

PROGRAMME.—Meet outside headquarters at 10-30 a.m., Saturday and Sunday mornings.

It is suggested that the time available should be devoted to the country within four or five miles of Pickering and between north-west and north-east of it. This would leave re-examination of Upper Newtondale, Fen Bog and the Hole of Horcum to some future meeting, perhaps based on Goathland. It will, of course, be easy for members with cars to visit these more distant areas themselves if they wish.

PREVIOUS MEETINGS.—The 1929 and 1938 Whitsun visits of the Union were both successful and enjoyable. Earlier visits were in 1886 and 1895. During the two recent Whitsun visits only two days out of the total of six were devoted to the restricted area suggested for the 1956 meeting. In any case the later date of this year's meeting should make it valuable especially botanically and entomologically.

The Circular for the 1938 meeting should be consulted, in particular for the account of the geology of the area by Dr. J. E. Hemingway and the Circular and the subsequent report for notes on the Lepidoptera by Mr. G. B. Walsh. The 1929 report includes valuable ecological notes by Dr. W. H. Pearsall and this and the 1938 report include considerable contributions on the fungi of the area (since worked more intensively by the Mycological Committee) by the late Mr. F. A. Mason and Mr. W. G. Bramley respectively.

FLOWERING PLANTS.—Miss C. M. Rob, F.L.S.: The country around Pickering has a rich and varied flora and reports of past meetings of the Union list many plants of interest. The report by Professor Pearsall, on the 1929 meeting, gives a full account of the ecology of the area investigated.

Some of the more interesting plants noted at past meetings include *Aquilegia vulgaris* L. (Columbine), *Lathraea squamaria* L. (Toothwort), *Convallaria majalis* L. (Lily-of-the-Valley), *Euonymus europaeus* L. (Spindle-tree), *Pyrola media* Sw. (Intermediate Wintergreen), *Trollius europaeus* L. (Globe Flower), *Cirsium heterophyllum* (L.) Hill (Melancholy Thistle), *C. dissectum* (L.) Hill (Meadow Thistle), *Myrica gale* L. (Bog Myrtle), *Potentilla palustris* (L.) Scop. (Marsh Cinquefoil), *Genista anglica* L. (Petty Whin), *Sambucus ebulus* L. (Danewort), *Leucorchis albida* (L.) Schur (Small White Orchid), *Coeloglossum viride* (L.) Hartm. (Frog Orchis), *Platanthera chlorantha* (Cust.) Rchb. (Greater Butterfly Orchid), *Ophrys insectifera* L. (Fly Orchid), *Neottia nidus-avis* (L.) L. C. Rich. (Birds' Nest Orchid), *Paris quadrifolia* L. (Herb Paris), *Rubus saxatilis* L. (Stone Bramble) and *Melica nutans* L. (Mountain Melick).

LEPIDOPTERA.—F. Hewson, F.R.E.S.: Lepidopterists will probably find that this is one of our richest areas. To mention but a few species—the Orange Tip (*Euchloe cardamines*) is common and the Fritillaries are well-established; Silver-washed (*Argynnis paphia*), Dark Green (*A. aglaia*), High Brown (*A. cydippe*), the Small Pearl-bordered (*A. selene*) and the Duke of Burgundy (*Hamearis lucina*). The ' Browns ', the ' Blues ' and the ' Skippers ' are all well represented. The moths are equally interesting and varied and the following should be on the wing. Forester (*Procris statices*), the Narrow-bordered Five-Spot and the Sis-Spot Burnet (*Zygaena lonicerae* and *Z. filipendulae*), the Sallow Kitten (*Cerura furcula*), the Clouded Buff (*Diacrisia sannio*), the Scorched Carpet (*Ligdia adustata*) and the Peach Blossom (*Thyatira batis*).

TEA AND MEETING.—Tea at the White Swan Hotel at 5-0 p.m. on Sunday will be followed by a short meeting for the presentation of reports on the week-end's work. Afternoon tea is 2/6 and high tea (e.g., ham and salad) about 5/6. Members not staying at the hotel should notify the General Secretary (address above) what tea they want by the previous Saturday (June 23rd).

Next Meeting.—Thixendale, Saturday, July 14th.

CIRCULAR No. 562

Yorkshire Naturalists' Union.

The 554th Meeting

WILL BE HELD AT

THIXENDALE

V.C. 61

On SATURDAY, JULY 14th, 1956

HEADQUARTERS AND MEETING.—The Cross Keys, Thixendale (Mrs. Heslewood). Tea to drink only will be provided at 5-30 p.m. and members should bring their own food. A short meeting to hear reports on the day's work will follow tea. There is a café at Fridaythorpe at which any members who wish will be able to buy a meal later.

MEETING PLACE.—The Cross Keys at 11-0 a.m.

TRANSPORT.—Passenger trains no longer run on the Malton-Driffield line and the only approach to Thixendale is by road.

PREVIOUS WORK.—The Union appears not to have visited Thixendale previously. A meeting was held at North Grimston, for Birdsall, in 1902 and the same area was visited again from Malton in 1950. Wetwang, for Sledmere, was visited in 1891 and 1928. Robinson in his *Flora of the East Riding of Yorkshire* makes only a single reference to Thixendale—under Thyme. It is hoped that as many members as possible, and representing as many sections as possible, will visit Thixendale, as records from the area seem scarce.

THE AREA.—The village of Thixendale lies on the chalk of the Wolds at the joining of four roads, north of the York to Bridlington road and about two miles north-west of Fridaythorpe. The road from Fridaythorpe drops down into Thixendale and then continues north-west through Water Dale to Leavening. The road running down Thixendale itself reaches Burdale and then divides, to climb north over the Wold top to Wharram-le-Street and to run south-west down the valley to Fimber. The steeper valley sides are grazed by sheep. The steeper slopes, scrubby areas on them, the tops of the slopes and quarries are likely to be the more interesting botanically.

FLOWERING PLANTS.—Thixendale was suggested by the Botanical Section as the site for the 1956 V.C. 61 meeting and it is hoped that as many botanists as possible will take the opportunity to examine the area, from the point of view of both the B.S.B.I. and Yorkshire records.

During a short visit at Whitsun time allowed of little more than a glance over ground near the road. Some of the steep grassy slopes had an abundance of Thyme, Rockrose, Salad Burnet, Carline Thistle and *Hieracium pilosella* L., the beautiful little Mouse-ear Hawkweed. A good patch of *Cirsium eriophorum* (L.) Scop. (Woolly-headed Thistle) was growing in one place and *Cerastium arvense* L. was flowering up the roadside from Burdale towards Wharram. Marjoram and Greater Knapweed are common. Most striking at this time of year was the abundance and luxuriant growth of Cowslips on all the grassy hillsides. The following are among the lime-loving plants recorded elsewhere in the Wolds: *Gentianella* (Gentian) species, *Clinopodium vulgare* L. (Wild Basil), *Campanula glomerata* L. (Clustered Bellflower), *Centaurium minus* Moench (Common Centaury), *Atropa belladonna* L. (Deadly Nightshade), *Filipendula vulgaris* Moench (Dropwort), *Erigeron acris* L. (Blue Fleabane), *Geranium columbinum* (Long-stalked Cranesbill), *Hypericum* (St. John's Wort) species, *Reseda lutea* L. (Mignonette), *Picris hieracioides* L. (Hawkweed Ox-tongue), *Salvia horminoides* Pourr. (Wild Clary), *Asperula cynanchica* (Squinancy Wort) recorded from Langton Wold, *Verbascum thapsus* L. (Aaron's Rod), *Verbena officinalis* L. (Vervain) and *Blackstonia perfoliata* (L.) Huds. (Yellow-wort). There is a locality for *Astragalus glycyphyllos* L. (Milk Vetch) near Brough, and it occurs in the Howardian Hills on the limestone. *A. danicus* Retz (Purple Milk Vetch) is recorded from Langton Wold, Brandesburton and Sherburn Wold.

LEPIDOPTERA.—F. Hewson, F.R.E.S.: My records of the area are not estensive but I expect it to be quite a good one. The Large Skipper (*Augiades venata*), the Small Skipper (*Thymelicus sylvestris*) and the Ringlet (*Aphantopus hyperantus*) should be on the wing. The best of the moths appears to be Blomer's Rivulet (*Discoloxia blomeri*) and this is said to be common there. If any one wishes, and has the time to travel the eight miles or so, he may find the Marblet White (*Melanargia galatea*) in an old quarry site by Gartonslack Gatehouse level crossing, where I saw it in numbers on July 24th, 1944.

REPORTS ON MEETINGS.—It is specially asked that all Recorders and other members having contributions to the reports on the Union's field meetings this year should send them to the General Secretary **as soon as possible** after the meeting concerned. Especially reports on this Thixendale meeting will have to be sent in straight away if they are to be in time for the October *Naturalist*.

CIRCULAR No. 563

Yorkshire Naturalists' Union.

SUBSCRIPTIONS.—If there are any subscriptions for 1956 still unpaid, will the members responsible please forward them (£1 for Full Members and 5/- for Family Members), without delay, to MR. SHAW at the address given above.

BRYOLOGICAL MEETING

A Bryological Field Meeting will be held at Hackfall, near Masham, on Saturday, 22nd September, 1956. All interested in mosses or liverworts will be welcome. Members should meet at Grewelthorpe Post Office at 11-40 a.m., and should carry lunch. A later meal can be obtained at the Hackfall Inn, Grewelthorpe, if required. A bus departs from Harrogate at 10-35 a.m. and arrives at Ripon at 11-10 a.m.: Ripon depart 11-15 a.m. to arrive at Grewelthorpe at 11-39 a.m. Buses return from Grewelthorpe at 3-34, 5-34 and 7-34 p.m.

For further particulars apply to Mr. G. A. SHAW, Botany Dept., The University, Leeds 2.

MYCOLOGICAL MEETING

A joint day foray will be held by the Y.N.U. Mycological Committee and the Mycological Section of the North Western Naturalists' Union at Hardcastle Crags on Saturday, October 20th, 1956. All interested in fungi will be welcome at this meeting in the old collecting haunts of Messrs. Crossland and Needham. Members should meet at Hebden Bridge Railway Station at 11 a.m. and should carry lunch and tea. Coffee, tea and cooked dinners may be obtained at Gilson Mill at appropriate charges. Any member in difficulty with travel arrangements or needing advice on overnight accommodation should get in touch with Mr. Roy Watling, 20 St. Anne's Road, Skircoats Green, Halifax.

SECTIONAL MEETINGS, 1956

for consideration of the Annual Reports and to nominate Officers for the Sections and their Committees.

All Members and Associate Members of the Union are eligible to attend.

October 6th.—The Botanical Section will meet in the Botanical Department, Leeds University, at 2-30 p.m. Entrance is *via* the Baines Door, from University Road.

After tea there will be an exhibition of specimens, to which members are invited to contribute.

October 13th.—The Conchological Section will meet at 2-30 p.m. in the Leeds City Museum, Park Row, Leeds.

October 20th.—The Vertebrate Section will meet in the St. John's Parish Room, Mark Lane, Leeds 2 (behind Lewis's Ltd.), at 3-15 p.m. Prior to this the **Protection of Birds Act Sub-Committee** will meet at 2-15 p.m., the **Ornithological Division** at 2-45 p.m. (for the election of officers) and the **Mammals, Reptiles, Amphibians and Fishes Division** at 3-0 p.m. (for the election of officers).

The business from 3-15 onwards will include the following:

Interim report of Spurn Observatory and Ringing Sub-Committee, G. H. Ainsworth. Interim report of Ornithological Division, R. Chislett. Election of Officers. 'Harriers'—an illustrated talk by R. Chislett. 'Bats'—an illustrated talk by John Armitage.

October 27th.—The Entomological Section and **The Freshwater Biology Committee** will meet together at the Leeds City Museum, Park Row, at 2-30 p.m. In addition to the business meeting there will be an exhibition of specimens to which members are asked to contribute and Mr. John Armitage will give an account, illustrated by specimens, of the present status of the Large Blue Butterfly in England.

Cups of Tea will be available at a small charge and members should bring their own food.

December 8th.—The Annual Meeting will be held in Barnsley at the invitation of the Barnsley Naturalist and Scientific Society.

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