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of Natural History for the North of England

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Chislett Memorial Lecture Huddersfield, 18th March 1972.

Peter Conder, the Director of the Royal Society for the Protection of Birds, will take as his subject — "Kills, Injures or Takes".

Will member Societies please make a note of this in their local programmes. Fuller details later.

WANTED Copies of *The Naturalist* for April-June 1969 and January-March 1970. Will anyone not requiring these please send to the Editor of *The Naturalist*, The University, Leeds LS2 9JT.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and November. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of Broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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THE NATURALIST

FOR 1972

BIRDS OF THE LEEDS AREA: A SUMMARY OF RECENT CHANGES

M. DENSLEY

In his paper "The Status of Wild Birds in Leeds", published in the *Naturalist*, October-December 1958, A. H. B. Lee summarised all the then known records for the Leeds area. He included data from earlier works by T. H. Denny and others. Since the publication of this paper, new additions have been made to the published list and many fluctuations and lasting changes have occurred in a number of species. Another twelve years of intensive coverage of the area, particularly by members of the Leeds and District Bird Watchers' Club, and access to many formerly restricted areas has added enormously to the knowledge of the birds of the region.

In this appraisal of what are considered by the author to be some of the more significant trends and changes which have occurred in that time, a number of sources of reference have been used. Information contained in the annual reports of the Leeds and District Bird Watchers' Club forms the basis of the paper, the author having been a Recorder and Report Editor for this club from 1961 to 1970. Much material has been added from the author's unpublished notes based on fifteen years field experience in the area discussed. Other sources of reference are acknowledged elsewhere.

The background to the area and its places of ornithological interest, drawn by Lee in 1958, is essentially the same today. A fuller account of the region in detail may be found in *Leeds and its Region*, published in 1967. Lee's original area has been enlarged slightly to cover a circle of ten mile radius from the centre of Leeds. This, since 1961, has been the report study area of the Leeds Club and is considered by the author, and presumably the birds, to be a less confusing and more obvious unit to deal with, rather than city boundaries.

The Pattern of Recent Observations

Interest in the sewage farms at Rodley and Knostrop waned shortly after Lee's paper was published. This also coincided with a decline in attractiveness to birds, particularly passage waders. A recent improvement in conditions at the latter locality has resulted in much better watching there in the last four years and it has produced interesting information on many species of birds in addition to waders.

In the middle of the 1960's, Stanley Sewage Works emerged as a major passage place for waders and other birds and the recent diminution of records from there is due to the departure from the area of the observer primarily concerned.

Interest in parkland, particularly at the now accessible areas such as Harewood, but also at the city parks of Temple Newsam, Golden Acre, Gledhow Valley and Roundhay, has been continuously maintained. Observations from these areas have formed the basis for many long-term status assessments.

Areas of open water in the district have always attracted regular observers to them and this is still true today of the gravel pits and reservoirs in the area. The apparent decline in observer popularity of some of the formerly well-watched flashes in the south of the area was due in part to the localities becoming less attractive to birds. Lee commented in 1958 that Eccup Reservoir, to the north of the city, had been intensively watched. The peak years of observation probably occurred there a year or so after his paper was published, i.e. the years 1959 to 1962 inclusive. (In 1960, the water was visited on 293 days in the year!). The recently established Yorkshire Naturalists' Trust Reserve, at Adel Dam, has been probably the most regularly watched locality in the Leeds area in recent years. An area of general rather than specific ornithological interest, it has nevertheless produced a number of remarkable records in the last two years.

As a general result of the presence in the area of more active observers, concerned with their own local areas, knowledge of the bird life of the suburbs and the city centre has also increased.

A SUMMARY OF CHANGE

Passage Birds and Unusual Species

A Great Northern Diver (*Colymbus immer*) at Eccup Reservoir in November 1960, two records of Black-throated Diver (*C. arcticus*) and three of Red-throated (*C. stellatus*) since that date, are not sufficient to alter Lee's 1958 status assessment for this group. No changes can be attributed to other scarce visitors to the region; Fulmar (*Fulmarus glacialis*) was recorded in 1970, Gannet (*Sula bassana*) in 1967 and 1968, and Adel Dam produced a Purple Heron (*Ardea purpurea*) in 1970.

Numbers of wintering wildfowl have been continuously well documented, those at Eccup Reservoir probably more so than anywhere. It was stated in 1958 that numbers of Wigeon (*Anas penelope*) at Eccup "seldom rise above 150". Despite the fact that the species since that time has begun to breed regularly in the county, peak wintering numbers at Eccup have only twice barely exceeded sixty since 1959 and have dropped to as low as nine. The years 1963 to 1967 appear to have been the peak ones in the last decade.

A similarly timed favourable peak occurred with Goldeneye (*Bucephala clangula*) at the same water, maximum numbers being forty-two in 1965. There have been three records of Long-tailed Duck (*Clangula hyemalis*) since 1960, including one of two males in full winter plumage. The species thus remains "a very rare winter visitor".

A sharp decline in the numbers of Goosander (*Mergus merganser*), probably Eccup's best-known winter duck, occurred in the middle years of the 1960's. Numbers barely reached the twenties in the years 1964 to 1968. The last two winters have seen a doubling of these figures, but winter flocks during the last decade cannot compare with the occasional eighties recorded by Lee.

After being recorded regularly in the Leeds area, particularly from Eccup and Harewood in the later years of the fifties and early sixties, the Smew (*Mergus albellus*) has been seen only irregularly since.

Of the raptors, single Buzzards (*Buteo buteo*) have been recorded in most of the last few winters, usually from northern localities, and there have been summer records in the last two years.

Osprey (*Pandion haliaetus*) has been seen several times since 1958, Peregrine (*Falco peregrinus*) has wintered locally in the last two years, and seven records of Merlin (*Falco columbarius*) in the last thirteen years would suggest an improvement in the winter status of this species.

Although no breeding record of Quail (*Coturnix coturnix*) has occurred since that of 1952, there have been four records of calling birds since that date, three being from the same locality, in 1964, 1969 and 1970.

The lower Aire Valley has revealed a number of interesting recent trends in the habits of migratory waders in the area. The Green Sandpiper (*Tringa ochropus*) summered in the Knostrop area in 1968 and wintered there in 1968 and 1970. The Common Sandpiper (*T. hypoleucos*) wintered along the Aire in central Leeds in the winter of 1967-68.

Many records of Greenshank (*T. nebularia*) have been received from Knostrop and the bird occurs in many other suitable areas in the district, Eccup being also well-known. With passage records from even the suburbs, it would appear that observer availability is one factor controlling numbers of records of this and other wader species.

The Wood Sandpiper (*T. glareola*) is now regularly seen in the Knostrop area and has occurred almost annually in the last ten years. Though more numerous than Lee suggested, it nevertheless remains much scarcer than the Green Sandpiper. It would appear that the Wood Sandpiper requires a more specialised habitat in which to feed.

Although not apparently recorded at Knostrop prior to 1958, the Curlew Sandpiper (*Calidris testacea*) has been seen there almost every year since 1965.

Three species, Rock Pipit (*Anthus spinoletta petrosus*), Snow Bunting (*Pletrophenax nivalis*) and Crossbill (*Loxia curvirostra*), each with more than six records in the last ten years, would appear to have been more frequent visitors to the area than formerly. Here again, greater observer density and competence is at least partially responsible.

This factor would certainly appear to be the case with records of the Great Grey Shrike (*Lanius excubitor*) in recent years. Lee recorded his last bird as long ago as 1942. Since 1960, there have been at least nine winter records. Formerly most often recorded in the north of the area, most recent records refer to birds in the lower Aire Valley.

The Waxwing (*Bombycilla garrulus*), always an erratic winter visitor, has been reported in most years since 1958. Records refer mainly to single birds or small parties, but large scale "irruptions" took place in the Leeds area, as they did elsewhere, in 1963, 1965 and 1970.

A good illustration of a trend which developed as a result of intensive study in one locality occurred at Eccup Reservoir between 1959 and 1963. This was a remarkable series of gull and skua records, which had not occurred before and has not since. In this four-year period there were three occurrences of Arctic Skua (*Stercorius parasiticus*), then a new bird to the Leeds area; two records of Glacuous Gull (*Larus hyperboreus*), again a new bird for Leeds; three records of Iceland Gull (*L. glaucoides*), only one less than the total Leeds records prior to that time; two records of Little Gull (*L. minutus*), only one Leeds record existed prior to this, and three records of Kittiwake (*Rissa tridactyla*). Given similar saturation coverage there again, one wonders what might result!

Other notable records have been added since 1958. A Grey Phalarope (*Phalaropus fulicarius*) was seen at Eccup Reservoir in 1961 and a Red-necked Phalarope (*P. lobatus*) at the same place two years later.

A number of species formerly considered to be almost exclusively coastal in occurrence have featured in the Leeds Club reports since 1958. These include Alpine Swift (*Apus melba*), Wryneck (*Jynx torquilla*), Shore Lark (*Eremophila alpestris*) and Firecrest (*Regulus ignicapillus*) all at Eccup in 1960. Single Golden Orioles (*Oriolus oriolus*) were seen and heard in song at Adel Dam in 1969 and Farnley Park in 1970, and a male Black Redstart (*Phoenicurus ochrurus*) appeared at Knostrop in 1967.

Breeding Birds

The Canada Goose (*Branta canadensis*), though long established in the Leeds area, still only bred in five localities in 1969. This is a slight improvement on the 1958 status.

In contrast, the Oystercatcher (*Haemotopus ostralegus*) and Little Ringed Plover (*Charadrius dubius*) have markedly improved their status. Despite a suspicion of breeding in 1959, the Oystercatcher remained a passage migrant in the area until 1966 in which year a pair was proved to breed in Wharfedale. A pair had been suspected of having done so the previous year. Two pairs bred in 1969 and one in 1970. Much disturbance from fishermen takes place and one adult bird has been found dead, apparently shot, so it remains to be seen whether this interesting extension to its range is consolidated. On at least one occasion breeding has occurred in growing crops where disturbance was not experienced.

The Little Ringed Plover population increased from two pairs in 1959 to eight in 1967. The most significant feature regarding the spread of this species has been its establishment in lower Wharfedale. This took place in 1970. Prior to this, the bird had been recorded breeding only in the industrial areas south of Leeds. This recent establishment in Wharfedale, albeit still in an artificial site, opens up possibilities for its colonisation of unlimited natural sites. The first breeding of the Little Ringed Plover on a natural river shingle site was reported from Ripon in 1964 and 1965.

Despite repeated requests for further information, the status of the Red-legged Partridge (*Alectoris rufa*) remains much as it was in 1958, with breeding in one or two places in both North and South Leeds. The Stock Dove (*Columba oenas*) too would appear to remain scarce in the Leeds area.

The success story of the last twelve years has been of course the spread of the Collared Dove (*Streptopelia decaocto*). In 1959, seven years after the first proved British breeding in Norfolk, birds were seen in the Chapel Allerton district of North Leeds. Although not accepted at the time, the record gained recognition in 1961 when the species began to breed elsewhere in Yorkshire. In Leeds it bred in at least two inner suburban areas in 1962, spread slowly in the next two years, and was widespread by 1965. The spread to the outermost suburbs was not completed until the end of the sixties. Harewood numbers were suddenly swelled in 1970 by the establishment there of a bird garden, on which the Collared Dove has become parasitic.

The Cuckoo (*Cuculus canorus*) showed a decline in the Leeds area in the late fifties and early sixties but appears now to have completely recovered.

The Barn Owl population (*Tyto alba*) remains at one or two pairs, much the same as in 1958.

The pair of Stonechats (*Saxicola torquata*) which successfully reared young in a locality south of Leeds in 1966 and 1967 were the first apparently to do so in Yorkshire since 1943. Coincidentally, another pair bred near Harrogate in 1966. Despite the presence of one or more birds in the Leeds locality in the breeding season before and after, no other breeding has been recorded.

The Whinchat (*Saxicola rubetra*) remains a constant breeding bird of the south of the area, appearing elsewhere in other suitable breeding areas as long as the locality remains so. An example of this occurred at Eccup Reservoir for a few years in the late nineteen-fifties, the birds not breeding there since. The more extensive areas of derelict industrial wasteland, with the lack of disturbance from agricultural activity, is no doubt the reason for the breeding stability of the species south of Leeds.

The Whinchat, together with the Redstart (*Phoenicurus phoenicurus*) and the Wheatear (*Oenanthe oenanthe*), is one of the most noticeable passage indicators in the autumn and, to a lesser extent the spring, in the area. In recent years one or more of these species have been recorded regularly in many open areas of the city. Birds are regularly seen now in the suburbs and occasionally even in the city centre. The Redstart suffered a temporary drop in breeding numbers in 1970 but appears now to have recovered.

A recent enquiry by the author into the breeding of the House Martin (*Delichon urbica*) in Leeds, revealed several facts previously unnoticed by him. The two most interesting were that of the colonies considered, over fifty per cent of nests were in houses of over thirty years of age. Also the life of over eighty per cent of the colonies was only five years or less. Thus it would appear that many of the numerous colonies appearing on new buildings in the suburbs, sometimes before human occupation, are relatively short lived, with the birds or their offspring subsequently moving on to older property.

Several warbler species merit reference. The colony of Reed Warblers (*Acrocephalus scirpaceous*) in the south of the area, discovered in 1966, contained twenty pairs the following year — a substantial increase from the previous year. This figure probably represented the maximum number of pairs the site would hold, as there were signs of peripheral colonisation of less suitable habitat. At present, open-cast coal-mining operations threaten this, to all intents and purposes, the only known colony in the Leeds area.

Suspected breeding of Grasshopper Warbler (*Locustella naevia*) was reported from only one Leeds locality in 1958. In 1970, eleven singing males were heard in the breeding season. Seemingly an increase in birds rather than observers.

The Whitethroat (*Sylvia communis*), although suffering a drastic decline, apparently on the way north from its winter quarters in 1969, would now appear to have completely recovered. Its status today is much the same as it was in 1958.

The Lesser Whitethroat (*Sylvia curruca*) too, appears not to have altered its status. Despite much better watching it is still little reported and rarely proved to breed. Its song is unfamiliar to many observers and this may be a contributory factor in its apparent scarcity.

The decline of the Wood Warbler (*Phylloscopus sibilatrix*) as a breeding species in the Leeds area, commented upon by Lee in 1958, appears to have been complete by the early nineteen-sixties. It was subsequently seen irregularly on passage, almost exclusively in spring, occasionally in song. Its former breeding habitat showed no marked physical change so presumably its decline was due to either local changes too subtle for the human eye to detect, or more general, possibly climatic change. Although too early as yet to recognise as a recovery, Wood Warblers have bred in two areas of Leeds in the last two summers (1969 and 1970). At one of these localities in 1969, a female laid two full clutches of eggs, both infertile, subsequently deserting both. No cock was heard to sing but a second bird, presumably a male, was seen in the area in the early part of the season. The locality was not visited by the species in 1970. At a second locality, successful breeding took place in both seasons. As has been suggested recently by another author, the time is possibly ripe for a study of this species at county level. This is probably true of the next species also.

The Pied Flycatcher (*Muscicapa hypoleuca*) shows much the same status pattern as the Wood Warbler, requiring much the same breeding habitat. Again, formerly a scarce summer resident in one or two localities, its decline was complete by the early nineteen-sixties. Two pairs which bred in Harewood in 1963 appear to have been the last. Passage birds were subsequently only irregularly recorded. Coincidentally, possible breeding took place in 1969, the same year as the return of the Wood Warblers, and in one of the same localities. Again it is too early to draw any firm conclusions.

The Suburbs and the City Centre

With the growth of the Leeds Club, the recording of the birds of the region increased. The records have indicated the spread of a number of species towards the city and the drift away of others.

The Kestrel (*Falco tinnunculus*) has long been a bird of the inner suburbs, breeding into the very centre and feeding on rodents and small birds of waste ground. A pair were noted breeding on the clock tower of Leeds Town Hall as long ago as 1958.

The spread of the Collared Dove in the suburbs has been described elsewhere, but that of the Woodpigeon (*Columba palumbus*) into the larger suburban gardens has been less spectacular as yet.

There are signs that the Great Tit (*Parus major*) has declined as a breeding species in at least the inner suburban gardens.

Another member of the same family, the Blue Tit (*Parus caeruleus*), has suffered both losses and gains. As a result of the Leeds Club providing many of its members with garden nesting boxes, many of which were occupied by Blue Tits, much information has been received regarding this species. In the summer of 1963, after the very hard winter, one pair of birds of this normally single-brooded species reared three families of young in the same box in a Tinshill garden. Disturbing instances of infant mortality and desertion occurred. In 1965, there were several cases of infertile eggs being left in the nest and one box was left unoccupied after four successive years of use. The following year a clutch of nine eggs was deserted. There were several reports of less than fifty per cent fledging success and in one extreme case a pair continued to bring food to a brood of nine nearly fledged young dead in the nest. The increased use of garden pesticides may well have been a contributory cause.

The Mistle Thrush (*Turdus viscivorus*) is now a regular breeding bird even of the city centre, while the Song Thrush (*Turdus ericetorum*) appears to be deserting many suburban areas in a spread away from the town. A third member of the group, the Blackbird (*T. merula*), is now undoubtedly the most familiar bird of gardens and parks, even into the heart of the city. Its increase has been spectacular even in the last five years. In 1963 a pair reared four broods of young at Tinshill.

City roosting of birds has not taken place in Leeds on any real scale and the few dozen Starlings (*Sternus vulgaris*) which spend the winter nights in Park Square or in trees outside the Infirmary, are insignificant when compared with the many thousands nightly occupying city buildings in Bradford only ten miles away.

In 1963 up to fourteen Pied Wagtails (*Motacilla alba*) were seen flying to and from a city roost and the following winter more were seen, but this appears not to have become a regular feature.

In his article in the *Naturalist* outlining the effects of the 1962-63 winter on birds, J. S. Armitage suggested that the "newly formed" habit of the Greenfinch (*Chloris chloris*) of competing with tits for strung peanuts helped it to survive the hard weather. This habit was noted some years before that in the Leeds area and has no doubt been a factor contributing to the spectacular success it now enjoys as a common and enterprising garden bird, even of the inner suburbs. It has been suspected of breeding in the city centre in recent years.

Much could be said of the records of flightlines and isolated records of many species overflying the city but suffice to instance three unusual records: a Redstart seen in a city centre park in 1966; a Pheasant (*Phasianus colchicus*) seen on a grassed city centre roundabout in 1969; and a Willow Warbler (*Phylloscopus trochilus*) which sang in city centre trees in 1966.

The Winter of 1962-63

The effects of the hard winter of 1962-63, in Yorkshire at least the worst since 1830, are well documented on a county scale by a number of authors. The effects locally in Leeds were never fully reported. Some species have never completely recovered.

The Heron (*Ardea cinerea*) as reported by Gunton in 1966, disappeared from Harewood in 1963. The hard winter certainly contributed to its final demise but an earlier contributory cause had been tree felling in the heronry by gales and man. The species has been seen a little more regularly of late and it may be that a new colony is on the point of starting in the area.

The Lapwing (*Vanellus vanellus*) certainly suffered at the time, large numbers deserting the area, and subsequent breeding numbers were much reduced. The species would appear now to have fully recovered.

Four species were more badly affected by the weather than all others. The Kingfisher (*Alcedo atthis*), although always a scarce bird locally, with one or two pairs breeding annually, completely disappeared. Breeding was not subsequently recorded until 1968. Similar pictures emerge for both Green Woodpecker (*Pica viridis*), which is still very much below its former status, and Grey Wagtail (*Motacilla cinerea*). The latter species bred numerously around Leeds prior to 1962 but was not recorded as breeding successfully until some years later, in 1966. Numbers today are still well below former strength. The Wren (*Troglodytes troglodytes*) was badly hit nationally. As an example of the effects of the winter locally, twenty-five occupied nests were found in Harewood Park in 1962, in 1963 only one was found, and only three singing males were heard. At Roundhay Park, thirteen nests were seen in 1962, in 1963 none could be found. By 1965 the species had fully recovered.

Other Species were badly affected at the time but are now more or less normal in status. Examples are Skylark (*Alauda arvensis*) and Treecreeper (*Certhia familiaris*).

Influences Effected by Man

It could of course be argued that the status of most if not all species of birds is controlled directly or indirectly by the works of man. Here we are concerned with specific man-made situations which have particularly influenced a single species or group of birds.

The Sparrowhawk (*Accipiter nisus*) has always been a scarce bird in the Leeds area and the worst years of the pesticide period caused its virtual disappearance. Little has happened in recent years to alter this situation materially, despite protection.

The reservoir at Eccup has long been known as a roost for many gulls of a number of species. Rubbish tips provide in addition day feeding areas. The regular watching of these has revealed the repeated presence of species previously considered to be rare vagrants to the area. Ten records of Glaucous Gull (*Larus hyperboreus*) since 1959 have almost all occurred in such areas. These birds presumably join the commoner species of gulls feeding at the tip at Eccup Reservoir for the night. It is strange, considering the regularity with which both Glaucous and Iceland Gulls (*L. glaucoides*) are now recorded at rubbish tips in Yorkshire, that M. E. & P. A. Greenhalgh, in their paper on the status of these gulls in Lancashire, could quote only two inland records of Iceland gull and one of Glaucous. Most of the Leeds records have been of immature birds.

The same tips have attracted single, and in some cases more than one Hooded Crow (*Corvus cornix*), with nine records in the last ten winters. The birds commonly associate with Carrion Crows (*C. corone*) and Jackdaws (*C. monedula*) at such places.

The Black-headed Gull (*Larus ridibundus*) is also heavily dependent on man. This gull forms by far the largest percentage of the roost at Eccup and at present nests only on one wholly man-made site. Its history as a breeding bird in the Leeds area has been of some interest. It established a colony at Knostrop Sewage Farm in 1949 and was reported to be as strong as five hundred pairs in 1955. In 1959 it deserted this site, as it did the nearby colony at Swillington the same year. In 1964 the Knostrop site was reported to be holding a "probable" breeding colony and the following year a small colony certainly bred there. Since 1966 about three hundred pairs have bred annually. In or about 1966 a large percentage of the nearby colony of Black-headed Gulls at Fairburn Ings Reserve deserted that area and it may well be that the Knostrop colony contains as its nucleus the former Fairburn birds.

Small scale local events have also, for a time, caused fluctuations in the status of species directly affected. Clearances of several species of ornamental shrubs at Harewood in the early sixties caused a decline in the breeding numbers of Blackcaps (*Sylvia atricapilla*) and Garden Warblers (*S. borin*), but replacement there and in many places elsewhere by young conifers has greatly enhanced the breeding status of the Redpoll (*Carduelis flammea*).

Both the Goldfinch (*Cardulis carduelis*) and Bullfinch (*Pyrrhula pyrrhula*) are certainly commoner than they were a decade ago, this no doubt due to the curtailment of the activities of the birdcatchers. In the winters of 1964 to 1966 inclusive, flocks of up to 40 Bullfinches were seen feeding on the moor edge at Otley Chevin.

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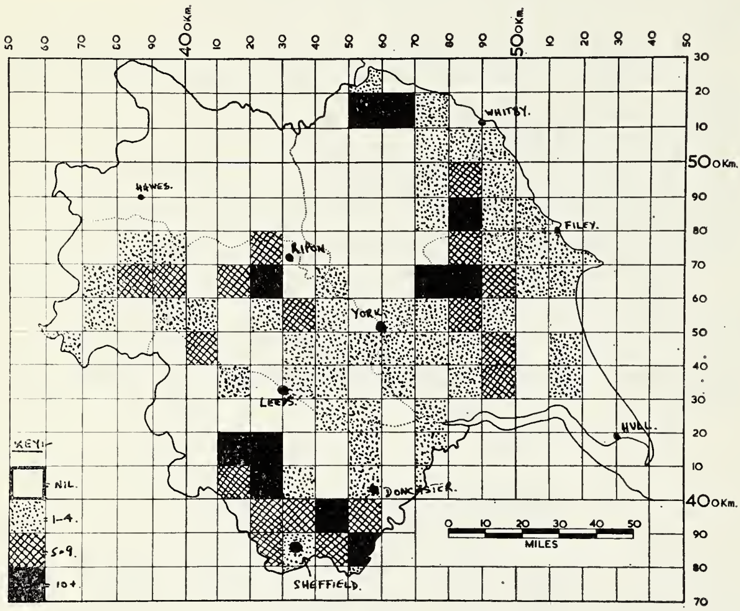
NATIONAL BADGER SURVEY, REPORT FROM YORKSHIRE

Following our previous reports in the *Naturalist* (Jan. 1968 and July 1969), we are now in a better position to comment on setts in the three Ridings of Yorkshire, although fairly large areas especially of the north-west remain uncovered. The following report (to April 1971) is based upon a total of 481 setts, 232 of which are in the West Riding, 125 in the North Riding and 124 in the East Riding.

The areas which have been particularly well studied are the south of Yorkshire, the north-east (which reflects the bases of the County Recorders of the West and North Ridings at Sheffield and Guisborough), and the Yorkshire Wolds. However we are already coming to the conclusion that the areas of large badger populations are in the Sheffield, Huddersfield and Barnsley area in the West Riding, in the Cleveland Hills and on the North West Wolds, without this being only a reflection of more intense recording. They appear to be quite plentiful around Ripon and in the Scarborough area, widely scattered in the Plain of York and sparse in Holderness, as can be seen in the map of badger sett density per 10km sq. This is what one would expect since badgers prefer to excavate on hillsides as we shall show later in this report (Table 3).

In Table 1 it can be seen that most setts (77%) are in woodland or hedgerows indicating a preference for cover—as one would expect from the badger's habits—in contrast with setts in open fields and moorlands. The much larger proportion of setts in coniferous woodland in the North Riding reflects the predominating type of woodland in the eastern part of the Riding where most of the setts are recorded. The high percentage (20%) of setts in open fields is a notable feature in the East Riding, and other interesting habitats reported include waterway banks (both natural river banks and artificial waterways), quarries and railway banks. Most of the railway bank setts are on disused lines, but one large sett in the West Riding is on the fairly active York to Knaresborough line. There is an active sett on the sea cliffs in the East Riding and a parkland sett in Scarborough completely surrounded by a built-up area. The percentage of moorland setts for the whole of Yorkshire is, we are sure, too low; so far only 12—all in the West Riding—are recorded though the moorland areas of West and North Yorkshire are to date not well explored. In conclusion then, in respect of habitat, we can say that most setts are in woodland, but that no type of habitat can be too lightly dismissed as not containing a badger sett.



Sett density per 10 km. square. April 1971

TABLE 1

Habitat	West Riding		North Riding		East Riding		All Yorkshire	
Deciduous Woodland	79	34.1%	27	21.6%	44	35.5%	150	30.4%
Coniferous Woodland	25	10.8%	58	46.4%	16	12.9%	99	23.4%
Mixed Woodland	29	12.5%	24	19.2%	14	11.3%	67	14.3%
Copse	11	4.7%	7	5.6%	2	1.6%	20	4.0%
Hedgerow	25	10.8%	3	2.4%	9	7.3%	37	6.8%
Open Field	22	9.4%	4	3.2%	26	20.9%	52	11.2%
Moorland	12	5.2%	0	0%	0	0%	12	1.7%
Quarry	9	3.9%	1	0.8%	7	5.7%	17	3.5%
Waterway Bank	14	6.0%	0	0%	3	2.4%	17	2.8%
Railway Bank	6	2.6%	0	0%	1	0.8%	7	1.1%
Others	0	0%	1	0.8%	2	1.6%	3	0.8%
TOTAL	232		125		124		481	

Table 2 indicates that sand is the predominant soil type utilised especially in the North Riding, giving a total of 47% of all Yorkshire setts to date in this soil type. Otherwise the relation of setts to soil type is very largely a reflection of the differing geology of the regions, as for example with the case of chalk in the East Riding. Of the 33 West Riding setts in limestone, most are in the south to north running strip of magnesian limestone where it enters the county at the Nottinghamshire-Derbyshire border, skirts Doncaster and heads for Knaresborough: a few "Dales" setts are in carboniferous limestone. In the Barnsley district where most of the setts are in shale, two or three are in a definite coal seam. One very low lying sett on Hatfield Moors is in peaty sand. The gritstone setts differ from the others in that very little soil is excavated by the badgers, the setts being under and among the gritstone boulders, very good known examples being at Bradfield, Bingley and Steeton.

Turning now to Table 3 in which we tabulate the occurrence of badger setts on sloping and level ground, it is immediately obvious that badgers prefer to dig into a slope, 90% of setts being on sloping ground. (Could this be in order to have the assistance of gravity in removal of the excavated soil from sett entrances, and/or to assist natural drainage of the sett?)

Table 2

Soil	*West Riding*		*North Riding*		*East Riding*		*All Yorkshire*	
Sand	70	30.2%	66	69.0%	52	41.9%	188	47.0%
Clay	70	30.2%	15	15.5%	2	1.6%	87	15.8%
Limestone	33	14.2%	5	5.2%	0	0%	38	6.5%
Chalk	0	0%	2	2.0%	70	56.5%	72	19.5%
Shale	12	5.2%	8	8.3%	0	0%	20	4.5%
Gritstone	43	18.5%	0	0%	0	0%	43	6.2%
Others (Coal, Peat)	4	1.7%	0	0%	0	0%	4	0.5%
Total	232		96*		124		452	

* Soil type only known in 96 of 125 setts.

Table 3

Inclination	*West Riding*		*North Riding*		*East Riding*		*All Yorkshire*	
Slope	190	81.9%	124	99.2%	113	91.1%	427	90.7%
Level	42	18.1%	1	0.8%	11	8.9%	54	9.3%
Total	232		125		124		481	

Table 4

Activity	*West Riding*		*North Riding*		*East Riding*		*All Yorkshire*	
Active	167	72.0%	86	80.4%	68	54.8%	321	69.3%
Non-active (inc. extinct)	65	28.0%	21	19.6%	56	45.2%	142	30.7%
Total	232		107*		124		463	

* Activity only known in 107 of 125 setts.

When setts are visited initially, and revisited from time to time on later occasions, some assessment of badger activity becomes possible. Many are obviously in constant use and tend to remain so if left undisturbed. Some however are no longer in use, and some which were initially occupied have been abandoned, either naturally or as a result of human interference. With this amount of swing it is difficult to compile totals of occupied and unoccupied setts but this has been attempted in Table 4 where it can be seen that about 70% of the Yorkshire setts are occupied, the lowest percentage being in the East Riding where human interference seems to be more common than in the rest of the County—

in certain areas where several setts are recorded most of these are in fact inactive on this account. It seems fairly true to say that badgers are persecuted to some extent throughout Yorkshire, enjoying least interference when resident on Forestry Commission property and on some enlightened estates. Badger digging remains a fairly common 'sport' in parts of South Yorkshire and seems unfortunately to be on the increase again.

Table 5 shows the siting of woodland setts (all types) and indicates that about 70% are bordering the edge, at least as far as the West and East Ridings are concerned (no details to date for this parameter in the North Riding).

TABLE 5

Sett Relation to Wood Edge	*West Riding*		*East Riding*		*W.R.*	*E.R.*
Within 25 yds. of edge	98	42.2%	55	44.4%	68.0%	72.3%
Deeper in wood	46	19.9%	21	16.9%	32.0%	27.7%
Outside woods	88	37.9%	48	38.7%	—	—
	232		124			

No figures available for North Riding.

In conclusion we consider that in Yorkshire there is a good badger population and that they show a preference for cover (particularly the edges of deciduous woodland), drainage and workability of the soil if these are available to it, though no area or habitat type can be rejected as being without them. In a future report we hope that more of the County will have been covered adding more knowledge of the badgers' status in Yorkshire.

Finally will anyone knowing any badger sett please send the information to the appropriate County Recorder viz.

John Knight (N.R.), 76 Thames Avenue, Guisborough.
Adrian Middleton (E.R.), 1 West End, Lund, Nr. Driffield.
Richard Paget (W.R.), Glebe Farm, Harthill, Nr. Sheffield.

We wish to express thanks to the following: The Forestry Commission, The Ministry of Agriculture, Fisheries and Food, numerous Landowners and Keepers, and G. Adams, R. Atkins, Mrs. G. de Boer, R. Dale, E. Ginz, W. Horsborough, E. Kemp, I. Massey, P. Morris, B. S. Pashby, J. Robinson, G. Simpson, W. Stoney, T. Upton, C. B. Waite, and F. Weston.

FIELD NOTE

Attempts at fledging of a runt Great Tit

On 18th May 1970, I inspected the nest contents of a pair of Great Tits (*Parus major*). The nest was built inside a model house which stood on a bird table in the garden of Mr. H. Henworth of Atwick, two miles north of Hornsea. The female parent bird was already ringed, thus providing another character by which the sex of the parent could be determined. Originally there were eleven eggs. On 18th May there were six newly hatched young. These were ringed on 28th May and one was noted to be smaller than its siblings. Of the fledging Mr. Henworth described the following sequence of events.

Between 06.30 and 07.00 hrs. on 11th June, five young fledged. The sixth continued to be fed in the nest by both parents. On 13th June at about 14.00 hrs. the male contrived to pull the remaining nestling out, using a green caterpillar. The caterpillar was not relinquished until the nestling was outside the "nesting box" and sitting on the ledge. After three or four minutes the runt fell into a flower bed. The flight feathers were still in quill and far from fully developed. It was returned to the nest by Mr. Henworth. The parents fed the runt at the nest until the following morning, 14th June when at 10.00 hrs. there was a repeat performance of the male pulling the runt out of the box using another green caterpillar. After falling from the ledge the bird was again replaced in the nest by Mr. Henworth. The whole procedure was repeated at 14.00 hrs. and again at 18.00 hrs. After the last abortive attempt to fly the runt could not be found. It was dead when found nearby the following morning. The ring number corresponded to that of the smallest pullus at the time of ringing.

I am unaware of a similar account in the relevant literature.

J. E. S. WALKER
Grebe House, Hornsea, Yorkshire.

PREY TAKEN BY A BARN OWL

C. I. MASSEY

The systematic collection of Barn Owl (*Tyto alba*) pellets is relatively easy, as it has been shown (Guérin, G., L'Effraye commune en Vendée, Paris, 1928) that one bird will use the same day roost for long periods of time and will regularly cast one of its two nightly pellets at this roost. Therefore, it may provide an almost continuous record of half its diet for months on end.

During the second week in December 1967 it was discovered that three small barns in Carr Fields Lane, East Ayton, near Scarborough, served as the daytime roosting places for a single Barn Owl. The three barns are situated on the eastern side of Carr Fields Lane, approximately one mile south of East Ayton, on the Vale of Pickering. The hunting area of the owl, during the period that the pellets were collected, consisted mainly of open fields planted largely to cereals and hay, some permanent pasture, a little root crops and a small amount of market gardening. Woodland is confined to a small patch of mixed European Larch (*Larix decidua*), Silver Birch (*Betula pendula*) and Scots Pine (*Pinus sylvestris*) about 1,000 yards east of the three barns. The River Derwent meanders south roughly parallel to Carr Fields Lane and only a few yards to the west of it and is bordered throughout its length with Alder (*Alnus glutinosa*). Several artificial drainage ditches criss-cross the low-lying carr land.

Method

The barns were cleared of all previous material and fresh pellets allowed to accumulate. These were then collected every 15 days and provided an almost continuous record of the prey taken by the owl for a period of six months until its disappearance during May 1968. Mammals were identified and counted on the basis of skull and lower mandible.

Results

A total of 134 pellets were collected during the 169 days that the Barn Owl occupied the three barns. As can be seen from Table 1, during the first three months pellets averaged one per day, but this dropped during the second three months to an average of only one every two days. During March and April 1968 the owl spent several days away from the barns and only three pellets were found after 15th May 1968.

Table 1

Number of pellets collected each month

1967	December (from 14th)	19	
1968	January	42	
	February	27	
	March	16	(none found between 17th-31st)
	April	19	(only 3 found after 15th)
	May	11	(only 3 found after 15th)

The 134 pellets contained 471 separate prey items, an average of 3.5 items per pellet over the six months period. During April and May 1968, when the owl was feeding mainly on shrews (see Table 3), 22 of the pellets examined contained 90 separate prey items or 4.1 prey items per pellet. Table 2 shows the number of contained prey items for these 22 pellets.

Table 2

Analysis of 22 pellets collected in April and May 1968 to show the number of contained prey items per pellet

Contained prey items	*No. of pellets*	%
1	2	9.1
2	3	13.6
3	3	13.6
4	5	22.7
5	2	9.1
6	6	27.3
7	1	4.6

TABLE 3

Details of the analysis of the 134 pellets collected between 14th December 1967 and May 1968

		Items	Prey Units	% Prey Weight
December 1967 19 Pellets (14th onwards)	Short-tailed Vole (*Microtus agrestis*)	33	33	52.1
	Bank Vole (*Clethrionomys glareolus*)	12	12	19.1
	Common Shrew (*Sorex araneus*)	24	12	19.1
	Pygmy Shrew (*Sorex minutus*)	1	0.2	0.3
	Water Shrew (*Neomys fodiens*)	4	3	4.7
	Wood Mouse (*Apodemus sylvaticus*)	3	3	4.7
		77	63.2	100.0
January 1968 42 Pellets	Short-tailed Vole	72	72	64.9
	Bank Vole	13	13	11.7
	Common Shrew	43	21.5	19.4
	Pygmy Shrew	7	1.4	1.3
	Water Shrew	4	3	2.7
	Wood Mouse	—	—	—
		139	110.9	100.0
February 1968 27 Pellets	Short-tailed Vole	39	39	62.3
	Bank Vole	5	5	8.0
	Common Shrew	30	15	23.9
	Pygmy Shrew	2	0.4	0.6
	Water Shrew	3	2.25	3.6
	Wood Mouse	1	1	1.6
		80	62.65	100.0
March 1968 16 Pellets (none between 17th-31st)	Short-tailed Vole	27	27	71.7
	Bank Vole	1	1	2.7
	Common Shrew	15	7.5	19.9
	Pygmy Shrew	2	0.4	1.0
	Water Shrew	1	0.75	2.0
	Wood Mouse	1	1	2.7
		47	37.65	100.0
April 1968 19 Pellets (only 3 found after 15th)	Short-tailed Vole	19	19	35.9
	Bank Vole	4	4	7.5
	Common Shrew	52	26	49.1
	Pygmy Shrew	6	1.2	2.3
	Water Shrew	1	0.75	1.4
	Wood Mouse	2	2	3.8
		84	52.95	100.0
May 1968 11 Pellets (only 3 found after 15th)	Short-tailed Vole	12	12	41.0
	Bank Vole	1	1	3.4
	Common Shrew	21	10.5	35.9
	Pygmy Shrew	5	1	3.4
	Water Shrew	1	0.75	2.6
	Wood Mouse	3	3	10.3
	Bird sp. (*Passer domesticus*?)	1	1	3.4
		44	29.25	100.0

Discussion

Although the period over which the pellets were collected did not allow for long term analysis of prey variations, certain trends were noticeable.

The Bank Vole is a scrub-cover animal, frequently subterranean in its habits and more active by day than the Short-tailed Vole whose surface activities, with dawn and dusk peaks, and preference for open habitats make it an easy prey item for the Barn Owl, particularly in winter months when leaves have fallen and ground vegetation has died away. This is reflected in the figures for the study period when 204 Short-tailed Voles were consumed by the Owl compared with only 36 Bank Voles, a ratio of approximately 6:1. In April and May when the ground cover was beginning to grow again the numbers of Short-tailed Voles eaten dropped considerably. At the same time there was a corresponding increase in the number of Common Shrews consumed from an average of 19-24% of prey taken in December-March to 36-49% of prey taken in April-May. This increase is obviously linked with the fact that the Common Shrew is a favourite food of the Barn Owl and most numerous in the summer months. Wood Mouse with 0-10.3% of prey weight remained scarce as a prey item, but the figures for both Pygmy and Water Shrew show the value of the Barn Owl in recording these species.

WILLIAM JOHNSON'S LICHEN COLLECTION

M. R. D. SEAWARD

Although the location of William Johnson's lichen herbarium at Leeds University is noted in literature (Burrell, 1929; Britten & Boulger, 1931), work on the collection has been totally neglected since its acquisition in 1922.

It has been possible over the past few months, by the courtesy of Professor H. W. Woolhouse, for Mr. G. A. Shaw and myself to work through the thirty-three fascicles and three volumes which constituted Johnson's own working collection. Closer examination of the fascicles and volumes revealed that much of the material had been removed prior to its acquisition (the labels remaining) no doubt for the purpose of providing specimens for his thirteen *North of England Lichen-Herbarium* fascicles which appeared in 1894 (1-2), 1895 (3-5), 1896 (6), 1897 (7), 1898 (8), 1900 (9), 1906 (10), 1910 (11), 1914 (12) and 1918 (13). The *Lichen-Herbarium* was printed at Newcastle (1894), Darlington (1895-1900) and Manchester (1906-1918), and consisted of specimens collected mostly from Cumberland, Durham and Northumberland.

Although the depletion of the collection is considerable, there still remain 1614 gatherings. These have now been repacketed, mounted on to sheets, arranged generically into folders according to the classification of James (1965), and housed in new cupboards in the Botany Department Herbarium of the University of Leeds. The following genera are represented (the number of gatherings indicated in parentheses):

Acarospora (13)
Alectoria (15)
Anaptychia (13)
Bacidia (1)
Baeomyces (6)
Buellia (3)
Calicium (11)
Caloplaca (112)
Candelaria (2)
Candelariella (11)
Catillaria (1)
Catinaria (1)
Cetraria (22)
Chaenotheca (8)
Cladonia (263)
Collema (76)
Coniocybe (1)
Cornicularia (14)
Cyphelium (3)
Diploschistes (1)
Enterographa (1)
Ephebe (8)
Evernia (10)
Fulgensia (1)
Graphis (4)
Gyalecta (1)
Haematomma (5)
Icmadophila (3)
Ionapsis (2)
Lecanactis (2)
Lecania (22)
Lecanora (254)
Lecidea (38)
Lemmopsis (4)
Lempholemma (7)
Lepraria (4)
Leptogium (50)
Lichina (1)
Lobaria (18)
Massalongia (1)
Mycoblastus (1)
Nephroma (20)
Ochrolechia (16)
Opeggrapha (3)
Pachyphiale (1)
Pannaria (7)
Parmelia (101)
Parmeliella (4)
Parmeliopsis (3)
Peltigera (51)
Pertusaria (40)
Physcia (65)
Pilophorus (1)
Placopsis (1)
Placynthium (8)
Protoblastenia (13)
Pseudocyphellaria(4)
Psoroma (2)
Psorotricha (3)
Ramalina (67)
Rhizocarpon (2)
Rinodina (24)
Roccella (7)
Sarcogyne (9)
Schismatomma (1)
Solenospora (5)
Solorina (3)
Sphaerophorus (8)
Spilonema (2)
Squamarina (3)
Stereocaulon (15)
Sticta (17)
Teloschistes (1)
Toninia (3)
Tromera (1)
Umbilicaria (16)
Usnea (31)
Xanthoria (42)

There are, in all, more than four hundred taxa present in the collection, which represents over 27% of the 1445 species, subspecies and varieties listed by James (1965).

1,387 gatherings of British lichens are attributable to Johnson, and have the following county coverage (the vice-county number is given in parentheses):

Caernarvon (49) — 41
Anglesey (52) — 8
North-east Yorkshire (62) — 15
Mid-west Yorkshire (64) — 33
North-west Yorkshire (65) — 21
Yorkshire/Durham boundary; unlocalized Teesdale gatherings (65/66) — 26
Durham (66) — 238
South Northumberland (67) — 292
North Northumberland (68) — 16
Westmorland (69) — 18
Cumberland (70) — 671
Dumfries (72) — 2
Kirkcudbright (73) — 4
Lanark (77) — 2

There are in addition nineteen packets collected by Johnson from Norway, and the remaining 227 packets (for the most part collected from England and Scotland) have been mainly accumulated through exchange with James M. Crombie. A few specimens collected about 1854 by George Dixon from the Cleveland area of Yorkshire are of particular importance.

The extant material collected by Johnson still represents a valuable contribution to our knowledge of the North of England lichen flora, and is worthy of further investigation, particularly for those working on the floras of Cumberland, Durham, Northumberland and Yorkshire. Associate species have not been identified or separated from the mounted packets, and these too will furnish additional lichen records. Furthermore, much of the material is in need of taxonomic investigation — particularly the crustose forms, where Johnson's attention to detail provided a considerable number of "varietal" and "ecotypical" forms not included in the four hundred taxa mentioned above. Some of the material has already received due attention from the referees of the British Lichen Society, but the genera *Caloplaca*, *Cladonia*, *Collema* and *Lecanora* need taxonomic revision.

As in the case of the Lees Herbarium at Bradford (Seaward, 1970) and the Hebden Herbarium at Keighley (Seaward, 1971), the Johnson Herbarium was not consulted by Watson for his *Lichens of Yorkshire* (1946) and his *Census Catalogue of British Lichens* (1953). A truer reflection of the past lichen flora of Yorkshire would have been possible by such consultations.

For further biographical and bibliographical details of the Rev. William Johnson (1844-1919) see Burrell (1929) and Britten & Boulger (1931). Permission to work on the Johnson collection may be obtained by application to Professor H. W. Woolhouse.

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Coefficients of Natural Selection by **L. M. Cook**. Pp. 207. Hutchinson University Library, London. Paper, £1.25 net.

The author's preface indicates that "It is the aim of this book to give an account for the non-mathematical biologist of the simple theory of selection, and to explain how selective pressures may be measured." Nevertheless, the uncompromising title gives a clear indication of the character of this book which, although it will be of considerable value to those biologists who have reason to take a serious interest in population genetics, will in the opinion of this reviewer be difficult and probably frustrating reading for the great majority of naturalists, unless they are fortunate enough to possess a competent facility in A-Level algebra. J.D.L.

THE YORKSHIRE NATURALISTS' UNION
ONE HUNDRED AND TENTH ANNUAL REPORT

The Hundred and Ninth Annual Meeting was held on 5th December 1970 in Leeds by kind invitation of the Leeds Naturalists' Club and Scientific Association.

The Presidential Address on "Insects in the changing Yorkshire scene" was delivered by Mr. J. H. Flint, F.L.A., F.R.E.S.

The Presidency for 1972 has been offered to and accepted by Mr. G. A. Shaw.

The Excursions for 1972 will be to:

V.C. 61	Warter Priory and Nunburnholme	Saturday, 22nd July
V.C. 62	Kepwick	Saturday, 10th June
V.C. 63	Sandbeck Park	24th and 25th June
V.C. 64	Austwick Moss	Saturday, 8th July
V.C. 65	Camphill and East Tanfield	27th to 29th May

Early in the new year the Union was informed that The Rev. Father Pearce would be unable to continue as the Union Secretary due to ill health. At about the same time Mr. G. A. Shaw also informed the Union that he would be resigning his post as Assistant Treasurer and Membership Secretary at the end of the year and suggested that the Union should look for a successor. The Executive discussed this problem at the March meeting and agreed that they should advertise for one person to fill both positions under the title of Administrative Officer. At the beginning of June this post was filled.

The Union is still having some difficulty with *The Naturalist*. We regret the late issue of all parts during the past year but it is hoped that we shall be able to rectify this next year. With the last issue the Ornithological Report for 1970 was sent out and a resumption of the regular appearance of these reports may now be expected. *The Naturalists' Yorkshire* appeared on the book-stalls in the middle of the year and it is understood that it is selling well.

We have been approached by the Planning Officer of the North Riding County Council with a view to our sending a representative to sit on a Consultative Committee which is organizing a survey of the North Riding part of the Pennine uplands. The survey will be called the Uplands Study and various organisations including the Countryside Commission, Forestry Commission and Nature Conservancy will participate.

The latest information from the Planning Officer of the West Riding lists 124 Sites of Scientific Interest in the Riding. Unfortunately this is the very Riding in which more sites are being lost or are likely to be lost in the near future due to improvements to roads, removal of trees etc. Letters of protest have been sent to the Planning Officer and the respective Rural or Borough Councils re Edlington Wood and Thorne Waste, and the Union was well represented at the enquiry into the M18 road which would pass through Potteric Carr, Sandall Beat Wood and Ox Carr Wood.

We have also been in contact with the East Yorkshire Conservation Committee which has been drawing up a list of Sites of Scientific Interest in East Yorkshire. The Committee will be sending us full details of its survey when the work is complete. A letter of protest was sent on behalf of the Union re the development of Leven Canal as a leisure area.

The Executive agreed to donate £250 to the Yorkshire Naturalists' Trust in response to the Derwent Reserve Appeal.

In completing this short report I would like to ask members of the Union to be a little more prompt in sending in their membership fees. As stated in the rules and in the membership card the fee of £2 for full membership and 25p for Associate membership is payable on 1st January. Membership fees were still being received in August this year. At the time of writing this report there were still 64 fees for 1971 outstanding. Please be prompt with payment and send the cheque, postal order or cash direct to me and not to Mr. Disbrey (Treasurer) or Mr. Shaw.

The Union gains approximately £1.70 for every £2 membership fee that is covenanted at no extra cost to the member. We should like as many members as possible to covenant their subscription and this can be done by applying to the Administrative Officer for the appropriate form. (Only those persons who are paying income tax can covenant their subscription.)

Membership

At the time of writing the membership of the Union stands at one Honorary Life Member, 14 Life Members, 495 Ordinary Members, 1 Life Associate Member, and 36 Associate Members. There are also 40 Affiliated Societies.

Deaths

It is with regret that we have to record the deaths of the following members: P. Baldwin, Mrs. E. Clarke, Mrs. G. Pashby and Major Worrin.

Resignations

Mrs. M. Barham, W. H. Black, Lt. Col., J. S. G. Branscome, T. Briscoe, W. E. Collinson, Dr. A. Critchlow, G. D. Darnbrough, J. Fleming, P. L. Gravett, A. N. Handley, Mrs. V. M. Harnett, N. Harrison, W. E. Higham, P. D. J. Hugo, P. A. Humble, J. G. Ireland, R. V. Jackson, W. J. Knight, Miss V. M. van der Lande, G. V. Lucas, Miss J. N. Milnes, M. H. Ness, Miss J. A. Newth, Miss J. Owen, M. J. Palmer, D. H. Parker, F. G. Parson, Mrs. E. E. Peel, A. E. Platt, Mrs. M. J. P. Reckitt, F. J. Sharpe, Miss M. C. Smith (life Member), Col. J. B. Sugden, C. Teale, D. Thorogood, J. W. Williams, A. H. Woodward, R. F. Wormald. *Associate Members* Miss L. M. Blackwell, Mrs. D. M. Burn, Mrs. E. M. Green, Mr. B. Hancock, Mrs. N. Harrison, Miss M. Hartley, Mrs. P. A. Humble, Mrs. U. Mason, B. Stephenson, Mrs. H. F. Wardale. *Affiliated Societies* Bootham School.

Change of Address

Armitage, J. S., 29 Garden Cottages, Pontefract Road, Cudworth, Nr. Barnsley.
Butler, R. F. E., 89 Ashorne Close, Matchborough West, Redditch, Worcs.
Chicken, E., Corner House, Scarborough Road, Driffield.
Ellerby, C., 4 Beech Grove, Beadlam, Nawton, York.
Farndon, Mrs. to Golightly, Mrs., 141 Rayleigh Drive, Woodlands Park, Wideopen, Northumberland.
Fenton, J. K., Cambridge Hotel, South Cliff, Scarborough.
Foster, R., 1 Manor Drive, Acomb, York.
Hartley, J. W., 101 Doncaster Road, Armthorpe, Doncaster.
Hird, D., 6 Hazel Grove Road, Sutton-in-Craven, Nr. Keighley.
Hirst, W. R., 45 Morrab Road, Penzance, Cornwall.
Hocking, Miss M. M., Chapel Allerton Hospital, Leeds.
Howe, G. B., 19 Central Drive, Cheadle, Cheshire.
King, C. E., 168 Chain Street, Bradford BD1 2PU
Knight, J. E., "Tanglewood", Hutton Village, Guisborough.
Lawrence, I. C., 11 Astern Drive, Acklam, Middlesbrough.
Ledwood, 27 Harley Street, Beverley Road, Hull.
Oldfield, P., 85 Huntsmans Walk, Foxwood Hill, York.
Richards, E., 14 Beech Grove, Acomb, York.
Weston, S. J., "Anston", Lower Kriklington Road, Southwell, Notts.
Wilson, C. H., The Flat, Shaw House, Shaw Lane, Leeds LS6 4BU.
Wood, J. S., 81 New Hey Road, Rastrick, Brighouse.

Change of Secretary

Bradford Scientific Society. Mrs. E. Fox, 66 Primrose Lane, Gilstead, Bingley.
Castleton and District Naturalists' Society. H. Davidson, 3 Dovecote Drive, Ledston, Castleford.
Goole and District Natural History Society. Mrs. M. F. Withers, 11 Rutland Road, Goole.
Harrogate and District Naturalists' Society. Mrs. M. Ogilvie, 2 Olive Walk, Harrogate.
The Hornsea Bird Club. J. N. Gunn, 8 College Gardens, Hornsea.
Huddersfield Naturalists, Photographic and Antiquarian Society. P. G. Ripley, 18 Cleveland Road, Edgerton, Huddersfield.
Kirkby Moorside and Ryedale Natural History Society. Dr Adamson, 1 Birklands, Beadlam, Nawton, York.
Teesmouth Bird Club. Mrs. A. Cooper, Wass Bank, Wass, York.
York Ornithological Club. Miss S. White, 60 Baker Street, Burtonstone Lane, York.

New Members

Barrans, D., 76 Jenkyn Lane, Shepley, Huddersfield. (O)
Bell, M. V., 4 Cheltenham Avenue, Ben Rhydding, Ilkley. (R)
Blunt, J. P., 2 Hall Farm Cottage, Sutton Bonington, Loughborough. (M)
Bush, E. B., B.SC., c/o Sheffield City Museum, Weston Park, Sheffield. (Ma.)
Caffrey, B., 43 Broadway West, Fulford Road, York. (O)
Cook, L. H., 9 Hall Close Avenue, Whiston, Rotherham. (Bot.) (O)

David, W. M., South Lodge, Kirk Smeaton, Pontefract. (O)
Deanes, Miss C. R., 151 Knaresborough Road, Harrogate.
Disney, R. H. L., B.A., CERT.ED., PH.D., Malham Tarn Field Centre, Nr. Settle. (Diptera)
Earland-Bennett, P. M., B.SC., Bankfield Museum, Haley Hill, Halifax. (Geol.) (Lichen)
Evison, R., 34 Frogmire Road, Knaresborough. (O) (Lep.) (Ma.)
Follows, G. W., B.SC., M.B.O.U., 337 Wigan Road, Atherton, Lancs. (O)
Fox, B. W., B.SC., PH.D., Tryfan, Longlands Road, New Mill, Stockport. (O)
Hudston, Wing Commander A. A. J., R.A.F., PL Division, H.Q. AFCENT, BFPO 28. (O)
Johnson, Mrs. J., 17 Tisbury Road, York. (Bot.) (O)
Lambert, Miss J., 110 Clifton, York. (Bot.)
Ledwood, J. S., B.SC., 27 Harley Street, Beverley Road, Hull. (My.)
Lightowler, D. M., 9 Roundhill Avenue, Cottingley, Bingley.
Limb, K., Kebroyd, 35 Croft Park, Menston, Ilkley. (O)
Lovett, M., 206 Bradford Road, Wakefield.
Meek, J. W., G.ENG., M.I.E.E., 77 Overslade Lane, Rugby, Warwickshire. (O) (Bot.)
Nelson, B. A., 8 Latchmere Walk, Moor Grange, Leeds 16. (O)
Norris, T. L., 4a Lower Wheatroyd, Almondbury, Huddersfield.
O'Rourke, Mrs. J. O., 22 Carr Manor Crescent, Leeds. (Lichen)
Phillips, R. J., "Elmsett", Brent Road, Burnham-on-Sea, Somerset.
Roger, Mrs. M., Tanmore, Lastingham, York. (Life Member). (Bot.)
Smith, G., 16 Templar Street, Asbrigg, Wakefield.
Smith, P., 16 Templar Street, Asbrigg, Wakefield. (O)
Stead, T. K., 41 Grange Avenue, Tadcaster. (O)
Sutcliffe, R., 284 Stants Drive, Leeds 14. (O)
Watson, Mrs. J. C., "West Point", Benley Lane, Menston, Ilkley. (Bot.)
Wells, D., 17 Mansion Court Gardens, Thorne, Nr. Doncaster.
Weston, S. J., F.R.I.C.S., 30 Flintham Court, Mansfield, Notts. (O)
Wilson, M., 120 Otley Road, Leeds. (O)
Woolhouse, Prof. H. W., B.SC., PH.D., F.L.S., F.INST.BIOL., 5 Lidgett Park Road, Leeds LS8 1EE. (Bot.)

New Associate Members

Haythornthwait W. G., "Low Garth", Arkendale, Knaresborough.
Limb, Mrs. P., "Kebroyd", 35 Croft Park, Menston, Ilkley.
Birkhead, T. R., 3 Hall Close, Bramhope, Nr. Leeds.

MAMMALS, REPTILES, AMPHIBIANS AND FISHES

M. J. A. THOMPSON

After the new committee for the F.A.R.M. Section of the Union had been elected in October 1970, it was decided to divide up the recording of the different vertebrate groups in the Section amongst members of the committee. Hence, our Chairman for 1970, Mr. N. Cowx took over the responsibility for the mammals; Mr. I. Massey, our Secretary, the fish (both have written their respective reports), and I, the overall responsibility for the Section's annual Report and the reptiles and amphibians recordership. On the whole this arrangement has worked well, but records have been slow in coming, partly, no doubt, because of the altered arrangements. During the course of the year a great deal of discussion was devoted, at committee and Section meetings, to various recording schemes. Eventually a scheme, using the ten kilometer system, has been worked out to which the active membership of the Section could contribute. It is hoped to launch a pilot scheme, with a set of ten kilometer square distribution maps, in the near future. Looking at the Mammal Society's provisional distribution maps (*Mammal Review*, Spring Number 1971), one can see that Yorkshire is badly represented. It is the hope of the committee to improve the quality and quantity of recording in the County, in the coming years.

As a seperate entity the F.A.R.M. Section met on three occasions during the year, and had one joint meeting with the Ornithological Section at Doncaster on 20th March, at which our Section contributed two papers. Between twenty to thirty members of the Union came to the meetings at Leeds on 1st May, and York on 25th September: the field meeting organised by the Yorkshire Mammal Group at Howsham Wood was reasonably well attended on 4th July and those who came, we hope, found it of some interest and value. As a Section, at this stage, it appears not to attract wide support, in spite of the fact that over a hundred members of the Union expressed an interest in the Section in the recent questionnaire issued by the F.A.R.M. committee to the total membership.

The task of reviewing the County records for reptiles and amphibians, after they have been in the capable hands of Mr. Colin Simms for so many years, is one which I approach with some trepidation. During this past year Colin has helped me in numerous ways, and therefore I would like to thank him for this support and for the help he has given the F.A.R.M. Section in the past. The Recorders wish to thank those field workers who have contributed to the records during the past year. The records for the fish have been received from C. A. Howes, W. Bunting Jnr., Mr. R. Gelder and from extracted sections of the local and national angling press. Others contributing to the reptile and amphibian records have been Mrs. J. Russell (Huddersfield), B. Spence (Spurn Point), Dr. R. Theakston (Hutton-le-Hole), J. Knight (Guisborough), B. S. Preston (Harrogate) and N. Snowden (York). Some of the information has been from non-members of the Union. Ian Massey (Scarborough) and Colin Howes (Doncaster) have supplied an extraordinary amount of information, and I look forward to the publication in a future issue of *The Naturalist* of Colin Howes' work.

MAMMALS

(N. COWX): Report not submitted.

REPTILES

The viper (*Vipera berus berus*) has had another good year, with reports coming in from all over the County and these when mapped out on a ten kilometre basis for 1971, show that the viper is well established on the North Yorkshire Moors (C.S., M.J.A.T., J.K., C.I.M.) and the south of the County. Other new reports come from the west and north-west, at Beckwithshaw SE25 (C.S.) and Langthwaite NZ00 (M.J.A.T.) and indicate its wide distribution. However, these records do seem to indicate the distribution of the recorders and their favourite haunts! Colin Simms describes a number of well established colonies in the County, at Strensall Common SE66, near Hutton-ld-Hole SE78, Thorne Moor SE71, Tripsdale Head SE59, Ellerburn Bank SE88 and Holwick Moor NY92. He notes that often the viper is found in association with other reptiles, namely, the slow worm, common lizard on which it preys and the grass snake. This latter species shares the same habitat with the viper, on the levels above the rivers in the Selby area. Colin Howes confirms that Thorne Moor is a stronghold of the viper in the Doncaster area, describing how in March of this year fifty individuals were counted on one occasion; he added that he saw the viper on every visit he made to Thorne Moor during the year. In the sixteen 10 kilometer squares around Doncaster, he has located the viper at sixteen sites. Ian Massey states that the viper is abundant on Stainton Dale Moor, Langdale End, and Lowdales Valley, Hackness (all sites within SE88). Abundance, as well a successful breeding, was noted by John Knight and me at Ellerburn Bank SE88. John Knight noticed that these snakes were common in the Cropton and Cawthorn districts SE78; he also found the "brilliant" green and black specimens at Danby Beacon NZ70 and Conmmondale NZ60.

The remaining new locations for 1971, not mentioned so far, are Scackleton SE77 (C.S.), Levisham SE89 (C.S.), Spaunton SE78 (C.S.), Yapham SE75 (C.S.), Guisborough Moor NZ61 (J.K.), and Hailand Moor NZ61 (J.K.).

As the result of conversations between Colin Simms, Mr. Gunnar Godwin of the Forestry Commission, Mr. B. Skelton, the shooting tenant, and I, a small marked population of vipers were put down in a suitable forestry locality. The area, in the York district, was chosen because of its remoteness, suitable cover and available food supplies. The snakes were originally brought to the York Museum by the general public; one was a pregnant female which gave birth to seven young soon after it was caught, the others came from land being "developed" near York and elsewhere in North Yorkshire. We felt that if this was successful as a small conservation project, then it could be repeated elsewhere in the County.

This year's records for the grass or ringed snake (*Natrix natrix helvetica*) make interesting reading, for all but four of them come from the south of Yorkshire in the West Riding. Most confirm old locations, but some are from new areas. It would seem that the grass snake's distribution is not as extensive as has been described, for the distribution maps in Malcolm Smith's book *British Amphibians and Reptiles*, indicate it as being present throughout the County, presumably based on the old vice-county records (1951). Obviously further records are needed to show if the range of the grass snake is shrinking southwards in Yorkshire. Colin Howes records forty-five localities for the grass snake in the Doncaster area; he remarks that this area is a stronghold for this species in Yorkshire. Further new records are from Thornhill SE21 (J.R.), Biggin SE53 (C.S.), Kirk Smeaton SE51 (C.S.), Snaith SE62 (C.S.) and Cropton SE78 (J.K.). There has also been a confirmation this year of a small colony in the Driffield area, which has been there for some time. The grass snake has been seen this year at Hutton-le-Hole SE69 (R.T.) and at Spurn Head TA41 (B.S.): these confirm established locations and appear to be isolated areas where this species of snake is locally common.

The only new record of successful breeding of an introduced species of snake this year comes from near Holme-on-Spalding-Moor SE88 (C.S.). It is the diced water snake (*Natrix tessellata*), whose breeding range is central, southern and south-eastern Europe through to Asia Minor. This water snake has a delightful diamond patterning with varying light to dark grey colour, depending on habitat.

There are few new records of the common lizard (*Lacerta vivipara*) for this year. Colin Simms has located new colonies at Wellburn SE76, Whenby SE66, Stealsby SE67 and at Kearton and Kisdon in Swaledale (squares SD99 and SD89 respectively). Successful breeding was noted as well, in establish colonies at Ellerburn Bank SE88 (M.J.A.T., N.S.) and Strensall Common SE66 (C.S.). The common lizard was again observed at Spurn Point (TA41) by Barry Spence. Colin Howes mentions twenty-four locations of this species in the Doncaster area. The sand lizard (*Lacerta agilis agilis*) colony at Spurn Point, which Colin Simms described in the last annual report, continues to exist; a further suspected sighting of the sand lizard in square SE63 has yet to be confirmed. Old records of the sand lizard on Thorne Moor around 1949, have not been located in recent years and these lizards appear to have been introduced and failed to thrive.

Several new records for the slow worm (*Anguis fragilis*) for Yorkshire have been sent in this year, especially from the North Riding. They are Grewelthorpe SE27 (C.S.), North Stainley SE27 (C.S.), Burton Leonard SE36 (C.S.), Kirby Overblow SE34 (C.S.), Crayke SE57 (C.S.), Pockley SE68 (C.S.), Levisham SE89 (C.S.), Lastingham SE79 (C.S.), Potto NZ40 (C.S.), Egton Bridge NZ80 (J.K.), Cropton SE78 (J.K.), Hutton Lowcross NZ61 (J.K.), Cawthorne SE78 (J.K.), Commondale NZ60 (J.K.) — the blue spotted variety, Guisborough Moor NZ61 (J.K.) on two different sites, Foul Sike, Fylingdales Moor NZ90 (C.I.M.), Randy Mere, Goathland NZ80 (C.I.M.), and Cloughton TA09 (C.I.M.). A late record comes from Michael Boyd at Preston-under-Scar in Wensleydale SE09; also from the Dales a breeding colony located in the north-west at Whaw NY90 (M.J.A.T.) on the edge of a small wood. Several slow worms were seen at the Yorkshire Naturalists' Trust reserve at Grassington SD96 on 27th June and 18th July; these are the first sightings of this lizard by the recorder (B.S.P.) after ten years of regular visits to the wood. Colin Simms reports successful breeding has been observed in the Stillington Huby area; a single juvenile was brought to the Yorkshire Museum from this vicinity on 19th September. The Doncaster district produced eight records for the slow worm

AMPHIBIANS

All recorders have noticed more frogs this year, but it is difficult to assess whether this is due to a cyclical increase or because less ponds have disappeared and remain relatively unpolluted. No-one has found any abnormally formed tadpoles or adult common frogs. Twelve ponds in the Scarborough area (C.I.M.) had frog spawn in them between 9th March and 6th April, but in spite of the mild winter these dates are no different from previous years. Adult common frogs were noted at Ravenscar NZ90, Harwood Dale SE99 and many were seen crossing the road into Throxenby Mere, Scarborough at midnight on the 18th March TA08 (C.I.M.). John Knight discovered that the pond complex around Wilton NZ51 in the north of the County, contained numerous breeding frogs: the Egton Bridge district NZ70 had a profusion of frogs, with individual specimens being found throughout the North Yorkshire Moors. In the Yorkshire Dales, up some of the remoter valleys around Swaledale NY90 (M.J.A.T.), the frog was found to be breeding in disused mill ponds. Near York, in Flaxton district, one observer (C. Street) found the common frog breeding in fifteen of the thirty ponds he visited; in one such pond he counted over 200 pairs and he noted that spawning occurred at the end of March. North of York, in the parish of Skelton SE55 (M.J.A.T.), the frog bred again in good numbers, mainly in domestic ponds. Nearer the centre of York, Clifford Smith had noticed that there were many more frogs than in previous years. The Doncaster Museum list, compiled by Colin Howes, is headed by the common frog with eighy-two localities named.

Few new records of the common toad (*Bufo bufo bufo*) have come in this year. However looking at the pinned distribution map of recent records in the York Museum, it can be seen that this amphibian is well established and evenly distributed throughout Yorkshire. From the Guisborough district the toad is reported as common and many hundreds have been killed on the roads on wet spring evenings NZ51 (J.K.). Ian Massey also noted that nearly 200 were killed on the half mile stretch of road alongside Throxenby Mere, Scarborough TA08 on 19th April. A previous migration to this Mere was seen on 18th March, several in amplexus en route. Forty toads were counted at Staxton sandpits ponds on 25th March, many in amplexus; spawning occurring four weeks earlier than usual. Around York SE66 the toad bred in good numbers, and from Doncaster forty localities are mentioned in Colin Howes' report. Colin Howes also made efforts to locate survivors of introduced colonies of the Natterjack Toad (*Bufo calamita*), the Marsh Frog (*Rana ridibunda*) and the Edible Frog (*Rana esculenta*), but these all failed. However, references to the successful establishment of a Midwife Toad (*Alytes obstetricans*) colony near Worksop in 1947, caused some excitement but the site of the colony was not located.

The Doncaster distribution list for the newts, describes twenty-seven localities for the smooth newt (*Triturus vulgaris*) in 1971, twenty-one for the great crested newt (*Triturus cristatus*) and four for the palmate newt (*Triturus helveticus*). From the north of the County the great crested and smooth newts have been found in the Wilton ponds NZ51 and on the Guisborough Moors NZ61 (J.K.); further south at Flaxton SE66 and Skelton SE55, the common newt is present in most of the ponds examined (M.J.A.T., C. Street). The only other records of the palmate newt comes from Scarborough TA08 on 20th May, and from a forestry water tank at Wykeham Low Moor SE98 (C.I.M.). The smooth newt was located at Seamer Gravel Pits, Scarborough TA08 and in the pond at the Boys High School TA80; also the great crested newt is to be found here. On the Y.N.U. excursion to Speeton TA17 on 12th June, the great crested was found in a pond in the church yard (C.I.M.). At Spurn Point TA41, in an old bomb crater near the warren, a small number of smooth newts have bred successfully this year (B.S.).

FISHES

I. MASSEY

Pollution has hit a lot of waters throughout Yorkshire in various degrees and many are now poorly stocked or fishless. In the Doncaster area rivers Torne, Went, Eaubeck and Ryton have been affected and the use of chemicals by the Trent River Authority to clear aquatic vegetation from some of the main drains of Hatfield Chase area is cause for concern. However, from the same area come reports that the R. Idle is a much improved river and that fish are again being caught in the Stainforth and Keadby canal. Further north the R. Tees, after being badly polluted below the Skerne outfall in 1970, has been re-stocked with roach, chub and barbel. A 3 ft. salmon found dying near the Middlesbrough Transporter Bridge was the first to struggle so far up the Tees for 20 years. Fish are back in the R. Aire in the centre of Leeds only a year after pollution wiped them out. Minnows, roach, perch and gudgeon have been seen. Another cause for concern is Bradford Corporation's plan to increase the size of Grimwith Res. near Grassington from 642 million gallons to 4,800 million gallons. Most of the increase in water volume will be pumped from the R. Wharfe, drastically affecting the water level down river.

Brown Trout	Thornton Beck, Thornton-le-Dale; R. Hertford at Flixton; Bishopdale Beck, Wensleydale; R. Nidd, Knaresborough; R. Ure, Topcliffe; to 6 lb. 5 oz. R. Rye, East Ness.
Pike	Askern Lake; Black Pond, North Bridge, Doncaster; Blaxton Gravel Pits; Bell Pond, Sprotborough Ings; Cantley Park Pond; Lindholme Lake; Childer Drain, Potteric Carr; R. Torne; common in dykes Hatfield Chase; Hatfield Brick Works; to 15 lb. R. Idle; 15 lb. 4 oz. Scarborough Mere; 23 lb. R. Wharfe; 9½ lb. Damflask Res., 12 lb. 5 oz. R. Ouse; 20 lb. R. Ure; 20 lb. R. Nidd.
Carp	Askern Lake; 8 lb. Cusworth Lakes; Bentley Colliery Pond.
Barbel	2 lb. R. Idle; R. Nidd; R. Ure; 6 lb. 3 oz. R. Ouse; 9 lb. 2 oz. R. Swale.
Gudgeon	Crowle Drain, Dirtness; Cockshaw Dyke, Skellow; Mill Dyke, Bentley Toll Bar; Pilkington's Pond, Barnby Dun; R. Ryton and R. Idle at Bawtry; River Torne at Auckley, Crowle and Tunnel Pits.

TENCH	Graves Park, Sheffield; Nostell Priory, Wakefield; 2 lb. Askern Lake; Cusworth Lakes; Cockshaw Dyke, Skellow; Bentley Colliery Pond; Willow Garth Pond, Arksey; Wintersett Res.; Lindholme Lake; R. Idle; Hatfield Brick Ponds.
CRUCIAN CARP	Rivelin and Round Dams, Sheffield.
BLEAK	R. Idle.
BREAM	4 lb. Leven Canal; Rivelin and Round Dams, Sheffield; R. Ouse at Dunsforth; Cusworth Lakes; Hatfield Brick Ponds; Pilkington's Pond, Barnby Dun; R. Torne; Fossdyke Canal.
MINNOW	Mill Dyke, Bentley Toll Bar; Cantley Park Pond; R. Ryton at Bawtry.
RUDD	Sandall Park Pond.
ROACH	Graves Park, Sheffield; R. Nidd; Rivelin and Round Dams, Sheffield; Damflask Res., Sheffield; Leeds/Liverpool Canal at Gargrave; Hornsea Mere; Askern Lake; Bell Pond, Sprotborough Ings; Bentley Colliery Pond; Cusworth Lakes; Sandall Park Pond; Hatfield Brick Ponds; R. Torne; R. Idle; New Junction Canal; Fossdyke Canal.
CHUB	Graves Park, Sheffield; 7 lb. 5 oz. R. Ure; 6 lb. 13½ oz. R. Ouse; R. Swale; R. Nidd; 4 lb. 10 oz. pond at Pocklington; R. Idle.
DACE	Fossdyke Canal; R. Idle; R. Nidd.
STONE LOACH	Wath Beck, Hovingham.
EEL	6 lb 7 oz., 42 in. long (largest Yorkshire specimen) from E. Yorkshire lake.
RUFFE	Askern Lake; River Torne at Tunnel Pits; Fossdyke Canal.
PERCH	Thorne Railway Bridge Ponds; Askern Lake; Bentley Colliery Pond; Cusworth Park Lakes; Pilkington's Pond, Barnby Dun; Sandall Park Lake; Potteric Carr; Hatfield Brick Pond; R. Torne; Rivelin and Round Dams, Sheffield; 3 lb. 9½ oz. Cawood Park Lake; Dam Flask Res., Sheffield; R. Tees above Croft Bridge.
BULLHEAD	Bishopdale Beck, Wensleydale; Wath Beck, Hovingham.
3-SPINED STICKLEBACK	Askern Lake; Old Denaby Marshes, Denby Ings; Black Pond, North Bridge, Doncaster; ponds on Bentley Ings; R. Torne; Balby Brick Pond; Cusworth Park Lakes; Sandall Park Lake; Potteric Carr; Cantley Park Lake; Elmfield Park Pond; flooded railway side dykes, Incle Moor, Thorne; old course R. Don, Fishlake; R. Don at Thorne Water-side, North Bridge, Doncaster and Sprotborough.
10-SPINED STICKLEBACK	Mother drain, Potteric Carr; In many sumps flowing under New Junction Canal, in dykes by canal and next to R. Went in Sykehouse and Southfield areas.
FLOUNDER	1 lb. 15 oz. R. Esk at Ruswarp Viaduct; R. Torne; R. Idle at Bawtry.
BASKING SHARK	22 ft. caught off Whitby by coble "Brighter Hope" 12.4.71. 15 ft. Caught off Flamborough Head by local coble 17.5.71. 19 ft. caught off Hayburn Wyke by coble "Mary Ellen" of Scarborough 15.6.71. Sold to Scarborough Zoo and Marineland.
GILTHEAD BREAM	First North Sea record. Trawled off Scarborough 23.2.71.

Records have been received from C. A. Howes, W. Bunting Jnr., Mr. R. Gelder and extracted from several sections of the local and national angling press.

ORNITHOLOGY

(R. F. Dickens): The General Committee has met on three occasions during the year, and there have been two full meetings of the Section, one jointly with the Fishes, Amphibians, Repitiles and Mammals group in March and one in October. Considering that our guest speaker for the latter had travelled, though indisposed, all the way from Slimbridge the attendance was to say the least disappointing. Despite the difficulties under which he was labouring at the time, Malcolm Ogilvie gave a splendid lecture, informative, well illustrated and well put over.

One only of the vice-county recorders was at this meeting and none were at any of their respective Field Meetings. On a more cheerful note, some progress has been made with annual reports and that for 1970 should have reached all members with their October-December *Naturalist*. After discussion both by the Reports Committee and the General Committee it was decided to proceed with the 1970 report rather than get further behind, but it is hoped that those for the "missing years" will eventually be forthcoming so that members may have a complete series. **It will be of great help in**

ensuring that we do not lapse into another period of delays, if members will please send in all records for 1971 to the appropriate V.C. recorder by the end of the current month. Members of local societies can perhaps carbon-copy their observations, sending one copy to the local society recorder and one direct to the county recorder. Not all records handed in to a local society find their way to the county report and some local society reports are completed too late for their inclusion.

A Research Committee has been inaugurated to explore the possibilities for co-operative efforts within the county and to make detailed plans for these. The first Chairman is J. R. Mather, and John Dale of Huddersfield is acting as secretary. Anyone who is prepared to undertake some sort of survey work of this kind should contact one or other of them. It is perhaps as well to recall that irrespective of any political boundary changes, our records, to be meaningful, must continue on the old vice-county basis. The Executive of the Union passed a resolution recognising this in 1968.

One or two societies have considered the use of a ten-kilometre grid system for ornithological recording purposes. Where neighbouring societies can co-operate to ensure adequate coverage this can have decided advantages. The botanical mapping schemes and those for many of the invertebrates demonstrate this well. The Ornithological Committee did not feel that it could recommend the division of the county into areas of responsibility, since bird-watchers, like the birds, tend to be highly mobile and to have their favourite haunts. Much would be gained if less frequented areas were examined more methodically. This of course is one of the prime objects of the Union's Field Meetings.

Plans have been discussed, and were partly implemented this year, for reports of the various executive committees of the section to be circulated with notices of the October meeting. This would not only reduce the time spent on business matters at the October meeting, but would allow for more informed questioning and discussion. The Section has been pleased to be able to support the Y.N. Trust's Wheldrake Ings Appeal and has sent a donation of £100. The Executive of the Union and many local societies have also contributed to the Appeal Fund. Mr. Basil Hancock, Chairman of the Acquisition Committee was one of the speakers at the October meeting.

Following the report of the Hon. Secretary of the Protection of Birds Act Committee, attention was drawn to two reports in the *Yorkshire Post* of organisations making representations to the Home Office about the increase in illegal and irresponsible shooting. I was asked to write in support and have been informed that present arrangements for the control of all kinds of firearms are being reviewed. I would particularly ask all those individuals and societies who have strong views on the widespread use of guns to make their views known without delay by writing to the Press, to local Chief Officers of Police, to M.P.'s or to the Home Office.

The Spurn Bird Observatory Committee has met on three occasions. One of the major items discussed was the rehabilitation of one of the old brick buildings at the Warren as a ringing laboratory. This is seen as an important development, providing better facilities for ringing etc., and more space for recovery maps etc. Already the lab. is in use in a rather rough state and it is hoped to finish it off with the necessary fitting and decoration during the winter.

The provision of portable display panels to illustrate the work at Spurn and various features of the peninsula has been discussed and put in hand. These boards could be used at Spurn or taken to meetings in the county and elsewhere.

The Spurn Report, as popular as ever, was out in good time and quickly sold out. One of the contributions — "The Flowering Plants of Spurn", by Miss Crackles, is available as a reprint.

A B.T.O. Ringers' Training Course was held at the Observatory in October.

If I may be permitted to end on a personal note, I would like to recall that it was as long ago as 1954 that I was first elected to the secretaryship of the section. I have felt for some time that someone else should take over and have in fact handed over to two successors for short intervals, only to take up the reins again. Since 1964, Vernon Crapnell has been my valued colleague and chairman. The Section has been well served by him and on his retirement from the position which he took over on the death of Ralph Chislett, I would like to express my own as well as the Section's thanks for all he has done over the past seven years. I hope that I may serve you as well as he has done and that you will extend the same loyalty to my successor as secretary, who from January 1972 will be Athol Wallis.

I am sure that the Section would wish me to record its delight that our member, Charles H. Wilson has been elected Chairman of Council of the Royal Society for the Protection of Birds. Charles will continue to serve as secretary of our own Protection of Birds Act Committee and his report follows separately.

PROTECTION OF BIRDS ACT COMMITTEE: REPORT FOR 1971

1. In general during the last twelve months, I have had few calls requiring action to be taken and this is partly due to the very active participation of the R.S.P.B. and its representatives, four of whom are members of this Committee, and who have been able to deal with matters in their own areas by direct contact with Sandy and with the local R.S.P.C.A. inspectors.
2. There is no doubt that the film "Kes", excellent as it is, has lead many youths to break the law by taking young birds of prey. Extreme vigilance is necessary to ensure that offenders with young birds are dealt with and the birds returned to the wild wherever possible without delay. I ascertained that permits to take birds of prey for falconry are only issued after enquiries have been made as to the suitability of the applicant and are issued very sparingly by the Nature Environment Research Council.
3. Illegal shooting occurs regularly throughout the country and the alertness of some members has led to successful prosecutions at Bempton, the Humber Sanctuary and elsewhere. Others, particularly young boys and youths in possession of air guns, have been duly warned and given details of the law as it applied to them. Herons are a much persecuted species and reports on shooting in and around fish hatcheries and at nesting sites have been reported to the R.S.P.B.
4. The general use of strychnine above ground in hens' eggs and carrion ostensibly to kill crows, has resulted in the deaths of ravens, buzzards and other protected species in N.W. Yorkshire. This is illegal and steps should be taken to prosecute offenders. This poison is issued in minute quantities to farmers by the Agricultural Executive to control moles underground but I have been informed by the Protection Officer at the R.S.P.B. that this poison can be bought quite freely and openly in Eire without permit.
5. Collecting eggs I am certain is now on the increase and successful prosecutions have been obtained by the Police in Sedbergh against youths taking Ravens eggs; but nests generally are being robbed and I was told that 27 nest boxes at Sandy had been cleared by eggers. I am certain that it is not only the young boys who do this. There is still a market for eggs and in particular the rarer species, hence the robbing of the Osprey eyrie. Education and an interest in spreading this conservation message will certainly help the young but the wider aspect will only be contained by active wardening on a national scale.
6. Pole trapping and other illegal activities are being reported regularly and the R.S.P.B. has taken up all cases and I am informed that they have over 30 cases in hand at the present time. It is essential if a trap is seen, to release it and report it immediately to the Lodge at Sandy. Prosecution will only be possible if the person who set the trap can be named and this is often difficult particularly if the trap is on private property. A photograph of the trap and its environment is useful and details of the owner of the property on which the trap is set and any other relevant details, map reference, proximity of pheasant farms etc. can be helpful.
7. The committee decided that this year it would not circularise the 3,300 schools in Yorkshire with protection posters as had been done for several years, as no new posters were available and the R.S.P.B. had been in direct touch with all education authorities throughout the country sending them details of teaching aids, posters etc. dealing with conservation and Bird protection.
8. During the year damaged birds on ships brought in to the Port of Hull have been dealt with by the R.S.P.C.A. and one Snowy Owl which recovered well was later released in Scotland by the R.S.P.B.
9. A successful prosecution was obtained on a dealer in birds at South Elmsall. The R.S.P.B. with the R.S.P.C.A. raided his premises with a search warrant and numerous finches were found to be wild birds recently taken. This man has been suspected of dealing in wild birds for some time and I got a member of the Leeds and District Birdwatchers' Club to buy two goldfinches from him for the Protection Officer at Sandy who found that the close rings could be easily removed from the birds' legs and this started the proceedings against him.
10. The funds of the Protection Act Committee stand at approx. £150.

C. H. Wilson
Hon. Secretary

CONCHOLOGY

(E. Dearing): The Section has held five indoor meetings and five outdoor excursions, with attendances ranging from 9 to 18 members.

Sectional meetings, arranged jointly with the Yorkshire Conchological Society, were held in City Museum, Leeds, by kind permission of the Director and Mr. A. Norris who looked after the domestic arrangements. The topics discussed were: "*Limnaea peregra*" by Mr. J. Armitage; "The Succineas" by Dr. L. Lloyd-Evans; "The Vertigos" by Dr. B. Colville and Mr. A. Norris; and there was a General Exhibition at the March meeting. In April the C.S. of G.B. & I. meeting was addressed by Dr Wynne Owen on "Parasitology and Molluscs".

The excursions were to Sandsend for Mulgrave Woods and Aislaby in May; Boroughbridge for Cundall and Pilmoor in September, and Blubberhouses for Raven's Ghyll, Pateley Bridge and Healey Wood in October. There were also field trips to Hetchell Woods Nature Reserve, near Thorner, and to Grass Woods at Grassington; both these were held in conjunction with the C.S. of G.B. & I. meeting in April.

The Recorder, Mr. A. Norris writes: A number of interesting new records have been made, the most interesting of which is the record by Mr. John Armitage of *Limax tenellus* Muller from Ravens Ghyll near Pateley Bridge on 2nd October. Mr. Armitage led the members of the Section to this site a week later to examine the site for other local species and to demonstrate the species to those members who had not previously seen it. *L. tenellus* proved to be very common in the Ghyll, large numbers being found. This record is only the fourth for Yorkshire, and the first for V.C. 64, the last record being from Hall Wood, Healey near Masham in 1904 (it was not found there this year). Since this meeting Dr. Lloyd-Evans has recorded this species from the woods at Grewelthorpe near Ripon, also in V.C. 64.

Other interesting records are *Vitrea diaphana* (Studer), first record for Wharfedale, and *Pisidium supinum* Schmidt, only the third Yorkshire record and the first from a natural habitat, all the other records being from the Leeds and Liverpool Canal.

List of Species Recorded on Field Trips in 1971

Sites	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Theodoxus fluviatilis (L.)					×		
Pomatias elegans (Müller)			×				
Potamopyrgus jenkinsi (E. A. Smith)	×			×	×		
Carychium minimum Müller	×	×	×	×	×	×	×
C. tridentatum (Risso)	×	×	×	×	×		×
Lymnaea truncatula (Müller)	×		×	×	×	×	
L. peregra (Müller)	×		×		×		
Ancylus fluviatilis Müller			×	×	×	×	×
Succinea pfeifferi Rossmassler	×		×	×	×		
Cochlicopa lubrica (Müller)	×	×	×	×	×		×
C. lubricella (Stabile)	×	×		×	×		
Pyramidula rupestris (Draparnaud)		×					
Columella edentula (Draparnaud)	×	×		×		×	
Vertigo antivertigo (Draparnaud)	×		×				
V. substriata (Jeffreys)	×			×			
V. pygmaea (Draparnaud)			×		×		
Lauria cylindracea (da Costa)		×	×	×			
L. anglica (Wood)				×			
Acanthinula aculeata (Müller)	×	×		×			
A. lamellata (Jeffreys)						×	
Vallonia costata (Müller)				×	×		
V. excentrica Sterki	×		×		×		
Ena obscura (Müller)		×	×	×			
Marpessa laminata (Montagu)	×	×		×			
Clausilia bidentata (Strom)		×	×	×	×	×	
C. dubia (Draparnaud)		×					
Helicigona lapicida (L.)		×					
Arianta arbustorum (L.)	×	×	×	×	×		
Helix hortensis (Müller)		×		×	×	×	
H. nemoralis (L.)	×	×	×	×	×		
H. aspersa Müller				×	×		
Hygromia subrufescens (Miller)	×			×		×	

H. striolata (C. Pfeiffer)	×	×	×	×	×	×	
H. hispida (L.)	×	×	×	×	×	×	
Monacha granulata (Alder)			×	×			
M. cantiana (Montagu)	×				×		
Helicella caperata (Montagu)				×	×		
Punctum pygmaeum (Draparnaud)	×	×		×			
Discus rotundatus (Müller)	×	×	×	×	×	×	×
Arion intermedius Normand	×	×	×	×	×	×	×
A. circumscriptus Johnston	×	×	×	×	×	×	×
A. sylvaticus	×						
A. fasciatus (Nilsson)		×		×	×		×
A. hortensis Ferussac	×	×	×	×	×	×	×
A. subfuscus (Draparnaud)	×		×	×		×	×
A. ater agg	×	×	×	×		×	
Euconulus fulvus (Müller)	×	×	×	×	×	×	×
Vitrea crystallina (Müller)	×	×	×	×	×	×	×
V. contracta (Westerlund)	×	×		×		×	×
V. diaphana (Studer)		×					
Oxychilus cellarius (Müller)	×	×		×	×		×
O. alliarius (Miller)	×	×	×	×	×	×	×
O. helveticus (Blum.)	×		×				
Retinella radiatula (Alder)	×	×		×	×		×
R. pura (Alder)	×	×	×	×	×	×	×
R. nitidula (Draparnaud)	×	×	×	×	×	×	×
Zonitoides nitidus (Müller)			×		×		
Vitrina pellucida (Müller)	×	×	×	×	×	×	×
Limax tenellus Müller						×	
L. maximus L.	×		×	×	×	×	
L. cinereoniger Wolf						×	×
Lehmannia marginata (Müller)		×		×		×	×
Agriolimax reticulatus Müller	×	×	×	×	×	×	×
A. laevis (Müller)	×		×	×	×	×	×
Pisidium subtruncatum Malm					×		
P. supinum Schmidt					×		

Site A. Hetchell Woods, Nr. Leeds (44/376425), 17th of April 1971.
,, B. Grass Woods, Grassington (34/9865), 18th of April 1971.
,, C. Lythe Woods, Grassington (44/0162), 18th of April 1971.
,, D. Mulgrave Woods, Sandsend (45/8512), 8th of May 1971.
,, E. Dalton (44/47), 11th of September 1971.
,, F. Ravens Ghyll, Pateley Bridge (44/153642), 9th of October 1971.
,, G. Hall Wood, Healey, Nr. Masham (44/170796), 9th of October 1971.

Nomenclature: 1951 Census Catalogue of Conchological Society of Great Britain and Ireland.

ENTOMOLOGY

Coleoptera (E. W. Aubrook): 1971 has, on the whole, proved to be a productive year for Coleoptera and this, combined with a larger than usual number of collectors, has helped to produce a list of additions to the known fauna which is the longest for a number of years. Of special interest was *Philonthus subuliformis* Gr. from a starling's nest in the Knaresborough Ringing Station, by no means an inconspicuous beetle, but probably one which spends most of its life hidden in this habitat. The record appears to be the most northerly on the eastern side of England. *Cryptophagus populi* Payk .from the same locality is a rare species whose habits are not known with any certainty; and *Ischnomera sanguinocollis* F., an attractive insect, has previously escaped notice in Yorkshire. Notable also was the discovery by Mr. Barnes of a colony of *Agabus undulatus* Schr., formerly common at Askham Bog, but now a rarity there, in a pond at Fulford on the east bank of the R. Ouse.

Of species of particular interest from previous years, *Trechus subnotatus* is particularly noteworthy. Mr. P. Skidmore recognized two specimens in the Doncaster Museum collection, from the vicinity of Almondbury Grammar School, as belonging to this species, and a third from Dalton, some two miles from Almondbury, was recognised in the Tolson Memorial Museum's collection. *Trechus subnotatus* has only been found twice in this country, on both occasions in South Devon, its headquarters apparently being in the Eastern Mediterranean region. It is pleasing to add to this list Mr. Welch's 1963 record of *Alaeochara verna* Say from Spurn Head, new to Britain.

The following collectors, in addition to the writer, are indicated by initials: D. Barnes, Mrs. H. E. Flint, J. H. Flint, G. Foster, C. Johnson, J. Mather, P. Skidmore.

This list introduces the names of eleven species new to the county and 61 new to one or other of the vice-counties.

†**Dyschirius luedersi* Wagn. (†61) Kilnsea, 21/7/63; C.J.: (*63) Thorne Moor, 15/5/69; C.J.

**Bembidion fumigatum* Duft. (63) Edderthorpe Ings, 3/2/71; abundant in *Phragmites* litter; C.J., P.S.

**Bembidion doris* Panz. (63) West Bretton, 28/1/48; E.W.A.

†*Trechus subnotatus* Dej. (63) Almondbury Grammar School, 18/3/38; E. F. Gilmour and G. Cockroft: Dalton, 2/48; E.W.A.

Amara famelica Zimm. (62) Strensall Common, 11/4/71; J.H.F. A rare beetle in Yorkshire.

Acupalpus dubius Schil. (63) Blaxton Common, 10/70; C.J. The third Yorkshire record.

†*Feronia cristata* Duf. (64) Ingleton, *c.* 1948; A. de Porochin.

Agonum ericeti Panz. (62) Fen Bog, 9/5/71; J.H.F.

Dromius sigma Ross. (63) Thorne Moor, 27/4/71; C.J. In numbers.

Hygrobia hermanni F. (64) Pond near Askham Bog, adults and larvae, 8/7/71; D.B.

**Hydroporus longicornis* Shp. (65) Leading Stead Bottom, 28/3/71; G.F.

**Hydroporus striola* Gyll. (61) Skipwith Common, 20/5/71; F.G.

**Agabus undulatus* Schr. (61) Fulford Ings, 20/5/71; D.B., G.F.

**Hydraena britteni* Joy. (61) Wheldrake, 24/10/71; E.W.A.

**Cryptopleurum subtile* Shp. (61) Wheldrake, 24/10/71; E.W.A.

**Laccobius sinuatus* Mots. (63) Wroot, 23/7/69; E.W.A.

†*Laccobius atratus* Rott. (62) Pamperdale Moor, Osmotherley, 29/3/69; G.F.

**Clambus pubescens* Redt. (61) Wheldrake, 24/10/71; E.W.A.

**Agathidium laevigatum* Er. (63) Hatfield Chase, 15/6/69, grass heap; E.W.A.

**Acidota crenata* F. (61) Hotham Carr (North Cave), 4/9/71; J.H.F.

Phyllodrepoidea crenata Gr. (62) Arncliffe Woods, 17/9/70; E.W.A. The third Yorkshire record.

**Deleaster dichroum* Gr. (61) Skipwith Common, 8/5/71; J.H.F. Several in flight on warm evening.

Stenus lustrator Er. (63) Thorne Moor, 27/4/71; C.J.

S. nitens Steph. (63) Thorne Moor, 27/4/71; C.J.

**S. latifrons* Er. (63) Thorne Moor, 27/4/71; C.J.

**Euaestethus bipunctatus* Ljun. (62) Fen Bog, 9/8/69; E.W.A. The first recent record for V.C. 62. (*63) Medge Hall, 7/6/70; E.W.A.

Erichsonius cinerascens Gr. (61) Skipwith Common, 20/5/71; E.W.A. A rare beetle in Yorkshire.

**Philonthus atratus* Gr. (63) Denaby Ings, 12/9/71; E.W.A. The third Yorkshire record.

†*Philonthus subuliformis* Gr. (64) Knaresborough Ringing Station, 23/2/71, a number in an old starling's nest; J.M.

**Conosomus pedicularius* Gr. (63) Medge Hall, 7/6/70; E.W.A.: Thorne Moor, 27/4/71; C.J.

**Conosomus littoreus* L. (64) Knaresborough Ringing Station, 12/2/71; J.M.

**Tachyporus transversalis* Gr. (63) Thorne Moor, 27/4/71; C.J.: (*64) Askham Bog, 8/12/45; E.W.A.

**Habrocerus capillaricornis* Gr. (61) Wheldrake, 24/10/71; E.W.A.

**Cypha apicalis* Bris. (61) Dunnington Common, near Kexby, 29/7/71; E.W.A.

†*Placusa complanata* Er. (63) Timber yard near Stocksmoor Reserve, 16/9/71; E.W.A.

**Myllaena intermedia* Er. (*61) Skipwith Common, 20/5/71; E.W.A.: (*63) Sprotborough Reservoir, 25/3/71; E.W.A.

†*Oligota parva* Kr. (61) Wheldrake, 24/10/71; E.W.A.

**Atheta gregaria* Er. (63) Edderthorpe Ings, 11/2/71; E.W.A.

**A. cambrica* Woll. (64) Queen Mary's Dub, 4/9/68; E.W.A.

**A. gyllenhali* Th. (63) West Bretton, 7/2/71; E.W.A.

**A. elongatula* Gr. (63) Thorne Moor, 27/4/71; C.J.

**A. pertyi* Heer. (63) Torne Bridge, 25/9/69; E.W.A.

**A. angusticollis* Thoms. (63) West Bretton, 2/2/49, on rabbit's skull; E.W.A.: Hatfield Chase, 26/12/69; C.J.
**A. occulta* Er (*63) Farnley Tyas, 11/9/48; E.W.A. (*65) Richmond, 6/9/70; E.W.A.
**A. hypnorum* Kies. (63) West Bretton, 7/2/71; E.W.A.
**A. pygmaea* Gr. (63) Shepley, 14/3/71; E.W.A.
**A. muscorum* Bris. (63) Torne Bridge, 25/9/69; E.W.A.
**Ocyusa maura* Er. (63) West Bretton, 25/3/48; E.W.A.
**O. incrassata* Muls. (61) Barlow, 20/5/71; E.W.A.
**Oxypoda elongatula* Aube. (63) West Bretton, 28/1/48; E.W.A.
†*O. procerula* Man. (64) Askham Bog, 20/4/67; E.W.A.
**Meotica exilis* Er. (63) West Bretton, 2/2/49; E.W.A.
†*Alaeochara verna* Say. (61) Spurn Head, 23/7/63; R. C. Welch. The first British record.
Lampyris noctiluca L. (63) Fryston Wood, Castleford, 10/7/71, per R. Dicken: (64) Shaw Mills near Harrogate, 28/6/71; C. W. Webb.
**Anthrenus fuscus* Ol. (62) West Ayton, 26/4/61: Buttercrambe, 28/7/71; E.W.A.
**Meligethes pedicularius* Gyll. (64) Askham Bog, 23/8/66; E.W.A.
**M. difficilis* Heer. (63) Medge Hall, 6/70; E.W.A.
**M. morosus* Er. (63) Torne Bridge, 25/9/69; E.W.A.
**Monotoma bicolor* Villa. (62) Snainton, 10/5/59; E.W.A.
**M.testacea* Motsch. (64) Copgrove, 12/7/67; E.W.A.
**M. spinicollis* Aube. (61) Wheldrake, 24/10/71, common in old potato dump; E.W.A.
**Cryptophagus populi* Payk. (64) Knaresborough Ringing Station, 8/70; J.M. The second Yorkshire record.
†*C. pseudodentatus* Bruce (63) Thorne Moor, 27/4/71; C.J.
**Aridius bifasciatus* Reitt. (*61) Dunnington Common, 29/7/71: (*64) Appleton Roebuck, 25/2/71; E.W.A.
**Cartodera filiformis* Gyll. (63) Huddersfield, 11/70, several on *Merulius lacrymans*; E.W.A. The first recent record for Yorkshire.
**Corticaria pubescens* Gyll. (64) Askham Bog, 21/9/66; E.W.A.
**Synchita humeralis* F. (61) Dunnington Common, 29/7/71; E.W.A.
**Harmonia quadripunctata* Pont. (61) Houghton Wood, 16/5/71; J.H.F.
Oedemera virescens L. (62) Ashberry Pastures, 27/6/71; Mrs. B. Frisby.
†*Ischnomera sanguinocollis* F. (62) Ashberry Pastures, 27/6/71; Miss C. Frisby.
**Mordellistena pumila* Gyll. (64) Fairburn, 24/6/71; J.H.F.
Alphitophagus bifasciatus Say. (61) Barlby, 17/7/71; D.B.
**Alphitobius ovatus* Hbst. (61) Barlby, 17/7/71, on sacks outside cattlefood mill, with the above; D.B.
**Hoplia philanthus* Fuess. (62) Strensall, 18/7/71; Mrs. B. Frisby.
Saperda populnea L. (61) Skipwith Common, 8/5/71, galls with live larvae: (64) Bishop Wood, 13/4/71: Askham Bog (golf course), 18/4/71: Fairburn, 15/5/71, old gall; J.H.F.
**Cryptocephalus fulvus* Gz. (62) Strensall, 18/7/71; J.H.F.
**Aphthona herbigrada* Curt. (61) Fordon Bank, 7/8/71; J.H.F.
**Haltica pusilla* Duft. (61) Fordon Bank, 7/8/71; J.H.F.
**Ceuthorrhynchus asperifoliarum* Gyll. (61) Houghton Wood, 16/5/71; J.H.F.
**Trypodendron lineatum* Ol. (63) Kirkheaton, Huddersfield, 4/68, in new floor boards; E.W.A.

Diptera (P. Skidmore): It is very pleasing to report further recorders into the Diptera sectional Annual Report; this year records have been received from Messrs. T. Ford, J. R. Mather and J. Burn. It is also pleasant to report another useful year for new records. The present list contains 11 new county records (†) and 46 new vice-county ones (*). A large proportion of the latter were from the Yorkshire Naturalists' Union meeting at Ashberry Pastures on 27th June. The combination of favourable weather conditions (for Diptera at least), a very rich locality and a general paucity of Diptera records from that vice-county, resulted in a larger than normal haul of new vice-county records.

It is interesting to note that species with a generally southern range in Britain continue to be discovered in Yorkshire; the most notable addition to our list this year being *Myopa strandi* Duda, taken by Mr. J. Burn near Doncaster. Another highlight this year was the capture of the rare hoverfly *Callicera aenea* (F.) near Leeds by Jeremy Flint.

Records were provided by Messrs. J. Burn, R. Crossley, J. H. Flint, T. Ford, C. A. Howes and J. R. Mather. Except where otherwise stated records are those of P. Skidmore.

**Tipula irrorata* Mcq. (62) Ashberry Pastures, frequent, 27/6/71.
**Nephrotoma quadrifaria* Mg. (62) Ashberry Pastures, 27/6/71.
**Microchrysa polita* L. (62) Ashberry Pastures, 27/6/71.
**M. flavicornis* Mg. (62) Ashberry Pastures, 27/6/71.
**Leptogaster guttiventris* Zett. (61) Brantingham, 10/7/71; R.C.: (63) Brocodale, 28/7/68; R.C.: Maltby Common, 9/7/71; P.S.
**Empis livida* L. (62) Ashberry Pastures, 27/6/71.
**E. nuntia* Mg. (62) Ashberry Pastures, 27/6/71.
**Xylota xanthocnema* Coll. (62) 2 ex. Ashberry Pastures, 27/6/71; J.H.F., P.S. Only other Yorkshire records are from Doncaster area.
Callicera aenea (F.) (64) Roundhay, Leeds 1 ex., 9/71; J.D.H. Flint (det. J.H.F.).
**Neoascia aenea* Mg. (61) Beckhead Wood, 16/5/71; R.C.
**Chilosia intonsa* Lw. (61) Speeton, 13/6/71, Welwick, 31/8/69; R.C.
**Pipizella virens* (F.) (62) Ashberry Pastures, 27/6/71; P.S.
†Myopa strandi Duda. (63) 1 ex. on sandy ground near Holme House, Armthorpe, near Doncaster, early May 1971; J.B. A most interesting discovery; this fly has only been recorded from the south of England (Kent to Devon, north to Cambridge). This is thus by far the most northerly British record.
**Conops flavipes* L. (63) Thorne Moor, 4/7/71.
**Palloptera saltuum* (L.) (62) Ashberry Pastures, 27/6/71.
**Neuroctena anilis* Fall. (62) Ashberry Pastures, 27/6/71.
**Neottiophilum praeustum* Mg. (62) Hackness, emerged from Finch's nest in April 1971; C.A.H.
**Tricholauxania praeusta* Fall. (62) Ashberry Pastures, 27/6/71.
**Chyliza vittata* Mg. (62) 1 male, Ashberry Pastures, 27/6/71. A southern species of rare occurrence said to be associated with *Neottia nidus-avis*.
†Psila nigrosetosa Frey. (63) Crimpsall Ings, Doncaster, one beaten from elder bush by canal, 30/6/71. A scarce southern species.
**Trepidaria adusta* Frey. (62) Ashberry Pastures, 27/6/71.
**Psila obscuritarsis* Lw. (62) Ashberry Pastures, 27/6/71.
**Enicita annulipes* Mg. (61) Kilnsea Warren, amongst Caricetum by dike, 19/9/71.
**Tetanocera silvatica* Mg. (62) Ashberry Pastures, 27/6/71.
†T. phyllophora Mel. (62) Ashberry Pastures, 27/6/71, 1 male. A local though widely distributed species often found in calcareous areas and known from the surrounding counties of Derby, Westmorland and N. Lancs.
**T. arrogans* Mg. (62) Ashberry Pastures, 27/6/71; R.C.
**T. ferruginea* Fall. (62) Ashberry Pastures, 27/6/71; R.C.
**Trypetoptera punctulata* Scop. (61) Speeton (sea cliffs), 12/6/71: Houghton Wood, 4/7/71: Goodmanham, 7/7/71; R.C.
**Pherbellia albocostata* Fall. (61) Wauldby, 17/7/71; R.C.
**P. dubia* Fall. (63) Thorne Moor, 4/6/69; R.C.
**Neoleria inscripta* Mg. (62) Ashberry Pastures, 27/6/71.
**Opomyza germinationis* L. (62) Ashberry Pastures, 27/6/71. An extremely common fly which has not previously been recorded for V.C. 62.
†Collinellula breviceps (Sten.) (61) Kilnsea Warren, by brackish dike, 19/9/71.
†C. fuscipennis (Hal.). (61) Kilnsea Warren, by dike, 19/9/71. These two are found mainly in brackish areas.
†Steganina coleopterata Scop. (63) Thorne Moor, 9/8/71 (*teste* H. Oldroyd). In small numbers by beating a small area of Rhododendrons; a decidedly uncommon though widely scattered species.
†Phytomyza vitalbae Kalt. (63) Levitt Hagg, near Doncaster, mines common on *Clematis* in September 1971.
**Cordilura pubera* F. (62) Ashberry Pastures, 27/6/71.
**Megaphthalma pallidum* Fall. (62) Ashberry Pastures, 27/6/71.
**Pelatachina tibialis* Fall. (63) Catcliffe, abundant, May 71; T.F.
**Lydina aenea* Mg. (63) Wharncliffe, ex *Anchoscelis helvola*, 4/7/69; T.F. (det. D.M. Acland).
**Meigenia mutabilis* Fall. (63) Catcliffe, 2/9/71; T.F.

†*Compsilura concinnata* Mg. (63) A common species which has been overlooked; T.F. gives the following records — Totley, ex *Phigalia pedaria* (det. D. M. Ackland), Catcliffe (ex *Apatele megacephala* larva and pupa of *Aglais urticae*).
**Actia pilipennis* Fall. (63) Catcliffe, 28/6/71; T.F.
**Siphona maculata* Staeger. (63) Anston Stones Wood, 29/4/71; T.F.
**Voria trepida* Mg. (63) Catcliffe, 22/7/71; T.F.
Carcelia lucorum* Mg. (63) Ulley, ex *Phragmatobia fuliginosa* (det. L. Parmenter; *Ent. Rec.*; **65; 30).
†*C. excisa* Fall. Anstone Stones Wood, males common, 15/7/71; T.F.
**Paraphorocera senilis* Mg. (63) Catcliffe, fairly common, 9/7/71; T.F.
†*Zenilia longicauda* Wain. (63) Grenoside, ex *Hydriomena furcata*; T.F. (det. D. M. Ackland).
**Protocalliphora sordida* Zett. (64) Knaresborough Ringing Station, 30/7/70; J.R.M.
**Eustalomyia histrio* Zett. (64) Knaresborough Ringing Station, 3/7/71; J.R.M.
**Pegohylemyia discreta* Mg. (63) Denaby Ings, 5/6/66.
**Fannia polychaeta* Stein (63) 1 male, Blaxton Common, 11/6/68.
**Piezura graminicola* Zett. (64) Copgrove Park, 14/7/67. According to Fonseca (R.E.S. Handbook; Muscidae; p. 100) this is recorded from Yorkshire. There are however no Yorkshire records on the Y.N.U. Diptera Cards, and hence this may constitute a new County record. It is a widespread but not a common species.
**Thricops nigrifrons* R-D. (62) Ashberry Pastures, 27/6/71.
**Lophosceles cristatus* Zett. (62) Ashberry Pastures, 27/6/71.
**Hydrotaea militaris* Mg. (62) Ashberry Pastures, 27/6/71.

Hymenoptera (Mrs. H. E. Flint): This is the first report since 1968 and includes species taken from lists and specimens submitted in 1969, 1970 and 1971. The four county and twenty-two vice-county additions to the Aculeates indicate the resurgence of interest in this sub-order. Mr. Archer has collected assiduously at Swincarr Plantation, Stockton-on-The-Forest, near York and at other localities east of York and also has worked on the identification of the Elliott collection in the Yorkshire Museum. There is an interesting colony of mining bees and wasps on a suitable sandy area at the Bird Ringing Station at Knaresborough and I am grateful to Mr. J. R. Mather for submitting a collection of insects from this Reserve for identification and for a fine, beautifully set female wood wasp, *Sirex noctilio* F., from Harrogate taken on 18th August 1971. Mr. Crossley has also handed in specimens for identification which he has taken on Y.N.U. excursions and Mr. Skidmore continues to send interesting lists from the Doncaster area and other parts of the county. With survey work on Yorkshire Naturalists' Trust reserves and potential reserves on almost every Saturday and Sunday throughout the season there has been a good haul, much of which remains to be identified. Those already named suggest that all the reserves examined are "good" for insects. Even Beckhead Wood, which seemed so unproductive at the time the Section visited, it yielded one county and two vice-county records for sawflies.

With more workers in the field we may well find that many of the new vice-county additions are really of species of fairly wide distribution and our records in the future may show the distribution of Hymenoptera rather than hymenopterists. Of the many notes received and entered in the records, the list that follows is restricted almost entirely to those which are additions to the county (†) or to the vice-counties (*). My thanks are due to the following contributors whose initials appear in the list; Messrs. M. E. Archer, J. Burn, R. Crossley, J. H. Flint and P. Skidmore.

Symphyta

**Xyela julii* Breb. (61) Houghton Wood, 16/5/71; J.H.F.
Xiphydria prolongata L. (63) Arksey Ings, Doncaster, larvae forming pupal cells in dead branches of *Salix fragilis* on 16/5/70; P.S. The site was revisited in late August when the flight period was over and the remains of several adults were found beneath loose bark on the very old willows. The site closely resembles that at the only previously known Yorkshire locality for this species at Denaby Ings.
**Hartigia linearis* Schrk. (63) Thorne Moors, 6-7/6/70; P.S.
**Cephus cultratus* Evers. (*63) Thorne Moors, 6-7/6/70; P.S. (*64) Sherburn Willows Nature Reserve, 27/5/71; J.H.F.
†*Sterictophora geminata* Gmel. (62) Ashberry Pastures Nature Reserve, 27/6/71; H.E.F.
**Arge ciliaris* L. (62) Ashberry Pastures, swept from *Filipendula ulmaria*, 27/6/71; P.S.

**Aneugmenus padi* L. (65) Bishopdale, 10/7/71; J.H.F.
**Stethomostus fuliginosus* Schrk. (65) Bishopdale, 10/7/71; J.H.F.
**Allantus rufocinctus* Retz. (64) Ellington Banks, Ripon, 3/7/71; J.H.F.
**Monophadnoides puncticeps* Kon. (61) Beckhead Wood Nature Reserve, 16/5/71; H.E.F.
**Rhogogaster viridis* Kon. (65) Bishopdale, 10/7/71; H.E.F.
**Tenthredo moniliata* Klug (63) Upper Derwent Valley, 21/6/69; R.C. (det. J.H.F.).
**T. livida* L. (65) Richmond, 6/9/70; Bishopdale, 10/7/71; J.H.F.
T. scrophulariae L. (63) Thorne Moors, many on Figwort at Spectacles Wells, 16/8/69; P.S.
**Anoplonyx destructor* Bens. (61) Beckhead Wood, 16/5/71; H.E.F.
†*Nematus umbratus* Thoms. (61) Beckhead Wood, 16/5/71; H.E.F.

ACULEATA

†*Notozus constrictus* Foerst. (61) Hotham, 18/7/71; R.C. (det. J.H.F.).
†*Tiphia femorata* F. (62) 22/8/68; M.E.A.
**Priocnemis minor* Zett. (65) Bishopdale, 10/7/71; J.H.F.
**Anoplius nigerrimus* L. (63) Thorne Moors, many on flowers of *Potentilla palustris* which had escaped the fire, 4/7/70; P.S.
**Mellinus arvensis* L. (65) Richmond, 6/9/70; J.H.F.
Psen dahlbomi Wesm. (64) Hetchell Wood Nature Reserve, 7/70; J.H.F.
†*Stigmus solskyi* Mor. (63) Sandall Beat Wood, 2/8/70, on dead tree trunk; J. Burn (teste P.S.).
**Ectemnius cephalotes* Ol. (62) Whey Carr Plantation, Sand Hutton, 31/8/69; M.E.A. Garbutt Wood Nature Reserve, 25/6/70; J.H.F.
**E. nigrifrons* Cress. (61) Skipwith Common, 14/7/71; J.H.F.
**Crossocerus tarsatus* Shuck. (65) Bishopdale, 10/7/71; J.H.F.
**C. elongatulus* Lind. (64) Chapel Allerton, Leeds, mining in old sandstone wall, 12/6/69; J.H.F.
**C. podagricus* Lind. (62) Sand Hutton, 20/6/70; M.E.A.
**Rhopalum coarctatum* Scop. (61) Skipwith Common, 7/9/69; J.H.F.
Oxybelus uniglumis L. (63) Hatfield Moors, mining in sandy dike banks near Candy pumping station, 14/6/70; P.S.
**Prosopis hyalinata* Smith (62) Heworth, York, 9/6/70; M.E.A.
**Sphecodes pellucidus* Smith (62) Swincarr Plantation, 4-8/69; M.E.A.
**Andrena barbilabris* Kby. (61) Speeton sea cliffs, 13/6/71; R.C. (det. J.H.F.). (*62) Swincarr Plantation, 5-6/69; M.E.A.
†*A. labialis* Kby. (61) Speeton sea cliffs, 13/6/71; R.C. (det. J.H.F.).
**A. tarsata* Nyl. (65) Bishopdale, 10/7/71; J.H.F.
**Epeolus cruciger* Pz. (62) Swincarr Plantation, 7-8/69; M.E.A.
**Nomada rufipes* F. (62) Swincarr Plantation, 8/8/69, 16/8/69; M.E.A.
**N. lineola* Pz. (61) Speeton sea cliffs, 13/6/71; R.C. (det. J.H.F.).
**N. hillana* Kby. (62) Swincarr Plantation, 14/6/69; M.E.A.
**N. flavoguttata* Kby. (65) Bishopdale, 10/7/71; J.H.F.
**Osmia coerulescens* L. (*62) Heworth, 24/5/70, 9/6/70; M.E.A. (63) Armthorpe, Doncaster, burrowing in a window frame, 6/70; J. Burn (fide. P.S.).
**Bombus lapponicus* F. (65) Bishopdale, 10/7/71; Waldendale, commonly, the only member of the genus seen, 11/7/71; J.H.F.

Hemiptera (J. H. Flint): This report covers two years' work, 1970 and 1971, and these years have seen a considerable accession to our knowledge of the Yorkshire Hemiptera. More entomologists than ever before have contributed notes on the material they have collected and their activities have been spread over the whole of the county. Most of the bugs now recorded for the first time in Yorkshire are southern insects and their discovery is the result of a good deal of field work in favourable localities in the East Riding by Mr. Crossley and in the Doncaster area by Mr. Skidmore. It is probable that most of these "new" Yorkshire bugs have lived in the area for a long time undiscovered, but one of them, *Ischnodemus sabuleti*, has been extending its range from South-East England northwards and must be a comparatively recent arrival here. Old Yorkshire records of *Enoplops scapha*, cinsidered of doubtful validity by Southwood and Leston (*Land and water bugs of the British Isles*, 1959) received support from the discovery of a single example by Father Pearce. After the discovery of the first specimen an extensive search failed to yield more and clearly this must be a bug that is hard to find, not necessarily as rare as the records indicate.

1970 seemed an averagely good year for bugs. 1971, after a rather poor start, proved to be an exceptionally good year and many bugs, shield bugs for example, appeared in unusually large numbers. Reports have been received from (or on behalf of) Messrs. H. E. Beaumont, J. Burn, R. Crossley, T. Ford, Dr. L. Lloyd-Evans, Rev. E. J. Pearce and Mr. P. Skidmore and their initials and mine are used in the list that follows. The usual symbols indicate county (†) and vice-county (*) records. My thanks are due to all contributors.

HETEROPTERA

Aradus depressus F. (61) Houghton Wood, 11/6/70; R.C. Widespread, but not often found.

**Sehirus bicolor* L. (*61) Wauldby, 8/5/71; R.C. (63) Hatfield Moor, among *Urtica* by dike near Tunnel Pits Farm, 14/6/70; J.B. First found in Yorkshire in 1968 at Adwick-le-Street.

**Pentatoma rufipes* L. (65) Richmond, 6/9/70; J.H.F.

Rhacognathus punctatus L. (61) Houghton Wood, 7/6/70; R.C. (62) Strensall Common, 18/7/71; J.H.F.

Enoplops scapha F. (62) Sandsend, 7/9/70; E.J.P. (det. J.H.F.).

Myrmus miriformis Fall. (62) Gundale, an abundance of adults with a large proportion of the rare macropterous form, 12/7/70; J.H.F.

†*Ischnodemus sabuleti* Fall. (63) High Ellers Carr (Potteric Carr), in *Phalaris* litter, 9/1/71; P.S. A very considerable northward extension of the known range of a bug which until recent years was rare and restricted to the south-east of England.

†*Kleidocerys resedae* Pz. (61) Houghton Wood, 20/6/70; R.C.

Acompus rufipes Wolff (63) Wilthorpe Marsh and Haw Park records (*Naturalist*, **1968**: 14) are erroneous, the specimens taken being *Stygnororis pedestris* Fall. The only record of *Acompus rufipes* in Yorkshire is that from Ripon in 1964.

**Drymus ryei* D. and S. (*61) Wauldby, 8/5/71; R.C. (63) Barnsley, 28/3/67; R.C. (teste G. E. Woodroffe).

**Lamproplax picea* Flor (61) Hotham, one female, 19/9/71; another, 3/10/71; R.C. A widespread, but apparently rare, bug; the only previous report in Yorkshire is from Great Ayton in the nineteenth century.

†*Scolopostethus grandis* Horv. (61) Houghton Wood, 28/2/70; R.C. Not previously reported in Britain north of Notts.

**S. thomsoni* Reut. (61) Melbourne, 16/8/69; R.C.

**Cymus claviculus* Fall. (63) Torne Bridge, 5/71; P.S.

Gampsocoris punctipes Germ. (61) Fordon Bank Nature Reserve, 7/8/71; J.H.F.

**Empicoris vagabundus* L. (61) Houghton Wood, beaten from gorse, 4/9/71; R.C. Widespread, but not often encountered in Yorkshire.

†*Stalia boops* Schdte. (61) Hotham, a male, 18/7/71; R.C. Not previously known north of the Wash.

**Anthocoris minki* Dohrn. (61) Wauldby, on ash, 13/6/71; R.C. Only previously reported in Yorkshire from the Leeds area, this bug will surely be found fairly widely if sought.

**Lyctocoris campestris* F. (64) Aberford, 3/52; J.H.F. Widespread, not uncommon.

Loricula pselaphiformis Curt. (61) Houghton Wood, 6/70; R.C.

**Bryocoris pteridis* Fall. (61) Houghton Wood, 26/6/70; R.C.

†*Deraeocoris lutescens* Schill. (63) Ox Carr Wood, near Armthorpe, J.B.; Potteric Carr, P.S.; both in early spring, 1971. (64) Brayton Barff, on oak, 1/9/70; J.H.F.

D. ruber L. (64) Fairburn Ings Nature Reserve, 17/8/71; J.H.F.

D. scutellaris F. (62) Strensall Common Nature Reserve, 23/6/70; J.H.F. A rare insect, only previously reported in Yorkshire from Guisborough.

**Hoplomachus thunbergi* Fall. (61) Abundant on the old railway line between Kiplingcotes and Goodmanham, 7/7/71; R.C.

**Tinicephalus hortulanus* M.-D. (*61) Brantingham, 10/7/71; R.C. Fordon Bank, 7/8/71; J.H.F. (*62) Hovingham, 26/7/71; J.H.F. In each case commonly on *Helianthemum*. This bug was first found in Yorkshire in 1956 and is now known from six places in four vice-counties.

**Harpocera thoracica* Fall. (61) Skipwith Common, 23/5/70; R.C. Although commonly found on oak in the West and North Ridings, curiously, this is the first time it has been reported in the East Riding.

Orthocephalus coriaceus F. (62) Gundale, 12/7/70; J.H.F. Forge Valley (1927) is the only other Yorkshire record.

**Dicyphus globulifer* Fall. (61) Land of Nod, Market Weighton, 20/9/70; R.C.

Fieberocapsus flaveolus Reur. (61) Humber bank, Brough, 18/7/70; R.C.

**Orthotylus flavosparsus* Sahl. (61) Spurn, 6/9/69; R.C. (det. G. E. Woodroffe) Humber bank, Brough, 18/7/70; R.C.

**Neomecomma bilineatus* Fall. (61) Skipwith Common, on aspen, 30/8/71; J.H.F.

**Lygus rugulipennis* Popp. (65) Richmond, 6/9/70; J.H.F.

**Polymerus palustris* Reut. (61) Hotham, 18/7/71; R.C. Its only other known Yorkshire haunt is Askham Bog, currently its northern limit in Britain.

**P. nigritus* Fall. (61) Wauldby, 17/7/71; Burdale, 25/7/71; Kiplingcotes, 27/7/71; R.C.

Calocoris roseomaculatus Deg. (61) Fordon Bank, 7/8/71; J.H.F.

†*Acetropis gimmerthali* Flor. (61) Houghton Wood, 11/7/70; R.C. Not previously reported in Britain north of Derby.

†*Teratocoris antennatus* Boh. (63) Askern, by sweeping *Carex acutiformis* on Rushy Moor, 20/6/70; P.S.

**Chartoscirta cocksi* Curt. (62) Fen Bog, Goathland, 9/5/71; J.H.F. (*64) Ilkley Moor, 28/7/61; J. H. Fidler (det. J. H. Flint).

**Gerris lateralis* Schum. (61) Skelton, near Howden, on a railway pond overgrown with *Phragmites*, 24/5/70; L.Ll.-E. Previous records are from Balne, Malham Tarn and Askham Bog. This skater is typically found in reed beds, often away from water. It only rarely seems to stray on to open water and so may be overlooked.

Notonecta maculata F. (63) Cantley, Doncaster, 27/9/70; H.E.B. Taken by Mr. J. W. Hartley, on to whose car the specimen dropped on a bright, sunny day while the car was being washed. The only other Yorkshire records are from Langsett and Robin Hood's Bay.

Cymatia coleoptrata F. (61) Howden, in a flooded brick pit, 24/5/70; L.Ll.-E. First found in Yorkshire by Dr. Hincks in the Pocklington Canal in 1950, it has since then been found near Leeds (pond now filled in), Wentbridge and Barnsley. Usually plentiful when found, in ponds with a silt bottom.

C. bonsdorffi Sahl. (61) Skelton, near Howden, railway pond, 24/5/70; L.Ll.-E. Only previously reported from Skipwith and near Leeds.

**Glaenocorisa propinqua* Fieb. (63) Upper Midhope Reservoir, near Langsett, 2/5/71; H.E.B. A relict, upland species previously found in Yorkshire at Robin Hood's Bay and Bowes.

Sigara concinna Fieb. (63) Denaby Ings, 9/5/71; H.E.B. (64) Fairburn Ings, 15/5/71; J.H.F.

Homoptera

†*Aphrophora major* Uhl. (64) Bishop Wood, 5/9/71; J.H.F. Although taken when beating *Salix caprae*, the single example may not have been attached to that plant. It is reputed to feed on *Myrica gale*, but this was not present. Not otherwise known north of Norfolk.

**Idiocerus tremulae* Est. (61) Skipwith Common, on aspen, 30/8/71; J.H.F.

Batrachomorphus irroratus Lewis (61) Fordon Bank, 7/8/71; J.H.F.

**Errastunus ocellaris* Fall. (65) Richmond, 6/9/70; J.H.F.

**Jassargus sursumflexus* Then (61) Skipwith Common, 25/8/71; J.H.F. The only other known Yorkshire locality is Strensall.

**Diplocolenus bensoni* China (65) Waldendale, at 1,200 ft., 11/7/71; Wether Fell, near Hawes, at 1,800 ft., 26/8/71; J.H.F. A montane species not recorded south of Yorkshire where it has been found on Fountains Fell at 2,000 ft. and Penyghent above 1,500 ft.

Idiodonus cruentatus Pz. (61) Skipwith Common, 25/8/71; J.H.F. The only other known Yorkshire localities are Allerthorpe, Strensall and Goathland.

Cicadula intermedia Boh. (65) Wether Fell, Hawes, at 1,800 ft., 26/8/71; J.H.F.

**Sonronius dahlbomi* Zett. (64) Ellington Banks, Ripon, 3/7/71; J.H.F.

**Macrosteles viridigriseus* Edw. (65) Richmond, 6/9/70; J.H.F.

**Kybos rufescens* Mel. (65) Richmond, on *Salix purpurea*, 6/9/70; J.H.F.

**Cixius cunicularius* L. (65) Richmond, 6/9/70; J.H.F.

†*Kelisia pallidula* Boh. (61) Hotham, 4/9/71; J.H.F.

†*Chloriona unicolor* H.-S. (64) Ellington Banks, Ripon, in dense reed (*Phragmites*) beds, plentifully, 3/7/71; J.H.F. A south-eastern insect not previously found north of the Severn-Wash line.

Euidella speciosa Boh. (64) Ellington Banks, Ripon, in the reed beds, 3/7/71; J.H.F. Askham Bog is the only other locality known north of the Wash.

**Eurybregma nigrolineatus* Scott (63) Thorne Moors, 6/6/70; J.H.F.

**Megamelus notula* Germ. (61) Hotham, 4/9/71; J.H.F.
**Javesella forcipata* Boh. (65) Bishopdale, near New House, 10/7/71; J.H.F.
**Paraliburnia lugubrina* Boh. (64) Fairburn Ings, on *Glyceria maxima*, 22/6/71; J.H.F. The most northerly British record.
†*Issus coleoptratus* Geoff. (65) Richmond, 6/9/70; J.H.F.
**Arytaena genistae* Latr. (*61) Hotham, on broom, 4/9/71; J.H.F. (64) Brayton Barff, on broom, 1/9/70; J.H.F.
Trioza galii Forst. (64) Fairburn Ings, 22/6/71; J.H.F.

Lepidoptera (S. M. Jackson)

The past season was a fairly good one generally. Again it was rather poor for the migrants with the exception of the Silver Y, which was very abundant. There are no additions to the county list but a number of species have turned up which have not been recorded for a very long time. Four contributors in particular (N.G., J.R.M., B.R.S., P.W.) have been doing important pioneer work in their respective areas and have furnished very interesting lists. N. Gill operating in the area between Huddersfield and Barnsley has already confirmed many of the older records of Porritt and Morley who worked this region so diligently and thoroughly up to the mid 1920's. The following list is compiled from records supplied by the undermentioned to whom my thanks are due. It seems necessary to mention, however, that although all records are welcome and are indeed entered in the master index system, pressure of space etc. forbids including in the annual report other than an extract of the more important species having in mind their rarity, changed status or place of origin. Several important belated records have been included which did not appear in previous reports.

Contributors: R. Crossley, J. H. Flint, T. H. Ford, N. Gill, P. Gunson, J. Harris, A. M. R. Heron, C. R. Haxby, J. Hunt, J. R. Mather, J. D. Pickup, A. C. Pullan, E. Richards, C. I. Rutherford, B. R. Spence, P. Winter, A. H. Wright.

Euchloe cardamines L. (Orange Tip) (63) Bretton Park, 5/71; N.G.
Gonepteryx rhamni L. (Brimstone) The only record I have is of two seen at (63) Woodlands, Doncaster, 25/8/71; A.H.W. The species seems to occur each year in the most southerly parts of the county.
Vanessa io L. (Peacock) Another good year for this species, records received showing it to be widespread. In particular, more insects out of hibernation in the spring were noted.
Vanessa cardui L. (Painted Lady) Apparently a very poor year. The only records I have received are singles from (63) Goole, 7/71; J.H. and (64) Leeds, 9/71; C.R.H. The occurrence of this and the following insect appears to have been reversed on last year.
Vanessa atalanta L. (Red Admiral) Generally speaking, not an outstanding year but it was noted fairly commonly in late autumn visiting gardens in the (63/64) Bradford /Leeds districts; C.R.H.
Maniola tithonus L. (Gatekeeper) (61) Frequent at Hotham, a new locality; R.C. A few in same area near canal, 15/8/71; S.M.J.
Coenonympha tullia Müll. (Large Heath) (63) In fair numbers on Rawcliffe side of Thorne Moors, 3/7/71, in spite of disastrous fire affecting the area last year; S.M.J.
Aricia agestis Schiff. (Brown Argus) (61) Fordon Bank, common, 8/71; J.H.F.
Thymelicus sylvestris Pod. (Small Skipper) (64) Knaresborough, noted from 26/6 to 20/7/70; J.R.M. This district is apparently its western limit.
Ochlodes venata Br. & Grey. (Large Skipper) J.D.P. reports this species more numerous than usual in many localities.
Smerinthus ocellata L. (Eyed Hawk) (63) Haw Park, Wakefield, 2/7/71; A.C.P. Distinctly uncommon in the industrial areas.
Herse convolvuli L. (Convolvulus Hawk) (62) One record only from Scarborough, 7/9/71. The moth was found resting outside a bedroom window.
Celerio galii Rott. (Bedstraw Hawk) (63) One in perfect condition taken in light trap Emley, 9/7/71; P.G. An important capture as this species has never regained its sudden upsurge in the 1950's.
Deilephila porcellus L. (Small Elephant-Hawk) (61) Spurn, one only; B.R.S. (63) Emley, singles, 2/7/71 and 5/7/71; N.G. and P.G.
Cerura vinula L. (Puss Moth) (63) Pollington, larvae, 8/71; J.H. (64) Knaresborough, larvae, 18/6/71; J.R.M. Not often reported. Is this moth scarcer than formerly or do observers feel it too common to mention?
Tethea ocularis L. (Figure of Eighty) (63) Of this scarce Yorks. species I again took two at sugar in my garden at Selby, 27/6/71; S.M.J.

Orgyia antiqua L. (Vapourer) (62) Ashbury Pastures, larvae 71; A.C.P. (63) Goole, numerous Sept./Oct. 71; J.H. Thorne Moors, 10/71; A.H.W.

Malacosoma neustria L. (Lackey) (61) Taken every year at Spurn where up to 12 in a night have occurred; B.R.S. (63) Pollington; J.H. One Emley, 19/7/71; N.G. The latter is first record for S.W. Riding.

Saturnia pavonia L. (Emperor) (61) With no report from Skipwith for many years it is interesting to learn that A.H.W. assembled several males to a virgin female on the Common, 5/71.

Drepana binaria Hufn. (Oak Hook-Tip) (64) Knaresborough, five, 8/8/70; J.R.M.

Apatele tridens Schiff. (Dark Dagger) (64) Knaresborugh, 1/7/70; J.R.M.

Eurois occulta L. (Great Brocade) (61) Muston, Filey, 14/9/71; P.W. Status of this immigrant as last year, a single capture.

Polia nitens Haw. (Pale Shing Brown) (61) Spurn, singles, 17/7/71 and 21/7/71; B.R.S. This "eastern counties" species which is often common enough further south, has not been reported from Yorks. for 50 years. The present insects are therefore among the highlights of this report.

Eumichtis lichenea Hubn. (Feathered Ranunculus) (61) Spurn, maximum of nine in one night; B.R.S. Muston, Filey, 13/9/71; P.W. (64) Knaresborough, one 7/9/67, one 8/9/70, three 15/9/71; J.R.M. This insect is essentially a denizen of coastal regions, being more common on the Lancs. coast than with us. Its occurrence at Knaresborough over a period shows it to be established in that district. At the present time I have no other record so far inland; S.M.J.

Eremobia ochroleuca Esp. (Dusky Sallow) (61) Spurn, four 15-18/8/71; B.R.S. (64) Barlow, one 4/8/71, first record for Selby district; S.M.J. (See also *Nat*. 1971, p. 17).

Apamea ophiogramma Esp. (Double Lobed) (61) Muston, 28/7 and 17/8; P.W. (63) Emley, 10/7/71; N.G. New record for area.

Apamea hepatica Hubn. (Clouded Brindle) (64) Fairly common at sugar near Fairburn, 7/71; S.M.J.

Dasypolia templi Thundb. (Brindled Ochre) (61) Now occurring regularly in Filey district (P.W.) in late Oct. C.I.R. and E.R. paid a special visit finding the insect resting on street-lighting columns. Live moths were exhibited at the Sectional meeting. (63) Emley, 13/10/70 and again this year; N.G.

Antitype flavicincta Fabr. (Large Ranunculus) (61) Spurn 20-21/9/71; B.R.S. First records for many years.

Hydraecia petasitis Doubl. (Butterbur) (64) Knaresborough, appeared 7-15/8/70; J.R.M.

Laphygma exigua Hubn. (Small Mottled Willow) (63) Emley, 27/7/69; N.G. Our records for this immigrant are very few and it is highly likely captures have been made and overlooked. It is very like the common and closely allied *calvipalpis* Scop. but the pearly hind wings and more slender lines of our present species at once separate it. Last record from Filey also 1969.

Orthosia populeti Treits. (Poplar Quaker) (61) Barlby, 20/4/71; S.M.J. Not often reported away from its well-known Bishop Wood locality.

Xylocampa areola Esp. (Early Grey) (62) Ashbury Pastures, larvae, 27/6/71; A.C.P. Not often reported as larvae.

Cucullia verbasci L. (Mullein Shark) (64) Barlow, larvae common on both mullein and figworth, 7/71; S.M.J.

Panemeria tenebrata Scop. (Small Yellow Underwing) (63) Clayton West, 29/5/71; N.G. This confirms very old record (64) Gateforth, still on canal bank, 27/5/71; S.M.J.

Eustrotia uncula Clerck. (Silver Hook) (62) Strensall, several, 18/7/71; J.H.F. Not previously known from here.

Mormo maura L. (Old Lady) (61) Common, Harwood Dale, 17/8/71; P.W. (62) Sutton Bank, 19/8/71; A.M.R.H. (63) Bretton Park, 8/70; N.G. (64) Knaresborough, 8/70; J.R.M.

Lygephila pastinum Treits. (Blackneck) (61) Spurn, 7/71; B.R.S.

Pseudoterpna pruinata Hufn. (Grass Emerald) (62) Strensall, 18/7/71; J.H.F. (64) Knaresborough, several, 9/7/71 to 1/8/71; J.R.M.

Iodis lactearia L. (Little Emerald) (64) Knaresborough, 18/7/71; J.R.M.

Sterrha seriata Schrank. (Small Dusty Wave) (63) Wakefield, 21/7/71; A.M.R.H. Not uncommon but rarely reported.

Chloroclysta miata L. (Autumn Green Carpet) (61) Spurn, 10/10/69; B.R.S. (See also *Nat*. 1971, p. 17).

Xanthorhoe designata Rott. (Flame Carpet) (64) Knaresborough, 6/70; J.R.M.
Larentia clavaria Haw. (Mallow) (64) Knaresborough, 4/9/70; J.R.M.
Oporinia christyi Prout. (Pale November Moth) (64) Knaresborough, 10/70; J.R.M.
Euchoeca nebulata Scop. (Dingy Shell) (63) Bretton Park, 1/6/71; N.G. (64) Hetchell Wood, 28/6/71; J.H.F.
Entephria caesiata Schiff. (Grey Mountain Carpet) (63) Emley, 7/71; N.G. (65) Waldendale, common, 11/7/71; J.H.F.
Epirrhoe rivata Hubn. (Wood Carpet) (61) Spurn, taken fairly regularly late June 71 with maximum of five on one night; B.R.S. (see also *Nat.* 1971, p.17).
Plemyria bicolorata Hufn. (Blue Bordered Carpet) (63) Emley, 27/7/68; N.G.
Perizoma affinitata Steph. (Large Rivulet) (63) Bretton Park, 2/6/71; N.G. (64) Knaresborough, 19/6/71; J.R.M.
Nyctosia obstipata Fabr. (Gem) (61) Spurn, 4/9/71; B.R.S. The only record of this migrant for the year.
Eupithecia tantillaria Boisd. (Dwarf Pug) (63) Bretton Park, 27/5/71; common Deffer Wood, 29/5/71; N.G.
Eupithecia virgaureata Doubl. (Golden Rod Pug) (61) Barlby, 9/8/71 (second brood); S.M.J. Skipwith, larvae 1970, moths emerged 1971; T.H.F.
Gymnoscelis pumilata Hubn. (Double-Striped Pug) (61) Barlby, 22/4/71; S.M.J. Skipwith larvae 1970; T.H.F.
Anticollix sparsata Treits. (Dentated Pug) (63) Still in wood near Selby in spite of reduction of food plant. Larvae, 31/8/71; S.M.J.
Ligdia adustata Schiff. (Scorched Carpet) (63) Wadworth Wood, larvae, 5/9/71. (64) Near Ledsham, larvae, 11/9/71. For very many years the only records of this scarce species have been from (62) Pickering district where it is far from common. I am happy therefore to confirm the old record from the Doncaster locality and report the insect from an entirely new area as above; S.M.J.
Theria rupicapraria Hubn. (Early Moth) (63) Frequent in Emley district and seen as early as 7/1/71; N.G. This is another of those species, although found commonly in many parts, appears to shun the industrial areas even though apparently suitable habitats exist.
Ennomos quercinaria Hufn. (August Thorn) (61) Muston, 24/9/71; P.W. Continues to be rare and extremely local.
Epione vespertaria Thundb. (Dark Bordered Beauty) (62) Strensall, 18/7/71; in spite of frequent fires this species still survives in good numbers; J.H.F. The colony is well-known as the headquarters of the species in Britain and in addition to the fire risk, it is under pressure from visiting collectors, frequently from out of the county. With all respects may I make a plea to such not to take series of the insect. A single female will lay readily and it is not difficult to rear.
Aethalura punctulata (Schiff.) (Grey Birch) (63) Bretton Park, 3/6/71; N.G. A new locality.
Psammotois crocealis Hubn. (64) Newfield Plantation, 7/71; S.M.J.
Hyponomeuta plumbella Schiff. (63) Near Wadworth Wood on spindle, 5/9/71; S.M.J.
Nemotois degeerella L. (64) Barlow, 15/6/71, a local species; S.M.J.

Arachnida (C. A. Howes): In addition to the threats to Thorne Moors and Sandall Beat Wood and Low Ellers nature reserves, Denaby Ings and Edlington Wood, both famous entomological sites, have joined the ever growing list of threatened areas in South Yorkshire. Consequently attention has been paid to all five localities. The preliminary list of Thorne Moor arachnids, compiled for the "Selby Fuel Ash Enquiry", has been considerably extended, work being concentrated on the spiders in *Eriophorum*, *Phragmites* and *Pteridium* litter. The Sandall Beat Wood and Potteric Carr lists were also extended, the resultant information contributing to the massive scientific evidence presented by the Doncaster and District Amentities Protection and Promotion Society at the M18 Public Enquiry. The information was also made available to the Y.N.T. for the Potteric Carr management report. Also incorporated in the D.D.A.P.P.S. evidence (embodied in the "Outline Study of the Hatfield Chase part II") are extensive lists of the *Oribatid* mites and *Hydracarina* of PottericCarr and Sandall Beat Wood. These lists, compiled by Mr. William Bunting based on his work from 1949-71, constitute a major contribution to the study of these difficult groups in Yorkshire.

The work of centralising the scattered records of Yorkshire arachnids is now showing results. Following the completion of a bibliography of references to the arachnids of Yorkshire, all pseudoscorpion and harvestspider records have now been indexed, and work on the spider records is well in hand. Pseudoscorpion records published since Falconer's review of 1916 (*Nat.* 1916, 191-193) have been brought together in "A Review of Yorkshire Pseudoscorpions" (*Nat.* 1971, 107-110) and a similar review of harvestspiders is in preparation. Based on Falconer (*loc. cit.*) and recent work, a paper entitled "A Preliminary list of South Yorkshire Harvestspiders and Pseudoscorpions" has appeared in the 1971 issue of the Sorby Record. The accumulation of old spider records is adding to the "Yorkshire list" compiled by Frank Dixon (*Nat.* 1945, 87-92) and it is hoped to publish these in due course.

With the small number of people working the arachnids of Yorkshire, a complete coverage of the county embodying distributional studies and mapping schemes is currently out of the question. However, much profitable and original work can be derived from detailed studies of particular localities, i.e. nature reserves or areas known to be of entomological interest, and this is to be encouraged.

I would like to thank Mr. C. J. Smith for determining some of the Potteric Carr material, and Messrs. P. Skidmore, C. J. Devlin and J. Burn for collecting specimens.

ARANEA

Ciniflo fenestralis (Stroem) (63) Arksey Ings, common under loose bark of old *Salix fragilis*, 15/7/71: Edlington Wood, 16/10/71; C.A.H.

C. similis Bl. (63) Arksey Ings, very fine females in abundance under loose bark of old *S. fragilis*, 15/7/71; C.A.H.
It is interesting that these similar species, *C. fenestralis* and *C. similis*, should occupy what appears to be the same ecological niche at Arksey Ings, This situation lends itself to further investigation. Perhaps competition is avoided by their having different period of activity or different methods of capturing prey.

Oonops pulcher Temp. (63) Hatfield Moor, amongst dumped household rubbish 5/5/71; C.A.H.

Harpactea hombergi (Scopoli) (62) Scarborough, -/6/71; per C. I. Massey.

Drassodes lapidosus (Walck) (61) Speeton Cliffs, female, 12/6/71; C.A.H.

Segestria senoculata (Linn.) (63) Shirley Pool, female, under bark of *S. fragilis*, 17/7/71. (62) Kepwick Moor (Hambledon Hills), under loose rocks, -/8/71. (65) Bishopdale, under loose rocks, 10/7/71; C.A.H.

Clubiona corticalis (Walck) (63) Arksey Ings, female, in brood cell under loose bark of *S. fragilis*, 15/7/71; C.A.H.

C. pallidula (Clerck) (63) Thorne Moors, female, under loose bark of *Betula*, 20/1/71; C.A.H.

C. phragmitis C. L. Koch (63) Potteric Carr (Low Ellers), in *Glyceria* and *Phragmites* litter, 19/1/71. Denaby Ings abundant in *Glyceria* litter, 26/1/71. Thorne Moors both sexes in abundance in *Phragmites* litter, 20/1/71; C.A.H.

C. neglecta O.P-C. (61) Speeton Cliffs, female, 21/6/71; C.A.H.

C. lutescens Westr. (63) Shirley Pool, male, under bark of dead *Quercus*, 17/7/71; C.A.H.

Xysticus cristatus (Clerck) (61) Speeton Cliffs, male, 12/6/71. (63) Hatfield Moors, in *Phragmites* litter, 5/5/71; C.A.H.

Salticus scenicus (Clerck) (63) Shirley Pool, on fence posts and the bark of old trees, 17/7/71; C.A.H.

S. cingulatus (Panzer) (63) Shirley Pool, on fence posts and the bark of old trees, 17/7/71;C.A.H.

Marpissa pomatia (Walck) (63) Black Pond (map ref SE44.56-03-) male, 30/7/71; P.S. A very exciting record, this species being known only from a handfull of British localities.

Euphris frontalis (Walck) (61) Speeton Cliffs, 21/6/71; C.A.H.

Lycosa agricola Thor. (63) Potteric Carr (Low Ellers), male, in *Glyceria* litter, 10/1/71. Shirley Pool, 17/7/71; C.A.H.

L. nigriceps Thor. (61) Speeton Cliffs, male, 12/6/71; C.A.H.

Pirata piratica (Clerck) (61) Speeton Cliffs, frequent by ponds on the undercliff, 12/6/71; C.A.H.

Textrix denticulata (Oliver) (65) Bishopdale (*c.* 1,800 ft.), their sheet webs forming a conspicuous feature of the dry stone walls and loose rocks, 12/6/71; C.A.H.

Tegenaria agrestis (Walck) (63) Thorne Moors, females under debris on colliery tip. A unicolorous specimen collected 19/9/69 by C.A.H. was determined as this species by D. W. Mackie. An interesting discovery bringing the Yorkshire total to three and indicating that this so called variety could be widespread in South Yorkshire.

T. domestica (Clerck) (62) Newby, in abundance in old shed, -/10/71; C.A.H.
Amarobius atropos (Walck) (65) Bishopdale (*c.* 1,800 ft.) magnificent females in abundance under embedded rocks, 10/7/71; C.A.H.
Ero cambridgei Kulcz. (63) Thorne Moors, female, in *Pteridium* litter, 20/1/71. Potteric Carr (Low Ellers) in *Glyceria*, 10/1/71; C.A.H.
E. furcata (Villers) (63) Thorne Moors, male, in *Pteridium* litter, 20/1/71. Potteric Carr (Low Ellers) in *Glyceria* litter, 10/1/71; C.A.H.
Episinis angulatus (Bf.) (63) Thorne Moors, many of both sexes in *Pteridium* litter, 20/1/71; C.A.H.
Theridium ovatum (Clerck) (63) Arksey Ings, 15/7/71. Shirley Pool, 2/2/71. Potteric Carr (Low Ellers), -/6/71. Sandall Beat Wood, -/6/71. Edlington Wood, -/10/71; C.A.H.

Tetragnatha extensa (Linn.) Shirley Pool, common in tall herbage, 2/7/71; C.A.H.
T. montana Simon (63) Shirley Pool, in beds of *Epilobium hirsutum*, 17/7/71; C.A.H.
Pachignatha clercki Sund. (63) Potteric Carr (Low Ellers) abundant in *Glyceria* and *Phragmites* litter, 10/1/71. Denaby Ings, abundant in *Glyceria* litter, 26/1/71. Sandall Beat Wood, in *Phragmites* litter, -/7/71; C.A.H.
Meta segmentata (Clerck) (61) Speeton Cliffs, one of the only orb web spinners in evidence in this exposed locality, 12/6/71; C.A.H.
M. menardi (Lat.) (63) Sheffield, an interesting record of this cave dwelling species in a cellar, -/7/71; per T. Riley.
Araneus sclopetarius (Clerck) (63) Stainforth, a thriving colony of this rarity under the concrete embankment by the river Don at Stainforth sewage works, -/9/70; C.A.H.
A. umbraticus (Clerck) (63) Arksey Ings, under loose bark of *S. fragilis*, 15/7/71. Potteric Carr (Low Ellers), under bark of *Betula*, 10/1/71; C.A.H. Edlington Wood, -/9/71; B. Lawrence.
A. curcurbitinus (Clerck) (63) Thorne Moors, imm. hibernating in *Sphagnum*, 20/1/71. Shirley Pool, amongst *Quercus* foliage, 17/7/71; C.A.H.
Walckeaenra acuminata Bl. (63) Sandall Beat Wood, male, in leaf litter, 24/1/71; C.A.H.
Trachinella nudipalpis (Westr.) (63) Potteric Carr (Low Ellers), in *Glyceria* litter, 10/1/71; C.A.H.
Cornicularia unicornis O.P.-Camb. (63) Potteric Carr (Low Ellers) in *Glyceria* litter, 10/1/71. Thorne Moors in *Pteridium* and *Eriophoram* litter, 20/1/71; C.A.H.
**C. kochi* (O.P.-C.) (63) Denaby Ings, male, *Glyceria* litter, 26/1/71. An exciting record, this species only previously being recorded from relict Humber head levels areas, the banks of the River Gowy (Cheshire) near the coast in Northumberland and recently from Askham Bog (*Nat.* 1962, 121-124).
Gnathonarium dentatum Wider (63) Potteric Carr (Low Ellers) in *Glyceria* litter, 10/1/71. Denaby Ings, in *Glyceria* litter, 26/1/71. Thorne Moors 2 males, from *Eriophoram* litter, 20/1/71; C.A.H.
Pocadicnemis pumila (Bl.) (63) Potteric Carr, both sexes in *Glyceria* litter, 10/1/71; C.A.H.
Oedothorax retusus (Westr.) (61) Speeton Cliffs, 12/6/71; C.A.H. (63) Potteric Carr (Low Ellers) both sexes in *Glyceria* litter, 10/1/71; C.A.H.
Monocephalus castinapes (Simon) Thorne Moors, males in *Phragmites* and *Eriophorum* litter, 20/1/71; C.A.H.
Savigina frontata Bl. (63) Potteric Carr (Low Ellers) female in *Glyceria* litter, 10/1/71; C.A.H.
Diplocephalus permixtus (O.P.-C.) Potteric Carr (Low Ellers) male in *Glyceria* litter, 10/1/71. Thorne Moors male, in *Eriophorum* litter, 20/1/71; C.A.H.
Drepanotylus uncatus (O.P.-C.) Potteric Carr (Low Ellers), in *Glyceria* litter, 10/1/71; C.A.H.
Porrhoma covexum (Westr.) (63) Potteric Carr (Low Ellers) in *Glyceria* litter, 10/1/71; C.A.H.

Microneta varia (Bl.) (63) Thorne Moors, male, in *Eriophram* litter, 20/1/71; C.A.H.
Centromerus expertus (O.P.-C.) (63) Potteric Carr (Low Ellers) male, in *Glyceria* litter, 10/1/71; C.A.H.
Bathyphantes concolor Wider (63) Potteric Carr (Low Ellers) male, in *Glyceria* litter, 10/1/71; C.A.H.

B. approximatus (O.P.-C.) (63) Potteric Carr (Low Ellers) 4 females, in *Glyceria* litter, 10/7/71; C.A.H.

B. parvulus (Westr.) (63) Potteric Carr (Low Ellers) male, in *Glyceria* litter, 10/7/71; C.A.H.

Lepthyphantes nebulosus (Sund.) (63) Sandall Beat Wood, 24/1/71; Thorne Moors, female, in *Pteridium* litter, 20/1/71; C.A.H.

L. leprosus (Ohert) (63) Thorne Moors, male, in *Pteridium* litter, 20/1/71; C.A.H.

L. minutus (Bl.) (63) Sandall Beat Wood, 24/1/71; C.A.H.

L. zimmermanni Bertkau (61) Speeton Cliffs, 21/1/71; C.A.H. (63) Thorne Moors, male, in *Pteridium* litter, 20/1/71, Sandall Beat Wood, 24/1/71; C.A.H.

Linyphia montana (Clerck) (63) Thorne Moors, many females, in *Deschampsia* and *Phragmites* litter, 20/1/71. Potteric Carr, female, in *Glyceria* litter, 10/1/71; C.A.H.

L. clathrata Sund. (63) Thorne Moors, male, in *Pteridium* litter, 20/1/71.

L. triangularis (Clerck) (63) Potteric Carr, amongst shrubs on railway embankments; C.A.H.

Pseudoscorpions

Neobisium muscorum (Leach) (61) Speeton Cliffs, amongst roots of *Anthyllis vulneraria*, 12/6/71; C.A.H. (63) Thorne Moors, abundant in *Sphagnum* and *Pteridium* litter, 20/1/71; P.S. Sandall Beat Wood, abundant in *Pteridium* litter, 24/1/71; C.A.H.

Cheridium museorum (Leach) (63) Barnby Dun, Two specimens collected by C. J. Devlin from an old taxidermy specimen, -/10/71. This is the first record since Falconer's 1916 review (*Nat.* 1916, 191-193).

Toxochernes panzeri (C. L. Koch) (63) Arksey Ings (map ref. SE44.591066) two females in brood cells under the loose bark of ancient *Salix fragilis*, 15/7/71. Shirley Pool, 10 males collected but many more present under bark of dead oak, many used cocoons also found, 17/7/71; C.A.H.

Plant Galls (T. F. Medd): Only vice-county records which did not appear in last year's report have been included. On the whole, galls have not been any more prevalent than in the previous summer, despite the very mild winter. I am indebted to Miss G. W. Brigham (G.W.B.) and Miss F. E. Crackles (F.E.C.) for their records.

AGENT	*PLANT*
HYMENOPTERA	
Aulacidea hieracii Bouche (62) Strensall Common, Aug/71; G.W.B.	*Hieracium umbellatum* L.
Diplolepis eglanteriae Hartig (62) Overton, 3/9/71	*Rosa canina* L.
Liposthenus latreillei Kieffer (62) Wath Quarry (Y.N.U.) 26/6/71	*Glechoma hederacea* L.
Pontania bridgmanii Cameron (61) Skipwith Common, 24/7/71	*Salix cinerea* L.
ACARINA	
Eriophyes tetanothorax Nalepa (61) Skipwith Common, 24/7/71	*Salix caprea* L. and *Salix cinerea* (ssp. *cinerea*) L.
Steneotarsonemus spinosus Schaarschmidt (61) Leven, June/71; F.E.C.	*Calamagrostis canescens* (Weber) Roth.
FUNGI	
Taphrina deformans (Berkeley) Tulasne (64) Little Ouseburn, 23/5/71	*Prunus* sp.
Albugo candida Person ex S. F. Gray (64) Tadcaster Road, York, 30/10/71	*Capsella bursa-pastoris* (L.) Medic

BOTANY

Plant Records: East Riding (E. Crackles)

There is nothing spectacular to report but the following list of records is the reflection of much continued hard work. The East Yorkshire Flora scheme continues to provide a stimulus; two meetings have been held during the year including an excursion to Rise Park which proved both enjoyable and profitable. I wish to thank Dr. Shimwell for organising these and previous meetings. Dr. Shimwell is leaving Hull in December and we shall miss his invaluable assistance.

Tom Dargie has made two interesting discoveries at Spurn; *Viola tricolor* ssp *curtisii* between the narrow neck and the chalk bank and *Trifolium suffocatum* in the garrison, the latter species being previously recorded only in the warren at Spurn. As *Botrychium lunaria* has gone from all its formerly recorded stations a new record for Thorpe Hall is very welcome. Other rare E. Yorkshire species for which there is at least one additional record include: *Ranunculus parviflorus*, *Ranunculus circinatus*, *Rosa pimpinellifolia*, *Schoenus nigricans*, *Epipactis palustris*, *Carex pseudocyperus*, *C. vesicaria*, *C. pendula* and *Glyceria declinata*.

Other interesting records include *Coronopus didymus* on the Humber bank at Blacktoft, *Iberis amara* along the old railway track near Goodmanham and *Amsinckia intermedia* near Brantingham.

Thanks are due to all who have contributed to this report. The inclusions of a grid-square reference indicates an addition to the distribution of a species as recorded in the *Atlas*, but well distributed species are not included in the report.

Key to contributors: E. Chicken (E.Ch.), Miss E. Crackles (E.C.), T. Dargie (T.D.), J. Gorham (J.G.), T. F. Medd (T.F.M.), D. W. Shimwell (D.W.S.), Miss M. Taylor (M.T.), E. Wear (E.W.)

Asplenium trichomanes L. Bridlington 54/16; M.T.

Botrychium lunaria (L.) Sw. Thorpe Hall 54/16; Hull Nats. Excursion.

Ophioglossum vulgatum L. Sunderlandwick; E.C. Holmpton 54/32 G. Hylands comm. E.C.

Ranunculus arvensis L. Tunstall 54/33; E.W.

Ranunculus parviflorus L. Cliff top, near Hunmanby Gap; Y.N.U. Excursion.

Ranunculus lingua L. East bank of the River Hull at Baswick Steer and near Leven Canal; E.C.

Ranunculus circinatus Sibth. Barmston drain at Aike and at Tophill Low 54/04; E.C. and M.T. Near Burnby 44/84; E.C.

Ranunculus baudotii Godr. Near Hunmanby Gap 54/17; E.Ch.

Papaver lecoqii Lamotte Near Langtoft, Nafferton, Harpham and Kilham 54/06; M.T.

Papaver argemone L. Near Thwing, Rudstone and Nafferton 54/06; M.T. Gravel pit near Burnby; E.W.

Coronopus squamatus (Forsk.) Aschers. Octon 54/06; M.T.

Coronopus didymus (L.) Sm. Humber bank near Blacktoft 44/82; R. Thistleton comm. E.C.

Iberis amara L. Established along railway, near Goodmanham 44/94; E.W.

Cardamine amara L. Asselby Island 44/72; D.W.S.

Rorippa islandica (Oeder) Borbas Kilham 54/06; M.T.

Arabidopsis thaliana (L.) Heynh. Staxton 54/07; M.T.

Descurainia sophia (L.) Webb ex Prantl Staxton 54/07 and Langtoft 54/06; M.T. Burnby 44/84; E.C. and E.W.

Viola tricolor L. ssp. *curtisii* (E. Forst.) Syme Spurn Point 54/41; T.D.

Hypericum humifusum L. Bygot wood 54/04; E.C. and M.T.

Hypericum pulchrum L. Rise Park 54/14; E. Yorks. Flora Excursion.

Stellaria alsine Grimm Great Givendale 44/85 and Filey Cliff 54/17; E.C.

Sagina apetala Ard. Hunmanby Gap 54/17; Y.N.U. Excursion.

Arenaria leptoclados (Reichb.) Guss. North Cave 44/93 and Brantingham 44/92; J.G.

Trifolium medium L. Rise Park 54/14; E.Yorks. Flora Excursion.

Trifolium suffocatum L. In the garrison at Spurn Point 54/31; T.D. Formerly recorded for Kilnsea Warren and still present; B. Spence.

Lotus tenuis Waldst. & Kit. ex Willd. Harpham 54/06; M.T.

Rosa pimpinellifolia L. Old hedge, Sunderlandwick Estate 54/05; E.C.

Parnassia palustris L. Flixton Carrs 54/07; M.T. and E.C.

Epilobium adenocaulon Hausskn. Beverley 54/03; E.C. Naburn Lane, York 44/64; T.F.M.

Epilobium obscurum Schreb. Rise Park 54/14; E. Yorks. Flora Excursion.

Hydrocotyle vulgaris L. Filey cliff 54/17; E.C. and M.T.

Torilis nodosa (L.) Gaertn. Nafferton 54/06; M.T.

Silaum silaus (L.) Schinz & Thell. Burton Fleming 54/07; M.T.

Populus x *canadensis* Moench Asselby Island 44/72; D.W.S.

Calluna vulgaris (L.) Hull Staxton 54/07; M.T.

Erica tetralix L. Staxton 54/07; M.T.

Armeria maritima (Mill.) Willd. Speeton 54/17; Y.N.U. Excursion.

Lysimachia nemorum L. Rise Park 54/14; E. Yorks. Flora Excursion.

Menyanthes trifoliata L. Lowthorpe 54/06; M.T.
Pentaglottis sempervirens (L.) Tausch Hunmanby Gap 54/17; Y.N.U. Excursion.
Amsinckia intermedia Fischer & Meyer Brantingham 44/92; J.G.
Myosotis sylvatica Hoffm. Rise Park 54/14; E. Yorks. Flora Excursion.
Calystegia sepium (L.) R.Br. ssp. *pulchra* Asselby Island 44/72; D.W.S.
Pedicularis palustris L. Flixton Carrs 54/07; M.T.
Galeopsis angustifolia Ehrh. ex Hoffm. Langtoft 54/06; M.T.
Teucrium scorodonia L. Disused Railway line, Wharram 44/86; E.C.
Galium saxatile L. Speeton cliff 54/17; Y.N.U. Excursion.
Viburnum lantana L. Near Fimber 44/96 and 44/95; D.W.S.
Valeriana dioica L. Filey cliff 54/17; E.C. and M.T.
Bidens tripartita L. In cucumber houses at Elloughton 44/92; J.G.
Senecio sylvaticus L. Staxton 54/07; M.T.
Senecio viscosus L. Hunmanby 54/17; E.Ch.
Inula conyza DC. Millington Wold 44/85; E.C.
Anthemis cotula L. Rise Park 54/14; E. Yorks. Flora Excursion.
Serratula tinctoria L. Flixton Carrs 54/07; E.C. and M.T.
Leontodon taraxacoides (Vill.) Merat Langtoft 54/06; M.T.
Picris echioides L. Hunmanby Gap 54/17; Y.N.U. Excursion.
Cicerbita macrophylla (Willd.) Wallr. Goodmanham 44/84: E.C.
Crepis vesicaria L. Naburn Lane, York 44/64; T.F.M.
Crepis paludosa (L.) Moench Lowthorpe 54/06; M.T.
Potamogeton alpinus Balb. Drain, Tophill Low 54/04; E.C.
Epipactis palustris (L.) Crantz Flixton Carrs 54/07; E.C. and M.T.
Ophrys apifera Huds. Near Goodmanham 44/94; E.W. Between Bridlington and Grindale; J. Rushton comm. M.T.
Eriophorum angustifolium Honck. Ganton 44/97; M.T.
Schoenus nigricans L. Fliston Carrs 54/07; M.T.
Carex lepidocarpa Tausch Birdsall 44/86; M.T.
Carex pseudocyperus L. Rise Park 54/14; E. Yorks. Flora Excursion.
Carex rostrata Stokes Flixton Carrs 54/07; M.T.
Carex vesicaria L. Filey cliff 54/17; E.C.
Carex pendula Huds. Jenny Brough Lane, Hessle 44/92; J.G.
Carex pilulifera L. Bygot Wood 54/04; E.C.
Carex elata All. Ellerton Common 44/74; D.W.S.
Carex nigra (L.) Reichard Filey cliff 54/17; E.C.
Carex paniculata L. Lowthorpe 54/06; M.T.
Carex spicata Huds. Harpham 54/06; M.T.
Carex echinata Murr. Lowthorpe 54/06; M.T.
Carex remota L. Asselby Island; D.W.S.
Carex ovalis Gooden. Rise Park 54/14; E. Yorks. Flora Excursion.
Sieglingia decumbens (L.) Bernh. Kilham 54/06; M.T.
Glyceria declinata Breb Routh 54/04 and Great Givendale 44/85; E.C. Octon 54/06; M.T.
Catapodium rigidum (L.) C. E. Hubbard Nafferton 54/06; M.T.
Helictotrichon pratense (L.) Pilg. Nafferton 54/06; M.T.
Aira praecox L. Speeton 54/17; Y.N.U. Excursion.
Calamagrostis epigejos (L.) Roth 54/14; E. Yorks. Flora Excursion.

WEST RIDING (F. Murgatroyd)

Many of the records sent in are from 10 km. squares for which no entry is given in the *Atlas* though the species concerned is frequent to common in the West Riding generally. Such records are entered on record cards for transmission direct to the Biological Records Centre. The species listed below are in nearly all cases those for which the *Atlas* gives records from not more than six squares in the vice-county.

Lycopodium clavatum L. (63) Plantation on former open-cast coal site, High Hoyland; presumably introduced when the trees were planted; D. Grant.
Actaea spicata L. (64) Keld Head Scar, Kingsdale 34/67; Y.N.U. Exc. (*Nat*. 1971, 133). Not previously recorded in the Yorkshire portion of this square.
Ranunculus sceleratus L. (63) Canal, west of Sowerby Bridge 44/02, and bank of R. Ryburn, Sowerby Bridge 44/03; F.M. Also in a field pond at Ogden 44/03 at 1100 ft. O.D.; F.M.
Thalictrum minus L. (63) Mickletown 44/32; E. Thompson and C. Hartley.

Diplotaxis muralis (L.) DC. (64) Grassington railway line 34/96; Miss H. Lefèvre.
Cardaria draba (L.) Desv. (64) Railway sidings, Swindon quarry, near Linton 43/96; Miss H. Lefèvre.
Barbarea verna (Mill.) Aschers. (64) Ditch at Baxter Hill, near Drax 44/62; D. Grant. Only previous record for V.C. 63 is pre-1930.
Hypericum maculatum Crantz (63) Kebroyd, near Ripponden, Halifax 44/02; F.M.
Myosoton aquaticum (L.) Moench. (64) Little Ouseburn 44/46; York & Dist. Field Nats.
Ononis spinosa L. (63) Near Elslack 34/94; J. N. Frankland. Recorded for this square in *Atlas* but very rare in V.C. 63.
Astragalus glycyphyllos L. (63) Loscar Wood near Thorpe Salvin 43/58; D. Grant. Recorded for this square in *Atlas*.
Rubus mucronulatus Bor. (64) Thruscross Lane, Fewston 44/15; F. Houseman.
R. ulmifolius Schott. (64) Mickley near Ripon; F. Houseman.
R. eboracensis W. C. R. Wats. (64) Stutton near Tadcaster 44/44; F. Houseman.
R. laciniatus Willd. (64) Stubbings Field near Otley 44/24; F. Houseman.
R. polyanthemus Lindeb. (64) Near Almscliff Crag 44/24; F. Houseman.
R. rubristylus W. C. R. Wats. (64) Norwood Lane, near Otley 44/25; F. Houseman
(All above Rubi det. A. Newton)
Potentilla crantzii (Crantz) G. Beck ex Fritsch (64) Kingsdale 34/77; Y.N.U. Exc. (*Nat*. 1971, 133).
P. anglica Laichard. (64) Red House Wood 44/55; T. F. Medd. Collected here by me in Aug. 1943 together with the hybrid *P. anglica* × *erecta*; W.A.S.
Crataegus oxyacanthoides Thuill. (63) Little Waite Wood, Dinnington 43/58; D. Grant. No Yorkshire record in *Atlas* but collected by me in June 1947 at South Anston in the same square; W.A.S.
Angelica archangelica L. (63) Mickletown Flash 44/32; R. F. Dickens. Evidently long established in this region, it was collected by me nearby on canal bank, Woodlesford, on 29 July 1924; W.A.S.
Mentha longifolia (L.) Huds. (64) Red House Wood, Moor Monkton 44/55; T. F. Medd.
Nepeta cataria L. (63) Between Darrington and Cridling Stubbs 44/52; S. R. Rowley and J. W. Williams.
Littorella uniflora (L.) Aschers. (63) Ingbirchworth Reservoir; L. Magee. Ryburn Reservoir, Rishworth, Halifax 44/01; F.M.
Asperula cynanchica L. (64) Ledsham 44/42; E. Thompson.
Bidens cernua L. (63) Canal bank near Sowerby Bridge 44/02; D. Grant. Last recorded from this area in 1888.
Inula helenium L. (63) Womersley to Pollington road 44/51; D. Pickup.
Gnaphalium sylvaticum L. (63) Hardcastle Crags 34/92; Y.N.U. Exc.
Picris hieracioides L. (63) Loscar quarry, near Thorpe Salvin 43/58; D. Grant.
Hieracium speluncarum Arv.-Touv. (64) Ilkley 44/14; Mrs. Young per F. Houseman.
H. maculosum (Stenstr.) Omang (64) Limestone pavement, Ribblehead 34/77; F. Houseman. Recorded previously for this square.
H. cymbifolium Purchas (64) Kingsdale and Twistleton Scar 34/77; Y.N.U. Exc. per F. Houseman. Recorded previously for this square.
H. pseudostenstroemii Pugsl. (64) Kingsdale and Twistleton Scar 34/77; Y.N.U. Exc. per F. Houseman. Recorded previously for this square.
H. rubiginosum F. J. Handb. (64) Attermire Scar, Settle 34/86; F. Houseman.
H. decolor (W. R. Linton) A. Ley (64) Attermire Scar 34/86; F. Houseman. Recorded previously for this square.
H. diaphanoides Lindeb. (64) Stutton quarry, Tadcaster; F. Houseman.
H. diaphanum Fr. (64) Monkhill Station 33/42; F. Houseman.
H. strumosum (W. R. Linton) A. Ley (64) Limestone pavement, Ribbleshead 34/77; F. Houseman.
H. vagum Jord. (64) Old railway track, Hunslet, Leeds 44/33; F. Houseman.
All Hieracia det. Dr. J. N. Mills.
Luronium natans (L.) Raf. (63) Canal, Hillhouse, Huddersfield; D. Grant.
Alisma lanceolatum With. (63) Canal, Copley, Halifax 44/02; D. Grant and F.M.
Potamogeton × *cooperi* (Fryer) Fryer (64) Toulson's Lagoon, Otley 44/24; F. Houseman.
Zannichellia palustris L. (63) Mickletown Flashes 44/32; D. Grant.
Allium scorodoprasum L. (64) Ouse bank, Barlow 44/62; D. Grant.
Sparganium angustifolium Michx. (63) Canal, Sowerby Bridge 44/02; D. Grant. Canal, Hebden Bridge 34/92; F.M. No Yorks. record in *Atlas*.
S. emersum Rehm. (63) Old Eye, Birkin 44/52; R. F. Dickens.

Scirpus lacustris L. (64) River Aire, Saltaire 44/13; L. Magee. Seen here prior to 1950 by G. A. Shaw.
Carex pendula Huds. (63) Beeley Wood, Wadsley, Sheffield; D. Grant.
Poa compressa L. (63) Ingrow, Keighley 44/03; D. Grant.
Calamagrostis epigejos (L.) Roth (63) Far Close Wood, Carlton 44/62; D. Grant.
C. canescens (Weber) Roth (63) Wadworth Wood 43/59; D. Grant.

Casuals and Adventives (Mrs. F. Houseman)

Fewer records have been sent for the past year.

The commonest wild oat, *Avena fatua*, which germinates in late spring on arable land of all types is doubtless an introduction with imported cereals, and is causing concern to farmers in Yorkshire and elsewhere. *Avena strigosa* and *A. ludoviciana* are less common, perhaps due to their germinating in winter of early spring.

The following members have contributed: C. and M. Disbrey, Mrs. P. Abbot, F. and R. B. Houseman, T. F. Medd, J. Oxtoby, Miss Taylor and Miss D. Walker.
Papaver lecoqii Lamotte (64) Brook St. car park, Ilkley; F.H.
P. lateritium C. Koch (64) Curly Hill, Ilkley; F. H.
Rapistrum orientale (L.) Crantz (64) On ground owned by NEEB, Harrogate; D.W.
Dianthus sylvestris Wulfen (62) Near Whitby harbour, abundantly escaping on rocks J.O.
Geranium ibericum Cavanilles (64) Railway embankment, Ellar Ghyll, Otley; F.H.
Lathyrus latifolius L. (64) Established on ruin, Thruscross; R.B.H.
Epilobium adenocaulon Hausskn. (61) 44/64 Naburn Lane, York; T.F.M.
E. nerterioides Cunn. (64) Valley of Desolation, Bolton Abbey; C.D.
Astrantia major L. (64) Salt Lake, Ribblehead; F.H.
Heracleum mantegazzianum Somm. & Lev. (62) 44/55 in quantity, Newton on Ouse; T.F.M.
Fagopyrum esculentum Moench (61) 54/06 near Langtoft; Miss Taylor.
Polygonum cuspidatum Sieb. & Zucc. (64) Cleasby Road, Menston; C. Brown per F.H.
Lysimachia punctata L. (64) Roadside, Snowden Moor and Clifton near Otley; and near Kettlesing; F.H.
Calystegia pulchra Brummitt (65) Roadside, West Witton; F.H.
Lycium halimifolium Mill. (64) Wescoe Hill near Otley; wall opposite Traveller's Rest, Killinghall; F.H.
Veronica filiformis Sm. (64) Car park, Kettlewell; F.H. (65) Old rail track, West Tanfield; R.B.H.
Senecio squalidus L. (64) Stutton, near Tadcaster; F.H.
Calendula officinalis L. (61) Roadside, near Huggate; F.H.
Aster longifolius Lam. (64) Roadside, Knaresborough; river bank, Pool Bridge; F.H.
Anthemis tinctoria L. (63) Ainley Top, Huddersfield (1970); M. and C.D.
Cotula coronopifolia L. (63) 44/32 Mickletown Flash; R. F. Dickens.
Centaurea montana L. (64) Pot Bank, Beckwithshaw; F. H.
Polygonatum multiflorum (L.) All. (64) One plant in Gab Wood, Cookridge; P.A. One plant, Toulson's laggons, Otley; F.H.
Bromus inermis Leyss. (61) 44/64 Naburn Lane, York; T.F.M.
Phalaris canariensis L. (61) 54/06 near Langtoft; Miss Taylor (64) Stutton, near Tadcaster; F.H.

BRYOLOGY

The Bryological Section met at Wass Bank in V.C. 62 for its spring meeting, and for its autumn weekend visited Todmorden in V.C. 63 to cover part of the historic ground of John Nowell. Both these meetings are fully reported elsewhere.

Musci (M. Dalby)

In September 1970 Mr. Shaw visited Grimwith Reservoir (V.C. 64) and recorded *Discelium nudum*, *Pseudephemerum nitidum*, *Oligotrichum hercynicum* and *Dicranella rufescens*. In December 1970 he and Mr. Branson refound *Myrinia pulvinata* at Cowthorpe Weir (V.C. 64), in its original station reported by F. A. Lees in the *Flora of the West Riding*, 1888. *Hygroamblystegium fluviatile*, *Tortula latifolia* and *Dicranella schreberana* in fruit were additional finds.

Miss E. M. Lobley and I spent 10 days in North Yorkshire in May 1971, chiefly to work on the grid square recording and the Sphagna. *Sphagnum subsecundum* var. *subsecundum* was found at High Force, Teesdale (V.C. 65), *Encalypta rhabdocarpa* at Kisdon Force (V.C. 65) and *Plagiothecium ruthei* on old mine workings by Cogden Beck near Grinton was a new record for that vice county.

How Stean Gorge, Nidderdale (V.C. 64) produced *Grimmia stirtonii* when visited by Mrs. Gow and Mr. Branson in June 1971, and Miss Robertson found *Thuidium philibertii* in Waldendale during the Y.N.U. visit there in July.

Weissia rostellata and *Ephemerum sessile* which were first recorded for V.C. 64 only last year at Stocks Reservoir by Dr. Duckett, were found at Lindley Reservoir in September 1971 by Mrs. Appleyard and myself. The low water levels of many reservoirs during the last two years have brought many interesting species to light.

Campylopus introflexus has extended its range and has now been found by Mr. J. Verhees at Thorne Moors (V.C. 63).

In addition work on the bryophytes of the Y.N.T. reserves at Littlebeck Wood near Whitby, Adel Dam near Leeds and Ashberry Pastures near Helmsley has been carried out and the Section hopes to survey the Brockadale reserve near Went Bridge in the early spring. Assistance in the Low Ellers and Sandall Beat Wood reserves threatened by a new motorway, and Edlington Wood, Doncaster, threatened by quarrying and building, has been given by the recorder.

HEPATICAE (F. E. Branson)

A fair number of hepatics have been recorded during the year and these have been augmented by the goodly number found during the meeting at Ingleton in September 1970. One of the best finds there was *Barbilophozia atlantica* (Kaal.) K. Mull. in Twistleton Glen, gathered from the trunk of a living tree.

Three vice-county records have to be recorded here:

**Riccia huebenerana* Lindenb. (64) Found by Dr. J. G. Duckett on mud at the edge of Swinsty Reservoir, Washburndale, in 1970.

**Pellia neesiana* (Gottsche) Limpr. (63) Found by Miss M. Dalby, Mrs. Gow and Mr. F. E. Branson in a small quarry, growing on swampy ground, at the roadside near Hippins Bridge at the meeting at Todmorden in September 1971.

Solenostoma levieri* (Steph.) Steph. (65) This species, new to Britain was the subject of an article in *B.B.S. Transactions*, **1970 by Mrs. J. A. Paton. It has been found in two stations in Teesdale, on calcareous soil by path at Cronkley Pastures; J. W. Fitzgerald, Sept. 1958, and on the bank of R. Tees near Holwick Bridge by J. A. Paton, October 1968.

The following list gives the more interesting finds since the last annual report:

Barbilophozia atlantica (Kaal.) K. Mull. (64) Twistleton Glen, Ingleton, Sept. 1970; F.E.B.

Porella laevigata (Schrad.) Lindb. (65) Back Gill, Bishopdale, July 1971; M. Dalby.

Trichocolea tomentella (Ehrh.) Dum. (62) Riccalldale and Fen Bog, May 1971; E. M. Lobley and M. Dalby.

Tritomaria exsectiformis (Breidl.) Schiffn. (62) Bransdale, May 1971; E. M. Lobley and M. Dalby.

Plectocolea hyalina (Lyell ex Hook.) Mitt. (62) Lythe Burn, Grosmont, May 1971; E. M. Lobley and M. Dalby.

Plectocolea obovata (Nees.) Mitt. (62) Lythe Burn, Grosmont, May 1971; E. M. Lobley and M. Dalby.

Radula complanata (L.) Dum. (62) On ash, Ashberry Pastures, Rievaulx, July 1971; M. Dalby.

Riccia sorocarpa Bisch. (64) Margin of Lindley reservoir, Washburndale, Sept. 1971; G. A. Shaw.

Fossombronia wondraczekii (Corda) Dum. (64) Margin of Lindley reservoir, Washburndale, Sept. 1971; G. A. Shaw.

Pedinophyllum interruptum (Nees) Lindb. (64) Swilla Glen, Ingleton, Sept, 1970; M. Dalby and W. M. Gow.

Lejeunea ulicina (Tayl.) Tayl. (64) Swilla Glen, Ingleton, Sept. 1970; W. M. Gow.

Marchesinia mackaii (Hook.) Gray (64) Swilla Glen, Ingleton, Sept. 1970; M. Dalby and W. M. Gow.

Cololejeunea calcarea (Lib.) Schiffn. (64) Swilla Glen, Ingleton, Sept. 1970; F.E.B.

Metzgeria conjugata Lindb. (64) Swilla Glen, Ingleton, Sept. 1970; M. Dalby.

Blepharostoma trichophyllum (Dum.) Dum. (64) Twistleton Glen, Ingleton, Sept. 1970; M. Dalby.

THE YORKSHIRE

Profit & Loss Account

£ s. d.		£ p	£ p
	GENERAL PRINTING		
	Circulars and Members Cards	85.80	
	Sundries	23.88	
199 13 7			109.68
	The Naturalist	1,076.71	
	Less Sales to non-members	239.00	
782 0 9			837.71
92 3 9	Newsletter		146.66
81 13 3	Officers Expenses and Postages		132.91
16 16 8	Duplicating and Stationery		14.08
12 16 2	Bank Charges		14.45
10 0 0	Subscriptions and Donations		5.00
	Hire of Films		5.74
17 15 0	Yorkshire Show Exhibition		
474 7 6	Surplus		548.32
£1.687 6 8			£1.814.55

Balance Sheet as at

£ s. d.		£ p	£ p
	ACCUMULATED FUNDS GENERAL		
	Booth Fund	100.00	
	Cheesman Fund	100.00	
	R. C. Fowler Jones Legacy	250.00	
	E. G. Bayford Legacy	100.00	
	R. Chislett Legacy	500.00	
	Anonymous Fund	250.00	
1,300 0 0			1,300.00
	MYCOLOGICAL FUND		
	Balance brought forward	176.55	
	Add Sales Cortinarius	2.42	
176 10 11			178.97
1,147 6 0	ORNITHOLOGICAL FUND CAPITAL		1,147.30
	ORNITHOLOGICAL FUND REVENUE		
	Balance brought forward	184.10	
	Interest on Investments	66.00	
309 2 1			250.10
	LIFE MEMBERS ACCOUNT		
	Balance brought forward	117.75	
	Less transfer to Subscription Account	15.00	
77 15 0			102.75
	SUNDRY CREDITORS		
	Courier Printers *The Naturalist*		
	Sundries		
247 17 7			
	PROFIT AND LOSS ACCOUNT		
1,261 17 11	Balance brought forward	1,261.89	
	Add Profit	548.32	
	Add Decimalisation adjustment	.01	
			1,810.22
£4,520 9 6			£4,789.34

NATURALISTS' UNION

September 30th, 1971

£ s. d.		£ p	£ p
1,229 19 6	Subscriptions and Donations		1,310.21
15 0 0	Life Members		15.00
222 19 7	Income Tax refund on Covenants		226.60
158 19 8	Interest and Dividends		170.90
	Sale of Publications	114.34	
	Less purchase of *Naturalists' Yorkshire*	22.50	
60 7 11			91.84
£1,687 6 8			£1,814.55

AUDITORS' REPORT

We have audited the foregoing Income and Expenditure Account and Balance Sheet of the Yorkshire Naturalists' Union with the books, records and vouchers submitted to us and certify the same to be in accordance therewith and with the information and explanations we have received.

WHITHAM, SMITH, MITCHELL & CO.,
4-6 Harrison Road,
Halifax.

September 30th, 1971

£ s. d.		£ p	£ p
	INVESTMENT AT COST		
	ORNITHOLOGICAL ACCOUNT		
	Nicholas Fund 3% Br. Transport	100.00	
	Chislett Legacy		
	1600 Treasury Stk. 5½% 2008/12	545.45	
	£600 Treasury Stk. 5% 86/89	501.85	
			1,147.30
	GENERAL ACCOUNT		
	Booth Fund 3½% Conversion Stock	100.00	
	Cheesman Fund 3½% War Stock	100.00	
	4% Consols (B of E)	200.00	
	4% Consols (P.O.)	159.55	
	£386 5½% Treasury Stock 2008/12	250.00	
	300 Unilever Ordinary Shares	522.07	
	250 Shell Transport Ordinary Shares	511.35	
			1,842.97
			2,990.27
	Less Reserve for Depreciation	235.00	
2,755 5 5			2,755.27
	BANK ACCOUNTS		
	York County T.S.B.	523.16	
	Nat. West. Bank Current A/c.	677.67	
	Nat. West. Bank Deposit A/c.	743.41	
1,444 18 2			1,944.24
	SUNDRY DEBTORS		
	Accrued Interest	35.50	
	Tax repayable on Dividends	54.33	
320 5 11			89.83
£4,520 9 6			£4,789.34

THE YORKSHIRE NATURALISTS' UNION

Profit & Loss Account September 30th, 1971

£ s. d.		£ p	£ p
	General Printing		
	Circulars and Members Cards	85.80	
	Sundries	23.88	
199 13 7			109.68
	The Naturalist	1,076.71	
	Less Sales to non-members	239.00	
782 0 9			837.71
92 3 9	Newsletter		146.66
81 13 3	Officers Expenses and Postages		132.91
16 16 8	Duplicating and Stationery		14.08
12 16 2	Bank Charges		14 45
10 0 0	Subscriptions and Donations		5.00
	Hire of Films		5.74
17 15 0	Yorkshire Show Exhibition		
474 7 6	Surplus		548.32
£1,687 6 8			£1,814.55

£ s. d.		£ p	£ p
1,229 19 6	Subscriptions and Donations		1,310.21
15 0 0	Life Members		15.00
222 19 7	Income Tax refund on Covenants		226.60
158 19 8	Interest and Dividends		170.90
	Sale of Publications	114.34	
	Less purchase of *Naturalists' Yorkshire*	22.50	
60 7 11			91.84
£1,687 6 8			£1,814.55

Auditors' Report

We have audited the foregoing Income and Expenditure Account and Balance Sheet of the Yorkshire Naturalists' Union with the books, records and vouchers submitted to us and certify the same to be in accordance therewith and with the information and explanations we have received.

WHITHAM, SMITH, MITCHELL & CO.,
4-6 Harrison Road,
Halifax.

Balance Sheet as at September 30th, 1971

£ s. d.		£ p	£ p
	Accumulated Funds General		
	Booth Fund	100.00	
	Cheesman Fund	100.00	
	R. C. Fowler Jones Legacy	250.00	
	E. G. Bayford Legacy	100.00	
	R. Chislett Legacy	500.00	
	Anonymous Fund	250.00	
1,300 0 0			1,300.00
	Mycological Fund		
	Balance brought forward	176.55	
	Add Sales Cortinarius	2.42	
176 10 11			178.97
1,147 6 0	Ornithological Fund Capital		1,147.30
	Ornithological Fund Revenue		
	Balance brought forward	184.10	
	Interest on Investments	66.00	
309 2 1			250.10
	Life Members Account		
	Balance brought forward	117.75	
	Less transfer to Subscription Account	15.00	
77 15 0			102.75
	Sundry Creditors		
	Courier Printers *The Naturalist*		
	Sundries		
247 17 7			
	Profit and Loss Account		
1,261 17 11	Balance brought forward	1,261.89	
	Add Profit	548.32	
	Add Decimalisation adjustment	.01	
			1,810.22
£4,520 9 6			£4,789.34

£ s. d.		£ p	£ p
	Investment at Cost		
	Ornithological Account		
	Nicholas Fund 3% Br. Transport	100.00	
	Chislett Legacy		
	1600 Treasury Stk. 5½% 2008/12	545.45	
	£600 Treasury Stk. 5% 86/89	501.85	
			1,147.30
	General Account		
	Booth Fund 3½% Conversion Stock	100.00	
	Cheesman Fund 3½% War Stock	100.00	
	4% Consols (B of E)	200.00	
	4% Consols (P.O.)	159.55	
	£386 5½% Treasury Stock 2008/12	250.00	
	300 Unilever Ordinary Shares	522.07	
	250 Shell Transport Ordinary Shares	511.35	
			1,842.97
			2,990.27
	Less Reserve for Depreciation	235.00	
2,755 5 5			2,755.27
	Bank Accounts		
	York County T.S.B.	523.16	
	Nat. West. Bank Current A/c.	677.67	
	Nat. West. Bank Deposit A/c.	743.41	
1,444 18 2			1,944.24
	Sundry Debtors		
	Accrued Interest	35.50	
	Tax repayable on Dividends	54.33	
320 5 11			89.83
£4,520 9 6			£4,789.34

SPRING FORAY, GRASSINGTON May 7th-10th 1971

W. G. BRAMLEY

The Mycological Section once more was favoured by the weather though somewhat cold and occasionally overcast, and we managed to be under cover at Bolton Abbey during a sharpish "lamb storm".

Both sides of the river were explored from the Strid downstream to the Abbey, but fungi were not very plentiful. The best find was *Conocybe aporus* listed for the first time from Britain, although Dr. Watling has collected it previously on several forays, particularly in the Grassington area. *Nectria purtonii* on Bird Cherry was hardly mature and was finally determined by Dr. C. Booth of C.M.I.

A pair of Pied Flycatchers gave pleasure to two or three of us, whilst the crossing of two bridges to get back to the cars provided some acrobatics.

Grass Woods proved to be very dry, but it was interesting to find Morels in the same place as on our last visit in 1961. At lunch time ornithology took over for a spell watching the antics of tits and finches, one of the former finally being enticed to feed on an outstretched hand.

The final excursion to Intake Plantation and Barden Tower was not any more rewarding, but the former provided its usual crop of *Vibrissea truncorum* as well as *Mitrula paludosa* in excellent condition. Once again a search for *Godronia urceola* proved abortive and there did not appear to be as many Blackcurrant bushes as on previous occasions. *Botrytis globosa* usually found on the lamina of the leaves was scarce in this position but was quite frequent towards the base of the stalk.

B = Bolton Abbey
BT = Barden Tower
G = Grass Woods
I = Intake Plantation

DISCOMYCETES (W.G.B.)

Dasyscypha acuum on *Pinus* needles, I.
Helotium clavus, I.
Micropodia pteridinus, B. G.
Mitrula paludosa, I.
Morchella vulgaris, G.
Vibrissea truncorum, I.

AGARICALES (R.W.)

Conocybe aporus Kits van Waveren, B. BT.
Coprinus miser, G.
C. patouillardii, G.
C. vermiculifera Joss. ex Dennis, G.
Pleurotus conucopiae on *Fraxinus*, BT.
Pseudohiatula tenacella

OTHER BASIDIOMYCETES (R.W.)

Peniophora cremea, BT.
Tremella foliacea on *Sorbus*, I.

A Guide to the Lichenological Collection of Thomas Hebden (1849-1931) by **M. R. D. Seaward**. Pp. 17, published by The Borough of Keighley Art Gallery and Museum, Cliffe Castle, Keighley, 1971. 16p (incl. postage).

Thomas Hebden was a Keighley man who earned an international reputation as a lichenologist. On his death, his extensive collections of herbarium material, drawings, manuscripts and books were left to the Keighley Museum. In this publication Mr. Seaward gives an account of the Hebden collection with special emphasis on the specimens — upwards of 70 taxa — gathered in the Keighley area. For these full data as to origin with grid references and, where necessary, revised nomenclature and corrected determinations are given. Other Yorkshire and British gatherings and specimens of foreign origin are dealt with briefly without identifications but with indications as to the numbers of packets from each source; a very necessary compression since the total number of packets in the collection amounts to over 3,400. Lists of Hebden's books, drawings, reprints, etc., complete the account.

This is an important collection which no serious student of Yorkshire lichens can afford to ignore and Mr. Seaward has done a useful job in making a knowledge of its contents more easily available. The authorities of the Keighley Museum are also to be congratulated upon the attractive way in which the guide has been produced.

BOOK REVIEWS

The Mole by **Kenneth Mellanby**, a monograph in the *New Naturalist* series. Pp. 159 with 18 photographs and 35 text figs. Collins, 1971. £2.00.

By reason of its habits the Mole is a difficult animal to study and Dr. Mellanby has had no easy task in investigating this highly specialised subterranean species nor does the ultimate text under such circumstances ever give much indication of the actual time spent on the project. This is an account of the Mole's world, where and how it lives, with especial reference to its environment, territory, and its place in nature as prey and predator, as friend and foe of Man and its control in this capacity by various kinds of traps and repellants. As well as providing a fund of information about the Mole, the author also emphasises the gaps in our present knowledge where more work is required — a vitally important section in any study — and collates useful historical records of various kinds as well as observations of other recent workers. As an account of the present state of knowledge of this species the book is of interest both to professional and amateur naturalists and it should stimulate effort towards the additional work so obviously needing to be done.

The illustrations are clear and the plates add considerably to the value of this book. E.H.

Sea and Island Birds, catalogue no. Red 100M, B.B.C. Radio Enterprises, London, 1971. 33½ r.p.m.

Technically this new record is of the high standard we have learned to expect from this series, and the introductions by Eric Simms are crisp, concise and clear. In addition to the birds, the grey seal, an animal already heard on two of the records that I have previously reviewed, has its place on this disc; the last band being devoted to a large range of sounds from its repertoire.

To an island lover like myself the bird calls recorded bring back memories of lonely places; Hascosay, Eynhallow, Handa and the Isle of May, their very names reminding one of the sea's sound and long days in lonely places. It is this evocativeness that is one of the greatest attractions of the record, and anyone who has heard the rush of a Great Skua's wings as the bird passed them too close for comfort, or the whining call of black Guillimots on the rocks of a northern shore, or even the rustling crackle of a Golden Eye's flight at Gowthwaite, should enjoy it.

In addition to the true birds of the sea there are recordings of the voices of many ducks, geese, grebes and the Red-necked Phalarope. One sequence I like is of the Black-throated divers twanging calls with a piping Common Sandpiper in the distance, and once again I noticed the similarity of some of the notes made by demonstrating Arctic Skuas to those of a small Kittiwake group.

I have not been able to find a price on the record submitted for review, probably as a result of the Price Maintenance Act, but previous ones have been £1.08. At that figure this disc is good value. A.G.

Uganda Quest by **Ernest Neal.** Pp. 128, with 44 coloured photographs. Collins. £2.25.

Ernest Neal became a well-known name in natural history circles as a result of his brilliant book, *The Badger*. In this book the same intensity of investigation and the same quality of interpretation occur, though this time the subject is the Queen Elizabeth National Park in Uganda, with particular emphasis on the smaller carnivorous mammals.

In four months the author absorbed enough of the atmosphere and ecology of this Ugandan paradise to produce a most interesting book and a concise study of one species, the Banded Mongoose. His text and photographs range from flowers to insects and on to birds and the large mammals whose names are synonymous with the African scene, but nowhere are hackneyed themes repeated. Books on African wildlife appear with great regularity and television has many happy hunting grounds in that continent but Ernest Neal's view is a fresh one to say the least.

It is to be hoped that the price of the book does not deter prospective purchasers, or that the rather trite title lead people into thinking that this is just another safari adventure. In defence of the price one can point to the lavish use of colour illustrations and the fact that these are of high quality. Collins, the publishers, deserve praise for their production and not least for the illustrations — the view that foreign work is best dies hard in this field.

T.M.C.

Ecology of Estuaries by **Donald S. McLusky.** Pp. 144, with eight black and white photographs and 55 text figures. Heinemann Educational Books Ltd., 1971. £1.60.

This book is intended for sixth-form students and those in the early stages of University education. For these, and to a certain extent for a wider readership, it fills a hitherto vacant niche in ecological literature.

Estuaries are dealt with as habitats and the relevant physical, chemical and hydrobiological factors are examined and lucidly explained. In many works on littoral affairs estuaries tend to be casually treated, usually as extensions of sandy or muddy shores, and this book could well introduce many people to estuaries as a habitat form which, in some areas, may be the nearest thing to truly "wild" country. To take just two of the subjects treated, sediments and salinity, these are the very essence of estuaries; the factors whose fluctuations and variation make the Wash differ from the Solway, the Dee from the Forth, and give the British coastline much of its character.

Some knowledge of estuarine faunas and their composition would benefit all estuary users, whether these be birdwatchers, fishermen or the borough engineers of estuary-sited towns and cities. The pecking rates of Redshank feeding on *Corophium volutator* (an amphipod) at different temperatures may be largely of academic interest; the survival of our estuaries in the face of pollution and other threats is of more general concern. Dr. McLusky sums up the position of estuaries and mankind in a very succinct manner; one has only to read the daily papers to realise how many threats are posed by the various barrage, reclamation, airport building and other schemes which are mooted each year. To counter these threats education and information are both necessary and this book contributes to both in a scholarly way. Seven of the ten largest cities of the world are situated adjacent to estuaries: can we be surprised when the author quotes "the estuary has become the septic tank of the megalopolis". T.M.C.

Fishes of the Sea by **John** and **Gillian Lythgoe.** Pp. 320, with 137 colour and 75 black and white photographs. Blandford, 1971. £3.00.

This book attempts to appeal to the widest possible public. On the one hand it is a picture book which will give pleasure to many, on the other it attempts an authoritative coverage of the fishes of the coasts of Europe including the Mediterranean. One of its objects is to provide a reference book for skin divers who see so many fish that they cannot identify, but the inclusion of so many other forms is clearly an attempt to capture the sea angling and naturalist markets. Whether it is possible for a book on fishes in such a vast area to succeed in being all things to all men is questionable.

The generous collection of colour photographs is however, most welcome. Too many books on fishes have used and reused the same illustrations in the past and to see live fish photographed in their life colours is a refreshing change. Most of the pictures are taken underwater and the photographers deserve the credit that the authors give for their skill, patience and not a little courage in obtaining such excellent pictures.

The text attempts to survey the inshore fishes of the whole European coastline. Most of the species are illustrated by outline sketches and characteristic identifying features are given with each figure. These are needed for the sketches are so crude, and not infrequently inaccurate, that they serve only to give a general impression of the shape of the fish and its obvious markings. The text for each species gives notes on general distribution, a description of the fish, and its biology. To try to compress so much into an average of 200 words for each species would be a major feat and it is possibly the cause of a number of the inaccuracies and errors which marr this book.

In justification of this statement pages 286-7 concerning the marine bullheads or sculpins (family Cottidae) and the hooknose or pogge (Agonidae) may be cited. Here *Oncocottus* is spelled *Onocottus* (although correct on the next page), *Agonus* is spelled *Agonos*, and the Norway bullhead *Taurulus lilljeborgi* is compared with its relative *Myoxocephalus bubalis* which on the page before is named as *Taurulus bubalis*. Perhaps correct scientific names are not of high importance to the likely users of the book, but inconsistencies and inaccuracies of this magnitude will only lead to confusion. One might expect distributional data to be more accurate. But here we have the Norway bullhead occurring only on the west coast of Scandinavia to West Iceland and the Irish Sea, whereas it has been known for many years from off southern Ireland and north-west Scotland in addition. The four-horned sculpin (*Oncocottus quadricornis*) is also said to occur on all coasts of the northern hemisphere northwards of Denmark whereas as a coastal fish it does not occur south of the Arctic Ocean. Such erros are avoidable in view of the availability of recent literature on European fishes and this sample is not atypical of the book as a whole. A.C.W.

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of Natural History for the North of England

Edited by
W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

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The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and November. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of Broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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THE BREEDING POPULATION OF THE OYSTERCATCHER IN NORTHERN ENGLAND, 1971

M. E. Greenhalgh

In a recent paper Dickens (1969) suggested that an up-to-date survey was needed of the breeding population of Oystercatchers *Haematopus ostralegus* in Yorkshire. Some previous censuses have been published from northern England: Buxton (1962) for the years 1958—59, Dare (1966) for the years 1960—65, and Greenhalgh (1969) dealing with an area of north-west England for the years up to 1968. These showed that an increase of the inland Oystercatcher population, begun in the 1880s, was still taking place into the 1960s. To try to assess whether the inland population was still increasing and how the coastal breeders were faring I decided to organise as complete a census as possible of the breeding Oystercatchers in northern England in 1971.

A duplicated questionnaire was produced asking observers to give all necessary relevant information: number of pairs, location, height above sea-level, habitat, distance from river or sea and evidence of breeding. It was felt that by asking for several pieces of information regarding location there would be less likelihood of duplication as each pair or group of pairs could be pin-pointed accurately on the map. About eighty questionnaires were distributed and just under half returned. These dealt mainly with areas outside the part of north-west England which I had previously censused, this area being counted by me in 1971. For a few stretches of river no questionnaires were returned. For some of these I had to fall back on previous years (1969-70) observations of my own or local bird reports. For the Rivers Lyne and Breamish I have had to incorporate the results of Dare's census in the calculation of total population.

COASTAL POPULATION

Yorkshire 9 pairs. Dare mentioned 1-2 pairs at Spurn and a pair in 1961 at Sunk Island as being the only Humber breeders. In 1966 six pairs nested between Easington and E. Hull (Yorkshire Bird Report) whilst in 1971 at least eight pairs bred between Spurn and Hull. A pair nested on the south of the Tees Estuary in 1971.

Durham 2 pairs. Both were in the Teesmouth area.

Northumberland 36 pairs. Though Dare reported 30-40 pairs from the Farnes, only 13 pairs bred there in 1971. A pair nested on Holy Island and 22 pairs along the mainland coast between Berwick-upon-Tweed and Tynemouth.

Cumberland 356 pairs. This total is near the minimum obtained by Dare's survey (350-450 pairs): Rockcliffe 67. Moricambe Bay area 46, Grune Point to Maryport 20, Maryport to Whitehaven 2, St. Bees to Ravenglass 36, Ravenglass and Esk Estuary about 100, Esk to Duddon Estuary 85.

Lancashire and Westmorland 159 pairs. Morecambe Bay (Walney Island to Wyre Estuary) 124, Fylde Coast nil, Ribble Estuary 18, S.W. Lancashire dunes 3, Mersey Estuary 4. Oystercatchers have been spreading on to the mosses behind the shore in S.W. Lancashire. In 1971 breeding occurred on Sollom Moss, Martin Mere (2 pairs), Mere Brow, Plex Moss, Formby Moss, at Altcar, Kirkby and, to the north of the Ribble, Marton Moss.

Dare estimated 125-190 pairs and Greenhalgh 172 pairs for the Lancashire coast.

Cheshire 16 pairs. These excluded Mersey Estuary birds which have been included with Lancashire. All nested around the Dee Estuary, including the Flintshire side.

Adding all the county totals together, a total of 577 pairs is arrived at. This is within Dare's range of 530-725 pairs for the same region for the years 1960-65, but includes some very interesting increases and decreases.

Oystercatchers are increasing very slowly on the Humber, Tees, Ribble, Mersey and Dee Estuaries and on coastal farmland in Lancashire and to a lesser extent in Cumberland and Northumberland. The record of a pair nesting near Hart Reservoir, Durham, suggests that this behaviour may become regular elsewhere. Possibly these increases are due to birds leaving disturbed areas and settling on the quieter adjacent habitats.

Oystercatchers are decreasing in the dune areas of S.W. Lancashire (Dare noted 10-25 pairs there in the early 1960's, but in 1971 there were only three), have become extinct on the Fylde beaches, and decreased around the Lune Estuary of Morecambe Bay. Destruction of habitat and a rapid increase in disturbance over the past ten years have seriously affected the shore-breeding Ringed Plover *Charadrius hiaticula* and terns in these areas, as well as Oystercatchers. It seems likely that all these will decrease in other similar areas (e.g. between Duddon Estuary and St. Bees, and in Northumberland) as pressure from tourism increases.

A very marked decrease is from the Farnes. N. Brown, in his report, noted that the increasing gulls take the eggs or young of this species, and that some pairs on Inner Farne and Staple lose occasional clutches due to tourist disturbance.

INLAND POPULATION

YORKSHIRE DALES at least 82 pairs. Airedale 18, Nidderdale 1, Wensleydale 19, Swaledale 31, Wharfedale 12, Ryedale 1. This is an increase over Dare's 45-80 pairs for the Dales. There seems to be a tendency for a spread further eastwards, out of the Dales: in 1969 I found a pair nesting near the Ouse at Poppleton which was probably an outlier from the Dales, as was a pair at Wetherby in 1971.

RIBBLE 52 pairs. R. Ribble from Ribblehead to Elston 35 pairs. R. Hodder 16 pairs (this included a pair on the R. Whitendale, a branch of the Hodder). R. Calder a pair nested in 1970 at Altham.

This is an increase over Dare's estimate of 30-50 pairs.

WYRE 4 pairs. Dare gave 5-10 pairs for this river, but certainly never more than 5 actually nested here.

LUNE 69 pairs. R. Lune from Tebay to Halton 52 pairs. Tributaries: Rawthey 2 at confluence with Lune, Greta 3, Wenning 6. At Killington Reservoir 6 pairs. This is an increase over Dare's estimate of 40-60 pairs.

DERWENT 2 pairs. Single pairs as Isel and Lamplugh (about 6 miles south of river). Oystercatchers nested at Bassenthwaite in 1954.

LEVEN 1 pair. This was close to the source of Windermere Lake.

EDEN (Survey not complete, involving some estimates.) 133 pairs. R. Eden—a sample showed just over one pair per mile from just above Carlisle, whilst between Appleby and Kirkby Stephen 12 pairs bred. These would suggest a total for the whole main river of c.65 pairs.

Tributaries: Irthing 35, Eaumont 5, Leith 2, Lyrennet 4, Petteril 6, Helmbeck 4, Swindale Beck 6, Slandale Beck 1, Belah Beck 4, Cote House 1. For this river system Dare estimated 70-120 pairs.

ALN 2 pairs. Two pairs were reported here in 1958.

COQUET 85 pairs. Nesting from just below the source in the Cheviots to Felton.

WANSBECK 1 pair in 1971; no previous record.

TYNE about 85 pairs. Though not censused completely in 1971, I visited this river system in 1969 and obtained the following totals:

South Tyne 60 pairs. Nesting from Garrigill to the confluence with the North Tyne at Warden, then along the main river eastwards to near Prudhoe.

North Tyne and its tributaries (mainly R. Rede to Spithopehaugh) 25 pairs.

TEES 7 pairs. Nesting recorded from a gravel pit near Darlington since 1969. Above Barnard Castle 6 pairs bred in 1971.

The Rivers Lynne and Breamish were not visited in 1971 for this survey. Dare estimated 10-20 pairs for each of them in 1960-65 and I have used these in calculations of the total inland Oystercatcher in 1971.

The total inland breeding population of Oystercatchers in northern England in 1971 was at least 560 pairs, higher than Dare's 303-505. This survey has illustrated that Oystercatchers are slowly filling-in gaps in the distribution as described by Dare and Buxton, as well as a spread to new tributaries and rivers. They are spreading eastwards along the river systems which flow to the North Sea — the Tees, Tyne and Yorkshire Dales — and southwards. Oystercatchers have now nested inland as far south as Nottinghamshire, Staffordshire and Leicestershire, and have summered in Warwickshire (Dobbs 1970) and the Goyt Valley, Derbyshire (in Buxton 1962).

Conclusions

The population of Oystercatchers in the seven counties constituting northern England was about 1,150 pairs, divided almost evenly between coastal and inland nesters. Dare's (1966) population range for the same counties in 1960-65 was 833-1,230. However, Oystercatchers on the coast are decreasing in several areas, though increasing in estuarine habitats and on farmland near the coast. Inland the population, which has been increasing since 1880, is still slowly increasing. It seems likely that these trends will continue during the next few years: a decrease on some coasts due to development and disturbance; an increase on coastal farmland and saltmarsh breeders; an increase of density and range of inland breeders. A full census ten years hence will be of great interest.

Acknowledgements

I am grateful to all those who spent much time counting and organising counts of Oystercatchers and sending me their results. I am also grateful for the interest and encouragement which Dr. Peter Dare of the M.A.F.F. has taken in my study of Oystercatchers and other waders. His large paper, referred to often in the text, provides the basis of any future population survey of this species in Britain.

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BOWLAND SIKA DEER: OBSERVATIONS ON A FERAL POPULATION

W. R. Mitchell and J. Robinson

A colony of Sika Deer (*Cervus nippon*) numbering about 70 beasts occupies the Ribble Valley between Gisburn and Sawley. The range extends up some of the tributary gills and across to the upper Hodder valley. The colonial status has been notable for the past 60-65 years. It is unlikely that there has been any fresh sikine blood introduced into the Bowland population. A Lune Valley stock of Sika Deer is believed to have become extinct, though not before a Sika stag from here, moving northwards, bred with red hinds in the Furness area of the Lake District, as recorded by P. Delap ("Hybridisation of the Red and Sika Deer in North-West England" *Deer*, 1-131, 1967). The nearest stock of Sika Deer consists of Japanese Sika (*Cervus nippon nippon*) formerly emparked at Allerton near Knaresborough and now at liberty.

The only other deer in the Bowland area are a few Roe, probably from the Lune valley stock, which venture as far as the upper stretches of Gisburn Forest in the upper Hodder, also occasionally into the Keasden and Giggleswick areas. A small herd of Red Deer is also kept at a farm near Hellifield, from which—in times past—stags have been known to prospect lower down the Ribble valley during the early stages of the rut.

We are at present trying to determine the sub-species of the Bowland Sika. Meanwhile, it is possible to state that they are not pure Japanese Sika, which is the commonest type in Britain. This type is believed to have been initially introduced into the Gisburn area for sport, the introduction taking place in the first decade of this century. Not being considered fleet-footed enough for the buckhounds, the Japanese Sika were augmented by a few Manchurian Sika (*Cervus nippon manchuricus*), and subsequently the Manchurian characteristics became strong. The Bowland stag, for instance, stands 3ft. 6in. at the shoulder, compared with an advantage of about 32in. for pure Japanese Sika. The velvet of the Bowland Sika is dark apricot, compared with the jet black of the typical Japanese type.

A further important basic fact about the Bowland Sika is that these beasts inhabit a countryside which, generally, is well farmed, though with abundant wooded gills, small woods and plantations, to provide the necessary cover. The deer are conditioned to the presence of man. It has been possible for farmers driving tractors or land rovers to approach within a few yards of wintering groups. Bowland Sika are far from being daytime recluses. While preferring to lie up in cover during the day, emerging to feed at dusk, they have been seen in the open at all times of the day and in all seasons of the year. In good weather some will lie on rough grazings, using banks or tufts of rushes as cover.

A considerable portion of the deer range consists of poor, acidic and ill-drained land. There has been no significant extension of the range in recent times, an indication that the Bowland deer are poor colonists. This is further borne out by the fact that although there have been stags in the 30,000 acre Gisburn Forest, on the catchment area of Stocks Reservoir, for many years, hinds have rarely been seen. Breeding here has not been proved.

In the past, the sikine population has been controlled by occasional culling on behalf of the several major local landowners. Public access to the deer range is limited; permission is invariably needed in advance of a visit.

1. Herd Structure and Movement

(a) *Hinds*. They occupy specific hind country. During the rut the hind areas are shared with the immigrant stags. In late May, mature hinds solitarily seek out secluded areas for calving, often returning to the places where calving took place in previous years. Most of the calves are dropped towards the end of May and into June, but July calving is not rare. There is a gradual build-up of hind groups in August and September ready for the rut. Hinds remain in herds, which are sometimes in excess of 12 beasts, until late May, when the groups once again break up for calving.

A hind party might include one or more knobbers (yearling stags), possibly a six-pointer, and is generally under the influence of an oldish hind. This hind is the most attentive of the group and is the first to take flight. In woodland the disturbance of a hind party is usually signified by the alarm squeal of the old hind. If the cause of the alarm has not been readily detected, squealing can continue, at intervals of several seconds, for minutes on end. Then the dominant female will lead the group away. In open country, where the cause of disturbance is more readily seen, little squealing is heard.

Alarmed hinds stand attentive and tend to bunch, with the dominant female taking a few stiff-legged movements towards the intruder, before bounding away, with caudal white spreading. The departure of a group of hinds is generally in line-ahead formation. Any young stags in the party respond instantly to the dominant female and usually take up a late position in the departing group. A bouncing movement is frequently seen when hinds have been alarmed, but not sufficiently to cause them to retreat at speed. The legs are kept stiff, all four touching the ground at the same time before another upward spring takes place. It is presumably a way of releasing surplus nervous energy. During the rut, the master stag invariably takes up the position of rearguard when a group of deer are moving away under stress.

A feature commonly seen in Bowland outside the calving and rutting seasons is what we have termed the "Bowland threesome"—a hind with her calf of the year and the offspring of the year before. It seems apparent that a calf runs with its parent until almost the point of the parent's calving, and that a reunion takes place when the new calf is strong enough to follow the parent.

(b) *Stags*. In a prolonged rutting season the stags can be seen running with hinds until into the New Year. In the depth of winter, stags are generally in small, all-male groups at the periphery of the range. A notable feature of recent years has been a tendency of many stags to mass at certain places, usually woodland and adjacent fields in the lower range where the grasslands, being well tended, are in the most advanced condition. Up to 16 stags have been observed in a wintering group.

The oldest stags and those that have been engaged in sparring drop their antlers in early April. At this time we often pick up antlers which have not been cleanly separated from the pedicles, and presume that sparring has brought about an earlier fall than would be usual. Mature stags drop their horns in mid-April, six-pointers in mid-May, while knobbers may retain their horns until very early in June.

After casting by the mature beasts, the stag parties are much smaller—two or three beasts in one place, usually secluded, with dense woodland to provide shade and an escape from the summer fly pests. At this time the stags tend to be crepuscular.

The return of the older stags to the hind ground occurs in late August and early September, when the dominant stags mark out territories, using pits and wallows for the transmission of scent, through antler-thrashing, to the surrounding shrubs and ground vegetation. The peak of the rut is reached in October.

2. Antler Development

(a) The yearling stage carries simple spikes. A poor quality beast has spikes up to 4in. long, but the average is from 4in. to 6in. Outstanding yearlings show 6in. to 8in. of horn.

(b) Although stags with four points—i.e., brow tine and main beam only—have been recorded, generally a stag grows six points, a poor quality beast having antlers from 12in. to 14in. long, average 15in. to 17in. and good from 17in. to 18in.

(c) Mature stags at eight points carry antlers measuring from 20in. to 22in. Nine and ten point heads are not uncommon. W.R.M. has collected the cast horn of an 11-pointer.

A typical mature stag will cast his antlers in the third week in April and a week later the new growth will be just visible as 1in. hairy knobs. By mid-May the new growth will have reached the "anvil" stage, where the brow tine and the main beam can clearly be seen. The brow tine appears to develop at the same rate as the main beam until about the last week in May, when the former is almost full grown. In early June, the growth of the main beam continues, and by the end of the first week a terminal thickening denotes the formation of the trez tine.

Again the main beam and the tine develop equally until the end of the second week, when its development is complete. The bifurcation that separates the upper and lower tops is present by late June. Most antler growth is complete by the third week in July. The growth phase of the antlers of a mature stage is therefore spread over two months or perhaps slightly longer. However, the antlers are far from complete at this stage and ossification (the laying down of bone) continues for 2-3 weeks. The velvet, which is now a dark apricot, is shed in the last week in August.

The immature beasts (knobbers and 6-pointers) have less antler growth to make; they usually strip velvet slightly later than the mature males.

Compared with Sika stags kept in fairly crowded conditions in parks, which rarely keep a complete head through the pugnacity of the rutting season, Bowland stags are not commonly found with broken spars. When this occurs, it us usually the trez tine that is damaged.

When the time is near for the old stags to cast they can become frolicsome, due to a change in the hormone balance, when in large parties. A clashing of antlers between stags often leads to premature casting, as evidenced by the lack of a clean edge to the discarded horn, on which comment has already been made. Cast stags remaining in large parties appear to maintain their dominance; they will spar by rearing up on their hind legs and using their forelegs pugnaciously.

The quality of the head falls appreciably when a stag is beyond its prime (over 10 years). Though still moderately strong in the beam, these antlers are smaller and there is a tendency for one of them to be malformed.

3. Pelage

(a) *Hinds.* Winter coat of dark greyish-brown with black stripe along top of neck extending along top of body almost to the rump, across the top of which is a black band with some dark hair on the dorsal side of the tail. Light spots on either side of the spine, which are prominent in summer, are usually detectable towards the rump in winter. Viewed from the rear, in strong but low winter light, the areas of white are very conspicuous. There is white on the caudal disc, which is accentuated by being bordered by black. White is seen on the underparts and on the insides (top) of the legs. Strong white hair forms in the ears, and there are patches of white near the ear roots, at the side of the head. The older hinds tend to be darker than young hinds, on which faint light dappling from the summer coat is often detectable. This is most prominent on the rear quarters. The hock glands in Sika are prominently indicated by short, coarse hair which is white in winter, creamy in summer. The progression into the summer coat has not been chronicled. The mature hinds are rarely seen from mid-May because they are in thick cover with their calves.

The summer pelage is a bright chestnut-red, copiously marked with light dappling. The black stripe along the top of the back has light markings, arranged in pairs, and the marks are white at the forepart, becoming creamy towards the rump. In early September hinds are still in full summer coat. The autumn moult is well-advanced by the third week in September, the front half of the beast being grey. The moult is usually complete by early October.

Calves lose the spots from their coat after 6-8 weeks. Their autumn moult is well in advance of that of the hinds.

(b) *Stags*. Generally, the winter pelage of the stag is darker than that of the hind and often appears to be rich chocolate-brown, with a faint indication of the summer dappling towards the rump. The spring moult begins to show in the older beasts during the 1st and 2nd weeks in May, and by the third week the stags are half-moulted. By June, all beasts are in their full summer coat. This coat is of chestnut-red, well dappled, and in the absence of the mane which is conspicuous in winter the stags have a very clean appearance. As with most deer of temperate zones, the summer coat is not retained for long.

The first signs of the autumn moult in mature stags occur towards the end of July, when a dark band is seen down the front of the neck. The moult is visible in late July as a greying of the head and neck and by mid-August a stag is half-moulted.

FIELD NOTES

Lesser Rorqual stranded at Saltwick Bay

On the morning of the 20th September 1971 an immature female Lesser Rorqual (*Balaenoptera acutorostrata* Lacépède) was found stranded near the base of the cliffs, about 100 yards north of Black Nab, at the southern end of Saltwick Bay, Whitby. Its horizontal length, from the tip of the snout to the notch in the tail fluke, was 14 ft. 9 in. Colour and black and white photographs were taken of the whale on the beach and the skull taken to Wood End Natural History Museum, Scarborough. The whale was in excellent condition and had presumably been stranded on the ebbing tide of the evening of September 19th (high tide 4.56 p.m.). At full tide the rocky wave-cut platform would be covered by several feet of water right to the cliff face, producing conditions very similar to those that occurred on 23rd September 1968 when a White-sided Dolphin (*Lagenorhynchus acutus* (Gray)) was stranded at Burniston (*Nat*. 1969, 2).

The Lesser Rorqual is the commonest of the whalebone whales to be stranded on the Yorkshire Coast and most records occur on their southward migration during the autumn. C. I. MASSEY

The dragonfly *Aeshna mixta* Latr. at Shirley Pool

On 10th October 1971, my wife and I visited Shirley Pool, Askern, for the first time. Although there was a strong wind, the afternoon was warm and humid. During a sunny period I was surprised to see a hawker dragonfly actively hunting in the lee of the trees and bushes, for one does not expect to see an *Aeshna* in Yorkshire in mid-October. My wife remarked on its small size and urged its capture, so I netted it as it flew past. In the hand, the small yellow humeral marks indicated that this was not either of the two common blue Yorkshire species. It proved to be *Aeshna mixta* Latr. and this dragonfly has not been recorded previously in Yorkshire.

Cynthia Longfield (in Corbet, P. S., Longfield, C., and Moore, N. W., *Dragonflies* (1960). New Naturalist Series) comments that *A. mixta* has become a successful colonist of southern England from its Mediterranean headquarters and between 1940 and 1960 had extended its range northwards. It is a regular immigrant in the south but has not previously been reported in England north of Lincolnshire. There is nothing to indicate whether the present specimen is an immigrant or developed locally. It is in good condition. The larva completes its development in five months from an egg which hatches in May and it is the inability of the final instar to tolerate cold conditions at the end of summer that limits its northward spread. It is worth noting, therefore, that the summer of 1971 has been warmer than average and September has been particularly fine and sunny, a condition which seems to be essential to the successful development of this dragonfly. J. H. FLINT

SAMUEL APPLEBY, DONCASTER BOTANIST

P. Skidmore

Samuel Appleby (1806-1870) was one of the leading South Yorkshire botanists of the early part of last century. Born at Egmanton near Retford, Nottinghamshire, in May 1806, the eldest child of Samuel Appleby, farmer of that place, he moved to Doncaster shortly after the death of his father (aged 38) in 1822.

As a boy at Egmanton young Samuel was much more at home in the world of nature than with his exercise books and he developed an interest in flowers which he maintained into old age. The only recorded incident relating to his childhood is given by Hatfield (1866). A Polecat had been causing havoc on the farm and young Samuel was told to watch that the animal did not come down from the tree which it had climbed, while a gun was brought from the house. The Polecat was shot and its skin was made into a tippet for Samuel's sister Anne. Anne, who was born on January 25th, 1810, wore the tippet for many years.

Following the death of his father, Samuel moved to Doncaster, where he became a nurseryman under the guidance of Rowland Crowder, whose gardens were at Bennetthorpe. Samuel's garden was St. James' Gardens, and here he learnt his trade. He divided his spare time between courting Mary Ann Crowder, Rowland's daughter, and visiting his friend Dr. Thomas le Gay Brewerton of Bawtry. The doctor was an active member of the York Philosophical Society and he instructed Samuel on many aspects of natural history, not least the work of Linnaeus. The eager pupil would walk to Bawtry and back in the evenings to visit his tutor. With equal eagerness he would step out across Potteric Carr with Mary Ann to visit her ancient uncle Abraham at Loversall. Abraham told fascinating reminiscences concerning the carrs, which he knew and loved in their virgin state. He was already 30 when in 1764 the Act for the Drainage of Potteric Carr was passed. He had known and ridden with John Manners, Marquis of Granby, on stag hunts on the carrs before 1751, the year the Marquis died. It is hardly surprising that the young botanist should search for rare plants on the remaining fragments of virgin bog on the carrs. He quickly found that many rare species such at *Butomus, Osmunda, Ranunculus lingua, Thelypteris palustris* etc., were still to be found in the now derelict Decoy wood.

On December 25th, 1828. Samuel Appleby and Mary Ann Crowder were married and in 1831, through the good offices of his old friend le Gay Brewerton, he became a fellow of the Linnean Society. Brewerton was primarily a geologist, whose particular interest was the mineral composition of the waters at Askern Spa (see Lankester, 1842).

On being received into the Linnean, Appleby published his first and only paper to a scientific periodical. This was his "Rare Plants of the Doncaster neighbourhood", printed in 1832. In the paper he gave ecological notes on local rarities, including *Scheuchzeria palustris,* which he found in great abundance on Thorne Moor. Sorrow also struck the Appleby household about the same time, for in 1831 Abraham Crowder died at the age of 97.

In 1832 the Doncaster Lyceum opened and most of the local dignitaries joined. Appleby found that his quarterly membership brought him into illustrious company and the natural history movement in Doncaster began to thrive. Notable amongst other naturalist members were Hugh Reid, the great Doncaster taxidermist and museum pioneer, Rev. Francis Orpen Morris, the nationally famous lepidopterist, Neville Wood, publisher and editor of the Naturalist, and Edwin Lankester, naturalist and historian of Campsmount and friend of Thomas le Gay Brewerton. Unfortunately intrigues developed in the Lyceum; annual subscribers sought preferential treatment over the quarterly ones, desiring to bar them from certain rights. Politics and religion became foremost matters of conversation and soon the Lyceum disintegrated in discord.

Meanwhile Appleby was developing his business and the clientele consisted of many of the local nobility, of whom Sir Wm. Cooke of Wheatley claimed his special regard. Pressure of business and home perhaps prevented him from publishing any further articles. but in 1849, when the Great Northern Railway was laid across Potteric Carr, he immediately recognised the damage done to the local flora. The track bisected the Decoy Wood and totally annihilated the Marsh

Fern *(Thelypteris palustris),* which occupied about an acre in the centre of this wooded bog. This was probably his favourite plant, growing in his favourite site and its destruction obviously upset him deeply. He recalls sadly in Hatfield (1866) that "it is now only known from two places in our area — Thorne Moor and Rushby Moor".

The arrival of the railway was to have a far more serious affect on Appleby's livelihood for, following the new status of Doncaster as a main communications centre, a great building plan began to house the employees of the newly established railway workshops. The early 1850's found him Librarian of the Mechanics Institute but about 1855 life at St. James' Gardens became untenable. Hatfield *(loc. cit.)* recalls "the nursery grounds of Mr. Samuel Appleby, who, in the power of his strength and the enthusiasm of his labours exhibited an assortment of rare and valuable plants; but the rapid progress of the population so hemmed him in on every side, that he was impelled to look for another country situation, where the busy haunts of men would not in his lifetime interfere with his pleasant and interesting avocation". During the period 1850 to 1860 the population of Doncaster rose from about 12,000 to 16,400. Thus about 1855 Appleby sold St. James' Gardens and purchased Oak Close, Balby, which the writer understands from Mr. L. Smith probably marked the site of the Balby Oak — the tree marking the western edge of Hatfield Chase, after it was enlarged by Henry VIII. Appleby called his new premises St. John's Nurseries. Today nothing remains of them, the area having been built over at the turn of the century. They were located on the land now bounded by Balby Road, Florence Avenue, Albany Road and St. John's Road.

Soon St. James' Gardens was built over, its memory remaining only in the name it imparted to the street running through it. But Appleby soon settled to his new surroundings where, apart from carrying out his gardening occupation, he kept meteorological records. These he supplied annually to Sheardown for publication in his Historical Notes.

Being a gardening man by trade, Appleby showed an appreciation of plant ecology far above the norm for his time. A lifetime close to the earth taught him that plants can appear again on lands from which they have apparently disappeared, as their seeds can remain dormant for long periods. He had seen this happen on Potteric Carr, although he acknowledged that many of the bog plants proper could hardly return as their habitat had been destroyed. Nevertheless he stated (Hatfield 1866) that "there are remnants of the original bog flora in the area, as for instance at Martin Beck and on Potteric Carr itself, where the careful observer can still find a few of our rarer plants, particularly in Decoy Wood and the Old Eaa plantation". It must have been a sad day for Appleby when, later in 1866, he learnt that new colliery sidings were to be built across the Decoy Wood, already bisected by the main line. Soon the entire Decoy Wood had been eradicated beneath the planned sidings and the age old- haven of wild plants was merely a nostalgic memory. Having been created in 1657 to benefit the local community it was destroyed 200 years later for the same purpose.

The precise date of Appleby's death is uncertain, though it was probably in 1870. (He was alive in July 1869 but dead in July 1871.) His old friend Charles William Hatfield knew him as "a kindly man who was never happier than when he was where flowers grew, a man whose life was a communion with nature". Hatfield, happily, frequently mentions Appleby, for were it not so he would have largely passed into oblivion with the passage of time. His botanical expertise was exceptional for even the over-cautious Lees (1888) was able to trust his records implicitly. Appleby gained an enormous amount of information which he passed on to Hatfield, who recorded it for posterity. Thus Hatfield writing on Stag Hunting in the District says "if further proof were required for the confirmation that deer were at large on Potteric Carr as recently as 1762, Mr. Appleby of St. John's Nursery Balby, was informed by Mr. Crowder's younger brother Rowland, an extensive nurseryman, who, like Abraham, was famous for the growth of old herbaceous plants, that he had seen stags leap from hassock to hassock on Potteric Carr to avoid immersions."

So far the writer has been unable to track any of Appleby's specimens or notes. That he kept notebooks is mentioned by Hatfield, for he tells us that "Mr. Appleby, in his notebook, under the date August 27th 1857 writes—visited Shirley Pool with Rev. F. W. Peel who kindly got out the boat and ferried me across to a point where *Lastrea thelypteris* was growing, a frond of which I gathered measured 33 inches." It is also known that Appleby had a herbarium for Lees (1888) saw some of his specimens.

Apart from his botanical interests, which are dealt with at length by Hatfield (*loc. cit.*), Appleby was also a poet of considerable ability and it is said that he also wrote hymns. One of his poems, about the Sundew, is published by Hatfield, along with a list of the plants of Potteric Carr.

Had Appleby lived more recently he would doubtless have been an ardent conservationionalist but he lived at atime when the mania for destruction of the environment was unquestioningly equated with progress. In the 1760's it was deemed imperative for the community that Potteric Carr should be drained and turned over to agriculture to alleviate the poverty of the underprivileged in Doncaster. In fact the draining did nothing to help the underprivileged according to the Doncaster Corporation Courtiers. Abraham Crowder, who from the start was opposed to the drainage as he saw that it was merely a means of the wealthy getting wealthier, was seen merely as a selfish person who stood in the way of progress for the common good.

Arising from Crowder's opposition to the drainage of the carrs, which was partly the brainchild of Thomas Tofield of Wilsic, there was presumably considerable animosity between these two gentlemen. It is a curious fact regarding Appleby that nowhere in Hatfield's writing about him is there any mention of Thomas Tofield, the famous botanist, who knew so much about the virgin flora of Potteric Carr. Could it be that Crowder's hostility to Tofield's drainage scheme coloured Appleby's opinion of the man and his botanical prowess?

ACKNOWLEDGEMENTS

The writer is indebted to all who have helped him in his researches on Samuel Appleby. Particular thanks are due to the staff of the Doncaster Public Reference Library, to Mr. L. Smith of the Doncaster Naturalists' Society and to my wife, Mrs. Heather Skidmore, for typing the manuscript.

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THE 'BOG SPIDER' *ARANEUS MARMOREUS* CLERCK IN BRITAIN

C. A. HOWES
Museum and Art Gallery, Doncaster

The type form of *Araneus marmoreus* Clerck is widespread on the continent but in Britain is exceedingly restricted in its distribution. It was first officially recognised here in 1947 when specimens were collected by Mr. C. S. Sweetman at Acomb near York. Currently it is known from eleven localities, their positions showing an eastern distribution tendency (see fig. 1), a feature possibly reflecting a preference for continental climatic conditions.

The magnificent chocolate and yellow variety *A. marmoreus* var. *pyramidatus* Clerck unlike the type, has been known in Britain at least since the late sixteenth century, being illustrated in T. Muffett's celebrated *Theatrum Insectorum* completed in 1589. Although by no means common var. *pyramidatus* is relatively widespread, Bristowe (1939) recording it for twenty-eight counties (see fig. 2).

Both type and variety are typically bogland spiders favouring the acid conditions of *Calluna* and *Eriophorum* clad peat bogs colonised by *Betula* and *Salix* scrub. Where *A. marmoreus* occurs it is usually accompanied and greatly outnumbered by var. *pyramidatus*, the Ardingley colony showing a ratio in favour of var. *pyramidatus* of 40 to 1 (Bristowe 1958 and 1966). There appears to be no obvious separation of populations, my own limited observations during July, August and September of 1969 and 1970 on the Thorne Moor colonies confirms this, both type and variety occupying the same general areas. Overlap of populations has been noted, particularly at Askham Bog where males of one and females of the other were seen occupying the same webs and intermediate forms were observed (McHugh 1966). Intermediate forms are also known from Strensall Common (Locket and Millidge 1952).

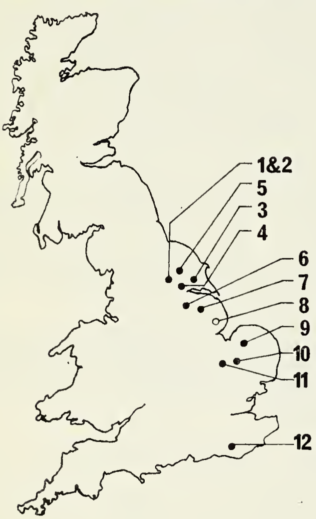

Fig.1. Known localities for A. marmoreus.

Fig.2. Distribution of A. m. pyramidatus based on Bristowe (1939).

Apart from a very generalised knowledge, the ecology of these spiders is not known and no doubt a close study of their respective habitat requirements and way of life would shed light on the reasons for their distributional, population and colour differences. There is a possibility that on a European scale var. *pyramidatus* could represent a relatively montane form, the phenomenon in Britain of its consistent dominance and greater dispersion to the north and west than *marmoreus* would tend to support this, though a critical investigation of the status and distribution of both *marmoreus* and var. *pyramidatus* on the Continent would be required for confirmation.

The following list represents a survey of available information on the distribution of *A. marmoreus* in Britain. The numbers allocated to the sites relate to fig. 1.

1. Acomb (Yorkshire)
Out of a batch of spiders collected by C. S. Sweetman at Acomb, six proved to be this species (Dixon 1948). The specimens were presented to Frank Dixon, then Hon. Arachnologist at the Yorkshire Museum, who sent two females to A. F. Millidge for determination (Millidge and Locket 1952: Ford 1953). One specimen, labelled the first British record, is in the Yorkshire Museum.
2. Askham Bog (Yorkshire)
Specimens were found by C. J. Smith during his investigation of the site from 1959-1962 (Howes and Smith 1971). A visit by members of the British Spider Study group during their York spider course, 1-7 September 1965, revealed both *A. marmoreus* and the var. *pyramidatus* (Smith 1970: Mackie 1970). Reporting on the course McHugh (1966) noted that webs were observed which

contained the male of one form and the female of the other, presumably accounting for the intermediate forms such as those on Skipwith Common referred to in Locket and Millidge (1953).

3. Allerthorpe Common (Yorkshire)
Spiders collected on the 21st August, 1955, during an excursion of the Hull Scientific and Field Naturalists' Club included one specimen of *A. marmoreus* (Geyer 1956).

4. Skipwith Common (Yorkshire)
The first record of it here is in Dixon (1949). Locket and Millidge (1953) noted that it was present "in some numbers on small birch trees". C. J. Smith collected it here during his survey of the area from 1959-1962 (Howes and Smith 1971).

5. Strensall Common (Yorkshire)
In 1948 Messrs. A. Smith and C. S. Sweetman collected a number of specimens of both sexes. Both *A. marmoreus* and var. *pyramidatus* occurred together and several specimens intermediate in pattern were found (Millidge and Locket 1952: Ford 1953).

6. Thorne Moors (Yorkshire)
Specimens were collected or noted during surveys carried out by the Thorne Moors study group during July, August and September of 1969 and 1970 (Howes 1969, 1970: Howes and Smith 1971). Specimens were in abundance during August 1969, examples being collected for the arachnida collection at Doncaster Museum. A. C. Braham, who ran an arachnological supply firm in Huddersfield, included several entries in his stock book (now in the Yorkshire Museum) of specimens collected in 1946 on Thorne Moors. Of those specimens so far located all have turned out to be var. *pyramidatus*. Although Braham visited Thorne Moors he did not collect or see *marmoreus* (Braham 1946).

7. Scotton Common (Lincolnshire)
Recorded for this locality though no data given (Merrett, 1971).

8. Tumby Wood (Lincolnshire)
Although its presence was not confirmed, an immature specimen possibly of *A. marmoreus* was collected in 1898 by C. A. W. Peacock and noted in 'Lincolnshire Spiders' (Smith 1910). The specimen was forwarded for determination to O. P-Cambridge who commented "The identity of the spider, being immature, is uncertain . . . . *Eperia (=Araneus) pyramidatus* is generally considered to be a variety of *E. (=Araneus) marmoreus*. The true *marmoreus* however in the adult state has not yet been recorded in Britain" (Smith 1910).

9. Thompson Common (Norfolk)
Recorded during arachnological investigations carried out during 1969 and 1970 by the Nature Conservancy of Broadland and Breckland habitats (Duffey 1971).

10. Tuddenham Fen (Suffolk)
Recorded during arachnological investigations carried out during 1969 and 1970 by the Nature Conservancy on Broadland and Breckland habitats (Duffey 1971).

11. Woodwalton Fen (Huntingdonshire)
Recorded for this locality though no data is given (Merrett 1971 and Mackie 1971).

12. Ardingley (Sussex)
Recorded for this locality pre-1958. "When examining a colony of *A. marmoreus* at Ardingley, Sussex, some years ago, I found only 4 whilst seeing 160 of the *A. m. pyramidatus* form" (Bristowe 1958 and 1966).

Acknowledgements

For help in compiling the list of localities I would like to thank Dr. Eric Duffey of Monks Wood Experimental Station, Abbots Ripton, Huntingdonshire, Dr. Peter Merrett of Furzebrook Research Station, Wareham, Dorset, Mr. D. W. Mackie and Mr. C. S. Smith. Thanks are also due to Mr. C. Simms for permission to inspect the A. C. Braham material in the Yorkshire Museum.

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NOTABLE LEPIDOPTERA

The following records of moths recently found in Yorkshire have not so far been published:—

Eilema complana (Linnaeus), The Scarce Footman. A single male specimen was taken at Spurn on 16th July 1970 by the Warden, Mr. B. Spence. Although the patterning of the wing indicated *complana* rather than its close relative *E. lurideola*, it seemed possible that the specimen was merely an aberration of the latter species, which is well established at Spurn. The matter was settled by examination of the genitalia, which clearly showed that this specimen was *complana*. I am grateful to Mr. D. S. Fletcher of the British Museum (Natural History) for carrying out the original genitalia examination.

Although South (Moths of the British Isles vol. I and II, Warne (1961))states that *complana* occurs in Yorkshire, this is in fact the first record for the county for seventy years, when the species was noted from several localities by Porritt. In Britain this is a widespread but local species in the southern half of England, also occuring in Ireland.

Eumichtis lichenea Hübner, The Feathered Ranunculus.

This is a maritime species, well known on the east coast, but there are no published records of its occurrence inland, at least in Yorkshire. However, on 7th September 1969 in Mr. John Mather's garden in Knaresborough a moth came to light which he identified correctly as *lichenea*. Nor was this an isolated occurrence as further specimens appeared $\frac{1}{4}$ mile away at Knaresborough Bird Ringing Station on 8th September 1970 and 15th September 1971 (3 specimens) strongly suggesting that the moth is breeding along this stretch of the Magnesian limestone. These are, of course, the first records for V.C. 64.

Oparinia christyi Prout. The Pale November Moth.

This species can only be separated with certainty from *O. dilutata* (The November Moth) by examination of the genitalia. The identification, however, can be carried out without dissection, using the characters described by Tams (Some British Moths Reviewed. *Amateur Entomologist* 5 (38): 1-20 (1941)). The first recorded Yorkshire specimen was taken at Knaresborough Ringing Station on 4th October 1970 along with half a dozen *dilutata*. *Christyi* is widespread in the north and west of the British Isles, and no doubt occurs in many parts of Yorkshire.

S. L. Sutton

THE COPEPODA HARPACTICOIDA OF ANGLESEY AND THE NORTH WALES COAST

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During the period from January to August 1966 a survey was made of the harpacticoid fauna of nineteen intertidal beaches around the Isle of Anglesey. Most of the sandy beaches studied were examined previously by Boaden (1963) in his extensive survey of the interstitial fauna, but the Harpacticoida were not identified. The 1966 survey was undertaken to rectify this omission, and was further extended to take into consideration the harpacticoid faunas of muds and muddy sands.

The present list is based primarily on this survey material, but for the sake of completeness additional records are included from two sources:—

(a) Previously published records relating to the North Wales area,

(b) Unpublished records maintained as a card index at the Marine Science Laboratories, Menai Bridge, and in large part attributable to Professor C. L. Oakley, F.R.S. These, to a certain extent, give data on biotopes not covered in the 1966 survey, e.g. algae and rock pools.

Arrangement of the Records

The nomenclature adopted is that of Lang (1948, 1965) except where otherwise stated. The name of each species is immediately followed by one or more bibliographic references to published descriptions including figures.

The localities mentioned are listed in Table I, and are indicated on the map (Fig. I). The standard abbreviations are used for tidal levels.

Table I

List of Localities

1. Criccieth	12. Llanfawr	22. Penmon Point	31. Ogwen Fish Weir
2. Nevin	13. Four Mile Bridge	23. Black Rocks	32. Garth Ferry
3. Port Dinorwic	14. Porth Trefadog	24. Llanfairfechan	33. Bangor Pier
4. Tal-y-foel	15. Porth Swtan (Church Bay)	25. Penmaenmawr	34. Gorad-y-gyt
5. Porth China	16. The Skerries	26. Great Ormes Head	35. Cae Coch
6. Porth Trecastell (Cable Bay)	17. Cemaes Bay	27. Little Ormes Head	36. Church Island
7. Rhosneigr	18. Traeth Lligwy	28. Colwyn Bay	37. Menai Bridge
8. Rhoscolyn	19. Traeth Bychan	29. Pensarn	38. Menai Bridge (Ynys Faelog)
9. Castell	20. Red Wharf Bay	30. Penrhyn Flats	39. Gallows Point
10. Treardurr Bay	21. Puffin Island		40. Beaumaris
11. Porth-y-post			

Table II

The Wentworth Particle Size Classification

Grade limits (Diameters in mm)	Description
2.000—1.000	Very coarse sand
1.000—0.500	Coarse sand
0.500—0.250	Medium sand
0.250—0.125	Fine sand
0.125—0.063	Very fine sand
<0.063	Silt and clay

In the case of my own records (DCG), the description of the substratum is based on a sieve analysis, and refers to the Wentworth Grade (Table II) within which the median particle diameter of the sample lay. Samples containing 10-50% silt are referred to as muddy sands, and those with more than 50% silt, as muds. The details of these sieve analyses are given in an appendix.

Also in the case of my own records, the relative abundance is given on the following scale:— few < 10; common 10-19; numerous > 19.

Previously published records are followed by the appropriate bibliographic reference, whereas previously unpublished records are followed by the initials of the authority responsible for the record. The key to these initials is:—

BB	B. Bayne.	DCG	D. C. Geddes.
CBJ	C. Burdon-Jones.	LJW	L. J. Walley.
CBK	C. B. Kensler.	RAK	R. A. Kenchington.
CLO	C. L. Oakley.		

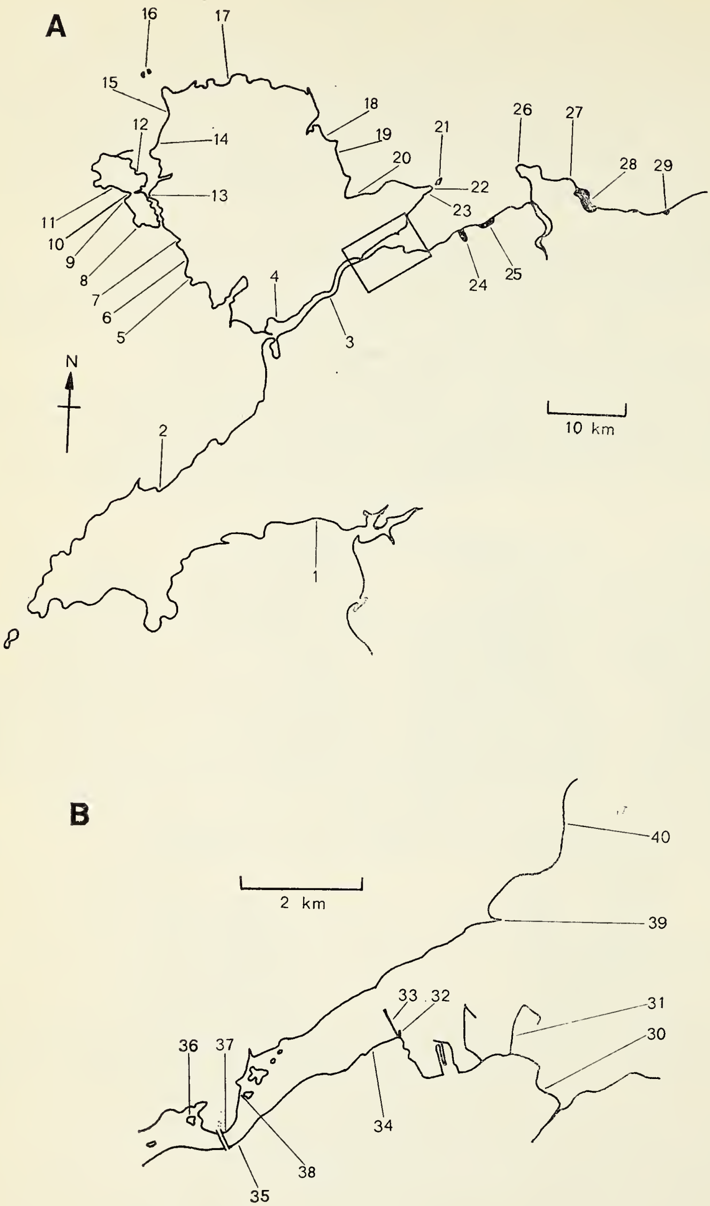

FIG 1. Maps of (A) Anglesey and the North Wales coast,

(B) the eastern end of the Menai Strait, indicating the record localities.

SYSTEMATIC LIST

Family LONGIPEDIIDAE

Longipedia coronata Claus, 1863. (Sars, 1903, V, p.10; Lang, 1948, p.155).
Near Menai Bridge, in plankton, occasional; Church Island, LWM, on algae, fairly common, March 1955 (CLO). Nevin, LWM, on algae, few; Cae Coch, LWM, in grooves of rubber plate, March 1956 (CLO). Puffin Island, in washings from dredged material, two females, April 1957 (CLO). Rhosneigr, LWM, on algae, one female, April 1965 (CLO). Church Island, LWM, one female, March 1971 (CLO).

L. minor T. & A. Scott, 1893. (Sars, 1903, V, p.12; Lang, 1948, p.157).
Church Island, LWM, on algae, rare, March 1955 (CLO). Black Rocks, LWM, on algae, few, March 1956 (CLO). Church Island, LWM, one female, March 1971, (CLO).

L. scotti Sars, 1903. (V. p.11; Lang, 1948, p.158).
Church Island, LWM, on algae, common, April 1954 (CLO). Black Rocks, LWM, on algae, rare, March 1955 (CLO). Nevin, LWM, on algae, rare, March 1956, (CLO).

L. weberi A. Scott, 1909. (Lang, 1948, p.159).
Gallows Point, LWS, very fine muddy sand, two females, two males, May 1966; Church Island, LWS, very coarse shell gravel, two males, April 1966 (DCG).

Family CANUELLIDAE

Canuella perplexa T. & A. Scott, 1893. (Sars, 1903, V, p.17; Lang, 1948, p.163).
Menai Strait, in plankton, one female, March 1965 (CLO). Llanfawr, HWN, MTL, LWS, fine to very fine sand, numerous, June 1966; Porth Trefadog, MTL, LWN, LWS, fine sand, common, June 1966; Porth Swtan (Church Bay), MTL, fine sand, one female, June 1966; Gallows Point, HWN, medium sand, one male, May 1966; Port Dinorwic, LWS, medium sand, one female, July 1966; Tal-y-foel, LWN, fine sand, one female, August 1966 (DCG).

Family ECTINOSOMIDAE

Ectinosoma melaniceps Boeck, 1864. (Sars, 1904, V, p.34; Lang, 1965, p.18).
Bangor Pier, LWM, on algae, common; Cae Coch, LWM, in grooves of rubber plate, common; Nevin, LWM, on algae, common, March 1956 (CLO); Penrhyn Flats HWM, on algae (chiefly *Enteromorpha*), fair numbers, April 1965 (CLO).

Halectinosoma sarsi (Boeck) 1872. (Sars, 1904, V, p.30, as *Ectinosoma;* Lang, 1948, p.206, as *Ectinosoma (Halectinosoma)*).
Llanfairfechan, from mud gathered at LW (Thompson, 1889, as *Ectinosoma spinipes*).

H. neglectum (Sars), 1904. (V. p.31, as *Ectinosoma*; Lang, 1948, p.211, as *Ectinosoma (Halectinosoma);* Lang, 1965, figs. 18-22).
Bangor Pier, on surface of mud, one only, March 1955 (CLO). Menai Bridge, interstitially in sand and mud, a few, April 1957 (CLO). Penrhyn Flats, LWM, fair numbers, March 1963 (CLO).

H. curticorne (Boeck), 1872. (Sars, 1904, V, p.36, as *Ectinosoma*; Lang, 1948, p.214, as *Ectinosoma (Halectinosoma)*).
Bangor Pier, LWM, on algae on reef, one female, March 1956 (CLO). Penrhyn Flats, HWM, on algae (chiefly *Enteromorpha*), numerous; Rhosneigr, HWM, a few, April 1965 (CLO). Four Mile Bridge, MTL(A), very fine muddy sand, common, MTL(B), fine muddy sand, few, May 1966; Gallows Point, MTL, mud, one female, LWN, LWS, very fine muddy sand, few, May 1966; Menai Bridge (Ynys Faelog), HWN, mud, common, February 1966; Church Island, LWS, very coarse shell gravel, common, April 1966; Port Dinorwic, LWS, medium sand, two females, July 1966 (DCG). Church Island, LWM, one female, March 1971 (CLO).

H. gothiceps (Giesbrecht), 1881. (Sars, 1904, V, p.37, as *Ectinosoma*; Lang, 1948, p.216, as *Ectinosoma (Halectinosoma)*).
Beaumaris, HWN, MTL, fine slightly silty sand, few, LWN, fine slightly silty sand, numerous, LWS, very fine muddy sand, numerous, June 1966; Gallows Point, MTL, mud, numerous, LWN, LWS, very fine muddy sand,

numerous, May 1966; Menai Bridge, LWS, very coarse shell gravel, few, March 1966; Church Island, LWS, very coarse shell gravel, numerous, April 1966; Port Dinorwic, LWS, medium sand, few, July 1966 (DCG).

H. erythrops (Brady), 1880. (Sars, 1904, V, p.39, as *Ectinosoma gracile;* Lang, 1948, p.256, as *Pararenosetella*).
Puffin Island, by tow-net, one specimen, January 1888 (Thompson, 1889, as *Ectinosoma*). Off Puffin Island, 10 fathoms, occasionally dredged (Thompson, 1893, as *Ectinosoma*).

H. spinicauda (Wells), 1961. (p.264, as *Ectinosoma*).
Porth Trefadog, LWN, fine sand, few, LWS, fine sand, few, June 1966; Tal-y-foel, LWN, LWS, fine sand, few, August 1966 (DCG).

Bradya (Bradya) typica Boeck 1872. (Sars, 1904, V. p.46; Lang, 1948, p.224).
Penmon Point and Llanfairfechan, mud from shore, in quantities, coll. W. S. McMillan (Thompson 1889). Cited as a doubtful record by Lang 1948.

Microsetella norvegica (Boeck), 1864. (Sars, 1904, V, p.44; Lang, 1948, p.230).
53°30.4′ N, 4°12.4′ W, in plankton haul, not uncommon, 53°35.8′N, 4°13.0′ W, surface plankton sample, March 1965 (LJW). Menai Strait, plankton, February 1966 (RAK). N.B. Occurs in small numbers throughout year, relatively more abundant in winter (RAK).

Arenosetella germanica Kunz, 1937. (Lang, 1948, p.254).
Castell, LWN, medium sand, one male, May 1966; Trearddur Bay, MTL, very coarse sand, few, July 1966; Porth Swtan (Church Bay), MTL, LWN, LWS, fine sand, few, June 1966; Cemaes Bay, HWN, fine sand, numerous, MTL, LWN, LWS, fine sand, few, April 1966; Traeth Lligwy, HWN, medium sand, numerous, MTL, LWN, medium sand, few, April 1966; Traeth Bychan, HWN, MTL, LWS, medium to fine sand, few, April 1966; Beaumaris, HWN, medium sand, common, June 1966; Gallows Point, HWN, medium sand, numerous, May 1966 (DCG).

Hastigerella leptoderma (Klie), 1929. (Lang, 1948, p. 258, as *Pararenosetella;* Kunz 1949, p. 57, as *Pararenosetella*; Wells, 1968, 0. 401 (♂)).
Trearddur Bay, MTL, coarse sand, few, LWN, LWS, medium sand, few, July 1966; Traeth Lligwy MTL, LWN, medium sand, few, April 1966 (DCG).

H. tenuissima (Klie), 1929. (Lang, 1948, p.254, as *Arenosetella*).
Llanfawr, HWN, fine sand, numerous, June 1966; Porth Trefadog, MTL, fine sand, one female, June 1966; Tal-y-foel, LWS, fine sand, one female, August 1966 (DCG).

Family D'ARCYTHOMPSONIIDAE

Nomenclature according to Kunz (1961).

Leptocaris ignavus (Noodt), 1953. (p.6-9, as *Horsiella*).
Four Mile Bridge, MTL (B), fine muddy sand, one male, May 1966 (DCG).

D'Arcythompsonia fairliensis (T. Scott), 1899. (Sars, 1909, V, p.325; Lang, 1948, p.272).
Menai Bridge, LWS, very coarse slightly silty shell gravel, occasional female specimens and one male specimen, 1965; 1966 (DCG).

Family TACHIDIIDAE

Euterpina acutifrons (Dana), 1848. (Sars, 1921, VII, p.97; Lang, 1948, p.285).
Puffin Island, several specimens (Thompson, 1888, as *Euterpe gracilis).* In open sea and near Puffin Island, during autumn months especially (Thompson, 1893, as *Euterpe*). 4½ miles off Great Ormes Head, Hensen Net, November 1907 (Scott, 1908).

Tachidius discipes Giesbrecht, 1881. (Sars, 1909, V, p.328, as *T. brevicornis*; Lang, 1948, p.292).
Penom Point, mud from shore (Thompson, 1889, as T. *brevicornis*). Pensarn, brackish pond, coll. G. S. Brady (Scourfield, 1895, as *T. brevicornis*). Penrhyn Flats, LWM, on algae, numerous, March 1963 (CLO). Four Mile Bridge, MTL(A), very fine, muddy sand, few, MTL(B), fine muddy sand, few, May 1966; Llanfawr, HWN, fine sand, few, June 1966; Cemaes Bay, HWN, fine sand, one female, April 1966; Traeth Lligwy, HWS,

medium sand, common, April 1966; Gallows Point, HWN, medium sand, few, LWN, very fine muddy sand, one male, May 1966; Menai Bridge (Ynys Faelog), HWN, mud, one female, February 1966; Port Dinorwic, LWS, medium sand, numerous, July 1966; Tal-y-foel, LWN, LWS, fine sand, few, August 1966 (DCG).

Microarthridion littorale (Poppe), 1881. (Lang, 1948, p.295; Lorenzen, 1969, p.219). Penmon Point and Llanfairfechan, common in mud (I. C. Thompson, 1889, as *Tachidius*). Penmon Point and Puffin Island, about LWM, in *Fucus* (Thompson, 1893, at *Tachidius*).

M. fallax Perkins, 1956. (p.108; Lorenzen, 1969, p.216; Bodin, 1970, p.400). Four Mile Bridge, M.TL(A), very fine muddy sand, numerous, MTL(B), fine muddy sand, common, May 1966; Beaumaris, MTL, LWN, fine sand, few, June 1966; MTL, mud, LWN, LWS, very fine muddy sand, few, May 1966; Menai Bridge (Ynys Faelog), HWN, MTL, mud, numerous, February 1966 (DCG).

Danielssenia fusiformis (Brady & Robertson), 1875. (Sars, 1910, V, p.338; Lang, 1948, p.300).
Off Puffin Island, no other data (Thompson, 1893, as *Jonesiella*).

Thompsonula hyaenae (Thompson), 1889. (Lang, 1948, p.302; Bodin, 1970, p.404). Llanfawr, MTL, fine sand, common, LWS, very fine sand, numerous, June 1966; Porth Trefadog, LWN, fine sand, few, June 1966; Gallows Point, HWN, medium sand, one male, May 1966; Tal-y-foel, LWN, LWS, fine sand, few, August 1966 (DCG).

Family HARPACTICIDAE

Harpacticus uniremis Kroeyer, 1842. (Sars, 1904, V, p.51; Lang, 1948, p.321). Criccieth, LWM, on algae, one male, March 1963 (CLO).

H. gracilis Claus, 1863. (Sars, 1904, V, p.52; Lang, 1948, p.323).
Bangor Pier, LWM, on algae on reef, fairly common, April 1954 (CLO). Bangor Pier, LWM, on algae on reef, rare, March 1956 (CLO). Rhosneigr, LWM, in algae, small numbers, April 1965 (CLO).

H. flexus Brady & Robertson, 1873. (Sars, 1904, V, p.53; Lang, 1948, p.326).
Bangor Pier, LWM, on algae on reef, one only, March 1955 (CLO). Menai Bridge, in laboratory header tanks, common, May 1956 (CBJ). Black Rocks, LWM, on algae, one female, March 1963 (CLO). Llanfawr, LWS, very fine sand, few, June 1966; Porth Trefadog, LWN, fine sand, one female, June 1966; Menai Bridge (Ynys Faelog), MTL, mud, one female, February 1966; Tal-y-foel, LWN, LWS, fine sand, few, August 1966 (DCG).

Tigriopus brevicornis (Mueller), 1776. (Sars, 1904, V, p.54, as *T. fulvus*; Lang, 1948, p.340).
Puffin Island, rock pools (Thompson, 1888, as *Harpacticus fulvus*). Puffin Island, rock pools, abundant, generally of a bright red colour and very conspicuous on green *Enteromorpha* (Thompson, 1893, as *H. fulvus*). Skerries Islands, at and above HWS, rock pools coloured green with flagellates, August 1950 (CBJ). Rhosneigr, HWN, HWS, rock pools on reef, common, April 1950 (CBJ). Rhosneigr, abundant in some pools, March/April 1950 (CLO). Menai Bridge, in laboratory header tanks, common, May 1956 (CBJ). Rhosneigr, LWM, on algae, a few, April 1965 (CLO). Rhosneigr, in pools in splash zone, common, March 1971 (CLO).

Zaus spinatus Goodsir, 1845. (Sars, 1904, V, p.57; Lang, 1948, p.347).
Puffin Island, tidal pools, frequent (Thompson, 1893). Church Island, under algae, March/April 1950 (CLO). Black Rocks and Church Island, middle to lower shore, on algae, fairly common, April 1954 (CLO). Cae Coch and Criccieth, LWM, on algae, common, March 1955 (CLO). Nevin, LWM, on algae, common, March 1956 (CLO). Cae Coch, LWM, on algae, few, April 1957 (CLO). Cae Coch, Church Island and Criccieth, on algae, fair numbers, March 1963 (CLO). Church Island, few, Black Rocks, fair numbers, Rhosneigr, LWM, large numbers, March 1971 (CLO).

Z. goodsiri Brady, 1880. (Sars, 1904, V, p.59; Lang, 1948, p.349).
Little Ormes Head, near Colwyn Bay, 10 fathoms, dredged, coll. A. O. Walker, May 1891 (Herdman, 1892). Little Ormes Head and in Colwyn Bay, dredged (Thompson. 1893).

Family TISBIDAE

Tisbe furcata (Baird), 1837. (Sars, 1905, V, p.88, as *Idya*; Lang, 1948, p.369).
Penmaenmawr, in open sea and in tidal pools (Thompson, 1888, as *Idya*). Bangor Pier, Church Island, LWM, in algae, numerous, April 1954 (CLO). Bangor Pier, LWM, on algae, not very common, March 1955 (CLO). Cae Coch and Nevin, LWM, on algae (at Cae Coch in grooves of rubber plate), common, March 1956 (CLO). Ogwen Fish Weir and Church Island, LWM, shell gravel, common, April 1957 (CLO). Penmon Point, Cae Coch and Black Rocks, on algae, numerous, March 1963 (CLO). Penrhyn Flats, Cae Coch, Black Rocks, Rhosneigr, HWM, on *Enteromorpha*, numerous, April 1965 (CLO). Menai Bridge, LWS, very coarse shell gravel, common, March 1966 (DCG). Cae Coch, LWM, fairly numerous. Church Island, LWM, fair numbers, Black Rocks, numerous, March 1971 (CLO).

Family PELTIDIIDAE

Alteutha depressa (Baird), 1837. (Lang, 1948, p.444).
Red Wharf Bay and about Puffin Island, chiefly amongst littoral algae (Thompson, 1893, as *A. crenulata*). Puffin Island, plankton, more abundant in bad weather, February 1966 (RAK). Black Rocks, LWM, one male, March 1971 (CLO).

A. interrupta (Goodsir), 1845. (Sars, 1904, V, p.62; Lang, 1948, p.445).
By tow-net off Anglesey, and frequently around Puffin Island (Thompson, 1888, as *Peltidium*). Penrhyn Flats, HWM, on red algae, one male, April 1965 (CLO).

A. oblonga (Goodsir), 1845. (Sars, 1904, V, p.64, as *A. depressa;* Lang, 1948, p.447).
Bangor Pier and Church Island, under algae, common, March/April 1950 (CLO). Bangor Pier, Cae Coch, Black Rocks, Church Island, and Rhosneigr, LWM, found on algae, not common, March 1955 (CLO). Bangor Pier, Cae Coch, Black Rocks, Nevin, LWM, on algae (at Cae Coch in grooves of rubber plate), not common, March 1956 (CLO). Cae Coch, LWM, on algae, few, from debris amongst trawled hermit crabs, March 1957 (CLO). Cae Coch, LWM, on algae, one male; Black Rocks, Church Island, LWM, on algae, few, March 1963 (CLO). Puffin Island, plankton, twelve, February 1966 (RAK).

Family TEGASTIDAE

Parategastes sphaericus (Claus), 1863. (Sars, 1904, V, p.73; Lang, 1948, p.478).
Off Puffin Island, dredged occasionally; Colwyn Bay, dredged material, coll. A. O. Walker (Thompson, 1893, as *Amymone*). Rhosneigr, in *Nebalia* mud, one only, March 1955 (CLO).

Family THALESTRIDAE

Thalestris longimana Claus, 1863. (Sars, 1905, V, p.104; Lang, 1948, p.498).
Black Rocks, LWN-LWS, amongst algae, common, March 1951 (CBJ). Bangor Pier, Cae Coch, Church Island, MTL-LWM, on algae, fairly numerous, April 1954 (CLO). Menai Strait, in plankton hauls, March 1955 (CLO). Bangor Pier, Cae Coch, Black Rocks, Church Island, Rhosneigr, Criccieth, "the commonest weed copepod everywhere", March 1955 (CLO). Bangor Pier, Cae Coch, Church Island, Nevin, LWM, on algae, numerous, March 1956 (CLO). Cae Coch, Black Rocks, Church Island, LWM, on algae, very common, April 1957 (CLO). Penrhyn Flats, Penmon Point, Cae Coch, Black Rocks, Church Island, Criccieth, LWM, on algae, numerous, March 1963 (CLO). Cae Coch, Church Island, Rhosneigr, LWM, on algae, very numerous at Cae Coch, less numerous elsewhere, April 1965 (CLO). Cae Coch, Church Island, Black Rocks, Rhosneigr, LWM, numerous, March 1971 (CLO).

T. rufoviolascens Claus, 1866. (Sars, 1905, V, p.107; Lang, 1948, p.501).
Church Island and Rhosneigr, LWM, on algae, fairly common, March 1955 (CLO).

Amenophia peltata Boeck, 1864. (Sars, 1906, V, p.136; Lang, 1948, p.508).
Off Little Ormes Head near Colwyn Bay, dredged, ten fathoms, coll. A. O. Walker (Herdman, 1892, as *Thalestris*). Off Little Ormes Head, dredged material, a few (Thompson, 1893, as *Thalestris*).

Parathalestris croni (Kroyer), 1842. (Sars, 1905, V, p.118, as *Halithalestris*; Lang, 1948, p.511).
Off Puffin Island, tow-net, one female, January 1889 (Thompson, 1889, 1893, as *Thalestris serrulata).*

P. harpactoides (Claus), 1863. (Sars, 1905, V, p.112, as *P. harpacticoides;* Lang, 1948, p.513).
Off Puffin Island; Penmon Point, mud from shore (Thompson, 1889, as *Thalestris*). Puffin Island, in rock pools, frequent (Thompson, 1893, as *Thalestris*). Black Rocks and Cae Coch, LWM, on algae, common, March 1955 (CLO). Bangor Pier, LWM, algae on reef, fairly common, March 1956 (CLO). Ogwen Fish Weir, on algae among mussel shells, and among shell gravel, almost pure culture, hundreds of females, few males, and numerous juveniles, April 1957 (CLO). Penrhyn Flats, Cae Coch, Black Rocks and Criccieth, LWM, on algae, numerous, March 1963 (CLO). Cae Coch, Rhosneigr, LWM, fair numbers, March 1971 (CLO).

P. clausi (Norman), 1868. (Sars, 1905, V, p.111; Lang, 1948, p.513).
Puffin Island, in tidal pools (Thompson, 1893), as *Thalestris*). Bangor Pier, LWM, algae on reef, not common, March 1956 (CLO).

P. hibernica (Brady & Robertson), 1873. (Sars, 1905, V, p.113; Lang, 1948, p.514).
Off Little Ormes Head, near Colwyn Bay, dredged, ten fathoms, May 1891, coll. A. O. Walker (Herdman, 1892). Puffin Island, rock pools, a few specimens (Thompson, 1893, as *Thalestris*).

P. intermedia Gurney, 1930. (Lang, 1948, p.516).
Beaumaris, LWN, fine sand, one male, June 1966; Gallows Point, HWN, medium sand one female, LWN, very fine muddy sand, one female, May 1966 (DCG).

Phyllothalestris mysis (Claus), 1863. (Sars, 1905, V, p.116; Lang, 1948, p.519).
Church Island, LWM, on algae, fairly common, March 1955 (CLO). Black Rocks, LWM, in algae, two females, April 1965 (CLO).

Rhynchothalestris helgolandica (Claus), 1863. (Sars, 1905, V, p.121; Lang, 1948, p.522).
Off Little Ormes Head, near Colwyn Bay, dredged, ten fathoms, May 1891, coll. A. O. Walker (Herdman, 1892). Off Little Ormes Head and near Puffin Island, dredged, a few specimens (Thompson, 1893, as *Thalestris*).

Diarthrodes nobilis (Baird), 1845. (Sars, 1906, V, p.140, as *Westwoodia*; Lang, 1948, p.529).
Puffin Island, rock pools, occasional (Thompson, 1893, as *Westwoodia*). Trearddur Bay, MTL-LWM, in algae, a few, May 1965 (CLO).

Dactylopodia tisboides (Claus), 1863. (Sars, 1905, V, p.126, as *Dactylopusia;* Lang, 1948, p.545).
Off Puffin Island, frequently dredged, also found in tidal pools (Thompson, 1893, as *Dactylopus*). Bangor Pier, LWM, on algae on reef, not common, March 1956 (CLO). Off Puffin Island, in trawl debris, among hermit crabs, April 1957 (CLO).

D. neglecta (Sars), 1905. (V, p.127, as *Dactylopusia*; Lang, 1948, p.548).
Llanfairfechan, pools near HWM, coll. G. S. Brady (Scourfield 1895, as *Dactylopus tisboides*). Bangor Pier, Cae Coch, Black Rocks and Criccieth, LWM, on algae, common, March 1955 (CLO). Cae Coch, LWM, in grooves of rubber plate, not uncommon, March 1956 (CLO). Cae Coch, LWM, on algae, few, April 1957 (CLO).

D. vulgaris (Sars), 1905. (V, p.128, as *Dactylopusia*; Lang, 1948, p.549).
Cae Coch and Black Rocks, LWM, on algae, fairly common, March 1955 (CLO). Cae Coch and Nevin, LWM, on algae, fairly common, March 1956 (CLO). Black Rocks, LWM, on algae, few, April 1957 (CLO). Penmon Point, Cae Coch, Criccieth, LWM, on algae, fair numbers, March 1963 (CLO). Rhosneigr, LWM, on algae, few, March 1965 (CLO). Cae Coch, Church Island, LWM, few, March 1971 (CLO).

Paradactylopodia brevicornis (Claus), 1866. (Sars, 1905, V, p.130, as *Dactylopusia*; Lang, 1948, p.557).
Church Island, LWS, very coarse shell gravel, one female, April 1966 (DCG).

Family PARASTENHELIIDAE

Parastenhelia spinosa (Fischer), 1860. (Sars, 1905, V, p.123, as *Microthalestris forficula;* Sars, 1911, V, p.369, as *Microthalestris littoralis;* Lang, 1948, p.588). Bangor Pier, under algae, common, March/April 1950 (CLO, as *M. littoralis*). Menai Bridge, interstitially in mud and sand, not very common, April 1957 (CLO as *M. forficula*). Trearddur Bay, LWS, medium sand, two females, July 1966; Porth-y-post, MTL (A), coarse shell gravel, one female, MTL (B), coarse shell gravel, common, July 1966; Gallows Point, HWN, medium sand, one female, May 1966 (DCG).

Family DIOSACCIDAE

The genus *Psammotopa* Pennak, 1942, is transferred to this family from the Cylindropsyllidae, for reasons discussed elsewhere (Geddes. 1968a).

Stenhelia (Delavalia) palustris Brady, 1868. (Sars, 1906, V, p.185; Lang, 1948, p.603).
Puffin Island, Garth Ferry, mud, several (Thompson, 1893, as *Delavalia).* Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), very fine muddy sand, few, May 1966; Llanfawr. HWN. MTL. LWS. fine to very fine sand, few, June 1966; Beaumaris, HWN, MTL, LWN, LWS, fine to very fine sand, few, June 1966; Gallows Point, HWN, medium sand, one female, MTL, mud, few, LWN, LWS, very fine muddy sand, few, May 1966; Menai Bridge (Ynys Faelog) HWN, MTL, mud. few, February 1966; Port Dinorwic, LWS, medium sand, few, July 1966 (DCG).

S.(D.) reflexa Brady & Robertson, 1880. (Sars, 1906. V, p.186; Lang, 1948, p.606).
Red Wharf Bay, twenty fathoms, one female; Garth Ferry, LWM, mud, one male (Thompson, 1893, as *Delavalia*).

Diosaccus tenuicornis (Claus), 1863. (Sars, 1906. V, p.146; Lang, 1948, p.617).
Puffin Island, in rock pools (Thompson, 1893).

Robertsonia tenuis (Brady & Robertson), 1880. (Sars, 1909, V, p.334; Lang, 1948, p.632).
Off Puffin Island, dredged. ten fathoms. on two occasions (Thompson, 1893).

Amphiascus varians (Norman & T. Scott), 1905. (Sars, 1906, V, p.156, as *Amphiascus imus;* Lang, 1948, p.655).
Trearddur Bay, LWS, medium sand, one male, July 1966; Porth-y-post, MTL (B), coarse shell gravel, few, July 1966; Church Island, LWS, very coarse shell gravel, numerous, April 1966 (DCG).

Amphiascopsis cinctus (Claus), 1866. (Sars, 1906, V, p.149, as *Amphiascus*; Lang, 1948, p.666).
Porth China. LWN, rock crevice detritus, one female, January 1966, coll. J. C. Gamble (DCG).

Paramphiascopsis longirostris (Claus), 1863. (Sars, 1906, V, p.159, as *Amphiascus;* Lang, 1948).
Menai Bridge, LWS, very coarse shell gravel, numerous, March 1966; Church Island, LWS, very coarse shell gravel, few, April 1966 (DCG).

Bulbamphiascus imus (Brady), 1872. (Sars, 1911, V, p.383, as *Amphiascus normani;* Lang, 1948, p.695).
Rhoscolyn Bay, dredged, not common (Thompson, 1893, as *Stenhelia*). Castell, LWS, coarse sand, numerous, May 1966; Gallows Point, LWN, very fine muddy sand, one female, May 1966; Menai Bridge, LWS, very coarse shell gravel, few, March, 1966; Church Island, LWS, very coarse shell gravel, few, April 1966 (DCG).

B. denticulatus (Thompson), 1893. (Sars, 1911, V, p.382, as *Amphiascus*; Lang, 1948, p.696).
Porth-y-post, MTL (B), coarse shell gravel, few, July 1966; Menai Bridge, LWS, very coarse shell gravel, common, March 1966; Church Island, LWS, very coarse shell gravel, few, April 1966 (DCG).

Amphiascoides neglectus (Norman & T. Scott), 1905. (Sars, 1906, V, p.177, as *Amphiascus linearis;* Lang, 1948, p.717, as *Amphiascella*).
Church Island, LWS, very coarse shell gravel, few, April 1966 (DCG).

A. debilis (Giesbrecht) 1881. (Sars, 1906, V, p.162, as *Amphiascus*; Lang, 1948, p.719, as *Amphiascella;* Lorenzen, 1969, p.220).
Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), fine muddy sand, few, May 1966; Beaumaris, HWN, medium sand, few, LWN, fine sand, one female, LWS, very fine muddy sand, few, June 1966; Menai Bridge (Ynys Faelog), HWN, mud, few, MTL, mud, numerous, March 1966 (DCG). N.B. Some of these specimens were originally identified as *A. limicola* (Brady), 1900, because of the bulbous form of the outer furcal seta, but Lorenzen (1969) gives grounds for regarding *A. limicola* as synonymous with *A. debilis*.

Paramphiascella hispida (Brady), 1880. (Sars, 1906, V, p.166, as *Amphiascus;* Lang, 1948, p.725).
Llanfairfechan, in mud, sparingly, February 1889 (Thompson, 1889, as *Stenhelia*). Puffin Island, rock pools; Garth Ferry, LWM, mud (Thompson, 1893, as *Stenhelia*).

Haloschizopera junodi (Monard), 1935. (Lang, 1948, p.736).
Gallows Point, LWS, very fine muddy sand, one female, May 1966 (DCG).

Psammotopa phyllosetosa (Noodt), 1952. (p.123, as *Protoleptastacus*).
Trearddur Bay, MTL, coarse sand, few, LWN, medium sand, numerous, LWS, medium sand, common, July 1966; Traeth Lligwy, HWS, HWN, medium sand, few, MTL, medium sand, numerous, LWN, medium sand, common, April 1966; Traeth Bychan, LWS, fine sand, one female, April 1966 (DCG).

Family METIDAE

Metis ignea Philippi, 1843. (Sars, 1910, V, p.345; Lang, 1948, p.776).
Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), fine muddy sand, few, May 1966; Menai Bridge (Ynys Faelog), HWN, mud, one female, February 1966 (DCG).

Family AMEIRIDAE

Ameira longipes Boeck, 1864. (Sars, 1907, V, p.215; Lang, 1948, p.788).
Off Puffin Island and Little Ormes Head, dredged (Thompson, 1893). Cited as a doubtful record by Lang, 1948.

Proameira psammophila Wells, 1963a. (p.89; Geddes, 1968, p.447 (♂)).
Porth-y-post, MTL (B), coarse shell gravel in pool, few, July 1966 (DCG).

Nitocra typica Boeck, 1864. (Sars, 1907, p.212; Lang, 1948, p.808).
Traeth Bychan, HWS, medium sand, common, April 1966 (DCG).

N. affinis Gurney, 1927. (Lang, 1948, p.820; Roe, 1958, p.250).
Menai Bridge, LWS, very coarse shell gravel, few, March 1966; Church Island, LWS, very coarse shell gravel, few, April 1966 (DCG). N.B. These specimens agreed with the description given by Roe (1958).

Interleptomesochra eulitoralis (Noodt), 1952. (p.112, as *Leptomesochra*).
Trearddur Bay, MTL, coarse sand, few, LWS, medium sand, one female, July 1966 (DCG).

Sarsameira propinqua (T. Scott), 1902. (Sars, 1911, V, p.399, as *Parameira;* Lang, 1948, p.853).
Menai Bridge, MTL, rock crevice, five specimens, November 1961 (BB & CBK).

Stenocopia longicaudata (T. Scott), 1892. (Sars, 1907, V, p.228; Lang, 1948, p.856).
Menai Bridge, LWS, very coarse shell gravel, one male, March 1966 (DCG).

Family PARAMESOCHRIDAE

Nomenclature according to Kunz (1962).

Scottopsyllus minor (T. & A. Scott), 1895. (Lang, 1948, p.872, as *Paramesochra*).
Castell, MTL, medium sand, two females, LWN, medium sand, numerous, LWS, coarse sand, numerous, May 1966; Traeth Bychan, HWN, medium sand, one male, MTL, medium sand, few, LWS, medium sand, common, April 1966; Gallows Point, HWN, medium sand, few, May 1966 (DCG).

S. herdmani (Thompson & A. Scott), 1899. (Lang, 1948, p.873, as *Paramesochra*).
Castell, LWS, coarse sand, one male, May 1966; Church Island, LWS, very coarse shell gravel, numerous, April 1966 (DCG).

Kliopsyllus holsaticus (Klie), 1929. (Lang, 1948, p.874, as *Paramesochra*).
Trearddur Bay, MTL, coarse sand, few, LWN, medium sand, one female, LWS, medium sand, numerous, July 1966; Cemaes Bay, LWN, fine sand, few, April 1966; Traeth Lligwy, HWN, MTL, LWN, medium sand, few, April 1966; Traeth Bychan, HWN, medium sand, common, MTL, LWN, medium sand, few, LWS, fine sand, one female, April 1966 (DCG).

K. coelebs (Monard), 1935. (Lang, 1948, p.875, as *Paramesochra*; Wells, 1963, p.16 (♀), as *Paramesochra*).
Porth-y-post, MTL (A), coarse shell gravel in pool, one female, July 1966 (DCG).

K. constrictus (Nicholls), 1935. (Lang, 1948, p.875, as *Paramesochra*).
Trearddur Bay, MTL, coarse sand, numerous, LWN, medium sand, few, LWS, medium sand, numerous, July 1966; Llanfawr, HWN, fine sand, few, June 1966; Porth Swtan (Church Bay), MTL, LWN, LWS, fine sand, numerous, June 1966; Cemaes Bay, MTL, fine sand, common, LWN, LWS, fine sand, numerous, April 1966; Traeth Lligwy, LWN, medium sand, common, April 1966; Tal-y-foel, LWN, fine sand, common, LWS, fine sand, numerous, August 1966 (DCG).

Intermedopsyllus intermedius (T. & Scott), 1895. (Lang, 1948, p.874, as *Paramesochra*).
Castell, LWN, medium sand, numerous, LWS, coarse sand, numerous, May 1966; Traeth Bychan, LWN, medium sand, one female, LWS, fine sand, common, April 1966; Church Island, LWS, very coarse shell gravel, one male, April 1966 (DCG).

Apodopsyllus littoralis (Nicholls), 1939. (p.328, as *Leptopsyllus*).
Castell, MTL, medium sand, few, May 1966 (DCG).

Remanea arenicola Klie, 1929. (Lang, 1948, p.8788).
Traeth Bychan, HWS, medium sand, numerous, April 1966 (DCG).

Family TETRAGONICIPITIDAE

Phyllopodopsyllus bradyi (T. Scott), 1892. (Sars, 1907, V, p.231; 1911, V, p.409; Lang, 1948, p.885).
Menai Bridge, LWS, very coarse shell gravel, common, March 1966; Church Island, LWS, very coarse shell gravel, numerous, April 1966 (DCG).

Diagoniceps menaiensis Geddes, 1968. (p.439).
Church Island, LWS, very coarse shell gravel, one male, one female, April 1966 (DCG).

Family CANTHOCAMPTIDAE

Mesochra lilljeborgi Boeck, 1853. (Gurney, 1932, p.257; Lang, 1948, p.946).
Off Puffin Island, tow-net, June 1886 (Thompson, 1889, 1893). Pensarn, brackish pond, coll. G. S. Brady (Scourfield, 1895).

Itunella tenuiremis (T. Scott), 1893. (Lang, 1948, p.1053).
Gorad-y-gyt, HWM, among decaying algae near stream, west side, numerous, both sexes, April 1956 (CLO). Gorad-y-gyt, exact provenance unknown, probably among algae, four females, April 1956 (CLO). Gorad-y-gyt, on algae, few, both sexes, April 1961 (CLO). Gorad-y-gyt, upper shore, in rotting and particularly half buried rotting algae, never in fresh algae, or in algae rotted to pieces, extremely numerous, March 1965 (CLO). Gorad-y-gyt, HWM, same site, extremely numerous, March 1971 (CLO). N.B. "There is some doubt about the species, as the animal does not agree exactly with either *I. tenuiremis (I. subsalsa)* or *I. muelleri* as figured in Lang." (CLO).

Family CYLINDROPSYLLIDAE

Cylindropsyllus laevis Brady, 1880. (Sars, 1909, V, p.321; Lang, 1948, p.1195).
Porth-y-post, MTL (B), coarse shell gravel in pool, one male, one female, July 1966 (DCG).

Evansula incerta (T. Scott), 1892. (Sars, 1911, V, p.415; Lang, 1948, p.1197).
Castell, LWN, medium sand, one female, May 1966; Porth-y-post, MTL (A), coarse shell gravel in pool, numerous, MTL (B), coarse shell gravel in pool, numerous, July 1966; Porth Swtan (Church Bay), LWS, fine sand, few, June 1966 (DCG).

E. pygmaea (T. Scott). 1903. (Lang, 1948, p.1198).
Trearddur Bay, MTL, coarse sand, numerous. LWN, medium sand, common, LWS. medium sand, numerous, July 1966; Traeth Lligwy, HWN, medium sand, common, MTL. medium sand, few, LWN, medium sand, numerous, April 1966; Traeth Bychan, HWN, medium sand. common, MTL. LWN, medium sand, few, LWS, fine sand, few, April 1966; Tal-y-foel, LWS, fine sand, one female. August 1966 (DCG).

Stenocaris minuta Nicholls, 1935. (Lang, 1948, p.1202).
Traeth Lligwy, HWS, medium sand, numerous, April 1966; Beaumaris, HWN, medium sand, one female, June 1966 (DCG).

Leptastacus macronyx (T. Scott). 1892. (Sars, 1911. V, p.417; Lang, 1948, p.1203).
Red Wharf Bay, in coarse sand. numerous, March 1971 (CLO).

L. laticaudatus intermedius Kunz, 1938. (Lang, 1948, p.1204).
Tal-y-foel, LWS, fine sand, one male, one female, August 1966 (DCG).

Paraleptastacus spinicauda (T. & A. Scott), 1895. (Lang, 1948, p.1206).
Porth Trecastell. HWN. MTL, LWN, LWS. medium sand, numerous, May 1966; Castell, MTL, medium sand, numerous, LWN, medium sand, few, May 1966; Trearddur Bay, MTL, coarse sand, numerous. LWN, medium sand, common, LWS, medium sand, few, July 1966; Porth Trefadog, MTL, fine sand, few, LWN. fine sand, common, LWS, fine sand, few. June 1966; Porth Swtan (Church Bay), MTL, fine sand, numerous, LWN, LWS, fine sand, few, June 1966; Cemaes Bay. HWS. HWN. MTL. LWS, fine sand, numerous, April 1966; Traeth Lligwy, HWS, HWN. medium sand, numerous, MTL, LWN, medium sand, common, April 1966; Traeth Bychan. HWS. medium sand, few, HWN. MTL, LWN, medium sand. numerous, LWS, fine sand, numerous, April 1966; Beaumaris. HWN. medium sand, numerous. June 1966; Tal-y-foel, LWS, fine sand, two females, August 1966 (DCG).

Psammastacus confluens Nicholls, 1935. (Lang, 1948, p.1210).
Porth Trecastell (Cable Bay). HWN, fine sand in bed of stream, numerous, May 1966; Rhosneigr, HWM, fine sand at source of spring, numerous, May 1966 (DCG).

Arenocaris bifida Nicholls, 1935. (Lang, 1948, p.1212).
Cemaes Bay, HWN, MTL. LWS, fine sand, few, April 1966; Traeth Lligwy, HWN, medium sand, few, April 1966; Traeth Bychan, HWN, medium sand, numerous, MTL, LWN, medium sand, few, LWS, fine sand, few, April 1966 (DCG).

Leptopontia curvicauda T. Scott, 1902. (Lang, 1948, p.1213).
Porth-y-post, MTL (A), coarse shell gravel in pool, one female, two males, July 1966 (DCG).

Family PARASTENOCARIDAE

Parastenocaris vicesima Klie, 1935. (Lang, 1948, p.1236).
Rhosneigr, HWN, fine sand at source of spring, numerous, both sexes, May 1966 (DCG).

P. phyllura Kiefer, 1938. (Lang, 1948, p.1246).
Rhosneigr, HWM, fine sand at source of spring, numerous, both sexes, May 1966 (DCG).

Family CLETODIDAE

Nomenclature of the genus *Rhizothrix* Brady & Robertson, 1875, according to Wells (1963).

Cletodes limicola Brady, 1872. (Sars, 1909, V, p.283; Lang, 1948, p.1256).
Penmon Point, mud from shore, common (Thompson, 1889). Penmon Point and Garth Ferry, LWM, mud (Thompson, 1893).

Enhydrosoma buchholtzi (Boeck), 1872. (Sars, 1909, V, p.287, as *Cletodes*; Lang, 1948, p.1263).
Four Mile Bridge, MTL (A), very fine muddy sand, one female, May 1966; Menai Bridge (Ynys Faelog), HWN, MTL, mud, few, February 1966 (DCG).

E. curticauda Boeck, 1872. (Sars, 1909, V, p.298, as *E. curticaudatum; Lang,* 1948, p.1264).

Beaumaris, LWN, fine sand, few, LWS, very fine muddy sand, few, June 1966; Gallows Point, LWN, very fine muddy sand, few, LWS, very fine muddy sand, numerous, May 1966 (DCG).

E. propinquum (Brady), 1880. (Sars, 1909, V, p.300; Lang, 1948, p.1264).
Llanfairfechan, mud from shore, very sparingly (Thompson, 1889, as *Cletodes*). Cae Coch, LWM, in grooves of rubber plate, one only, March 1956 (CLO). Four Mile Bridge, MTL (B), fine muddy sand, few, May 1966; Beaumaris, HWN, medium sand, one female, MTL, mud, one male, LWN, very fine muddy sand, few, LWS, very fine muddy sand, common, June 1966; Port Dinorwic, LWS, medium sand, few, July 1966 (DCG).

E. longifurcatum Sars, 1909. (V, p.301; Lang, 1948, p.1268).
Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), fine muddy sand, common, May 1966; Beaumaris, LWN, fine sand few, LWS, very fine muddy sand, numerous, June 1966; Gallows Point, MTL, mud, one male, LWN, very fine muddy sand, common, LWS, very fine muddy sand, few, May 1966; Menai Bridge (Ynys Faelog), MTL, mud, few, February 1966; Church Island, very coarse shell gravel, few, April 1966 (DCG).

E. garienis Gurney, 1930. (Lang, 1948, p.1271; Lorenzen, 1969, p.221).
Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), fine muddy sand, common, May 1966; Gallows Point, MTL, mud, few, LWN, very fine muddy sand, few, May 1966 (DCG).

Rhizothrix (Rhizothrix) curvata (Brady & Robertson), 1880. (Sars, 1909, V, p.303; Lang, 1948, p.1286).
Llanfairfechan, mud from shore, a number of this species (Thompson, 1889, as *Enhydrosoma*). Llanfairfechan and Garth, LWM, mud (Thompson, 1893, as *Enhydrosoma*). Beaumaris, LWN, fine sand, one male, June 1966; Gallows Point, LWS, very fine muddy sand, two females, May 1966 (DCG).

R. (*R.*) *minuta* (T. Scott), 1903. (Lang, 1948, p.1287; Bozic. 1953, p.20; Noodt, 1953, p.18 (♂)).
Llanfawr, MTL, fine sand, few, LWS, very fine sand, common, June 1966; Porth Trefadog, LWN, LWS, fine sand, few, June 1966; Cemaes Bay, LWS, fine sand, one male, April 1966; Traeth Bychan, LWS, fine sand, one female, April 1966; Tal-y-foel, LWN, LWS, fine sand, common, August 1966 (DCG).

R. (*R.*) *gracilis* (T. Scott), 1903. (Sars, 1911, V, p.430; Lang, 1948, p.1287).
Porth-y-post, MTL (A), coarse shell gravel in pool, few, MTL (B), coarse shell gravel in pool, few, July 1966; Traeth Lligwy, HWN, MTL, medium sand, few, LWN, medium sand, common, April 1966; Beaumaris, HWN, medium sand, common, June 1966 (DCG).

Rhizothrix (Tryphoema) bocqueti (Bozic), 1953. (p.21, as *Rhizothrix (Adelopoda)*; Wells, 1963, p.22, (♂); Por, 1964, p.256, as *Rhizothrix* (♂)).
Cemaes Bay, MTL, fine sand, one female, April 1966; Traeth Lligwy, HWS, HWN, MTL, LWN, few, April, 1966; Traeth Bychan, LWN, medium sand, few, April 1966; Beaumaris, HWN, numerous, MTL, fine sand, one male, June 1966; Port Dinorwic, LWS, medium sand, one female, July 1966; Tal-y-foel, LWN, LWS, fine sand, few, August 1966 (DCG).

R. (T.) lusitanica Wells & Clark, 1965. (p.94; Wells, 1968, p.422).
Trearddur Bay, MTL, coarse sand, common, LWN, medium sand, few, LWS, medium sand, one female, July 1966 (DCG).

Nannopus palustris Brady, 1880. (Sars, 1909, V, p.307; Lang, 1948, p.1291).
Puffin Island, surface tow-net, one only, December 1888; Llanfairfechan, mud from shore, sparingly (Thompson, 1889). Beaumaris, HWN, MTL, fine sand, few, June 1966; Gallows Point, MTL, mud, numerous, May 1966; Menai Bridge (Ynys Faelog), HWN, mud, one female, February 1966 (DCG).

Huntemannia jadensis Poppe, 1884. (Sars, 1909, V, p.305; Lang, 1948, p.1294)
Traeth Lligwy, HWS, medium sand, common, April 1966; Beaumaris, HWN, medium sand, numerous, MTL, fine sand, common, June 1966; Gallows Point, HWN, medium sand, few, May 1966 (DCG).

H. micropus Monard, 1935. (Lang, 1948, p.1295; Geddes, 1968, p.443 (♂)).
Beaumaris, HWN. medium sand, few, June 1966; Gallows Point, medium sand, in moderate numbers, June/August 1966 (DCG).

Pontopolites typicus T. Scott, 1894. (Sars, 1909, V, p.309; Lang, 1948, p.1296).
Gallows Point, MTL, mud, one female, May 1966; Menai Bridge, LWS, very coarse shell gravel, few, March 1966; Church Island, LWS, very coarse shell gravel, few, April 1966 (DCG).

Eurycletodes (Oligocletodes) similis (T. Scott), 1895. (Sars, 1909, V, p.295; Lang, 1948, p.1311).
Rhosneigr, HWS, fine sand, one female, May 1966 (DCG).

Stylicletodes longicaudatus (Brady & Robertson), 1880. (Sars, 1920, VII, p.77, as *Cletodes leptostylis*; Lang, 1948, p.1328).
Llanfairfechan, mud from shore, sparingly (Thompson, 1889, 1893, as *Cletodes*).

Family LAOPHONTIDAE

Laophonte cornuta Philippi, 1840. (Sars, 1907, V, p.235; Lang, 1948, p.1347; Lang, 1965, p.448).
Puffin Island, by tow-net, one only (Thompson, 1888, as *L. serrata*). Off Puffin Island, rare (Thompson, 1893, as *L. serrata*). Black Rocks, on algae, few, April 1954 (CLO). Cae Coch and Black Rocks, LWM, fairly common, March 1955 (CLO). Black Rocks, LWM, on algae, few, March 1956 (CLO). Rhosneigr, LWM, March 1971 (CLO).

L. setosa Boeck, 1864. (Sars, 1908, V, p.224, as *L. similis*; Lang, 1948, p.1351)
Colwyn Bay, in dredged material (Thompson, 1893, as *L. similis*). Nevin, LWM, on algae, few, March 1956 (CLO). Penrhyn Flats, LWM, on algae, fair numbers, March 1963 (CLO). Penrhyn Flats, HWM, on *Enteromorpha*, numerous. Cae Coch and Black Rocks, HWM, on *Enteromorpha* and red algae, fair numbers, Rhosneigr, HWM, few, April 1965 (CLO).

L. thoracica Boeck, 1864. (Sars, 1903, V, p.240; Lang, 1948, p.1352).
Near Puffin Island, tow-net, sparingly, (Thompson, 1889). Puffin Island, by tow-net amongst algae, "our only specimen" (Thompson, 1893).

L. elongata Boeck, 1872. (Sars, 1908, V, p.241; Lang, 1948, p.1354).
Black Rocks, LWM, on algae, fairly common, March 1955 (CLO).

L. denticornis T. Scott, 1894. (Sars, 1908, V, p.264; Lang, 1948, p.1357).
Menai Bridge, LWS, very coarse shell gravel, few, March 1966 (DCG).

Heterolaophonte stroemi (Baird), 1834. (Sars, 1908, V, p.251, as *Laophonte*; Lang, 1948, p.1368).
Puffin Island, in tidal pools (Thompson, 1893, as *Laophonte curticauda*).

H. minuta (Boeck), 1872. (Sars, 1908, V, p.253, as *Laophonte*; Lang, 1948, p.1371).
Gallows Point, HWN, medium sand, one female, May 1966 (DCG).

H. littoralis (T. & A. Scott), 1893. (Sars, 1908, V, p.255, as *Laophonte;* Lang, 1948, p.1372).
Cae Coch, LWM, on algae, not common, March 1955 (CLO).

Paronychocamptus curticaudatus (Boeck), 1864. (Sars, 1908, V, p.252, as *Laophonte*; Lang, 1948, p.1381).
Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), fine muddy sand, few, May 1966; Beaumaris, HWN, fine sand, numerous, MTL, fine sand, common, LWN, fine sand, numerous June 1966; Gallows Point, LWN, LWS, very fine muddy sand, few, May 1966; Church Island, LWS, very coarse shell gravel, one male, April 1966 (DCG).

P. nanus (Sars), 1908. (V, p.262, as *Laophonte*; Lang, 1948, p.1382).
Four Mile Bridge, MTL (A), very fine muddy sand, numerous, MTL (B), fine muddy sand, few, May 1966; Port Dinorwic, LWS, medium sand, one male, July 1966 (DCG).

Paralaophonte brevirostris (Claus), 1863. (Sars, 1908, V, p.256, as *Laophonte;* Lang, 1948, p.1389).
Gallows Point, LWS, very fine muddy sand, one female, May 1966 (DCG).

Asellopsis hispida Brady & Robertson, 1873. (Sars, 1908, V, p.268; Lang, 1948, p.1401).
Puffin Island, by tow-net, surface, one only (Thompson, 1893, as *Laophonte*).

A. intermedia (T. Scott), 1895. (Lang, 1948, p.1402).
Trearddur Bay, MTL, coarse sand, few, LWS, medium sand, few, July 1966;

Llanfawr, HWN, fine sand, common, MTL, fine sand, numerous, June 1966; Porth Trefadog, LWN, LWS, fine sand, few, June 1966; Cemaes Bay, HWN, fine sand, numerous, MTL, fine sand, few, LWN, fine sand, numerous, LWS, fine sand, few, April 1966; Traeth Lligwy, MTL, LWN, medium sand, few, April 1966; Traeth Bychan, HWN, MTL, LWN, medium sand, few, LWS, fine sand, few, April 1966; Beaumaris, HWN, medium sand, few, MTL, fine sand, numerous, LWN, fine sand, one female, June 1966; Gallows Point, HWN, medium sand, numerous, May 1966; Church Island, LWS, very coarse shell gravel, one female, April 1966; Port Dinorwic, LWS, medium sand, numerous, July 1966; Tal-y-foel, LWN, fine sand, common, LWS, fine sand, few, August 1966 (DCG).

Platychelipus littoralis Brady, 1880. (Sars, 1908, V, p.274; Lang, 1948, p.1404). Penmon Point, mud, numbers of both sexes, coll. W. S. McMillan (Thompson, 1889). Puffin Island, Llanfairfechan, Garth Ferry, LWM, mud, in abundance (Thompson, 1893). Church Island, HWM, mud, near main shore, one female, April 1965 (CLO). Four Mile Bridge, MTL (A), very fine muddy sand, few, MTL (B), fine muddy sand, common, May 1966; Beaumaris, HWN, MTL, LWN, fine sand, common, LWS, very fine muddy sand, common, June 1966; Gallows Point, MTL, mud, few, LWN, very fine muddy sand, common, LWS, very fine muddy sand, few, May 1966; Menai Bridge (Ynys Faelog), HWN, MTL, mud, common, LWN, mud, numerous, February 1966; Port Dinorwic, LWS, medium sand, one male, July 1966 (DCG). Red Wharf Bay, mud, two females, March 1971 (CLO).

Pseudolaophonte spinosa (Thompson), 1893. (Sars, 1911, V, p.428; Lang, 1948, p.1414. Menai Bridge, LWS, very coarse shell gravel, two males, March 1966; Church Island, LWS, very coarse shell gravel, one male, April 1966 (DCG).

Onychocamptus mohammed (Blanchard & Richard), 1891. (Gurney, 1932, p.316, as *Laophonte*; Lang, 1948, p.1417). North Wales, no other data (Scourfield, 1895).

Laophontina dubia Norman & T. Scott, 1905. (Lang, 1948, p.1425). Porth-y-post, MTL (A), coarse shell gravel in pool, few, MTL (B), coarse shell gravel in pool, few, July 1966 (DCG).

Laophontopsis lamellifera (Claus), 1863. (Sars, 1908, V, p.266; Lang, 1948, p.1476, as *Cleta*). Near Puffin Island, tow-net, very sparingly (Thompson, 1889, as *Laophonte*). About Puffin Island, two-net, amongst algae, frequently taken (Thompson, 1893, as *Laophonte*). Gallows Point, HWN, medium sand, two females, May 1966 (DCG).

Normanella minuta (Boeck), 1872. (Sars, 1909, V, p.278; Lang, 1948, p.1440). Gallows Point, HWN, medium sand, one female, May 1966; Menai Bridge (Ynys Faelog), HWN, mud, one female, February 1966 (DCG).

SUMMARY

134 species of harpacticoid copepod belonging to 21 families are recorded from the coasts of Anglesey and North Wales. The records, which include information on substrata, are derived from a survey of the faunas of littoral sands and muds carried out in 1966, and are collated with other published and unpublished records relating to the area.

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The survey work was carried out during a year's leave from St. John's College of Education, York, and I am indebted to the Principal, the Rev. Canon P. J. Lamb, and to the Department of Education and Science for making this study leave possible.

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Appendix

Results of the Substrate Analyses

Locality	Tidal Level	Median Diameter (μ)	QDφ*	Skqφ*	% by weight fine particles: Very fine sand 124-66μ	% by weight fine particles: Silt <66μ
Port Dinorwic	LWS	320	0.71	—0.01	10.0	0.3
Tal-y-foel	LWN	190	0.30	0.00	2.0	—
	LWS	190	0.33	—0.03	1.3	—
Porth Trecastell (Cable Bay)	HWN	230	0.43	0.08	1.8	—
	MTL	340	0.34	0.03	0.3	—
	LWN	340	0.34	—0.34	0.2	—
	LWS	330	0.41	—0.06	0.4	—
Rhosneigr	HWS	200	0.36	—0.06	4.0	—
Castell	MTL	320	0.71	—0.03	10.0	0.3
	LWN	460	0.73	0.05	3.5	0.1
	LWS	650	0.89	—0.23	1.3	0.1
Trearddur Bay	MTL	540	1.04	—0.11	0.1	—
	LWN	330	0.71	—0.11	0.3	—
	LWS	430	0.60	0.03	0.2	0.1
Porth-y-post	MTL(A)	650	0.39	—0.06	0.1	—
	MTL(B)	800	0.45	—0.08	—	—
Llanfawr	HWN	180	0.19	0.01	2.9	—
	MTL	170	0.28	0.00	13.7	0.1
	LWS	120	0.44	—0.04	55.7	0.1
Four Mile Bridge	MTL(A)	110	0.49	0.01	46.2	15.8
	MTL(B)	150	0.47	0.10	26.6	11.2
Porth Trefadog	MTL	200	0.28	—0.03	4.5	—
	LWN	190	0.24	0.01	2.9	—
	LWS	180	0.25	0.00	5.3	—
Porth Swtan (Church Bay)	MTL	210	0.35	—0.05	0.6	—
	LWN	220	0.39	—0.06	0.7	—
	LWS	200	0.38	—0.05	1.0	—
Cemaes Bay	HWS	230	0.41	—0.06	0.1	—
	HWN	240	0.44	—0.04	0.2	—
	MTL	200	0.40	—0.08	0.6	—
	LWN	210	0.44	—0.06	0.2	—
	LWS	210	0.41	—0.06	0.2	—
Traeth Lligwy	HWN	300	0.40	0.05	0.1	—
	MTL	300	0.41	—0.04	0.3	—
	LWN	380	1.11	—1.08	0.1	—
Traeth Bychan	HWS	400	0.59	—0.11	—	—
	HWN	260	0.50	—0.05	0.1	—
	MTL	280	0.55	—0.08	0.1	—
	LWN	280	0.61	—0.11	0.1	—
	LWS	240	0.50	—0.05	0.3	—
Church Island	LWS	1080	0.75	0.15	2.6	0.1
Menai Bridge	LWS	1900	0.65	0.10	3.1	0.6
Menai Bridge (Ynys Faelog)	HWN	20	1.43	0.46	4.5	90.4
	MTL	40	0.92	0.23	14.9	77.5
	LWN	30	2.25	0.97	17.5	67.7
Gallows Point	HWN	300	0.39	—0.01	1.3	1.2
	MTL	70	—	—	34.8	50.1
	LWN	90	—	—	30.1	37.3
	LWS	100	0.50	0.00	42.9	21.7
Beaumaris	HWN	360	0.27	—0.05	0.8	0.2
	MTL	160	0.34	—0.01	16.8	7.4
	LWN	160	0.36	0.02	24.2	3.2
	LWS	90	0.53	—0.08	47.0	23.4

*See Morgans (1956) for a discussion of the Phi quartile deviation (QDø) and the Phi quartile Skewness (Skqø).

BRYOLOGICAL MEETING AT TODMORDEN, V.C. 59 and 63, 11-12 September 1971
A Pilgrimage to the John Nowell Country

F. E. Branson

The choice of Todmorden for the autumn Bryological Meeting was indeed a happy one and we enjoyed lovely sunny weather for the whole time. In spite of the fact that the area has been so thoroughly bryologised in the past, we were able to make a number of additions including one new vice-county record for V.C.63.

In the preface of the *Flora of Todmorden* by the late Abraham Stansfield and John Nowell of Todmorden, the editor Abraham Stansfield of Manchester says . . . "for as regards the lower spore-plants of cryptogams, probably no similar area of England has at any time been so throroughly 'ransacked.' Indeed, the labours of the late Mr John Nowell in this field were so successful as to excite the wonder and admiration of botanists of more than European fame. And there can be little doubt that the botanical records made by this humble factory operative, whose attachment to his native region was such that no offers of worldly advancement could ever detach or wean him from it, will be read with interest when, through vicissitude of trade, or the advancement of science as applied to the industrial arts, every factory chimney in the Todmorden and neighbouring valleys shall have been razed to the ground."

The kindness of the members of the Todmorden Natural History Society made a great impression on all of us and added much to the enjoyment of this meeting. We were welcomed by Mr Clifford Suthers (President), Mr Philip Spence (Secretary) and Mr. Fred Elliman, all of whom conducted us around places in the locality most calculated to be of interest. On the Saturday morning, before commencing our investigations, we visited the obelisk erected to John Nowell outside the front porch of St. Mary's Church by the Todmorden Botanical Society. This impressive memorial bears the inscription "In memory of John Nowell, a working man and vice-president of the Todmorden Botanical Society for 15 years. His unassuming manner, kind disposition, as well as his extensive knowledge of cryptogamic botany endeared him to a wide circle of admiring friends." On the four sides of the base are (1) John Nowell; (2) Born at Springs, Harley Wood, September 28th. 1802; (3) Erected by the members and friends of the Botanical Society, 1868; (4) Died October 28th, 1867, and was interred at Cross Stone.

The history of this remarkable man, who devoted himself to the study of science for its own sake rather than for either fame or profit, is full of interest. He enjoyed the friendship of many of the most eminent living botanists including Dr. Schimper, of Strassbourg, who on visiting him at his home in Todmorden remarked that he was astonished to find such a profound botanist toiling at the same time for his daily bread in the humblest walks of life. Such men he considered were one of England's greatest ornaments and peculiar to our country. Mr Spence is himself a blood-relation of John Nowell.

It is as well to include here a note on the vice-county boundaries. At the time when H. C. Watson drew up the limits of his vice-counties, the boundary between Lancashire and Yorkshire to the west of Todmorden was the Yorkshire Calder, coming down the valley from its source near Holme Chapel through Portsmouth and Cornholme to Todmorden. Some years later, however, the Yorkshire boundary was extended to the west by the taking in of some 11.6 square miles of former Lancashire territory. This meant that part of V.C.59 was now in Yorkshire. Whilst recognising the original vice-county boundaries of Watson as inviolate, it did seem desirable to the Bryological Section that at least a part of our meeting should be devoted to the investigation of that part of Yorkshire which lies in V.C.59. The two areas of V.C.59 visited were (1) Lovers' Walk, above and immediately to the west of Centre Vale Park; and (2) Gorpley Clough. off the Todmorden to Bacup road. The rest of the meeting (Harley Wood, Stannally Clough and Springs area, and Hippins Bridge) was held in V.C.63.

Lovers' Walk (V.C.59): This long, "leafy" and wooded lane is bounded by a wall on one side which was the home of many interesting bryophytes. Rupestral species always have a peculiar fascination for the bryologist and we were not disappointed. Among turf was *Acrocladium stamineum*; on the path side was

Pohlia annotina and *Ditrichum heteromallum;* on a tree base and wall was *Orthodontium lineare* (not recorded by Nowell, of course, as it was only first observed in 1920 near Greenfield but has now spread to most parts of the couunty); *Aulacomnium androgynum* seemed pretty plentiful, although in the *Flora* Nowell gives Ratton Clough as the only locality. Of the hepatics we saw, *Lophozia ventricosa* is given as rare; *Nardia scalaris* seen in many places, also given as rare; *Calypogeia arguta,* of which I had some nice specimens from several places, is not mentioned at all.

Stannally Lane, Stannally Clough and Springs (V.C.63): Springs, the birthplace of John Nowell, is now a derelict and ruined farmhouse on a hillside. I collected a number of specimens from the fallen stones at the back of the house. These were *Bryum argenteum, Pohlia nutans, Ceratodon purpureus* var. *purpureus, Bryum capillare, Dicranella heteromalla* (mixed with this last was the hepatic *Cephaloziella starkei,* which Nowell says is tolerably common). *Barbula rigidula* and *B. recurvirostra* were on a wall in Stannally Lane (not mentioned in the *Flora*) and *Dicranella rufescens* from earth in Wickenberry Clough (given in *Flora* as not uncommon).

Gorpley Clough (V.C.59): This is a very deep valley with a stream in the bottom and very steep sides—a paradise for the bryologist. *Oligotrichum hercynicum* was on a clay bank; I gathered *Brachythecium populeum* from the top of the bank; *Barbilophozia attenuata* (without the attentuate shoots and with cells 15-21μ in width were much too small for *B. atlantica* which at first I thought it was); *Calypogeia arguta* was also found here. Miss Dalby visited some tufa formation at the side of the clough and discovered *Eucladium verticillatum* (not mentioned in the *Flora*) and *Tetraphis browniana* in fine fruiting condition. This is given as one of the locations for it in the *Flora* and it is probably the very place from where Nowell himself recorded it.

Hippins Bridge and Clough (V.C.63): It was in a small roadside quarry with a marshy bottom that *Pellia neesiana* was found, a new record for V.C.63. *Nardia scalaris* was also here. The stream was of great interest and luxuriant with bryophytes. *Atrichum crispum* grew in great patches at the streamside, a quite common moss in the area, as we found it at Greenfield during a previous meeting. *Oligotrichum hercynicum* was also seen in a large patch. Neither of the sites in which this moss was seen on the present excursion corresponds with the two sites given in the *Flora*. *Gymnocolea inflata* was very common, covering stones by the stream. Lastly we went to a valley a short distance away and were shown a cave in which grew *Schistostega pennata.* We could see it gleaming in the dark but could not reach the narrow fissure where it was. However, I was able to locate some in a rock crevice (on loose sand) outside.

It has been difficult to select the species for mention above and I have omitted many that I would have liked to comment on. We are all agreed it was one of the best meetings we have ever had.

	Lovers' Walk (59)	Gorpley Clough (59)	Stannally Clough area (63)	Hippins Bridge (63)
Sphagnum palustre			x	
S. squarrosum				x
S. recurvum			x	x
S. cuspidatum			x	
S. subsecundum var. *inundatum*				x
S. subsecundum var. *auriculatum*		x	x	x
S. fimbriatum		x	x	x
S. capillaceum			x	
Atrichum crispum		x		x
A. undulatum		x		
Oligotrichum hercynicum		x		x
Polytrichum aloides		x		x
P. commune		x	x	x
Fissidens bryoides	x			
F. taxifolius		x		
Ditrichum heteromallum	x			

	Lovers' Walk (59)	Gorpley Clough (59)	Stannally Clough area (63)	Hippins Bridge (63)
Ceratodon purpureus var. *purpureus*	x	x	x	
Dicranella palustris		x	x	x
D. rufescens			x	
D. heteromalla	x	x	x	x
Campylopus pyriformis	x	x		x
Tortula muralis	x		x	
Barbula convoluta	x			x
B. unguiculata	x			
B. rigidula			x	
B. cylindrica	x		x	
B. recurvirostra			x	
Eucladium verticillatum		x		
Rhacomitrium aciculare				x
R. canescens			x	
Funaria hygrometrica	x	x		
Schistostega pennata				x
Tetraphis pellucida	x	x		
T. browniana		x		
Orthodontium lineare	x	x		x
Pohlia nutans	x	x	x	x
P. annotina	x	x		x
P. wahlenbergii	x	x		x
Bryum caespiticium	x			
B. capillare			x	
B. argenteum	x		x	
B. bicolor	x			
Mnium hornum	x	x		
M. undulatum		x		
M. punctatum	x	x		
Aulacomnium androgynum	x			
Philonotis fontana	x	x		x
P. calcarea			x	x
Cratoneuron commutatum var. *commutatum*		x		
Amblystegium serpens	x			
Drepanocladus fluitans			x	x
D. uncinatus				x
Hygrohypnum ochraceum				x
Hygrohypnum luridum			x	
Acrocladium stramineum	x	x		x
A. cuspidatum	x			
Brachythecium rutabulum	x	x	x	
B. rivulare	x	x		
B. populeum		x		
Eurhynchium praelongum	x		x	
E. riparioides			x	
E. murale	x	x		
E. confertum	x		x	
Isopterygium elegans	x	x		x
Plagiothecium succulentum		x		
P. undulatum	x	x		
Hypnum cupressiforme	x	x		
Hyocomium flagellare		x		
Rhytidiadelphus squarrosus	x			
HEPATICAE				
Conocephalum conicum		x	x	
Pellia epiphylla	x	x		x
P. neesiana				x
P. endiviifolia		x		

	Lovers' Walk (59)	Gorpley Clough (59)	Stannally Clough area (63)	Hippins Bridge (63)
Lepidozia reptans		x		
Calypogeia muellerana	x	x		x
C. fissa	x			
C. arguta	x	x		
Lophozia ventricosa	x			
Leiocolea turbinata		x		
Barbilophozia floerkei	x	x		x
B. attenuata		x		
Gymnocolea inflata	x	x		x
Solenostoma triste		x		
S. sphaerocarpum				x
Nardia scalaris	x			x
Lophocolea bidentata	x	x		
L. cuspidata	x			
Chiloscyphus polyanthos		x	x	
Cephaloziella starkei			x	
Cephalozia bicuspidata	x	x	x	
Diplophyllum albicans	x	x		x
Scapania undulata	x	x	x	x

Nomenclature and arrangement for mosses follows *Census Catalogue of British Mosses* (3rd edition) by E. F. Warburg, and for hepatics *Census Catalogue of British Hepatics* (4th edition) by J. A. Paton

My grateful acknowledgments are due to Mrs J. Appleyard, Mr F. Corley, Mr J. H. Field, Mrs J. W. Fitzgerald and Mrs J. A. Paton for giving their views on critical material; also to Mr G. A. Shaw for providing the fifth paragraph above on vice-county boundaries, which was also vetted by Mr F. Murgatroyd.

The Structure and Life of Bryophytes by E. V. Watson. Pp. 211 with 26 text figures Hutchinson University Library. Hardback £2.25: Paperback 90p.

The first edition of this book was reviewed in *Nat.* 1964: 76. It is perhaps a difficult book for the beginner (and indeed is not primarily intended for him), but for University students and others with the necessary academic background it cannot fail to interest and stimulate. A criticism of the first edition was that the text-figures suffered from being too much reduced. This has to some extent been rectified in this third edition. Attention has been drawn to recent bryological literature with the result that over 200 additional references appear in the bibliography, and certain chapters have been. remodelled or largely rewritten. The price is most reasonable for a production of this quality. G.A.S.

Drawings of British Plants: Part 28, Hydrocharitaceae and Orchidaceae by Stella Ross-Craig. G. Bell & Sons Ltd., 1971. £1.

All but four of the 53 plates in this part are of orchids. They are not easy subjects; they tax the resources of all but the most competent of botanical artists. Needless to say Miss Ross-Craig takes them in her stride.

As with all the other parts in this series the drawings fulfil two rôles. Many of the species depicted are of common and well-known or of rare but quite unmistakable plants. The drawings of these are purely for our pleasure. Others — in the so-called critical groups — give help as well as pleasure, and in the present part those of the marsh orchids and helleborines will probably be the most frequently consulted. The drawings of the dissected flowers of the seven species of *Epipactis* illustrated will certainly be of great help in distinguishing the species in this awkward group. Amongst the marsh orchids the characteristically reflexed labellum in *Dactylorhiza incarnata* is not shown nor is it referred to in the notes where it is stated that the leaves are sometimes spotted. Is this ever so in pure *D. incarnata*, and are the flowers ever "flesh-pink" in *D. purpurella*? Though it is true that in the latter species the leaves may be without spots, one would have preferred to see a specimen drawn which showed the distinctive small dots about the distal part of the leaf.

It may be somewhat irrelevant to comment on matters unconnected with the drawings but one notes with interest that the Fly Orchid and Bog Orchid revert to their old names of *Ophrys muscifera* Huds. and *Malaxis paludosa* (L.) Sw. and the erstwhile *Leucorchis albida* now becomes *Pseudorchis albida* (L.) Löve and Löve. W.A.S.

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24-27 September 1971

W. G. BRAMLEY

This was one of the most successful forays both mycologically and socially for many years. Eighteen members and friends enjoyed the hospitality of Goodricke College and the use of the Biological Laboratory at York University during the week-end. Our numbers were augmented by local visitors on most of our outings and reached a total of thirty on the Sunday afternoon. Besides our usual contingent "frae o'er the border" it was a pleasure to meet Dr. Van Brummelen from Leiden, an authority on the Ascobolaceae. Mrs. Fieldhouse, who has visited us before, with other help treated us (with memories of the famous fungus suppers of the now gone Berry Brow Naturalists), to a late feast of *Boletus pseudoscaber*, a quantity of which had been gathered earlier. Nowadays little of what we gather seems to find its way into the culinary department, though we are not always lucky enough to find such a quantity of delicious fungi as we did this time. It was also noted that examples of *Agaricus sylvaticus* found their way north of the border. Another newcomer from the midlands was Mr. S. C. Porter, who helped to illustrate Ramsbottom's "Mushrooms and Toadstools". To this gentleman there was eventually tracked down a puzzling echo of fungus names that were heard. He was recording finds as they occurred on a pocket tape-recorder.

Bramham Park on the Friday was rather dry in spite of fairly heavy rain the previous night. The party of some two dozen got rather split up which probably proved advantageous as fungi seemed less prolific than usual, but in the end a fair number were listed. *Polyporus perennis* again turned up and has been known here for many years; its only other locality in Yorkshire being Allerthorpe Common. (Does it still occur there?). *Lactarius aspideus* with milk which turns purple was collected by Dr. Sledge.

Saturday morning found us at Strensall Nature Reserve which proved surprisingly good. Besides the large quantity of *Boletus pseudoscaber*, Dr. Watling was able to add three species of *Leccinum* to the Yorkshire list. Rabbit pellets taken from here by Mr. Richardson also produced a number of asco- and pyrenomycetes which are not in the Yorkshire records. *Fomes fomentarius* which appears to be getting more frequent on *Betula* was also seen. It has long been known on *Fagus* at Duncombe Park but it is only in the past eight years or so that it has been noted on *Betula* in the Pickering-Helmsley area.

After lunch most of the party went on to Kirkham, which was rather badly off for the larger fungi though the dung experts appeared to be busy. Bishops Wood near Selby is now mostly young conifer plantations. The portion examined on Sunday morning has some older conifers with Ash and Sycamore, which did not produce anything startling with the exception of a species of *Dacryomyces* which has been turning up in the Pickering area during the last two years. To end up the party got completely lost and in spite of a compass and map emerged on the opposite side of the wood to the cars. Deeming discretion the better part of valour it was "boots, boots marching up and down" the mile or so of hard road round the side of the wood back to our transport.

Buttercrambe Moor in the afternoon drew a crowd of thirty with supporters from York and Leeds. Here again there was no big show of the larger fungi but a good list was finally produced.

The final excursion was to Nun Appleton where a pleasant day was spent in the park and gardens with their lawns closely shaved, different from when I knew them in the war days, and in Sickle Pits wood where Andrew Marvel wandered and composed poetry. *Collybia radicata* and *Coprinus atramentarius* in excellent condition proved attractive to the photographers and indicated the old roots of felled trees many yards from the stumps. Jew's Ear on Sycamore was uncommon and a variety of the earth ball, *Scleroderma verrucosum*, was new.

I thank all who helped by collecting and in making the report possible. To Dr. Watling, P. D. Orton, M. Richardson and S. Porter I am indebted for the lists they provided. The species listed are those either not yet listed for Yorkshire or with very few records. A full list has been compiled and added to the records. Specimens of a species of *Coprinus* and *Psilocybe* not yet published were collected at Bramham and Kirkham by Mr. Orton.

B = Bramham Park (V.C. 64)
BC = Buttercrambe Moor (V.C. 62)
BP = Bishops Wood (V.C. 64)
K = Kirkham (V.C. 61)
N = Nun Appleton (V.C. 64)
S = Strensall (V.C. 62)
† = not in *Catalogue of Yorkshire Fungi*
c = cow dung
r = rabbit dung

PHYCOMYCETES (M. Richardson)
Chaetocladium brefeldii, BP, r.
Pilobolus kleinii, K, c.
Piptocephalis arrhiza, BP, r.

DISCOMYCETES (M.R.)
†*Ascobolus albidus*, S, r.
Ascophanus microsporus, K, c.
Ascozonus woolhopensis, BP, r.
Cheilymenia coprinaria, S.
Rutstroemia luteo-virescens, on *Acer* petiole, B.
Saccobolus versicolor, BP, r.
Thelebolus stercorius, BP, r.

PYRENOMYCETES (M.R.)
†*Coniochaeta discospora*, S, r.
†*Delitschia didyma*, S, r.
Melanospora parasitica, on *Isaria farinosa*, B.
Podospora setosa, BP, r; R, r.
Pseudovalsa lanciformis, S, on *Betula*.
Sphaeronaemella fimicola, BP, r.
Sporormia minima, K. c.
†*Trichodelitschia bisporula*, S, r.

UREDINALES (W.G.B.)
Puccinia pygmaea, II.III. on *Calamagrostis epigejos*, B. BP.

AGARICALES (P. D. Orton and R. Watling) Authors according to 1960 Check List.
Amanita sp. aff. *aspera*, N.
Boletus lanatus Rostk., K.
Clitocybe clavipes, BC.
C. odora, BC.
C. suaveolens, BC.
Collybia cirrhata, S.
C. palustris, S.
Conocybe blattaria, K.
C. filaris, BC.
†*C. lactea*, N.
†*C. macrocephala*, K.
†*C. percincta*, BC.
Coprinus acuminatus (Romagn.) Orton, N.
C. heptemerus, BP, r.
C. leiocephalus Orton, BC. K. N. (=*plicatilis* var. *microsporus*)
C. hiascens, BP. N.
†*C. stercoreus* sensu Watling in *Notes Roy. Bot. Gard. Edin.* 1967, BP.K.
†*Cortinarius azureovelatus*, S.
C. helvelloides, BC.
Dermoloma cuneifolium, N.
Drosella fracida, K.
Galerina paludosa, B. S.
G. unicolor, K.
†*Gomphidius roseus*, BC. N.
†*Chroogomphus corralinus* Miller & Watling, N.
Gymnopilus hybridus, B.
Hebeloma sacchariolens, K.
Hygrophorus chrysaspis, B.
†*H. glutinipes*, N.
H. lacmus, B.
†*H. insipidus*, N.
Hypholoma epixanthum, BC.
Inocybe lacera, N.
Laccaria proxima, B.S.
L. striatula, S.
Lactarius aspideus, B.
L. obscuratus, BC. K.
†*Leccinum quercinum* (Pilat) Green & Watling, S.
†*L. roseofracta* Watling, S.
†*L. variicolor* Watling, S.
Leptonia babingtonii, B.
Leucopaxillus giganteus, BC.
Lyophyllum connatum, K.
L. decastes, N.
Melanoleuca melaleuca, BC.
Mycena olida, K.
M. oortiana, K.
†*Naucoria bohemica*, K.
N. celluloderma, K.
†*N. salicis*, K.
N. scolecina, BC. K.
N. striatula, B. BC. K.
N. subconspersa, BC.
†*N.* sp. aff. *clavuligera* Romagn., K.
Omphalina oniscus, S.
Oudemansiella mucida, N.
Pholiota flammans, K.
P. myosotis, S.
Pleurotus dryinus, N.
Pluteus lutescens, K.
P. nanus, K.

P. salicinus, N.
Psathyrella pygmaea, K. N.
†*Psilocybe rhombispora* (Brit.) K.&R., BC.
Russula aeruginea, S.
R. betularum, S.
R. claroflava, S.
R. lauro-cerasi, B.
R. nitida, S.
R. sardonia, B.
Stropharia albocyanea, K.
Tricholoma album, BC.
T. imbricatum, BC.
T. psammopus, BC.
T. saponaceum var. *atrosquamosum*, S.
Tubaria inquilina, K.
Volvariella speciosa, BC.
V. taylori, B.

APHYLLOPHORALES (R.W. *et al.*)
Fomes fomentarius on *Betula*, S.
Hydnum fuligo-album Fr., S (?) found on bench in lab.
Polyporus melanopus
Poria vitrea, BP.

GASTEROMYCETALES (R.W.)
Lycoperdon echinatum, BC.
L. perlatum var. *nigrescens* (=*foetidum* Bon.), BC.
†*Scleroderma verrucosum* var. *fasciorhizum* Sebek, N.

CORRESPONDENCE

Dear Sir,

Some of your readers may be interested to learn that the old yew tree in the churchyard of St. Mary's Church, Eastham, on the Wirral Peninsula, is in danger through decay. This tree is reputed to be well over one thousand years old. Certainly it was old in 1152 for, when the Abbot and monks of St. Werburgh received the Manor of Eastham at the hand of Earl Randall of Chester, the villagers of Eastham entreated the new owner "to have a care of ye olde yew".

If the tree is to be preserved it is essential that it should receive treatment without delay. The Parocial Church Council is arranging for the tree to be treated and they would be very grateful for any donations from persons interested in its welfare.

Yours faithfully,

NORA BAILEY, Hon. Secretary,
4 Doe's Meadow Road, Bromborough, Cheshire.

Dear Sir,

I was most interested in the method used by Ian Massey in sampling the population ratios of small mammals in a circumscribed area, by the analysis of pellets from a resident barn owl. I have used an entirely different method to determine a similar ratio of small mammals in my half acre of garden.

The garden consists of lawns, flower beds, rockery, shrubbery, vegetable garden and orchard. It is bounded on both sides by neighbours' gardens and dry stone walls separate it from rough hillside pasture at the back and from the Scarborough —Ravenscar Road at the front. To protect my apples, potatoes and other stored crops, I have set spring traps in my wooden tool-shed and garage.

During the ten years 1960-69, my records of captures are as follows:-
House Mouse 44—Wood Mouse 380—Bank Vole 76—Short-tailed Field Vole 0—Common Shrew 106—Pigmy Shrew 33—Water Shrew 3.

The absence of Short-tailed Field Voles is curious as these are more numerous in the area than Bank Voles and the occational capture of Water Shrews is noteworthy, as we are a long way from the nearest stream.

Naturally these records present a very different picture from Mr. Massey's, but it has points of interest for owners of country gardens who may be unaware of the numbers of small creatures that share their territory. Late in 1969 a family of feral cats set up their headquarters in the shubbery and as a result my recordings are no longer of interest.

Yours faithfully,

R. S. POLLARD
Ackworth Cottage, Cloughton, Scarborough.

BOOK REVIEWS

Purpose in Animal Behaviour by **F. V. Smith.** Pp. 192 with 25 text figures. Hutchinson University Library, London, 1971. 90p.

This is an interesting book in that it attempts to view a number of well-known aspects of animal behaviour from a particular standpoint. The main theme is that there must be "a form of conscious awareness of the environment and of the organism's own needs and related conscious, purposeful behaviour by the organism". To this end the author devotes a post-introductory chapter to the difficulties of explanation, which is in essence the most valuable in the book. It is a very useful review of biological thinking on the question of animal behaviour, not forgetting psychology, covering the variously held theories and methods of potential explanation through the history of the subject up to modern cybernetics and systems theory. Subsequent chapters are then devoted to considerations of the data on a number of aspects of behaviour, the parent-young relationship, finding the way about, social organisation, ritual in sexual approaches, and a limited consideration of territory, followed again by social organisation specifically in primates. All this makes the main section of the book rather disjointed and highly selective though the facts presented are brought together in a form which will be handy for reference as they are derived from a wide variety of sources. Finally an attempt at assimilation into the initially stated theme is made in the concluding chapter. It is perhaps to be regretted that the book remains on two distinct levels, the factual and the philosophical, as the time has come when this sort of integration is becoming necessary; but it is a useful bridge in that direction. I.W.

Field Guide to British Deer Second edition compiled and edited by **F. J. Taylor** Pp. 83 with numerous drawings, diagrams etc. Blackwell Scientific Publications, 1971. £1.00.

The Watcher and the Red Deer by **Richard Perry.** Pp. 183. David and Charles, 1971. £2.00.

These two books about deer are both recent editions, the first mentioned a re-print and extensive revision of the field guide which first appeared in 1957. The second work is a re-issue of Richard Perry's work which was first published in 1952. It is a fine piece of nature writing in which the yearly cycle of a Red Deer herd's life unfolds against a Scottish background. In their approach to deer these books are entirely opposite in style and yet have in common their ability to evoke their elusive subjects. For the armchair observer *The Watcher and the Red Deer* would make an ideal fireside companion, whilst the *Field Guide* might stir even the most inactive of naturalists into consideration of which deer species might be living on his doorstep.

The revision of the 1957 edition is pretty complete and has been necessitated by the amount of deer study which has taken place in recent years. The seven species which live wild or feral in Britain are comprehensively treated in respect of identification, life histories and behaviour. Other sections cover study techniques, information sources and the terms of venery. Distribution on a county and island basis is given in tabular form. The illustrations by Michael Clark are very apt — particularly the end paper sketches. These capture the fleeting and yet haunting flavour of such deer encounters which fall to the lot of most of us. A mine of information, the *Field Guide* is well worth a pound to any naturalist, whatever his or her speciality. T.M.C.

The Countryside on View by **Elisabeth Beazley.** Pp. 207 with 22 black and white photographs and 20 text figures. Constable, 1971. £1.50.

This is a handbook for those concerned with presenting to the public natural environments and ancient monuments. In this interpretive age, when a mobile public visits country houses by the score and nature trails by the dozen, standards of presentation are naturally subject to comparison. The author has filled a vacant niche in admirable style, and has provided a book worthy of being studied seriously by a wide readership.

For anyone concerned with countryside interpretation, museum worker, field centre organiser, country house owner or whatever this is a must for the working library. The visitor to such establishments will also profit from this book too, if only by the sharpening of his or her critical faculties. Labels and signboards, fences and barriers, car parks and cafeterias have all to be considered by the planner who wishes to present a site to a wide public. Sometimes these obtrude to such an extent as to make nonsense of a whole scheme.

At the present time appeals are being made for money to save or preserve everything from cathedrals to marshlands. Since the money comes from the public it is inevitable that the public will want to see that for which it has paid out. This book can do much to ensure that the meeting between the two is not unhappy for either. T.M.C.

The Struggle for the Great Barrier Reef, by **Patricia Clare.** Pp. 224 with 15 coloured plates. Collins, London & Sydney, 1971. £2.50.

Miss Clare's book can be recommended with pleasure both as an accurately informed natural history of a fascinating part of the world, and also as a very good introduction to the complexity of the problems involved in the overlapping fields of preservation and pollution control. The author does not consider in any depth the really daunting technical difficulties which face a biologist actually engaged in such work, since this is not the aim of her book, but she does highlight skilfully some of the human problems which arise and how much more intractable they are in detail than might appear at first sight. In the case of the Reef there is the struggling sugar planter whose soil is deficient in lime, is he to be allowed to grind up a few tons of the apparently endless miles of dead coral? Can the holiday makers be allowed, in their rapidly increasing numbers, to tramp the shallows in their heavy boots (necessary against the poisonous rays of the Stonefish), collecting corals and shells at will? Or skin diving with their harpoon guns? Or on the other hand the great companies wishing to bore for oil or search for minerals? Each application to exploit the Reef may have limited and quite reasonable objectives but taken all together they threaten total destruction. Perhaps the dramatic attack upon the coral polyps by the Crown-of-thorns starfish may have some compensatory value in focussing public attention on the whole Reef, problem before it is too late and so bringing pressure upon, but also giving support to the politicians in the very difficult decision they have to make. If so one may hope that the present book, both sympathetic and outspoken, may help to form the balanced udgements upon which the success of their decisions must depend. T.K

Woodland Birds, by **Eric Simms.** Pp. 391 with 27 figures, 31 tables and 28 illustrations. Collins, *New Naturalist* Series, 1971. £3.00.

The amount of work which has gone into this important volume can be gauged by the extent of the bibliography — 19 closely packed pages. Simms, who will be known for his sound-recording and allied work for the B.B.C., has obviously made woodland birds his other forte. Yet one is tempted to ask whether a more appropriate title might not have been "Woods and their Birds", for he initially deals with the woodland itself in great depth and then goes on to consider the long-term fluctuations in climate and changes in vegetational cover consequent upon successive glaciations, together with the probable origin of the birds associated with the different types of woodland.

Since neolithic times 90% of our native forests have been cleared. The amount of woodland per county and the distribution of mainly deciduous and mainly coniferous woods come out clearly in two full-page maps. Much of the material for this chapter on "Woodlands in Historic Times" obviously derives from the Forestry Commission. Having set this complex environmental scene which we call woodland the author takes us in successive chapters to oakwoods in summer and oakwoods in winter to study their avifauna. The author shows us that "every organism in a wood, from the giant oaks down through the birds to the fauna of the soil, occupies a niche in the ecosystem and each must play some part in the harmonious working of the whole". One is perhaps tempted to question such statements as "Long-tailed Tits, which start the winter searching hawthorns for food, switch to the twigs of oaks from December to April." (p. 114) but is then humbled by the realisation that one's own lack of precise detailed recording compares unfavourably with the obviously meticulous note-keeping of the author. He draws on a multitude of personal observations and welds them most skilfully with the more important references from earlier works.

Alder, birch, ash, beech, mixed and coniferous woods each have their own chapter, dealing with the order of frequency of the bird species within them. Not surprisingly, in view of the author's well-known work in sound-recording, 25 pages are devoted to woodland birdsong and I am glad that he hints, if he does not actually claim, that not all bird song is purely utilitarian.

Other sections deal with changes in bird populations through the various stages of development as succession progresses in both seral communities and artificial plantations. Birds of "Woodland fragments, farms and forest edge" occupy a whole chapter as do "Woodland Birds in Towns". Factors controlling numbers are examined, and the special relationship between birds and forestry practices are dealt with. We read of one County Trust being responsible for 462 nest-boxes. The wisdom of mixed planting is shown. A detailed suggestion which

I found interesting was that whilst brashings left on the ground provide some suitable low nest sites, much could be done to encourage nesting at a higher level by such species as thrushes and blackbirds by tying branches in bundles and lashing them to the trees.

The final 70 pages comprise a systematic list of woodland birds with notes on their status and distribution within the British Isles, the habitats they occupy, their European distribution, together with additional notes on nesting, feeding habits etc.

This is a book which will appeal not only to the ornithologist, but also to botanist, entomologist, ecologist and general reader alike. I am sure I shall come back to it time and again. For its price, we really have two books for the cost of one; a book about woods and a book about birds. R.F.D.

Insect Natural History by **A. D. Imms.** Third Edition. Pp. 317 with 40 colour and 32 black and white plates, 40 text figures and 8 distribution maps. Collins, 1971. £2.50.

This popular volume in the *New Naturalist* series was first published in 1947. Dr. Imms died in 1949 and the text was revised for the second (1956) edition by Dr. G. C. Varley and Dr. B. M. Hobby. For this third (1971) edition Mr. Michael Tweedie has re-written Chapter 3, "On Wings and Flight", and has supplied a new figure in that chapter.

The text and illustrations remain substantially as in the first edition and such was the excellence of the book in its original form that it is right and proper this should be so. Minor errors in the first edition have been corrected but the caption to the illustration on Plate IX(d) is still wrong. Whatever the insect may be, it is not a female Stag Beetle. This was pointed out in the original review in this Journal and presumably no one would now like to hazard a guess at the true identity! A miss-print in this edition occurs in a reference in the Documentary Appendix on page 296. The 1943 volume of the *Entomologists' Monthly Magazine* is 79, not 70 as stated three lines from the bottom of the page. There has been only one change in the plates, that of Crane-flies in the original being replaced by a much more attractive series of three beetle photographs which first appeared in *Mountains and Moorlands* by W. H. Pearsall. Over the years a number of the colour plates have lost some of their original quality, the photograph of the Red Admiral in plate 24 being outstandingly poor in the review copy.

The chapter by Mr. Tweedie is an improvement on the original, incorporating some relatively new material, but in order to compress the increased length within the original page limits a smaller type has had to be used which I found irritating.

The distribution maps at the end of the book are exactly as they appeared over twenty years ago and it is to be regretted that the opportunity has not been taken to replace them with others in a more up-to-date format. Comparison of the maps relating to the three Orthopterans with the latest published work on the Order shows some deviations. If, as our first reviewer suggested in 1947, these maps were pointless then, they are now not only pointless but probably inaccurate.

Insect Natural History is a book of high merit as it stands, but is it too much to hope that another future edition will incorporate at least one new chapter dealing with the many ways in which the study of insects and our knowledge of their lives and distribution have developed since the book was first written? R.C.

Insects: World of Miniature Beauty. Translated from the Italian of Umberti Parenti, with a foreword by Michael Tweedie. Photographs by Carlo Bevilacqua, line illustrations by oyce Bee. Orbis Books, London, 1971. £1·25.

In his introduction Michael Tweedie says, "Insects may be harmful or useful, but they are important to us in another entirely different way. Many of them are beautiful and a delight to watch in the wild and to examine as specimens with a lens or microscope. The loveliness of butterflies is very generally appreciated, but few people realise how intricately exquisite the jointed armour of a small beetle may be. This kind of beauty is revealed to perfection by skilled close-up photography of the kind displayed in the hundred odd colour plates that illustrate this book."

The colour plates are quite superb and the text accompanying them is concise and to the point. Many of the insects portrayed are not British but that does not lessen the interest of the book which is aimed primarily at the general nature lover rather than the entomologist. R.C.

Concise Encyclopedia of Nature. Edited by **Michael Chinery.** Pp. 254. Copiously illustrated in colour and black and white. Purnell, 1971. £1.75.

This book is designed to appeal to the 9 to 15 age group and it certainly did just that to my three children whose ages are precisely within those limits. I have nothing but praise for this volume. The text is crisp and concise, simple but accurate, and although every subject is dealt with only briefly, enough information is given to cover the essentials. The mass of illustrations are a delight, both the photographs and drawings being of a high standard and they range over the whole realm of nature on a world scale.

In addition to the brief chapters on topics ranging from The Living Cell to Conservation, there is a Dictionary of Flower Families and a Dictionary of Animals. The choice of subjects to be included in the Dictionaries must have presented the editor with many problems and there are some curious omissions, Damsel-Flies being included but not Dragonflies, the Rabbit but not the Hare.

Inevitably there will be some inaccuracies. Linnaeus lived in the eighteenth century, not the seventeenth as stated on p. 13. But this is a minor criticism and the book can be thoroughly recommended as an ideal present (and it is not only the children who will enjoy it either). By modern standards the price is very modest. R.C.

A Key to the larvae, pupae and adults of the British species of Elminthidae, by **D. G. Holland.** Freshwater Biological Association, Scientific Publication No. 26, 1972. £0·40.

The keys cover to specific level larvae and adults, and to generic level pupae, of the eleven species of tiny water-beetles of the family better known as Elmidae. Short accounts are included on systematics, collecting, examination and life histories (but no mention of what these insects feed on). Distribution maps for each species, based on 10 km. squares, are to the same scale as those in the *Atlas of the British Flora* so the overlays in that work will fit these maps also.

For the first time, the work provides adequate keys to the larvae and pupae. Adults are easy to identify with the existing literature except in the case of *Oulimnius (Limnius)* and the *Riolus/Normandia* group where it is necessary to examine the genitalia to be certain of identification. Male and female genitalia are figured and although the species which require dissection are generally less than 2 mm. in length, even old specimens are not too difficult to deal with. The figures of genitalia are very clear, those of the adult beetles less so, but adequate. The author writes of placing three adult *Oulimnius troglodytes* into a dish containing twenty *O. tuberculatus* and then being unable to distinguish them until they were dissected. This is not surprising. All the reviewer's examples but one of *O. tuberculatus* seem to fall midway in external characters between the figures of these two species shown here (fig. 3e, 3f) although clearly distinct on genital characters.

Entomologists and fresh-water biologists will be grateful for this clear guide. The distribution maps do little more at present than indicate the possibility that most of these beetles could occur anywhere in Britain where there are quickly flowing streams or stony lake shores, but they may inspire collectors to fill in the gaps.

J.H.F.

Your Book of Watching Wild Life by **Michael Blackmore** with drawings by Eileen Hill. Pp. 80 with 12 plates and 10 text drawings. Faber and Faber, 1971. £1.10.

The author commences by saying that mammals are most active at night and therefore difficult to observe directly but there are many signs and indications of their presence if only one knows what to look for, how and where. Requirements of the naturalist are few but guidance is offered as to the selection of binoculars and the opportunities of companionship and help so readily available to the young naturalist through membership of the various natural history societies, both national or especially local. From p. 33 the book is divided into sections dealing with the main orders of mammals and more specific suggestions as to the location of the more common among them, along with snatches of information about the animals themselves and their habits. The book is written in an interesting manner and attractively produced. Both plates and illustrations are pleasing. E.H.

The Natural History of Selborne by **Gilbert White.** Edited and introduced by R. M. Lockley. Dent, Everyman's Library, 1971. Paper-backed edition, 60p.

A re-print of the classic letters of Gilbert White to Thomas Pennant and The Honourable Daines Barrington. If any naturalist of adult years has not so far read these, then he or she should rectify this immediately. This edition can be especially recommended for its introduction by R. M. Lockley which adds to the pleasure of reading (or re-reading) the words of Gilbert White.

Two hundred years ago, when these letters were written, British natural history was leaving the dark ages and entering a sort of golden age. Gilbert White's contributions to zoology at this time included the final identification of the three leaf warblers — Wood, Willow and Chiffchaff, the addition of the Harvest Mouse to the British fauna and a sensible contribution to current migration theories where birds were concerned. He also gave a picture of Hampshire which, in the vicinity of Selborne anyway, offers complete contrast to the present state of the county. Because of Gilbert White, to an overwhelming extent, the Selborne area remains an oasis in a desert of motorways and twentieth century over-plan. T.M.C.

The Naturalist in Devon and Cornwall by **Roger Burrows.** Pp. 303 with 31 photographic illustrations and 26 figures. David & Charles, 1971. £3.50. net.

In this account of the flora and fauna of two of our most attractive and popular counties, both to tourists and naturalists, the arrangement is based on habitats. Following a preliminary account of the geology of the region there are chapters on woodlands, heathlands and moorlands, cliffs, estuaries, seashores, sand dunes, freshwater habitats and cultivated land. A separate chapter is devoted to Dartmoor, Exmoor and Bodmin Moor and one to the Isles of Scilly. The emphasis is on the flora but birds, insects and other animals are all covered and the chapters on seashore and sublittoral life include an account of the effects of the *Torrey Canyon* disaster and the extent to which recovery has taken place. The numerous sketch maps are very informative and a series of useful check lists of plants, birds, butterflies and other groups of animals concludes a volume which the visiting naturalist will find an invaluable guide to the region.

W.A.S.

Ecological Morality by **Bruce Allsopp.** Pp. viii + 117. Frederick Muller Ltd. £1.80.

This book deals with the urgent problems of mankind in relation to his environment. By wasteful policies of economic and industrial expansion, the human species is seen inevitably to become an infestation of its own environment, polluting and finally destroying not only itself but all forms of life. Modern warfare can produce the same result all too quickly. We are urged to see ourselves as an integral part of nature but at the same time having the choice and ability to influence our own environment and to strike a proper ecological balance. The hard facts of over-opulation and diminishing natural resources which face our future existence require a new morality cutting across present political ideologies. The present conflict between Communism and Capitalism is seen as a dangerous irrelevance of our time and the author calls for a shift of society from an economic basis to an ecological basis, in which we see ourselves in an ecological context, every living species, including humanity, relating to and dependant upon the other.

This is an enormous subject of increasing importance to everyone who thinks about the future of the world and the author has expressed his views clearly and logically. The book deserves serious thought.

Wildflowers of Western Australia by **Kenneth F. Baker.** Pp. 32 with 70 colour photographs. Robert Hale, London. £1·60.

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CONTENTS

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THE RED GROUSE (*LAGOPUS LAGOPUS SCOTICUS* (LATH.)) IN THE PEAK DISTRICT

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Two animal species dominate the fauna in the north of the Peak District National Park. Domestic sheep are the main crop on the lower slopes of the High Peak, while much of the higher ground is devoted to the "preservation" (more correctly, conservation) of the red grouse, *Lagopus lagopus scoticus* Lathkill. This species tends to be ignored by amateur ornithologists, but professional ornithologists have devoted considerable attention to it, partly because of its sporting interest, partly because the study has proved to be extremely interesting scientifically in illuminating mechanisms of population regulation. The early work of the Committee of Inquiry on Grouse Disease (1911) has thus been followed more recently by a series of papers by Jenkins, Watson, Miller and others (Jenkins, Watson and Miller, 1963, 1967; Moss, 1969, etc.). These have been summarised in an informative booklet, *Grouse Management*, published by the Game Conservancy (1970). Most of this work has been carried out in Scotland, the only recent work in the Peak District being that by Picozzi (1971). In view of the importance of the red grouse itself in the economy of the Peak District, and moreover of the amenity value of the grouse moors, some statement of the present distribution of the species seems desirable.

Methods

The primary aim of the survey was simply to record the present distribution of red grouse in the Peak District using one kilometre squares as the units; detailed counts were not attempted. Since it is well established that heather, *Calluna vulgaris*, is the main food plant of the red grouse (Wilson and Leslie, 1911, Jenkins *et al.*, 1963), particular attention was paid to squares containing that plant. Squares were walked for 20-30 minutes, and any grouse seen were counted. Where grouse were not seen, the ground was searched for droppings and feathers.

A dog was not used and most moors were examined by the solitary observer. Notes were also kept on the vegetation, in the form of a subjective assessment of the percentage cover of each one kilometre square by the dominant plant species, particularly *Calluna vulgaris*, *Vaccinium myrtillus*, *Empetrum nigrum*, *Eriophorum* sp. (mostly *E. vaginatum*) and, less rigorously, various grasses (*Molinia caerulea*, *Festuca ovina*, *Nardus stricta*). Some of these data on the vegetation have already been used, and a preliminary account of the red grouse in Cheshire has also been published (Yalden, 1970, 1971); that county has not, for the most part, been re-examined. The observations were carried out between August 1969 and August 1971, at weekends throughout the year.

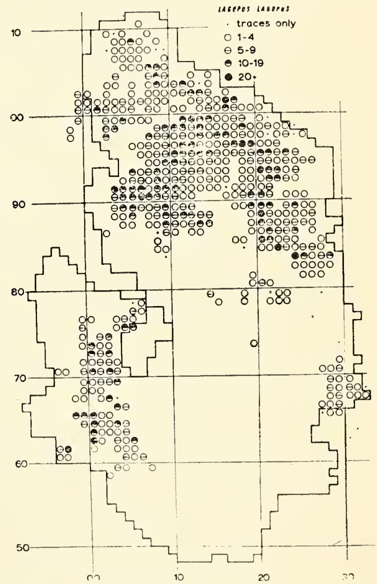

Fig. 1. Distribution and relative status of red grouse in the Peak District 1969-1971.
Numbers are "corrected numbers seen", see text.

Distribution

The primary result of the survey is presented in the map, fig. 1. The present distribution of the bird in the Peak District falls roughly into a broken horseshoe-shaped pattern, with two southern populations on the millstone grit outcrops along either flank of the limestone and the main population on the grit massif of the High Peak.

South-Western Population

In the south-west, the bird occurs in Staffordshire along Morridge almost as far south as Thorncliff (SKO258) and Revidge (SKO759). The distribution northwards includes The Roaches, Hen Cloud, Back Forest, Gradbach Hill, Ramshaw Rocks, Merrytown Low, Lum Edge and Lady Edge. There is also an isolated grouse moor on Gun Hill. The pasturelands around the head waters of the rivers Dane and Manifold cause a small break in distribution, but in the extreme north of Staffordshire, there are grouse on Wolf Edge, Turn Edge, and around Dun Cow's Grove. Hollinsclough Moor appears not (or, no longer) to have any red grouse, and they are also absent from the Cloud. The only additional record in south-east Cheshire is of a territorial male heard "crowing" in SJ9867. In the neighbouring part of Derbyshire, grouse are found from the county boundary northwards on Axe Edge Moor, Goyt's Moss, Hoo Moor, and Wild Moor, though the grassland area around Errwood Hall apparently lacks red grouse. The pastureland along Long Hill also results in a gap in distribution, but there are grouse on Combs Moss to the north-east. North eastwards again, the lower lying pasture around Chapel-en-le-Frith, and the edge of the limestone which reaches north-west to Dove Holes produce a larger gap which separates the south-western grouse populations from the main area of distribution in the High Peak.

South-Eastern Population

The south-eastern population covers an area from Bumper Castle and Moor Farm northwards over Beeley Moor, Harewood Moor, Brampton East Moor and Gibbet Moor. Further south, there appeared to be no red grouse on the remnants of the re-afforested Middle Moor, and a single clump of old game bird droppings on Matlock Moor (SK3062) were more probably partridge (*Perdix perdix*) which were seen there than red grouse (but see below). Further north, Birchen Edge, Leash Fen, Ramsley Moor, Big Moor and Totley Moor appeared to be largely devoid of grouse; no birds were seen, and only 3 old clumps of droppings.

Main Population

The main population of red grouse in the Peak District covers the majority of the Kinder and Bleaklow plateaux, the high eastern ridge from Burbage, Hallam and Bamford Moors north through Derwent, Howden, Bradfield, Broomhead and Harden Moors and in the north, more patchily, the high areas of Saddleworth, Wessenden, and Meltham Moors, and the Longdendale moors in Cheshire. Within this area, there are gaps in distribution caused by the pasture land along the valleys of the rivers Derwent (SK1792-1794 especially), Alport, Ashop (Snake Pass), Etherow (Woodhead Pass), and Loxley (Strines Reservoir, etc.). There are further gaps around Brown Edge (on Hallam Moors) and on Crook Hill and Bridge End Pasture (between the arms of the Ladybower Reservoir) where the ground is afforested or pasture, also in the north where much of the ground is dominated by *Eriophorum*. On the eastern side of this area, grouse extend as far south as Brown Knoll and Horsehill Tor, and perhaps onto Colborne where droppings were seen but not the birds themselves. Northwards, there are no grouse on the sheep pasture which forms the western face of Kinder Scout from Kinderlow End to William Clough, but grouse occur on Leygatehead Moor south to Oldpits Plantation, and there is a small isolated population by Birch Vale (SKO286). There appear to be no grouse on Lantern Pike or Cown Edge. There are grouse alongside the A624 in the vicinity of Hollingworth Clough, and on Chunal, Shaw, Black and Span Moors, Lordship Hill, Shelf Moor, Harrop Moss, and Glossop Low around Glossop. The only additional record from the Longdendale area of Cheshire is from SKO297, consequent upon the realisation that Tintwistle Low Moor extends rather further south than previously indicated (Yalden, 1970). In Lancashire, there are grouse from Slatepit, Swineshaw and Buckton Moors to the county boundary. Into Yorkshire, there are no grouse on the grass slopes around Greenfield House and Upperwood House, nor on Dick Hill, but they are sparsely distributed from Dove Stone Moss, Dean Rocks and Broadstone Hill eastwards. They occur at the northern edge of the Peak Park on Round Hill and Butterly, and on Meltham Moor as far north as Shooters Nab. Coming southwards down the eastern boundary of the Peak District, there is a small somewhat isolated colony of grouse on the small moor between Marsden Clough and Hey Clough, but elsewhere the steep slopes below Holme Moss and Twizle Head Moss are sheep pasture, and grouse are limited to the high plateaux. Further east, there are good grouse moors on Crooks Study (SEO204) and grouse on Snailsden and around the quarries on the north side of Harden Clough. The pasture around the Don reservoirs near Dunford Bridge limits the distribution, but there are grouse on much of Thurlestone Moors, and on Langsett and Midhope Moors up to the shores of the Langsett Reservoir. There are still grouse on Whitwell Moor, and, further south, on White Lee Moor. However, White Lee Moor is planted with conifers, and one must expect that the grouse will disappear from there over the next five years. There appear to be no grouse on

Spout House Hill, Edge Mount, or Onesmoor, but there are still grouse on Bradfield Moors, Ughill Moors, and as far east as Rod Moor. On the Burbage Moor area grouse occur as far east as Houndkirk Moor, and south to Hathersage Moor, and there are still grouse on Carhead Rocks (SK2482). Further west, the southern boundary of the main grouse population runs from Crookstone Knoll and Nether Moor, to Rowland Cote, The Nab, Grindslow Knoll and Crowden Tower. Crookstone Hill, most of Grindslow, and the lower slopes around Edale are however mostly grass covered and lack grouse.

Outliers

South of the main area of grouse, there are isolated populations on several moors. These include the millstone grit areas of Win Hill and Thornhill Brink, Abney Moor, Shatton Moor, Offerton Moor and Eyam Moor, and small populations on Longstone Moor (SK1973), Hucklow Moor (SK1578) and Bradwell Moor (SK1479) which overlie limestone.

Other Records

In addition to my own sightings, a few records from other observers, which extend or contradict my own, should be noted. Single grouse have been reported from New Mills (SJ9984, 7 September, 1970, Miss S. Evans) and Parkhouse Hill (SKO767, 1 August, 1970, R. Jones). These were both stragglers and certainly do not indicate breeding populations which I have overlooked. More significantly, R. A. Frost reports seeing a pair and a singleton on Matlock Moor (SK3063) on 24 June, 1971, and the same in SK3163 later in the year. He also saw three on Big Moor (SK2676, 3677) on 13 December, 1971. Mrs. A. Shaw reports seeing grouse in January, 1969 and June, 1971 on Lantern Pike (SKO288) and also in Phoside (SKO386) while Mrs. M. Bailey reports a nest in 1971 near Kinderlow End (SKO686) and grouse on Matley Moor (SKO290).

distribution and geographical factors

Geology

Geologically, the Peak District is composed almost entirely of Carboniferous rocks or of recent glacial, alluvial, and peat deposits. The Carboniferous rocks include three main series, the limestones, millstone grits, and coal measures. The limestone is the oldest of these, and forms the dome of the White Peak. It is overlain and flanked by the millstone grit, which contributes most of the higher ground, including the High Peak. The coal measures include coal seams interbedded with sandstones, and lie mostly outside the Peak District, but small areas of both the south-eastern and south-western grouse populations lie over coal measures.

Alluvial deposits and glacial clays are confined to the valleys of the Peak District, and are not here very relevant. Much of the millstone grit is overlain by peat deposits which form a thick blanket, often over 200 cms. deep, and reaching at least 285 cms. on Kinder Plateau (Tallis, 1964a, 1964b). The only other soil type of note in the Peak District is head, formed from the debris of underlying rock.

Table 1. Mineral content of some rock types. Figures are percentage content, for selected minerals only, based on the means of at least 4 separate analyses given by Guppy *et al.* 1931, Guppy and Sabine 1956, Sabine *et al.* 1969 and Greensmith, 1971. Analyses for the Millstone Grit and Coal Measures were selected for their relevance to the Peak District. The Granite, Diorite and Epidiorite figures are relevant to Scottish Moors, and are given for comparison. The Carboniferous Limestone was from North Wales.

	SiO_2	MgO	CaO	K_2O	Na_2O	P_2O_5
Millstone Grit	97.74	0.07	0.12	0.13	0.32	.01
Coal Measures Sandstones	93.57	0.10	0.25	0.31	0.25	.05
Granite	76.44	0.18	0.64	5.03	3.22	0.21
Diorite	55.30	5.63	6.89	2.56	3.74	0.52
Epidiorite	49.45	7.78	9.30	1.65	2.83	0.49
Limestone	1.14	0.26	54.84	—	—	—

Moss (1969) has shown that grouse stocks may be consistantly higher on moors overlying base rich rocks, due to the better nutritional state of the heather, and Watson (in Game Conservancy 1970) has suggested practical means of evaluating the potential of a grouse moor as a result of its geology. Millstone grit is a very base-poor rock, poorer in fact than granite (table 1) and the peat which frequently overlies the grit is symptomatic of this acidity; the presence of peat does not modify the base-poor state of the moor. The sandstones associated with the coal measures are also extremely base poor, perhaps slightly less so than the millstone grit, but comparable with granite. It is difficult to be sure of the base status of the head, but since it is derived mainly from the millstone grit, it is probably of comparable acidity. The limestone of the White Peak is of course extremely base rich. Table 2 shows that over 95% of the squares in which grouse were seen are on the very acid millstone grit, peat, or a mixture of the two, and only two squares overlie limestone, that is 0.5%.

Table 2. Rock types underlying grouse moors in the Peak District. Each one kilometre square in which grouse were seen is assigned to its predominant rock type as judged from the appropriate drift sheet of the Geological Survey. Sheet 111, Buxton, was not available.

Rock Type	*Coal Measures*	*Millstone Grit*	*Peat*	*Millstone Grit/Peat Mixture*	*Head*	*Limestone*
No. of squares	10	136	121	112	7	2
Percentage	2.6	35.1	31.2	28.9	1.8	0.5
Total Number of Squares		483				
Indeterminate		95				
Percentages of		388				

Altitude

The highest parts of the Peak District, Bleaklow and Kinder, reach 2,060 ft. and 2,088 ft. respectively, and grouse are found throughout these high plateaux. Some idea of the altitudinal range of the species in the Peak District is given by figure 2, which plots the one kilometre squares in which grouse were recorded in terms of the lowest contour and the highest contour in each square. Since the contours are taken from the current Ordnance Survey 1 in. Tourist Map, they are in feet (50 ft. intervals) but a metre scale is given, and also, for comparison, the altitudes of some of the study moors used in Scotland by Jenkins *et al.* (1963, 1967). It will be seen that the majority of grouse live between a low contour of 1,000 ft. and a high contour of 1,800 ft. Fig. 2 tends to exaggerate the low ground available to grouse in the Peak, for in fact very few moors (that is, very little heather) extend below 1,000 ft. Tintwistle Low Moor and Harewood Moor descend to 800 ft. and Park Hall Moor to 850 ft., but these are exceptional. There are no moors in the Peak which compare in altitude with the Kerlock study area, but grouse in Scotland range from sea level to 800 m. and most moors there are at similar altitudes to those in the Peak (Jenkins and Watson, 1967).

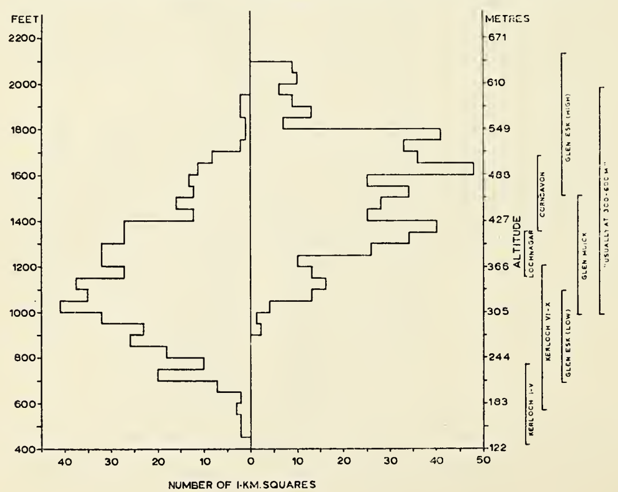

Fig. 2. Altitudinal distribution of grouse moors in the Peak District. Histograms show lowest (left) and highest (right) contour in each 1 km. square in which grouse were seen.

CLIMATE

Edwards (1962) provides a useful summary of the climate of the Peak District. For the present study, the most important feature is the rainfall. Most of the Peak District grouse moors are in high rainfall areas, practically all the south-western and main population grouse moors receive over 45 in. rain per annum, and Kinder, Bleaklow and Black Hill average over 60 in. per annum. Only the south-eastern population, the Hallam Moors part of the main population, the outliers and a few of the Staffordshire moors get under 40 in. per annum. Thus the moors in the Peak District are not so wet as those in Western Ireland (40-80 in. per annum) or North-western Scotland (40-150 in.) which are regarded (Game Conservancy, 1970) as poor for grouse, but they are rather wetter than the traditionally good areas of north-eastern Scotland which receive 30-40 in. rainfall per annum (Manley 1952).

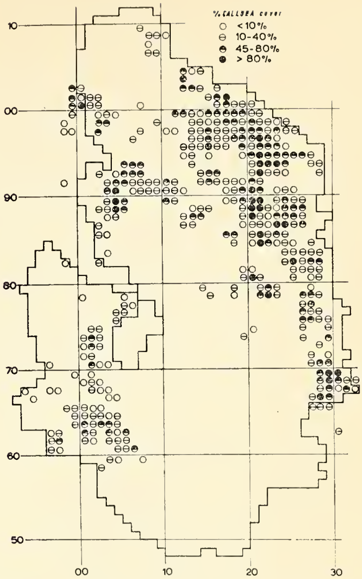

Fig. 3 Distribution and coverage of heather, *Calluna vulgaris*, in the Peak District.

VEGETATION

The importance of heather *Calluna vulgaris*, in the diet of the red grouse has been mentioned. The distribution map for heather (fig. 3) shows a general correspondence with that for grouse, particularly in the south-west of the Peak District, but there are obvious discrepancies between the distributions of the two species. Areas with grouse but totally lacking heather include the plateaux of Bleaklow, Longdendale and Saddleworth moors above 1,600 feet. Cotton-grass *Eriophorum vaginatum* predominates here (Yalden, 1971, fig. 5), frequently to the exclusion of practically any other plant species, though crowberry, *Empetrum nigrum* and bilberry, *Vaccinium myrtillus*, are widespread throughout these high areas, and in places are the dominants (figs. 4 and 5). They also cover much of the Kinder Plateau where *Calluna* is again absent (despite the caption to plate V in Edwards 1962), but bare peat is exposed in large areas.

The other notable discrepancy between the distributions of heather and red grouse is seen in the south-east of the Peak District, in the Big Moor — Leash Fen area, where it is the grouse which are absent despite the presence of heather. A distribution map such as fig. 3 only indicates the quantity of *Calluna*, and cannot show the quality of the plant, though Moss (1969) and Watson (in Game Conservancy 1970) have stressed that this may be at least as important. Much of Leash Fen is very wet, while on Big Moor the heather is rather short, apparently due to heavy grazing by cattle; perhaps both are unsuitable, in different ways, for nesting.

The vegetation of the grouse moors provides confirmation of the base-poor state of the underlying substrate. Watson provides a list of indicator species for rich and poor moors (Game Conservancy, 1970). Except for *Agrostis tenuis* and *Holcus lanatus*, which occur on some of the lower moors, the rich indicators are absent from these moors; indeed, the five most calcicole species are unrecorded in north Derbyshire (Clapham 1969). On the other hand, *Eriophorum angustifolium* and *E. vaginatum*, both "poor" indicators, are widespread.

FOOD

The most interesting question posed by these patterns of distribution concerns the food of the red grouse in those areas where heather is absent, but the bird is present. In the high plateaux areas, grouse are certainly present, except possibly under the most severe snowy conditions, throughout the year. The first territorial "crowing" by adult males is heard in August, as in Scotland (Watson and Jenkins, 1964) and becomes more intensive through the winter, whenever the weather is not too inimical. Cocks have been observed taking up territorial challenges on Axe Edge immediately after the end of a severe snow storm, (2nd Feb., 1969) and birds were present on Shelf Moor above 1,700 ft. in March, 1970, despite the heavy snow cover. The birds are, then, on their territories in these high areas some two months before the new spring growth appears, and presumably feed mostly within their territories. Further, of 19 nests found during the study, 8 were in squares totally lacking heather.

To examine this point further, some faecal pellets are analysed. Hard rectal pellets (not the amorphous caecal droppings) were collected during routine field trips. Five pellets from each sample (a sample being the pellets collected on one day from a one-kilometre square) were individually teased apart in water, some of the small fragments made into a temporary mount in glycerine, and the first 100 epidermal fragments encountered were identified. A sliding stage microscope was used to minimise the risk of double counting. The results of each anlysis were checked by examining each pellet afterwards under a binocular microscope, confirming the plant species present, and roughly noting the quantities as well. The analysis concentrated on the spring period, since this was likely to be most critical in terms of food shortage and nutritional status.

The results of this analysis are presented in table 3. It will be noted that the number of indeterminate fragments never exceeded 5% (indeterminate fragments being those which had enough character to be recognisable but did not match any of the reference material). These may have been unrecognised parts of the known food plants, or unexpected species of which no reference materials had been prepared. Undoubtedly the fact that the analysis concerned spring material simplified the exercise, as did the poverty of the flora of these moors. The results confirm that heather *Calluna* is likely to be a main food when it is available (SKO499, SKO272, SK1199), but most of these samples were selected from squares where it was absent. In the high plateaux areas, it is evident that bilberry, *Vaccinium myrtillus*, is the staple food of the grouse, at least at this time of year. This is mainly shoots and buds, for in March and April the leaves have not developed. Examination under the binocular microscope confirmed that the green cortical tissues of the bilberry stems had been removed, leaving the yellow vascular tissues, cut into short lengths of about 6 mm., as the most prominent item in the faeces. Bilberry was eaten even where my subjective assessment of the vegetation in the square suggested that none was present. This suggestion is of course deceptive for an insignificant amount of bilberry in terms of the cover of one kilometre square could still have provided plenty of food for grouse. 1% cover, possibly overlooked by me, could nevertheless total 10,000 sq. metres. Crowberry, *Empetrum nigrum* was only found to exceed 20% of the fragments in any pellet twice, and only in one square (SE1003) was it a significant part of the food. The evident availability of *Empetrum* throughout the year and the fact that the birds usually flushed from cover of that species, led me to suggest (Yalden, 1970) that it was the main food, but I was clearly wrong. Possibly it is more suitable as cover, both for nesting and for roosting, than other vegetation. Cotton-grass, *Eriophorum* sp. was present in the pellets very irregularly, little or none in most pellets but averaging 80% in one sample (SE1003). Practically all of this material was newly growing flower heads, and was recognised from the distinctive bracts. This is probably the first spring growth to appear in the moorland vegetation, as is well-known in sheep farming. Evidently the grouse may also avail themselves of a "spring bite". The foliage of *Eriophorum* is not eaten in significant amounts, and the plant is therefore only of limited use as a food species. It is notable that the major inconsistencies within my samples between the five pellets analysed concern mainly the extent to which *Eriophorum* flower shoots had replaced *Vaccinium* as the main food (SEO804, one pellet 60% *Eriophorum*, the others around 15%; SK1194, one pellet 28% *Eriophorum*, one 10%, the other three practically none).

These results are likely to be qualitatively very accurate, for the epidermes of the species concerned are quite distinctive. *Calluna* and *Empetrum* are somewhat similar, for both have epidermal cells with sinuous cell walls, but the cells of *Calluna* are rather elongate (generally 2.5 times longer than broad) while those of *Empetrum* are almost circular. Possibly a few fragments of grass were confused with *Eriophorum*, but the binocular microscope examination of the material confirmed the identifications obtained from epidermal fragments. The precise quantitative determination of the food in the present analysis is a little less certain. Eastman and Jenkins (1970) show that *Vaccinium* resulted in more unidentifiable fragments when eaten by grouse than *Calluna*. However, this was due to the large amount of indigestible vascular tissue present in *Vaccinium*, and I ignored unidentifiable fragments ("rubbish"), only scoring pieces of recognisable (even if not identifiable) epidermis. If *Vaccinium* epidermis breaks into many more,

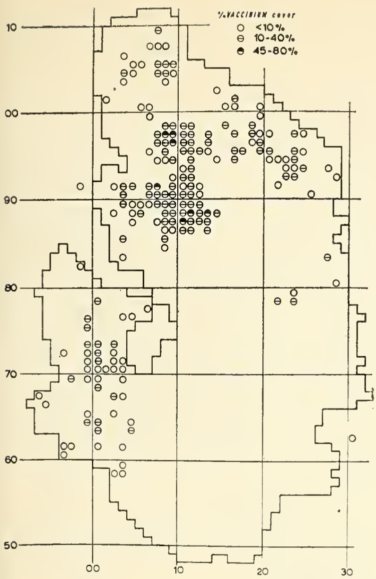

Fig. 4. Distribution and coverage of bilberry, *Vaccinium myrtillus*, in the Peak District.

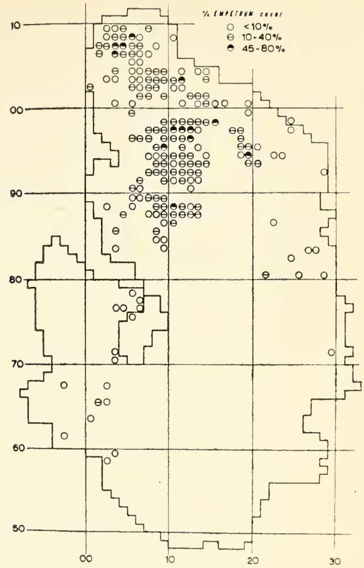

Fig. 5. Distribution and coverage of crowberry, *Empetrum nigrum*, in the Peak Distrct.

TABLE 3. Analysis of Peak District red grouse faecal pellets. Mean and range of epidermal fragments given above the estimate of the percentage vegetation cover of the square.

Square	*Date*	*Calluna*	*Vaccinium*	*Empetrum*	*Eriophorum*	*Indet.*
SKO499	23-3-1971	20.0(7-31)	72.8(62-85)	—	6.4(6-8)	0.8(0-2)
		10	*0*	*0*	*40*	
SEO701	27-3-1971	1.6(0-3)	89.6(84-95)	—	8.8(3-14)	—
		0	*0*	*5*	*30*	
SKO272	28-3-1971	51.6(28-72)	44.4(23-70)	—	3.0(1-9)	1.2(0-4)
		30	*5*	*0*	*65*	
SEO804	18-4-1971	—	70.4(40-89)	6.4(0.23)	22.6(9.60)	0.6(0-1)
		0	*20*	*20*	*10*	
SEO904	18-4-1971	—	94.8(93-97)	3.0(1-5)	2.0(0-3)	—
		0	*20*	*5*	*5*	
SEO703	18-4-1971	0.2(0-1)	93.6(85-95)	4.8(1-10)	1.4(0-5)	—
		0	*0*	*20*	*80*	
SK1395	25-4-1971	2.2(0-7)	83.6(74-93)	5.8(0-11)	8.2(1-15)	—
		10	*5*	—	*80*	
SK1194	25-4-1971	0.4(0-2)	88.4(69-99)	2.8(0-9)	8.4(0-28)	—
		0	*20*	*20*	*40*	
SK1092	2-5-1971	1.2(0-4)	93.8(78-100)	—	5.0(0.18)	—
		0	*30*	*30*	*40*	
SE1003	16-5-1971	—	4.8(1-9)	13.6(9-20)	80-4(74-87)	1.2(0-3)
		0	*0*	*40*	*40*	
SK1199	28-5-1971	87.8(52-100)	10.8(0.46)	—	—	1.4(0-3)
		60	*0*	*0*	*0*	
Average, 4 *Calluna* areas:-						
		40.4	52.9	1.5	4.4	0.9
Average, 7 non-*Calluna* areas:-						
		0.3	76.5	4.8	18.4	0.3

perhaps smaller, fragments, it is likely to be overscored. On the other hand, it has larger stems and leaves, and if the sheets of epidermis stay intact, it might be underscored. However, the main conclusion from the results is very clear. Bearing in mind that the *Eriophorum* flower shoots represent a source of food with only a limited availability, *Vaccinium* is extremely important as a food for red grouse in the non-*Calluna* areas of the Peak District, particularly at the most critical time of the year.

As *Vaccinium* rather than *Calluna* must be the staple food of many Peak District grouse, I wondered whether it is as suitable a diet. Jenkins *et al.* (1963) showed a number of variables in their study populations which fluctuated together and indicated "good" or "poor" seasons for grouse, including adult survival over winter, mean laying date, clutch size, hatching success, chick survival and adult post breeding (August) weight. Presumably these would all also vary between "good" and "poor" moors, and chick survival certainly does (Moss 1969). Unfortunately, establishing most of these is rather time consuming, for a part-time student, but mean adult weight in August can readily be obtained from gamebags during the shooting season. Five moors were visited during the 1971 season, two "*Calluna* moors", two "*Vaccinium* moors", and one which ranged vertically from one vegetation type to the other. Sample sizes were small, but, as table 4 shows, there were no (statistically significant) differences between the weights of the adults. Indeed, there was a slight suggestion that the cocks were rather heavier on the *Vaccinium* moors. One can reasonably suppose from this limited information that *Vaccinium* may be as suitable a main food as *Calluna* in the Peak District, though information on breeding success would be desirable.

TABLE 4. Weight (g.) of adult red grouse from five Peak District moors.

Moor Type	*Mean Wt. ♂ Standard deviation and Range*	*n.*	*Mean Wt. ♀ Standard deviation and Range*	*n.*	*Mean Wt. $\frac{♂+♀}{2}$*
Calluna	645.0 ± 36.2 (585-725)	23	595.0 ± 40.5 (510-640)	7	620.0
Calluna	651.3 ± 45.9 (555-735)	23	592.7 ± 33.6 (535-635)	11	622.0
Vaccinium	673.3 ± 42.3 (595-755)	15	590.8 ± 38.3 (535-665)	12	632.1
Vaccinium	684.1 ± 47.1 (540-750)	16	572.1 ± 38.4 (525-640)	7	628.1
Mixture	668.6 ± 55.8	18	611.7 ± 18.9	6	640.2

These may be compared with the averages given by Wilson (1911) from Derbyshire birds ♂ 700g. (24.5 oz.) ♀ 610g. (21.3 oz.) on samples of 15 birds each.

STATUS

Recording the distribution of red grouse over the whole of the Peak District over a short period of time was not too difficult, though time consuming. To say anything meaningful about its numerical status is much more difficult. Because the distribution survey was carried out through the year, counts were severely affected by seasonal changes in behaviour. Game bags might give a much better basis for comparing the various moors, but moor owners and shooting tenants are reluctant to divulge these, and for some areas, no records are available.

An assessment of the status of the bird is therefore given in fig 1, based on a manipulation of my own counts. For May and June, the figures used were double the number of males seen, on the grounds that for every male seen, there was probably a female incubating or brooding nearby. Autumn counts were divided by three, on the assumption that for every breeding adult seen, there were also two young birds. Regular monthly visits to a limited area of moorland suggested that these corrections gave a reasonable approximation to the number of breeding birds. Figures obviously inflated by packing in severe weather were not used.

It is evident that most of the best squares for grouse (those with 10 or more birds seen) also have high heather coverage, or are instead (especially on Kinder and Bleaklow) good bilberry squares (fig. 4). It is obvious that bilberry rarely forms such a complete cover over a square as does heather, but the figures quoted by Moss (1968) suggest that this is to some extent compensated by the fact that *Vaccinium* contains about 30% more nitrogen and phosphorus than *Calluna* on the same moor. Even so, there is no close correlation of high grouse numbers in a square and predominant cover of

Ericaceae (table 5). This is probably due to the inaccuracy of the methods involved, but might reflect the fact that the quality (as opposed to the quantity) of the ericaceous cover has not been considered.

TABLE 5. Numbers of 1 km. squares with low or high grouse numbers (corrected counts) and good or poor cover of Ericaceae (*Calluna*, *Vaccinium*). The table is highly heterogeneous ($x_1^2 = 29.1$, $p < .001$) but this is evidently not due to a positive association.

	0-9 grouse	*10 + grouse*	*Totals*
< 49% Ericaceae	345	58	403
> 50% Ericaceae	91	50	141
Totals	436	108	544

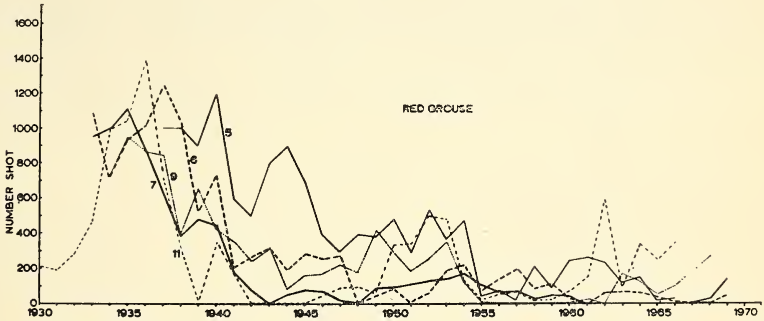

Fig. 6. Grouse bags for a number of moors in the Peak District (selected from Picozzi, 1971, for length and continuity of records). The main contrast is between fairly high (though fluctuating) bags pre-1940 and very low bags post 1945.

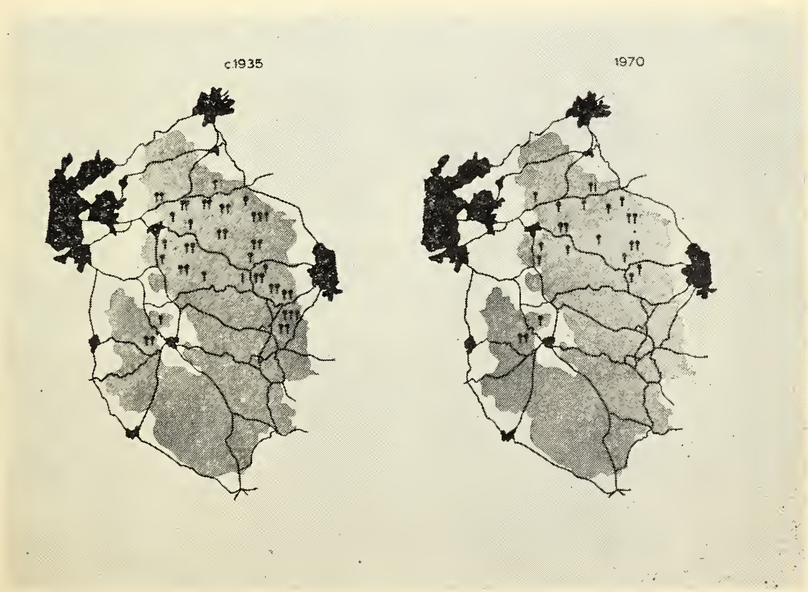

Fig. 7. Numbers of gamekeepers on Peak District moors, *c*. 1935 and 1970.

The large parts of the birds distribution where its number appear to be rather low should be noted. In particular, the population on much of the northern area (Saddleworth Moors, Meltham Moors) appears to be very sparse while some of the south-eastern moors and outliers also have rather low populations.

Change of Status

The present status of the red grouse in the Peak District causes most concern because of the considerable decline in numbers which has occurred since pre-war days. The size of this decline is indicated most strikingly by the game-bag figures assembled by Picozzi (1971) some of which are graphed as fig. 6. Grouse populations fluctuate markedly, but, by and large, the lowest levels reached by the game bags pre-war are about as high as the peak levels obtained post-war, and Picozzi has shown elsewhere that game bags do reflect changes in the population being shot (Picozzi 1968). In particular numbers reached very low levels between 1955 and 1960. Eight moors from which in 1935-36 25,019 grouse were shot, yielded only 3,226 in 1957-58. Picozzi (1971) was concerned primarily with whether public access, resulting in more

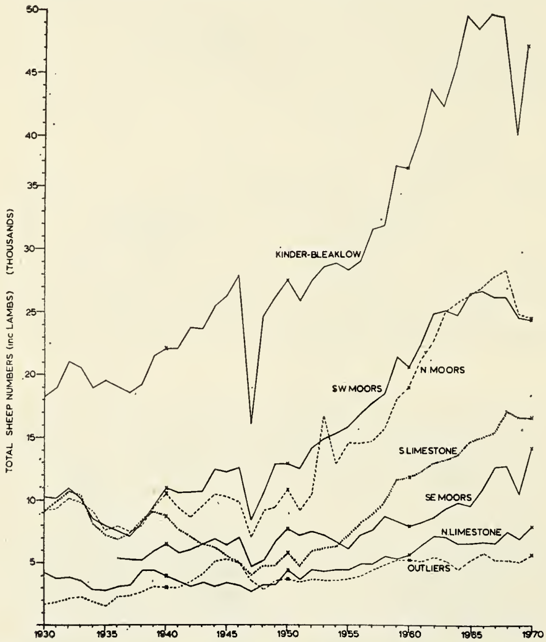

Fig. 8. Numbers of sheep in areas of the Peak District, compiled from parish returns for the June census, Ministry of Agriculture, Fisheries and Food. Lambs are included in these figures.

Kinder-Bleaklow — Charlesworth, Hayfield, Chinley Buxworth and Brownside, Edale, Hope Woodlands, Derwent, Bradfield.
S.W. Moors — Hartington Upper Quarter, Macclesfield Forest, Rainow, Wincle, Wildboarclough.
S.E. Moors — Baslow and Bubnell, Beeley, Bamford, Froggat, Hathersage, Nether Padley, Outseats, Chatsworth.
Northern Moors — Longdendale, Tintwistle, Dunford, Holmfirth, Langsett, Meltham, Saddleworth.
Outliers — Abney and Abney Grange, Eyam, Highlow, Great Longstone, Offerton.
Northern Limestone — Peak Forest, Castleton.
Southern Limestone — Chelmorton, Elton, Flagg, Foolow, Harthill, Hartington Middle Quarter, Middleton and Smerrill, Monyash, Stoney Middleton, Taddington, Tideswell, Wardlow, Wheston, Winster, Youlgreave.

disturbance to the birds, was responsible in any way for this decline. He failed to find any evidence that it was, although, as a relatively recent change in the management of the moorland areas, many keepers and shooting tenants were (and still are) suspicious. Moreover, he pointed out that, on many moors, the standard of management of the heather was not comparable with that in Scotland.

It is scarcely possible to compare present heather management in the Peak District with that obtaining pre-war directly, but an indication is given by the number of gamekeepers present then and now. There are 22 full-time and one part-time keeper at the present time where there were 42 full-time and one part-time keeper in the 1930's (fig. 7). (There are in fact some keepers employed at present additional to this figure of $22\frac{1}{2}$, but I have not been able to obtain comparable figures for the 1930's for their moors). It is obvious that with the number of keepers halved, much less heather-burning, in particular, can be carried out. However, this sort of decline in the level of keepering should have had most effect on moors which have lost their keepers entirely, for example the Longshaw Estate (Totley Moor, Big Moor, etc.) where bags were 4,500 per annum around 1900 (Bryden 1907) but there are now practically no grouse at all. One might expect that on those moors where there has been continuity of keepering (e.g. those in fig. 6), grouse bags should not have declined, or at least not so much, as on other moors. Yet many of the best maintained moors are among those which have shown a sharp decline (e.g. Picozzi 1971, moor 3 in fig. 1).

Fig. 9. Comparison of the total sheep numbers in one hill parish of the Peak District (area 11,055 acres 4,422 ha) and the combined game bag record for two grouse moors which cover 61% of the area of that parish. Sheep numbers on one of the moors were reduced by 1,000 in 1968; it will be noted that the grouse bag has improved somewhat in the last three years. No grouse bag records were available for one of the moors from 1962-1966.

I personally suspect that the main cause of this decline has been the sharp increase of hill sheep in the Peak District, as shown in the agricultural returns, made in June each year, by the Ministry of Agriculture, Food and Fisheries. (Data for the last decade is kept by the Ministry, and for earlier years by the Public Record Office). The returns are made on a parish basis, and so do not correspond precisely with the moorland areas. I have grouped several parishes together to form units which roughly correspond to sections of the Peak District moorland, and total sheep numbers in these units are plotted on fig 8. For comparison, two sets of data relating to the limestone plateau are included. In England and Wales as a whole, sheep numbers increased only 17.5% from 1930 to 1960 (M.A.F.F. 1968) but this stability masks a decline in the numbers of lowland sheep which is balanced by a considerable increase in hill sheep. The main moorland areas of the Peak District held some 40,000 sheep in 1930, and by 1940 there were still only 48,000. In the limestone areas, sheep numbers declined during the war as pasture was ploughed, but on the gritstone numbers increased markedly, so that by 1950 there were 60,0000, by 1960 over 90,000, and at the peak in 1968, 130,000. As an example of the stocking rates, Hayfield parish, which includes the western slopes of Kinder, has a map area (ignoring slopes) of 7,400 acres (3,960ha) and carried a maximum of 6,225 sheep (1967). This gives 1 sheep to 1.19 acres (1 : 0.53 ha), or, if the lambs are excluded, 1 sheep to 1.84 acres (1 : 0.82 ha); these figures seem fairly typical of the Kinder-Bleaklow plateau area. It seems probable that the lower areas of these hill parishes, the areas with better pasture, were well stocked with sheep pre-war, and that this trebling of sheep has taken place principally on the moorland areas. Martin (1964) has confirmed the general impression that *Calluna* may be an important food of sheep, particularly in winter at just the period when the quality of the *Calluna* is likely to be most important for red grouse. A hill sheep might weight 90 lb., or 40 kg., about the same as 60 red grouse. While the sheep are feeding on grasses, they are not in competition with grouse for food, but it seems probable that competition for over-winter forage by such an enlarged sheep population has been instrumental in causing the decline in grouse stocks (fig. 9). It is worth noting that Rimington-Wilson (1911) in discussing the increase in grouse numbers on the Broomhead Estate during the second half of the 19th century considered that the improvement was due solely to the method of driving, but mentioned in passing that all the sheep (about 1,000 on 4,000 acres) were removed in 1877. Confirmation of a change in the vegetation is given by the maps of plant communities in Moss (1913). For example, the slopes around Kinder, from William Clough to Grindlsow Knoll are shown as bilberry heath, but are now heavily grazed *Festuca* pasture. Approximately 19 sq. km. of ground which Moss showed as dominated by *Calluna* or *Vaccinium* would now be classed as siliceous grassland. Continued heavy grazing pressure by sheep is particularly evident on some of the areas of low grouse population, on the northern moors and some of the outliers, and the continued survival of these grouse is doubtful.

Discussion

The Peak District is in some respects not ideal for grouse; the extreme acidity of the underlying rock, the high rainfall, and possibly the average altitude of the moors, compare unfavourably with the best grouse moors in Scotland. Picozzi (1968) has shown that good management can minimize such handicaps, but in the Peak District the decline in the number of gamekeepers, together with the increased number of sheep, militate against this.

The present status of the red grouse in the Peak District is but one point in a fluctuating record. In the 17th century, black grouse (*Lyrurus tetrix*) was the common game bird in the area, and red grouse was regarded as less numerous (Smith 1937, quoting Plot 1686). During the 19th century, shooting red grouse, and from about 1865, driving them to butts, became more popular. Probably the largest bags in the Peak District were obtained on Broomhead Moor in the early years of the 20th century (average bag 5,000 1908-10, Lovat 1911). The decline since 1940 is likely to include both a decline in the stocks on the managed moors, of the sort documented in fig. 6, and a more general decline where areas previously managed as grouse moor have been converted to pasture.

This obviously raises the question of the future of this species in the Peak District. Biologically this is very difficult to answer, for its seems to depend on the economic balance between grouse shooting as one form of land use and sheep farming as another. Of subsidiary land uses, public recreation and water gathering are largely neutral in this equation, all four being reasonably compatable, while forestry is largely incompatable with both red grouse and sheep. At present shooting rents, I am given to understand that grouse moors are at least as profitable as sheep farming. A rent of about £1 for 3 acres for grouse moor is usual at present, from which expenses must be paid, so that the profit may be about £1 from 4 acres. As sheep pasture, 4 acres might carry one ewe, bringing 50p per annum profit from the fleece, and another 50p from the sale of half a fat lamb (i.e. one lamb between 2 ewes). Thus sheep farming may also produce £1 per 4 acres, but this only just covers the costs on most hill farms of sheep dips, winter feed, etc. However, the hill sheep subsidy, recently paid at £1.20 (£1.65 from 1972) on every ewe on the hill (full supplementary rate), is all profit — in fact 66% of the net income of hill sheep farms in the Northern region of England in 1965 was from production grants (Select Committee on Agriculture, 1967). At present, therefore, economic factors seem to be somewhat in favour of sheep farming.

It should not, of course, be supposed that sheep farming is totally incompatable with grouse conservation. Present stocks of sheep tend to be too high for the moors to carry high grouse stocks, and in some areas, where erosion is occurring, are perhaps too high for the good of the sheep as well.

Further, productivity is fairly low; the lambs form around 38% of the flocks in June, whereas they may form about 56% of flocks on the limestone. (If every ewe produced a lamb every year, and a few produced twins to compensate for the number of rams, etc., the lambs would be 50% of the flock; if every other ewe produced a lamb the proportion would be 33% which is clearly nearer the situation in the moorland areas.) Better control of sheep grazing, which would mean more fencing, and perhaps the removal of some of the bracken (*Pteridium aquilinum*) and mat-grass (*Nardus stricta*), would probably allow the same stocks of sheep to produce more lambs and allow improved grouse stocks as well.

There is no doubt that from a zoological point of view, grouse moor, with plenty of heather (*Calluna vulgaris*), is infinitely preferable to sheep pasture — apart from the red grouse itself, black grouse, twite (*Carduelis flaviorostris*), merlin (*Falco columbarius*), ring ouzel (*Turdus torquatus*), mountain hare (*Lepus timidus*), golden plover (*Charadrius apricarius*) and red deer (*Cervus elaphus*) are all closely associated in the Peak District with grouse moors, several of them depending directly on *Calluna* for much of their food. Sheep pasture, by contrast, is very poor for wildlife, and at its most extreme may only contain a few wheatear (*Oenanthe oenanthe*) in rocky areas. It is therefore to be hoped that grouse conservation will continue to be a major form of land use in the Peak District.

Acknowledgements

A number of people have helped in providing information and discussing my conclusions. In particular, Mr. R. Walsh, Senior District Agricultural Advisor, M.A.F.F., Bakewell, has discussed sheep figures with me, and Mr. J. A. G. Lees, Peak Park Shooting Association, has helped to obtain grouse statistics and provided contacts. Many gamekeepers and shooting tenants have discussed my findings, and given me permission to examine their moors and their grouse. Needless to say, my interpretation is entirely my own, and they do not necessarily (perhaps at all) agree with me. I would like to thank all these, and also the various ornithologists who have provided supplementary observations. Dr. A. Watson and N. Picozzi read the first draft of this paper and made a number of comments for which I am most grateful.

Summary

The distribution of red grouse in the Peak District follows a rough horseshoe-shaped pattern, conforming to the outcrop of millstone grit. Millstone grit, and the thick peat deposits which often overlie it, provide an extremely base-poor substrate; most of the grouse moors are above 1,000 feet; and receive relatively high rainfall. All these militate against high stocks of red grouse on the Peak District moors, when compared with Scottish moors. There is a general correlation between the distribution of grouse and of heather, but grouse are present on parts of the northern moors in the absence of heather. In these areas, bilberry provides the main food, at least in the critical late winter period.

Despite the factors which preclude good grouse stocks in the Peak District, bags were much higher pre-war, and declined sharply on most moors from 1940 onwards. This is associated with a decline in the number of gamekeepers, to about half the pre-war number. In addition, the number of sheep in the hill parishes has trebled since pre-war and the extent of bilberry moorland has declined markedly.

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Birds in Flight by **John Kaufmann.** Pp. 96 with numerous sketches by the author. World's Work Ltd., 1972. £1.40.

I enjoyed this book which sets out in readable terms the principles governing the flight of birds in its many aspects. Initial sections deal with bird anatomy, in particular the skeletal and muscular features pertaining to flight. The conclusion that "Each bird uses its own specially shaped wings to live and thrive within its own particular environment" is difficult to reconcile with such statements as "weaker fliers such as herons", or "large birds have efficient wings", or "basically the narrow pointed wing is a more efficient shape in flight". Similarly the "inefficiency in flight" (of the humming bird) is virtually contradicted later when it is said that they "can fly at zero m.p.h. for extended periods when in calm air".

Further sections deal with wing structure and shape, and feather structure. The principles of aerofoil and wing-loading are explained. Gliding and soaring flight are examined and explained in one chapter; and flapping and hovering flight in another. The flight of a bird from take-off to touch-down is analysed. The difficulty of translating aerodynamics into terms understandable to the layman is largely overcome and the many sketches are a great help towards this understanding.

Many of the examples are from New World sources. There is some unfortunate repetition. The bibliography gives a short note indicating the scope of each of the books listed. It is a suitable book for school library shelves, as well as of general interest to bird-watchers. R.F.D.

A STUDY OF HEDGEHOG ROAD MORTALITY IN THE SCARBOROUGH DISTRICT, 1966-1971

C. I. MASSEY

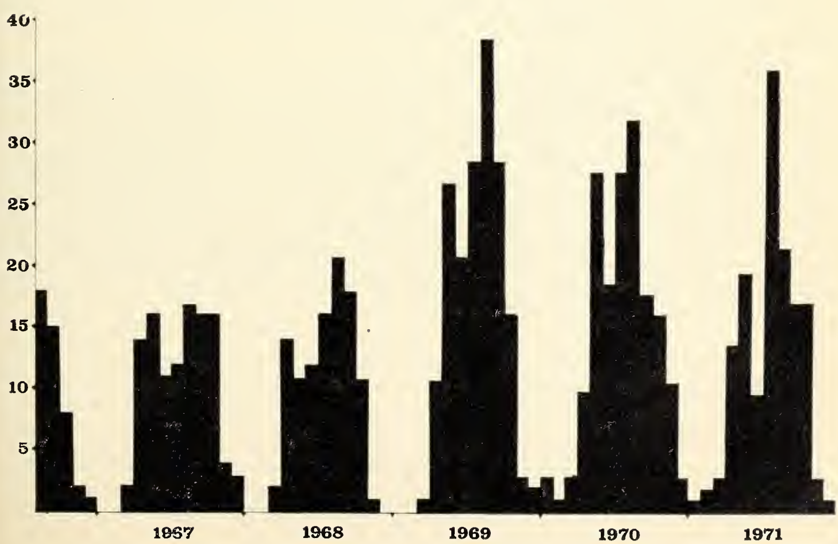
The hedgehog (*Erinaceus europaeus* L.) is described as being "widespread throughout the British Isles, being common in most open country which has some cover for making nests and shelters such as grassy heath, cultivated land, open wood and scrub and sand-dunes; abundant in gardens and parks in built-up areas but rare in woodland, marshes and high moorland" (Southern 1964). It is said to be "abundant in most parts of Yorkshire" (Taylor 1956), and in the Scarborough district is described as "generally distributed and common" (Walsh and Rimington 1956). Yet because it is almost entirely nocturnal in habits, Yorkshire Naturalists' Union and Scarborough Field Naturalists' Society field excursion reports contain little or no reference to hedgehog sightings.

Apart from semi-tame individuals in gardens, hedgehogs are most frequently noticed as flattened corpses on the road. It is perhaps the most conspicuous of road victims in Britain and provides with the rabbit (*Oryctolagus cuniculus* (L.)), brown hare (*Lepus capensis* L.) and brown rat (*Rattus norvegicus* (Erxl.)) a great number of casualties, and has since the advent of myxomatosis moved into first place on the mammal road mortality list. The corpses are easily spotted and it is rarely necessary to stop the car to do so, although other species are not so readily identified.

Method and Results

The area studied was within a 15 mile radius of Scarborough and was roughly outlined by a line joining Whitby, Pickering, Sledmere and Bridlington. Grid references were noted month by month of corpses seen on the roads within that area. The results must be regarded as minimal as many roads within the study area were only infrequently covered and a few not at all.

The number of dead hedgehogs seen was: 1966 — 44 (August to December only); 1967 — 111; 1968 — 106; 1969 — 178; 1970 — 172; 1971 — 145. A total of 756 in the five years and five months that the count was made (see histograph). The increase in the figures from 1969 — 71 is accounted for by better road coverage of the area during those years than in the years 1966-68 when many dead hedgehogs were presumably missed.



Discussion

The most obvious variation in the number of animals killed was the drop each winter. No hedgehog casulaties were found in the 2nd and 3rd weeks of November or in the 1st and 2nd weeks of March of any year. This suggests a hibernation period of four months from mid-November to mid-March, though it is evident that the occasional hedgehog was active during the winter (e.g. winters of 1969/70 and 1970/71). This hibernation period is similar to the December-end of March/April suggested by Southern (1964) and when compared with Davies (1957) and Brockie (1960) there is the same falling away of the death rate during the winter months but the hibernation period is in between the three months of Davies and four to five months suggested by Brockie.

Each year the number of animals killed rose abruptly in early Spring to a peak in April and May, followed by a definite drop in June or early July before a second peak was reached in August and September. The early Spring mortality peak can probably be attributed to the activity of the population following emergence of the animals from hibernation and both peaks coincide with the increased activity associated with the two breeding periods of May to June (Southern 1964) and September (Morris 1961). These two peaks also occurred in the surveys carried out by Brockie (1960) and Davies (1957). Davies suggests that the increase is due to a large proportion of the casualties being partly grown animals. Brockie did not agree with this and very few of the bodies examined in the Scarborough district during these two mortality peaks proved to be juveniles. So it cannot be maintained that the high death rate in those months is the result of inexperienced young animals venturing on to the roads. The second mortality peak in August-September of each year was much greater than the one in April-May, a fact that can be linked with the enormous increase in the amount of road traffic during that period, especially in a holiday area such as the Scarborough district.

It became obvious, as the results were plotted, that gaps occurred where dead hedgehogs were not recorded, even on roads covered many times during the study period. These gaps were invariably on straight, level stretches of road away from human habitation. Most corpses occurred near to a bend in the road or over the brow of a hill, the animal presumably having been caught by surprise in the car headlights as it crossed the road, with the result that neither the driver nor the hedgehog had time to take avoiding action. Hedgehogs crossing straight, level stretches of road are picked out in the car headlights at a considerable distance and avoiding action can be taken by both parties. This fact is best illustrated by comparing mortalities on two stretches of road that run roughly parallel on the north and south sides of the Vale of Pickering. To the south of the A.64 is a much improved straight, level and wide road and on the sixteen miles between Staxton and Malton only 57 corpses were noted during the study period. To the north the fourteen miles of the narrower A.170 between Seamer and Pickering consist of continous bends and hills and 188 corpses were noted during the corresponding period.

Dead hedgehogs also occurred most frequently on the outskirts of villages and towns or, as on the less densely populated Wolds, near to isolated houses and farms, indicating a higher hedgehog population in these areas than in the surrounding open countryside. Herter (1938) suggests the reason for this may be the greater use of agricultural insecticides in the open country as compared with private and public gardens. Another reason may be the decrease in suitable cover in which the animals can sleep, hibernate, or rear their young, as more hedges are removed and copses felled as a result of modern farming practices. Then again hedgehogs are often picked up and taken home by children and released in the garden. As hedgehogs are not migratory, they remain in the neighbourhood where they were turned loose and become very tame. So it must be assumed that some of the hedgehogs to be found near to human habitation have been tranported in this way.

Summary

1. Hedgehog corpses within a 15 mile radius of Scarborough were plotted month by month.
2. The number of animals killed dropped in winter, coinciding with the four-month hibernation period.
3. Two mortality peaks were noted, in April-May and in August-September. The first concided with the activity following the animals emergence from hibernation and both could be linked with the increased activity of the two breeding periods.
4. The two mortality peaks were not affected by an increase in inexperienced juvenile hedgehogs straying on to the roads, but the second peak was further increased by the larger volume of road traffic at that time of year.

5. Most corpses occurred near a bend in the road or over the brow of a hill with the result that long stretches of straight road had little or no hedgehog mortality recorded on them during the survey.
6. An increase in the number of corpses occurred on the outskirts of villages and towns, and near isolated farms and houses indicating a higher hedgehog population in these areas than in the surrounding countryside.
7. Reasons for this higher hedgehog population near habitation may be the greater use of agricultural insecticides and a decrease in suitable protective cover in open country as a result of modern farming practices. Also hedgehogs are transported into gardens from the countryside as "pets".

Acknowledgements

I would like to thank the many members of the Scarborough Field Naturalists' Society who supplied me with records of dead hedgehogs seen on their travels throughout the survey area.

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YORKSHIRE SPECIMENS OF SPIDERS AMONGST THE TYPE MATERIAL IN THE O. PICKARD-CAMBRIDGE COLLECTION

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During extensive work undertaken by G. H. Locket on the O. Pickard-Cambridge collection in the Hope Department of Entomology, University of Oxford, special attention was paid to the type material.

From Pickard-Cambridge's own collecting and from material sent to him by arachnologists like W. Falconer, J. E. Hull, A. R. Jackson and C. Warburton, he described and named well over one hundred British spiders new to Science. Much of this original material is still in the collection but unfortunately, like many of his contemporaries, Pickard-Cambridge was not particularly concerned with designating types. Consequently, in his work on the collection, Locket was in many cases unable to distinguish the actual individuals originally described. In view of the importance now attached to types of species, Locket selected specimens to act as the ultimate standard references for the interpretation of nominal species. The criteria used in the choice of specimens and their designation as holotypes or lectotypes is discussed in Locket (1964).

Amongst the specimens selected by Locket are several from Yorkshire localities. Most are noted in 'The Spiders of Yorkshire' (Falconer 1918-22); *Centromerus prudens,* is listed in Dixon (1945); and *C. persimilis* (O. P.-Cambridge), collected at Malham Cove in 1961 by C. J. Smith, represents a new Yorkshire record.

The following list (abstracted from Locket 1964) represents the Yorkshire specimens amongst the type material of the O. Pickard-Cambridge collection. For each species the first name cited is that originally given by Pickard-Cambridge. This is followed by the reference to the original description; the revised name according to Locket and Millidge (1954); data on the specimens (the catalogue numbers refer to the position of the specimen in the collection) and finally references in the Yorkshire literature.

Walckenaera minutissima O. P-Cambridge (1879. 203). *Theone minutissima* (O. P-Cambridge). Neotype male: 2900 (ii) labelled "Falconer Huddersfield" (Falconer 1919. 21-25).

Erigone florens O. P-Cambridge (1875 (2) 403) *Hypselistes florens* (O. P-Cambridge). Neotype male; 3960 (i) Yorkshire, October 1909, J. E. Hull, Falconer (1919, 365-368) notes his specimen as being collected from Eston Nab.

Erigone (walckenaera) elegans O. P-Cambridge (1872. 766) *Silometropus elegans* (O. P-Cambridge). Holotype female: 4110 (ii) Huddersfield, Yorkshire, W. Falconer. (Falconer 1919. 21-25).

Walckenaera cirrifrons O. P-Cambridge (1871. 458) *Toxochrus cirrifrons* (O. P-Cambridge). Neotype male: 4270 (i) labelled "W.F." (=W. Falconer) and Marske. Possibly one of the specimens from Marske-by-the-sea noted in Falconer (1910. 21 and 1919, 365-368).

Erigone (Neriene) sarcinata O. P-Cambridge (1872. 757). *Notioscopus sarcinata* (O. P-Cambridge). Neotype female: 4510 (ii) with a male. Cleveland Moors, Yorkshire 1910, J. E. Hull (Falconer 1919. 365-368).

Erigone protruberans O. P-Cambridge (1875 (i) 218). *Diplocephalus protruberans* (O. P-Cambridge). Lectotype female: 4630 (ii), Slaithwaite, October 1913, W. Falconer (Falconer 1919. 137-140).

Linyphia prudens O. P-Cambridge (1873. 538) *Centromerus prudens* (O. P-Cambridge). Neotype female: 5270 (ii) one of a batch of two females and seven males, W. Falconer, presumably near Huddersfield. (Dixon 1945).

Maro minutus O. P-Cambridge (1906. 87; female described). Huddersfield 1905; W. Falconer. Lectotype female: 5230 (i) male: 5230 (ii). Both from Huddersfield: W. Falconer. (Falconer 1919. 365-368).

Linyphia acarus O. P-Cambridge (1873. 539) *Centromerus acarus* (O. P-Cambridge). Neotype female: 528 (v) one of a batch of seven with three males, Huddersfield 1908; W. Falconer (Falconer 1920. 21-25).

Maro persimilis O. P-Cambridge (1912, 91) *Centromerus persimilis* (O. P-Cambridge). Holotype female: 5360 (i) male: 5360 (ii) Limestone pavement, Malham Cove, Yorkshire; Clifford J. Smith. November 1961 and presented by him to the collection.

Tmeticus firmus O. P-Cambridge (1905. 59; male and female described). Huddersfield, 1903; female; W. Falconer. *Oreontides firmus* (O. P-Cambridge). Neotype female: 5240 (i) labelled 'Drop Clough *Microneta*? N female . . . 03' (Falconer 1920. 21-24).

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SPIDERS AND HARVESTMEN OF A CHESHIRE MOSS

D. W. MACKIE

Delamere Forest now covers a comparatively limited area in Cheshire but was much more extensive some hundreds of years ago and at that time no doubt included the area known as Abbots Moss. Now Abbots Moss is separated from Delamere Forest by miles of cultivated land and is under the control of the Forestry Commission who have planted most of this area with trees, mainly coniferous. However, within the area lie two interesting basins of "Schwingmoor" (a type of peat moss floating over many feet of water) and as these two basins are of no value for planting purposes, they have been left undisturbed for many years. The two bog basins, along with some of the surrounding margins, have been leased to the Cheshire Conservation Trust who manage them as one of their nature reserves. There are a number of similar mosses in Cheshire and these basin bogs have all developed in deep hollows from which the water cannot drain away except for some small overflow. The two basin bogs at Abbots Moss are thought to be some twenty feet deep and are filled with fluid peat covered by a floating raft of mosses and other plants. For the greater part, this floating raft is made up of *Sphagnum* species, but nearer the edges, where the vegetation rises above the water level, other plants such as cranberry and various sedges occur and there is also a large area of reedmace in one of the basins. Cotton-grass grows profusely in a good portion of the *Sphagnum* mat, with its fluffy seed-heads rising a foot or more above the mat. *Polytrichum* moss species and cross-leaved heath are also common and there are some self-sown birches and pines.

In the drier surrounding slopes to the bogs, the planted trees are mainly coniferous but there are also a few sweet-chestnut trees, rowans and scrub birch with an undercarpet of heather (*Calluna vulgaris*) and grasses. The sub-soil of the entire area is sandy and where fire-breaks and paths have been made, considerable extents of bare sandy soil have been exposed which provide a very different habitat from that found in the immediate vicinity of the bogs. Due to the fact that there is a much greater variation in the habitats on and around the bog areas, the number of spider and harvestmen species is consequently richer and more varied than in the tree-planted surroundings.

The following list roughly summarises the habitats available, working outwards from the centre of the bogs:

(a) Floating mat of *Sphagnum* on bogs
(b) Cotton-grass, cranberry etc. on top of the sphagnum
(c) Sedges, reedmace and grasses on fringes of bogs
(d) Dead pine trees (with loose bark) at edges of bogs
(e) Heather and other field-layer herbage along fringes of bogs
(f) Needle litter under pines; also deciduous tree foliage and leaf litter
(g) On *Calluna* heath fringes and heath litter adjacent to bogs
(h) At grass and herbage root litter
(j) Sandy areas with scant grass and heather near pathways and firebreaks

Each of these habitats carries a varying population of spider species which more or less merge into each other. A total of 148 spider species and 8 species of harvestmen have been recorded from Abbots Moss so far and it is obvious from the species list that a number of fairly common species have still to be recorded.

The *Sphagnum* mat over the main portion of the bogs is colonised largely by hunting spiders of the genus *Pirata*, three species having been so far recorded. *Robertus lividus* is also found here and many interesting Linyphiid spiders such as *Hypselistes jacksoni*, *Hillhousia misera*, *Pocadicnemis pumila*, and *Oedothorax* species. Where the cotton grass grows up through the *Sphagnum* on the bogs, one of the important spiders of this area is locally common. This is the jumping spider *Sitticus floricola*, a species confined to Delamere Forest area and its surroundings in Cheshire and not recorded from any other county in Great Britain, although it has been recorded from a few counties in Ireland. During a large part of the year, this spider spins its resting cell in the fluffy seed-heads of the cotton grass and here both sexes are often found living together in the same cell. Later, the female constructs a cocoon in which eggs are laid and she remains in the cell beside the young after they hatch out, and until they are large enough to disperse and fend for themselves.

However, as cotton grass does not come into flower and set its seed (with the characteristic silky tassels) until early June, *Sitticus floricola* occupies a different habitat for many months of the year and appears to over-winter deep in the *Sphagnum* mat, where this is not flooded, and moves about on the *Sphagnum* surface where it catches its prey until the cotton grass seed heads are at the right stage to give the spiders adequate cover. The females then move into the seed heads to construct their cells whilst the males are still to be found wandering on the *Sphagnum* in search of females and food. As shown by A. M. Wild (1969) it is probable that the males of this species survive for one year only and that the females may not reach maturity until their second year.

It is difficult to understand why this particular spider should be so intensely local in its distribution, being confined, as far as we are aware at present, to only five locations in Cheshire. There are many other areas in Cheshire and the surrounding counties where exactly the same habitat conditions apparently prevail but which do not support this species. There seems to be some factor in the combination of *Sphagnum* mat with the cotton grass growing through it which is necessary for the survival of the spiders or which supports the particular invertebrates that provide the necessary food. With the spread of cultivation, sand quarrying and the making of new roads, such floating bogs are being gradually reduced or drained so that it becomes more and more difficult for such a spider to colonise new areas.

The reedmace, sedges, grasses and other field-layer herbage round the fringes of the bogs support a spider population largely dominated by *Clubiona* species and certain orb-web spinners such as *Araneus cornutus*, a species having a preference for habitats near water. The dead pine trees which fringe the bog form an interesting habitat. These trees, self-sown from the surrounding pine woods, grow on until they reach a certain size, when the roots reach through the *Sphagnum* mat into the water beneath, or the increasing weight of the tree makes it sink, so that the trees are eventually drowned. After they die, the bark becomes loose from the bole and branches (possibly helped by fungal infection) and under this loose bole a number of spider species have found a home. Three of the larger common species found in this habitat are *Araneus umbraticus*, *Ciniflo fenestralis* and *Salticus cingulatus* (in size 12 mm., 8 mm., and 6 mm. respectively) all occupying the same habitat but, owing to their differing habits, not coming into competition with each other for the available food supply. *Araneus umbraticus* is a dark-coloured orb-web spinner whose body is flattened so that it can crawl into narrow spaces such as under bark. The spider is nocturnal, spends the daylight hours hidden under the loose bark and emerges at dusk to visit its large web among the pine branches. Before daylight it renews the web if this has been damaged after having eaten any flies caught, and retiring again under the tree bark. *Ciniflo fenestralis* is a cribellate spider which spins a flocculated web over the crevices of the rough pine bark. This spider is also nocturnal, remaining hidden under the bark in daylight and searching the sheet web and bark surface at night for any available prey. *Salticus cingulatus* is a jumping spider which spins no snare, but stalks and jumps on its prey on the surface of the tree bark during daylight hours (particularly in sunshine) and retires under the bark for shelter at night. Because of the different methods of securing their prey, differences in prey, and the differing times during which they are active, the three species can survive in numbers in what is a relatively restricted habitat.

Around the fringes of the bogs, field-layer shrubs and plants carry a population of spiders such as the long-bidied *Tetragnatha extensa* and *T. montana* and the long grass and heather below form a habitat for *Pisaura mirabilis* and less frequently *Tibellus maritimus*. In the litter below the trees *Hahnia montana* is common and *Hahnia helveola* frequent. Here also is a common jumping spider *Neon reticulatus* and such Linyphiid spiders as *Ceratinella brevipes* and *Microneta viaria*. The birch trunks are the habitat for *Drapetisca socialis* and at their bases *Labulla thoracica* in the grass. *Lepthyphantes alacris* and *L. minutus* are common on the pine trunks near the ground. The bright green orb-web spinner *Araneus cucurbitinus* occurs on the birch foliage whilst *Evarcha falcata* a jumping spider, has been noted on shrub foliage. In June, the brightly marked males of the wolf spider *Lycosa lugubris* can often be seen running actively over the leaflitter carpet on the border area between light and shade under the deciduous trees.

The heather areas (*Calluna vulgaris*) which fringe the bogs on the rising ground are rich in spider species and numbers. Three crab spiders, *Philodromus aureolus*, *P. histrio* and *Oxyptila atomaria* are all found on the heather foliage along with *Dictyna arundinacea*, *Theridion sisyphium* and *Araneus quadratus*. Under the heather overhangs *Episinus angulatus* spins its H-shaped web from the heather tips to the ground to trap wandering insects, and in the litter beneath the plants *Zora spinimana*, *Agroeca proxima*, *A. brunnea* and *Scotina gracilipes* can all be found. Also in this habitat *Gnaphosa leporina* has been seen once under fallen bark. Another rare spider, *Clubiona norvegica* has also been found twice at Abbots Moss, in July in long heather and in winter, deep in *Sphagnum*.

During many months of the year, numerous Linyphiid species can be shaken from the heather including *Walckenaera acuminata*, *Gonatium rubens*, *Cnephalocotes obscurus* and *Metopobactrus prominulus*. Searching at the grass roots in areas free of heather, one finds such species as *Euophrys frontalis*, *Pachygnatha degeeri* and *Tapinopa longidens*. On the sandy areas near pathways and firebreaks one can find the sand-coloured hunting spider *Arctosa perita* along with another hunting spider *Tarentula pulverulenta* whilst *Cheiracanthium erraticum* spins a neat cell in the bent-over heads of the grass *Deschampsia flexuosa* which grows here. A number of spider species which are rare in Cheshire have occurred at Abbots Moss, usually as single specimens. These include *Xysticus sabulosus*, *Euryopis flavomaculata*, *Asagena phalerata* and *Cyclosa conica*.

Eight species of harvestmen have been recorded so far from Abbots Moss, the two dominant species for a great part of the year being *Mitopus morio* and *Oligolophus agrestis*; the former common on the needles of young pines and the latter in the same habitat but also common in birch leaf litter, especially in October and November. In the early months of the year *Platybunus triangularis* is common until the end of June, usually in birch and heather litter. At the grass roots, *Nemastoma bimaculatum* is frequent in almost every month of the year, but *Nemastoma chrysomelas* has only been noted twice, in September and November, swept from pine foliage and at grass roots.

I would like to thank the Cheshire Conservation Trust and Mr. P. J. Askey (Chairman) for kindly providing me with a permit to work at Abbots Moss, and also to thank Mr. L. N. Kidd and Mr. R. Leighton who have helped me on many of my visits and have supplied a number of the species records. My thanks go also to Dr. P. Merrett for his unfailing help in determining certain species. A species check list of both spiders and harvestmen follows.

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Species List of spiders from Abbots Moss, Cheshire

Dictynidae
- *Ciniflo fenestralis* (Stroem)
- *C. similis* Bl.
- *Dictyna arundinacea* (Linn.)

Gnaphosidae
- *Drassodes lapidosus* (Walck.)
- **D. signifer* (C. L. Koch)
- *Gnaphosa leporina* (L. Koch)
- *Micaria pulicaria* (C. L. Koch)

Clubionidae
- *Clubiona reclusa* O.P.C.
- *C. stagnatilis* Kulcz.
- *C. norvegica* Strand
- *C. phragmites* C. L. Koch
- *C. terrestris* Westr.
- *C. lutescens* Westr.
- *C. compta* C. L. Koch
- *C. trivialis* C. L. Koch
- *C. diversa* O.P.C.
- *Cheiracanthium erraticum* (Walck.)
- *Agroeca brunnea* (Bl.)
- *A. proxima* (O.P.C.)
- *Scotina gracilipes* (Bl.)
- *Zora spinimana* (Sund.)

Thomisidae
- *Xysticus cristatus* (Clerck)
- *X. sabulosus* (Hahn)
- *Oxyptila atomaria* (Panzer)
- *Philodromus aureolus* (Clerck)
- *P. caespitum* (Walck.)
- *P. histrio* (Latr.)
- *Tibellus maritimus* (Menge)

Salticidae
- *Salticus cingulatus* (Panzer)
- *Neon reticulatus* (Bl.)
- *Euophrys frontalis* (Walck.)
- *Sitticus floricola* (C. L. Koch)
- *Evarcha falcata* (Clerck)

Lycosidae
- *Lycosa tarsalis* Thor.
- *L. pullata* (Clerck)
- *L. nigriceps* Thor.
- *L. lugubris* (Walck.)
- *Tarentula pulverulenta* (Clerck)
- *Trochosa ruricola* (Degeer)
- *T. terricola* Thor.
- *T. spinipalpis* (F.O.P.Camb.)
- *Arctosa perita* (Latr.)
- *Pirata piraticus* (Clerck)
- *P. hygrophilus* Thor.
- *P. latitans* (Bl.)

Pisauridae
- *Pisaura mirabilis* (Clerck)

Agelenidae
- *Hahnia montana* (Bl.)
- *H. helveola* Simon

MIMETIDAE
Ero furcata (Villiers)
THERIDIIDAE
Episinus angulatus (Bl.)
Euryopis flavomaculata (C. L. Koch)
Asagena phalerata (Panzer)
Theridion vittatum C. L. Koch
T. sisyphium (Clerck)
T. pictum (Walck.)
T. simile C. L. Koch
T. varians Hahn
Theridion neglectum Wiehle
T. ovatum (Clerck)
T. bimaculatum (Linn).
T. pallens Bl.
Robertus lividus (Bl.)
Pholcomma gibbum (Westr.)
TETRAGNATHIDAE
Tetragnatha extensa (Linn.)
T. montana Simon
Pachygnatha degeeri Sund.
ARGIOPIDAE
Meta segmentata (Clerck)
M. segmentata mengei (Bl.)
Araneus diadematus (Clerck)
A. quadratus Clerck
A. cornutus Clerck
A. umbraticus Clerck
A. cucurbitinus Clerck
Zygiella atrica (C. L. Koch)
Cyclosa conica (Pallas) sub-adult.
LINYPHIIDAE
Ceratinella brevipes (Westr.)
C. brevis (Wider)
Walckenaera acuminata Bl.
Wideria antica (Wider)
W. cucullata (C. L. Koch)
W. fugax (O.P.C.)
Trachynella nudipalpis (Westr.)
Cornicularia unicornis (O.P.C.)
**Dicymbium nigrum* (Bl.)
Gongylidium rufipes (Sund.)
Dismodicus bifrons (Bl.)
Hypomma bituberculatum (Wider)
Metopobactrus prominulus (O.P.C.)
Gonatium rubens (Bl.)
Maso sundevalli (Westr.)
Peponocranium ludicrum (O.P.C.)
Pocadicnemis pumila (Bl.)
Hypselistes jacksoni (O.P.C.)
Oedothorax gibbosus (Bl.)
Oe. tuberosus (Bl.)
Oe. agrestis (Bl.)
Oe. retusus (Westr.)
Oe. apicatus (Bl.)
Cnephalocotes obscurus (Bl.)
Minyriolus pusillus (Wider)
Tapinocyba pallens (O.P.C.)
Monocephalus fuscipes (Bl.)
M. castaneipes (Simon)
Gongylidiellum vivum (O.P.C.
Micrargus herbigradus (Bl.)
Savignia frontata (Bl.)
Diplocephalus cristatus (Bl.)
D. permixtus (O.P.C.)
D. latifrons (O.P.C.)
D. picinus (Bl.)
Erigone dentipalpis (Wider)
E. atra (Bl.)
Hillhousia misera (O.P.C.)
Porrhomma pygmaeum (Bl.)
**P. pallidum* Jackson
P. convexum (Westr.)
Agyneta subtilis (O.P.C.)
A. conigera (O.P.C.)
Meioneta rurestris (C. L. Koch)
**M. beata* (O.P.C.)
Microneta viaria (Bl.)
Centromerus sylvaticus (Bl.)
C. expertus (O.P.C.)
C. dilutus (O.P.C.)
Centromerita concinna (Thor.)
Oreonetides abnormis (Bl.)
Macrargus rufus (Wider)
Bathyphantes approximatus (O.P.C.)
B. pullatus (O.P.C.)
Drapetisca socialis (Sund.)
Tapinopa longidens (Wider)
Floronia bucculenta (Clerck)
Labulla thoracica (Wider)
Stemonyphantes lineatus (Linn.)
Lepthyphantes minutus (Bl.)
L. alacris (Bl.)
L. tenuis (Bl.)
L. zimmermanni Berktau
L. cristatus (Menge)
L. mengei Kulcz.
L. tenebricola (Wider)
L. ericaeus (Bl.)
Helophora insignis (Bl.)
Linyphia triangularis (Clerck)
L. montana (Clerck)
L. clathrata Sund.
L. peltata Wider
L. pusilla Sund.

Note: Species marked thus * are early records by W. Falconer (1930).

SPECIES LIST OF HARVESTMEN (OPILIONES)
Nemastoma bimaculatum (Fabr.)
N. chrysomelas (Hermann)
Leiobunum blackwalli Meade
Mitopus morio (Fabr.)
Oligolophus agrestis (Meade)
O. tridens (C. L. Koch)
Phalangium opilio Linn.
Platybunus triangularis (Herbst)

POLYTRICHUM COMMUNE HEDW. ON THE NORTH YORKSHIRE MOORS

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Polytrichum commune is a common species on the North Yorkshire Moors but it is unusual for it to be dominant over a large area. It is so on the east-facing hillside to the west of Fen Bogs however (grid. ref. 850980) and also on another east-facing hillside near Botany Bay (grid. ref. 607938). *Polytrichum commune* usually occupies damp sites on acid soils and it is also likely that it would benefit from exposure to higher light intensities resulting from the burning of heather. The greater part of the North Yorkshire Moors is subject to a regular burning cycle however so if a *Polytrichum*-dominated community were part of the normal succession following burning it is reasonable to expect that it would be much more common. Furthermore the Fen Bogs community is known to have been in existence for at least ten years. The majority of soils on the North Yorkshire Moors are acid and the degree of moisture in the soil would be a function of the physical composition of the soil, the slope and the aspect. It is not possible to consider the effect of aspect but an attempt has been made to determine whether the presence of the Polytrichetum can be explained in terms of other soil factors.

As a preliminary investigation six pits were dug in the Fen Bogs area, three on the east-facing slope and three on the west-facing. The latter is covered with communities dominated by *Calluna vulgaris* or *Pteridium aquilinum*. Each pit was about two feet deep. In all three profiles from the east-facing side, with extensive Polytrichetum, the soil below 15 cm. was a light grey clay with rust-coloured mottlings, features which are usually associated with a fluctuating water table. A mottled clay layer was found in only one of the pits on the west-facing slope and furthermore it began at the much deeper level of 35 cm. It seemed therefore that there were grounds for believing that the soils of the east-facing slope were wetter, possibly because heavy clay layers occurred closer to the surface, so an investigation of the physical composition of the soils of the two slopes was carried out.

Methods

A transect about 500 feet in length was marked out up the east facing slope and levelled with a quickset level. Three sites which were representative of different gradients, were chosen and soil pits dug. The profiles revealed in each of the pits were zoned and samples were taken from the various strata represented in the profile. The transect was extended across Fen Bogs to the west-facing slope, pits dug at heights or on gradients corresponding to those on the other side of the valley and sampled in the same way. The relative positions of the various sampling sites, together with the true gradients of the slopes are shown in Fig. 1.

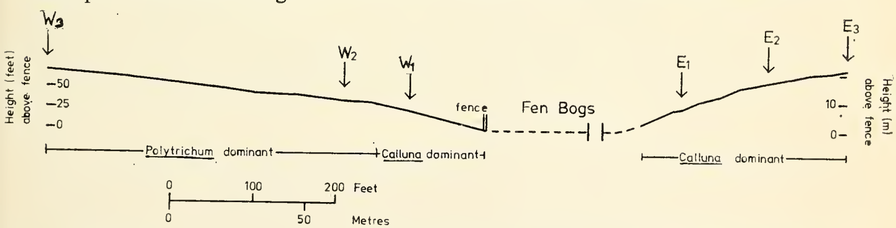

Fig. 1. Hillsides west and east of Fen Bogs showing the true gradients and the sites from which soil samples were taken.

Physical analysis of the soil samples was carried out according to the "pipette" method (Piper 1942), for which it is assumed that the soil particles are perfect spheres and that the rate of sedimentation of a particle of a given size follows Stokes' Law. The particles were separated into coarse sand, fine sand, silt and clay fractions which, in the International System of Mechanical Analysis have diameters of 2-0.2 mm., 0.2-0.02 mm., 0.02-0.002 mm. and < 0.002 mm. respectively. Twenty g. of soil were used for each determination and the organic matter was first removed by oxidation with 6% hydrogen peroxide.

RESULTS

In Table 1 the percentages of clay and fine sand in the various samples are presented. The amount of coarse sand was low and exceeded 8% only in the very sandy layer of profile W1 between 5 and 25 cm. Apart from this layer, where the content of coarse sand was about 20%, it can be assumed that the bulk of the material not classed as clay or fine sand is silt. The precise positions from which samples were taken in any profile depended on the positions of boundaries between the visual zones but in order to simplify the presentation only the approximate depths from which samples were taken are indicated in Table 1. The approximate positions of zone boundaries are also shown. In all profiles the uppermost boundary delimits a surface layer stained dark grey by organic matter from a lower lighter grey or yellowish layer. Where a second boundary is indicated this marks a change in texture of the soil based on estimates made in the field. The lowermost layer was strongly mottled in profiles W2, W1, E2, slightly mottled in E1 and uniformly light grey in W3.

TABLE 1. Physical properties of soils at six sites in the Fen Bogs area

Depth	Clay						Sand					
(cm.)	W3	W2	W1	E1	E2	E3	W3	W2	W1	EI	E2	E3
0–6	8	34	7	30	11	27 20	66	40	69	34	63	42 50
6–12		30			26			51			57	
12–20	45		13 29	19	56	30	39		52 46	61	23	49
20–30	42	21		21		50	44	60		57		30
30–40		33						47				
40–50	55				51	54	32				27	27
50–60		50	47	40				31	20	34		
Thickness of surface organic layers (cm)	1	0	6	1	12	16						
Local gradient	5°05′	6°40′	11°30′	20°50′	9°05′	6°07′						

Horizontal lines indicate zone boundaries

In all of the profiles the clay content of the lower part is greater than that of the upper part, a feature which may be a result of the washing down of clay particles from the surface layers. On comparing the two soils under *Polytrichum* with that under *Calluna* on the east-facing slope, it is apparent that layers with a high clay content occur closer to the surface under *Polytrichum* than under *Calluna*. When the soils under *Polytrichum* are compared with those under *Calluna* on the west-facing slope however it is apparent that this difference is not constant for in all three profiles on the latter slope layers with a high clay content again occur close to the surface. Indeed the distribution of clay in E2 is very similar to that in W3 and, above 20 cm, that in E3 resembles W2. The latter comparison is perhaps particularly important because the surface slopes across the two profiles are also similar. Thus no consistent differences between the profiles under *Polytrichum* and under *Calluna* can be discerned which can explain the distribution of vegetation types.

A layer of organic matter occurred on the surface of the majority of the profiles. Two types could be recognized, a loose brown material clearly derived from *Polytrichum*, and a black amorphous, compact type derived largely from *Calluna*. The thickness of the latter type is given in Table 1 and it can be seen that a considerably greater thickness occurs under vegetation dominated by *Calluna* than under that dominated by *Polytrichum*. It was considered that further investigation of this difference would be worthwhile.

TABLE 2. Distribution of *Calluna* humus under different types of vegetation.

	Fen Bogs		Botany Bay	
Dominant sp.	*Polytrichum*	*Calluna*	*Polytrichum*	*Calluna*
Samples with < 1 c.m *Calluna* humus	12	0	5	0
Samples with > 1 cm. *Calluna* humus	0	6	4	10
Total samples	12	6	9	10

A sixty foot transect was laid out down the east-facing slope at the Fen Bogs site in such a position that it crossed several large patches of vegetation dominated by *P. commune* and several dominated by *C. vulgaris*. At intervals of three feet shallow soil pits were dug so that the thickness of organic matter could be determined. A similar transect was laid out at the Botany Bay site. Data on the thickness of the surface organic layer under the different types of vegetation are presented in Table 2.

Taking the two sites together, of the 21 positions sampled beneath *P. commune* only 4 showed more than 1 cm. of *Calluna* humus whereas this was true of all 16 positions under *C. vulgaris*. The mean depth of *Calluna* humus at the four positions under *Polytrichum* was 4.0 cm. whereas that at the positions dominated by *C. vulgaris* was 6.3 cm.

DISCUSSION

At about 50 per cent of the sampling points beneath *Polytrichum commune*, mostly at the Fen Bogs site, there was a layer of decaying *Polytrichum* shoots up to 8 cm. in thickness. This probably represents no more than a few years' accumulation. At the remaining sampling points beneath *Polytrichum* no organic matter at all could be detected. There seems to be a definite association between the distribution of *Calluna* and the presence of a surface layer of *Calluna* humus while *Polytrichum* seems to occur largely where *Calluna* humus is absent.

The most likely explanation of the patchy distribution of *Calluna* humus is that, during past fires, the heat has been so intense that not only the *Calluna* stems have been burned but the surface humus layer as well. This has led to the exposure of the mineral soil. It appears that *Polytrichum* has been successful in colonizing such places in the face of competition from *Calluna* but *Calluna* has been able to regenerate where a layer of humus has remained. Dalby, Fidler, Fidler and Duncan (1971) refer to a small area of Ilkley Moor burned in 1959 which, in 1971, was still covered by two species of *Polytrichum*, *P. juniperinum* and *P. piliferum* but they give no information about the soil profile. The underlying rock at both sites on the North Yorkshire Moors belongs to the Estuarine series and since this rock crops out over a large part of the North Yorkshire Moors the implication of the work described here is that replacement of *Calluna* by *Polytrichum* could occur on slopes of shallow gradient wherever burning of the vegetation is so severe that the superficial layer of organic matter is destroyed.

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SOME NORTH YORKSHIRE RECENT BONE SITES

C. SIMMS

These notes summarise occasional work excavating unstratified Recent deposits at a series of contrasted sites since 1959 and the determination of vertebrate remains found there. More intensive work in Teesdale is treated elsewhere (1). The material from Boltby, where it is hoped to do further work, Carlton and Pifelhead Wood, is not yet deposited in a public collection; the other remains are in the Yorkshire Museum, York, where further information can be sought. Material was the subject of a temporary display at the Yorkshire Museum in 1971.

Boltby Rock-Shelter (SE 5087)

A small disturbed site in rockfall in the escarpment; the possibility of there being other rock-shelters in this and other crag-lines is real. Discovered by York schoolboys in 1967, the site has been visited and worked infrequently but has yielded Hedgehog, Dog, Stoat, Red Deer, Sheep, Rabbit and Vole (*Arvicola*). Birds include Corncrake, a Thrush and some smaller passerines yet to be determined.

Carlton Fissure (SE 6188)

A minor accumulation of postglacial and domestic mammal bones from a fissure near Helmsley; another situation which is probably only one of many small fissures. The site was reported by Mrs. S. Pacitto in 1968. The district has also, of course, the Windypits where some more important finds, including artefacts, have been made (2). Perhaps there are also caves in this north-eastern limestone. Apart from domestic cow and sheep or goat, the site has yielded Fox, Polecat (or Ferret), Badger, Otter, much Red Deer, Roe Deer, a Hare and Rabbit. Birds have not yet been determined.

Catterick Roman Site (SE 2299)

During excavations for a by-pass and factories ditch and surface remains of Roman date were briefly worked. Other collectors were Miss F. Gunningham, and Mr. and Mrs. J. Kemsley (during the Y.N.U. meeting, see *Nat.* 1968, 119) and the late J. Radley. There were remains of Dog (possibly also Wolf), Wild Boar and many Roe Deer. Bird remains were scarce, but included anatids and grouse (*Lagopus*). Associated pottery is in the Yorkshire Museum.

Muker Gill-Bed (SD 9197)

A washing or hushing from a source as yet unidentified on Oxnopside, Upper Swaledale was examined in 1969, by permission of Mr. and Mrs. L. Thorpe. Recent and very unweathered teeth of Brown Bear, and bones of Fox and Red Deer.

Pifelhead Wood, Newtondale (SE 8395)

There were two types of deposit here, which I interpret as (a) a small rock-shelter associated with a minor pot-hole, (b) as a badger or other recent excavation of a masked shelter adjacent to the pot-hole. The site was excavated by the late D. Pearson and the writer in 1959, and was probably a Recent den of Wild Cat, more recently perhaps of Fox. Other mammalian remains included a Hare (several), Rabbit, Voles (*Arvicola* and *Microtus*) and small Beaver (one or more). This may be the first find of Recent Beaver in the district. Birds were numerous, but are not yet determined.

Tripsdale Rock-Shelter (SE 5899)

A minor accumulation within a sheep-fold; a site discovered in 1954 and excavated 1959-60. Ironically, Wolf and Fox remains predominated, but Badger, Roe Deer, sheep or goat, Hares (probably both *L. capensis L.* and *L. timidus L.*) Rabbit, Voles (*Arvicola* and *Microtus*) and Mice (*Apodemus*) were represented, together with a very few passerine birds, including *Turdus* sp.

Whenby Lake-Margin (SE 6170)

Apparently a strandline deposit under marl at 190ft OD. This deposit (which was first reported in *The Naturalist* 1971, 137) is still being examined by courtesy of Mr. and Mrs. D. Marwood. Mammalian remains so far include Beaver and Vole (*Arvicola*); birds remains include Dunlin, Bittern and some passerines. Waterworn wood and shell samples from the marl are being examined by other workers.

Notes on Interpretations

From their situation today, the Boltby and Tripsdale sites may have been contributed to by the decomposition of avian pellets; at present one of these sites is directly overlooked by a roost of Kestrel. Except for Whenby, there is no stratification at any of these sites and so no means of relative dating for them, but it is possible that some bone samples can be dated by chemical means. We may thus be able to add to the history of the extinct species represented.

Discussion

This account gives an indication of the variety of sources of bone finds and it is emphasised that no find, however small, is without interest if carefully preserved, related to its deposit and correctly determined. More and more naturalists, archaeologists and others are finding animal remains and it is important for an understanding of past distributions, to say nothing of other aspects of natural history, that these discoveries come to the notice of appropriate specialists, including our own conchologists and geologists.

Acknowledgements

The late D. Pearson and W. Thompson provided much help in the field during early work, assisted by D. B. Cain and H. Thompson. More recent workers are mentioned in the text, except for Whenby which has attracted the attention of a number of specialists and for which a report will be prepared in due course for *The Naturalist*. This paper has been read critically in first draft by D. Bramwell and P. J. Boylan. It was prepared in December, 1971. For the determination or confirmation of some bones I am very grateful to R. Wagstaffe, and more recently to D. Bramwell and A. J. Sutcliffe.

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LINCOLNSHIRE POLYTRICHALES

M. R. D. Seaward

This paper represents a further contribution to a Bryophyte Flora for Lincolnshire; for previous papers in this series see Seaward (1962, 1963, 1964a, 1966a) — for a check-list of the county see Seaward (1969).

The Polytrichales is an important order of mosses since it incorporates taxa which are ecologically significant. In Lincolnshire the distribution of the genus *Atrichum* is associated with woodland; the latter is infrequent and sometimes absent over wide areas. The distribution of *Atrichum* therefore, as can be seen from figure 1, is indicative of the status of woodlands in Lincolnshire which are very limited or absent in coastal and fenland areas to the north, east and south of the county, and in intensified agricultural areas to the west of the county. Only about 2% of the county as a whole is wooded (Seaward, 1966b), of which over one-quarter may be classed as scrub, felled or devastated (Seaward, 1965).

The different species of the genus *Polytrichum,* likewise, have present-day distributions indicative of the impact of man over the past hundred years. *P. commune,* although tolerating desiccation under the seasonal retreat of the water table, is disappearing from lowland wet heaths due to extensive drainage programmes. Where water-tables have remained optimal, a change in the pH status through the increasing use of chemical fertilizers, has also been instrumental in the decrease of this taxon.

The impotant colonizers of open sand areas, such as *P. aloides, P. urnigerum, P. piliferum* and *P. juniperinum,* are often disappearing from such habitats due to the spread of bracken *(Pteridium aquilinum)* and rosebay willow-herb *(Chamaenerion angustifolium)* with their excessive and persistent litter, dense shade cover and prolific reproductive capacity above and below ground level. The spread of scrub and immature woodlands, such as that produced by regeneration of birch over lowland heaths (Seaward, 1965), have also been instrumental in the reduction of the *Polytrichum* colonizers, unless burning or conservation programmes have been effective. On the other hand, it is interesting to note the spread of certain species, such as *P. juniperinum,* has been brought about by man's activities in the provision of waste and spoil areas conducive to such colonizations.

The list below follows mainly the lines of previous papers in providing ecological and distributional data (see Jukes-Brown and Woodruffe-Peacock, 1895), but on this occasion, ten-kilometre grid-square records are given to bring the work into line with modern mapping trends. The principal areas for *Polytrichum* recording, and the 89 ten-kilometre grid-squares (with intersecting 100 kilometre grid-square reference lines indicated) are given in figure 1.

The following abbreviations have been employed:

FR — First Lincolnshire record.

GR — Ten-kilometre grid-square distribution in Lincolnshire (records for squares overlapping the county boundary are for the Lincolnshire side only); figures in parentheses are for pre-1930 records.

VC — Vice-county distribution according to Warburg (1963) with additional records from the *Transactions of the British Bryological Society* since that date.

The herbaria of Bristol University, Cartwright Hall at Bradford (see Seaward, 1968), City and County Museum at Lincoln, J. H. Chandler at Stamford and the author at Leeds have been consulted in the compilation of the list, but for the most part, distributional data is based on field recording over the past twelve years. I should like to thank Mr. P. J. Wanstall for his help in the confirmation or determination of the more critical *Polytrichum* material, and Miss V. A. Hinton for checking the manuscript and proofs.

3/2 *Atrichum undulatum* (Hedw.) P. Beauv. (*Catherinea undulata* Web. & Mohr).
FR: Jenny's Wood, Louth, 1859, Bogg.
Very common in divisions 2-8, 10, 11, 13, 15 and 16; limited distribution in divisions 1 and 14; unrecorded, and perhaps absent due to intense agricultural practices and lack of suitable habitats, from divisions 9, 12, 17 and 18.
GR: 43/79, 83, 84, 85, 88, 89, 91, 92, 93, 94, 96, 97, 99; 44/70, 80, 81, 90, 91; 53/01, 02, 03, 04, 05, 06, 07, 08, 09, 16, 17, 18, 19, 25, 26, 27, 28, 29, 36, 37, 38, 39, 46, 47, 48: 54/00. 01, 10, 11, 20.

Ecologically versatile — records from woodland, scrub and open areas are common, although woodland rides, especially the marginal banks, are preferred; found on sandy, loamy or clayey soils, usually where there is a good humus decomposition, but frequently adapted to pits and quarries, where humus production can be meagre. Fruiting material very common; polysety exhibited in 95% of collections in fruit that have been examined. In a sample of 27 Lincolnshire collections (containing 1,994 fertile inflorescences) the following polysetous conditions were determined (cf. Longton, 1962; Seaward, 1964b):

No. of sporophytes to the inflorescence	No. of inflorescences	Percentage
1	1826	91.58
2	155	7.77
3	12	0.60
4	1	0.05

VC: 1-112. H 1-40. C.

var. *minus* (Hedw.) Paris (*Catherinea undulata* var. *minor* Web. & Mohr) Scotton and Laughton Commons (division 5; GR: 43/89), 1931, Aillson (*Brit. Bryol. Soc. Rep.*, 1931, 332; *Trans. Lincs. Nat. Un.*, *8*, 22).
Antheridial perichaetia and sporophytes observed; ecologically restricted to the damp, sandy banks of ditches; present distribution unknown.
VC: 1, 2, 5, 6, 8-11, 16, 17, (18), (19), 20-22, 28, 32, 36, 38, 39, 42, 48, 54-57, 59, 60, 62, 64-69, 74, 81, 85, 86, 88, 90-92, 96, 98, 101, 102, 106-108, 110.

5/1 *Polytrichum nanum* Hedw.
All material packeted by Allison from collections made in 1927 and 1928 from the Linwood Warren area (division 7; GR: 53/18), which have been examined by myself, should be referred to *P. aloides* Hedw.; the leaves were quite sharply toothed and not comparable with the bluntly toothed leaves of material collected from non-Lincolnshire locations. There is a possibility that packets of *Polytricha* mixtures do exist which contain *P. nanum* (see *Brit. Bryol. Soc. Rep.*, 1928, 91), but Warburg (1963) omitted the vice-county 54 record on my advice. There is an unconfirmed record of this taxon from a seedfield near Tumby Wood (division 10; GR: 53/25) by Hawley in 1904.
VC: 1-27, 29, 30, 32-52, 55-58, (59), 60-64, 66-73, 75-79, 81, 83-92, 94-98, 100-104, 106, 108-112. H 1-5, 10, 12, 13, 20, 21, 27, 28, 32-40. C.

In view of the extensive vice-county coverage of this species, I should be interested to see distribution maps based on intensive ten-kilometre grid square mapping which would give a clearer picture of the status of this species in the British Isles; its absence from both Lincolnshire vice-counties, and its presence in all but four of the other English vice-counties, warrants further investigation.

5/2 *P. aloides* Hedw.
FR: Near Market Rasen, 1877, Lees.
2. Brumby West, near Scunthorpe
3. Nettleton
7. Market Rasen area
10. Woodhall Spa, Tumby
13. Stapleford

The above distribution is based mainly on old records; present distribution in all probability restricted to three or four localities in vice-county 54; possibly absent in vice-county 53.
GR: 43/(85); 44/(80); 53/(16), 18, (25); 54/(10).
Recorded mainly from dry soils, often very much disturbed as in sand-pits and in rabbit-burrowing areas, and usually taking a pioneer role in moderately acid conditions.
VC: 1-20, (21), 22-28, (29), 30, 32-52, (53), 54-112. H 1-14, 16, 18-21, 24-40. C.

5/3 *P. urnigerum* Hedw.
FR: Near Market Rasen, 1877, Lees.
7. Market Rasen area
10. Tumby
15. Blind Eye Quarry
GR: 53/01, (18), (25).

Limited distribution; on loose, dry, acid soils of heathlands and sand-pits.
VC: 1-17, 21, 22, 24, 26, 27, (30), 32-112. H 1-8, 10, 12-16, 18, 20, 21, 25-40. C.

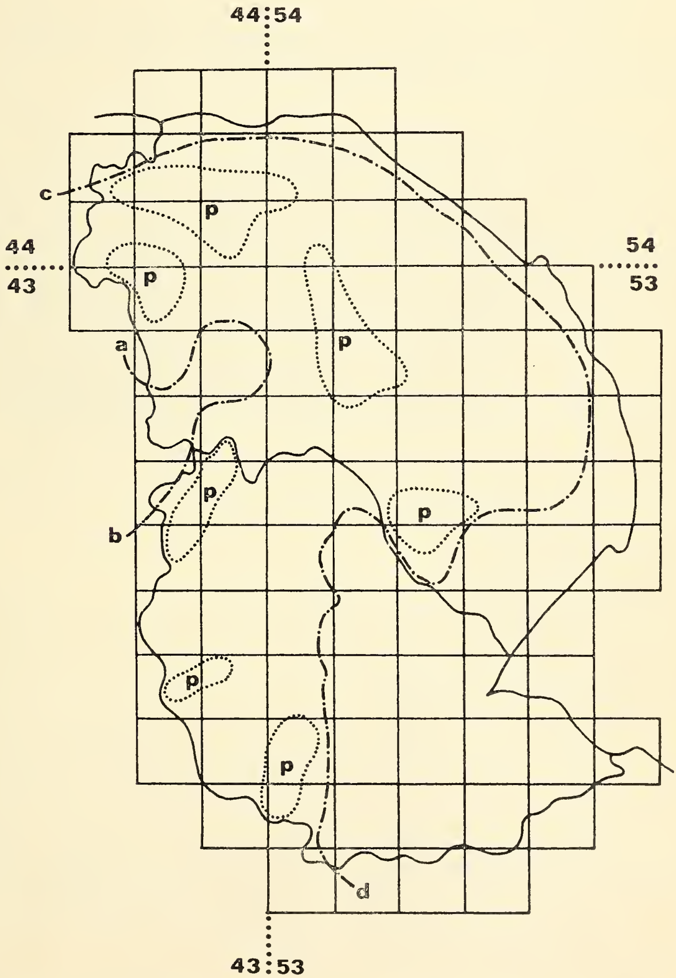

Fig. 1. Map of Lincolnshire, incorporating ten-kilometre grid square recording system, and illustrating main sites for *Polytrichum* species (denoted by p) and for *Atrichum undulatum* (between discontinuous lines a-b and c-d).

5/6 *P. piliferum* Hedw.
FR: Linwood Warren, 1877, Lees.
1. Haxey area
2. Scunthorpe area
3. Caister
5. Scotton, Laughton
7. Linwood, Tealby, North Willingham
10. Woodhall Spa area
13. Stapleford, Thorpe
15. Blind Eye Quarry area
16. Careby

GR: 43/85, 89, 91, (93), 96; 44/70, 80, 81, 90, 91; 53/01, 09, 18, 19, 25, 26; 54/10.

Locally common on heathland areas in vice-county 54; frequent in small pockets of sand forming lenses in the predominantly limestone areas of vice-county 53; pioneer of burnt areas and loose sands.

VC: 1-112. H 1-21, 24-40. C.

5/7 *P. juniperinum* Hedw.
FR: Near Market Rasen, 1877, Lees.

Wide distribution in divisions 1-3, 5, 7, 10 and 13; scattered distribution in divisions 4, 6, 8 and 14-16; unrecorded from divisions 9, 11, 12, 17 and 18.

GR: 43/83, 85, 88, 89, 93, 96, 97, 99; 44/70, 71, 80, 81, 90, 91; 53/01, 02, 04, (06), 07, 09, 16, 17, 18, 19, 25, 26, 28, 37; 54/01, 10, 20, 30.

One of the commonest members of the genus in Lincolnshire; recorded from all heathland areas in vice-county 54 and from numerous railway cuttings (this type of record will no doubt be on the increase with the closure of many of the branch lines, although burning, caused by the odd engine spark, is no longer effective in the production of suitable regeneration areas once exploited by P. *juniperinum*), waste places, sand-pits and on those areas of rock or boulder covered by a thin layer of peat often encrusted with *Cladonia* lichens. This species prefers better-drained soils than *P. commune,* and is dominant over wide areas of heathland in dry seasons when other vegetation has failed to succeed.

VC: 1-112. H 1-6, 8, 9, 11-40. C.

5/9 *P. aurantiacum* Sw. (*P. gracile* Sm.)
FR: Haxey, 1898, Fowler.
1. Haxley, Epworth
2. Manton, Scunthorpe area
3. Wrawby
5. Scotton, Laughton
7. Linwood, Panton
10. Revesby, Tumby
12. Friskney Decoy
13. Stapleford, Norton Disney
15. Stubton
16. Temple Wood

Probably still present in most of the localities listed above, and overlooked in other areas.

GR: 43/(84), 85, 86, 89; 44/70, 80, 81, 90; 53/02, 17, 18, 25, 26, 36, 45; 54/01.

Recorded from damp peaty woodland areas, and from turfy and peaty areas of heathland and open situations.

VC: (1), 3, 5-7, 9, 10, 12-44, 46-48, 50, 53-65, 67-92, 94-98, 100, 101, 103, 105, 110-112. H 1-3, 7, 8, 12-15, 17-30, 32, 33, 36-40.

5/10 *P. formosum* Hedw.
FR: Linwood Warren, 1878, Lees.
1. Haxey
2. Manton, Twigmoor, Scunthorpe area, East Butterwick
3. Howsham, Cadney, Nettleton
4. Barnoldby-le-Beck
5. Scotton

6. Burton
7. Sturton, Linwood
10. Tumby, Woodhall Spa area
12. Friskney Decoy
13. Stapleford, Hartsholme, Skellingthorpe
15. Irnham
16. Aslackby, Kirkby Underwood

GR: 43/85, 89, 97; 44/70, 80, 81, 90; 53/02, (06), 16, 18, 19, 25, 26, 45; 54/00, 10, 20.

Recorded from reasonably well-drained peaty and loamy soils in woodlands or in the vicinity of woodlands. Frequent in vice-county 54 and less frequent in vice-county 53; certainly under-recorded.

VC: 1-83, 85-112. H 1-14, 16-40. C.

5/11 *P. commune* Hedw.

FR: Isle of Axholme, 1815, Peck.

Records are numerous and widely distributed; common in divisions 1-3, 5-7, 10, 13 and 15; scattered records from divisions 8, 11, 12, 14 and 16; absent from divisions 4, 9, 17 and 18.

GR: 43/83, 85, 86, 87, (88), 89, (93), 96, 97, 99; 53/01, 06, 07, 09, 16, 18, 19, 25, 26, 28, 36, 38, 45, 48; 54/01, 10.

Probably less common than the records suggest; some of the older records may be referred to *P. formosum* Hedw. Found in moderately to highly acidic situations on wet heath and in peat and bog areas; occasionally in open woodland and in wet pockets created in old sand- and brick-pits. Luxuriant growth (up to 45 cm.) in wet areas with a relatively stable water-table (i.e. affected by seasonal rather than agricultural demands). Fruiting material common.

VC: 1-28, (29), 30-112. H 1-40. C.

var. *perigoniale* (Michx.) B. & S.

1. Epworth, 1899, Hudson; Haxey, 1899, Fowler.
7. Linwood Warren, 1959, Seaward.

GR: 44/(70); 53/18.

The status of this variety in Lincolnshire is unknown, perhaps overlooked — perichaetia and mature capsules are required for ideal identifications. Found in peaty areas — probably drier than those for *P. commune* var. *commune*.

VC: (2), 3, 12, 17, (18), 22, 32, 35-39, 48, 51, 54, 59, 62, 85, 88-90, 95, 104-106, 111.

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ENTOMOLOGICAL SECTION FIELD MEETING ASHBERRY PASTURES, V.C. 62, 27th JUNE 1971

ROY CROSSLEY

Ten members and friends attended this field meeting. The area worked comprised the Nature Reserve and the surrounding woodland edges. It proved to be an exceptionally rich area for the entomologist and Mr. Skidmore comments that amongst the Diptera he collected were two new County records and twenty new Vice-County records.

The Coleoptera included very rare southern species like *Ischnomera sanguinicollis* and *Leptura sexguttata*, and a few scarce northern species like *Rhagonycha translucida*.

The following list details only selected species of special note and a full species list covering several Orders is being prepared for the Reserve Management Committee to whom our thanks are extended for permission to visit the Reserve. Our brief preliminary work indicates that the Reserve is of considerable entomological importance and a more thorough survey of the insect fauna is planned for 1972.

Records have been contributed by R. Crossley, J. H. Flint, Mrs. H. E. Flint, A. C. Pullan and P. Skidmore.

HEMIPTERA:

Lygus wagneri Remane. Previously recorded from Deep Gill near Hawnby, but probably more widespread in the Vice-County than these two records suggest: R.C.

Cercopis vulnerata Ill.: J.H.F.

Sonronius dahlbomi Zett. Very local in England (Yorks., Glos., Surrey, Berks.) In Yorks. records from Allerthorpe, Forge Valley, Robin Hoods Bay, Hovingham: J.H.F.

Cixius cunicularius L. Recorded from hilly districts: J.H.F.

LEPIDOPTERA:

Erynnis tages L. (Dingy Skipper): J.H.F.

Xylocampa areola Esp. (Early Grey): A.C.P.

COLEOPTERA:

Amara communis Pz.: J.H.F.

Cantharis paludosa Fall. A northern species: J.H.F.

Rhagonycha translucida Kryn. One amongst Dogs Mercury by path; a very local northern species: P.S.

Elmis maugei a. aenea Mull. Underside of stones in beck: J.H.F.

Ischnomera sanguinicollis F. The most outstanding discovery of the meeting. This is a very rare beetle of old forest areas of southern England and has not previously been found north of Notts. The first example was discovered by Miss C. Frisby and later by other members. Mr. Skidmore located a bush of Guelder Rose to which these striking beetles were attracted, the larvae probably living in rotten wood in the adjacent woodlands.

Oedemera virescens L. This is a very rare and local beetle in England but it is well-known in this general area, colonies thriving in several of the valleys: J.H.F., P.S.

Alosterna tabacicolor Deg. A local Yorkshire beetle: J.H.F., P.S.

Phytodecta pallida L. Local in Yorkshire, occurring on hazel: J.H.F.

Leptura sexguttata F. One on *Heracleum* umbel by path; a very rare beetle of old forest areas of southern Britain: P.S.

Apoderus coryli L. Although no specimens of this weevil were found, the hazels bore the characteristic cut and rolled leaves: P.S.

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Polydrosus mollis Strm. Sparingly on hazel; a very local species although well-known in this part of Yorkshire: P.S.

Magdalis armigera (Geoff.) One swept from beneath old elm: P.S.

HYMENOPTERA:

Sterictophora geminata Gmel. On *Rosa*; local and new to Yorkshire: J.H.F.

Arge ustulata L. *Salix*, *Betula*, *Crataegus*; local: J.H.F.

Arge ciliaris L. *Ex* Meadowsweet; a very local species: P.S.

Abia sericea L. *Succisa*, *Knautia*; local: J.H.F.

Allantus calceatus Klug.: J.H.F.

Eriocampa ovata L. *Ex* Alder; a local species rarely occurring in Yorkshire: J.H.F.

Eutomostethus luteiventris Klug.: J.H.F.

Rhogogaster viridis L.: J.H.F.

Tenthredo ferruginea Schrk.: J.H.F.
T. olivacea Klug.: J.H.F.
Macrophya 12-*punctata* L. *Ex* grasses and sedges; local: J.H.F.
M. albipuncta Fall. *Geranium sylvaticum*; local and scarce, new to V.C. 62: J.H.F.

DIPTERA:

Pyrophaena rosarum Fab. A local species in Yorkshire, known in V.C. 62 from another nearby valley: R.C.
Xylota xanthocnema Collin. This handsome fly is an uncommon insect of southern England, known otherwise in the north only from the Doncaster area: P.S., J.H.F.
Chyliza vittata Mg. One on a Gelder Rose bush. New to the County: P.S.
Tetanocera phylophora Mel. One male amongst Dogs Mercury. A local, but widespread species of which this is the first Yorkshire record: P.S.
Cordilura pubera F. New to V.C. 62, this species is associated with *Carex* and was common in the marsh: P.S.
Megaphthalma pallidum Fall. Two in the wood by the path. A generally scarce species of which this is the first record for V.C. 62 and only the second for the County: P.S.

A full list of new County and Vice-County Diptera records emanating from this field meeting has already appeared in the Yorkshire Naturalists' Union Annual Report for 1971 (*Naturalist* Jan.-Mar. 1972, 27-29.)

FIELD NOTES

Unusual Nest Site for Collared Dove

The Naturalist, No. 912 (January-March, 1970) carried a note concerning an unusual nest site for Turtle Dove (*Streptopelia turtur*).

On 29th April, 1971, my attention was drawn by one of my pupils, to the nest of a Collared Dove (*Streptopelia decaocto*) at Townville, Castleford, where a bird was sitting, apparently on eggs, in a nest at the top of a telegraph pole. The nest itself was lodged on the brackets holding a metal ring and insulators some 25 ft. from the ground, and was completely exposed. The telegraph pole was in a grass verge between the road and footpath along which residents and visitors to the housing estate were continually passing to and fro. Most were unaware of the Collared Doves although nest and sitting bird were quite obvious from the ground. Later, well-grown young could be seen in the nest.

The position of the nest is unusual though not unique. Hudson, (in *British Birds*, vol. 58, no. 4, April 1965), recorded four instances (out of a total of 182 nests) where insulators of telegraph poles were used. Generally, trees and shrubs with greater cover are favoured as nest sites. The Collared Dove's predilection for built-up areas and suburbs is also well-known. Leeds, Goole, Hull, Middlesbrough, Knottingley and Sheffield were among the earliest breeding places in Yorkshire.

Of additional interest it can now be recorded that birds were back at the same nest in Townville in early March 1972, and in the second half of April had young in the same nest in which they reared their 1971 brood.

The species has now been breeding in the county since 1959.

R. F. DICKENS

Great Black-backed Gull taking Moorhen

Whilst watching birds from the hide at Fairburn Ings Nature Reserve and Bird Sanctuary, on 15th January, 1972, my attention was drawn to a Great Black-backed Gull flying low over the Cut area.

Without warning the large gull suddenly dropped on to a Moorhen swimming across the open water. A tussle ensued in which both birds almost disappeared under water. Several Black-headed Gulls swooped down screeching, just above the entangled birds. At this stage the Great Black-backed Gull picked up the Moorhen in its bill and flew some fifteen yards to a clear patch of water. There it began to peck savagely at its victim, occasionally picking the Moorhen out of the water and shaking it. A Mute Swan tried to drive off the gull but to no avail. Eventually the Moorhen became weaker and then turned over apparently dead.

The Great Black-backed Gull picked at the corpse for nearly half an hour before it flew off to another part of the Reserve.

G. Thrussell

BOOK REVIEWS

The Flora of the Isles of Scilly by **J. E. Lousley.** Pp. x + 336 with 16 monochrome photographs, 16 distribution maps, 5 text figures, 12 tables and 7 pages of drawing by Barbara Everard depicting 31 species. David and Charles, 1972. £4.75

Mr. Lousley's interest in the flora of these islands extends over 35 years. Hand in hand with his ever-widening knowledge of the individual islands and their wild flowers has gone an ever-increasing interest in all aspects of their history, as well as their geology and topography, which have any bearing upon their present vegetation. This book therefore represents a distillation of the results arising from his own repeated visits, his investigations into the history of their botanical exploration, and his meticulous sifting of all earlier records and specimens from there. In so far as any Flora can ever claim to be a definitive work this is surely such a Flora.

The Isles of Scilly have a special interest in the context of the British flora on account of their extreme western and southern position and the climatic conditions consequent upon their situation. The five inhabited islands together with the 40 other islands which carry any vegetation together cover little more than 6 square miles or 8 square kilometres. For nearly 4,000 years they had been occupied by man and used for growing crops or pasturing herds before the development over the past century of the flower industry on which, together with the rapidly expanding tourist trade, their economy now depends. Ecologically the range of habitats is relatively restricted; granite cliffs and boulders, sandy shores and dunes, 'downs' or heathlands and a little marshland on St. Mary's make up nearly all the available terrain for plants apart from the artificial habitats associated with the bulb fields which yield an interesting weed flora. Comparisons with the flora of Cornwall show notable differences and the islands have more in common with the Channel Islands with which they share some of the rarest species such as *Ophioglossum lusitanicum*, *Viola kitaibeliana* and *Ornithopus pinnatus*.

About 450 species are accepted as native to the islands and information on the occurrence of these and about 220 colonists, established aliens, introductions and garden escapes is included. The presence or absence of each species in the five inhabited islands and the five groups of uninhabited islands is detailed along with habitat, frequency and first records and, in many instances, supplementary notes and comments are added.

This book will be an essential part of the equipment of all botanists who in future visit these islands. It is too highly priced despite its excellent printing and production, yet any botanist who omits to take it with him will be in the position of a traveller who forgets to pack his maps or a climber who leaves his boots behind. Mr. Lousley long ago won the admiration of field botanists for the combination of sustained enthusiasm and high degree of care and accuracy which characterises his work. We warmly congratulate him upon the successful completion of another task; one which, in this case, has occupied him along with his many other botanical activities for half a lifetime.

W.A.S.

A Check List of the Vascular Plants of County Durham compiled by **G. G. Graham, C. D. Sayers** and **J. H. Gaman.** Pp. vi + 73. Published by and obtainable from Department of Botany, University of Durham, South Road, Durham City. Price 20p (30p by post).

More than a century has passed since the publication of Baker and Tate's *Flora of Northumberland and Durham.* Since then much active work has been done in County Durham, especially by the late Professor Heslop Harrison whose records are plentifully scattered through nearly 50 years' issues of *The Vasculum.* The present work brings together records from *The Vasculum* and other published sources and from the University Herbarium, indicates the frequency of the species and gives localities in the case of those species with few recorded stations. It does not purport to be a Flora. No critical assessment is attempted of the many problematical records which have appeared, though in certain groups the compilers have had help from acknowledged authorities. The numerous introductions included, ranging from established aliens to the merest waifs and strays form nearly 20% of the total.

By assembling all these records in one easily consulted list the compilers have taken a very useful and important step forward in the work which needs to be done before a full and modern Flora of the county can be produced. It is to be hoped that their labours will stimulate others to co-operate by sending additions and corrections and supplying information based on their own observations from all parts of the area so that the more comprehensive account which is envisaged may follow in due course. W.A.S.

Exotic Mushrooms by **Henri Romagnesi.** Pp. 192 with 160 text-figs. and 160 coloured plates. Sterling Nature Series, Oak Tree Press, distributed by Ward Lock Ltd. 1972. £5.00.

This book, adapted by Rhea Rollin and E. W. Egan from the author's *Nouvel Atlas des Champignons*, consists of a short introduction about various aspects of mushrooms' (this word is used in a very wide sense to include all larger fungi), 18 pages of text-figures of microscopical characters of the 208 species depicted, and 160 coloured plates done by a team of artists.

As the foreword indicates this is not a book for identification of species, but is rather for artists and others to study the possibilities of the larger fungi as objects on which to practise artistic skill. For those more concerned with identification it can be no more than a reference book for confirmation after identification by some other means.

The best part of the book is that containing the drawings of microscopical details, which are very well done indeed. Unfortunately the same cannot be said of the plates which are of varying quality, some suffering either incontestably from poor reproduction or, more a matter of personal opinion, from artistic distortion. Some of them are very good, for example some of the boletes, some are indifferent, and a few are so bad as to be misleading. One of the worst is Plate 32, *Amanita phalloides*, and since this is one of the most important species depicted, that is a serious blemish. There is an unfortunate error of naming on Plate 63, where *Cortinarius cyanopus* and *C. bolaris* are indicated as varieties of *C. calochrous* instead of as separate species as indicated in the table of contents. *Agrocybe aegerita* is incorrectly spelt '*aegirita*'.

Considering the high price and the limited number of species included, this book cannot be recommended except to those interested in 'artistic' plates, or to those with money to spare who are interested in the microscopical details of the species included in the book. P.D.O.

Non-Verbal Communication edited by **Robert A. Hinde.** Pp. xiii + 443 with 10 plates, 51 text figures and 10 tables. Cambridge Univ. Press, 1972. £5.00.

As new scientific disciplines emerge they have first a descriptive phase using words from ordinary everyday language because everyone knows what they mean. Soon this is recognised as being too vague and imprecise and these ordinary words come to be used in specific, very limited and defined ways relevant to that discipline, and comprehension also tends to become limited to the initiated. Thus a word like communication comes to mean different things to the information theorist, the animal behaviourist, the psychologist, the anthropologist and, to widen the scope, the linguist and the drama critic. Yet it would appear to the ordinary speaker of this common everyday language that it might be of benefit to all these different disciplines if they could establish their common ground and their areas of difference. This is precisely the basis on which Sir Julian Huxley spurred on the Royal Society to set up in 1965 a study group to this end under the chairmanship of Professor W. H. Thorpe. The outcome of that group's thirteen meetings is presented in this volume under the competent editorship of Professor R. A. Hinde. As readers of the *Naturalist* will know from a previous review (*Nat*. 1970, 37) Professor Hinde's style of editorship is based on involvement. In this volume he sets out the problems in a general introduction, gives short introductions to each of the three parts and even more valuably adds an editorial comment on most chapters, ending with an epilogue. In short, like a good chairman he succeeds in keeping all the threads of discussion together, pointing out the significance of each. More editors of composite contributory volumes would do well to follow his example.

The three parts of this book deal respectively with the nature of communication, communication in animals and non-verbal communication in man. The first part, as might be expected, sets the scene, beginning with an analysis of communicative processes in all their aspects. A comparison of vocal communications in man and animals follows, and the section concludes with a chapter on human language, from the point of view of a linguist. Many biologists have agreed that human verbal languages must have evolved, probably from the non-verbal systems of animals, hence the inclusion of this chapter with an attempt to analyse language from that point of view and with some editorial comment on the problem. On the other hand there is the point of view that language depends on properties peculiar to man. Our present state of knowledge about human and animal non-verbal systems and the knowledge about language is insufficient to answer broad comparative questions. A more hopeful approach to this problem will come with the increase in understanding and the refining of the questions asked about particular properties of these systems.

There are however a number of features of non-verbal communication, particularly facial expressions and gestures, which man does share with animals and the two subsequent sections of the book provide the basic evidence of this. The middle part is therefore a wide but selective survey of such knowledge, deliberately omitting references to such communication systems as pheromones — chemical substances secreted and disseminated for example by ants — but covering comprehensively those aspects which have links with human behaviour, or from which principles can be elucidated. The discussions within the study group and the editor's cross references to other chapters and their writer's viewpoints serve to underline the way in which unifying principles are painstakingly extracted from scientific data by a mixture of deductive and inductive thinking.

About half the book is in fact concerned with the non-verbal communication aspect of human interaction, not only from the evolutionary viewpoint referred to above, such as the derivation of laughter and smiling, and expressive movements in different cultures, but also the type of behaviour investigated by social psychologists in adults and children, and the type of interest of the anthropologist. The final two chapters are considerations of non-verbal communications on the stage and in western art, and they do somewhat suggest that it is difficult to fit these categories in the behavioural evolutionary patterns. The chief difficulty is that they are post-language developments only found among humans. The easiest things to depict are the gestures which would normally be accompanied by language but have subsequently become ritualised such as prayer or greeting.

To the student of animal behaviour this is a most valuable book resulting from discussions over seven years by a few of the leading exponents of this discipline in this country in conjunction with members of other relevant disciplines. The cross fertilisation obviously leads to vigour and general readers will learn much about themselves as well as much about animal communication. Those interested in scientific thought and methodology can see it in action here. I.W.

Animals in the Service of Man by **Edward Hyams.** Pp. 203, with 42 black and white photographs. J. M. Dent & Sons Ltd., 1972. £2.95.

The sub-title of this book is "10,000 years of domestication", and this is only a part of the process which started with Man and Dog. For many naturalists domestic animals lack appeal and yet looking at the span of time over which they have been around, one must marvel at the evolution of such diversity of breeds from parent stock in so short a time.

As an introduction to the subject this is an excellent book, but I feel that the serious student would soon come to appreciate the controversies which rage over who tamed what, and where. Sheep and goats probably cause the greatest hair-tearing, but even horses and dogs have their factions and sources as diverse as scientific archaeology and relatively unscientific art history, get pulled in to support various claims.

However, this is a book which one can recommend for wide reference. The species covered range from elephants and camels, through the whole range of conventional European farm stock, to fur-bearing carnivores, frogs, snails and canaries. On the subject of fish-farming the author has much interesting information. This field, of course, is now the subject of advanced experiment in the face of the coming world food crisis and is a far cry from the training of cetaceans to destroy enemy submarines, or of Sparrowhawks to protect cherry orchards. The latter, by the way, was a failure, though the use of falcons to protect expensive aircraft from expendable gulls does not really seem less odd. T.M.C

The Observer's Book of Wild Animals by **Maurice Burton.** Pp. 199 with 29 colour and 35 half tone illustrations. Frederick Warne and Co. Ltd. 1971. 45p.

The revision and updating of this valuable and now superbly illustrated little compendium of information on British Mammals, Reptiles and Amphibians, has been completely re-written though, unfortunately, without reflecting the current trend towards distribution studies. It still gives, in the tradition of the Observer book series, well condensed information for each species on food, habitat, life cycle and behaviour. This revision is beautifully presented and special mention must be made of the brilliant close up photographs of Bats by Steward C. Bisserot. C.A.H.

Gulls in Britain by **Richard Vaughan.** Pp. 96, with 52 black and white photographs. H. F. and G. Witherby Ltd. London 1972. £1.75.

On the foundation of many very good photographs the author has built short, but clear pictures of the six species of gull that breed regularly in the British Isles and he remarks on several others that only visit us. It is unfortunate that the type of reproduction has not done credit to what have obviously been first class originals, but has robbed them of brightness and sparkle.

Many aspects of the lives of the gulls are given; display, nesting behaviour and feeding habits are all illustrated and described. Field identification details for each of the species, in both their breeding and winter plumages, are covered, but in the case of the Black-headed Gull, the white primaries, that show so well in the picture on page 14, should have been mentioned. Opinions on the melodic quality of the call of the Herring Gull will vary, just as they do about the need to control the species. Although I do not care for the idea of man setting himself up as God to decide what shall live and what shall not survive, there is no doubt that these birds, along with Lesser Black-backed Gulls, are becoming too numerous for the wellbeing of terns, petrels and puffins.

The author implies that Kittiwakes go to fresh water to drink, not to bathe; but I have watched them at lochans where groups come daily to wash out their feathers. I have always thought they did so to get rid of parasites that were capable of withstanding seawater but not fresh.

It is perhaps quibbling to raise minor details in a book as informative and well illustrated as the one under review. To readers of this journal it should have a special appeal as much of the information and many of the photographs were obtained in Yorkshire. There is, at the end of the book, a list of works consulted that is quite impressive and not only does this show the extent of the author's research but, along with his comments on photography, also adds to the value of an attractive and reasonably priced work. A.G.

The Lapwing, the Journal of the Doncaster and District Ornithological Society. 20p.

This is designed primarily for home consumption, consisting of reports of activities, profiles of personalities etc., as well as more scientific material and results of surveys.

The Doncaster Museum also publishes a Doncaster Bird Report based on the observations of the D.D.O.S. The proliferation of such local publications raises a number of general problems. Quite a few local societies have printed annual reports, Spurn Bird Observatory, Knaresborough Ringing Station, Fairburn Ings Nature Reserve (to name but a few others) each publishes its own report. To cover the whole county would cost a fortune. There is a wide divergence of style, content and quality. All have one likely shortcoming in common. Whilst of local interest — to their own members or visitors — they reach only a small proportion of the county's naturalists and very few outside. In a number of cases these local publications have contained articles or information which, properly, should have found their way into a recognised scientific journal. Records of species new to the county at least should have been given some prominence in *The Naturalist* where fuller treatment could be given than the bare record which is usual in an annual report. Some of these journals contain articles and reports whose excellence and importance also merit wider audiences.

Name This Bird by **Eric Fitch Daglish.** Pp. 215 with 64 colour plates. An Aldine paperback by Dent, 1972. £1.25.

With the wealth of recent excellent field-guides, any new publication on birds needs to be of top-quality and up-to-date, or else to undercut others in price. *Name This Bird* is a reprint of a book first published in 1934 and last corrected in 1954. Of Black Redstart it is said that song is "not heard in this country". The White-tailed Eagle is "Now almost extinct in the British Isles"; the Sparrow Hawk, "widely distributed and fairly common". We meet 'Shield Duck" in the plates, and 'Gadwell" in the text; and innumerable other errors. The name Richardson's Skua and Buffon's Skua occur in the plates, but the generally accepted names in the text.

This selection will indicate that the book does not fit the top-quality requirement. At £1.25 it isn't even cheap. The plates are not even passable, by modern standards.

R.F.D.

Collins Guide to The Freshwater Fishes of Britain and Europe by **Brent J. Muus** and **Preben Dahlstrom.** Pp. 222 with 73 colour plates and 91 line drawings. Collins. £2.25.

This book has been written with the intention of providing a simple pocket guide to the freshwater fish of the British Isles and Western Europe. That such a guide has long been lacking has been painfully apparent to all who sought information on or to identify even relatively common fish.

The first and last parts of the book deal briefly with the study and understanding of fish life in freshwater with sections on anatomy; behaviour and reproduction; food and feeding; habitats; planned fish farming and the problems of pollution. The central section describes all the 130 species and distinct races of freshwater fish found from Russia westwards, including all species native or introduced to Britain. All are illustrated by what must be some of the finest colour paintings of recent times. Distribution maps have been prepared to give at a glance an impression of the range of each species. Being of necessity of a very small scale, their use as a guide to status in a localised area is limited.

For this English edition (first published in Denmark 1967) a few interpolations have been made to add to its value, but unfortunately mistakes have appeared. The Bitterling *Rhodeus amarus*, Zander *Stizostedion lucioperca* and Wels *Silurus glanis* are marked as introduced into Britain in the text but do not appear as such on the distribution maps. These, however, are minor defects in what is a much needed complete handbook for both fisherman and naturalist. C.I.M.

Name This Insect by **Eric Fitch Daglish.** Pp. 294, 16 pp. of colour plates, 48 pp. black and white half tones and text diagrams. Aldine Paperbacks, 1972. £1.25.

The aim of this book, originally published in 1952 and revised in 1960, is "to enable the rambler to identify all the insects commonly met with in this country whose appearance is likely to arrest attention . . . ". That it lamentably fails to do so is very quickly apparent. Out of the 700 insects selected for inclusion many are by no means common; indeed, of the 40 bugs mentioned one is doubtfully native, one is known from a single British locality and another is a coastal species which lives in rock crevices below high water mark and is recorded from about 20 sites in Britain. The 13 species of butterflies illustrated in colour include the Glanville Fritillary (known in Britain only from the Isle of Wight), Adonis Blue and White Admiral. If the choice of species is odd, to say the least, worse is to come in the nomenclature which is an inconsistent jumble of invented English names and outdated scientific ones.

The keys for the Heteroptera and Diptera are totally useless and nothing induces me to believe that they are any better in the other Orders covered.

An introductory chapter covering two and a half pages is entitled, "An easy way to name insects". I wish I knew of one; it is most definitely not provided by this book.
R.C.

The Scottish Lochs 2 by **Tom Weir**. Pp. 246, with 124 photographs. Constable, 1972. £2.00.

The second volume of Tom Weir's *Scottish Lochs* deals with the lochs in those parts of Scotland excluded from Volume 1; thus it covers the mainland north of Invernessshire, the islands of the north and west and the uplands of the south-west. The pattern established in the previous volume is continued; the mainland lochs are grouped in the 24 drainage basins in which they lie, and there are separate sections on the lochs of Orkney, Shetland, the Outer Hebrides, Skye and Mull.

This volume deals with parts of Scotland still to be discovered by the average summer holiday-maker. In some of the more watery areas sheer force of numbers — and the fact that some of the lochs are nameless — have compelled the author to be selective, but the book is a mine of information for the specialist, be he fisherman or bird-watcher; details of angling prospects, permits and prices are included where available. The text covers hundreds of miles of little-trodden shores, and is splendidly illustrated from the author's photographs. Like its predecessor, the work is almost free from clerical error; the printer has mis-spelt Lochalsh on p. 49, and Klibreck (pp. 107, 109) becomes Klibrick on pp. 117, 118. Iceland Purslane is, in fact, known from elsewhere in Britain than the Storr in Skye (p. 195); it has a station in Mull.
R.M.

The Shamba Raiders by **Bruce Kinloch.** Pp. 384, with 45 black and white photographs and 13 colour plates. Collins and Harvill Press, London, 1972. £3.50.

Accounts of African wildlife are many and varied. This one has the merit of being enormously varied, like the career of its author. After a period in the Indian Army, he moved to Africa and spent the next twenty-three years working with wildlife, first in Uganda, then in Tanganyika, and after that in Botswana, Rwanda and finally Malawi. With a background of such wide experience he is well qualified to make comparisons and draw conclusions.

From pioneering days to his last act, there unfolds a fascinating story of conservation, and sometimes the lack of it, in various African countries. The conservation movement in Africa has passed through many stages and so many characters have emerged that the value of this book as a guide to African progress is considerable. The author's pithy comments on situations, personalities and what must at times have seemed an uphill struggle, carry one through all the stages of progress from mere preservation to organised wildlife management. The high point came with the foundation of the College of African Wildlife Management in Tanzania.

The Shamba raiders, by the way, are Elephants — for whom the author has the greatest admiration. T.M.C.

Shores of Macquarie Island by **Isobel Bennett.** Pp. 69, with 27 colour plates and 36 black and white photographs. Rigby Ltd., Adelaide, and Robert Hale and Company Ltd., London, 1972. No price given.

Macquarie Island is one of those dots on the map which lies almost directly on the Antarctic Convergence. To a casual browser this book might be taken for just another repetition of the now familiar penguin-dominated work emanating from yet another sub-Antarctic expedition. I am happy to say that it is refreshingly different. True, the penguins are there, and so are the Elephant Seals, but there the resemblance ends. Miss Bennett is a marine biologist, specialising in inter-tidal ecology, and her view of the shores of Macquarie Island presents a view of the other antarctic, that of marine invertebrates. Here familiar genera mingle with the little known, and anyone who has an interest in British shores need not feel lost entirely. In a small book in terms of text, she covers a lot of ground, drawing the reader from one discovery to the next, and weaving an ecological web. No longer do the penguins, albatrosses and seals exist *in vacuo*, but they become credible components of a fauna which even now is beginning to be threatened by pollution and exploitation. The data accruing from the research programme of the Australian National Antarctic Research Expedition groups work, and no less the contributions of individuals like the author in presenting those results to a wider public will, one hopes, safeguard places like this for the future.

The production of this book deserves special mention — only the text pages are numbered, which means it is longer than one might imagine, and the end papers carry excellent maps. The illustrations are lavish and the colour good. No price is given in the review copy, but I would imagine that this could prove one of the best bargains to come from Hong Kong — where it was printed. T.M.C.

The World of a Tree by **Arnold Darlington.** Pp. 153 with 24 photographic illustrations and 48 figures. Faber and Faber Ltd., 1972. £1.60 net.

Planned for readers of eleven and over this book tells the story of the oak tree and how the lives of numerous animals and plants are involved with it. Clearly written, packed with accurate information and containing many suggestions for practical work, this book can be highly recommended, not only for the age group for which it is specifically designed, but also for anyone with a serious interest in natural history. The illustrations are excellent and the suggestions for further reading are well chosen.

R.C.

The Hidden Country by **John Richards.** Pp. 144 with 28 figures. Faber and Faber Ltd., 1972. £1.75 net.

The sub title of this book is, "Nature on Your Doorstep", and the chapter headings such as, "A look at lichens", "The plant hairs", "A gnat called *Culex*", and "Just grass", give an indication of the scope of subjects covered. The book is designed for young readers and it is certainly suitable for young teenagers but it may be too difficult for younger children. Adults will find this book of limited interest for the treatment of the subjects is superficial and even at todays inflated prices the cost is high for what it is.

R.C.

Biology: An Environmental Approach in 5 volumes. 1972 (1) **The World of Life: The Biosphere,** 102 pp., 75p. limp/£1.50 boards; (2) **Diversity Among Living Things,** 128 pp., 85p. limp/£1.65 boards; (3) **Patterns in the Living World,** 147 pp., 95p. limp/ £1.75 boards; (4) **Looking into Organisms,** 192 pp., £1.10 limp/£2.10 boards; (5) **Man and His Environment,** 184 pp., £1.10 limp/£2.10 boards. John Murray, London.

These five volumes have been adapted from the second edition (1968) of the Biological Sciences Curriculum Study textbook (Green Version) of the United States by a team of biology teachers and lecturers under the leadership of Professor Elizabeth Perrott of Stirling University. Of the three versions developed by the BSCS, the Green Version has proved to be the most acceptable to the British market. It has often been difficult for the teacher and pupil to utilise animals and plants peculiar to the United States, and broad ecological concepts derived from living in a continent with a range of conditions from tropical to arctic as suitable material for work in British classrooms and field situations.

The trend in recent years has been towards the breakdown of large, unified textbooks into study units and compartmentalized work. The undergraduate biologist is familiar with the scope offered by the Hutchinson University Library and the Arnold Studies in Biology, and schools have been able to use several of these together with *Scientific American* reprints and the Heinemann Scholarship Series to very good effect. *Biology: An Environmental Approach* embodies the BSCS Green Version textbook and the Student's Manual, but it remains to be seen what back-up materials, such as equipment, visual aids and teacher's guides, are necessary for a "complete" course. The total cost of the five volumes in limp covers, with a short school life, is £4.75, and the library edition, which would be more suitable for the laboratory bench and the school satchel, cost £9.10.

The books are well prepared and serve to a large extent the needs of British schools; although there is still a tendency to rely on American examples, such as the Eskimo, Indian, rattle snakes, bison, coyote, prairie dog, beaver and Kirtland warbler, to demonstrate certain biological principles and phenomena.

The texts as a whole are rich in plates (monochrome and coloured), figures, practical investigations, questions, problems and reading lists. Many excellent plates and figures, however, have inadequate captions, e.g. "lichen growing on a tree branch" and "lichen growing on poor siol" (especially when habit and habitat details are not covered in the text), and "compare this electron miscroscope with Leeuwenhoek's microscope and with those in your laboratory" (when no mention of the structure and capabilities of the electron microscope is made in the text, and one is left in a position similar to that of comparing the function of a washing machine and a refrigerator on outward appearances only).

The title of the volume *Man and His Environment* is misleading, since only one-third of the text is truly devoted to this subject. It is surprising that topical and well-documented subjects such as pollution, population growth, world resources (especially food), agricultural practices, urbanization, and the future of man are poorly covered. There is also a lack of field investigations, and little attention is paid to conservation.

The volume entitled *Diversity Among Living Things* is spoilt by the review (especially of the plants) at the end of the text, for although the figures are colourful, they are often inaccurate (e.g. *Conocephalum* has the appearance of being one-cell thick, and *Sphagnum* and *Polytrichum* are particularly poor for coloration, habit and sporogonia), and a choice of common British examples wherever possible (e.g. *Lycopodium*) would have been appropriate. These illustrations detract from the excellence of the preceding chapters and supporting plates.

One must also question the use of pictures for the sake of pictures. A sketch of 'Plane trees tolerating an urban environment", and an artistic mock-up of present-day tropical savanna are not complementary (or indeed complimentary) to the adjoining text and photography.

I am sure that these books will form a valuable accession to secondary school library shelves, but it remains to be seen if some, or all, of the volumes will provide a minor or major supplementary role, or a "complete" biology course (bearing in mind the cost) in British schools. Although this work is predominantly for school use, the naturalist will, I am sure, be gratified to see ecologically-orientated books and/or courses introduced into our schools provided that adequate attention is paid to such aspects as environmental conservation and a better understanding of the environment results.

M.R.D.S.

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Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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"KILLS, INJURES OR TAKES"

PETER CONDER

I would like to start by saying how honoured I am to be asked by the Yorkshire Naturalists' Union to give the Ralph Chislett Memorial Lecture in 1972. First, I am honoured because I remember Ralph Chislett in the days when I was warden of Skokholm Bird Observatory and I used to visit Spurn to see what ideas I could gather. I remember meeting such pioneers in Bird Observatory work as Chislett, Ronald Garnett, whose widow still writes to me every year from Canada, and of course George Ainsworth who did so much in the early days to keep Spurn going.

Second, I am glad to give this lecture because anyone connected with bird protection must admire the work and indeed the leadership and the spur provided by the Bird Protection Committee of the Yorkshire Naturalists' Union. Charles Wilson pointed out in an article in *Birds* recently that "Members of the Yorkshire Naturalists' Union stimulated the first Act of Parliament to protect birds other than sporting birds". This Act was, of course, the Seabirds Protection Act 1869, which protected the seabirds of Bempton from the boatloads of sportsmen with guns who used to pot at them as they flew out from the cliffs. Much of Bempton cliff face is now an RSPB reserve.

As one reads Charles Wilson's article in *Birds* one can appreciate that no other regional organisation has done as much as the Yorkshire Naturalists' Union to protect its birds. Indeed, at times I am, disloyally perhaps, tempted to think that at least at certain periods of history the YNU probably did more, certainly in relation to its resources, than the RSPB itself. Quite clearly too the Committee had a number of forward-thinking people amongst its members whose ideas have been incorporated in the Protection of Birds Acts of 1954-67.

The protection of birds denotes largely a defensive method of securing by legislation and by other means a degree of non-disturbance for wild birds from excessive predation, cruelty or exploitation by man. It is considered nowadays to be only part of a more forward-looking policy of the conservation of birds and other forms of wildlife. It is understandable, since some birds are so confiding, that they should have been singled out for such special legislation; nevertheless, it is illogical in some ways since it is often the birds' total environment that needs conservation.

The current philosophy of bird protection considers that the protection of populations is generally more important than the protection of individual birds, particularly in view of the paucity of financial resources available to conservation. As a general rule too in Britain, the aim is to conserve as wide a variety of wild species as possible but often especial protection measures are taken to protect small populations of species which might be extremely common in other parts of their range, such as black-tailed godwits, avocets, ospreys, ruffs and black terns.

Sympathy for and indeed love of birds was one of the earliest motives for protecting birds. St. Cuthbert of Northumbria was an example of one of the early British Saints who provided some measure of sanctuary for birds. A more selfish approach was shown by the Norman knights, who established large hunting estates and declared other areas crown land in order to protect them for hunting deer and other game. These areas have been important factors in providing large areas untouched by agriculture which, whilst formerly set aside for game, have been important sanctuaries for wildlife.

Both these attitudes remain important in bird protection today. Most people who are committed to bird protection really do it for sentimental reasons because they like, love, enjoy and are interested in birds. On the other hand the closely guarded game estates, the stately homes with the varied parkland and open woodland, are kept for shooting but serve another important purpose.

But now there is a third, almost disinterested reason for protecting wildlife — its value as a scientific resource for the future: some people have such a breadth of vision that though they are not interested in birds or nature themselves, they can see the value of preserving wildlife as part of our national heritage.

So, for a variety of reasons birds come to have a special relationship to man. St. Cuthbert, through his love for them, provided one motive for protection. The Norman kings gave another, more selfish, reason and the early members of the YNU pioneered wild bird legislation.

Between 1869 and 1954 a number of measures were enacted, each of which tackled piecemeal the increasing problem of the exploitation of wild birds. Finally, the Protection of Birds Act 1954, as amended by the Protection of Birds Act 1967, brought together the best of the previous Acts into one comprehensive piece of legislation.

In this lecture, I wanted to think about some of the attitudes which I tend to adopt when I am asked about such things as egg-collectors, the bird "fancy", shooting in its various facets, and to wonder myself if my attitudes or those of my contempories are really sensible, or whether just like some every day conventions they are useful because they give me the opportunity not to think deeply about certain subjects. I wanted to talk about some of the RSPB attitudes to birds and to bird legislation. Just occasionally I shall be expressing opinions which may well be a personal opinion rather than an RSPB opinion.

It seemed to me in thinking about this, a suitable text for this lecture could be taken from those words with which the Protection of Birds Act 1954 is prefixed: "Be it enacted by the Queen's Most Excellent Majesty by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the the authority of the same, as follows:

1. If, save as permitted by or under this Act, any person wilfully —
(a) kills, injures or takes, or attempts to kill, injure or take, any wild birds; or
(b) takes, damages or destroys the nest of any wild bird while that nest is in use; or
(c) takes or destroys an egg of any wild bird,
or if any person has in his possession or control any wild bird recently killed or taken which is not shown to have been killed or taken otherwise than in contravention of this Act, etc., etc., etc.
he shall be guilty of an offence against this Act, etc., etc.

These sentences contain the main principle of the Protection of Birds Acts. By and large the Acts are reasonably good Acts. I think they are reasonably fair Acts. But of course in trying to be reasonably fair Acts, in looking after the interests of lots of different people, it has become a somewhat complicated Act. Indeed, one might say that it is a very complicated Act. Some people then go on to argue that the Act ought to be made simpler, but they have not the breadth of vision of the Committee who framed this Act, who have tried to be fair to all those who have an interested in birds. I have said that in my view it is a reasonably good Act but there are the weak points which I will come back to later.

I am going to start off by being provocative on the subject of "kill". For a variety of different reasons it is legal to kill certain birds; it is legal to kill game birds or quasi-game birds during the open season. The game birds having been killed are then eaten.

But I personally have often wondered: would it not be simpler, possibly cheaper, to rear these birds in pens and when they are fat enough humanely destroy them like hens, turkeys, guinea fowls, etc. I appreciate that there may be some difficulties in rearing partidges in pens, but I have always understood that there might be some progress being made in this direction. But if we lost the shooting interest we might lose too a lot of beautiful countryside, particularly in the eastern arable counties which every year tend to become more and more like a prairie, except on the shooting estates where cover is maintained not only for game birds but also for wild birds. Indeed, it seems that in some parts of the country the number of shooting estates is increasing because more firms and businessmen are leasing shooting in large acreages for the enjoyment of their clients. Here the problem is that the people who make use of the shoot have no idea of the basic ethics of shooting behaviour or even of the law. Some may even consider they are above the law. We have had reports, reasonably well authenticated but insufficient to take anybody to court, of such a shooting syndicate, when sport was poor, shooting at anything that came along the line including such birds as blackbirds. Unfortunately, many still think that shooting is a fashionable sport and the up-and-coming imitative apes follow on thoughtlessly.

Have they thought "Is the taking of life for pleasure civilised?" This is the question that every individual has to ask himself in relation to his own type of shooting. I reckon that the wildfowler or the rough shooter of duck, pigeons or rabbits and so on who shoot for their own table can produce a satisfactory answer. But I am not so sure about those whose skill lies purely in aiming at and shooting a flying bird; they could surely practice their skill just as well on "skeet" shooting.

It often happens that the people who shoot often have a terribly feudal attitude — indeed, so feudal that one might say that they have lost their allegiance to the Queen. They set illegal pole traps. The RSPB used to write polite letters to landowners who wrote back saying its their land and they can do what they like (forgetting the opening words of the Acts), demanding the name of our informant, threatening trespass, never once acknowledging that a wild bird had been killed, very often in a most bestial manner. Well, in dealing with this type of person the RSPB has changed its policy and we are prosecuting wherever we can, whenever we find a pole trap set. Our aim is to make this type of crime a socially unacceptable one.

Not only do allegedly respectable people make use of pole traps. They use poison. In one estate in Lincolnshire three eggs and two dead crows were found lying about; they have been analysed and the analyst found strychnine and phosdrin. It is the desperately feudal, callous and even brutal attitude that some of those connected with shooting display which is so frightening, and I once again suggest that the shooting fraternity have got to watch their public image; if they don't clean up their image such societies as the League Against Cruel Sports might start jumping on their backs to attack shooting. Whilst the RSPB is not going to be anti-shooting, the latest campaign against the use of pole traps may well tarnish the image of the shooting man unless he comes out clearly against this illegal behaviour.

I have moved from the subject of attitudes to shooting, which is controlled by the word "kill" in the Protection of Birds Act, onto the subject of pole traps — a subject involving gross cruelty which is covered by the word in my title "injures". Whilst on the subject of "injures", a word or two on the subject of oil pollution and the attitude that most ornithological societies now adopt towards the cleaning of birds. This is that auks, which are too badly oiled to be released at sea in a day or two after "rescue", should be humanely destroyed. In the press recently, particularly in the Daily Telegraph and New Scientist, there has been correspondence on the meaning of the word "success". It has been the tradition amongst those who cleaned birds over many years to think of success as the point when the bird is cleaned and ready to go back to sea. We now know that this is only the first half of the problem; the second is much more difficult — getting the bird back to sea and into breeding condition. People forget that if you are in hospital for three to six months you need a period of recuperation. They forget or never knew, or sometimes don't want to know that fish shoals move about and that it takes time to find out where these fish shoals are. Therefore, success to my mind really only comes when a de-oiled bird is once again part of its natural community. One of the problems is, of course, that we don't know very much at present about the distribution of seabirds during the winter months and the work which is being done by Dr. Bourne from Aberdeen University, which has been so briefly mentioned in a recent issue of *Birds*, may again give us valuable help.

I now want to move on to the section of the Act which deals with the "taking" of birds. The subjects which most frequently raise their heads are aviculture, falconry and egg-collecting. Each in their way is a legitimate pursuit. Aviculture was given rather a poor deal by the Protection of Birds Act 1954. British birds could only be taken for scientific or educational purposes and no licences could be given for attempted breeding of birds in captivity. However, this situation was rectified by the 1967 Act. Aviculture, or more particularly, bird fancying or exhibiting, has been a pain in the neck for protectionists for years and years. So much so that we see the protectionist and fancy-man in entrenched positions.

The "fancy" is inevitably in some peoples' minds a "lower class" pursuit — if I may be forgiven for using the words. We tend to say these people should be prosecuted — while we write nice letters to landowners with pole traps. But that has, of course, all changed. The RSPB is prosecuting landowners now and we are regularly talking with aviculturists through the recently formed British Bird Fancy Council which brings together the three leading bird fancy clubs which deal with British birds. The BBFC was formed, in fact, to deal with the threat to their hobby posed by the RSPB. The RSPB has prosecuted bird catchers which is fine in some respects — it shows our members that we are awake, it may frighten some people, but it hasn't really resolved the problem which causes the illegal taking of birds and their sale. It was in an attempt to resolve this problem that the RSPB asked the Bird Fancy and the RSPCA to The Lodge to discuss what we considered to be problems, and to try to improve the ethics of British bird keeping and breeding. We have said to the BBFC that we know that in spite of the 1967 Act birds are being illegally taken, largely for exhibition purposes. We have said that we could go on prosecuting but this does not always produce the best results and we would like to work with the fancy to produce a satisfactory solution. We want them to set about improving the ethics of aviculture. We have put to them four proposals which might, in the long run, need new legislation. Both sides have been discussing them with their parent bodies.

(a) All caged birds' rings should be split rings of an approved type, each ring carrying in addition some form of identifying initial or unique serial number.

(b) All such rings should be available only through the British Bird Fancy Council or similar body which keep a register showing the name of the person to whom the ring is issued. This register should be available for inspection.

(c) Either the law be changed, or the various societies voluntarily alter their schedule, so that no British bird can be entered for any show unless it is carrying a split ring, ring number being displayed on a card attached to the cage.

(d) That the law be changed to make it an offence to sell, offer for sale, or have in one's possession for sale, any bird on the Fourth Schedule of the Protection of Birds Act that is not ringed with a split ring issued by the national issuing authority and carrying a unique serial number.

The basic point is that we feel that we must now make avicultural societies take a more responsible attitude and they should give a lead in improving the ethics of their hobby. This is the attitude taken by most responsible bodies who have sections in their charter dealing with this problem. However at one stage this proposition put to aviculturists in Cage and Aviary Birds stimulated a letter expostulating that it was the RSPB's job to look after this matter not the avicultural societies to persecute their own members. This attitude, I think, typifies the whole problem. A few members think their own organisation must not stop them committing illegal acts.

The word "takes" raises at least two further big problems; one is falconry or — better perhaps — pseudo-falconry, and the other is egg-collecting. The trouble with falconry is that it is a form of exploitation of a resource which is in very short supply. If carried out properly it is a traditional sport which when managed by a few devoted people helps to create a public interest in birds. Unfortunately, also it is a sport which captures peoples' imagination in the wrong way. Men wish to become falconers or at least have birds of prey on their fists. Some people want to dress up in traditional clothes and stalk around very conspicuously with birds on their fists. Why do they do this? My answer is that it is purely showing-off. They have an inferiority complex and in a way the falcon is a symbol of their manhood, their toughness, their virility. These people get true falconers into a difficult position. I am not anxious that wildbirds should be used to bolster somebody's ego. I find myself particularly worried by such places which encourage falconry by running courses for budding falconers. I get very worried about such films as "Kes" which resulted in us receiving some 300 letters in one year from youngsters asking us where they could get hold of kestrels. I hope that the Hawk Trust, which will soon develop its activities, will also soon learn to breed falcons which then can be used for falconry, so that the wild birds will not be in so much demand.

A second aspect of the word "takes" covers egg-collecting. I had rather thought that egg-collecting, particularly of the rarer birds, had declined in popularity in recent years but we received a very rude shock in 1971. The clutch of ospreys' eggs was taken from the Loch Garten eyrie; five clutches of golden eagles' eggs were taken from various parts of Scotland; three clutches of kites' eggs were taken from Wales, and on a slightly different scale over 29 clutches of eggs were taken from nestboxes in the grounds of The Lodge, in what must have been a deliberate series of raids.

Has European Conservation Year 1970 now backfired? Has the interest which it might have aroused in the environment encouraged people to take the easiest way to identify themselves with nature — by taking empty egg-shells? There is some evidence that this collecting is being undertaken by a new and younger age group. We have recently been told there is a new organisation which calls itself the British Oologists' Association; it is supposed to be composed of young north country people who specialise in taking the eggs of Schedule I birds and particularly birds on RSPB reserves. They are not particularly scientific. Their schoolboy method of blowing eggs from end to end must reduce the financial value. There is no evidence that they collect for scientific reasons. They do it, I think, out of a spirit of dare-devilry and bravado. For that reason it is probably very much more difficult to detect than if the motive had been different. Once upon a time we at least had an inkling of who the older egg-collectors were.

I have attended officially a Jourdain Society meeting and I still regularly meet representatives of the scientific egg-collectors to discuss their problems with them. The RSPB's attitude is that oology — the study of eggs — is a perfectly legitimate science. But oology does not mean just collecting eggs and keeping them in cabinets to gloat over. Nowadays, as the Nest Record Scheme of the British Trust for Ornithology has shown, an enormous amount of information can be gained from eggs without ever taking them. At the meeting I was invited to attend of the Jourdain Society I was really rather surprised that few people knew about the work which had been done by bird biologists at Oxford and a large number of amateurs on clutch sizes.

The 1967 Act which amended the 1954 Act in a number of important ways corrected some of the anomalies of the principle Act. For instance, it tackled the peculiar problem created by the section which permitted the taking of lapwings' eggs for food and for sale before April 15th every year. The late Lord Jowitt had forced this provision into the principle Act presumably because he had liked to eat lapwings' eggs. A number of the noble Lords who had similar tastes had argued, when Lord Hurcomb was guiding the 1967 Bill through the Lords, that this provision would help the lapwing since normally it laid its eggs so early in the season that many of them failed because of seasonal cold and wet weather. All this argument did was to demonstrate their Lordships' lack of knowledge of lapwings' ecology; they did not realise that the lapwings' breeding cycle is adapted to the need for damper and soft ground when the young hatch. As we all know, the young feed from the moment they are hatched. They need to be able to probe in soft ground for insects and if they hatch too late in the season the ground dries out before they are able to fly off to damper pastures. In the 1967 Act, Lord Hurcomb was able to get a provision through which, in spite of opposition, prohibited the taking of lapwings' eggs and prohibited also their importation.

Another anomaly in the principle Act was the provision that allowed the taking of the eggs of certain common birds. Lord Hurcomb, who did so much to guide the 1967 Act through Parliament with Colonel Sir Tufton Beamish's help in the Commons, also had trouble with some of his colleagues in the Lords over the section which finally repealed the provision which allowed the eggs of certain common birds to be taken. The idea behind the provision in the 1954 Act was apparently to avoid making children criminals; it was felt that if the taking of the eggs of common birds was illegal, children might be prosecuted. However, both teachers and the Education Section of the RSPB had for years felt that this particular provision hindered their work in encouraging children to take a more constructive interest in birds, for when children were told that it was morally wrong to take eggs they argued it is perfectly legal under the existing laws. In the 1967 Act this particular section was finally repealed but it had become ineffective some time earlier. With a magnificent stroke of imagination, Lord Hurcomb, on St. Valentine's day in 1963, at the end of that very hard winter, appealed to the Government to rescind this order at least for that year. He pointed out that the birds had had an extremely hard time throughout the winter and that birds' nesting would be an additional burden for them to bear. The Government took the point and rescinded the Statutory Instruments which listed the birds whose eggs could be taken. Four years later Lord Hurcomb was able to have this section of the principle Act repealed, after some opposition.

I have one particular bone of contention with his Lordship over the section in the 1967 Act which makes it an offence to "wilfully" disturb First Schedule birds at or near the nest containing eggs or unfledged young, unless one has the approval of the Nature Conservancy. As hard as Lord Hurcomb fought for it, I have fought against it; I think that I was right. This section of the Act is quite an administrative headache both from an organisation such as the RSPB's point of view and from the Conservancy's. The RSPB needs about 200 licences to do its work. The Conservancy has to issue a vast number of licences for photographers and so on.

So far as I am aware only two prosecutions have been brought under this section of the Act. In one case, the photographer walked into a golden eagle's nest without a licence to take photographs; he was caught but the Sheriff in Scotland ruled that the man went there for the purpose of photographing the eggs and not for the wilful disturbance of eagles. On the other hand, in the recent osprey case, the Sheriff in Inverness County Court ruled that stealing the eggs and climbing the tree was a matter of wilful disturbance and fined the men accordingly.

I said at the beginning of this lecture that, to a very large extent, the Protection of Birds Act must be a code of behaviour. It is one of the best and most comprehensive Acts in Europe and perhaps in the world. Because it is comprehensive it is not particularly simple. But we feel that the best protection of birds is for the Society to try to inculcate in every way and into every sphere of life a thorough understanding of the ways of birds combined with a discriminating love of birds. I think that one must appreciate that one cannot possibly hope to protect all types of birds. To achieve maximum sympathy and protection for the maximum number of species, one has to realise that some species are pests and accept that some may have to be legally and humanely destroyed. I think that many people would appreciate that crows can do damage, that woodpigeons are a major agricultural pest. In the south-east one has to face the fact that a most beautiful bird, the bullfinch, can do serious damage to fruit farms. Reluctantly, perhaps, one must agree that it is legal for them to be destroyed humanely and by the proper people.

However good or comprehensive or complicated the Act is, it is only of any significance if its principles are enforced or naturally followed. The enforcement of the Protection of Birds Acts leaves a lot to be desired. Police forces have an enormous amount of work to do; one cannot expect a policeman to identify all birds and their eggs.

The adequate presentation of cases to court is important: often a knowledge of birds is necessary to enable a proper cross-examination to be carried out and one cannot expect the normal police prosecutor to have this knowledge. So, more often than not, for the big cases, such an organisation as the RSPB or RSPCA or YNU may have to use its own resources to bring the case, brief Counsel and so on.

Another problem in the enforcement of the Act is the attitude taken by the Magistrates to the seriousness of the offences. There are a few Magistrates who give penalties which are a deterrent to offenders but we feel that far too many of them do not treat the matter at all seriously. We suggest that heavier fines should be given; we are asked in return whether it is right that offences against the Protection of Birds Act should be more heavily fined than offences involving cruelty to children. I think that many of us feel that offences of this sort are not fined heavily enough anyway. The problem really is that whilst birds and bird protection is becoming more and more popular amongst certain sections of the population, it hasn't yet got the same sort of level of popularity as the killing of birds for sport.

I am sure that this will change. For I do detect that our campaign against the use of pole traps is making landowners and sportsmen think. We are trying, by all proper means, to influence the Magistrate to take a more serious attitude to offences against wild birds.

I said at the very beginning that the protection of birds is a defensive method of looking after bird populations — even one might say a somewhat negative attitude. Legislation is a code of conduct which is agreed to, by and large, by all those who are involved one way or another with birds, but I am sure it is the duty of all those who are positively interested in the welfare of birds to strive unceasingly to create a public interest in birds in their place in nature, because when it comes to the test it is our affection and concern for birds which is going to be their greatest safeguard.

FIELD NOTE

Occurrence of a Shore Lark at Lower Gorple Reservoir – V.C. 63

Whilst walking along the road bordering Lower Gorple Reservoir on the 12th December 1971 at about 12.15 p.m., J. Nuttall, K. Sutton and G. Chapman, came upon a small bird walking along and feeding on the short grasses and seeds which are abundant between the two concrete strips that form the road at an altitude of 1,000 ft. OD on open moorland. The bird was watched for about five minutes before it flew off towards the reservoir. A search for the bird was made but it was not found. We continued on our way to the Upper Gorple Reservoir to make duck counts and on our return journey about one hour later, the bird was seen again in approximately the same place and we were able to watch it for about half an hour at ranges down to about four yards. It was identified as a male Shore Lark (*Eremophila alpestris*). The facial markings and horns were clearly seen a number of times and a complete description was sent to the Vice County recorder. Mr. J. Jackson of Nelson was notified on our return home; he visited the place just before dusk and confirmed our identification. The bird was seen by a number of people during the next two weeks and it was last seen on 27th December by K. Sutton.

This is the first record of this species for Vice County 63 and only the third inland record for Yorkshire. *Yorkshire Birds* (Chislett 1952) gives no inland record for this species. In *Birds of Yorkshire* (1907), Nelson comments that although many migratory flocks are seen to pass on inland, he had only one record of the Shore Lark inland — two shot "many years ago" at Harewood, near Leeds. In 1960 C. Winn reported one at Fairburn (*Naturalist*, 1960, 88).

J. Nuttall

EFFECTS ON WILDLIFE OF THE AERIAL SPRAYING OF TETRACHLORVINPHOS ON ALLERSTON FOREST, YORKSHIRE

J. L. F. PARSLOW, E. POLLARD and JUDY RELTON

The Nature Conservancy, Monks Wood Experimental Station, Abbots Ripton, Huntingdotn

Operations involving the aerial application of insecticides to large areas of forest are extremely unusual in Britain. Such an operation occurred in Allerston Forest, Yorkshire, in August 1970 to control a heavy infestation of caterpillars of the Pine Looper Moth (*Bupalus piniaria*) on Scots Pine (*Pinus sylvestris*). It was the first such control programme to be carried out since 1963 when a large area of Cannock Chase, Staffordshire, was sprayed with DDT to control a similar outbreak of *Bupalus* (Walker 1966).

Because of the persistence and undesirable side effects of DDT, the Forestry Commission were unwilling to use this insecticide in Allerston Forest, and after careful screening tests of alternative insecticides decided to use tetrachlorvinphos. At the time this new organophosphorus compound was not registered under the Pesticide Safety Precaution Scheme for use in Britain and a special trials clearance had to be obtained. At the invitation of the Forestry Commission we took the opportunity of this large-scale trial to assess possible effects of the spraying on wildlife, which local naturalists had feared might be at risk.

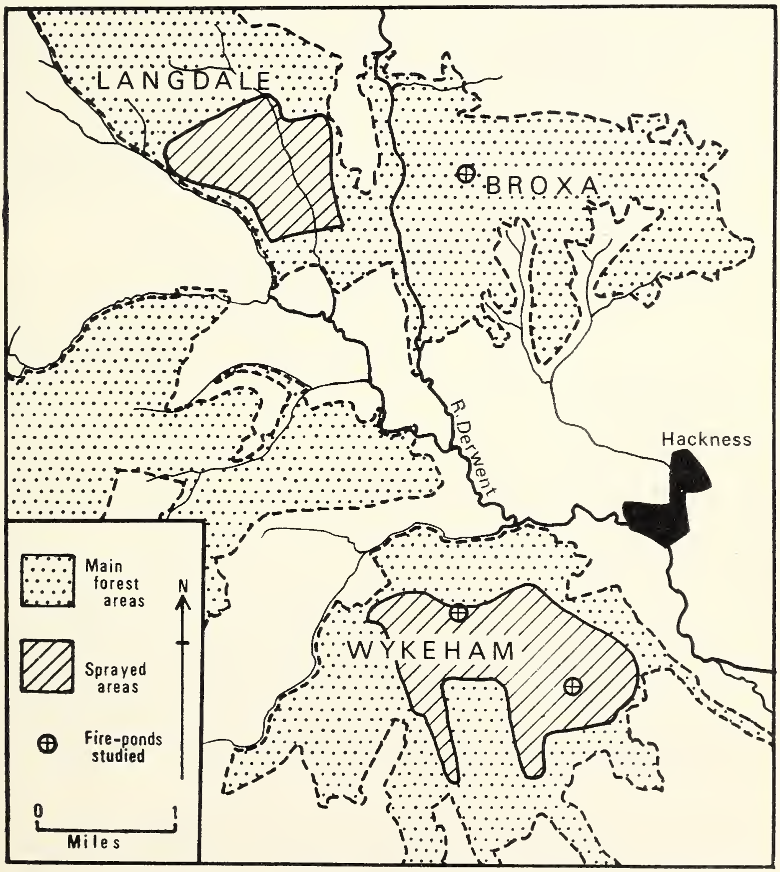

Fig. 1 Sketch map of part of Allerston Forest, Yorkshire, showing main areas sprayed with tetrachlorvinphos.

We thank Dr. Dermot Bevan and other members of the Forestry Commission's staff for their help, also the Shell International Chemical Co. Ltd., for providing technical information and a sample of tetrachlorvinphos ('Gardona'), and Miss Erika Wynter for assistance in the field.

THE SPRAYING PROGRAMME

Spraying of the most heavily infested Scots Pine plantations began in the Wykeham block of the forest at 11.30 a.m. on 18th August and was completed there and in the Langdale and other forest blocks on the 19th. A total of about 500 ha was sprayed aerially by helicopter with water-diluted tetrachlorvinphos at a rate of 560 g active ingredient per ha.

Pre-spraying sampling and observation of wildlife populations were carried out in the Wykeham and Langdale blocks on 13th, 14th and 18th August, while post-spraying recording was carried out on 19th, 20th, 26th, 27th and 28th August. Parts of Broxa Forest, which was not treated with insecticide, were used as control areas, as was an untreated part of Langdale Forest. These areas were selected as being comparable in many respects with the Wykeham sprayed area. The sprayed and control areas are shown in Fig. 1.

Some sampling programmes were severely affected by bad weather immediately after spraying. Much rain fell on 19th August and there was a considerable drop in temperature and increase in wind speed. Small streams in the area turned into torrents and this led to the abandonment of a sampling programme of the fauna and phytoplankton of these streams. The poor weather conditions also resulted in very few captures or records of butterflies, hoverflies and other insects in both the sprayed and control areas on this day.

METHODS AND RESULTS

Birds

All birds encountered on standard routes through the Wykeham sprayed area and the Broxa control area were recorded on three pre-spray and three post-spray visits. Results of the Wykeham counts are shown in Table 1.

Table 1

Bird Counts in Sprayed Area, Wykeham Forest

	Total number of birds encountered (Each figure represents the total of 3 replicated counts in each period)	
	pre-spray period 13th, 14th, 18th Aug.	**post-spray period** 19th, 27th, 28th Aug.
Willow Warbler *Phylloscopus trochilus*	101	82
Coal Tit *Parus ater*	27	85
Chaffinch *Fringilla coelebs*	61	38
Goldcrest *Regulus regulus*	14	62
Blue Tit *Parus caeruleus*	29	30
Woodpigeon *Columba palumbus*	22	29
Wren *Troglodytes troglodytes*	19	12
Great Tit *Parus major*	19	5
Robin *Erithacus rubecula*	2	8
Others	8 (6 species)	24 (8 species)
Total	302 (15 species)	375 (17 species)

Note: The Willow Warbler total probably includes small numbers of Chiffchaffs *P. collybita*. 'Others' included small numbers of Greenfinch *Carduelis chloris*, Treecreeper *Certhia familiaris* and Marsh Tit *Parus palustris* in the pre-spray period only, Long-tailed Tit *Aegithalos caudatus*, Blackcap *Sylvia atricapilla*, Garden Warbler *S. borin*, Hedgesparrow *Prunella modularis* and Great Spotted Woodpecker *Dendrocopos major* in the post-spray period only, and Jay *Garrulus glandarius*, Pheasant *Phasianus colchicus* and Sparrowhawk *Accipiter nisus* in both periods.

No major changes in bird populations were found. The three pre-spray counts on the Wykeham route averaged 101 individuals belonging to 15 species; the three post spray counts averaged 125 individuals belonging to 17 species. Some changes in the relative abundance of different species were noticed, but such changes, which also occurred in the control areas, were due to migrants passing through the forest and were unconnected with the spraying operation. Two Woodpigeon nests in the sprayed area were unaffected; incubating birds were present on all visits before and after spraying. No dead birds were found and there were no obvious changes in the behaviour or activity of living ones present.

Several species of insectivorous birds, notably Willow Warblers and Goldcrests, were seen feeding actively and normally in both the crowns and lower branches of the Scots Pines 24 hours after they had been sprayed, as well as 8-11 days after spraying.

Invertebrates in Scots Pines

Because insectivorous birds were clearly still obtaining food from the Scots Pines after spraying, sample beating of the lower branches of some trees in the sprayed area was carried out on 20th and 27th August and the results compared with similar samples collected in the Broxa control area. The results indicated that a satisfactory control of *Bupalus* larvae had been achieved (on average, less than one individual per sample in the sprayed area compared with 40 (20-54) individuals per sample in the control area) and that several other species of invertebrates, notably the harvestmen *Parologolophus agrestis* and *Mitopus morio*, and the small spiders *Drapetisca socialis* and *Erigone dentipalpis*, were apparently unaffected and were still present in some numbers after spraying. Further information on the efficiency of the operation in controlling *Bupalus* larvae is given by Scott and Brown (in press).

Hoverflies

One sub-family of the hoverflies, the Syrphinae, were collected before and after spraying. The adults were very conspicuous and abundant along woodland rides and were collected with a net using a standard method (Pollard 1971) along five north-south oriented transects, three in control areas in the Broxa and Langdale blocks, and two in sprayed areas in Wykeham (see Appendix 2). At each site collection was for one hour.

A total of 12 transects was made before spraying. After spraying each transect was repeated on 19th August (also one of them on the 20th) but bad weather for most of the day lowered catches and made the results inconclusive. Nine further transects were therefore made a week later.

Table 2

Results of Hoverfly (Syrphinae) Collections

Each figure represents no. of individuals/no. of species

	Before spraying			After spraying				
	13th	14th	18th	19th	20th	26th	27th	28th
Controls								
Broxa A		39/9		59/7			67/11	
Broxa B		51/11	66/9	20/3		45/8	49/6	
Langdale	26/9	30/9	42/11	8/3		27/12	24/11	
Sprayed Areas								
Wykeham A	38/7	47/7	46/8	10/4			29/11	44/9
Wykeham B	38/11	60/11	68/10	21/8	70/5		49/6	61/8

Results are shown in Table 2. A total of 22 species was collected (out of 99 British species in this sub-family); these are listed in Appendix 1. There were differences in the proportions of various species in the catches in different areas but the range of species caught was virtually identical at all sites. No major changes were shown in the numbers of hoverflies caught before and after spraying either in the control or sprayed areas. Variations due to weather conditions were such that minor effects might have been missed. Also, there may have been some movement into the sprayed areas after spraying as well as some emergence of new individuals. It may be assumed, however, that there was no important effect of the spraying on adult hoverflies. A very few dead and sick hoverflies were noticed in the sprayed area 24 hours after spraying. None was noticed there before spraying nor in the control areas.

Butterflies, Grasshoppers

In the course of carrying out the bird surveys, counts were also made of the numbers of butterflies and singing grasshoppers encountered. Results from the sprayed area in Wykeham are given in Table 3.

The very marked reduction in the numbers of butterflies observed on the 19th, the day following spraying, was probably due mainly to the poor weather conditions, since, as with the hoverflies, numbers were also reduced in the control areas. By the 27th nearly all the butterfly species which had been present before spraying were again found in the sprayed area. Many of these species are of course very mobile and could therefore have immigrated into the area. Hence the results are inconclusive, but at the worst it seems that many species of butterflies were able to recolonise the sprayed plantations and rides within about a week of the spraying operation.

TABLE 3

RESULTS OF BUTTERFLY AND GRASSHOPPER COUNTS (A) IN WYKEHAM SPRAYED AREA AND (B) IN BROXA CONTROL AREA, AUGUST 1970

	Numbers encountered on standard routes					
	Before spraying			After spraying		
	13th	14th	18th	19th	27th	28th
(A) WYKEHAM SPRAYED AREA						
Whites *Pieris* spp.	53	26	11	1	9	6
Painted Lady *Vanessa cardui*					1	
Red Admiral *V. atalanta*		1			1	
Wall Brown *Pararge megaera*			2			
Peacock *Nymphalis io*		2	1		3	2
Small Copper *Lycaena phlaeas*		1			2	
Small Tortoiseshell *Aglais urticae*	1		1		2	1
Fritillary *Argynnis* sp.					1	
Grasshopper *Chorthippus* sp.	4	17	4			
(B) BROXA CONTROL AREA		14th	18th	19th	26th	27th
Whites *Pieris* spp.		24	9	2	14	6
Other butterflies (nos./species)		3/2	3/2	1	2/2	9/4
Grasshopper *Chorthippus* sp.		11	5	4	8	10

Grasshoppers *Chorthippus* sp., on the other hand, certainly seem to have been affected by the spraying. None was recorded on the Wykeham transects following spraying compared with 4, 17 and 4 respectively on the three pre-spray counts. Their apparent absence on the 19th may have been due to the poor weather that day, but the weather on 27th and 28th (when they were present in normal numbers in the control areas) was suitable for locating them. In other parts of Wykeham, 24 hours after spraying, dead and sick grasshoppers were found, the latter attracting attention by the unusually low pitch of their song; unlike healthy grasshoppers, these individuals were easily picked up. As well as grasshoppers and the hoverflies mentioned earlier, a few other dying insects were found immediately after spraying, including ground beetles, *Carabus violaceus* and *Patrobus* sp., a muscid fly, and two bumble bees.

AQUATIC LIFE

Using standardised methods and nets, samples of phytoplankton and small crustacea were taken before and after spraying at two fire-ponds in the Wykeham sprayed area and at one control pond in Broxa Forest. (Similar sampling at two streams in Langdale Forest was abandoned following the rapid rise in water levels after the heavy rain on the 19th.) The fire-ponds had concrete sides and bottoms and had a surface area of *c.* 22 m^2 and a water depth of *c.* 1.5 m. These ponds had a different but generally rich fauna including water beetles, chironomid and culicid fly larvae, corixid and gerrid bugs and crustacea of the orders Copepoda and Cladocera. Pond-skaters *Gerris* sp. were particularly abundant on one of the Wykeham ponds, while the other had a dense population of *Daphnia pulex/obtusa.* Newts *Triturus* sp. were present in one pond but none contained fish.

By 19th August, only 20 hours after spraying, the *Daphnia* in the only pond in which they were present had apparently been completely eliminated. Other forms of aquatic animal life seemed to have been unaffected, as were phytoplankton levels.

The effects on *Daphnia* were almost certainly due to the spraying. To investigate the toxicity of tetrachlorvinphos to *Daphinia*, a laboratory experiment was conducted in which the compound was added to three small tanks to produce concentrations of 1, 0.3 and 0.1 ppm in the water, the lowest of these corresponding with levels likely to have been present in the fire-pond in Wykeham immediately after spraying. Populations of several hundred *D. pulex/obtusa* were already established in each of the tanks, and 18 hours after application of the chemical all had died. Animals present in a fourth, control, tank all survived. The minimum lethal dose was not established, but *D. pulex* is known to be sensitive to several organophosphorus insecticides at environmental concentrations very much lower than 0.1 ppm (*cf.* Cope 1966).

Conclusions

These limited observations on the effects of the spraying of tetrachlorvinphos in Wykeham indicate that a satisfactory measure of control of *Bupalus* larvae was achieved with very few undesirable effects on wildlife. In particular, birds were unaffected by the spraying and were as abundant after the operation as before it; insectivorous species behaved normally and still fed in the Scots Pine after they had been sprayed. Grasshoppers were almost certainly killed by the spray, but this was not unexpected since they are known to be susceptible and the chemical has been used to control them in parts of North and South America where their numbers reach pest proportions (Shell Chemicals 1969). *Daphnia pulex/obtusa* also appear to be sensitive to tetrachlorvinphos and all present in the one sprayed pond were apparently killed. Other animals living in the ponds (no fish were present) seem to have been unaffected.

These observations indicate that tetrachlorvinphos had little impact on wildlife populations in the sprayed areas. Potentially, the most important effect noticed was that on *Daphnia*, which in their role as the main secondary producers in freshwater ecosystems, form the major food source for certain species of carnivorous fish. In view of this, great care should be taken to avoid the contamination of water courses whenever this insecticide is used. For obvious reasons this caution particularly applies to aerial applications. Tetrachlorvinphos has now been cleared by the Pesticides Safety Precaution Scheme for use in Britain against pests of a number of horticultural and agricultural crops. Precautionary notes on its potential hazards to aquatic animals and honey bees are marked on the package labels.

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Appendix 1. List of Hoverflies (Syrphinae) Collected in Allerston Forest, August 1970.

	Langdale	Broxa A	Broxa B	Wykeham A	Wykeham B	Total
Baccha elongata Fab.	2					2
Baccha obscuripennis (Meig.)				1	1	2
Platychirus manicatus Meig.			1	1	1	3
Platychirus peltatus Meig.	2				7	9
Platychirus scutatus Meig.	5	1			2	8
Platychirus albimanus Fab.	1	7	17	10	7	42
Platychirus clypeatus Meig.	12	5	10	78	117	222
Melanostoma scalare Fab.	12	15	20	31	59	137
Melanostoma mellinum L.	7	19	21	15	35	97
Sphaerophoria menthastri Meig.	1	1	1	1		4
Scaeva pyrastri L.				1		1
Syrphus albostriatus Fall.	1	1				2
Syrphus annulipes Zett.	6				2	8
Syrphus arcticus Zett.				2	2	4
Syrphus balteatus Degeer	34	13	6	11	47	111
Syrphus cinctellus Zett.	44	87	121	47	52	351
Syrphus corollae Fab.	2	3	12	3	1	21
Syrphus latifasciatus Macq.			1			1
Syrphus luniger Meig.	1	1	3	3	1	9
Syrphus ribesii L.	6	5	1	1	7	20
Syrphus torvus Osten-Sacken	2	1		1		4
Syrphus tricinctus Fall.	3	1	2		1	7
Syrphus vitripennis Meig.	1	1			2	4
Syrphus vittiger Zett.	15	4	15	8	23	65
Total	157	165	231	214	367	1134

Appendix 2. Details of Hoverfly (Syrphinae) Collection Transects

Transects	Grid Ref. of S. end of transect	Length of transect (m)	Time of day of sample
Controls			
Broxa A	943936	250	0945-1045
Broxa B	955935	250	1645-1745
Langdale	925937	300	1500-1600
Sprayed Areas			
Wykeham A	939878	400	1100-1200
Wykeham B	941879	250	1205-1305

THE STATUS AND DISTRIBUTION OF THE TWITE (*CARDUELIS FLAVIROSTRIS*) IN EAST LANCASHIRE WITH SOME NOTES ON ITS BREEDING BIOLOGY

J. NUTTALL

This paper is based mainly on three field enquiries of the East Lancashire Ornithologists' Club (Nuttall 1967, 1968; Ward 1958).

The study area consisted of the uplands to the south of Blackburn and Accrington and to the north-east, east and south of Burnley, extending into Yorkshire. On these uplands the habitat is mainly grass moor with Cotton-grass (*Eriophorum angustifolium*), Tufted Hair-grass (*Deschampsia caespitosa*) and Purple Moor-grass (*Molinia caerulea*) as the prevalent species. Patches of Soft Rush (*Juncus effusus*) and Compact Rush (*Juncus conglomeratus*) occur in the wetter parts and some of the moors have a scattering of Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Crowberry (*Empetrum nigrum*) and Bracken (*Pteridium aquilinum*). Much of the area is wet and acid; it is laced with dry-stone walls and there are occasional rocky outcrops. Heaps of loose stones are also found as a reminder of former quarrying.

The estimated minimal number of breeding pairs in 1967 and 1968 was as follows:

	1967	**1968**
North-east and east of Burnley	74	48
Rossendale	34	40
South of Accrington and Blackburn	27	47
	135	135

The figures confirm a general impression that although there are movements in location within the area, the overall population remains stable.

Spring Arrival

From ten years' records, the average arrival date is 13th March. Early dates are 20th February (1967) and 28th February (1953, 1971). There are records for earlier in the year, but they are felt to relate to wintering birds — (see later).

Nesting

From nest-record cards completed by members of the East Lancashire Ornithologists' Club in 1967, plus a few observations submitted before or since, the following figures for clutch size are obtained. It is not certain that all these relate to a complete clutch, but they suffice to give the general pattern.

1	2	3	4	5	6	7
4	3	2	9	27	24	4

Laying occurs from late April onwards, but mostly takes place in the last two weeks of May and the first two weeks of June. A late nest with five young on the point of fledging was found by E.W. in Rossendale on 14th August 1969, and a young bird, fully fledged but still dependent, was seen with a parent at Crown Point, Burnley on 26th August 1970 (K.G.S.).

The breeding grounds lie at between 800 ft. and 1,500 ft. above sea level. As to the nest-site itself, the commonest type is not mentioned in *The Handbook of British Birds* (Witherby *et al.* 1941), viz. a recess in moorland grass similar to the situation usually chosen by a Meadow Pipit (*Anthus pratensis*). In 1967, eighteen nests were recorded in such sites, whilst ten were slightly raised above ground level in rushes, heather, bracken, etc. One nest was found in a pile of stones. No preference for any particular aspect could be detected.

Summer Feeding Areas

Feeding areas can be an important link in the discovery of the nesting area: the observer has only to follow the flight lines. The author found six breeding areas by this method and was able to locate nests in four of them. The distance between feeding and nesting areas can vary from a quarter of a mile up to at least a mile and the author found three types of feeding grounds:

(a) Quarries with a spring or water seepage and a growth of short lush grass and small plants such as chickweed (*Cerastium vulgatum*).
(b) Reservoir inlets and surrounding banks where, again, lush grass and small plants grow.
(c) Reservoir dams where grass is kept short by sheep grazing, and the overflow channel where small plants grow in the cracks between the stones.

Post-Breeding Flocks

Flocking may begin as early as the first week in July. A flock of *c.* 500 seen on 10th September 1967 at Habergam Eaves near Burnley remains the largest on record locally, but occurrences of up to 300 are not exceptional, particularly in August and September. Neglected pastures at about 800-1,000 ft. are the main haunts, the birds feeding on seeds of Thistle spp., Ragwort (*Senecio jacobea*) Meadow Buttercup (*Ranunculus bulbosus*), Autumn Hawkbit (*Leontodon autumnalis*) Chickweed (*Cerastium vulgatum*) etc. Eighty birds were seen in a disused farmyard on Turton Moor, 4th August 1968 (H.C.); no food could be detected and it is thought that they were taking grit.

Numbers diminish in October and there are not many records of flocks in November. There are occasional lowland records in mid-winter, but generally speaking the Twite is absent from the district between mid-November and early March. This is contrary to the situation a little further south, in the Littleborough area, where wintering flocks are not uncommon (e.g. 18 birds at 1,250 ft. on Blackstone Edge, 4th January 1969 (E.G.D., E.T.)).

Association with Linnets (*Carduelis cannabina*)

Association with Linnets — and other finches — is common in the post-breeding flocks, but was not recorded on the East Lancashire nesting grounds during any of the enquiries. Overlap in breeding area was noted at Thursden Valley (I.C.) and Worsthorne (J.N.) in 1968, but there was no association beyond the fact that the birds happened to be in the same habitat.

Acknowledgements

My thanks are due to Messrs. K. G. Spencer and F. Underwood for reading the preliminary draft and suggesting various improvements; to Mr. L. E. Bouldin for typing the final script and to the following members of the East Lancashire Ornithologists' Club who gave their valuable time in search of the Twite: Mr. and Mrs. Anderton, L. E. Bouldin, J. N. Burke, H. Clarke, I. Corbett, J. T. Corcoran, T. Darbyshire, E. G. Davis, J. Driver, J. Hodson, T. W. McConville, K. G. Spencer, K. Sutton, E. Tallet, E. Ward, R.D.S. Wilson, D. Windle, and members of the Bacup and Rawtenstall Grammar School Bird Watching Society.

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FIELD NOTE

The Pseudoscorpion *Chthonius kewi* Gabbutt in North Nottinghamshire and notes on its Breeding.

The pseudoscorpion *Chthonius kewi* new to science in August 1961, was discovered at Colne Point, near St. Osyth, Essex. Specimens collected then, and subsequently in July and August 1963 and July 1964, were extracted by the use of a Tullgren funnel from *Agropyron* litter and other debris at the base of the sea wall (Gabbutt, D. P.: A new species of pseudoscorpion from Britain. *J. Linn. Soc.* (*Zool.*) *Lond.* **150,** 165-181, 1966).

No further discoveries of *C. kewi* were made until Messrs. Peter Skidmore and Colin Johnson collected two specimens and a probable third at Idle Stop, North Nottinghamshire (Grid. Ref. SE 725982), only a few yards from the Lincolnshire border and about 2 miles from the West Riding border. The specimens were sieved from heaps of rotting aquatic plants (*Potamogeton*, etc.) dredged onto the banks of the Warping Drain.

The three specimens were examined in 50% alchohol by C.A.H. and worked out to members of genus *Chthonius* C. L. Koch. As one of the specimens recovered from the immersion and examination it was kept alive in order to make observations on its feeding and behaviour. The two preserved specimens were sent for determination via Mr. P. Jones to Dr. P. Gabbutt who confirmed them as 1 male and 1 female *C. kewi.* The specimens are now in the Arachnida collection at Doncaster Museum and Art Gallery.

The live specimen was kept in the dark in a corked test tube at a temperature of about 65°F. On 27th June the beginnings of a silken chamber were noticed, spun across the angle of the tube's base. By 30th June the chamber was complete and constructed like an elliptical canopy. The pseudoscorpion was sealed between the silken canopy and the glass of the test tube, but still freely moved about inside the chamber. On 12th July a cluster of eggs was noticed; there appeared to be five eggs in a pentagonal arrangement. The cluster appeared to be secured to the silken canopy and not to the parent, she still being able to move with agility around the chamber. When the tube was moved, or the area of the silken chamber tapped with a pencil, the female would extend its pedipalps and open its pincers in an aggressive stance orientating itself towards the area of disturbance. By 20th July the eggs had hatched and the larvae could be made out still within the sac which had encased the eggs.

On 29th July the protonymphs were free from the egg pouch.At least five could be seen, though with dirt and distortion of the glass in the base of the test tube the exact number could not be made out and, as they moult after leaving the "pouch", the spent skins may have further confused the situation. The protonymphs moved freely around the chamber and on occasions the parent could be seen apparently feeding them individually through their mouth parts coming into contact. As observations had to be discontinued for a week a small fruit fly was placed inside the test tube for the brood to feed on following their emergence from the silken chamber. Unfortunately the parent and brood did not survive and on the 9th August they were all found in a very desiccated state still within the silken chamber.

The specimens were dispatched to Dr. Gabbutt but were in too poor a state to be positively determined as *C. kewi*.

According to Dr. Gabbutt (pers. comm.) the observation concerning the female being independent of the egg mass is new, since in all reports of other members of the Chthoniidae (see especially Weygoldt, P.: *The Biology of Pseudoscorpions.* Oxford University Press, 1969) the eggs are retained in a "pouch" by the female and supplied with a nutritive fluid until a few days after the protonymphs have hatched.

C. A. Howes

A CENSUS OF ROOKERIES WITHIN THE LEEDS AREA

It is proposed that a census of rookeries, within a 15 mile radius of Leeds will be carried out in the spring of 1973, in order to assess changes in the Rook population which may have occurred since the last complete count in 1955. In order to avoid wasteful repetition of coverage, 5 km. and 10 km. squares will be allocated. If the census is to prove worthwhile full support is needed. For full information Societies or interested individuals should contact T. R. Birkhead, 3 Hall Close, Bramhope, Nr. Leeds, stating approximately the area they wish to cover.

MIELICHHOFERIA AND COSCINODON IN CLEVELAND — A SEQUEL

C. COCKRAM

In 1970 a paper was published in *The Naturalist* (1970) in which the writer discussed the occurrence of *Mielichhoferia* and *Coscinodon* on Cleveland shales, with reference to the presence of sulphuric acid derived from pyrites. It was suggested that a more extensive search for these mosses in Cleveland might throw light on how they arrived there. When that paper was written, the writer had not seen the mosses and knew only vaguely of their location. In the spring of 1970 a study was made of the Ingleby Greenhow enclave. Photographs of the escarpment under a light covering of snow were revealing of the very rugged nature of the escarpment below Botton Head and the multiplicity of deep gullies with the right aspect contained in the upper part. On July 11th a gully was found containing a fine display of *Mielichhoferia* and a second visit, with Miss Dalby, confirmed that this was "Mudd's Gully" which he found in 1862. On July 31st a search was made in another gully, the middle one of the three in this area which have streams carrying some water throughout the year; a considerable amount of *Mielichhoferia* was found on the north-east facing side of the gully at about 1100 ft. OD. The lower end of the more westerly gully, which looked a very likely place, proved disappointing, but an exchange of notes and sketches with Dr. Duckett showed that this "West Gully" was the one to which he and his party made a successful visit in 1967. Mrs. Cullum of Sheepfold Farm, a bacteriologist and a keen botanist, made an ascent of the "Middle Gully" by a different route to the top; there she found a fourth location for *Mielichhoferia* at about 1300 ft. OD in a side gully. It seems clear that these four sites are quite isolated one from another, by position and land profiles. It is not very likely that moss detached from the upper part of "Middle Gully" and carried down by the beck could reach the site now occupied by the lower colony.

A survey of the escarpment from Charlton's, near Guisborough, to Osmotherly has been made; these limits were chosen for geological reasons. Outside these limits the few exposures of bare shale look most unpromising. It has been concluded that, with one reservation which is discussed later, the area below Botton Head is unique in its topography, its climate, and its water supply, and that *Mielichhoferia* is unlikely to be found elsewhere in Cleveland.

This paper is mainly concerned with attempts to discover the factors which make these sites so special. The following discussion is based on studies of "Mudd's Gully" and "Middle Gully". Jackdaw Quarry, the old alum works on Carlton Bank, has been studied because it provides one of the few complete exposures of the alum shales away from Whitby. An interesting gully at Cribdale Gate above Great Ayton has been used to study the behaviour of water in shales. This place provided the main clue to how very acid shales are produced. Many shales have been tested for acidity but the normal pH is above 4 and iron salts are absent. The shale outcrops on which *Mielichhoferia* is found go down to pH2 and they have a strong reaction for ferric sulphate. The shale grit which is accumulated by the moss shows the strongest reactions. When alum shales are broken into pieces iron oxide can be seen as surface films or as shellac-like partings which are probably the result of iron bacteria converting iron salts into oxide and sulphuric acid. Calcium sulphate is present in all the becks and it often appears as crystals on shale surfaces. Obviously sulphuric acid is being produced in considerable quantities, but only in special circumstances does it accumulate to the point of its being detectable by normal methods. Much of this acid is neutralised by the calcium carbonate which is present in alum shales in amounts depending on the particular kind of shale, or the acid is washed out by rain. In many places exposure to alternate wetting and drying causes loss of bacterial activity. As an interesting sidelight on this question of what happens to sulphuric acid, three heaps of jet miners' debris chosen at random from Carlton Bank, Hasty Bank and Great Ayton, all showed an interesting feature, the presence of large quantities of crystals of aluminium sulphate and granules of iron oxide which are displayed when large sheets of jet shale are split open. Several grammes of moist crystals were removed from one squre foot of surface. These heaps of debris have been lying undisturbed for at least 50 years and they were not connected with alum manufacture. The shale pieces lie flat and weathering has caused the bedding planes to open up slightly, so that they allow entry of aqueous solutions without being leached by rain. It would appear that acid concentrates in the shale and attacks it, a kind of very slow version of the modern way of making aluminium sulphate by heating clay with strong sulphuric acid.

The clue to how really acid shales are produced was obtained when a sample of alum shale from the floor of the gully at Cribdale Gate was placed in a polythene bag with a little moorland water. The shale was just wetted from below, and the bag was partly closed to control evaporation. After four weeks it was evident that something strange was happening; the surface was covered with pustules of clay forced up from below the surface by carbon dioxide gas produced from particles of calcium carbonate and acid. In two months the pH fell to 2.5 and both sulphuric acid and iron sulphate were found in quantity. Scrapings from the surface, when ignited to remove organic matter, gave a brilliant pink residue similar to the residues from shales associated with the moss sites. The presence of sulphur oxidising bacteria in the water from the gully was proved by adding solid sulphur; in summer when temperatures were high, the pH fell to 2 in a week, but in winter there was little or no bacterial activity. These tests have been repeated with a number of alum shales of differing hardness; with hard shales on which *Mielichhoferia* has been seen growing there seems to be little change in the surface, but with the softer shales such as the "Main Alum Shales" acidity is accompanied by disintegration of the surface. This is important in relation to the stability of moss colonies when subjected to frost. Now these were laboratory experiments under controlled conditions in which the presence of active bacteria was assured, the shale was always damp and slow evaporation at the surface allowed water to move upwards and acid to concentrate.

Careful examinations of "Mudd's Gully" site and the site in the lower part of "Middle Gully" show that they have much in common, but there are some interesting differences. They are both bare screes with outcrops of solid shale on which the moss grows. The shale strata dips downwards and inwards to the gully face. The screes in a hot August and also in May were damp but not running with water. There is a very sharp line of demarcation between where the scree ends and the thick covering of bracken and grass begins. Water oozes steadily out from the junctions between the screes and the gully floors. Holes dug in the scree to a depth of 12 inches, near the floor of "Middle Gully", produced very wet and fairly acid shale. Professor Pigott's (1958) analysis of the "Mudd's Gully" site has proved very helpful in making further investigations. It is useful to note how the two gullies differ and to see what conclusions can be drawn.

In one sense "Mudd's Gully" is the odd one out in the quartet of moss sites; it lies in a corner where the main face of the escarpment changes its direction from roughly north-west facing to north-east. Professor Pigott's comment that *Mielichhoferia* only grows on a surface with a north to north-east aspect is true for this gully only because it takes a great curving sweep down the escarpment so that near the bottom where the moss is found there is a length of gully with one north-east facing side on an escarpment which itself faces in this direction. The other three sites are in gullies facing north-west with one side of the gully facing north-east. It may be noted that close to "Mudd's Gully" are several others, all straight. Their aspect is 60° to that of the bit of gully on which *Mielichhoferia* grows. No moss grows on them. On all the moss sites, the angle of dip of the rock strata is such that rain falling on the moss is carried downward into the shale to be returned to the surface later by evaporation. It is suggested that the significance of this north-east aspect is that it gives protection from the drying effect of prevailing south-west winds and from the shale-shattering effects of cold north-east winds. All four gullies where the moss grows are well protected by their position and structure. Bacteria do not react favourably to ultra violet light in strong sunshine. On the first visit to "Mudd's Gully" in July, at noon, the whole area of moss was brilliantly lit, something which does not happen in "Middle Gully". It is, however, to be noted that for years this area has been the subject of legends arising from the high concentration of water vapour prevailing here. On few days in the year is it free from haze; it is a photographer's nightmare because good definition is seldom possible and photographs in colour suffer from excessive scatter of ultra violet. So the area below Botton Head has built-in protection against strong sunlight.

Ingleby Greenhow, particularly that part below Botton Head, is an example of a scar and slump formation. At some time after the ice disappeared, the upper part of the escarpment fell down forming the steep cliff and the slumped shales which now cover the lower slopes. This has gone on, assisted by water moving down from the moor above, either in streams or below ground. It is said that no alum shale now visible below 800 ft. OD is where it was originally formed. *Mielichhoferia* grows on the solid shale strata. These moss sites all receive water from a common source, via springs or by seepage from a vast area of water containing sulphur bacteria, stored under the peat of Botton Head and Urra Moor. The moor has an enormous capacity for storing water above sandstone and the seasonal rise and fall in levels exercise a large measure of control of the water flow. Although there are large changes in the flow of water down the gullies the moss sites do not flood or dry out.

When "Middle Gully" is ascended via the stream there is little of interest until 900 ft. OD is reached, the valley is well clothed with bracken and grass on slumped shale. At about 1000 ft. OD the slope steepens suddenly and bare shale appears; a short stiff scramble and a very narrow gully is reached, a kind of hanging valley. At this point the beck appears from under the solid floor which was, in August, quite dry and covered with large sheets of jet shale. This is the junction, at about 1100 ft. OD, between the top of the "Jet Shale" and the "Hard Shales". The "Main Alum Shales" lie some 30 ft. higher up. The "Hard Shales" and the "Main Alum Shales" were the most sought after by the alum makers because they have a favourable ratio of iron pyrites to calcium carbonate. The jet shales contain much more pyrites but the value of this was more than offset by the disproportionally high content of calcium carbonate which resulted in wasting sulphuric acid and uneconomic production of alum. As a, substrate for *Mielichhoferia* the "Hard Shale" is more resistant to weathering than either the "Jet Shale" or the "Main Alum Shales" and this is one reason for the stability of these moss sites. The gully at this point has an east-facing wall, sloping at about 40° it is curved like a saucer, in two directions. The west-facing wall is about 100 ft. high, almost vertical, so that the gully has considerable depth and is narrow, giving shelter from prevailing winds (SW and NE). The first few yards of the east-facing slope are covered with grass which drips water in summer; three mosses commonly found in wet places, *Philonotis fontana*, *Dicranella squarrosa* and *Bryum pseudotriquetrum*, grow in quantity. This suddenly gives place to the bare scree some 100 ft. high and 60 ft. wide. Apart from the moss, a few scattered clumps of coarse grass appear to occupy the few spots where surface water is visible. Two Liverworts, *Scapania undulata* and *Gymnocolea inflata*, grow with the moss in some places. The moss grows on outcrops of shale, the concentration being much less than in "Mudd's Gully" because the outcrops are more scattered. The adjoining section is a vertical wall of laminated shale, some 30-40 ft. high from the floor of the gully; here the moss forms large thick cushions keyed into the bedding planes, and again there is an accumulation of shale grit. Some water drips from this face. On the scree slope the cushions of moss are attached to hard shale which has been split by frost into small pieces. The moss radicals are very extensive, reaching down to 5 cms. Fine grit cements the whole structure together as a well aerated but stable substrate. The moss has a prostrate habit and individual stems are so tightly packed as to form a thick cushion, so the moss cushion is a very stable unit which keeps the shale below quite moist. The sulphur bacteria live in water and are most active in summer, the mode of growth of the moss ensures that the most active periods for bacterial activity are utilised fully. Away from these moss sites the bare shales dry out easily in summer, so that the total annual bacterial activity must be much lower. There is a strong similarity between the structure of the moss cushions and the type of shale in "Mudd's Gully" and in "Middle Gully" but as no jet shale outcrops in "Mudd's Gully" it is more difficult to determine the geological level exactly; the Ordnance Survey level is 1100-1150 OD. It seems certain that these moss colonies are old but still vigorous, they cannot be relics of some by-gone age just managing to hold on. The rarity of *Mielichhoferia* in Cleveland and the farther north of Britain seems to be a question of the scarcity of suitable sites; given suitable sites there seems no reason why they should not be occupied. The requirements, which are many, can be summarised as conditions which provide:

1. A gully in the alum shales or some other pyritic rock with one wall facing north to north-east above 1000 ft. OD, with a good reservoir of moorland water to provide both water and bacteria.
2. Moisture at the shale surface to enable the bacteria to survive and work. This also means water below the shale surface.
3. Conditions which allow accumulation of sulphuric acid at the surface, i.e. no leaching out.
4. Stability of the surface and some protection from freezing winds and heavy rain.
5. There must be shale outcrops in which the moss can get deep anchorage.

In setting out to make a survey of possible sites away from Ingleby Greenhow, it is a good thing to acquire some knowledge of the geology of the district. To know where the alum shales start in relation to the Middle Lias of the ironstone seams and the physical difference between "Jet Shales" and the "Hard" and "Main Alum Shales" can save a lot of time. The jet shales are easy to recognise; when a thin edge is presented to a flame it burns with a yellow flame and much smoke. An excellent paper by M. A. Gad, J. A. Catt and H. H. Le Riche (1969) describes a complete section of the alum shale series at Whitby, with detailed chemical analyses of 24 samples.

When a survey of places outside Ingleby Greenhow was made, it was surprising how small is the number of areas of bare alum shale, the majority of the more spectacular gullies are in the Middle Lias which are not pyritic. In short there are few gullies worth a second look, and it was not difficult to decide on the reasons why they could not support *Mielichhoferia*. Now it is always difficult to prove a negative, that this moss will never be found outside Ingleby Greenhow, but the facts are that the moss sites are of great rarity for demonstrable reasons. One possibility which should not be overlooked is Dromonby Bank, due south of Kirkby. This place has much of the look of the Ingleby Greenhow site, a high scar rising steeply to the shoulder of the moor at 1300-1350 ft. OD, with numerous narrow gullies with streams and the right aspect. It was worked for jet and alum. Someone with the energy for fairly rough scrambling might be well rewarded.

Now to revert to the original question — how did *Mielichhoferia* get to Cleveland? The answer cannot be divorced from the occurrence of this moss and *Grimmia atrata* in Corrie Kander and *Grimmia atrata* on Hobcarton Crag in the Lake District; all are places with pyritic rock and sulphuric acid. It is difficult to avoid the conclusion that because they are all such highly specialised sites and widely spread, it must be due to a massive invasion which can only be achieved by windborne spores.

In conclusion I would like to thank the many friends I have acquired while carrying out this most interesting investigation. In particular, Mr. and Mrs. Cullum, late of Sheepfold Farm, who kept an eye on my comings and goings, and to the Forester and his staff for much advice.

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TAXIDERMISTS' DELIGHT

Museum officials and private collectors from America, Europe and the Middle East are expected to converge on London in October for a 2-day auction which is claimed to be the largest sale of natural history specimens the world has ever seen. The sale is being held by the Great British Natural History Company and comprises some 3,000 animals and birds and hundreds of cases of insects.

The wide variety of specimens ranges in size from elephants and sharks to the common flea and alphabetically from the agouti — a West Indian rodent — to the zygaenidae moth from the New Forest. Virtually every European animal is represented among the range of species which have been collected from practically every country in the world. The collection includes such extinct breeds as Australian grand parakeets, swallow-tailed kites, Serow goats and passenger pigeons while the most unusual item is a "simulated" Dodo. Other rare specimens are snow leopards, monkey-eating eagles and bald-headed eagles — the symbol of the U.S.A. Some of the more unusual items are a duck-billed platypus, a gnu, a king vulture, a 16-foot-long fibre-glass rhinoceros, scorpions, tarantulas and bird-eating spiders, a "Guinness" toucan, vampire bats, a white blackbird and 499 ostrich eggs.

The sale also includes specimens of the work of the great 19/20th-century taxidermists James Gardner, Eric Hare, the three generations of the Spicer family and the Dutchman Van Ingan who was famed for his mounted heads.

What is believed to be the largest mounted bull elephant head in existence — it measures 10-feet from eartip to eartip — is among the score of game heads in the sale. Completing the collection is a selection of skulls, skeletons and skins including one polar bear, two snow leopard and three tiger skins.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1972
MASHAM FOR THE TANFIELD DISTRICT, V.C. 65 – 27th-29th May

The area visited is in the foothills of the Pennines, where Wensleydale opens eastwards into the Vale of York. The hillier terrain is well wooded, with arable farmland on lower ground. A number of gravel quarries are being worked in the district. We were fortunate to enjoy dry weather during this three-day Spring Bank Holiday weekend and were delighted to meet, in all, nearly one hundred and forty members in the field.

On the Saturday, Major Bourne Arton had very kindly given us permission to visit his estate at Tanfield Lodge, which has much mature woodland and through which runs the river Ure. The Union had paid two previous visits, one in the last century, and it was gratifying to be able to confirm many interesting old records. Members left cars at a gravel quarry and made a circular tour, along the Ure banks and back through Magdalen Wood.

On Sunday we spent the day, under Lady Nussey's direction, at East Tanfield. In the morning we visited a botanically excellent old gravel quarry adjacent to Thornborough Ring, and after lunch followed the Ure downstream to Norton Mills and an interesting wooded reed swamp known as Jetty Pond.

On Monday, the morning was spent in West Tanfield village itself and upstream along the north-west banks of the Ure. After lunch we drove over to the grounds of Camphill House, to visit the gardens and to pay a short visit to nearby woodlands.

The tea and meeting was held at the King's Head Hotel, Masham, near Ripon, when our President, Mr. George Shaw, took the Chair. The appreciation and thanks of the Union were expressed by Mr. Ian Lawrence, to the landowners: Lady Nussey, Major D. Bourne Arton, Mr. B. Ropner and Sir Richard Graham, to Mrs. Jean Holloway who had arranged the meeting and to Miss J. Robertson who had acted as leader in Mrs. Holloway's unfortunate absence due to illness.

Flowering Plants and Ferns (J. R. HICKSON)

From the records in the *Atlas* it would appear that the Tanfield area has been well worked botanically and only ten unrecorded species were added for SE/27 during the week-end.

Saturday's excursion started at South Park Wood on the north bank of the river Ure above West Tanfield and provided a good general introduction to the woodland species of the area. *Equisetum telmateia* (Great Horsetail) was seen growing plentifully at the east end of the wood and a few good specimens of *Geum* × *intermedium* were also seen. More generally *Athyrium filix-femina* (Lady-fern), *Polystichum aculeatum* (Hard Shield-fern), *Hypericum hirsutum* (Hairy St. John's Wort), *Circaea lutetiana* (Enchanter's Nightshade), *Pimpinella major* (Greater Burnet Saxifrage), *Scrophularia auriculata* (Water Figwort), *Campanula latifolia* (Greater Bell-flower), *Galium odoratum* (Sweet Woodruff), *Melica uniflora* (Wood Melick) and *Bromus ramosus* (Hairy Brome) were among the more interesting species noted.

In a small marsh below Tanfield Lodge *Alisma plantago-aquatica* (Water Plantain), not recorded in the *Atlas* for SE/27, was seen together with *Sparganium erectum* (Branched Bur-reed) and other associated species.

The party then went on to explore Magdalen Wood and quite soon *Pyrola minor* (Lesser Wintergreen) was seen growing under trees near the river. Other species observed along the river bank included *Arabis hirsuta* (Hairy Rock-cress), *Hesperis matronalis* (Dame's Violet), *Lysimachia vulgaris* (Yellow Loosestrife), *Doronicum pardalianches* (Great Leopard's Bane) and *Polystichum setiferum* (Soft Shield-fern). Along the woodland trackes *Carex pendula* was plentiful, as were *Stellaria nemorum* (Wood Stitchwort) and *Eupatorium cannabinum* (Hemp Agrimony). Among the trees noted were *Prunus padus* (Bird Cherry) and *Prunus avium* (Gean).

On Sunday the area around East Tanfield was visited and two of the more interesting sites proved to be a disused quarry and a woodland pool with reedswamp. At the former site the wealth of species observed included *Botrychium lunaria* (Moonwort), *Ophioglossum vulgatum* (Adder's Tongue), *Geranium pusillum* (Small-flowered Cranesbill), *G. pyrenaicum* (Mountain Cranesbill), *Anthyllis vulneraria* (Kidney-vetch), *Vicia angustifolia* (Narrow-leaved Vetch), *Blackstonia perfoliata* (Yellow-wort), *Sherardia arvensis* (Field Madder), *Carlina vulgaris* (Carline Thistle) and *Listera ovata* (Twayblade). The second site had obviously not been visited very much, as *Scirpus lacustris* (Common Bulrush), *Carex paniculata* (Greater Tussock-sedge), *C. hirta* (Hairy Sedge), *C. acutiformis* (Lesser Pond-sedge) and *C. riparia* (Great Pond-sedge) were all seen here without being recorded in the *Atlas* for SE/27. Also seen here were *Cardamine amara* (Large Bitter-cress), *Hippuris vulgaris* (Mare's Tail) and *Carex lepidocarpa* (Yellow Sedge).

Along the river bank near East Tanfield (*Epilobium nerterioides*) (New Zealand Willow-herb) had extensively colonised an outcrop of rock near the water and along much of the bank *Salix purpurea* (Purple Willow) was growing in profusion. On the grassy banks above the river *Centaurea scabiosa* (Great Knapweed) and *Helianthemum chamaecistus* (Common Rockrose) were seen in several places. In fields nearby *Lamium amplexicaule* (Henbit), *Urtica urens* (Small Nettle) and *Galium mollugo* (Hedge Bedstraw), the latter not recorded in the *Atlas* for SE/27, were seen.

Monday morning's excursion was to the village of West Tanfield and to the woodland alongside the river, immediately above the village. *Sedum dasyphyllum* (Thick-leaved Stonecrop) was seen to be thriving on the village walls, as was *Parietaria diffusa* (Pellitory-of-the-Wall) by the church. *Atropa belladonna* (Deadly Nightshade) was thriving near the village.

Along the riverside *Equisetum telmateia* (Great Horsetail) was seen in considerable quantity and a small amount of *Carex pendula* and *Ribes spicatum* were seen here. As expected the plants were very similar to those seen on the Saturday, but in a stretch of formerly wet woodland, a fine stand of *Trollius europaeus* (Globe Flower) added to the variety. In the same stretch, *Ophioglossum vulgatum* (Adder's Tongue) and *Lythrum salicaria* (Purple Loosestrife) were also noted.

The afternoon was spent in the grounds and woodland at Camphill and among many interesting species seen in the grounds *Allium paradoxum* was particularly plentiful and some good plants of *Orchis mascula* (Early Purple Orchid) were observed along a woodland ride.

From the foregoing account it will be apparent that no exceptional finds were made during the week-end, but the area contains many varied habitats and a wide range of plants was seen.

Bryology) F. BRANSON)

The damp lower slopes of Magdalen Woods, which we visited on the Saturday, were well carpeted with bryophytes. Luxuriant species there were: *Atrichum undulatum, Cirrophyllum piliferum, Isopterygium elegans, Thamnium alopecurum, Thuidium tamariscinum, Plagiothecium undulatum, Mnium stellare, M. undulatum, M. hornum, M. longirostrum, M. punctatum, M. seligeri, Isothecium myurum, I. myosuroides, Hypnum cupressiforme* var. *resupinatum* and var. *ericetorum, Dicranum scoparium, D. majus, Dicranella heteromalla* and *Eurhynchium striatum.*

Common in the meadowland were: *Acrocladium cuspidatum, Brachythecium rutabulum, Eurhynchium praelongum, Pseudoscleropodium purum* and *Rhytidiadelphus squarrosus.*

Walls provided a foothold for: *Grimmia apocarpa, Eurhynchium confertum, Grimmia pulvinata, Encalypta streptocarpa, Ceratodon purpureus, Bryum capillare, B. caespiticium, B. argenteum, Tortula muralis, Barbula unguiculata, Ctenidium molluscum, Neckera complanata* and *Camptothecium sericeum.* In calcareous flushes was *Cratoneuron commutatum* and in other boggy patches were: *Fissidens taxifolius, Cratoneuron filicinum, Eurhynchium riparioides* and the hepatic, *Solenostema riparia. Hygroamblystegium fluviatile* occurred in one small stream. *Physcomitrium pyriforme*, fruiting freely, occurred on damp clay in one of the rides. *Leskea polycarpa* grew on tree boles, near the river, although the Ure was too flooded to explore. *Orthodontium lineare, Dicranoweisia cirrata, Amblystegium serpens* and *Homalia trichomanoides* also occurred frequently on tree trunks. One unusual hepatic, *Ptilidium pulcherrimum*, was also found on a rotting stump.

Along the river bank, old, burnt ashes of wood fires were completely covered by fruiting *Funaria hygrometrica*: a typical habitat for this common species. On the Monday, I collected along the bank of the River Ure, near West Tanfield Church, most of the species being the usual river bank types. On tree roots were: *Leskea polycarpa, Brachythecium rivulare, Eurhynchium swartzii, Mnium hornum, M. longirostrum, Thamnium alopecurum, Brachythecium plumosum, Cirriphyllum crassinervium, Homalia trichomanoides, Hypnum cupressiforme* and *Tortula subulata.* On rocks were *Cinclidotus fontinaloides, Eurhynchium murale* and *E. riparioides.* There was also some *Plagiothecium denticulatum* (and other species) in the woods at the side of the river, and *Lunularia cruciata*, a thalloid hepatic, on the river bank.

Thornborough old gravel quarry at East Tanfield was also visited, a disused quarry with a calcareous element and a number of willow-fringed pools. In one of these pools were *Drepanocladus aduncus* and *Leptodictyum riparium.* The floor of the quarry was covered with the smaller acrocarps: *Fissidens adianthoides*, *Barbula fallax*, *Bryum pallens*, *B. pseudotriquetrum* and very abundant *Encalypta streptocarpa*. The best find of all here was *Distichium inclinatum* (with abundant capsules), a moss I had never seen before. The late Chris. A. Cheetham used to record it from gravel on roadsides in the mountainous parts of the county.

On some concrete blocks in the quarry were *Brachythecium albicans*, *Bryum capillare*, and *Grimmia pulvinata*. Other species noted were: *Brachythecium rutabulum*, *Pseudoscleropodium purum*, *Rhytidiadelphus squarrosus*, *Acrocladium cuspidatum*, *Ctenidium molluscum* (always indicating a calcareous element in the soil), *Grimmia apocarpa*, *Campylium chrysophyllum*, *Orthodontium lineare*, *Hypnum cupressiforme*, *Brachythecium velutinum*.

The thalloid hepatic *Riccardia pinguis* was also present on the quarry floor and the foliose hepatic *Gymnocolea inflata*. This quarry proved a most interesting place.

Ornithology (A. C. M. DUNCAN)

Over the three days, woodlands alongside the river Ure were explored and we also went to estates with plantations and agricultural land, which included some gravel pits.

The following were found with nest and eggs, or young: Mallard, Partridge, Pheasant, Wood Pigeon, House Martin, Grey Wagtail, Goldcrest, Blackbird, Song Thrush, House Sparrow, Starling, Magpie. On the waters visited, Little Grebe and Canada Goose were seen. A Kestrel was recorded on two days. Red-legged Partridge was added to the game birds. Moorhen, Coot and Oystercatcher were seen and Lapwing were in the fields, with Redshank and Snipe near the gravel pits. Black-headed and Lesser Black-backed and Herring Gulls were seen flying.

Wood Pigeon, Stock Dove, Collared Dove and Turtle Dove were present. Little Owl was seen on the first two days and Swifts were about on all three. It was good to see Kingfishers along the river. A Great Spotted Woodpecker was observed on the trees. Skylarks rose singing from the fields. A colony of Sand Martins was found. Swallows and House Martins were seen about the buildings. Both Tree and Meadow Pipit were present, as were Yellow, Grey and Pied Wagtails, Wren and Dunnock and Dipper along the river. The Warblers present included Sedge, Garden, Blackcap, Whitethroat, Willow, Chiffchaff and Wood Warbler. Spotted Flycatchers were hawking flies, and Whinchat, Robin, Blackbird, Song Thrush and Mistle Thrush were all noted. The Tits present were: Long-tailed, Marsh, Willow, Coal, Blue and Great Tit. Nuthatch and Treecreeper were both seen. A Corn Bunting was singing from the field hedges. Chaffinch, Greenfinch, Goldfinch and Bullfinch, Linnet and Redpoll were all seen. House Sparrow and Tree Sparrow were both met with and so were Jay and Magpie. Jackdaw, Rook and Carrion Crow were present. This made a total of eighty-two birds for the three days. Other species recorded were: Tufted Duck, Water Rail, Common Sandpiper, Curlew, Cuckoo, Barn Owl, Redstart, Yellow Hammer, and Reed Bunting.

Entomology (J. H. FLINT)

This excursion proved to be one of the most profitable for many years in terms of new records for a vice-county. Much material remains to be examined, but so far 31 species are known to be additions to the vice-county (they are indicated below by an asterisk) and although some are of general distribution in lowland areas, others are decidedly local in their distribution.

Although Saturday was mainly dull, cool and windy, during the intervals of warm sunshine many insects were active over the vegetation in sheltered places near Tanfield Lodge. A fine, newly-emerged Poplar Hawk moth (*Laothoe populi* L.) was seen by many people beside the path through the woods. The shingle of the river banks just above the Lodge produced such beetles as *Nebria gyllenhali* Schoen. and *Bembidion prasinum* Duft. and the shore bugs *Saldula c-album* Fieb. and *S. saltatoria* L., the two latter being found later on shingle at East Tanfield.

The sand quarry at West Tanfield was visited on Sunday morning in dull and overcast conditions when few insects were moving but a number of water-beetles and water-bugs were taken from the pools here. The characteristic spoil heaps, like tiny, but granular, worm casts, revealed the presence of colonies of the local little rove-beetle *Bledius erraticus* Er., the adults being extracted by delicately excavating the tunnels with a small knife. Colonies of another species, *Bledius pallipes* Grav., were later revealed in the same way in vertical banks of the river nearby. Mr. Simms, Dr. Lloyd-Evans and Mr. Bernard Nau worked the pools in the quarry and Mr. Nau recorded all the aquatic Hemiptera here and also in the woodland pool at East Tanfield.

The most productive area visited over the weekend was the rough, boulder-strewn stretch of river bank above the riverside gravel workings and the margin of the narrow belt of woodland which borders it. A rich variety of insect life was active here in the hot sunshine in parts that were sheltered from the brisk breeze. A little way upstream from this point, mosses beside the stony bed of the river sheltered colonies of the rove-beetles *Lesteva longo-elytrata* Goeze, *Stenus guttula* Mull. and *S. biguttatus* L.

On Monday morning many insects, particularly sawflies, were very active in the sunshine above West Tanfield. The woodland rides of Camphill were worked in hot sunshine between showers. The grid-iron pattern of the rides provided shelter from the wind and there was a rich variety of insect life, particularly on the flowers of the mountain ash trees that bordered each ride.

In the lists that follow, which do not include species named above, Mr. Nau is responsible for the names of the aquatic Hemiptera, Mrs. Flint for the Symphyta, myself for the remainder. There is one addition to the county (†). Abbreviations have been used to indicate locality as follows:

C Camphill
E Riverside, East Tanfield
P Woodland pond, East Tanfield
Q Sand quarry, West Tanfield
T Tanfield Lodge
W West Tanfield

HEMIPTERA HETEROPTERA

Harpocera thoracica Fall. (T)
Callicorixa praeusta Fieb. (Q)
Corixa punctata Ill. (Q)
Hesperocorixa sahlbergi Fieb. (Q)
**Sigara distincta* Fieb. (P)
**S. falleni* Fieb. (P)
S. nigrolineata Fieb. (P)
**S. venusta* D. & S. (P)

HEMIPTERA HOMOPTERA

Cercopis vulnerata Ill. (C)
Speudotettix subfusculus Fall. (E)
**Stenocranus minutus* F. (W)
Cixius pilosus Ol. (C)

LEPIDOPTERA

Euchloe cardamines L. (Orange Tip) (C, T, W)
Pararge megera L. (Wall) (E)
**Panemeria tenebrata* Scop. (Small Yellow Underwing) (E)
**Abraxas sylvata* L. (Clouded Magpie) (W)
**Lomaspilis marginata* L. (Clouded Border) (C)
**Aethalura punctulata* Schiff. (Grey Birch (E)
Ethnia funerella F. (E, on *Symphytum*)

COLEOPTERA

Cychrus caraboides v. *rostratus* F. (E)
**Badister bipustulatus* F. (E)
**Amara plebeia* Gyll. (E)
**A. fulva* Deg. (E)
Hygrotus inaequalis F. (Q)
H. impressopunctatus Schall. (Q)
**Agabus nebulosus* Forst. (Q)
**Colymbetes fuscus* L. (Q)
Quedius cruentus Ol. (T)
Staphylinus brunnipes F. (E)
Podabrus alpinus Pk. (C)
Cantharis cryptica Ashe (E)
Pyrrochroa serraticornis Scop. (T)
Cyltus arietis L. (C)
Polydrusus mollis Strm. (E)
Zacladus geranii Pk. (E)
**Ceuthorhynchus asperifoliarium* Gyll. (E)

HYMENOPTERA: SYMPHYTA

**Arge cyanocrocea* Forst. (T)
**Dolerus niger* L. (cornfield)
**D. sanguinicollis* Klug (W)
**Athalia cordata* Lep. (W)
**Tomostethus nigritus* F. (W)
**Aglaostigma fulvipes* Scop. (W)
**Rhogogaster viridis* L. (Q)
**Macrophya albicincta* Schrk. (W)
**Tenthredo maculata* Geoff. (E)
**T. celtica* Benson (C)
**T. atra* L. (T)
T. livida L. (T)
**T. olivacea* Klug (T)
**T. mesomelas* L. (T)
**T. arcuata* Forst. (C)

HYMENOPTERA: ACULEATA

**Argogorytes mystaceus* L. (E)
**Halictus smeathmanellus* Kby. (E)
†*Andrena proxima* Kby. (C)
**Nomada flavoguttata* Kby. (E)

DIPTERA

Beris chalybeata Forst. (T)
Leucozona lucorum L. (C)
Syrphus venustus Mg. (C)
S. luniger Mg. (C)
Cheilosia maculata Fall. (E, T)
C. variabilis Pz. (W)
Eristalis intricarius L. (E)
Xylota segnis L. (C, E)
Criorhina floccosa Mg. (C, E)

Galls (F. B. STUBBS)

Biorhiza pallida was recorded on *Quercus robur* and on *Acer campestre*. *Eriophyes macrorhynchus* was also seen on *Acer campestre*. The Rose Bedeguar *Rhodites rosae* was seen on *Rosa canina*.

Conchology (A. NORRIS)

The molluscan fauna of the East Tanfield, Rushwood district, the two areas examined over the weekend, proved to be interesting, but no new or exceptional species were noted. The square 44/27 has been examined by the Conchological Section several times in the past few years with the result that over 68 species are now recorded from it. The following is the list of species recorded by Dr. L. Lloyd Evans, Miss K. M. Morehouse and other members of the Section.

A = Tanfield Lodge
B = Rushwood area

Carychium minimum Müller		B
C. tridentatum (Risso)	A	
Lymnaea truncatula (Müller)	A	B
Planorbis albus Müller		B
Succinea pfeifferi Rossmassler		B
Cochlicopa lubrica (Müller)	A	B
Columella edentula (Drap.)	A	B
Lauria cylindracea (da Costa)		B
Acanthinula aculeata (Müller)		B
Vallonia costata (Müller)		B
V. excentrica Sterki	A	B
Ena obscura (Müller)	A	
Marpessa laminata (Mont.)	A	
Clausilia bidentata (Strom)	A	B
Arianta arbustorum (L.)		B
Helix hortensis (Müller)		B
Hygromia striolata (C. Pfeiffer)	A	B
H. hispida (L.)		B
Monacha granulata (Alder)	A	B
M. cantiana (Montagu)		B
Helicella caperata (Montagu)		B
Punctum pygmaeum (Drap.)	A	B
Discus rotundatus (Müller)	A	B
Arion intermedius Normand	A	B
A. circumscriptus Johnston	A	B
A. c. faciatus (Nilsson)		B
A. c. silvaticus	A	
A. hortensis Ferussac	A	B
A. subfuscus (Drap.)	A	
A. ater agg.	A	B
Euconulus fulvus (Müller)	A	B
Vitrea crystallina (Müller)	A	B
V. contracta (West.)	A	B
Oxychilus cellarius (Müller)	A	B
O. alliarius (Miller)	A	B
Retinella radiatula (Alder)	A	B
R. pura (Alder)	A	
R. nitidula (Drap.)	A	B
Vitrina pellucida (Miller)	A	B
Limax maximus L.	A	
Lehmannia marginata (L.)	A	B
Agriolimax reticulatus Miller)	A	B
A. laevis (Müller)		B
Pisidium subtruncatum Malm		B
P. nitidum Jenyns		B

KEPWICK, V.C. 62 – 10th June

Forty members attended this meeting in the western foothills of the Hambleton Hills. Regrettably, the weather was truly execrable for most of the day. Major Guthe, the local landowner, had kindly given us permission to visit his estate and we were pleased to meet him at the beginning of the day. The bulk of the party spent the morning and the afternoon in the shelter of the woodlands in the grounds of Kepwick Hall, or on the nearby hillsides, although a few hardy souls did brave the elements on the open moorland above.

The President, Mr. George Shaw, took the Chair at the meeting for records after tea when the thanks of the Union were expressed to Mr. Ian Lawrence, the Divisional Secretary, who had arranged and led the day, and to Major Guthe, who had granted us access to his land, by Miss J. Robertson.

Vascular Plants (E. CRACKLES and J. DUNCAN)

Despite the adverse weather conditions a list of 206 species was made for a comparatively small area with a good variety of habitats.

In the morning, some of the botanists worked deciduous woodland which covered the hillside, paying particular attention to the streams and adjacent flushes. A specimen of *Ulmus carpinifolia* at the edge of the wood was remarkable for the numerous widespread suckers which it had produced. Species present in the woodland ground flora included: *Oxalis acetosella* (Wood-sorrel) and *Lysimachia nemorum* (Yellow Pimpernel) which were both frequent; also *Viola riviniana* (Dog Violet) and *Moehringia trinervia* (Three-nerved Sandwort). *Valeriana dioica* (Marsh Valerian) was the most characteristic plant of the marshy areas, whilst other species noted were: *Equisetum palustre* (Marsh Horsetail), *Cardamine pratensis* (Cuckoo flower), *Cardamine flexuosa* (Wood Bitter-cress), *Stellaria alsine* (Bog Stitchwort), *Galium palustre* (Marsh Bedstraw) and *Juncus effusus* (Soft Rush). The above-mentioned woodland species also persisted in the flushes and *Ajuga reptans* (Bugle) was locally frequent in this habitat. Both *Dryopteris filix-mas* (Male Fern) and *Athyrium filix-femina* (Lady-fern) were common on the stream banks and *Blechnum spicant* (Hard-fern) occurred near the sources of the streams. Other species recorded for the general woodland area included: *Thelypteris oreopteris* (Mountain Fern), *Myosotis sylvatica* (Wood Forget-me-not), *Teucrium scorodonia* (Wood Sage), *Luzula pilosa* (Hairy Woodrush) and *Poa nemoralis* (Wood Poa).

Above the woodland the vegetation was mainly one characteristic of acid soils. On a stretch of Bracken (*Pteridium aquilinum*) dominated hillside two small colonies of *Trientalis europaea* (Chickweed Wintergreen) were seen, this species being reported as abundant on other parts of the same hillside. *Deschampsia flexuosa* (Wavy Hair-grass) and *Festuca ovina* (Sheep's Fescue) were the dominant species in heathland extending from the road, whilst other species noted here included: *Polygala serpyllifolia* (Milk-wort), *Veronica officinalis* (Common Speedwell), *Pedicularis sylvatica* (Lousewort), *Galium saxatile* (Heath Bedstraw), *Juncus squarrosus* (Heath Rush), *Luzula multiflora* (Many-headed Rush) and *Nardus stricta* (Mat-grass). Most of the terrain is moorland with *Calluna vulgaris* (Heather), *Erica tetralix* (Cross-leaved Heath) and *Vaccinium myrtillus* (Bilberry) as the dominants and with *Potentilla erecta* (Tormentil) and *Empetrum nigrum* (Crowberry) amongst the associated species. A number of seeded *Rhododendron ponticum* were present. The following species were recorded for the wetter parts: *Ranunculus flammula* (Lesser Spearwort), *R. leonormandii*, *Juncus bulbosus* (Bulbous Rush), *J. inflexus* (Hard Rush), *J. effusus* (Soft Rush) and *Eriophorum angustifolium* (Common Cotton-grass). Here and there, in places where water had come from a limestone source, such calcicoles as *Pinguicula vulgaris* (Butterwort), *Valeriana dioica* (Marsh Valerian) and *Eleocharis quinqueflora* (Few-flowered Spike-rush) occurred.

At the top of the road there was an interesting patch of grassland where *Ophioglossum vulgatum* (Adder's Tongue), *Alchemilla vestita* (Lady's Mantle), *Plantago media* (Hoary Plantain) and *Listera ovata* (Twayblade) were noted. Heavy rain and high wind in the afternoon made searching of the old limestone quarries difficult and these would repay investigation under more congenial conditions. The quarries were notable for attractive patches of *Botrychium lunaria* (Moonwort), *Trifolium dubium* (Lesser Clover) and *Thymus drucei* (Wild Thyme). Other species found in calcareous grassland included: *Helianthemum chamaecistus* (Rockrose), *Linum catharticum* (Purging Flax), *Trifolium medium* (Zigzag Clover), *Carlina vulgaris* (Carline Thistle), *Leontodon hispidus* (Rough Hawkbit) and *Carex caryophyllea* (Spring Sedge).

A large number of species recorded for the vicinity of the village contributed to the total and included the following species not previously recorded for the 10 km square 44/49: *Dryopteris borreri*, *Polystichum aculeatum* (Hard Shield-fern), *Corydalis lutea* (Yellow Fumitory), *Arabidopsis thaliana* (Thale Cress), *Stellaria neglecta* (Greater Chickweed), *Alchemilla glabra*, *Prunus padus* (Bird-Cherry), *Sedum acre* (Stonecrop), *Polygonum lapathifolium* (Pale Persicaria), *Polygonum cuspidatum* and *Carex pilulifera* (Pill-headed Sedge) as well as *Lathyrus montanus* (Bitter Vetch), *Geum* x *intermedium*, *Epilobium obscurum* and *Carex binervis* (Ribbed Sedge).

Bryology (F. E. BRANSON)

The Kepwick area was quite a good collecting place and had the driving rain kept off, much more would have been recorded, especially from the area of moorland above the Hall. Before we started the ascent, I gathered from a wall in the village *Polytrichum piliferum*, *P. juniperinum* and *Rhacomitrium heterostichum*. The shaded wall ascending to the moorland produced *Lophocolea heterophylla*, *Diplophyllum albicans*, both hepatics, and *Dicranoweisia cirrata*, *Orthodontium lineare*, *Mnium punctatum*, *M. longirostrum*, *Pohlia nutans*, *Bryum capillare*, *Camptothecium sericeum*, *Brachythecium velutinum*, *Grimmia pulvinata*, *Barbula rigidula*, *Amblystegium serpens*, *Plagiothecium denticulatum*, *Eurhynchium murale*, *Hypnum cupressiforme* and *Eurhynchium striatum*.

On the shaded and damp roadside there were large quantities of the thalloid hepatics *Conocephalum conicum* and *Pellia endiviifolia*. Also from the roadside were *Lepidozia reptans* and *Brachythecium rivulare*, *Fissidens taxifolius*, *Cratoneuron filicinum*, *Bryum caespiticium*, *Isopterygium elegans* and *Barbula fallax*.

The area of woodland was only very briefly looked at because of the driving rain and the wind. Certain of the species seen indicated calcareous soils. The mosses noted were: *Polytrichum formosum*, *Hylocomium splendens*, *Rhytidiadelphus squarrosus*, *Orthotrichum cupulatum*, *Climacium dendroides*, *Pleurozium schreberi*, *Pseudoscleropodium purum*, *Grimmia apocarpa*, *Dicranum scoparium* and *Ctenidium molluscum*.

Had the weather been kinder no doubt this list of species would have been greatly augmented.

Ornithology (R. H. APPLEBY)

Surely this was one of the wettest June excursions recorded. Members met and set off into the field in the rain many not returning until the late afternoon, after being out in virtually non-stop rain all day. Let no one ever accuse any members who attended this outdoor meeting of being fine weather naturalists!

Kepwick, at the foot of the Hambleton Hills and on the western border of the North Yorkshire Moors, gave the ornithologists a wide variety of countryside to work in. Many, like myself, had not visited this really beautiful part of Yorkshire before and will, no doubt, return. In spite of the inclement weather, the species listed totalled fifty-seven. Because of the weather it was impossible to roughly assess a bird's density or scarcity and many obvious species were "missing".

One of the commonest birds seen was Blackbird, with birds literally everywhere, both on high and low ground, with many feeding young. Song Thrush and Goldfinch were plentiful on the low ground, Chaffinch less common, but heard as often as seen. Walking northwards along the Nether Silton road, which winds its way through fields of cereals, several flocks of Woodpigeons, many Lapwings, Skylarks, a single Spotted Flycatcher and a female Whinchat were seen. Approaching Sorrow Beck, a single Grey Wagtail flew over and pair of Swallows had obviously set up residence under the bridge there. Bearing north-eastwards at Nether Silton up Hunters Hill, over Silton Moor, which has been partly planted by the Forestry Commission, was not a particularly fruitful area, mainly because of the rain. Odd Redpolls, two Bullfinches and a Cuckoo were seen. Up on the top moor of Black Hambleton, there was thick, but patchy moor fog. Turning southwards along the Cleveland Way, several Red Grouse, at least four pairs of Golden Plovers and a Merlin were seen. Meadow Pipits were much in evidence. Between Arden Great Moor and Little Moor, several Curlews, Snipe and two Common Terns were positively identified. At the old quarry, turning westward and downwards towards Kepwick and winding through Warren Wood, alongside Kepwick Hall grounds, Blackcap sounded the commonest Warbler. The lake in the grounds had attracted birds like Mallard, Mute Swan, Heron and Moorhen.

Other species seen or heard during the day were: Pheasant, Partridge, one Black Headed Gull, a Tawny Owl heard, Rook, Jackdaw, Magpie, Blue Tit, Carrion Crow, Great Tit, Marsh Tit, Coal Tit, Wren, Robin, Mistle Thrush feeding young, Whitethroat feeding young, Willow Warbler feeding young, Dunnock, Tree Pipit, Starling, Linnet, Yellow Hammer, cock Goldcrest, Pied Wagtail and a family party of Greenfinches.

Entomology (J. H. FLINT)

Rain and the cold wind effectively prevented entomologists from using their nets and no insects of note were seen.

Conchology (A. NORRIS)

The only species of special interest recorded on this wet and windy occasion by Dr. and Mrs. L. Lloyd Evans was *Pyramidula rupestris* (Drap.). This locality is by far the most easterly record of this species in Yorkshire, most of the previous records being found to the west of Masham. 29 species were recorded as follows:

Carychium minimum Müller
Ancylus fluviatilis Müller
Cochlicopa lubrica (Müller)
C. lubricella (Porro)
Pyramidula rupestris (Drap.)
Lauria cylindracea (da Costa)
Ena obscura (Müller)
Arianta arbustorum (L.)
Hygromia striolata (C. Pfeiffer)
H. hispida (L.)
Helicella caperata (Montagu)
Discus rotundatus (Müller)
Arion intermedius Normand
A. fasciatus (Nilsson)
A. hortensis Ferussac
Arion subfuscus (Drap.)
A. ater agg.
Euconulus fulvus (Müller)
Vitrea crystallina (Müller)
V. contracta (West)
Oxychilus cellarius (Müller)
O. alliarius (Miller)
Retinella pura (Alder)
R. nitidula (Drap.)
Vitrina pellucida (Müller)
Limax maximus L.
Lehmannia marginata (L.)
Agriolimax reticulatus Müller
A. laevis (Müller)

ROCHE ABBEY, MALTBY LOW COMMON AND SANDBECK PARK

V.C. 63 - 24th and 25th June

This two day meeting was well supported and we were particularly appreciative of the guidance given by Mr. R. Smith and Mr. J. Vaughan.

On the Saturday, about thirty-five members explored Maltby Dyke down from Wood Lee to Roche Abbey and after lunch we investigated King's Wood.

The next morning, over forty-five members met at Maltby to visit Maltby Low Common Nature Reserve. In the afternoon we were joined by the Earl of Scarborough, who had most kindly permitted us to visit his estate, and we were able to explore the lake and woodlands at Sandbeck Park.

Tea was taken at the Manor Junior School, Maltby, by kind invitation of the Headmaster: Mr. J. Vaughan. Our President, Mr. George Shaw, took the Chair at the meeting for records, after tea. Mr. Duncan Grant expressed the thanks of the Union to the Earl of Scarborough, to Mr. Vaughan and his helpers, to members of the Rotherham Naturalists' Society for guidance on local matters, and to Mrs. Freda Kemsley, the Divisional Secretary, who had planned the programme and co-ordinated it.

Flowering Plants and Ferns (W. A. SLEDGE)

King's Wood is probably the finest surviving example in the county of semi-natural woodland on Magnesian Limestone. There is little evidence of planting and both the number and size of the Yew trees are a notable feature of the wood. Ash and Oak are both plentiful and the Large-leaved Lime (*Tilia platyphyllos*) which is also abundant is probably indigenous here. Shrubs present, typical of such calcareous soils, are Spindle Tree, Common Buckthorn (*Rhamnus catharticus*), Dogwood and Privet. Service Tree (*Sorbus torminalis*) and Norway Maple (*Acer platanoides*) have been introduced in one place and the former is regenerating. The ground flora is rather uniform consisting largely of Dog's Mercury and almost exclusively so over considerable areas. Writing after the Y.N.U. visit here in 1941 I commented upon the "very extensive carpets of Lily-of-the-Valley which is co-dominant with or even largely replaces Dog's Mercury over wide areas". No such extensive carpets were seen on this visit though it may be that the parts traversed on the two visits did not coincide. A considerable area of the wood at the east end has recently been clear-felled and unfortunately further felling seems likely to take place. If it is continued throughout the remaining part the ecological loss will be irreparable.

Green Hellebore (*Helleborus viridis*) was seen in the wood near to Roche Abbey as in 1941 and we were informed that the Daffodils are also still present. Pellitory-of-the-Wall (*Parietaria*) is plentiful on the rocks near the Abbey and *Ribes alpinum*, also noted in 1941, is still present near the ruins. *Ranunculus sceleratus* (Celerly-leaved Buttercup) and *Scirpus sylvaticus* (Wood Club-rush) were seen in a marsh by the stream beyond the Abbey.

The walk to Roche Abbey and King's Wood had followed Maltby Dyke from Wood Lea. The grassy and shrubby limestone banks yielded a number of interesting species. The white form of Bee Orchis was more common than the normal pink-petalled form both here and again at Maltby Common on the following day. Other species seen included *Thalictrum minus* (Meadow Rue), *Aquilegia* (Columbine), *Melianthemum chamaecistus* (Rock Rose), *Astragalus glycyphyllos* (Wild Liquorice), *Blackstonia perfoliata* (Yellow-wort), *Acinos arvensis* (Basil Thyme), *Daphne laureola* (Spurge Laurel), White and Black Bryony, *Crepis biennis* (Rough Hawk's Beard), *Lithospermum officinale* (Gromwell), *Euphorbia uralensis*, *Polygonum bistorta* (Bistort), *Galeobdolon luteum* (Yellow Archangel), *Scirpus setaceus*, *Carex distans* and *Catapodium rigidum* (Hard Fescue), together with Spindle Tree, Dogwood, Common Buckthorn, Aspen and *Rosa arvensis*.

Sunday's excursion was to Maltby Common in the morning. On the Nature Reserve *Cirsium dissectum* (Meadow Thistle) was just coming into flower and on the limestone bank nearby more Columbine was seen. Other species seen on the Reserve included *Genists tinctoria* (Dyer's Greenweed), *Scirpus setaceus* (Bristle Club-rush) and seven species — all common ones — of *Carex*. Beyond the Reserve *Platanthera chlorantha* (Butterfly Orchid) and *Neottia nidus-avis* (Bird's-nest Orchid) were each seen in two different stations and *Calamagrostis epigeios* (Smallreed) was noted. At Maltby railway sidings, *Symphytum asperum* (Rough Comfrey), *Epilobium adenocaulon* (American Willow-herb), *Sisymbrium orientale* and *S. altissimum* were among the aliens present, a more unexpected species but doubtless also an introduction, being *Geranium sylvaticum* (Wood Geranium).

In Sandbeck Park we were too late to see the Fritillary but *Acorus calamus* (Sweet Flag) was present round the lake margin and *Cirsium heterophyllum* (Melancholy Thistle) looked very much at home in a marshy place by the lake though presumably it was derived from a former introduction.

Mammals (C. A. HOWES)

Although no traps were laid or owl pellets found, a fairly systematic search was made of all areas visited by the Union. Records were based on sightings, droppings, footprints and other signs of activity; and through the good offices of Mr. Trevor Stables verbal accounts of local mammals were obtained from local game-keepers.

Mole (*Talpa europaea*) was much in evidence throughout Maltby Common especially in the wooded areas and adjacent rough grassland situated over the Permian marles. Activity was not noticed on the steep Magnesian Limestone banks. Mole hills were also encountered on the lawns in Sandbeck Park, in Kings Wood, Roche Abbey and the Norwoods. Undetermined shrews were heard in several places amongst tall herbage and woodland ground flora at Maltby Common and Roche Abbey. Lord Scarborough stated that bats are present at Sandbeck Hall. Although no sightings were made, the area around the Sandbeck Estate with the abundance of old trees and old buildings are clearly ideal for several species. Despite the foul conditions of the Maltby Dyke (which about 6 years ago featured as one of the few trout streams in south-east Yorkshire) water voles were present, their droppings and runs being noted along the stretch from Maltby to Roche. The corpses of Wood Mouse (*Apodemus sylvaticus*) and Bank Vole (*Clethrionomys glareolus*) proved the presence of these species at Maltby Common. Brown Rat (*Rattus norvegicus*) footprints were seen in the mud by Maltby Dyke below the old Sewerage Works. Grey Squirrel (*Sciurus carolinensis*) was recorded at Kings Wood and the Norwoods. According to local keepers the species is abundant in woods throughout the Sandbeck district. Although the Red Squirrel (*Sciurus vulgaris*) has not been reported from the area since the early 1950s the species may still occur or at least be able to recolonise from near-by Stainton if the venerable Kings Wood, one of their old haunts, is not felled. According to the presence of droppings the Rabbit (*Oryctolagus cuniculus*) was present at Maltby Common, Roche Abbey, the Norwoods, and Sandbeck Park. Lord Scarborough notes that despite the presence of myxomatosis in a small proportion, rabbits are on the increase and are becoming an agricultural pest. Fox (*Vulpes vulpes*) was also said to be in the area in good numbers. Hares (*Lepus europaeus*) were seen in fields at Maltby Common, Sandbeck Park and Roche Abbey and Weasel (*Mustela nivalis*) and Stoat (*Mustela erminea*) were also noted for the district.

Ornithology (A. H. V. SMITH)

The relatively large number of species encountered on both days (68), suggests that the area is still as favourable for birds as it was when Ralph Chislett knew it as a boy. Fifty species were recorded in the vicinity of Roche Abbey, compared with 48 on the occasion of the previous visit by the Y.N.U. in 1941. Five species of tit were identified, with family parties of Coal and Marsh Tit. Warblers were well represented, including Grasshopper. Blackcap song was much in evidence although no Garden Warblers were heard in the Abbey area. The Goldcrest was heard in the Yews at the upper end of the approach road to the Abbey, in Kings Wood. At the Abbey, four or five pairs of Spotted Flycatcher were seen within a few hundred yards; one pair probably nesting in the ruins. Goldfinches were also plentiful near the Abbey and members were particularly impressed by the numbers of young Robins and young and adult Bullfinches. Contrary to expectations, the Nuthatch was not recorded, nor were any members of the Woodpecker family. In the past, these birds have bred in the area regularly, but how far the recent tree felling might have affected them is not known. A Heron visited the lake behind the Abbey and was seen by members who visited the Abbey on the Sunday.

Although Sunday's route via Maltby Low Common to Sandbeck Park included a wider variety of habitats, the total number of species recorded was less, fifty-one. As is to be expected, the list is essentially the same, but the Great Spotted Woodpecker and the Redstart, were among the species not seen at Roche Abbey. The Redstart record was of a pair feeding young in a hole in an isolated tree near a farmhouse.

Maltby Sewage Farm proved disappointing; Little Ringed Plover had been seen earlier in the year, but at the time of the visit, virtually the whole area was covered by a dense growth of vegetation. A pair of Snipe was, however, flushed.

Sandbeck Park was of interest for its water birds: Mallard, Tufted Duck and Great Grested Grebes, all had young. A second pair of Great Crested Grebe was still incubating eggs close to the lake shore. These are useful records for the B.T.O. Atlas as there are no other waters of comparable size in the corresponding 10 km. square.

A Little Owl was seen at Maltby Low Common and a roosting place of a Tawny Owl, with numbers of pellets, was found in Sandbeck Park.

A full list of the species seen on the two days has been deposited with the V.C. 63 Recorder.

Entomology (J. H. FLINT) Records for Maltby (Saturday) only.

The cool overcast weather on Saturday was not conducive to insect activity and although the valley between Maltby and Roche Abbey looked promising, the results of collecting were disappoining. The Clouded Magpie moth (*Abraxas sylvata* L.) was seen by several people at different times but butterflies were scarce indeed. In the area of limestone turf south of the railway line my wife found some occupied larval holes of the tiger-beetle *Cicindela campestris* L., an unusual insect to find on the Magnesian Limestone, and in the same area I swept from the grasses a couple of the slender robberfly *Leptogaster guttiventris* Zett., an uncommon insect in Yorkshire.

AUSTWICK FOR AUSTWICK AND LAWKLAND MOSSES

V.C. 64 – 8th July

There was an excellent turn out of nearly fifty members for this meeting on the western fringes of V.C. 64, and we were again fortunate to have sunny weather.

The morning was spent on Lawkland Moss, where many Small Pearl-bordered Fritillary butterflies were seen in flight, at their only station in V.C. 64, among a rich variety of plants.

After lunch Austwick Moss was investigated — now very much overgrown by maturing birch and willows, but still very wet where deep peat holes had been excavated. Those who had visited it thirty years previously, considered that there had been much change, as the birch scrub had now invaded the formerly open areas and was crowding out some rare species.

Forty members and friends took tea at the Cross Streets Hotel, Austwick, after which Mr. George Shaw, took the Chair at the meeting for records. Our guides for the day, to whom we were much indebted, included Lt.-Col. and Mrs. George Field, and Miss Helen Lefevre, the Divisional Secretary for V.C. 64, to whom our thanks were expressed by Mrs. Hilda Flint.

Flowering Plants and Ferns (W. A. SLEDGE)
Lawkland Moss is less well-known to most botanists than Austwick Moss. Many of the typical peat-moss species are common to both localities; other species are seemingly confined to one or other of the two areas. This certainly applies to *Colchicum autumnale* (Meadow Saffron) and *Serratula tinctoria* (Sawwort) which were seen close together at Lawkland. *Genista tinctoria* (Dyer's Greenweed) is also present at Lawkland but not at Austwick Moss.

Soon after entering the Moss at Lawkland two fine spikes of *Platanthera chlorantha* (Greater Butterfly-orchid) were seen and the marsh orchids, which were about at their best, included *Dactylorhiza purpurella* (Northern Fen Orchid) and hybrids of this with *D. fuchsii* (Common Spotted Orchid. Shrubs fringing the Moss both here and at Austwick included *Salix pentandra* ♀ (Bay-leaved Willow) and in both *Dryopteris carthusiana* (Narrow Buckler-fern) is abundant. *Scirpus setaceus* (Bristle Scirpus) was seen in the damp fields bordering both Mosses.

At Austwick Moss *Andromeda polifolia* (Bog Rosemary), which does not appear to be present in Lawkland Moss, was seen in good quantity though past flowering. *Vaccinium oxycoccos* (Cranberry) was in good flower. Great changes have taken place here since pre-war days. Self-sown birch and pine have grown up over a large part of the Moss and if allowed to continue unchecked the Moss seems destined to change into woodland and this will certainly lead to the disappearance of many species such as the *Andromeda*.

The marshy field bordering the Moss on the north side shows the influence of a calcareous soil (or of drainage from a calcareous soil) in its flora which includes *Primula farinosa* (Mealy Primrose), *Pinguicula vulgaris* (Butterwort), *Schoenus nigricans* (Black Bog-rush), *Carex hostiana* and *C. lepidocarpa*.

Bryology

AUSTWICK MOSS AND LAWKLAND MOSS (Mary Dalby)

Interest in the old peat cuttings on Austwick Moss dates back to 1916 when Mr. C. A. Cheetham wrote an article in *The Naturalist* (*Nat*. 1916, 247) noting the varying flora in different pools "some pools are practically pure *Sphagnum*, others Harpidioid Hypna or aquatic hepatics and lastly pools with plants such as Pondweed or Floating Burweed". He suggested that the variation might be due to degree of acidity and further work on this aspect was carried out by Dr. W. H. Pearsall (*Nat*. 1938, 247-9) who found that the *Sphagnum* pools were markedly more acid — in the region of 3.6 pH — than the "Hypna" pools where pH was about 4.6, while in occasional pools the pH was up to 6.8. A further article by Mr. W. H. Burrell and Mr. C. A. Cheetham (*Nat*. 1938, 271-3) identified a series of seven pools, giving details of their vegetation. They varied from open water to almost complete reclamation.

In 1972 the pools on the Moss still range from open water to complete reclamation, but no Pondweed, Floating Burweed or Bladderwort was found. A subsequent visit, by courtesy of Lt. Col. and Mrs. Field, established the fact that it is now impossible to identify Mr. Cheetham's original pools owing to the growth of birch, the multiplicity of pools and the obliteration of the original track. The succession, with the exception of the plants listed above, remains virtually the same except that very little "Harpidioid Hypna" (*Drepanocladus spp*.) were seen. Most of the pools are small, about 5 × 4 yards. The beautiful plumose form of submerged *Sphagnum cuspidatum* is the first invader of open water, although in a few pools *S. squarrosum* is also submerged. As the water recedes and the *Sphagna* become more exposed *S. recurvum* comes in from the sides or in some cases into the middle of the pool among the *S. cuspidatum*. Cotton-grass (*Eriophorum angustifolium*) grows where the water is shallow and a very little *Drepanocladus fluitans* was found on exposed mud. Later large tussocks of *S. palustre*, *S. fimbriatum* and even *S. magellanicum* invade from the banks of the pools and their dense growth allows vascular plants such as Cranberry (*Oxycoccus palustris*) and Sundew (*Drosera rotundifolia*) to establish themselves. The hepatics *Mylia anomala*, *Lophozia ventricosa* and *Cephalozia connivens* were found intermingled with the *Sphagna*.

In the dryer areas between the pools and among the *Molinia* were large tussocks of *S. palustre*, *S. fimbriatum*, *S. magellanicum*, *S. plumulosum*, *S. capillaceum*, *S. papillosum* and *S. rubellum* with dense cushions of the whitish coloured moss *Leucobryum glaucum*. The cord moss *Polytrichum alpestre*, *Aulacomnium palustre* and *Dicranum bonjeanii* grew among the *Sphagna* while the tussocks of *Molinia* supported such mosses as *Tetraphis pellucida*, *Pohlia nutans*, *Campylopus pyriformis* and the hepatic *Lepidozia reptans*. *Orthodontium lineare* was noted at the base of many of the trees.

Lawkland Moss was on the whole dryer than Austwick and there was more *Molinia* with a similar bryophyte flora but *Acrocladium cordifolium* was reported by Mr. Branson from the pools and *Campylium stellatum*, *Drepanocladus revolvens* and *Mnium seligeri* from the wetter places.

An area of calcareous fen between the two Mosses produced in addition *Sphagnum teres*, *S. subsecundum* var. *auriculatum* and the much rarer var. *subsecundum*.

My thanks are due to Mr. Shaw for information on the past records for the Moss, Mr. Branson and Miss Robertson for lists of species and Miss E. M. Lobley for identification of *Sphagna*.

The following list was compiled from both Mosses. Sequence and nomencalture follow the Census Catalogues of British Mosses, (1963) and Hepatics (1965.

Sphagnum palustre
S. papillosum
S. squarrosum
S. cuspidatum
S. subsecundum var. *auriculatum*
S. rubellum
S. plumulosum
S. magellanicum
S. teres
S. recurvum
S. subsecundum var. *subsecundum*
S. fimbriatum
S. capillaceum
Polytrichum alpestre
Polytrichum commune
Dicranella heteromalla
Dicranum bonjeanii
Campylopus pyriformis
Campylopus flexuosus
Leucobryum glaucum
Tetraphis pellucida
Orthodontium lineare
Mnium hornum
Mnium seligeri
Aulacomnium palustre
Climacium dendroides
Thuidium tamariscinum
Campylium stellatum

Drepanocladus fluitans
Drepanocladus revolvens
Acrocladium cordifolium
Acrocladium stramineum
A. cuspidatum
Pleurozium schreberi
Rhytidiadelphus squarrosus
Pseudoscleropodium purum
Plagiothecium succulentum
H. cupressiforme var. *ericetorum*
Lepidozia reptans
Lophozia ventricosa
Plagiochila asplenioides var. *major*
Lophocolea bidentata
Lophocolea cuspidata
Cephalozia bicuspidata
Cephalozia connivens
Calypogeia fissa
Mylia anomala

THE STONE WALLS (F. E. Branson)

A rupestral bryophyte flora has always had an attraction for me, an old stone wall being my favourite habitat. The walls in the vicinity of the Mosses, although not so prolifically covered with species as some I have seen, yet proved very interesting.

Some of the more interesting mosses gathered were: *Barbula rigidula* (c.fr.), *Tortula intermedia* (c.fr.), *Tortella tortuosa*, *Zygodon viridissimus*, *Orthotrichum anomalum* (c.fr.), *Neckera complanata*, *Isothecium myurum*, *I. myosuroides*, *Anomodon viticulosus* and of hepatics, *Frullania dilatata* and *Metzgeria furcata*. Other species of mosses were: *Bryum capillare*, *Grimmia apocarpa* (c.fr.) *Orthotrichum cupulatum* (c.fr.), *Pohlia nutans* (c.fr.), *Fissidens taxifolius*, *Dicranoweissia cirrata*, *Tortula muralis*, *Camptothecium sericeum* (c.fr.), *Brachythecium rutabulum*, *Hypnum cupressiforme*, *Isopterygium elegans* and *Eurhynchium murale*.

Also, on a roadside was *Barbula convoluta*, *Pohlia annotina*, *Barbula unguiculata*, *Bryum argenteum*, *Bryum bicolor*, *Atrichum undulatum* and *Cratoneuron filicinum*. On a flower pot at the hotel I found the best specimens of *Leptobryum pyriforme* I have ever seen, with capsules present.

Ornithology (A. C. M. DUNCAN)

It was warm and sunny for the visit to Lawkland Moss, but after lunch rain came on when we got into Austwick Moss, a more acid raised bog. The most interesting thing seen was a flock of some four hundred Curlew. The date seems very early for such a flock. It has been suggested that it has been a poor breeding year, owing to a cold, wet spring. A total of forty-seven species were noted during the day. The complete list follows:

Grey Heron, Sparrow Hawk, Kestrel, Partridge, Pheasant, Moorhen, Oystercatcher, Lapwing, Curlew, Snipe, Black-headed, Lesser Black-backed and Herring Gulls, Great Black-backed Gull, Wood Pigeon, Swift, Skylark, Swallow, House Martin, Tree Pipit, Meadow Pipit, Yellow and Pied Wagtails, Wren, Dunnock, Sedge Warbler, Whitethroat, Willow Warbler, Wheatear, Robin, Blackbird, Song Thrush, Blue and Great Tits, Yellow Hammer, Reed Bunting, Chaffinch, Greenfinch, Goldfinch, Linnet, Redpoll, House Sparrow, Tree Sparrow, Starling, Jackdaw, Rook and Carrion Crow.

Entomology (J. H. FLINT)

The morning was spent in Lawkland Moss where conditions were good for collecting insects. Almost immediately upon entering the Moss a Small Pearl-bordered Fritillary (*Argynnis selene* Schiff.) was seen and this pretty butterfly was quite plentiful here, so much so that ten were seen on the wing at one time in quite a small space. Moths seen here included Chimney Sweeper (*Odezia atrata* L.) and Latticed Heath (*Chiasmia clathrata* L.), both of which were very common, and examples of the Fox (*Macrothylacia rubi* L.) and Buff Tip (*Phalera bucephala* L.). The other insects seen were mostly unremarkable, the most notable being the bug *Charagochilus gyllenhali* Fall. which was swept from *Galium*. Others included (Hemiptera) *Javesella forcipata* Boh. and *Stiroma bicarinata* H.-S., (Hymenoptera) *Tenthredo ferruginea* Schrk. and (Diptera) *Eumerus strigatus* Fall.

Cloud, a cold wind and ultimately rain spoilt conditions on Austwick Moss in the afternoon and apart from a Wood Tiger moth (*Parasemia plantaginis* L.), the only insects worth noting resulted from Jeremy Flint's collecting in the mossy peat pools. Here the water-beetles included *Agabus affinis* Pk., *Hydroporus gyllenhali* Schd. and *H. obscurus* Stm., all typical of these peat pools. The beautiful metallic reed-beetles *Plateumaris discolor* Pz., whose larvae feed at the roots of the cotton-grass, and the skater *Gerris thoracicus* Schm. were also found here.

WARTER AND NUNBURNHOLME, V.C. 61 - 22nd July

This proved to be a wet and rather foggy day, which was unfortunate as some fifty naturalists assembled in the morning at Pocklington, in order to visit some of the outlying parts of the Warter Estate. The Divisional Secretary, Mr. Eric Chicken, led us first to Singleton Wood and Bratt Wood both dry chalk woodlands, and after a picnic lunch, we went up on to the top of the wolds, to the north-west fringe of the estate, to explore two dry chalk valleys, Sylvandale and Nettledale.

After a meal at The Feathers, Pocklington, members heard reports on the days recordings, when the Chair was taken by our President, Mr. George Shaw. At this meeting, Mr. R. Dickens reminded members that this was at least the third visit paid to the Warter area by the Union, as the mycologists had held a fungus foray here in 1893 and there were field excursions in 1885 and 1905. He also spoke of Francis Orpen Morris, one time rector of Nunburnholme and an excellent naturalist and early conservationist, who in 1857 had written his six volumes on *British Birds* and further works on butterflies and moths there.

Dr. J. D. Pickup, the Chairman of the Executive, expressed the thanks of the Union to Mr. Eric Chicken, who had organised and led the day, and to Mr. H. J. Goodhart, the Warter Estate Manager, for granting us access to certain part of the Warter estate.

Vascular Plants (E. CRACKLES)

In spite of extremely difficult weather conditions the botanists worked hard, but found the area disappointing. In the morning Singleton wood, the western part of Bratt Wood and the field in between were worked; there was insufficient time to examine the allotted part of Bratt Wood adequately. Both woods are on the site of ancient woodland but the native tree species have been largely replaced by an abudance of *Ulmus procera* (English Elm) with some *Acer pseudoplatanus* (Sycamore), *Ulmus glabra* (Wych Elm) and *Fraxinus exelsior* (Ash) present. In both woods *Mercurialis perennis* (Dog's Mercury) was the dominant plant of the ground flora, with *Sanicula europaea* (Sanicle) common and the following species also present: *Dryopteris filixmas* (Male Fern), *Dryopteris dilatata* (Broad Buckler Fern), *Circaea lutetiana* (Enchanter's Nightshade), *Endymion non-scriptus* (Bluebell), *Allium ursinum* (Ramsons), *Primula vulgaris* (Primrose), *Orchis mascula* (Early Purple Orchid), *Carex sylvatica* (Wood Sedge) and *Brachypodium sylvaticum* (Slender False-brome). *Conopodium majus* (Earthnut) was a characteristic member of the flora of Singleton Wood and the following additional species were noted in Bratt Wood: *Fragaria vesca* (Wild Strawberry), *Angelica sylvestris* (Wild Angelica), *Veronica montana* (Wood Speedwell), *Ajuga reptans* (Bugle) and *Festuca gigantea* (Tall Brome). A variety of species was recorded for the intervening land and these included: *Linum catharticum* (Purging Flax), *Agrimonia eupatoria* (Agrimonia), *Alchemilla vestita* (Lady's Bedstraw), *Silaum silaus* (Pepper Saxifrage), *Primula veris* (Cowslip), *Clinopodium vulgare* (Wild Basil), *Galium verum* (Lady's Bedstraw), *Leontodon hispidus* (Rough Hawkbit), *Hieracium pilosella* (Mouse-ear Hawkweed), *Juncus inflexus* (Hard Rush), *Dactylorhiza fuchsii* (Common Spotted Orchid) and *Listera ovata* (Twayblade). An interesting association of plants occurred by the roadside here *Hordeum secalinum* (Meadow Barley) and *Hypericum hirstuum* (Hairy St. John's Wort) being amongst the species noted.

Most of the afternoon was spent examining Sylvandale. *Carduus nutans* x *C. crispus* was noted, with *C. nutans* (Nodding Thistle), in the bottom of the valley. The hillsides were dominated by *Brachypodium pinnatum* (Heath False-brome) with very small remnants of chalk grassland on the south-facing slope containing the following species: *Helianthemum chamaecistus* (Common Rockrose), *Filipendula vulgaris* (Dropwort), *Poterium sanguisorba* (Salad Burnet), *Pimpinella saxifraga* (Burnet Saxifrage), *Centaurium erythraea* (Common Centaury), *Campanula rotundifolia* (Harebell), *Carlina vulgaris* (Carline Thistle) and *Crepis capillaris* (Smooth Hawk'sbeard). *Acinos arvensis* (Basil Thyme) and *Gentianella amarella* (Felwort) occurred on patches of bare chalk on the same hillside with *Arabis hirsuta* (Hairy Rock-cress) and *Myosotis arvensis* (Common Forget-me-not) on scree on the north-facing slope. *Ophioglossum vulgatum* (Adder's Tongue) occurred in grassland at the top of the south-facing slope. An abundance of Dropwort was reported to be present on the earthwork but no other details of the vegetation there are available.

At the edge of an extremely large cornfield between Sylvandale and Nettledale the most frequent weeds were: *Fumaria officinalis* (Common Fumitory), *Aphanes arvensis* (Parsley Piert), *Polygonum persicaria* (Persicaria), *Polygonum convolvulus*

(Black Bindweed), *Veronica persica* (Buxbaum's Speedwell), *V. arvensis* (Wall Speedwell), *Mentha arvensis* (Corn Mint), *Stachys arvensis* (Field Woundwort), *Lamium amplexicaule* (Henbit) and *Galeopsis tetrahit* (Common Hemp-nettle), whilst *Galeopsis angustifolia* (Narrow-leaved Hemp-nettle) was also seen. *Veronica serpyllifolia* (Thyme-leaved Speedwell) was noted in the turf at the top of Nettledale.

Bryology (M. DALBY)

The day proved disappointing both in weather and in the variety of species found. Singleton and Bratt Woods composed of comparatively young trees provided only two habitats. The ground cover, which was typical of such woodland, was chiefly of *Eurhynchium praelongum*, *Fissidens taxifolius*, *Mnium hornum*, *Mnium undulatum* and *Atrichum undulatum* with a little *Plagiothecium succulentum*, *Thamnium alopecurum* and *Eurhynchium striatum*. Tree bases, stumps and a very little fallen wood formed a second habitat where *Orthodontium lineare*, *Amblystegium serpens*, *Brachythecium rutabulum*, *Hypnum cupressiforme*, *Plagiochila asplenioides* and *Lophocolea cuspidata* were the main species found.

Sylvandale in the afternoon was on the chalk but was so wet that identification in the field was difficult with water in one's lens and running down one's neck so that specimens had to be gathered rather at random for identification later. In the turf were *Barbula unguiculata*, *Fissidens cristatus*, *Camptothecium lutescens*, *Thuidium philibertii* and a very slender form of *Cratoneuron filicinum*. A few old elders in the bottom of the valley produced *Dicranoweissia cirrata* and *Hypnum cupressiforme* var. *resupinatum*. *Acrocladium cuspidatum* grew in abundance round the pond at the entrance to the valley.

As the morning and afternoon were spent in different grid squares the following list of species indicates their location. My thanks to Mr. Branson, Miss Robertson and Mr. Shaw for lists of species found, and to Mr. Branson for identification of species. Nomenclature and sequence follow the Census Catalogue of British Mosses (1963) and of Hepatics (1965).

Atrichum undulatum	84	
Fissidens taxifolius	84	
F. cristatus		85
Ceratodon purpureus	84	
Dicranella heteromalla	84	
Dicranoweissia cirrata		85
Dicranum scoparium	84	85
Tortula muralis	84	
Barbula unguiculata		85
Funaria hygrometrica		85
Orthodontium lineare	84	
Pohlia nutans	84	85
Bryum argenteum		85
Bryum capillare		85
Mnium hornum	84	85
M. undulatum	84	85
Thamnium alopecurum	84	
Thuidium philibertii		85
Cratoneuron filicinum		85
Amblystegium serpens	84	
Acrocladium cuspidatum		85
Camptothecium lutescens		85
Brachythecium rutabulum	84	85
B. velutinum		85
Eurhynchium striatum	84	
E. praelongum	84	85
E. confertum		85
Pseudoscleropodium purum		85
Plagiothecium succulentum	84	
P. sylvaticum	84	
Hypnum cupressiforme	84	85
var. *resupinatum*	84	85
Rhytidiadelphus squarrosus		85
Hylocomium splendens		85
Pellia epiphylla	84	
Plagiochila asplenioides	84	
Lophocolea bidentata		85
L. cuspidata	84	
L. heterophylla	84	

Ornithology (R. F. DICKENS)

The total of forty-eight species might suggest a better day for the ornithologists than it was. It was disappointing weatherwise, nor were we able to visit the Warter Estate proper where, undoubtedly, a number of additional species would have been located. No Wagtails, Woodpeckers or Owls were seen; Garden Warbler and White-throat were not listed. On the farmland and marginal land visited, even Cuckoo and Stock Dove failed to appear on a rain-sodden day and Lapwing was the only wading bird recorded. The full list has been lodged with the V.C. 61 Recorder. A good many of the species occurring in it result from the observation of no more than a single bird. The Ornithological Section was better represented than usual, despite the weather.

Other Vertebrates (C. I. MASSEY)

A pond at the head of Sylvandale contained both Common Frog and Common Toad tadpoles, and two dead adult Common Toads were found on the road near Cobdale Farm.

Single Hedgehog casulaties occurred on the B1246 on the outskirts of Pocklington and in the village of Warter, and three on the road from Warter to Cobdale Farm. Mole hills were common in both Singleton and Bratt Woods (but not in the pasture between the two), and in the bottoms of the two dry valleys visited in the afternoon: Sylvandale and Nettledale. The only other insectivores noted were the remains of two Common Shrews in a one-pint, pasteurised milk-bottle found in Sylvandale. A single Stoat was seen crossing the road near Bratt Wood and Brown Hare was seen near Singleton Wood and in Nettledale. Surprisingly, no evidence was found in either Bratt Wood or Singleton Wood of Grey Squirrel, but a dead one was found on the road nearby. The Rabbit was a feature of the day, being very common on the pasture between Bratt Wood and Singleton Wood and in both of the dry valleys, Sylvandale and Nettledale, especially the latter and the earthworks between the two.

BRYOLOGICAL MEETING AT NORTH GRIMSTON, V.C. 61
29th April 1972

F. E. BRANSON

The morning, although showery, was ideal for bryophyte hunting and the two quarries which we visited both very near the village, had an abundant moss flora. The quarry which we visited in the morning adjoined some woodland which some of us also investigated. At the entrance to the quarry was a quantity of the little earth-moss *Phascum cuspidatum*; *Tortula intermedia* occurred in patches in the turf at the edge of the quarry, and a patch of *Weissia controversa* with capsules showing a peristome, which distinguished it from the closely allied species *W. microstoma*, which has no peristome. It is virtually impossible to distinguish between these two species in a purely vegetative state. There were a number of other limestone species in small quantity and some excellent *Eurhynchium murale*. The woodland next the quarry did not produce so many species. There were masses of *Eurhynchium praelongum* var. *stokesii* (a very regularly branched and "bushy" variety) and loose "balls" of *Thamnium alopecurum*. This is a moss one usually meets with by water, but in damp woodland it sometimes occurs in considerable quantity in the form of these detached "balls" about 4 in. in diameter, which get blown about by the wind. It is dark blackish-green in colour and when in such a situation loses its dendroid and "wiry" appearance and become attentuated and flaccid. A roadside bank had *Eurhynchium striatum* as a dominant species.

In the afternoon we visited a large overgrown area which at one time had been a shallow quarry. One long and steep bank at the edge was covered with *Pseudoscleropodium purum* and *Camptothecium lutescens* in the largest quantity I had ever seen. The only *Dicranum scoparium* seen during the day was in this quarry. *Barbula trifaria* and *Campylium chrysophyllum* also occurred in small quantity. The only hepatic seen all day was *Lophocolea cuspidata*.

A consolidated list of species seen during the day, excluding those mentioned above, follows. I have never seen such an abundance of mosses in the East Riding in any other place. One can account for the dearth of hepatics because of the dry limestone soil.

Arrangement and nomenclature follows *Census Catalogue of British Mosses* (3rd ed.) by E. F. Warburg.

Fissidens taxifolius
Ceratodon purpureus var. *purpureus*
Dicranella varia
Barbula convoluta
B. unguiculata
B. cylindrica
Grimmia apocarpa
Bryum pseudotriquetrum
B. caespiticium
B. argenteum
B. capillare
Mnium undulatum
Cratoneuron filicinum
Amblystegium serpens
Acrocladium cuspidatum
Brachythecium rutabulum
Eurhynchium praelongum
E. swartzii
E. confertum
Hypnum cupressiforme
Ctenidium molluscum
Rhytidiadelphus triquetrus

FLOWERING PLANT SECTION FIELD MEETING
AUGHTON, V.C. 61, 18th June 1972

E. Crackles

This meeting was very well attended. Although the weather was poor, light waterproofs sufficed and the day was both enjoyable and profitable. Most of the time was spent working a small area of Aughton Ings: 190 species were recorded in spite of the late development of many species this year. *Barbarea stricta* (Small-flowered Yellow Rocket) and *Eleocharis uniglumis* were notable additions to the list of plants for the area. It was also pleasing to find that *Oenanthe silaifolia* is still here where it was first collected by Dr. Sledge in 1937, as well as at Bubwith where it was found by Eric Chicken in 1969, and to confirm the presence of a number of other uncommon species.

The Ings themselves provided a variety of habitats. *Glyceria maxima* (Reed-grass) is the dominant plant over large stretches of the area. Other species widespread on the grazed part of the Ings were: *Equisetum fluviatilis* (Water Horsetail), *Ranunculus repens* (Creeping Buttercup), *Rorippa amphibia* (Great Yellow-cress), *Lychnis flos-cuculi* (Ragged Robin), *Stellaria palustris* (Marsh Stitchwort), *Lotus uliginosus* (Large Birdsfoot-trefoil), *Lathyrus pratensis* (Meadow Vetchling), *Oenanthe fistulosa* (Water Dropwort), *Rumex acetosa* (Sorrel), *Myosotis scorpioides* (Water Forget-me-not), *Mentha aquatica* (Water Mint), *Senecio aquaticus* (Marsh Ragwort), *Triglochin palustris* (Marsh Arrow-grass), *Juncus compressus* (Round-fruited Rush), *Eleocharis palustris* (Common Spike-rush), *Carex hirta* (Hairy Sedge), *Carex disticha* (Brown Sedge), *Festuca pratensis* (Meadow Fescue) and *Cynosurus cristatus* (Crested Dog's-tail).

The dikes and their banks were rich in species. *Veronica beccabunga* (Brooklime) and *Ranunculus sceleratus* (Celery-leaved Crowfoot) were co-dominant in one of the shallower dikes. In the deeper dikes, the following aquatics were noted: *Ranunculus peltatus*, *Ceratophyllum demersum* (Horn-wort), *Veronica catenata* (Water Speedwell), *Potamogeton natans* (Broad-leaved Pondweed), *Lemna trisulca* (Ivy-leaved Duckweed), *Alisma plantago-aquatica* (Water Plantain) and a *Potamogeton* believed to be *P. pusillus*.

Carex vesicaria (Bladder Sedge) was frequent by some stretches of dike as was *C. acuta* (Slender-tufted Sedge) and both also occurred in the wetter parts of the marshes. Other species locally frequent by the drain side were *Thalictrum flavum* (Meadow Rue) *Iris pseudacorus* (Iris) and *Carex acutiformis*; a sedge bed, believed to be *C. acuta* x *C. acutiformis* was also noted. Other species also found in this type of habitat were *Sium latifolium* (Water Parsnip) and *Veronica serpyllifolia* (Thyme-leaved Speedwell).

Sanguisorba officinalis (Great Burnet) was locally frequent in a meadow to be cut for hay, whilst in another *Senecio aquaticus* (Marsh Ragwort) abounded. Other species noted in these meadows included: *Epilobium obscurum*, *Oenanthe silaifolia*, *Silaum silaus* (Pepper Saxifrage) and *Lysimachia nummularia* (Creeping Jenny).

An interesting association of plants was found in and near a spring-fed flush. Species noted in this area included: *Hypericum tetrapterum* (Square stemmed St. John', Wort), *Dactylorhiza praetermissa* (Southern Marsh Orchid), *Stellaria alsine* (Bog Stitchwort) *Epilobium palustre* (Marsh Willow-herb), *Hydrocotyle vulgaris* (Pennywort), *Menyanthes trifoliata* (Bogbean) and *Eriophorum angustifolium* (Common Cotton-grass). *Galium uliginosum* (Fen Bedstraw) and *Eleocharis uniglumis* both occurred very locally, just within the flush.

Hordeum secalinum (Meadow Barley) was found in a drier field and other species found in the general area included *Myosotis secunda* (Water Forget-me-not), *Polygonum amphibium* (Amphibious Bistort) *Polygonum bistorta* (Bistort) and *Achillea ptarmica* (Sneezewort). *Coronopus squamatus* (Swine-cress) was common on a farm track, whilst the churchyard where the party had lunch held a variety of species including: *Ajuga reptans* (Bugle), *Bromus ramosus* (Hairy Brome) and *Petasites hybridus* (Butterbur), which occurred in abundance.

A Silkworm is Born by **Ann Stepp.** Pp. 96 with 59 photographic illustrations. Oak Tree Press Co. Ltd., distributed by Ward Lock Ltd. £1.25.

This little book in the Sterling Nature Series tells clearly and concisely the story of silk moths and silk production. It cannot fail to interest readers of any age although it is obviously written for children. It is a pity that it could not have been retailed a little more cheaply.

BOOK REVIEWS

Flora of Staffordshire by **E. S. Edees.** Pp. 280 with 15 photographic illustrations. David and Charles. £4.20.

The publication of this book fills another gap in the tally of English County Floras. Although two previous and incomplete accounts have appeared in the form of excerpts from journals, no previous full-length Flora of the county in book form has been attempted.

Staffordshire is not a holiday county: it attracts few botanists from other parts of the country. Yet the presence of Carboniferous limestone in the north-east and the continued existence of some heaths and mosses add many species to its flora which are absent from most other Midland counties. A flora which includes such species as *Daphne mezereon*, *Draba muralis*, *Hornungia petraea*, *Polemonium caeruleum*, *Silene nutans*, *Andromeda polifolia*, *Drosera anglica*, *Ranunculus lingua*, *Polygonatum odoratum*, *Carex strigosa* and *C. elongata*, to name a few, has something to be proud of. And it is good to know that steps have been successfully taken to conserve many of the botanically rich areas before they have been ploughed up or covered with concrete.

The unit of recording in this Flora is the 10 km. square but records have been assembled on a tetrad basis and the total number of tetrads, out of a possible 800, in which a species has been observed is indicated for most species. Historical records and citations from early works are freely given for the more notable members of the flora and these are of value as well as of interest, as a reflection of the changes which have taken place over the years. The introductory part includes an interesting account of the history of field botany in Staffordshire together with the usual outlines of topography, geology, etc., and a gazetteer with grid references enables place names to be located easily. There are in addition distribution maps, four per page, based on tetrad recording for 200 species.

This is a good Flora and Mr. Edees is to be congratulated on the care and skill which he has devoted to its compilation. One good example of its commendable qualities in the writer's view concerns the problem of what to include and what to exclude in the matter of adventive and casual species. To draw a line is no easy matter: it calls for discrimination and though complete unanimity may not be reachable the solution of this problem is certainly not to include everything. The cluttering of Floras with copious records of the most transient and ephemeral waifs, strays and garden outcasts, very many of which have vanished long before the records ever appear in print, has become a fad with some authors. One of the many merits of this book is the sound judgement which its author has exercised in this matter.

W.A.S.

Flora of Rutland by **Guy Messenger.** Pp. 128 with 17 pages of photographs. Leicester Museums. £2.50.

The smallest English county, with an area less than one eighth of the East Riding, has not previously had a separate volume devoted to its flora though it was included with Leicestershire in Horwood and Gainsborough's Flora of 1933. If Yorkshire botanists, daunted by the unmanageable size of their county, feel some twinges of envy at the author's task of coping with an area which amounts to only four 10 km. squares, these may well be dispelled on reading of the ravages which "progress" has made, and is making, on the flora of a largely agrarian county. Nearly one hundred species, excluding casuals, recorded in the earlier Flora have not been verified during the preparation of this work. The impact of modern trends in land utilisation, drainage, road construction, felling and replanting of woodlands, removal of hedgerows, conversion of grassland to arable cultivation, railway closures (there is now only one railway station in the county served by passenger trains) and extensive quarrying, have taken a heavy toll. The wonder is that so many interesting plants survive, if precariously, in the county.

The small size of Rutland has enabled a very detailed coverage to be made. The recording units employed are tetrads and it is interesting to find that in more than 20 of these over 300 species are recorded, with a maximum of 394. Grid maps, 15 per page, show the distribution of all species other than waifs and strays, seen during the field work involved. The information under each species gives data as to constituent or intrusive status, frequency of occurrence, first and last records and category of habitat (these being divided into a considerable number of types), while the gazetteer of localities provided obviates the necessity of duplicating topographical information. With the accompanying maps therefore there is a combination of condensation with accuracy and precision which much exceeds the more lengthy and subjective citations of old-type Floras. This is in fact a thoroughly competent Flora which deserves high praise. It mirrors the changing flora of the countryside as well as its existing constituents and packs between its covers an amount of information which is out of all proportion to the modest size of the book. W.A.S.

Drawings of British Plants. Part 29: Iridaceae, Amaryllidaceae, Dioscoreaceae, Liliaceae, by **Stella Ross-Craig**. G. Bell & Sons. £1.00.

The drawings which form the thirty-three plates of the present part display all the combination of artistry and accuracy which have characterised this whole work. The chief criticism of this part concerns its omissions. A rather rigorous line has been observed throughout in the matter of the exclusion of non-indigenous species. Some doubt exists however as to which are truly indigenous species and which are ancient introductions now so thoroughly naturalised as to defy positive assertions as to their origins. In previous parts the benefit of the doubt has often been given to species belonging to the latter category and in earlier parts a number of species which are certainly introductions were included, e.g. *Sisymbrium orientale* and *S. altissimum*, the two *Doronicums* and *Artemisia verlotorum*. The criteria employed in this part are not obvious. *Leucojum aestivum* is illustrated but not *L. vernum; Galanthus*, *Maianthemum* and *Ornithogalum umbellatum* are included but not *Crocus nudiflorus*, *Tulipa sylvestris* or *Lilium martagon* which though not native are long-established introductions — the *Crocus* for more than 200 years. But it is particularly in the genus *Allium* (which is put in the Liliaceae) where the selection is open to serious objections. Only three species, *A. vineale*, *A. sphaerocephalon* and *A. ursinum* are included. Why are *A. oleraceum*, *A. scorodoprasum*, *A. schoenoprasum* and *A. ampeloprasum* (or failing that, *A. babingtonii*) omitted? The native status of the first three species at least is beyond question; their omission therefore is incomprehensible. W.A.S.

British Wild Flowers 2 vols. by **John Hutchinson**. Vol. 1, pp. xxxvi + 492 with 408 illustrations: Vol. 2, pp. xxiv + 456 with 401 illustrations. David & Charles. £3.50 per vol.

Between 1945-50 Dr. Hutchinson compiled three paperbacks on British wild flowers which were issued as Pelican books. The two present hardback volumes consist of a re-issue of the previous drawings and descriptions to which are added about 200 additional species bringing the total to 809. The descriptions are non-technical and intelligible to a beginner without any previous botanical training. It is indeed for such people that the volumes are intended and hence they are unlikely to be put off by the sequence of families adopted, or even to be aware that in this respect Dr. Hutchinson has views which are not shared by others or to be found in any British Flora. They are similarly not likely to notice that Latin names employed are frequently different from those generally accepted or that the distributions credited to some of the rarer species are inaccurate.

The main object is to render the recognition of wild flowers possible from the drawings and descriptions supplied and in this respect the work will probably fulfil its purpose very well and especially if the user first examines his specimen carefully and uses the excellent key to the families which is provided in both volumes. The illustrations are mostly satisfactory representations of the species depicted and the numerous dissections and drawings of individual parts add much to their usefulness. Some however look stiff and unnatural and a few are well below the general standard. The descriptions are precise and succint and interesting supplementary information especially about pollination mechanisms, is often given. As in all such works covering a selection of species, criticism might be made on the grounds that some species are excluded which might well have replaced some which are included. Amongst the saxifrages for example five very rare species are included which the user of the book is unlikely ever to come across yet only four Forget-me-nots and four Docks are illustrated. But by bringing all the previously published descriptions ana drawings together into their respective families and issuing them in one work this is a more satisfactory publication than its predecessors and one which therefore deserves to have better sales, though the price may well prevent its achieving this. W.A.S.

The Birds of Britain and Europe with North Africa and the Middle East by **Hermann Heinzel, Richard Fitter** and **John Parslow.** Pp. 234: copiously illustrated in colour. Collins, 1972. £1.50.

It is becoming almost a habit among bird-watchers to collect bird-books as they do species. This book on their shelves will be comparable with one of the rarities on their bird-list. In the first place it claims that "every species found from Russia to the Atlantic Islands, and from the Sahara to the North Pole" is illustrated in colour. "No other bird guide does this". Geographical variations are shown as well as plumages for different sexes, ages and seasons. For the majority of non-passerines the birds are also depicted in flight. In addition, there are pleasing sketches of birds in typical attitudes or groupings, as for example Redshank perched on a fencing post, Spoonbills feeding and preening, scoters afloat and taking off, skuas bathing and chasing terns. It is helpful to have these all together and the accompanying text on the facing page.

The by-now standard practice of showing together for comparison certain groups of similar birds, in flight, is extended to winter waders, birds of prey, gulls, vagrant American waders, swifts, etc., and to female ducks. Male and female ducks, as with other species, are also shown in flight alongside the individual species "portraits". In all over 1,000 birds are illustrated, all in colour, specially done for this work and superb by any standards. They are the mammoth contribution of Hermann Heinzel to the book.

Apart from the vagrants, there are maps opposite each species to show their breeding and winter distribution and the areas where they occur on migration. A separate section at the end has 240 individual maps to show the distribution within the British Isles of the regular breeding species and the regular visitors. "No other pocket guide has these". In a way, this section anticipates the findings of the current B.T.O. Atlas Survey and provides a "mini-Atlas of the British Avi-fauna". John Parslow has been responsible for all the maps and those who know his series of contributions to *British Birds* on the changing status of breeding birds will not suppose that the B.T.O. survey will lead to any material revision, though obviously to a scale of maps with greater detail. These 240 British distribution maps have four types of shading and it is unfortunate that because of the small scale the large dots ("occurs commonly as a non-breeding visitor") can be confused with spot records for breeding birds. Following the key to the maps literally, one might be excused for thinking that the petrels, Sandwich Tern and Gannet for example, occur only as non-breeding visitors. But any minor criticisms of what is so excellent a book must seem almost churlish.

Richard Fitter's reputation is such that it is almost sufficient to say that he has contributed the text. It is incredible how much information is packed into so small a space. "●RsmW Map 102" tells us that the Curlew occurs regularly and is widespread and common in Britain (●); that its main status is as a resident (R) and winter visitor (W); whilst m and s indicate that it also has less important status as a summer resident and as a migrant. The cross reference is to map 102 at the end of the book where the Curlew's distribution within the British Isles is detailed. This space-saving device allows greater scope for discussion of identification features, habits, habitats, voice, etc.

For the hard work I am sure this book will be called on to do, I wonder if hard lids and more substantial binding might not have been advisable even at an increased cost. At £1.50 it is an absolute bargain.

R.F.D.

Flight and Nature by **M. W. Saunders.** Second edition. Pp. 125. Obtainable from the author at 7 Leazes Avenue, Chaldon, Surrey. £4.80.

The author clearly has great enthusiasm for his work and has ensured that it appeared in print by having it published privately.

Page (i) proposes the following classification for the book: Natural Flight, Ornithoptics, Aeronautics, Aeroecology, Conservation, Ethics. Ornithoptics and Aeronautics occupy nine-tenths of the book. The author attempts to demonstrate that man-powered flight by means of flapping wings is a feasible proposition. However, despite the formidable and bewildering display of mathematical *notation* that is brought to bear, the mathematics as such is elementary and quite inadequate to describe the very difficult dynamical and aerodynamical aspects of the problem. The analysis is thus a gross over-simplification and the validity of the conclusions is accordingly suspect. Nevertheless, man-powered flight of some 300 yards has been achieved in an ornithopter following a catapulted take-off, as is described in one of the references in the bibliography. The subject could no doubt be a fascinating study.

H.L.P.

How Animals Work by **Knut Schmidt-Nielsen.** Pp. 114 with 55 text figures; Cambridge University Press: Hardback £2.20: Paperback 80p.

This is not the comprehensive book the title suggests, but is an informal account of the particular physiological problems in which the author and his collaborators have been involved over the past fifteen years or so. It is nevertheless a book which great numbers of zoologists will wish to read, for Professor Schmidt-Nielsen is one of the most able, active and stimulating of comparative physiologists. He is Professor of Physiology in the Zoology Department of Duke University.

The main theme of the book is exchange of heat, water and oxygen between animals and their surroundings. Nearly all the animals are vertebrates, but many of them are ones which have seldom been used in physiology. Many physiologists have done experiments on domesticated dogs and ducks, but who else would have thought of using such exotic subjects as the Cape hunting dog and the rhea? The unlikely animals have all been chosen for good reasons. For instance, the Cape hunting dog pursues gazelles across the hot dry grasslands of East and South Africa, often for distances of two miles or more. It might be expected to have to lose a lot of water by evaporation, to prevent itself from overheating. It turns out that it saves water, by allowing its body temperature to rise higher than a domestic dog would do.

The principle of countercurrent exchange recurs frequently in the book. This principle, which is important in the design of industrial heat exchangers, was introduced to biology by Scholander but has been used to tremendous effect by Schmidt-Nielsen.

I enjoyed reading this book and I learnt a good deal from it, although I am reasonably familiar with the recent literature of comparative physiology. I will recommend it most warmly to my students.

R.McN.A.

Looking at Mammals by **Peter Stanbury.** Pp. 236, copiously illustrated with black and white photographs. Heinemann Educational Books, 1972. £3.00.

The author, Peter Stanbury of the University of Sydney, describes this as either a reference or a picture book, depending on the readers' requirements. The coverage includes all the orders and most of the families of mammals and the treatment gives short notes on the salient morphological and anatomical features of a wide range of species. The numerous illustrations show close-up detail of limbs and other structures, skulls and distinctive familial characters. Most of these make their points well, but occasionally one feels the lack of a first class picture of the whole animal which would summarise the significance of points made in the text. The marsupials receive special treatment and this section is perhaps of greater interest.

It is obvious that in an educational context this book could be very useful, whether it is used in association with observations on living mammals or as a classroom aid. The author has filled a hitherto vacant niche in the literature creditably.

T.M.C.

Reptiles and Amphibians in Colour by **Hans Hvass.** Pp. 153 with 83 colour plates. Blandford Press. £1.50.

This beautifully produced book on Reptiles and Amphibians adds another volume to the naturalists' armoury of field guides and is particularly useful in these days of Continental travel. On reading this reference book, one soon becomes aware of the great variety in this group of lower vertebrates in Europe. The hand-painted, fully-coloured illustrations, although a little stylised, show this variety in shape and colour and no naturalist should have any difficulty in species identification using this field guide. I found it pleasing to see illustrated a number of species that I had once studied in the Lebanon for a number of these animals are common to both the Middle East and South-East Europe, such as the diced water snake (*Natrix tesselata*), the green lizard (*Lacerta viridis*), the Greek tortoise (*Testudo graeca*) and the Mediterranean chameleon (*Chamaelo chamaeleon*). The text of the eighty-three species described is sub-divided into identification, distribution, habitat and habits and it gives a precise but readable description of each animal presented. There are forty-seven distribution maps but these are not labelled, so that when two or more maps are present on two adjacent pages, it is necessary to read through the distribution text to discover which is the appropriate map for the species shown. The maps for British reptiles and amphibians seem to me to be accurate, although with one or two species, such as the palmate newt (*Triturus helveticus*) and the grass snake (*Natrix natrix*), I would not describe them as being as widely distributed as indicated, especially in northern areas such as Yorkshire. Only future accurate ten kilometer square records will correct this.

A delightful book to have and well worth its cost.

M.J.T.

British Marine Isopods by **E. Naylor.** Linnean Society Synopsis of the British Fauna (New Series) No. 3. Pp. 86 with 24 figures. Academic Press, London and New York. £1.00.

Marine isopods are a constant and fairly prominent feature of the intertidal fauna· Standard texts identify the most common species, but up to now systematic study by the keen amateur has hardly been feasible. This key by the leading British authority puts matters entirely to rights. The introduction has brief but informative sections on morphology, life history, development, feeding, habitat preferences, economic importance and techniques of collection and preservation. Keys to families, genera and species follow, with full descriptions of each species and information on habitat and geographical distribution (often tantalisingly brief due to our lack of knowledge). There is a comprehensive bibliography and a systematic index, but no general index. Parasitic and sublittoral species are included if they are likely to occur between the tide marks, and in all some 80 species are considered.

The keys are very well designed and should offer no great problem to the beginner provided he reads the section on body structure first, and can equip himself with a low power microscope. The figures, estimable as they are (with the exception of the one purporting to show *Eurydice pulchra*) would have been far more use had they coincided with the text to which they refer. This is a fault common to most keys, however, and should not obscure the fact that this is a major contribution to the taxonomic literature and one which should stimulate enterprising spirits to study the group in depth.

S.L.S.

Woodlice by **Stephen Sutton;** key written in collaboration with Paul Harding and David Burn. Invertebrate types (series), Ginn & Co., London. 1972. £2.00.

Woodlice hardly seem the most attractive of creatures but the very fine coloured illustrations in this book almost succeed in making them appear so. In particular, that of the tiny, white *Platyarthrus hoffmannseggi* has a singularly delicate beauty of colouring as portrayed here. Hilary Burn, the artist, is to be congratulated on the excellence of her work.

The book is designed primarily for those who would use woodlice in the course of teaching sixth form biology for which these creatures have certain notable advantages over other animals. They are easy to find in quantity, few will have scruples about killing them and they can be used to demonstrate many biological principles. A chapter is devoted to detailing experiments that can be performed in a reasonably equipped biology laboratory.

Structure, physiology, behaviour, genetics, life history and distribution are dealt with. The chapter on identification will be valuable to any naturalist who wishes to name woodlice. The keys are straightforward and are supported by line drawings of an admirable clarity. I had no difficulty in identifying the few species I found and used for testing the keys. Information on techniques is as thorough as everything else in the book and extends, and this is unusual, to advice on how to obtain literature. Too few naturalists, and others for that matter, appear to know how easy it is to obtain scientific literature from the National Lending Library through an approved public library.

The book can be thoroughly recommended for biologists. For naturalists, here is an excellent guide to a group of animals which can be sought throughout the year and whose current distribution is inadequately known, a challenge in itself. I treasure Dr. Sutton's statement that the hunting of woodlice enjoyed a considerable vogue among the clergy at the turn of the century and that distribution records may be distorted by the previous tendency to do one's collecting in the Rectory greenhouse.

J.H.F.

A revised key to the adults of the British species of Ephemeroptera with notes on their ecology by **D. E. Kimmins.** Freshwater Biological Association, Scientific Publication No. 15. Second revised edition, 1972. 60p.

This revision of the second edition of 1954 is principally a rearrangement of the text to conform with present nomenclature. Minor additions have been made to the text of the keys and in a few cases a greater precision is given to the ecological notes. *Baetis tenax* Etn. is sunk as a synonym of *B. vernus* Curt., but the figures illustrating the differences are still included, and *B. digitatus* Bengt. is added although this appears doubtfully distinct from *B. niger* L., and there is no figure to illustrate the rather critical difference.

The mayflies are an attractive group and it is a pity that, with this first class guide available, they attract so little attention.

J.H.F.

Farming and Food Supply by **Sir Joseph Hutchinson.** Pp. x + 146 with 8 text figures. Cambridge University Press. £3.00.

The sub-title "The Interdependence of Countryside and Town" indicates a recurring theme in this book, which is far from being a merely factual account of farming systems and food sources. The essential and universal factors conditioning the production of crops and livestock in different parts of the world, particularly Britain, India and sub-Saharan Africa, are certainly indicated, but detail has been restricted to the minimum necessary to give a true perspective of the basic situation. Economists, conservationists and others concerned with their fellow man will be more interested in the author's views on the problems facing both old and new countries in establishing a balance between increasing urban populations and an exodus from the land.

Modern science, where capital is available, is capable of producing more food with fewer workers, at least for the time being, but this, as the author shows, may create as many problems as it solves. The solution of these problems is vital, yet fraught with all kinds of difficulties — political as well as economic. The author, a distinguished plant breeder with years of tropical experience and, more latterly, as Drapers Professor of Agriculture in the University of Cambridge, has long been interested in these matters. He writes with great clarity and authority, and his book is to be warmly recommended to those interested in this fundamental matter of man, his food, and his life in the widest sense.

J.H.W.

Journey Through Europe by **John Hillaby.** Pp. 273 with 24 black and white photographs and 13 sketch maps. Constable & Co. Ltd. 1972. £3.00.

This book is a well written account of the cross sections of life seen on a journey by foot from the Dutch coast to the shores of the Mediterranean.

It is not perhaps a book that one would expect to find reviewed in *The Naturalist* for it refers more to the kaleidoscope of present human nature and of past history than to natural history matters. The author, however, does know sufficient of the birds, plants and insects seen on the way to have enhanced the pleasure he so clearly derived from many parts of the journey. His contact with falconry in the south of the Netherlands is one of the particularly interesting passages, but it was a pity he lost his book on the alpine flora just when he could have used it to best advantage.

Of current interest are the references to the success with which the Dutch absorbed their exiles from Indonesia and the examples of pollution revealed to a man whose mode of progress allowed him the necessary time to use his eyes and lend an attentive ear to the people he met. A book to be recommended to all who can enjoy a perceptive writer's commentary on the passing scene — mainly human — along the line he drew across the map of Europe.

J.K.

School Projects in Natural History. Edited by **The Devon Trust for Nature Conservation.** Pp. 180. Heinemann. £2.00.

This is an attractive book containing 114 projects in natural history. It is a compilation of suggestions from dozens of workers and very effectively couples the work which young people can do at school with the wider experiments and surveys which are largely occupying adult biologists and naturalists at this time. The projects are arranged in ten sections, e.g. general; mammals; birds; snails and slugs; ponds and rivers, etc. They are also classified into three categories: simple, intermediate and advanced, and these groups are envisaged as including primary schools, secondary up to 5th form, and 6th form level. There is a wealth of suggestions, some requiring very little apparatus; others can be made as complex and sophisticated as the workers wish. Some schemes would suit an individual scholar, others are designed as group projects. The material in the book represents the sum of two collections of projects previously published in 1965 and 1969, together with an additional collection which was designed for a third small volume. It is not surprising to read that the earlier collections sold widely. The Devon Trust is to be congratulated on this compilation and one feels that there is a place for it on the bookshelves of anyone who is interested in field work with young naturalists.

N.V.M.

CONTRIBUTORS

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Compiled by G. A. SHAW

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THE NATURALIST

A Quarterly Journal

of Natural History for the North of England

Edited by
W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

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CHISLETT MEMORIAL LECTURE, 1973

The spring meeting of the joint vertebrate sections will be held in ***SKIPTON*** on Saturday, 17th March, 1973. During the afternoon short papers will be contributed, two on birds and two on other vertebrates.

In the evening Dr. Eric Ennion will give the 1973 Chislett Memorial Lecture. Dr. Ennion is well-known not only for his paintings of birds, but as Warden of the first Field Study Centre at Flatford Mill and later of his own Field Centre and Bird Observatory at Monkshouse, on the Northumberland coast.

Will Society secretaries please make a point of including the above date in their local syllabus?

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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THE NATURALIST

FOR 1973

SOME YORKSHIRE BRYOLOGISTS AND BRYOPHYTES

G. A. Shaw

Presidential Address to the Yorkshire Naturalists' Union, Scarborough, 2nd December, 1972

Perhaps my greatest claim to fame in the Union lies in the fact that for fifteen years it was my duty to extract from you money in the form of subscriptions, and members could perhaps have been excused if they had classed me with income tax inspectors, rent collectors and similar undesirables, not to be encouraged. It came as something of a bombshell therefore to find myself nominated as President of this ancient Union. I am very conscious of the honour you have done me and I should like to think that some of the honour will accrue to my own local society, the Bradford Naturalists' Society, which reared me in the way a naturalist should go and which in the past has provided you with three other Presidents, these being William West in 1899, Harry Blamires Booth in 1921, and Albert Malins Smith in 1943.

I should now like o quote a paragraph from Tom Sheppard's Presidential Address of 1914, which you may think appropriate to the present occasion. I quote: "Probably by now it will have dawned upon you that this somewhat elaborate preamble is merely an apology for the shortcomings of my address, and for the glorious traditions of the Yorkshire Naturalists' Union I deeply grieve that on this occasion you have so poor a figure-head. (I trust I am not misunderstood in this term: I collect 'figure-heads,' so know something about them. A figure-head is usually a wooden effigy, more or less grotesque, placed on the front of a ship. It has absolutely no say or control over the ship's course, but should anything go wrong with the steering gear, it is the first to get bruised or damaged). But from some slight acquaintance with the rules of the Union I can assure you that the President is not self-elected—the figure-head is chosen by the builders or the crew. If it fails to add dignity to the craft the fault is not his." Well, so much for Tom Sheppard and his nautical allusions. I am glad to say that the ship has sailed in relatively calm waters during my year of office.

Now, coming to the subject of my address, I should like first of all to refer to the original members of the Bryological Committee, which was formed in 1897. Here is the relevant extract from the annual report for 1897 which is contained in Part 26 of Y.N.U. Transactions issued to the members for the year 1900:

Proposed Yorkshire Bryological Committee.

> The new arrangement begun at the present annual general meeting, whereby excursions will be organised in November in connection with the annual meeting, and the fact that the bryologists of Yorkshire are a numerous, able, and enthusiastic body, renders it desirable that encouragement should be given to systematic investigation in their department, and it is therefore recommended that Mr. R. Barnes, Saltburn; R. Braithwaite, M.D., F.L.S., London; Ll. J. Cocks, Harrogate; Charles Crossland, Halifax; Charles P. Hobkirk, F.L.S., Dewsbury; William Ingham, B.A., York; J. J. Marshall, Market Weighton; James Needham, Hebden Bridge; Matthew B. Slater, F.L.S., Malton; H. T. Soppitt, Halifax and William West, F.L.S., Bradford, be appointed as a Yorkshire Bryological Committee, for the investigation of the bryophytal fauna (*sic*) of Yorkshire.

Who were these people who formed this first Bryological Committee?

Richard Barnes (1851-1919) was the son of Thomas Barnes of The Nurseries, Thirsk. His interest in botanical pursuits as a youth was developed by his contact with William Foggitt. After five years in his father's business he went, through the influence of John Gilbert Baker, to London, spending one year at Chiswick and two years at Kew. He then returned to Thirsk and at his father's death obtained the post of Curator of the Saltburn gardens where he remained for sixteen year and then set up in business in Harrogate where he spent the remainder of his life, and was buried in the cemetery at Harlow. Barnes was very friendly with Dr Braithwaite, and many of Barnes's discoveries are cited in Braithwaite's Moss Flora. Among Barnes's most striking discoveries were *Bryum marattii* and *Bryum calophyllum* on Coatham Marshes and *Barbula glauca* near Richmond. Barnes developed a remarkable skill in preparing microscope slides and he made a very wide study of the peristomes of mosses, especially in the genus *Bryum*. His collection of peristome slides is in the Botany Department of the University of Leeds, and is a unique collection which I hope it may be possible to exhibit at some future Y.N.U. meeting.

Robert Braithwaite was born at Ruswarp in 1824 and died in London in 1917. He commenced his greatest work, *The British Moss Flora*, in 1879 and the final part was not issued until 1905. He was President of the Union in 1895, the subject of his address being appropriately 'The Study of Mosses,' although I have been unable to find this reproduced in any Union publication. *The Naturalist* for 1903 contains remarkable photographs of Braithwaite and Slater taken on the Union meeting at Bowes.

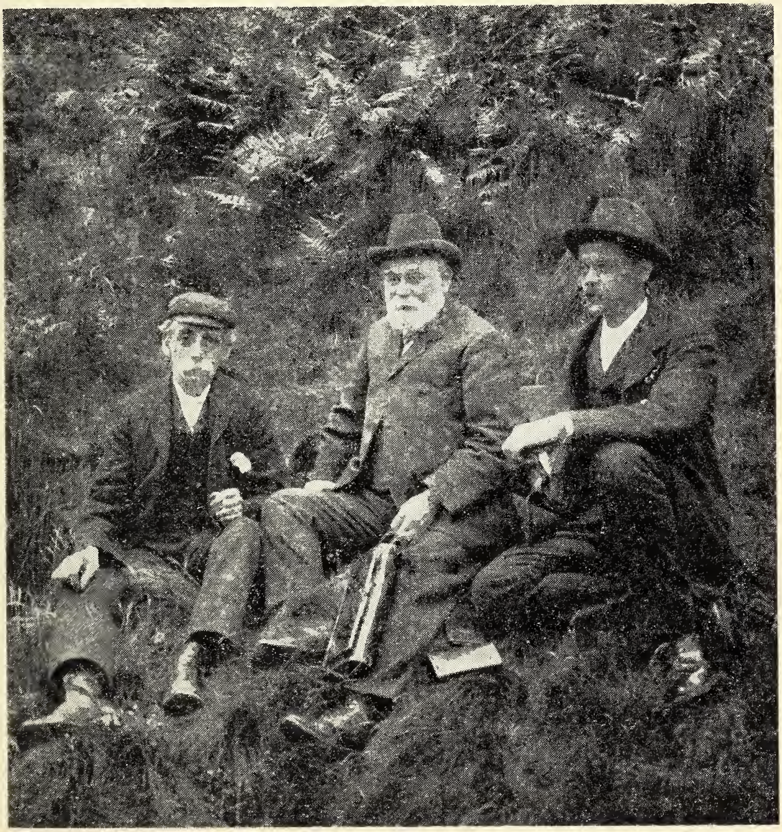
Llewellyn J. Cocks is a much more elusive character, and I am unable to produce any biographical details of his career, though I learn from Mr. E. C. Wallace that Cocks joined the Moss Exchange Club in 1901, when he was at Bromley, Kent, and that he died at Holly Lodge, Esher, Surrey, in 1921. His first contribution to *The Naturalist* is a note on some Nidderdale mosses 1897, and here his address is given as Godolphin House, Harrogate. The year 1897 was an important one for Yorkshire bryology, marking not only the inception of the bryological committee, but also the discovery by James Needham, of an hepatic new to the county (*Jubula hutchinsiae*) near Hebden Bridge and shortly afterwards by L. J. Cocks, at Ravensgill, Pateley Bridge. In a note in *The Naturalist* 1898, Cocks records the finding on Killinghall Moor, of two new Yorkshire mosses, *Weissia rutilans* and *Funaria fascicularis*. In the same note he records *Diplophyllum minutum* from Guy's Cliff, and *Jungermannia lanceolata* from Wath waterfall, a rare hepatic thought to be extinct in the county until its recent discovery at Ingleton.

Charles Crossland (1854-1917) is of course best known as a mycologist and as the co-author with W. B. Crump of the *Flora of the Halifax Parish*, and with Massee of the *Fungus Flora of Yorkshire*. He was President of the Union in 1907.

Charles P. Hobkirk (1837-1902) was a former joint editor of *The Naturalist* and author of the *Synopsis of British Mosses* which he published in 1873. He was President of the Union in 1892. His first contribution to *The Naturalist* was in 1864 when he wrote a note on *Tetraphis pellucida*. The first mention of *Desmatodon cernua* as a British moss occurs in a note written by Hobkirk in *The Naturalist* 1901 in which he records its discovery near Aberford by George Webster, of York.

William Ingham (1854-1923) was born in Manchester, but spent the greater part of his life in York. His earliest note in *The Naturalist* was in 1895 on *Malaxis paludosa* in Teesdale, and soon afterwards he wrote on *Hypnum giganteum* at Skipwith, the first of a long series of notes and articles on mosses and hepatics which he supplied until 1919. He gave a résumé of the known *Sphagna* and harpidioid *Hypna* of Yorkshire and Durham in 1901 and 1902, and a series of papers on the bryophytes of districts where he had specially worked: Skipwith, Strensall, Tadcaster, Arkengarthdale, Baugh Fell and Buckden. He added about a score of mosses and hepatics to the county list. In addition he recorded a large number of varieties of *Sphagna* and harpidioid *Hypna*, the details of these variations appealing to his keenness for small differences which earned for him the title of 'our lynx-eyed bryological friend.' Ingham was closely connected with the Moss Exchange Club which he joined in 1897 and his retirement practically coincided with its reconstruction as the British Bryological Society. The annual reports show that he contributed regularly and generously to the exchange and was a referee from 1899 onwards, specialising in *Hypna*. On the retirement of the Rev. C. H. Waddell in 1903, he became Honorary Secretary and in that capacity became widely known among British bryologists especially in connection with the publication of the *Census Catalogue of British Mosses* *and Hepatics* which he edited. Ingham's large collection of British bryophytes, containing upwards of 12,000 specimens, was purchased by the University of Leeds for £200 in 1920, and is now in the care of the Botany Department there. His collection of exotic mosses came into the possession of another Yorkshire bryologist, Mr. William Bellerby, of York, but at the suggestion of Mr. W. H. Burrell, this collection, too, came into the care of the University in 1926. I quote briefly from a letter from Bellerby to Burrell dated 12 November, 1926: "Dear Mr. Burrell, The suggestion which you made some months ago, that I should make over to the Leeds University Mr. Ingham's collection of the world's mosses to form a nucleus for a Bryophyta Universalis came as a shock to me and which at the time was considered as a cool cheek, but such is the power of an idea projected into space, that it has actually come back to me with renewed force and I have yielded to its influence. Of course, I have regarded this collection of European and exotic mosses and hepatics as a valuable and highly prized souvenir of my esteemed friend and tutor in bryology, the late Mr. W. Ingham of York, which was given to me by Mr. Wilfred Ingham shortly after his father's death."

Information about Joseph Jewison Marshall (1860-1934) is not easy to come by. Like many other bryologists, he was a pharmaceutical chemist, and resided in Market Weighton and Beverley, Yorkshire, and in Grimsby, Lincolnshire, from



Two original members of the first Bryological Committee (left to right) James Needham and Charles Crossland, with W. A. Thwaites. Probably taken about 1910.

1909 to 1916, when he moved to Hampshire. No doubt his long absence from the county between the year 1916 and his death in 1934 accounts for the fact that he had no obituary notice in *The Naturalist.* Marshall is of course best known for his work on the bryophytes of the East Riding and Lincolnshire, and he was responsible for the list of bryophytes in Robinson's *Flora of the East Riding of Yorkshire* of 1902. As recorded by Sheppard (*Nat.*: 1934) Marshall's bryophyte collection was presented to the Hull Museums in that year by Mr. G. Allison, of Grimsby, but unfortunately this collection perished during the second world war. Gatherings of Marshall's still extant in herb. Lincolnshire Naturalists' Union and in herb. Ingham at Leeds, have been listed by M. R. D. Seaward in *The Naturalist* 1962 and 1964. The only other information that I can give you, and that somewhat irrelevant and inconsequential, is contained in a letter from Mr. A. A. Bullock, of Kew, to Dr. Seaward in 1962, in which he gives an early recollection of Marshall. I quote: "I was still a schoolboy when Marshall left Grimsby and my recollection of him is somewhate hazy! I regret that I cannot give you anything about him which could be of use to you. My most vivid picture of him is his adventures when he started using a bicycle. He bought one much too big for him and his only method of dismounting was to fall off. Eventually he exchanged with Allison, and though he still had to fall off, it wasn't so far to fall and he usually managed to land on his feet." I am grateful to Dr. Seaward for some of the information on Marshall and for permission to quote from Bullock's letter. Marshall added *Dicranum polysetum* to the Yorkshire flora in 1896, when he found this moss near Holme-on-Spalding-Moor. Also new to Yorkshire was *Aloina brevirostris* in 1896 from near Market Weighton.

James Needham (1849-1913), by trade an iron moulder, was born and died in Hebden Bridge. One of those working-men naturalists for which the Calder Valley was famous, he was an all-round botanist, though perhaps more concerned with the fungi than with any other group. He added to the county flora the hepatic *Jubula hutchinsiae* from Hardcastle Crags. Needham related some amusing stories concerning the remarks the natives had made when he was collecting. One such (quoted by Crossland) ran thus: "On another occasion, while searching for micro-fungi, one friendly native asked another: 'Wat's Jimmy rooitin for; has he lost summat?' 'Nay' (was the reply) 'he's nobbut seeking fungusses at he weant know he's fun, wol he gets a magnifying glass to see 'em wi'."

Matthew B. Slater, of Malton (1830-1918) in his early years came under the influence of Richard Spruce, and is best known for the bryology of the second edition of Baker's *North Yorkshire*.

Henry Thomas Soppitt (1858-1899) was best known for his mycological work. Of him, E. G. Bayford said: 'Soppitt was as frail as his photograph suggests: he was consumptive. He had an amiable disposition and a saving sense of humour, but his chief characteristic was his enthusiasm. He was not a great talker, unless he had something to say; then he could talk well. He wrote more readily, and well, and enjoyed writing.'

In recording the life and work of William West (1848-1914) I cannot do better than quote from the very full obituary notice written by Denison Roebuck in *The Naturalist* 1914. "The story of the life-history of our late friend William West, the loss of whom by his death on the 14th May is one of the greatest which Yorkshire and botanical science have sustained of late years, is the tale of the gradual development of an exceptionally keen intellect by its own inherent force and vitality, from an excellent observer and all-round naturalist to the highest position as a specialist in the study of freshwater algae. From the beginning he was an ardent nature lover, a keen enthusiastic observer and one with ever a wide and comprehensive grasp of the subjects he took up. Beginning first of all with no special advantages beyond his own personality he trained himself as an accurate field botanist familiar with the whole range of the flowering plants and then turned his attention to the cryptogams with all groups of which he became familiar—mosses, hepatics, lichens, fungi, algae. Next when fully armed with the literature of the subject he devoted his attention to the study of the freshwater algae and more particularly the Desmidiaceae on which he speedily became one of the greatest living authorities". West was born on the 22nd February, 1848, on the edge of Woodhouse Moor, Leeds, his father being George West of 8 Delph Terrace. This house was standing until a few years ago, and I once made a special pilgrimage to see it. It had then fallen upon evil days and was demolished not long after. Roebuck goes on to give a detailed account of West's life and work, how he set up in business as a pharmaceutical chemist in Bradford, later giving up business to devote himself to his appointment as lecturer in botany at the Bradford Technical College, afterwards adding biology and materia medica to his curriculum of work. "Good as was all this preliminary work, excellent as was his educational work at the college, his principal work in life was now being taken up and he was concentrating his energy and ability upon the study of the freshwater algae, especially upon the Desmidiaceae. His son George was now growing up and co-operating in these studies. And now it was that the practical self-training of the father, the parental and academic training of the son, based as they were on the combination of field-work and minute and precise appreciation of specific and varietal differentiation on the one hand, and on the other the capacity for broad generalisations, began to bear fruit in abundant measure. Theirs was no mere local study—the whole world became their province; and the possession of the complete literature and of innumerable gatherings from everywhere that an algologist went, with the ready aid of leading European and American investigators, enabled the two Wests to establish their reputation among the foremost students of their subject, fully abreast of their greatest contemporaries, fully equal to their most distinguished predecessors. Indeed, the father's most extraordinary knowledge of cryptogams, which was both wide and deep, whether these were mosses, hepatics, lichens or algae, and of their ecological conditions, made him quite a unique personality certainly in Britain, probably in Europe. He was always in advance of his time, an ecologist long before the term itself was invented, always fully conscious of the importance of the common and dominant forms, ever alive to the significance of evey observation he made". West was one of the chief contributors of records to Lees's *Flora of West Yorkshire*, and hardly a page in any section of that work is without his name.

So much for the members of that first bryological committee. Of earlier workers, the name of John Nowell is well-known. My friend Mr. Branson has given some account of Nowell's work in the report on the bryological meeting of the Union held at Todmorden in 1971. On the 19th March, 1866, Nowell, then vice-president of the Todmorden Botanical Society, read the following paper entitled 'Notes on some rare mosses at Todmorden.' "In Wilson's *Bryologica Britannica* there are four hundred and forty-four species of mosses described as having been found in Britain; and since then a considerable number have been added to the list, so that we may now venture to put them down at nearly five hundred species. Of that number I think about two hundred species have been met with within six or seven miles round Todmorden, within the last thirty years; probably we may have a greater number of species in this radius than most other districts of the same extent. This, no doubt is owing partly to the great diversity of surface, and to the different degrees of altitude, affording a variety of aspects and different degrees of light and shade. But I am sorry to say that a considerable number of species have disappeared from the neighbourhood within the last ten or fifteen years from some cause or other, and there are some which were pretty common, which are seldom met with now, and are not so fine and healthy as they were formerly. However, we have a goodly number of species that are not frequently met with in some other districts of the same extent. Of these I will mention a few. *Anodus donianus* of Bruch and Schimper, one of the smallest of mosses, has only been found in a very few places in Britain, and we nave two stations for it in this district; both of them near Heptonstall. We have another little known species, *Leskea sprucei* Bruch. Mr. Spruce first gathered this in Teesdale, about the year 1842, very sparingly; and about the year 1853, I had the good fortune to meet with it on shady rocks by the side of a waterfall in Green's Clough, and in a similar situation in Dule's Gate; and also under shady rocks in Shedden Clough; all very sparingly. I have since met with it at Chee Tor in Derbyshire; and also in Gordale, Malham, and in Helk's Wood, Ingleton; Mr. Baker found a little of it on rocks by the side of the Tees, near Eggleston, in 1856; these I believe are the only known places where this very delicate and beautiful moss has been found in Britain. I may also mention the beautiful and elegant *Schistostega osmundacea* which has its northern limit in Britain in this neighbourhood; it has been found in a number of other places in England, but no further north than here. The little known *Atrichum laxifolium* Wils.MS; *Atrichum crispum* Sullivant, was first brought into notice in this neighbourhood, either as a curious form of *Atrichum undulatum*, or a new species; but not having been found in fruit here, it was not much noticed, until a Mr. James, of New Jersey, North America, sent it in fruit unnamed, along with other plants to Mr. Wilson, having met with it in fruit in New Jersey; and Mr. Wilson made it out to be identical with our plant. Only the male plant has yet been found in Britain. Dr. Schimper says that it is new to Europe. It is found in nearly all the rocky moorland streams of this district, and it has also been found in similar places in Saddleworth, but I have not heard of its being found further north than here. *Mnium subglobosum* B. & S. was first brought under notice in this neighbourhood as being a distinct species, before having been overlooked as only a variety of *Mnium punctatum*; it has been found in a few places in other parts of the country, but nowhere in such abundance and perfection as in this neighbourhood. I believe it is unknown on the continent, but is said to have been found by Drummond in North America, who named it *Mnium pseudopunctatum*. We have *Hypnum ochraceum* of Turner, which had not been much noticed until recently, only as a form of *Hypnum palustre*, but it is quite distinct from that species. I think it is not found on the continent, as Dr. Schimper had not seen it growing until he came to Todmorden; this I believe is found in greater abundance and perfection in this district than in any other place where it has been found."

We are told that the paper was illustrated by numerous beautifully mounted specimens of some of the rarer species of mosses. The President remarked, "with regard to the disappearance of mosses, that the same circumstance had happened to several beautiful Hepaticae, and as no effect took place without an adequate cause, it would be interesting to ascertain what had caused the disappearance of these beautiful plants—whether it arose from the super-abundance of smoke, superior drainage, or the wanton destruction of the timber trees of the neighbourhood." A spirited discussion ensued, in which Messrs. Nowell, J. Haworth, T. Stansfield, W. Patman, T. Aitkin, W. Sutcliffe, and other members took part. All agreed in condemning in the most unmeasured terms the unwarrantable destruction of the trees of the neighbourhood, and ascribing to this the principal cause of the disappearance of the plants in question. So even over a hundred years ago our bryologists were deploring the loss of species through pollution and other causes, and there is little doubt that Nowell's complaint that of five species of *Orthotrichum* which used to occur about Todmorden, not one now survived, was the result of atmospheric pollution. At our own meeting in Greenfield a few years ago, the results of atmospheric pollution were most evident: in addition to a permanent blue haze covering the whole area the vegetation was highly depauperate and even the heather had for the most part been killed. The recent *Flora of South Lancashire* gives a list of some 67 bryophytes which have not been recorded since 1900 and no doubt a similar list could be produced for similar areas of industrial Yorkshire. I end my reference to Nowell by a quotation from the preface to the *Flora of Todmorden* by Abraham Stansfield and John Nowell: " . . . for as regards the lower spore-plants, or cryptogams, probably no similar area of England has at any time been so thoroughly "ransacked." Indeed, the labours of the late John Nowell in this field were so successful as to excite the wonder and admiration of botanists of more than European fame. And there can be little doubt that the botanical records made by this humble factory operative, whose attachment to his native region was such that no offers of worldly advancement could ever detach or wean him from it, will be read with interest when, through vicissitudes of trade, or the advancement of science as applied to the industrial arts, every factory chimney in the Todmorden and neighbouring valleys shall have been razed to the ground."

The name of Richard Spruce must always stand high in any review of Yorkshire bryologists, but as he has had a certain amount of publicity recently I propose to say little about him beyond expressing my unbounded admiration for the wonderful work this humble man was able to achieve under difficult circumstances, and to say what a great pleasure it was to be present at the ceremony in Coneysthorpe in September 1971 when a plaque in memory of Spruce was unveiled. Those seeking further information on Spruce and other early bryologists, should also consult Miss L. I. Scott's paper in *The Naturalist* 1961.

Benjamin Carrington (1827-1893) was best known for his work on the hepatics. At one time resident at Yeadon near Leeds he was joint author with Professor

Miall of *A Flora of the West Riding of Yorkshire* published in 1862, of which he wrote the cryptogamic portion. First county records due to Carrington include *Marchesinia mackaii* at Ingleton, and *Harpanthus scutatus* from the Strid, at Bolton Abbey. In the introduction to this flora, Carrington says of Nowell: "To my friend Mr. J. Nowell of Todmorden I owe special thanks. There are few districts of Yorkshire or the adjacent counties with the rarities of which he has not become acquainted during his long and useful life, and I paid my first visit to many of the stations recorded below under his guidance." He also acknowledges assistance received from J. G. Baker, Esq., L. Miall, Esq., Dr. Deighton, Mr. C. Hobkirk, Dr. Windsor, J. Cramond, Esq., Rev. G. Pinder, P. Inchbald, Esq., R. Clapham, Esq., Mr. C. Eastwood; and the Fellows of the Todmorden and Thirsk Botanical Societies. Appended at the back of the flora is a list of subscribers. Most subscribed for one copy, and one cannot but wonder what Sir Titus Salt, of Methley Park, did with the 20 copies for which he subscribed.

Christopher Arthington Cheetham (1875-1954) was a regular contributor to *The Naturalist* from 1907 until his death. His first contribution is a note in 1907 on the occurrence of *Pseudoleskea catenulata* on Mickle Fell and *Orthothecium rufescens* in Park Gill, Buckden. One of the most striking papers he wrote was that on the moss flora of boulders (1939), in which he discussed the various factors affecting the moss flora of four types of rock, viz. millstone grit, mounttain limestone, Silurian, and the conglomerate of Norber. Cheetham was up to the time of his death a member of the Bradford Naturalists' Society, and here he early came under the influence of that great teacher, William West, whose botanical classes he attended. Many were the stories that Cheetham told of West—how on one excursion in North Wales Cheetham had great difficulty in

An unpublished photograph of C. A. Cheetham taken on Norber, Austwick, in 1946.

persuading West to get into the last conveyance from some remote spot to the village where they were staying; West's love of old, mossy walls—"give him a good mossy wall, with plenty of lichens, and he'd still be there half a day later." Cheetham studied the mosses to such an extent that eventually, as he once put it to me, he "knew the mosses as well as t'maister." My own introduction to mosses took place this wise. About 1945 I had collected a few mosses from Pendle Hill and sent them on to Cheetham for naming. The reply I got said that if I wanted to learn something about mosses, the best thing would be for me to come up to Austwick and stay with him. And thereafter, on several occasions, I stayed with Cheetham in his cottage overlooking the Green at Austwick, where the coffee-pot was permanently on the hob, and in all weathers we made sorties into the hills. A constant companion on these outings was the little kettle and spirit stove which was used to brew up at lunch time. Needless to say C.A.C. knew all the likely springs where fresh water was to be had. One such meal at Arco Wood, when there was snow on the ground, stands out in my memory. Other places I visited with him included Trow Ghyll, Gaping Ghyll, Ingleborough, Kettlesbeck, Penyghent, Helwith Bridge and Moughton. Cheetham added greatly to our knowledge of the mosses of Yorkshire and it would take up a great deal of space to list all his important finds. Two of particular interest were *Hypnum hamulosum* on the Ribble/Wharfe watershed, and *Grimmia retracta* at Helwith Bridge. I add a brief item taken from Dr. Sledge's appreciation appended to Cheetham's obituary: "He was the only Englishman I ever knew whose sartorial equipment did not include a pair of long trousers: shorts were the normal attire, knickerbockers for more formal occasions." A great naturalist, a great character, whose like we shall never see again.

Francis Eric Milsom (1886-1945), another bryologist who started off as a pharmaceutical chemist, joined the Union in 1918 and from 1923 until his death in 1945 was recorder for the bryological committee and its representative on the executive. Milsom, who was a nephew of W. H. Burrell, had a special knowledge of the hepatics, and was responsible for that sction of the Transactions published in 1946.

Harold Walsh (1881-1962), of Luddendenfoot, was one of those workingmen naturalists so often produced by the Calder Valley. Like Nowell before him, Walsh was primarily concerned with the flora of his own immediate district, and although for a year or two he did act as recorder for bryophytes, he soon gave this up to concentrate on his home ground. Perhaps his most important contribution to the literature was his list of the bryophytes of the Halifax parish in which he made comparisons of the present distribution with that given in Crump and Crossland's Flora of 1904. I made numerous bryological trips with Walsh, perhaps the most rewarding of which was the one up the Hebden valley when we had the pleasure of rediscovering *Andreaea rothii* in 1948. One of his most remarkable finds was a single plant of *Buxbaumia aphylla* on a wall near Hebden Bridge in 1947.

That famous botanical partnership between James Alfred Wheldon and Albert Wilson fully deserves a lecture to itself, but as most of their work was done outside the county I do not propose to say much about them. Wheldon was a Yorkshireman, born at Northallerton in 1862, but most of his life was spent in Liverpool, becoming one of the foremost field botanists of his day and an acknowledged authority on the harpidioid Hypna. His old friend, Wilson, though born in Lancashire, lived in Yorkshire (York, Ilkley, Bentham, Sedbergh) for short periods and made useful contributions to our knowledge of the flora.

William Holmes Burrell (1865-1945), another pharmaceutical chemist, though born in London and resident in Norfolk for many years, lived in Yorkshire from 1914 until his death in 1945, and made a marked impact on local bryology by reason of his great care and thoroughness. He took a great interest in the spread of *Orthodontium* in the county, and in *The Naturalist* 1940 he published a paper on this subject which was a masterly summing-up of the information then available, though his conclusion that *O. gracile* Schwaegr. var. *heterocarpum* Wats. was "a true breeding, very fertile, fixed mutation" has proved to be erroneous. In 1917 he published an interesting paper on the mosses of an industrial city (Leeds), in which he noted that the three mosses which could withstand the worst atmospheric pollution in the very centre of the city were *Ceratodon purpureus*, *Funaria hygrometrica* and *Bryum argenteum*. The bryological section of the Union owes a very great debt to Burrell for the vast amount of work he did for Yorkshire bryology, and in particular for commencing the register of bryophytes which is now being maintained by our present recorders.

Over the years there have been a number of losses to the bryophyte flora. The drainage of several carrs accounted for the disappearance of *Paludella squarrosa* and *Helodium blandoyii. Camptothecium nitens* has gone from many of its old localities and is now only known for certain at Malham Tarn, where after being lost for many years it was refound by Dr. T. H. B. Bedford in 1937. At Queen Mary's Dubb it was on the point of extinction when Mr. Branson and I last saw it there several years ago. *Catascopium nigritum* used to occur at the head of Gordale, Malham, where it was first found by Cheetham and Burrell in 1915. It has now gone from here and Cheetham told me that it had been gradually exterminated by a succession of collectors each of whom took just a bit for his herbarium. It is now known from the county in Teesdale only. That handsome moss, *Ptilium crista-castrensis*, used to be known from several stations in Teesdale, both on Cronkley and lower down in the region of Croft and Gainford, in Castle Howard Park, and on the slopes above the ebbing and flowing well, Giggleswick. It had been completely lost from all these localities, but was by good fortune restored to our flora by Dr. T. H. B. Bedford's discovery of it on moorland at Penny Farm Gill, on the slopes of Baugh Fell near Sedbergh. He found it here in 1940; I saw it first in 1949, and I showed it to the bryological section in 1961.

I should now like to consider the history of a few bryophytes which have special Yorkshire connections, and the three I have chosen are *Cinclidium stygium, Orthothecium intricatum* var. *abbreviatum*, and *Aulacomnium turgidum.*

Cinclidium stygium Swartz

James Cash, writing in *Naturalist* Vol. VIII 1882-3, says: "The history of *Cinclidium stygium* as a British moss is not a little interesting to Lancashire muscologists, especially those who are old enough to remember its fortunate discoverer, John Nowell. In speaking of Nowell as its discoverer, I merely give utterance to the current belief, though, as we shall presently see, Nowell did not, at the time of the discovery, do more than share the credit with certain muscological acquaintances, namely—John Hanworth, of Lobb Mill, and William Greenwood of Lumbutts. The discovery was made in the summer of 1836. When the moss was picked up on the bog near Malham Tarn, none of the three could identify it. They were, however, acute enough to see that it was a rare thing, and convinced themselves by subsequent investigation—apparently before communicating the moss to any of the experts then living—that it was new to the British flora. I cannot say whether they sent specimens for identification to anyone besides Mr. William Wilson, who at that time (17 years before the publication of his *Bryologia Britannica*) was known throughout England as the best authority on British mosses; but the presumption is that they did not, if we are to judge by a letter they sent to him dated September 12th, 1836. That letter bore at the foot the joint signatures of Hanworth, Greenwood, and Nowell (and they appear in the order here given)—a circumstance which seems to show that no one claimed priority over the rest. It was the first letter, apparently, which had reached Mr. Wilson from the Todmorden muscologists, and I have no doubt that *Cinclidium stygium* was the interesting medium of introduction between Nowell and Wilson, forming the commencement of a lifelong acquaintance, and of extensive correspondence on matters muscological. The writers intimated to Mr. Wilson the discovery, in the vicinity of Malham, Craven, June 13th and 14th on a very wet bog near Malham Tarn, a species of moss which they said appears to us not to be described in volume 2nd part 1 of Hooker's *British Flora.* The letter at this point bears a memorandum in Mr. Wilson's writing giving the name of the moss *Cinclidium stygium.* The writers enclosed specimens of the moss for Mr. Wilson's acceptance, with remarks on its general appearance. "It has," they said, "much the appearance of *Bryum punctatum.* It was growing along with *Hypnum scorpioides* and *Bryum dealbatum.* We will thank you to give us your opinion of it, as we think none more competent than you, who have displayed so much zeal in collecting and investigating the various species of the British musci." Mr. Wilson lost no time in communicating the fact of *Cinclidium* having been added to the list of British mosses, to his friend Dr. W. J. Hooker, then Professor of Botany in the University of Glasgow. Dr. Hooker wrote on the 15th February, 1837, to

Mr. Wilson a letter, in which occurs the following passage: "Thank you for having sent me the *Cinclidium*. Surely the persons who discovered it must be men of some knowledge, and acuteness too; and if so, they deserve to be encouraged." It is quite certain that the Todmorden worthies received from Mr. Wilson the encouragement of which the Glasgow professor considered them so deserving. In a later letter to Wilson they said: "Our situation in life (being that of labourers) will not admit of us going so far at *any* time, the distance being nearly forty miles from Todmorden." At the time of which we write, Hanworth, Greenwood and Nowell seemed to be pursuing their botanical labours jointly, and it is curious to see letter after letter with their three signatures at foot. One dated May 28th, 1837, is worth quoting in full:

Lobb Mill, May 28th, 1837.

Dear Sir,

We received your valuable communication of the 19th November together with an abundance and interesting supply of rare mosses, such as we have long wished to see, and for which we beg you will accept our most sincere thanks. Our reason for troubling you again so early is that you desired directions to the spot where we found our *Cinclidium*, which will be best found (if you start from Malham) by going directly to the place where the water discharges itself from the Tarn; then turn to your right in the direction towards Gordale. The distance, we think, where it grows is not above a quarter of a mile from the bye-wash, in a hollow place on the moor, on which grow *Carex teretiuscula* and *Menyanthes trifoliata*, which we think will not fail to attract your attention." It is interesting to know that the *Cinclidium* still grows in the very same spot, which is on that part of Malham Moor known as Malham Lings.

Orthothecium intricatum B. & S. var. *abbreviatum* Dixon

This variety differs from the type in being very compact and small, forming dense tufts, blackish below, stems filiform, leaves minute, very shortly acuminate and cells short. It is a strongly marked plant. Its history is interesting, for although first collected in 1890 it did not receive a name until 1923. It was apparently first gathered by William West in 1890 on Penyghent; and J. A. Wheldon had it from Ingleborough in the same year. Neither of these gatherings were named. C. A. Cheetham and F. Haxby collected it from walls and rocks on Ingleborough in December 1912, and at this time a determined attempt was made to find out what it was. A letter from H. N. Dixon, dated 14th December, 1912, states: "The moss is a difficult problem. I think it can scarcely be any form of *Orthothecium intricatum*; it is like var. *binervulum* in leaf outline, but the leaves are not plicate, the nerve is wanting, and the cells are too wide. It has not the alar cells of *Platygyrium*, nor the recurved margin of *Orthothecium strictum*. I think it must be a form of *Pylaisia polyantha*. That is a very variable moss on the continent, and not unfrequently grows on rocks. Roth describes six varieties, none of which however seems quite to fit this. I should rather like to have had someone else's opinion on it. Perhaps you would ask Mr. Nicholson what he thinks of it? If we cannot decide, we might send it to Dr. Hagen for his opinion.

Yours sincerely,

H. N. Dixon.

The calareous substratum would be against *Pylaisia*, I think".

Specimens were thereupon sent to Mr. W. E. Nicholson, who replies in a letter dated 18th December, 1912, in the following vein: "I am sorry to say that I cannot follow Mr. Dixon in referring it to a form of *Pylaisia polyantha*. I find marked differences in the shape of the leaves and especially in their basal cells. Moreover *Pylaisia* is monoicous and a remarkably fertile plant which is generally loaded with capsules. Although I am quite unable to match your plant in my herbarium I am inclined to think that it must be a species of *Orthothecium* allied to, if not a derivative, of *O. intricatum*. It is very unlike the typical form of this moss but in general appearance it seems to approach the var. *binervulum*. The occasionally red stems and the distinct gloss which your plant possesses are rather in favour of *Orthothecium* and it would be interesting to know if further research may bring to light larger or better developed forms of the plant which may show its affinities more satisfactorily.

Yours very truly,

Wm. Ed. Nicholson.

The next piece of information is contained in a letter from Burrell to Cheetham, dated 10th April, 1914, in which he says: "Your *Orthothecium* is very curious. The small size, colour, wide lumen of cells and less porose cell walls at first gave me an inclination to doubt its belonging to that genus, but an attempt to place it elsewhere offered even greater difficulty. The three possible things were *Hypnum resupinatum, Pylaisia* and *Hypnum incurvatum*, but they are out of court. The enclosed sketches were made this evening in an attempt to fix definitely in what and to what extent it varies from type and I reached the conclusion that size and colour are the most noticeable variations. In my opinion it is not *binervulum*. By description that is as big a plant as the type. Your plant has not the double nerve nor the two longitudinal plicae and it might as well be a local variation from the type as from the variety.

Yours sincerely,

W. H. BURRELL.

There the matter rested until 1923, when Albert Wilson collected it on Yoredale limestone rocks at 2,100 feet on the north side of Ingleborough and found that he had gathered the same moss in 1919 on Yoredale limestone at 1,900 feet on Barbon High Fell, Westmorland. These gatherings were all made independently and without the moss being definitely determined. As regards the habitat, Mr. Wilson wrote to Mr. Wheldon on 16th July, 1923, as follows: "On getting your letter I was just starting for Chapel-le-Dale, so I decided to make another investigation of the rocks on Ingleborough where I found the plant. I felt sure that Mr. Dixon was right in regarding it as a condensed form of *O. intricatum*. I ascended Simon Fell and examined some Yoredale limestone rocks on which I found the same moss as on Ingleborough, so I did not need to go to the original locality. The moss occurs in shaded rock crevices and a form rather nearer to the type occurs in more open spaces on the same rocks. I have similar plants gathered a few years ago on Barbon High Fell, Westmorland."

Finally, a postcard from Dixon to Cheetham 15th August, 1923, reads as follows: "Mr. Wheldon recently sent me a moss gathered on Ingleborough this year by Mr. Wilson and himself, which I considered to be a varietal form of *Orthothecium intricatum*, and suggested the name var. *abbreviatum*, both leaves and cells being very short. I had an idea I had seen the same plant from Ingleborough before, but could not find it—the reason being that I had left it undetermined and so not mounted it. I have just come across it, gathered by you in 1912 and noted by me *Pylaisia polyantha* var? I think the reference to *Orthothecium* is safe and Mr. Wheldon's plant shows a faint tinge of red sometimes. I believe it is a good variety.

Yours sincerely,

H. N. DIXON.

This is almost the end of the story, for in the *Journal of Botany*, November 1923, H. N. Dixon gave a diagnosis of the new variety.

Aulacomnium turgidum (Wahlenb.) Schwaegr.

Our sole Yorkshire record rests on specimens gathered on Whernside by Lees and West in August 1878. This is recorded in the following manner (*Nat.* Vol. 4 p.36): "We now ascended the north eastern shoulder to the spring, where the water rushes out of the hillside with great force at an altitude of 1,800 feet, picking up in the ascent (as we trod on *Rubus chamaemorus*) *Hylocomium loreum, Sphagnum intermedium, S. papillosum* and *Aulacomnium turgidum*; specimens of this latter moss were determined by Mr. Boswell at the end of August, and we should have announced it ere this but for an arrangement we had to work the same route in November, when we hoped to bring away a fair quantity of the moss for distribution, as unfortunately we only found a small quantity of it among the mosses we had collected that day, but unforeseen circumstances have postponed our intended journey. We have since learnt that it has been collected by Prof. Barker also on a northern slope in the Breadalbane mountains seven years ago, but was not determined until last October or November. Its occurrence in a similar cold aspect in Scotland seems to point out that it is a moss which may have been more abundant when our climate was colder." This moss has been looked for on Whernside many times since by many botanists, but has never been seen again. It has always mystified me that although West lived on until 1914 and Lees even later still, yet they never seem to have made further efforts to rediscover the plant on Whernside. There is in *The Naturalist* 1879 a spate of correspondence from various eminent bryologists, one side maintaining that specimens of *A. turgidum* from Ben More gathered by Prof. Barker in 1871 were not determined as such until attention was drawn to them *after* the discovery of the Whernside plant, the other that they were determined before. The Rev. J. Fergusson, Mr. Henry Boswell and Mr. E. M. Holmes, all had their say in the discussion. There can be little doubt of the correctness of the determination. One small point is somewhat out of character, for in his account of the Whernside excursion, Lees says that the *Aulacomnium* was mixed with *Sphagnum papillosum*. Now Dr. Derek A. Ratcliffe, than whom no botanist in this country knows the alpine plants better, points out *in litt.* 5.2.1965 that *Aulacomnium turgidum* (I quote): "Is a moss I became well acquainted with in the N.W. Highlands, where it is abundant on some of the highest hills. I was, however, impressed by the occurrence of the species in relatively "rich" vegetation, usually alpine grassland or species–rich moss heath, on well-drained and non-peaty brown loam soils. I never saw it amongst *Sphagnum* or any of the plants of blanket bog, and the habitat as described by West sounds altogether wrong. If it were in that area at all it ought to be in limestone pasture—I think in Breadalbane it is more confined to base-rich habitats than in the N.W." It was looked for by the BBS on their Sedbergh meeting a year or two back but without result. This is a first-class problem which I trust some member of our section will eventually solve.

GANNET *SULA BASSANA* FOUND IN LEEDS

Adrian Norris

On the afternoon of the 18th of July 1972 I was asked to call at the premises of the R.S.P.C.A. in Leeds to cxamine a large bird which they suspected to be an immature Gannet. The bird had been found the previous evening by two boys in a field near to their school in Middleton, south Leeds and reported to them as a large duck. Exhaustion and exposure to the hot sun must have incapacitated the bird as they had little difficulty in capturing and placing it in a caged area for the night. When I examined the bird it seemed healthy and ready to return to the wild; arrangements were made therefore with the chief voluntary warden of Fairburn Ings for it to be received onto the Reserve, in preference to the long journey to the coast. This would enable it to recover fully before going on its own way. The Gannet unfortunately died only a few days after its release onto the waters of the Reserve.

The occurrence of sea birds in inland stations has in most cases been put down to bad weather conditions on the coast and/or prevailing strong winds. The weather prior to the finding of this bird had been hot with only light winds. It would seem therefore that it came inland either as a deliberate act or because it had become disorientated in some way, possibly due to some disease or injury to its nervous system or to some of its internal organs. The death of a seemingly healthy bird so soon after its release would seem to hold out the theory that something was wrong internally. Might I suggest that an examination of birds found in this type of circumstance and which die as a result, be made to determine the cause of death? If some member with experience and the facilities would be willing to undertake these examinations, we might learn more about the reasons for the occurrence of single birds in inland locations.

Records of the occurrence of the Gannet in the Leeds area have been supplied to me by Mr. A. D. Flintham and Mr. R. F. Dickens and are listed below. These records are only those recorded since 1948 and which have been verified, and cannot pretend to be complete.

1948 Kirkstall.
1948 Near Bradford, September 25th. A first winter bird, (YNU 1948).
1953 Otley S.F. September (YNU 1953).
1956 Manor Road, Ossett, September 24th. One flew westward, (YNU 1956 & LDBWC).
1956 Wakefield, mid-September. A juvenile found at Fall Ings Lock which was taken to the R.S.P.C.A. but died later.
1958 Adult present, Fairburn Ings, 16th July 1958.
1966 Immature present, Fairburn Ings, 25th May, 1966.
1967 Crossgates, one immature found in early August.
1967 Juvenile, one flew over Fairburn on the 4th November, 1967.
1968 Rodley; report in the *Yorkshire Evening Post* of 15th November. Actual date of capture and release not reported. The bird was exhausted but uninjured and was taken to the R.S.P.C.A. and released later on the Durham coast.

OBSERVATIONS AT A STANDING-GROUND ADJOINING A HERONRY

T. R. BIRKHEAD

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Herons (*Ardea cinerea*) are known to spend time during the breeding season on a traditional standing-ground near the herony (Beetham 1910, Huxley 1924, Lowe 1954, Baerends & Van der Cingel 1962, Milstein *et al.* 1970). Their behaviour at these standing-grounds has been little studied, although Huxley (1924) and Lowe (1954) both refer to "dance gatherings", and Meyerriecks (1960) describes displays of *A. herodias* at what he calls a "dancing ground". More recently, Milstein *et al.* (1970) observed gatherings but saw nothing resembling a dance. These authors point out that these gatherings are certainly not confined to the pre-mating period as was originally supposed by both Huxley (1924) and Lowe (1954).

In the present paper some observations made during late March and early April 1971 at a heronry in Huntingdon are described. The study was made at a time when most of the 41 pairs of herons had eggs but no chicks. There were several aims of this work. First, to provide a general account of all behaviour seen at the standing-ground, second, to give some indication of the significance of standing with respect to breeding and, finally, to provide a basis for a long-term more detailed study. The work was carried out while the author was working with the Monks Wood Research Team and forms part of a broader continuing programme of work in an attempt to provide a firmer biological foundation for the long-term research of the Nature Conservancy.

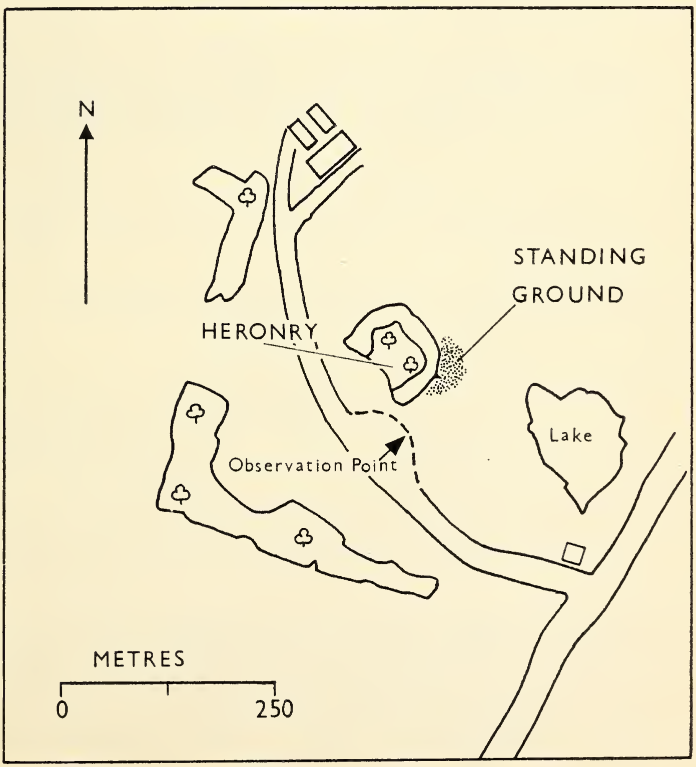

Fig. 1. Map of the study area at Hemingford Park, showing the heronry, standing-ground and observation point.

Location of the Heronry

The heronry at Hemingford Park, Huntingdon is ideal for observations. It stands at the southern edge of an area of flat parkland and consists of a clump of about 20 mixed deciduous trees partially surrounded by a small pond (Fig. 1). Several hundred metres to the north-west and south are two other stands of trees which are more extensive. These are used by the herons for stick collecting. Approximately 200 metres to the south-east lies a small lake from which nesting material is also collected. The standing-ground is an area of short meadow grass directly adjacent to the heronry on the east side but separated from the trees by the pond.

Method of Observation

It was possible to drive a landrover to within fifty metres of the standing-ground and make observations without disturbing the birds. A total of forty hours observations were made from the south side of the colony in periods ranging from 42-260 minutes.

events recorded at the standing-ground

(1) Arrivals and Departures

The arrival of all birds at the standing-ground, the number of birds already there, and all departures from the standing-ground were recorded.

(2) General Activities

It was possible to allocate a number to each bird on the standing-ground which was retained for the duration of its stay there. Behaviour for each heron was noted at five minute intervals, when it was placed in one of the categories given below. These categories were decided upon after preliminary observations at this and other heronries. Birds remaining at the standing-ground for less than five minutes were not included in the results.

(a) *Standing*

Two main attitudes were adopted. The first, when the body was held vertically, with the neck retracted was termed "hunched" (Fig. 2a). The second was termed "horizontal" (Fig. 2e), Huxley (1924) noted that this position was adopted when birds faced into the wind. Sometimes an intermediate posture was also assumed. However, in this investigation no distinction was made between these different standing postures.

(b) *Asleep*

A bird was regarded as asleep if in the "hunched" attitude with its head partly or completely buried in the powderdown feathers of the breast (Fig. 2d) or if the head lolled at an unusual angle.

(c) *Lying*

All birds sitting on the grass with their legs beneath them bent at the tibiotarsus/tarsometatarsus joint with wings closed, were recorded as lying (Fig. 2f).

(d) *Hunting*

Herons in the hunting attitude (Fig. 2c) were recorded.

(e) *Twig Fiddling*

Sometimes a bird which had been on the standing-ground for some time would pick-up and drop a stick several times, but would not take the twig to the nest. These birds were distinct from "twig-hunters" which flew down to the ground, picked up a stick and returned to the trees within five minutes.

(f) *Preening*

Birds performing feather maintenance activities were recorded.

(g) *Sunning*

As for "lying" but with wings open, and also as "hunched" with wings partially open.

(3) Displays

(a) *Arch-neck Displays*

The displays observed when a bird alighted on the standing-ground were all similar, they will be referred to as arch-neck displays (Fig. 2b). They always included the following. The neck was raised and arched, the crest, dorsal and ventral body plumes were erected. Arch-neck displays given by both incoming birds and birds already on the standing-ground in response to individuals alighting near them were recorded. This included airborne displays immediately prior to landing. Previous observations at other heronries had shown that arch-neck displays also occurred apparently spontaneously among birds on the standing-ground. Generally one bird assumed the arch-neck posture then approached another. All incidents involving this display were recorded.

(b) *Bitterning Display*

This display was frequently seen at the nest during the early part of the breeding season. It involved bending of the tibiotarsus-tarsometatarsus joint and subsequent lowering of the body with the head and neck stretched vertically (see Milstein *et al.* 1970: 189, 190).

(c) *Bow-Snap Display*

The legs are bent as in the "bittern" posture but the head and stretched neck are directed towards the ground (see Milstein *et al.* 1970: 189, 192).

(d) *Upward Snap/Threat Display*

The heron stands with neck erect, crest erect and the mandibles are snapped together as the bird lunges (see Milstein *et al.* 1970: 191, 194).

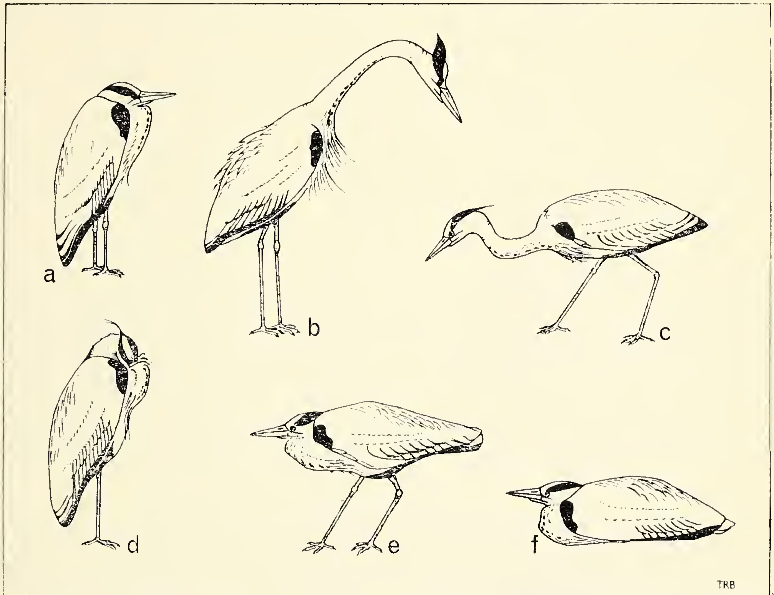

Fig. 2. Some heron postures; (a) Hunched. (b) Arch-neck display. (c) Hunting. (d) Asleep. (e) Horizontal. (f) Lying.

RESULTS

1) ARRIVALS AND DEPARTURES

At approximately three hours after dawn on each of the visits made to the heronry there was a period of great activity in it. This involved stick-collecting, short flights around the trees of the colony and a variety of vocalizations. A large number of arrivals to the standing-ground were noted at this time. Subsequently, there was considerable movement both to and from the standing-ground during the rest of the day. In general there was no clear cut pattern of arrivals and departures, although there was a suggestion of a decrease of arrivals after mid-day (Fig.3), and all of the herons had left the standing-ground two or three hours before dark in the evening. It seems, however, the pattern of movements may vary in different heronries. Prestt and Bell (personal communication) observed a very regular pattern of arrivals and departures at a heronry in Norfolk — all birds arriving in the morning and not departing until dusk in the evening.

There is some evidence that paired birds, when relieved of incubation duties immediately spend time on the standing-ground. From my observation point only two nests in the heronry were clearly visible. On one occasion a bird which had been on the standing-ground for 63 minutes was seen to alight at one of these nests and relieve its mate of incubation. The relieved bird then flew down to the standing-ground. On another occasion, at the other nest, the male attempted to copulate with the female but was unsuccessful. He then flew down to the standing-ground. In all, five separate incidents involving nest-relief were observed, each involving a relieved bird alighting on the standing-ground. During some further observations in Yorkshire, in late March 1972 (unpublished results), this pattern of events was frequently recorded. It was also noted that birds returning from feeding areas always alighted in the heronry and not directly on the standing-ground.

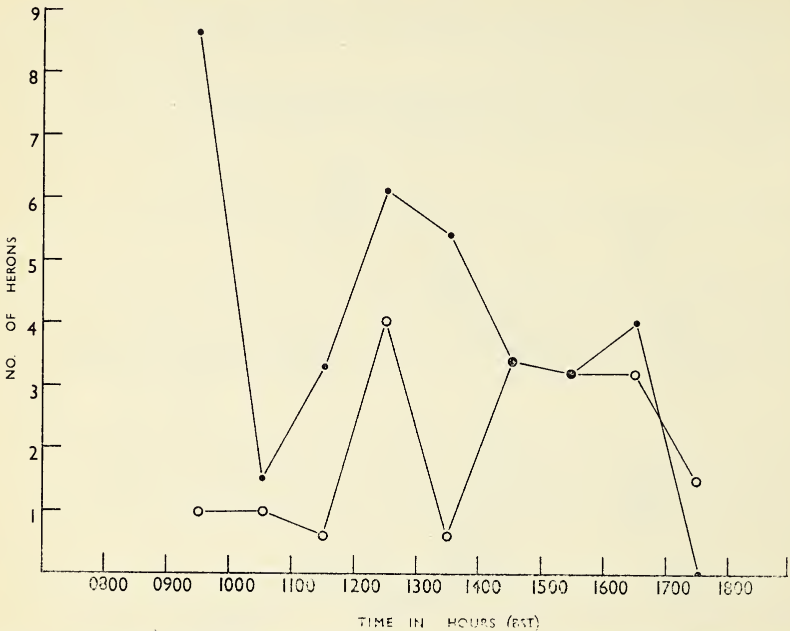

Fig. 3. Mean number of herons arriving (filled circles) and departing (closed circles) from the standing-ground. Data collected throughout the study period. Arrivals and Departures do not balance exactly since on some occasions birds were already present when I commenced observations after 0900 hrs. and were still present when I finished observations before 1700 hrs.

(2) General Activities

The results are expressed in Table 1. Some herons remained on the standing-ground for longer than 260 minutes and it is clear from observations that a large proportion of that time is spent standing (68.8 %). This suggests that the standing-ground may be used as a rest area during the day, when birds are not incubating eggs or feeding. The amount of preening is also high (22.8 %), but this probably varies with the stage in the breeding cycle. Bell and Stainsby (unpublished results) working at a heronry in Norfolk in early — mid March 1970 recorded less preening (10 % of the total time on the standing-ground spent); they also found that 54 % of the total time was spent standing and 36 % sleeping.

It is interesting to note that in the present study no sunning was seen on the standing-ground. However, herons in the sunning attitude were observed on several occasions by the copse south of the standing-ground. This suggests that there is a favoured place for this activity. On two occasions herons which had been hunting were observed eating earthworms taken from mole-hills.

Table 1. General Activities. The total time engaged in different activities during observations lasting for 395 minutes. Results are expressed as percentages.

Standing	68.8 %
Asleep	3.5 %
Lying	2.8 %
Hunting	1.3 %
Twig fiddling	0.8 %
Preening	22.8 %
Sunning	0.0 %

3) Displays

(i) Displays involving an incoming bird.

A total of sixty-eight arrival sequences was observed. This included "twig hunters" which alighted on the standing-ground solely to collect a stick. Of these arrivals 73% (50 observations) were associated with displays. Results are expressed as percentages of these 50 arrivals in Table 2. The remaining 27% (18 observations) of arrivals landed without any display on either their own part or on the part of other birds already present.

Table 2. Variation in display performed on landing.

	%	No. Obs.
(i) Incoming bird displays but no display from other birds on the standing-ground	66	33
(ii) Incoming bird displays and one or more of the birds on the standing-ground displays	22	11
(iii) Incoming bird does not display but one or more of birds on the standing-ground displays	4	2
(iv) Incoming bird displays and chases another bird on the standing-ground	6	3
(v) Incoming bird displays and is chased by a bird on the standing-ground	2	1

The displays performed were all of the arch-neck type. In approximately two thirds of the observations the landing bird displayed but did not elicit displays in other birds (see Table 2). However, birds already on the standing-ground did display in 22% of observations. This display was apparently in response to the display given by the landing bird since it was unusual (observed only twice) for standing birds to display when the landing bird did not do so first.

Generally, an incoming bird would display to the individual nearest to it. However, the distance between birds involved in a display was variable. On some occasions incoming birds would alight within about two metres of another individual but no display ensued. In other cases birds landing at distances of approximately thirty metres from the nearest individual would display. This behaviour in some instances was apparently related to a previous incident elsewhere. One example of this was when a bird which had been chased from the heronry by another individual landed and displayed despite the fact that the nearest bird was about thirty metres distant. On another occasion a bird which had presented its mate with a stick at the nest, landed on the standing-ground and displayed with no bird nearer than thirty metres.

Table 3. Number of birds on the standing-ground and proportion or arch-neck displays performed, over entire study period. Based on sixty-eight observations.

No. of birds on S.G. as arrival alights	Displays performed		No display no response		Total
	%	No. obs.	%	No. obs.	
1-3	61.5	8	38.5	5	13
4-6	75.0	18	25.0	6	24
7-9	73.6	14	26.4	5	19
10-12	66.6	2	33.3	1	3
13-15	88.8	8	11.2	1	9

The number of birds on the standing-ground as an incoming bird alighted is recorded in Table 3, in relation to the number of arch-neck displays. In general, the percentage of displays performed appears similar for each category, Despite the obvious lack of data for the 10-12 category, and to a lesser extent the 13-15 category, the latter figures indicate a higher frequency of displays with a greater number of birds on the standing-ground. However, in view of the small number of observations, no conclusions can be drawn from this.

(ii) Displays not associated with an incoming bird.

(a) *Arch-neck displays:* On 7 occasions arch-neck displays were observed between birds already on the standing-ground. On one of these a bird walked near two others and all three assumed the arch-neck posture. Then after approximately sixty seconds the birds returned to their "hunched" standing attitudes.

Three different birds (A, B and C) were involved in another incident. Bird A unexpectedly began to chase bird B. Bird A then turned, displayed and chased bird C: bird B maintained its arch-neck posture whilst bird C was being chased.

A further incident was of particular note. A bird which had been twig-hunting under the nesting trees adjacent to the standing-ground, flew out from under the trees with a stick. As it flew over the standing-ground, a bird, which had been on the ground for thirty-five minutes, then assumed the arch-neck posture. The bird carrying the stick alighted and postured as it approached the other bird. The heron which had been on the standing-ground for thirty-five minutes then attempted to take the twig from the other bird, but did not succeed. The two birds stood close together, with necks raised, for approximately two minutes, after which the bird with the stick flew back to the nesting trees. It was not followed by the other bird. It would appear that these two birds might have been a pair, but even if not a pair it is likely that they were male (stick bearer) and female since this behaviour was superficially similar to that at the nest between a pair.

(b) *Bitterning Display:* This display was seen on the standing-ground on three separate occasions and in each case was apparently elicited by another heron flying overhead. One incident involved the overhead bird landing but no further display ensued. On another occasion the "bitterning" was followed by a threat display.

(c) *Bow-Snap Display:* This display was not recorded on the standing-ground although other workers have recorded it (Baerends & van der Cingel 1962 and Stainsby 1970 unpublished results). An upward directed snap is considered separate from the bow-snap display by Milstein *et al.* (1970) but not by Baerends & van der Cingel (1962). On one occasion a bird on the standing-ground adopted the threat posture and directed a snap at a heron flying overhead.

DISCUSSION

Although the displays on the standing-ground described here are similar to those given at the nest in various circumstances (see Milstein *et al.* 1970), they are clearly not concerned with nest defence nor does it appear that they are concerned with attraction of a mate. The arch-neck display occurred both as herons landed on the standing-ground and also amongst birds already on the ground. These observations differ somewhat from those of Lowe (1954) who saw displays only associated with landing birds. Meyerriecks (1960) on the other hand, describes similar arch-neck displays for *A. herodias* in Florida but does not mention these associated with birds landing.

The arch-neck display performed on landing at the standing-ground may be a greeting display, but is more probably an aggressive display, possibly related to the maintenance of individual distance. The variation in response may be related to the density of birds on the ground, when the closer the birds the more likely it is that an arrival will land within another's individual distance. This may be further complicated if a social hierarchy exists within the colony, lower ranking individuals avoiding other birds and high ranking herons, as they alight on the standing-ground, challenging others. Milstein *et al.* (1970) noted that yearling birds at the nest were persecuted by older birds. Yearling herons were not observed in chasing incidents more than older birps whilst on the standing-ground.

The observations in this study have indicated a wide variety of activities and displays performed on the standing-ground during the breeding season. However, once birds are on the standing-ground the overall impression is one of inactivity. This would suggest that the standing-ground serves as a rest area for off-duty herons and possibly could equally well be classed as a day-time roost. The possible function of day-time roosts of herons, both during and outside the breeding season will be discussed in a subsequent paper (Birkhead, in preparation).

SUMMARY

General activities, arrivals and departures and displays of herons on a standing-ground, directly adjacent to a heronry, during late March and early April are described. The main activities on the standing-ground were standing (68% of the total time) and preening (22% of the total time). The most common display seen was the arch-neck display, frequently given when a bird alighted on the standing-ground, but also given

apparently spontaneously amongst individuals on the standing-ground. Other less frequent displays are described. The possible functions of such gatherings are discussed.

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The Oxford Book of Birds: Pocket Edition by **Bruce Campell.** Illustrated by Donald Watson. Pp.207 with 96 colour plates. Oxford University Press, 1972. £1·35.

This is a pocket edition of the *Oxford Book of Birds* published in 1964. The reduction in size makes the type uncomfortably small for a presbyopic reader. The amount of information in Bruce Campbell's text is remarkable and conveniently faces the relevant plate. There are chapters on anatomy, flight, behaviour and breeding, giving the beginner a good introduction to general ornithology. Donald Watson's pictures are delightful and illustrate the birds in the field and are not mere side views so popular in field guides. In places the colour reproduction is garish as in the reds of the Redstarts and Bluethroats, in the review copy. However the plates of Fieldfares, Redwings and Nuthatch and many of the water birds are particularly attractive.

This is a remarkably full and attractive account of British birds.

J.D.P.

Lombriciens de France: Ecologie et Systematique by **M. B. Bouché**. Pp.671, 100 text figures, 18 tables. Editions Institut National de la Recherche Agronomique. Paris, 1972 (in French). 150 fr.

Earthworms are notoriously difficult to identify and in the absence of a comprehensive account of the British species one is bound to consider this prodigious work on the identification and distribution of French species as a possible guide to the British fauna. This it may well prove to be, but the keys are not for the uninitiated and will only be useful to the experienced worker.

An introductory chapter on techniques of study gives well-illustrated details of sampling, extracting and culturing, and much else besides. The bulk of the book consists of a treatment of species in taxonomic order, while there are also substantial chapters on morphology, taxonomy and ecological aspects of distribution. There is a bibliography of 380 entries.

The author has indulged in the usual French passion for obscure terms like 'chorology' and 'mesology' the use of which we have managed to avoid in this country, and he appears occasionally to take liberties with the rules of nomenclature—notably in changing the name *Lumbricus terrestris* Linnaeus to *L. herculeus.* However, the bulk of knowledge presented is very impressive and the book will no doubt be useful to the specialist.

S.L.S.

MAMMALS AND LOWER VERTEBRATES SECTION

MEETING AT SLEIGHTHOLMEDALE, 2nd JULY, 1972

It was the main purpose of this field meeting to record as many mammals and lower vertebrates as possible for this 10 km. square (SE.68), as part of the Section Recording Scheme. Also a recent publication of the Mammal Society has shown the many gaps in the mammal records for Yorkshire as well as for other parts of the country. Sleightholmedale (V.C. 62) was chosen as an initial step in remedying these deficiencies. It is a beautiful area presenting a wide variety of habitats.

Members set 47 Longworth live animal traps between 19.30 hrs. and 22.00 hrs. B.S.T. on the evening preceding the meeting. Each group of six traps were layed in different areas in the valley e.g. deciduous woodland, beech plantation, river bank and meadow.

The morning of the meeting was occupied in visiting these trapping sites. The technique of extracting animals from the traps was demonstrated to those unfamiliar with this. Following examination of the animal, the species, sex, weight, maturity and reproductive condition were noted and the animal then released.

The following animals were trapped:—

1. Wood Mouse *Apodemus sylvaticus*
Adult ♀ Pregnant. Wt. 27 gm. Deciduous woodland.
Adult ♂ Testes enlarged (indicating that animal was in reproductive condition). Wt. 23 gm. Young beech plantation.
Adult ♀ Four young were also in nesting box (born overnight). Young beech plantation. Mother and young released immediately.

2. Bank Vole *Clethrionomys glareolus*
Adult ♀ Vagina open (indicating that the animal was in reproductive condition). Wt. 18 gm. Large tick present on back of head. Woodland edge with dense herb layer.
Adult ♂ Testes enlarged. Wt. 14 gm. Woodland edge.
Adult ♀ Pregnant. Wt. 21 gm. Woodland edge.
Adult ♂ Testes enlarged. Wt. 15 gm.

3. Common Shrew *Sorex araneus*
Adult. Wt. 12 gm. Beech plantation. Sex could not be determined. The external genitalia of male and female are usually indistinguishable.

No animals were caught in traps set in meadow, pasture, and river bank. Only small areas were sampled and further trapping is required to show the mammals in these habitats.

4. Pygmy Shrew *Sorex minutus*
Wt. 4 gm. Caught in butterfly net in pasture.

5. Short-Tailed Field Vole *Microtus agrestis*
Skeletal remains were found in a heron pellet which was examined later.

6. Rabbit *Oryctolagus cuniculus*
One found recently killed on the road and several seen during the day.

7. Hare *Lepus europaeus*
Seen on the road in car headlights on the 1st July. There were signs also of mole, grey squirrel, fox and roe deer. We did not see stoat, or weasel, or definite signs of badger. Tadpoles of frog and newt were found. Bullhead and Brown Trout were seen in the river.

The party later visited the site of a barn owl's nest in a neighbouring 10 km. square (kindly shown to us by the Chairman—J. E. Knight). Owl pellets contained skeletal remains of *Microtus agrestis*. A slow worm was found here and much of botanical interest.

Although several of those attending were not primarily involved in the activities of the section, they found much to interest them in the rich botanical and insect life of the area. We are particularly grateful to the younger members who introduced a new method of small mammal capture, using a butterfly net, and later located the slow worm.

We gratefully acknowledge the kindness of Mrs. Gordon Foster in allowing us access to her estate.

A REVIEW OF YORKSHIRE HARVESTSPIDERS

C. A. HOWES
Museum and Art Gallery, Doncaster

With the discovery of *Dicranopalpus caudatus* Dresco at Hove, Sussex, in 1966, (30), twenty-two species of Harvestspiders are now known to occur in the British Isles. Of these, eighteen species with one variety are recorded for Yorkshire and it is likely that, with the knowledge of habitat requirements provided by Todd (33), diligent searching may reveal more.

One of the first naturalists to scientifically work the Harvestspiders was Dr. R. H. Meade (1814-1899), a surgeon and widely travelled amateur entomologist from Bradford. Although not a leading arachnologist, Meade played a key rôle in the history of British arachnology. Bristowe (2) noted that he "should be remembered less for his minor contribution to spider knowledge than for his part in arousing in Blackwall's successor, the Rev. O. Pickard-Cambridge, an interest in spiders and introducing these great men to each other". Indeed this fortuitous introduction resulted in a magnificent era of arachnid study. The era spanned three generations from the great but ageing John Blackwall (1790-1881), author of the monumental *Spiders of Great Britain and Ireland* (published in two beautifully illustrated volumes by the Ray Society in 1861 and 1863), to the Rev. Octavius Pickard-Cambridge F.R.S. (1828-1917), author of numerous keys and monographs. He became one of the world's leading arachnologists and was subsequently followed by the spate of workers of the early 20th century including F. O. Pickard-Cambridge (nephew of the Rev. O. P.-Cambridge), Dr. A. Randall Jackson, C. Warburton, Rev. Dr. J. E. Hull, Rev. R. A. Taylor and William Falconer.

Meade commenced the documentation of British Harvestspiders in 1855 with the publication of his *Monograph on the British species of Phalangiidae or Harvestspiders* which he supplemented in 1861. These papers provided one of the first lists of British Harvestspiders, naming some sixteen species. Subsequent taxonomic revision has greatly reduced this list, though of the species still recognised nine were recorded in Yorkshire — *Liobunum rotundum* Lat., *Phalangium opilio* Linn., *Opilio parietinum* Degeer, *Megabunus insignis* Meade, *Mitopus morio* Fab., *Oligolophus agretis* Meade, *Odiellus ephippiatus* C. L. Koch, *Nemastoma lugubre* Mull. and *N. chrysomelas* Herm. Thirty years after Meade's pioneer work, the Rev. O. Pickard-Cambridge published his *Monograph of the British Phalangidae or Harvestspiders*. This monograph superseded Meade's as the standard work and constituted a major advance both in revising nomenclature in the light of continental work and in contributing much to the scant knowledge of Harvestspiders.

Despite Pickard-Cambridge's work, no additions were made to Meade's Yorkshire list until the appearance in 1906 of William Falconer's second introductory paper for the *Naturalist* on the study of Harvestspiders (13) where a further five species were noted — *Phalangium saxatile* C. L. Koch, *Platybunus coniger* Herm., *P. triangularis* Herbst, *Oligolophus hansenii* Kraeplin and *Odiellus palpinalis* Herbst. The fact that Falconer's additions resulted from nearly three months' collecting (from July to September, 1905), demonstrated the opportunities for new work in this subject.

No doubt influenced by the encouragement and help extended to him by the Rev. O. Pickard-Cambridge, and perhaps goaded by a note Cambridge published in the *Naturalist* (10) asking for work to be carried out on the arachnida in Yorkshire, Falconer attempted to kindle an enthusiasm for the Opiliones amongst his Yorkshire colleagues. By publishing introductory notes on the anatomy, natural history and taxonomy of harvestspiders (12 and 14), and keys to their identification (12 and 14), Falconer provided a concise and readily available synopsis for Yorkshire naturalists. Falconer's lead succeeded in stimulating interest and in 1909 the Arachnida Committee of the Y.N.U. was formed with himself as chairman and T. Stainforth and E. A. Parsons of Hull, W. H. Winter of Shipley, H. C. Drake of Scarborough, W. J. Fordham of Selby, W. Dennison Roebuck of Leeds and G. B. Walsh of Middlesborough, as committee members. The declared intention of the committee was to investigate the arachnids of Yorkshire, which they did with great industry. The resultant information was written up by Falconer, from whose pen poured forth a continuous stream of notes, reports and papers until 1938.

After seven years of the Committee's work, the Harvestspider records were reviewed and included in 'The Harvestmen and Pseudoscorpions of Yorkshire' (15), which not only noted a total of fifteen species and one variety for the county, adding *Liobunum* *blackwallii* Meade, *Oligolphus tridens* (C. L. Koch) and *Mitopus morio* var *alpinus* Herbst to the list, but also include information on their ecology. Since the late 1930s there has been little organised collecting and recording of Yorkshire arachnids; Bristowe (1) basing the Yorkshire records in his review of British Opiliones entirely of Falconer's work (15). During this period, however, the following three new county records have been discovered — *Oligolophus meadii* Camb.,*Anelasmocephalus cambridgei* Westwood and *Nelima silvatica* (Simon).

It is probable that biological recording may alter somewhat in the near future bearing in mind (a) the 10 km. system of recording currently being adopted for the purpose of recording on a national scale, and (b) the breakdown of traditional — and hence vice-county — boundaries through the proposed imposition of new local government administrative areas. With this in view the following list has been compiled in an attempt to bring together the Yorkshire Harvestspider records since Falconer (15), and these have been organised under the traditional vice-county system. For each species the vice-counties recorded by Falconer (15) are listed, together with subsequent vice county additions. From this stage, future recording can either continue on the existing vice-county system or any of the alternative schemes can be adopted.

Brief notes are given on preferred habitats, relative abundance and distribution in Yorkshire, though more extensive information on these aspects on a national scale is to be found in Bristowe (1), Sankey (27, 28, 29) and Todd (33).

The arrangement and nomenclature follows that used by Todd (32) with *Nemastoma lugubre* (Muller) altered to *N. bimaculatum* (Fab). after Martens (25).

Order OPILIONES

Family Phalangiidae

Sub-Family Liobuninae

Nelima silvatica (Simon)

A very local ground dwelling species having a scattered but chiefly western distribution.

(63) The only records for Yorkshire were five specimens (two 6/9/1965, one 7/9/1965, one 23/9/1965, one 27/10/1965) collected by L. N. Kidd from a garage at Greenfield (24).

Liobunum blackwallii Meade

Common generally in Britain but local in Yorkshire, collected mainly from low herbage. It has been recorded from V.C. 61 and 63 (15) and subsequently V.C. 62 and 65.

(62) Sleights, female, 6/10/1935 (4).

(63) Haw Park, Wakefield, two females, 30/3/1969; D. W. Mackie.

(65) Aysgarth, male, 8/10/1970; C. A. Howes.

L. rotundum (Latreille)

Very common, frequently occurring on walls, tree trunks, etc., in damp shaded situations. It has been recorded from V.C. 61, 62 and 63 (15) and subsequently V.C. 65.

(62) Arncliffe Woods, 1935, (4), male and female, 2/10/1937 (5). Littlebeck Wood near Whitby, 9/10/1970; C. A. Howes.

(63) Greenfield, 11/9/1967; L. N. Kidd. Haw Park, Wakefield, two females and two males, 3/8/1969; D. W. Mackie. Thorne Moors, males and females, July and August, 1969 and 1970; T.M.S.G. Low Ellers (Potteric Carr), 31/5/1970. Black Pond, Doncaster, -/8/1970. Nostell Priory, on Rhododendrons, 10/8/1970. Levitt Hagg Quarry, Warmsworth, males amongst limestone slabs 27/9/1970; C. A. Howes.

(65) Hawes 7/7/1919 (16) Reeth, imm., -/5/1920 (17). Sedbergh, male, -/5/1927 (21) Aysgarth, two males in dry stone walling, 8/10/1970. Bishopdale, dozens clustered under a concrete bridge over Bishopdale beck, -/8/1971; C. A. Howes.

Sub-Family Oligolophinae

Mitopus morio (Fabricius) (=*Oligolophus morio* Fab.: *O. cinerascens* C. L. Koch: *O. alpinus* Herbst).

Abundant everywhere in herbaceous vegetation. It has been recorded from all Yorkshire vice-counties (15).

(61) Spurn, -/7/1948, -/8/1949 (3).

(62) Spaunton Moor, -/8/1958 (31).

(63) Greenfield 14/7/1963, 3/11/1965. Warmton, 19/7/1966; L. N. Kidd. Haw Park, Wakefield, three females, 30/8/1969; D. W. Mackie. Thorne Moors, July and August, 1969 and 1970; T.M.S.G. Nostell Priory, on Rhododendrons, 10/8/1970. Sandall Beat Wood, -/8/1970; C. A. Howes.

M.m. var *alpinus* Herbst
An upland form recorded from V.C. 62, 63, 64 and 65 (15).
(65) Sedbergh, 1921, (21).

Oligolophus meadii Cambridge
A rare, predominantly south-eastern species, associated with dry heath or moorland conditions. This species is unknown on the continent and in the British Isles is only known from England and Guernsey.
(62) The only Yorkshire record is from Spaunton Moor, -/8/1958 (31).

O. agrestis (Meade)
Abundant and widespread, occurring in herbage and on trees (23). It has been recorded from all Yorkshire vice-counties. (15).
(61) Skipwith Common, male and female, 4/9/1965; D. W. Mackie.
(62) Sleights, two males and two females, 6/10/1935. Whitby, two males 8/12/1935. Mulgrave Wood female, 23/11/1935 (4). Helwath Beck, two males, 26/9/1937 (5). Whitby male, 2/1/1938 (6). Spaunton Moor, -/8/1958 (31).
(63) Haw Park, Wakefield, 3/30/1969; D. W. Mackie. Thorne Moors, males and females, July and August 1969; T.M.S.G. Denaby Ings, imm's in rotting stump of *Salix fragilis*, 10/7/1970. Black Carr, Doncaster, two females under rotten rug, 6/9/1970. Levitt Hagg Quarry, female under limestone slabs, 27/9/1970; C. A. Howes.

O. hansenii Kraeplin
An uncommon species associated with trees and shrubs, (1). It has been recorded from V.C. 61, 62 and 63 (15) but there have been no subsequent records.

O. tridens (C. L. Koch)
A common ground dwelling species recorded from all Yorkshire vice-counties. (15).
(62) Whitby, male, 29/10/1935, male 8/12/1935 (4). Sleights, male, 2/10/1937, (5). Hayburn Wyke and Falling Foss, 1936-37 (34).

Odiellus palpinalis (Herbst)
A ground dwelling species occurring amongst moss and low herbage. Although regarded as local in Britain it is known from many Yorkshire localities. It has been recorded from V.C. 61, 62 and 63 (15).
(62) Sleights, male, 2/10/1937 (5). Stainton Dale and Goathland, 1936-37 (34).

Lacinius ephippiatus (C. L. Koch)
A widely distributed species occurring in low vegetation. It has been recorded from V.C. 61, 62, 63 and 64 (15) and subsequently V.C. 65.
(61) Rillington, females, -/11/1926 (19). Spurn, -/7/1949 (3).
(63) Thorne Moors, July and August 1969; T.M.S.G.
(65) Haws, -/6/1969 (16). Sedbergh, female, 1927 (21).

Sub-Family Phalangiinae

Platybunus triangularis (Herbst) (=*P. coniger* Hermann)
An abundant and widely distributed species occurring amongst herbage. It has been recorded from all Yorkshire vice-counties. (15)
(61)Hornsea Mere, 1928, (18). Spurn, 26/28/5/1928 (7). -/6/1950 (3).
(62) Whitby, 8/12/1935 (4) Hole of Horcum, male, 31/8/1937, Goathland, male, 12/3/1938 (6).
(63) Armthorpe, specimens on algae covered sycamore trunks and amongst tall shaded grass, -/8/1969; C. A. Howes.

Megabunus diadema Fabricius
Found typically on tree trunks, dry stone walls and rocks amongst mosses and luxuriant growth of lichens. It has been recorded from all Yorkshire vice-counties (15).
(62) Hole of Horcum male, 1/5/1938 (6). Spaunton Moor, -/8/1958 (31). Dalby Forest, under slabs of stone, -/7/1971. Kepwick, under rubble in disused quarry, -/8/1971; C. A. Howes.
(63) Thorne Moors, July and August 1969; T.M.S.G.
(64) Austwick, female, winter 1921 (11). Grassington. Dib Gill, -/7/1927 (20). Oxenber 14/6/1928 (22). Malham female, 30/5/1952. Buttertubs near Askrig, males and females, 12/7/1965, D. W. Mackie. Ingleborough, -/4/1964; M. B. Usher.
(65) Aysgarth, male, 8/10/1970 on dry stone walling. Bishopdale abundant on rock outcrops, and lichen covered tree trunks, -/8/1971; C. A. Howes.

Phalangium opilio Linn. (=*P. canescens*, *P. cornutum*, *P. brevicorne*, *P. molluscorum*)
A common species occurring amongst herbage in most habitats. It has been recorded from V.C. 61, 62, 63 and 64 (15).

(61) Spurn, 1947-1949 (3).
(62) Spaunton Moor, -/8/1958 (31).
(63) Greenfield, 22/8/1965, 6/8/1966, 14-23/9/1969; L. N. Kidd. Thorne Moors, July and August 1969; T.M.S.G., Doncaster, 28/8/1970; amongst shrubs; C. A. Howes.

Opilio parietinus (De Geer)

A common species in gardens and outbuildings, on walls,fences, etc. It has been recorded from V. C. 61, 62, 63 and 64 (15).
(62) Whitby, males and females, 16/11/1935, male, 24/11/1935 (4). Sleights male, 2/10/1937 (5).
(63) Huddersfield, 1923 (18).

O. saxatilis C. L. Koch

A ground dwelling species occurring amongst grass roots, low herbage and under stones in dry situations. In Yorkshire it favours limestone and chalk districts. It has been recorded from V.C. 61, 62, 63 and 64 (15) but there have been no subsequent records.

Family Trogulidae

Anelasmocephalus cambridgei (Westwood)

A very local ground dwelling species of leaf litter, occurring mainly in chalk and limestone soils in the South of England.
(64) The only record of its occurrance in Yorkshire is of specimens collected at Malham Cove in 1961 by Dr. P. Merrett. This represents the most northerly British locality.

Family Nemastomatidae

Nemastoma chrysomelas (Hermann)

A ground dwelling species occurring in leaf litter and favouring marsh and upland habitats. It has been recorded from V.C. 61, 62, 63 and 64.
(62) Egton (4). Sleight's male and two females, 2/10/1937 (5). Mulgrave Woods, male, 29/1/1938 (6).
(63) Thorne Moors, female, -/9/1969; T.M.S.G.

N. bimaculatum (Fabricius)

A very common species occurring amongst leaf litter and under stones. Martens (25) states that *Nemastoma bimaculatum* (Fabricius 1775) has been mistakenly referred to by all modern British authors as *N. lugubre* (Muller 1776). *N. lugubre* is essentially continental in distribution, occurring mainly in eastern, central and northern Europe. All British material studied by Martens belongs to the species *N. bimaculatum* (Fab.). There is at present no evidence of *N. lugubre* (Mull.) also occurring in Britain, thus all past records of *Lugubre* should be regarded as *bimaculatum*.
(61) Spurn, 1948-49 (3).
(62) Robin Hood's Bay, 18/7/1921. Sleights, male, 2/10/1937 (5) Sleights, female, 6/10/1935. Whitby, male, three females, 22/11/1935 Mulgrave Wood, female, 21/11/1935 (4), Goathland, 5/2/1938 (6). Spaunton Moor, -/8/1958 (31).
(63) Hellifield, 30/3/1929 (8). Thorne Moors, April to July 1969; T.M.S.G. Black Carr, Doncaster, -/3/1969. Potteric Carr (Low Ellers), -/4/1971, C.A.H.
(64) Grassington, female, -/7/1927 (20).
(65) Hawes, male and female, 7-9/6/1919. Reeth, -/5/1920 (17). Aysgarth, 8/10/70; C. A. Howes.

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NOTES ON A COLONY OF PIPISTRELLE BATS AT BRANTON NEAR DONCASTER

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Despite the careful work of Arthur Whitaker around Barnsley, Adam Gordon around Helmsley, Dr. E. W. Taylor around York and Maurice Johnson around Halifax, Yorkshire bats as a whole are still very poorly known and according to Stebbings (pers. comm.) the county represents a gap in the studies of British bats.

Through co-operation with the Doncaster Rural District Health Department, Doncaster Museum was notified of the intention to remove a colony of bats from a new bungalow at the village of Branton (map ref. SE44 639016) 2½ miles to the south-east of Doncaster. This gave the rare opportunity of identifying, de-lousing, weighing and measuring a Yorkshire population of bats.

Evidence of the colony was first noticed on 19th July, 1972, when droppings were found beneath the apex of the front (south-east facing) gable. For the following days Mr. and Mrs. G. H. Lawson, the bungalow owners, made observations on the behaviour of the bats; notes from Mr. Lawson's report are as follows:—On 20th July, the droppings were removed from beneath the gable; by the following morning (21st July) a further scattering had appeared. That evening from 21.30 hours G.M.T. about 50 bats were seen to leave from small apertures between weather-boarding and facing tiles under the gable. On 22nd July, 52 bats were seen to leave, emergence commencing at 21.23 hours and terminating at about 21.45 hours. On 23rd July, emergence again commenced 21.23 hours and a total of 62 bats were seen to emerge in groups at regular intervals with stragglers in between. On 24th July, this observation was verified. Emergence commenced at 21.23 hours when about 10 left the roost, at 21.28 hours 12 emerged, by 21.33 hours the total was up to 28, at 21.38 hours 54 and at 21.43 hours 62. Observation ceased at 21.48 hours. Emergence lasted 20 minutes. This pattern of emergence differs in detail from that described by Stebbings (1968) though the principal of emergence in a series of bursts is the same and confirms the observations of Venables (1943).

On the 26th July, the colony was removed by the insertion of two non-toxic smoke candles under the weather-boarding beneath the roost. The operation lasted from about 15.00 hours to 16.30 hours. The effect of the smoke was almost immediate, much twittering and commotion could be heard from the roost, as is usual prior to normal emergence, and bats quickly emerged from three tiny exits. Quick also to leave the roost were a number of Calliphorid flies and Empid flies of the genus *Sicodus* Raf., the latter being in abundance and running about on the facing tiles of the gable. Attempts were made to catch the emerging bats in a butterfly net as they scrambled from the three exits, but for the first few seconds all the author caught were showers of bat urine and droppings. Stebbings (1968) also noted that droppings were pushed out of the entrance hole prior to emergence, though I suspect that the urination of the escaping bats was induced by panic caused by the smoke.

A total of 142 bats left the colony of which 18 were caught. Of these, a further two escaped by squeezing out from under the deep rim of the collecting box; an incident which demonstrates the amazing ability of bats to crawl into very small crevices. The remaining 16 captives were taken to an old air-raid shelter at the edge of Potteric Carr Nature Reserve (Map Ref. SE44 598011), about 2½ miles west of Branton, where they were examined for parasites, measured and weighed, before being released.

De-lousing failed to reveal any fleas, Nycteribid flies or ticks; however many males, females and protonymphs of the mite *Stetonyssus periblepharus* Kolenati were found. These were particularly obvious on the wings of the juvenile specimens.

Measurements of head and body, tail, ear, tragus and forearm were taken and are given in table 1. Due to the struggling of the specimens the accuracy of the head and body and tail measurements may not be reliable. The specimens were not sexed but observations on colouration and size indicated sex and age (see section on colouration).

TABLE 1. Measurements and weight of sixteen *P. pipistrellus* from a colony at Branton.

Specimen number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Colouration (1)	B	G	B	B	B	B	G	B	B	B	B	G	B	B	G	B
H + B in millimetres	45	42	38	40	41	40	42	45	36	48	34	45	40	48	40	41
Tail in millimetres	25	27	23	27	25	30	24	24	20	24	27	26	29	29	29	30
Forearm in millimetres	30	29	33	34	35	35	29	32	33.5	33	34	30	32	32	29	34
Ear in millimetres	11	10	11	11	10	10	10	9	11	11	11	11	10	10	10	11
Tragus in millimetres	4	4	4	5	4	4	5	4	5	5	5	4	4	5.5	4	6
Weight in grammes (2)	6	5	5.5	5	4.5	6	5	5	6	6	7	5	5	5	5	4.5

(1) B=Ginger-Brown (Adults) G=Grey-Brown (Juveniles).

(2) Weights were taken at between 16.40 hours and 17.00 hours G.M.T.

Although the weights and most of the measurements fall within the range published for *P. pipistrellus* in Britain, the forearm measurements—perhaps the most reliable data—exceed the range published to date.

TABLE 2. Comparison between the Branton *P. pipistrellus* forearm range and ranges cited in available British and European literature. (Measurements in millimetres)

Branton, Yorks.	29.0—35.0
Barrett-Hamilton (1909)	27.5—31.25
Blackmore (1964)	29.0—32.0
Brink (1967)	27.0—32.0
Hurka (1966)	28.0—34.1
Stebbings (1968)	28.7—33.6

As the Branton forearm measurements overlapped into the forearm range for *P. nathusii* Keyserling and Blasius (31—36 mm (Brink 1967)) specimen number 16, which had died from its experience, was sent to the British Museum (Nat. Hist.) for critical determination. The specimen was confirmed as *P. pipistrellus* and consequently raised the suggestion that the Branton colony may indicate a north of England cline. Stebbings (pers. comm.) tells me that from his extensive work on clines in British pipistrelles specimens from certain areas in the north of England are larger than those further south (see table 3), the largest specimens measured to date being from the Lincolnshire coast with a maximum recorded forearm length of up to 35 mm. This measurement was equalled by specimens 5 and 6 from the Branton colony.

Two colour forms were noted: in four specimens the pellage and membrane colour was a dark slate grey-brown, and in twelve were a light ginger-brown. This information is indicated in table 1. Stebbings (pers. comm.) suggested that the dark specimens represented the young of the year and that the lighter specimens were over one year old, the dark juvenile pellage being moulted after the first year. This indicated that the Branton bats constituted a nursing colony consisting of adult females and young. It also implied that abandoned young, incapable of flight, were possibly still in the roost unable to escape, in which case the operation of smoking out the colony was a serious mistake. Stebbings' comments on the composition of the colony are confirmed by analysis of forearm measurements in the two colour forms (see table 3). It also demonstrates that the mean and maximum forearm lengths of the South Yorkshire bats are greater than those of Stebbings (1968) from Dorset.

Table 3. Comparison of forearm lengths in *P. pipistrellus* populations in Branton, South Yorkshire and Charlton Marshall, Dorset. (Data from Charlton Marshall based on Stebbings (1968)).

	Grey-Brown (Juveniles)		Ginger-Brown (Adults)	
	S. Yorks.	Dorset	S. Yorks.	Dorset
Range (Min.)	29.0	28.7	30.0	30.0
(Max.)	30.0	33.6	35.0	33.1
Mean	29.25	31.3	33.1	31.51
Numbers	4	389	12	40

Bat dung was collected from beneath the roost in order to gain some data on the little-known diet of pipistrelles. Droppings which provide a useful pointer to the location of a roost, are dark brown to black, have a granular texture and are cigar shaped, tapering to a point at each end and having a characteristic corkscrew twist. Although the droppings are damp when produced, they dry very quickly (being composed almost entirely of the exoskeletons of insects) and do not leave the unpleasant odour for which bats are erroneously reputed. Being so finely chewed, the insect remains were largely unidentifiable. However, the remains of Chironomid flies and the Nematoceran fly *Anisopus punctatus* Fab. were identified.

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FIELD NOTES

Sowerby's Whale stranded in Filey Bay

On 14th October 1972 a whale was reported stranded at the foot of the cliff in Filey Bay about eight hundred yards north of Hunmanby Gap. On investigation this proved to be an adult male Sowerby's Whale (*Mesoplodon bidens* (Sowerby)) that had apparently been stranded on the ebbing tide of the evening of October 10th (high tide 6-53 p.m.). Its horizontal length from the tip of the beak to the centre of the trailing edge of the tail fluke was 14′ 3¾″; the curved length measured along the mid-dorsal line between the same two points was 14′ 11″. Colour photographs and detailed measurements were taken of the whale *in situ* on the beach and the skeleton is now in the possession of D. E. Whittaker of Scarborough.

Although a North Atlantic species, Sowerby's whale is one of the rarer beaked whales in British waters and this is only the second to be recorded for Yorkshire.

C. I. Massey.

Wilson's Phalarope—A New Species For Fairburn

At mid-day on Thursday, 7th September, 1972, 15-year old Philip Jones of Townville, Castleford, saw a pale grey wading-bird in front of the new hide at Fairburn Ings Nature Reserve and Bird Sanctuary. He made a series of notes and then returned home to consult reference books. The long needle-like bill, very white breast, small head and long neck, its swimming and its Avocet-like method of feeding in shallow water led him to believe that the bird was a Wilson's Phalarope (*Phalaropus tricolor*). Other notes which he made which also pointed to this species, included a call, "dwurti/dwurta"; the "very energetic lurching sort of walk"; the fast wing-beat in flight, when white tail and rump were noticeable; and the absence of a wing bar. He returned to the hide later in the afternoon by which time C. Winn had also spotted the bird and independently reached the same conclusion as to its identity.

Some twenty or so observers were subsequently able to watch the bird during the course of the evening, but it was not seen the following day or thereafter. Full details have been submitted to the British Birds Rarities Committee whose latest report (*British Birds*, Vol. 65, No. 8, August 1972, p.335) recalls that the Wilson's Phalarope was first recorded in Britain only as recently as 1954. Between 1954 and 1960 it was seen irregularly, but since 1961 it has been recorded annually and no fewer than 10 occurred in Britain in 1971. Most records are for June and September and the suggestion is put forward that a small population of this phalarope may now be migrating north and south in western Europe. It is a native of the north-western part of North America. If this suggestion in *British Birds* is correct, it is interesting to speculate whether in time a new breeding area for the species may be discovered.

Previously the Wilson's Phalarope has been recorded in Yorkshire on 20th and 21st June, 1965 at Scaling Dam; and again at the same place on 22nd June, 1966 when an adult female in breeding plumage was found dead. The Fairburn bird would appear to be the third for the county.

R. F. Dickens

The Occurrence of *Dytiscus circumcinctus* Ahrens at Spurn

Through the kindness of Dr. S. L. Sutton, I paid my first visit to Spurn on August 19th, 1970. Towards the end of the day I collected in the bomb-crater pond, just across the field from the staff-house. Here I took a fine male of *Dytiscus circumcinctus* Ahrens. This species is an addition to the list of Coleoptera given in *The Entomology of Spurn Peninsula*, (reprinted from *The Naturalist*, 1951-54, see page 133). F. Balfour-Browne (in *British Water Beetles*, London, Ray Society, 1950, vol. II, p.279) states that in regard to South-East Yorks.: "There was what might be called an outbreak of the species from 1912 to 1914, when a number of specimens were taken by W. J. Fordham and E. G. Bayford at Bubwith and at Skipwith, but since that period the only record is one by Fordham in 1918, when he found one in a tub at Thorganby, within a few miles of the other localities." He further states (p.278) that: "whereas *circumflexus*" (already recorded from Spurn) " has its centre in Southern Europe, *circumcinctus* is a more northern species, not common in the British Isles. It is the only one of our species which has both forms (smooth and sulcate) of female about equally common in this country." So far as published records for this century go, South-East Yorkshire appears to be the northernmost limit of its range. Should female specimens be found it would be of interest to know to which form (smooth or sulcate) they belong.

E. J. Pearce

POTAMOPYRGUS JENKINSI SMITH, AT MALHAM, WITH PARTICULAR REFERENCE TO ITS INVASION ECOLOGY

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The following note is derived from a more detailed survey (to be published elsewhere) concerned with the species composition of gastropod communities in Malham Tarn. Work on the Mollusca at Malham began with Soppitt and Carter (1888) and was most recently carried out by Stratton (1956). The present survey was undertaken between August 1968 and August 1971 and has essentially been involved with a quantitative extension of Stratton's qualitative findings.

Table 1 shows a summary chart of snail species distributions throughout various parts of the Tarn, both in terms of results from the present survey and Stratton's own observations. Fig. 1 shows the location of sampling sites, and position of weed beds within the Tarn. It should be noted that there is only one isolated patch of the pondweed *Elodea canadensis* Michx. outside the north-west boathouse, where it has apparently remained since its introduction in July 1962 (Holmes, 1965).

Of particular interest is the case of *Potamopyrgus jenkinsi.* This species is the most recent molluscan colonist of fresh-waters, making the transition from its original brackish location around the turn of the century. Robson (1923) has discussed reasons for this transition and its history of colonisation is well documented (see Robson, 1923 and Boycott, 1936, for England; Hunter and Warwick, 1957, for Scotland; Bondesen and Kaiser, 1949, for Denmark; and Hubendick, 1950, for the whole of Europe). Warwick (1944, 1952) suggests that there are probably several distinct races within the species.

Figure 1: Distribution of major weed beds within the Tarn (after Philipson, 1968, but checked August 1969) and position of the sampling stations. Squares indicate stations in weed beds, circles on the rocky shores.

Potamopyrgus was not recorded in Malham Tarn until 1950 (Stratton, *op. cit.*) although it had been found in Coniston Tarn, 6½ miles south of Malham, by 1928 (Fysher, 1929). Reduced dispersal rate of this species in highland, compared with lowland, areas seems to be typical (Hunter and Warwick, 1954). Its subsequent course of colonisation in the Tarn is described by Holmes (1955), from whom the following description is a summary. *Potamopyrgus* was originally recorded from around the mouth of the inflow stream but by 1954 it had become very abundant along most of the north shores as far as "Three Trees Point", and also in the offshore *Chara* beds. In August 1954 some 2,000 snails were transplanted beyond the Point and by the following year had begun to spread slowly. In 1958 and 1959 however total densities of *P. jenkinsi* fell drastically in all locations, although between this time and Holmes's publication in 1965 *Potamopyrgus* was again apparently undergoing slow recovery and recolonisation. There are no further records after 1965 until the present survey.

TABLE 1: A qualitative illustration of the distribution of Gastropoda in Malham Tarn, both in terms of the present survey (X) and results compiled from Stratton (1956), (S). Sampling stations are defined in Fig. 1.

STATION NAME	Three Trees Bay		Ha Mire Shore				*Elodea*			*Chara*	*Myrio-phyllum*	*Potamo-geton*	North east sedge bed
Species list / Station number	1	2	3	4	5	6	7	8	9	10	11	12	13
Subclass EUTHYNEURA order PULMONATA													
Ancylus fluviatilis Müll.	X	XS	X	X	X	X	X	X					
Planorbis conortus L.	X	XS	X	X	X	X	X	X	X	X	X	X	X
Planorbis albus Müll.	X	XS				X			X	X	X	X	
Planorbis crista L.	X	XS				X			X	X	X	X	
Planorbis leucostoma Millet													X
Lymnaea stagnalis L.	X	XS	X	X	X	X	X	X		XS	XS	XS	S
Lymnaea pereger Müll.	X	XS	X	X					X	X	X		S
Lymnaea palustris Müll.		S							X	X	X	XS	S
Physa fontinalis L.		X								X	XS	XS	X
Subclass STREPTONEURA order PECTINIBRANCHIA													
Bithynia tentaculata L.		S		X		X			X	S	XS	XS	
Valvata cristata Müll.		S								X			
Valvata piscinalis Müll.		S							X	XS	XS	XS	X
Potamopyrgus jenkinsi Smith		S							X	S			

Table 1 shows that *Potamopyrgus* is now strictly confined to the equally limited *Elodea* bed, so that between 1965 and the present time its total Tarn density must again have fallen. This pattern of initial rapid invasion and dispersal, followed by dramatic reductions in density and restrictions in distribution seems to have been typical (Boycott, 1936; Macan, 1950), and may be characteristic of any new colonist whilst finding its ecological place within the indigenous fauna (Elton, 1958).

The present association between *P. jenkinsi* and the Canadian pondweed may be significant. Certainly the invasion of British fresh-waters by both these species seems to have been related and Robson (1923) suggests that *Elodea* may have prepared the way for *Potamopyrgus* by contributing some factor to its food supply. It should be noted however that *Elodea* appeared in the Tarn in 1962, after the initial invasion of the snail (Holmes, *op. cit.*) and that *Potamopyrgus* does not eat weed tissue directly, only the encrusting epiphytes (Robson, *op. cit.*). This latter behaviour is similar to that of *Lymnaea pereger* populations living on *Elodea* (Calow, 1970).

It seems likely therefore that *Elodea* merely provides a suitable refuge for *Potamopyrgus* either against the direct action of predators or from competition with other snails. From this point of view it is interesting to note that although other species of gastropod do occur within the *Elodea* bed, *P. jenkinsi* is by far the most abundant (see Fig. 2) and also that some snails apparently find *Elodea* tissue toxic (Gaevskaya, 1966). Whether or not the *P. jenkinsi* population has ultimately become stabilised within the Tarn remains to be seen.

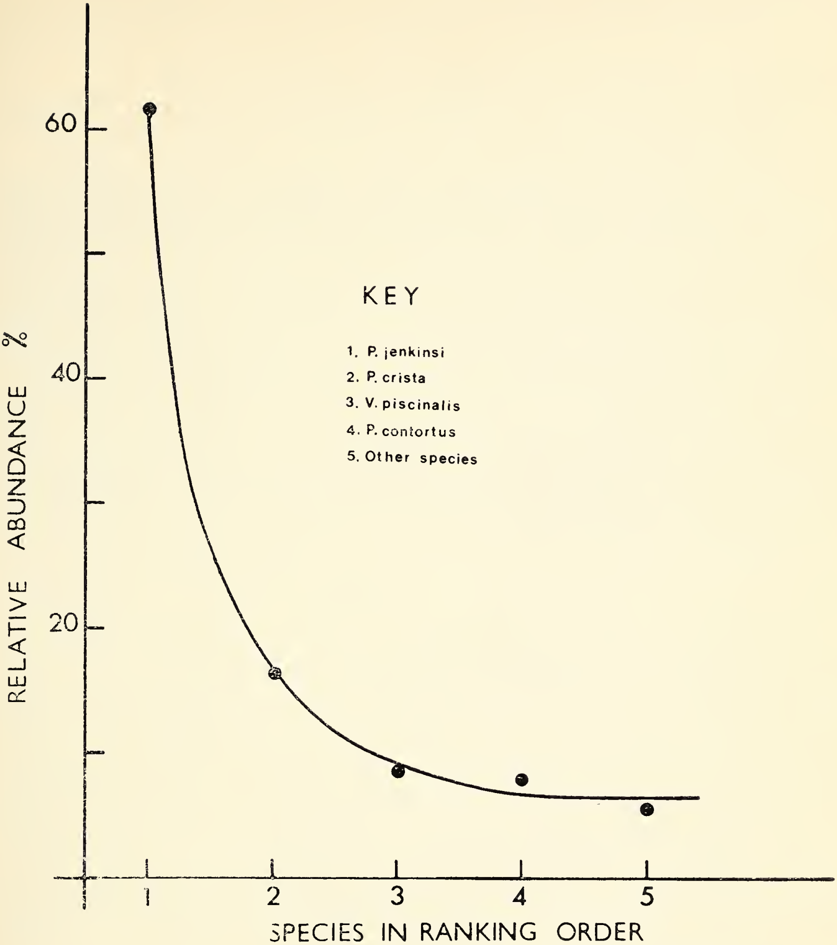

Figure 2: Relative abundance $\left(\frac{\text{(no. of particular spp. in sample)}}{\text{(total no. of all spp.)}} \times \frac{(100)}{(1)}\right)$ v. ranking order of species in the *Elodea* bed. Results are the average of 3 samples taken with a Philipson (1968) grab in August 1969, when there were *ca.* 1,000 snails/kg spun dry weight of weed.

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Drosophila by **Bryan Shorrocks.** Pp.144 with 53 figures and 8 plates. Invertebrate Types series, Ginn & Co., London, 1972. £2·25.

Drosophila is the fruit-fly, invented by geneticists just after the turn of the century and since kept in increasing numbers in bottles in laboratories. So much is common knowledge, but it is an unbalanced view. There are real wild native *Drosophila* species in the natural world around us, and one may even as you read this review be prospecting that slightly over-ripe banana in your dining room. Dr. Shorrocks reminds us of these other fruit-flies so generally neglected in favour of their much-mutated domesticated brethren, and indeed he indicates that the study of natural *Drosophila* populations is a disregarded field of great potential interest, a study that can moreover be readily undertaken by groups or individuals with limited resources. Until now the necessary taxonomic information has not been readily accessible, but Dr. Shorrocks provides an illustrated key to the British species, together with notes on the habitat preferences of the various species and advice on how to collect, study and keep them.

More conventional aspects of *Drosophila* are also treated. There are chapters on the general biology, on the laboratory life-history, and on the practical application of *Drosophila* for the demonstration of basic genetical principles. All of this material is handled very competently, though there are some small lapses. The clarity of description of cytological procedures could be improved in places. Entomological innocents attempting to use the taxonomic key may be initially put out of countenance by the term 'mesotonum', which is not labelled on any of the figures, although an explanation of its meaning can be discovered by careful search of the text.

Splendid features of the book are the numerous very elegant line drawings and the colour plates, which are simply beautiful and truly constitute examples of biological art of outstanding quality. All of these are by Hilary Burn.

This is a practical and useful book which deserves to be amongst the personal equipment of most zoology and all genetics undergraduates, though such a state of affairs is unlikely to come about unless the publishers can see their way to producing a paper-back edition.

J.D.L.

SWIMMING SPEEDS OF SOME CILIATED PROTOZOA FROM A EUTROPHIC POND

Susan W. Jones and R. Goulder

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Priest Pot is a eutrophic pond of area about 10,000 m^2 and maximum depth 3 to 4 m which is situated near Hawkshead, North Lancashire (Grid Ref. SD 357978). The vertical distribution of planktonic ciliated Protozoa and of some physical and chemical features in this pond have been described by Goulder (1971, 1972). The situation in summer may be demonstrated by a set of data collected at 14.00 G.M.T. on 12th August, 1971 which is illustrated in Fig. 1. The graphs in this figure are compiled from data published in Goulder (1972) and the reader is referred to that paper for details of methodology. Fig. 1 shows that the pond was stratified with an oxygen deficient hypolimnion and that *Loxodes magnus* Stokes and *Loxodes striatus* Penard, which were the most common ciliates present, were confined to the hypolimnion. A taxonomic description of these species may be found in Kahl (1930-35). Although the most dense populations of *Loxodes* were found towards the top of the hypolimnion, where there were probably traces of oxygen, quite dense populations occurred even at the bottom of the hypolimnion where conditions were probably completely anoxic. Both *L. magnus* and *L. striatus*, however, require oxygen and, therefore, Goulder (1971) suggested that the *Loxodes* which live in the anoxic water might, from time to time, migrate vertically

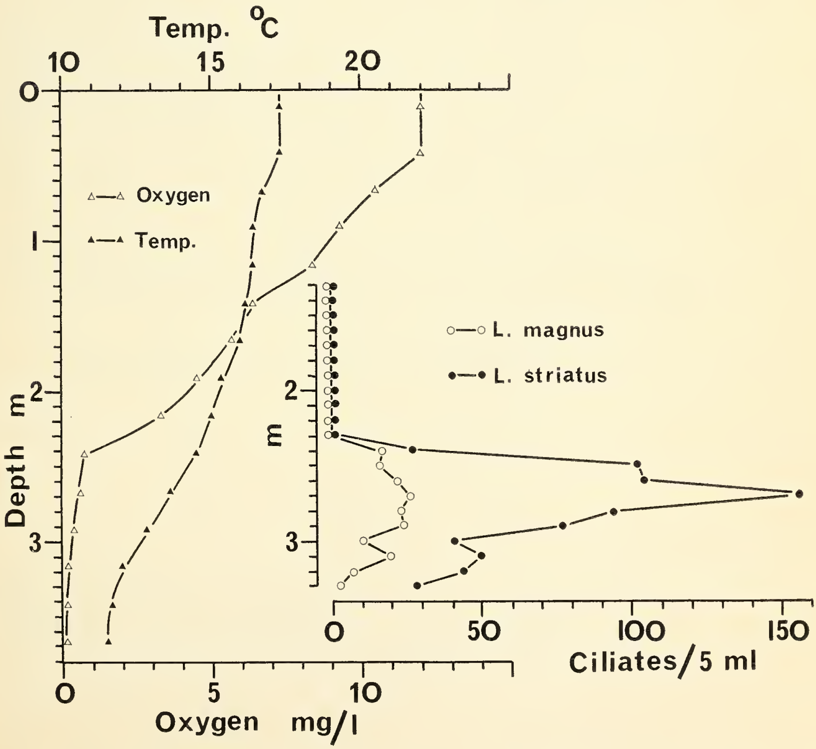

Fig. 1. Profiles of oxygen concentration and temperature for the whole water column, and number of *Loxodes magnus* and *L. striatus* from 1.3 to 3.3 metres depth, in Priest Pot at 14.00 G.M.T. on 12th August, 1971.

to an oxygen supply at the boundary between the hypolimnion and the well-oxygenated epilimnion. During summer 1971, while evidence was being collected in support of this suggestion (Goulder, 1972), it became apparent that one piece of information required was the swimming speeds of the ciliates. At that time, one of us (Susan Jones) needed a project to work on as part of the Biology Advanced level G.C.E. syllabus of the Northern Universities Joint Matriculation Board and it seemed that the measurement of these swimming speeds might be a suitable topic.

The purposes of the work described in the present paper were, therefore, firstly to measure ciliate swimming speeds as part of a wider study of these organisms and secondly to demonstrate that, with suitable supervision and the desire to concentrate on a clearly defined and manageable objective, useful ecological information can be obtained by sixth-form students.

Methods

Swimming speeds were measured in July 1971 using a low-power microscope (magnification x 33) with field radius 1.9 mm, which was fitted with a graduated eyepiece enabling the exact centre of the field to be easily located, and a mechanical stage. Illumination was provided by a separate lamp and a sub-stage mirror, which ensured that the stage was not warmed by the light source. Water which contained ciliates was collected from the hypolimnion of Priest Pot using a one litre Friedinger sampler as described in Golterman (1969). Half the measurements were made in a refrigerated room which was maintained at 10°C and before these were made the water was stored at that temperature for some hours. The procedure was to transfer a drop of water onto a microscope slide, using a Pasteur pipette, and to scan the drop under the microscope. When a ciliate was located the stage was traversed until the ciliate was at the exact centre of the field then the time taken for the ciliate to swim the distance from the centre to the edge of the field (that is the field radius of 1.9 mm) was measured using a stop-watch, and the speed was calculated. This procedure was repeated, using further drops of water, until the swimming speeds of at least 30 individuals of each of the two *Loxodes* species had been obtained. A second sample of water which contained ciliates was kept for a few hours at normal July room temperature (20°C) and then the swimming speeds of these ciliates were also determined, but this time the measurements were made at normal room temperature.

Some errors of the technique may be briefly mentioned. (1) Not all individuals proceeded in a straight line from the centre to the circumference of the field; results obtained from individuals which followed an obviously devious course were, however, disregarded. (2) Cover-glasses were not used, in order not to constrict the ciliates between slide and cover-glass; this meant that the ciliates may not, at all times, have been swimming parallel to the slide surface. (3) The shock caused by manipulation and illumination under the microscope may have affected swimming speeds.

Table 1. Mean swimming speeds ($\bar{x}$ mm/s) of *Loxodes magnus* and *L. striatus* at 10°C and 20°C, s = standard deviation and n = number of individuals measured.

	$\bar{x}$	s	n
Temperature 10°C			
L. magnus	0.32	0.08	31
L. striatus	0.22	0.06	44
Temperature 20° C			
L. magnus	0.47	0.07	31
L. striatus	0.39	0.09	30

Results and Discussion

The results are given in Table 1. The swimming speed of *L. magnus*, which is the larger of the two species (length 400—600 *u*m), was greater than that of *L. striatus* (length 150—200 *u*m) at both 10°C and 20°C. The speeds of both species were higher at 20°C than at 10°C but of these two temperatures, 10°C is the one nearest to that of the summer hypolimnion (see Fig. 1). Goulder (1972) found by experiment that these *Loxodes* species can only survive 5 to 10 hours away from an oxygen supply; however if they swim at the speeds measured at 10°C (0.32 mm/s for *L. magnus* and 0.22 mm/s for *L. striatus*) they could complete the return journey between the top of the hypolimnion and the bottom mud (about 2.5—3 m) within the 5 to 10 hours limit. Therefore the data obtained in this study do not contradict the suggestion that the ciliates in the hypolimnion are in a dynamic state and constantly swim between the upper boundary of the hypolimnion and the bottom mud.

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F. A. LEES' BOTANICAL COLLECTIONS: PART 4

M. R. D. SEAWARD

This is the final paper relating to the lichen collection of F. A. Lees housed in the Cartwright Hall, Bradford. My previous papers (Seaward, 1968 and 1970) have dealt with his Lincolnshire and Yorkshire material respectively; in the latter case, material of collectors other than Lees was analysed. An analysis of the remaining 180 packets of his lichen collection is made here and the material collected by Lees, together with the Yorkshire records which escaped notice in the previous examination (Seaward, 1970), is given in more detail. The following list gives details of collector, areas and dates of collections, and the number of packets (in parentheses):

Armstrong, J., South Northumberland, 1883 (4).

Curnow, W., Cornwall, Devon and Scilly Isles, 1871-1877 (41).

Fraser, Dr., Worcestershire, 1881 (1).

Hick, T., *Baeomyces roseus* Pers., *Cladonia polydactyla* (Flörke) Spreng. and *Pannaria pezizoides* (Web.) Trevis., Egton, North-east Yorkshire, March 1880 (3); omissions from Seaward, 1970.

Holmes, E. M., Merioneth, c.1880 (1).

Lees, F. A., full details of 44 gatherings given below.

McAndrew, J., Kirkcudbright, 1881-1884 (6).

McKinley, A., Mid Perth, n.d. (1).

Pickard, E. S., West Cornwall, 1898 (1).

Waterfall, W. B., Cornwall, Devon, Somerset and West Gloucestershire, 1880-1884 (62).

West, W., Argyll, Buckinghamshire, Cantyre, Cumberland, Mid Perth, South Aberdeenshire, Westerness and Westmorland, 1880-1909 (16).

MATERIAL COLLECTED BY F. A. LEES:

Baeomyces rufus (Huds.) Rebent. Old sand rocks, nr. Redstone Cliff, Lower Mitton, Worcs., March 1883.

Buellia canescens (Dicks.) DNot. On beech, Streatley Hill, Berks., September 1883.

Cladonia arbuscula (Wallr.) Rabenh. Warren Wood, Kidderminster, Worcs., March 1883.

C.chlorophaea (Flörke ex Sommerf.) Spreng. Warren Wood, Worcs., March 1883.

C.coccifera (L.) Willd. Spring Grove Wood, nr. Bewdley, Worcs., March 1883.

C.furcata (Huds.) Schrad. Devil's Spittleful and Spring Grove Moor, Worcs., n.d.

C.gracilis (L.) Willd. Warren Wood and Spring Grove Moor, Worcs., March 1883.

C.impexa Harm. Moor, above Devil's Spittleful, Worcs., n.d.

C.rangiformis Hoffm. Sweep Lane, 1½ miles S. of Wetherby, mid-west Yorks., February 1880. (An omission from: Seaward, 1970).

C.tenuis (Flörke) Harm. Warren Wood, Worcs., 1883.

C.uncialis (L.) Web. Warren Wood and Spring Grove Moor, Worcs., March 1883.

Collema tenax var. *vulgare* (Schaer.) Degel. Old oolitic wall, Blockley, Worcs., June 1883. (Locality not traced).

Cystocoleus niger (Huds.) Hariot Damp rocks, Redstone Cliff, Worcs., March 1883.

Diploschistes scruposus (Schreb.) Norm. Crumbling red sand rocks by road, Giant's Grave, Habberley Vale-head, Worcs., January 1883.

Evernia prunastri (L.) Ach. Furnace Pool, Horsmonden, W. Kent, December 1883; Wyre Forest, Salop., 1883.

Graphis elegans (Borr. ex Sm.) Ach. On hollies in beech wood, above Streatley, Berks., September 1883; on holly, nr. Uncless, Wyre Forest, Worcs., February 1883; on beech, just above Whitfell Force, North-West Yorks., June 1884. (An omission from: Seaward, 1970).

G.scripta (L.) Ach. On beech, Streatley, Berks., September 1883; bole of young ash tree, Shrawley Wood, Worcs., March 1884.

Lecanora campestris (Schaer.) Hue Rocks, nr. Giant's Grave, Habberley Vale-head, Worcs., January 1883; on gravestones, Stone, Worcs., January 1883.

L.chlarotera Nyl. On poplar, Shiplake (Berks. side of boundary), September 1883; on beech boles, in wood above Streatley, Berks., September 1883.

Ochrolechia parella (L.) Massal. Rocks, nr. Giant's Grave, Habberley Vale-head, Worcs., January 1883.

Opegrapha atra Pers. Old pollarded ash, by path from Lower Mitton to Redstone Cliff, Worcs., March 1882.

O.rufescens Pers. On ash, Habberley Vale-head, Worcs., January 1883.

O.vulgata (Ach.) Ach. On oak, Redstone Cliff, Worcs., March 1883.

Parmelia caperata (L.) Ach. On oak, Furnace Pool, Horsmonden, W. Kent, December 1883; main fork of Fenny Rough, Stone, Worcs., February 1883; on oak boles, Shrawley Wood, Worcs., March 1883.

P.physodes (L.) Ach. Main fork of Fenny Rough, Worcs., February 1883; Wyre Forest, Salop., March 1883.

P.subaurifera Nyl. On beech, Streatley, Berks., September 1883.

P.tubulosa (Schaer.) Bitt. On poplar, Shiplake, Oxon., August 1883.

Peltigera canina (L.) Willd. Warren Wood, Worcs., February 1883.

Pertusaria amara (Ach.) Nyl. On rocks, Giant's Grave, Habberley Vale-head, Worcs., January 1883.

Phlyctis argena (Ach.) Flot. On beech, Streatley, Berks., September 1883.

Ramalina calicaris (L.) Fr. Walls, Streatley, Berks., September 1883.

R.farinacea (L.) Ach. On tree boles, Furnace Coppice, Horsmonden, W. Kent, December 1883.

Usnea subfloridana Stirt. Wyre Forest, Salop., 1883.

Xanthoria parietina (L.) Th. Fr. Wall, Lea Castle, Worcs., March 1883.

The entire lichen collection (Seaward, 1968 and 1970. and the above lists) is made up of 445 gatherings (179 taxa = over 12% of British Flora), and the following genera are represented:

Alectoria (12)	*Dimerella* (1)	*Nephroma* (4)	*Solenospora* (1)
Anaptychia (9)	*Diploschistes* (3)	*Ochrolechia* (6)	*Solorina* (8)
Arthonia (1)	*Enterographa* (2)	*Opegrapha* (6)	*Sphaerophorus* (12)
Arthopyrenia (2)	*Ephebe* (1)	*Pannaria* (2)	*Squamarina* (5)
Bacidia (1)	*Evernia* (8)	*Parmelia* (65)	*Stereocaulon* (2)
Baeomyces (5)	*Graphina* (1)	*Peltigera* (10)	*Sticta* (6)
Buellia (2)	*Graphis* (8)	*Pertusaria* (5)	*Teloschistes* (3)
Caloplaca (8)	*Gyalecta* (4)	*Phlyctis* (1)	*Thelidium* (1)
Candelariella (1)	*Haematomma* (4)	*Physcia* (22)	*Thelotrema* (1)
Catillaria (2)	*Lecania* (2)	*Placopsis* (2)	*Toninia* (5)
Cetraria (14)	*Lecanora* (11)	*Placynthium* (1)	*Umbilicaria* (11)
Cladonia (43)	*Lecidea* (13)	*Protoblastenia* (1)	*Usnea* (5)
Collema (23)	*Lepraria* (3)	*Pseudocyphellaria* (2)	*Verrucaria* (3)
Cornicularia (3)	*Lobaria* (13)	*Ramalina* (21)	*Xanthoria* (8)
Cystocoleus (1)	*Menegazzia* (1)	*Rhizocarpon* (12)	
Dermatocarpon (9)	*Mycoblastus* (2)	*Roccella* (1)	

It is regrettable that these 445 gatherings, together with the occasional packet in the British Museum (Natural History), South London Botanical Institute and author's herbaria, are all that remain to substantiate Lees' extensive lichenological activities, especially in Yorkshire and Lincolnshire, and his work as Curator and Recorder of the Botanical Locality Record Club. Many of Lees' records for Lincolnshire are unlocalized (see Seaward, 1966); habitat and locality data would have been particularly valuable in the detailed British distributional analyses of early and recent records (e.g. *Lobaria pulmonaria*) at present being undertaken.

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BOOK REVIEWS

The Concise Flowers of Europe by **Oleg Polunin.** Pp.xx + 108 with 192 colour plates depicting about 1,000 species. Oxford University Press, 1972. £1·95.

This book consists of all the coloured illustrations used in the author's *Flowers of Europe* with a much condensed and simplified text designed to enable identification by non-botanists. The species are arranged according to habit—herbs, shrubs, trees, etc.—and these are then subdivided according to flower colour and further subdivided into groups based on large, medium and small size of flowers and whole plants. The resulting sequence thus brings the most diverse species together. Individual descriptions are very brief (a dozen to the page) but a series of marginal symbols attached to each species gives information on flower form, habitat and distribution. No doubt the system will work satisfactorily for most species but there are bound to be snags in such an arrangement. Will the layman who finds *Dryas* search amongst the shrubs when he tries to track it down? However, with the coloured photographic illustrations which form the essential feature of the book working out at about five flowers to the penny, he can hardly complain of not getting value for money.

W.A.S.

The Flowering Wilderness by **Uberto Tosco.** Pp.128 with 129 colour plates. Orbis Books, London, 1972. £1·95.

This book sets out to give a picture—verbal and visual—of world vegetation. It covers forests, savannas and steppes, swamps, deserts, tundras and mountain vegetation. There are sections devoted to palms, lianas, orchids and cacti, to myrmecophilous and insectivorous plants, and to timbers, spices, fruits, drug and crop plants. To cover so wide a spectrum the narrative part is necessarily brief. But it is the lavish provision of illustrations which forms the outstanding part of the book. Both the quality of the colour photographs and their reproduction are quite superb. They portray habitats and species with a clarity and beauty which could scarcely be surpassed. Both author and illustrators are Italian and the book is printed in Italy. One doubts if any British firm could produce so richly illustrated a book at so low a price.

W.A.S.

A Field Guide to Australian Wildflowers by **Margaret Hodgson & Roland Paine.** Pp.251 with 96 colour plates. Rigby, distributed by Frederick Muller Ltd., London, 1972. £3·20.

In essence this book consists of paintings by Margaret Hodgson of 384 Australian flowers, with each illustration accompanied by a brief description. All of the plants are depicted in a very distinctive stylised form. The overall effect although unusual is charming and attractive. It is clear that the authors have taken considerable pains to obtain taxonomic accuracy, but have not succeeded in totally excluding curious minor infelicities such as "*Acacia longifolia* var. sp.". The range of the book extends through all of the States of the Commonwealth. 384 species is only a small sample of the many thousands present in the very rich Australian flora and therefore the value of the book as a field-guide must be limited. However, the sample is well-balanced, and the book can be recommended to readers on this side of the world who would be interested in a pictorial indication of the character of the Australian flora.

J.D.L.

The Unknown Ocean by **Richard Parry.** Pp.288. Volume 1 of The Many Worlds of Wildlife Series. David and Charles. 1972. £3·25.

This is a book for naturalists, and anyone interested in life below the surface of the sea, to read for pleasure. If one settled down comfortably in an armchair after a good dinner and discussed with friends of similar interests the fascinating organisms, particularly the animals, which inhabit the oceans and what we know and do not know about them and their habits and ways of life the ensuing conversation would be very like this book. The difference would lie in the fact that the author has the answers to a number of the questions that would be asked, and most readers will undoubtedly learn something new. The style is pleasant and the reader's visual sense is also satisfied by a number of pen and ink portraits of the animals. Very much a book for cold winter evenings.

I.W.

Collins Guide to Aquarium Fishes and Plants by **Anne Schiotz.** Pp.223 with over 400 coloured illustrations by Preben Dahlstrom. Collins. £2·50.

In recent years a large number of books have been published for aquarists, some good, many bad. This is one that both beginner and expert will want to keep readily to hand. The aim of the book is to give a basic account of the main aquarium fish and plants from freshwater, brackish water and the sea. The author guides the reader through all aspects of fishkeeping and explains in non-technical language how to set up a tank, how to lay out gravel, rocks and plants for an effective display, and describes the equipment required to maintain the aquarium in peak condition. Diseases of fish are not forgotten and a comprehensive section shows how diseases may be diagnosed and treated. Over 400 aquarium fish and over 50 aquarium plants are described. For each fish are given notes on its names, country of origin, size, variety, habits, required water temperature, lighting, feeding, social and other aquarium conditions. The superb quality of the colour illustrations by Preben Dahlstrom make this book remarkable value. 'Guide' it may be, but the knowledge packed into the text is encyclopaedic.

C.I.M.

Nemerteans by **Ray Gibson.** Pp.224 with 4 plates (2 in colour), 33 figures and 7 tables. Hutchinson University Library, 1972. Hardback £3·00; Paperback £1·75.

The nemerteans, or ribbon worms, can hardly be rated as one of the more popular or familiar animal phyla. Even among professional zoologists knowledge of the group is not remarkable for its depth or even its incidence. This deficiency, while partly due to the reticent habits of the animals themselves, is certainly also associated with the lack of an up-to-date and authoritative reference text. The latter omission has certainly been more than adequately repaired by Dr. Gibson's excellent book.

A lengthy and detailed account of nemertean functional morphology is followed by shorter, although no less critical, chapters on nutrition, general physiology, asexual reproduction and regeneration, sexual reproduction and embryology, ecology and zoogeography. The text is rounded off by a brief discussion of possible phylogenetic relationships and, in an appendix, the classification of the phylum to family level. There is an excellent index and a comprehensive bibliography.

It is difficult to recommend too highly Dr. Gibson's informative and enthusiastic summary of nemertean structure and biology. The book is virtually free from blemishes apart from an obtrusively contrived cover picture and a mis-statement on p.104 of the relationship between the angle of basement membrane fibres and the degree of body contraction. It deserves the widest possible readership not only for its factual content but also for the exemplary way in which it is presented.

R.W.O.

Fossils for Amateurs by **Russell P. MacFall and Jay C. Wollin.** Pp.ix + 341. Von Nostrand Reinhold Company, 1972. £3·95.

This volume will be welcomed by all who are interested in and collect fossils, not only the amateur for whom it is primarily written but also the professional palaeontologist who may well glean some useful tips from its contents. There are sections devoted to the nature of fossils, where they occur and where to look for them, and field practice including the interpretation of maps. Especially useful are the chapters dealing with the preparation, cleaning and display of fossils, including special techniques such as grinding thin sections, peeling, and casting. Microfossils receive separate treatment. The closing chapter is a brief review of fossils by phyla and covers plants and the invertebrate animals (vertebrates are intentionally not treated in the book for reasons explained in the opening chapter). The volume concludes with an appendix of maps showing fossil areas of the U.S.A., together with a list of recommended books. A wealth of excellent photographic illustrations accompanies a most readable text. Though the book is written for American collectors, the major part of its contents is of universal application and of equal usefulness to fossil collectors in other countries.

A.W.

Conservation in the Soviet Union by **Philip R. Pryde.** Pp.299, with 23 black and white photographs and text figures. Cambridge University Press, 1972. £5·00.

When an American geographer writes the first ever comprehensive review of conservation and management of natural resources in the Soviet Union, then one can believe that it really is "a small world." It is also equally apparent to the reader of this book that conservation is a global concern. Since this book is a first in so many ways, it is difficult to offer any comparisons but the author, with a unique knowledge of conservation in the United States of America and the Soviet Union, guides the reader through the subject with authority and erudition. Land and water, soil erosion, forestry, air pollution and so on pose problems which are not unique to any country or continent. These and more form the themes of the first section of this book. Every development of conservation, the fight against pollution, and the utilisation of resources is contained in the first part of the author's text.

The second part of the book is a mass of appendices, notes and a comprehensive bibliography. Excerpts from laws on the Conservation of Nature in the Soviet Union may not sound very inspiring but, presented with their natural ancillaries which range from recommended procedures for implementing these laws to outlines of conservation courses for inclusion in schools curricula, they form the basis on which the whole structure of a government's concern for its heritage rests. Personally, I found this section of great interest—sufficient indeed to hope that one day it may be possible to obtain texts of similar laws for all nations for whom conservation is a real concern.

Lest it be thought that this book chronicles a perfect system, it should be pointed out that there are controversies raging about certain areas of conservation in Russia, just as there are elsewhere. The wastage of timber resources is condemned in a plea by Leonid Leonov—in the form of a satirical essay with statistics. Professor Pryde discusses the current concern over Lake Baikal, where industry and a unique environment have been threatening a head-on collision for some time. A bulletin of the Novosti Information Service, issued on 30th October, 1972, indicates that a settlement has been arrived at and that the pulp works, the tourists and the unique fauna of this inland sea will live happily ever after.

One can hardly commend this book too highly; it contains so much information which is potentially useful to so many people. For the naturalist there is information on the current state of faunal, and some floral, rarities; the conservationist, whether professional or voluntary may have his views on the creation and dissolution of nature reserves influenced; the planners and the industrialists too may learn something to their advantage, as may the political agents of conservation. Perhaps with the wider dissemination of information such as this, the day when conservation is the concern of everybody, governments and individuals, may yet arrive. Until then, article 21 of the 1960 law "On the Conservation of Nature in the R.S.F.S.R." offers a clear line in legislation for those guilty of abuses against conservation. "Citizens who are guilty of unlawfully using or damaging natural wealth shall be held in administrative or criminal liability, accountable for the losses caused by them, in accordance with established legal procedures."

T.M.C.

S.O.S. Save the Earth by **Giancarlo Masini** with an introduction by the Rt. Hon Anthony Crosland. Pp. 49 with numerous illustrations. Collins, 1972. £1.50.

A book which attempts to "bring home the message" of pollution to children, containing facts, concisely written, and intriguing lids to lift displaying these facts in full colour drawings.

The first half of the book deals with the environment, the biosphere, the ecological niche, food chains and associations (parasitism being the only one specifically named) whilst the second half shows man's influence on these and the dangerous situation caused by pollution of land, sea and air. The book is simply written and lavishly illustrated and will be enjoyed by the well-informed 9 to 12 year old. It was first published on the continent where, we are told, "it has been a runaway success", being adopted by schools and youth groups studying environmental and pollution problems. The high price is accounted for by the large number of full colour diagrams.

F.J.T.

Deer of the World by **G. Kenneth Whitehead.** P. 194, with one colour plate and 32 pages of black and white photographs. Constable, London, 1972. £5.00.

This is a modern look at the Deer family, treating all the forty species of extant or recently extinct forms. Similar treatment has been attempted in recent years for cetaceans, seals, the cat family and so on, but none, in my opinion, comes near the standard of this work for thoroughness. The lay-out, with the deer of broad geographical areas placed together, allows an economic style which crams the book with facts whilst retaining a feeling of spaciousness. Twenty-seven distribution maps cover the ranges of all the species and allow the most up-to-date information on the distribution of racial forms to be given.

Everyone with an interest in deer, whether they are field naturalists or wildlife park habitues, should have access to this book. If at first glance the price appears off-puttingly high, the buyer should take some consolation from the fact that books as good as this only appear at infrequent intervals. As the jacket blurb indicates, it is now seventy years since the publication of Richard Lydekker's *Deer of all Lands* — and a good copy of that now fetches a hundred pounds! T.M.C.

Wildlife Conservation and Dead Wood by **Alan E. Stubbs.** A Supplement to the Journal of the Devon Trust for Nature Conservation. Pp.18, obtainable from the Devon Trust for Nature Conservation, 2 Pennsylvania Road, Exeter, EX4 6BQ. Price: 20p plus postage.

At a time when in some quarters conservation seems to be becoming almost synonymous with cleanliness and tidy mindedness it is salutary to be reminded of the important part that decay plays in the scheme of things. Dead trees and decaying logs and branches provide habitats for many kinds of insects as well as other animals and this paper is a well written account of the place of dead wood as a vital component of the forest ecosystem. Mr. Stubbs gives a concise account of the succession of animal species associated with decaying wood and of suggested conservation practices to be followed to ensure a regular supply of this scarce biological resource. As the writer points out: "To study it is often to destroy it, therefore an ample supply is required," a sentiment with which most entomologists would heartily agree.

The Devon Trust for Nature Conservation is to be congratulated on publishing Mr. Stubbs' paper in this illustrated booklet form. I feel sure that it will become a standard guide and should be required reading for anyone involved in the management of nature reserves.

R.C.

The Woodland World by **S. A. Manning.** Pp.64 with numerous black and white photographs. World's Work Ltd., Kingswood, 1972. £1·45.

This slim volume is presumably designed to stimulate children, of an unspecified age, to develop an enquiring mind. Whether it will succeed is open to doubt. Many youngsters will probably soon tire when they cannot find "an entomologist to help them" to sort out the insects that emerge from oak apple galls. "The naturalist at the local museum" may not be willing to help identify the contents of owl pellets and anyone who looks out for the brimstone butterfly in spring is going to be disappointed if they live in the greater part of northern Britain. They may also become disillusioned not to find a dormouse using the bird nesting box they put up, or when, after searching, they fail to find evidence for the presence of crossbills. Although it is no doubt of interest to learn that wrynecks, amongst others, use old woodpecker nest holes, this can only be academic in these days and one questions the relevance of such information in such a short book at this price.

R.C.

How to begin the study of Entomology by **Anthony Wootton.** Pp. 16. Illustrated. Published by the British Naturalists' Association. 18p (including postage).

The budding entomologist who does not know how to set about the subject will find some help from this pamphlet. Unfortunately if he follows all the advice given, especially that which is influenced by the anti-collecting bias displayed by the author, it is difficult to see how he will be able to make much progress, at least with identification.

R.C.

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W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

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Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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NOTICE

Will members please note that the Y.N.U. Excursion to Upper Nidderdale will be held on Saturday, July 28th NOT Sunday as printed in the Circular.

HISTORICAL RECORDS OF MAMMALS IN SOUTH EAST YORKSHIRE AND THE DONCASTER DISTRICT

C. A. Howes

Museum and Art Gallery, Doncaster

As a preliminary stage to Doncaster Museum's mammal survey, an attempt was made to gather together all historical data relating to local mammals in order to form a background against which future records could be evaluated. The results of this historical survey have proved useful in giving a clue to the status of local species in the past and, in instances where continuity of records exists (e.g. for Grey Squirrel, Red Squirrel and Otter), it has been possible to monitor changes in population and distribution. Though records of otters are particularly frequent, they have been omitted from this account, being the subject of a separate paper currently in preparation. The results have also provided information for the Museum's new conservation-biased displays on the "vanishing wildlife of Yorkshire".

The region to which the records refer is basically that covered by the one inch to one mile Doncaster Ordnance Survey Map No. 103, extended to the River Aire in the north and the River Trent in the east. The area encompasses most of the eastern part of South Yorkshire, a narrow corridor of north Lincolnshire and a small section of north Nottinghamshire and Derbyshire.

Records have been extracted from a variety of sources and date back to Norman times, the earliest being of Wolf at Roche Abbey in 1158. A number of records and descriptive passages on fauna relating to the 16th, 17th and 18th centuries, come from the historical accounts of the Doncaster district—notably Miller (1804), Hatfield (1866) and Tomlinson (1882). Very useful historical data are to be found in accounts of peripheral areas like the Lofthouse district (Roberts 1882-5), Worsborough (Wilkinson 1872) and Sheffield (Holland 1843 and Denny 1910), much of the relevant information in Denny (1910) being supplied by Dr. H. H. Corbett of Doncaster and Arthur Whitaker of Worsborough.

The majority of records date from the late 19th century, when organised documentation of local natural history began to flourish, providing the material for such journals as *The Naturalist* and the now discontinued *North Western Naturalist*. These two publications provide a continuous source of data from the Doncaster district from the 1800s to the present day.

During the investigation, the minute book and scientific reports of the Doncaster Naturalists' Society (formerly the Doncaster Scientific and General Microscopical Society) were made available to the Museum for the purpose of extracting and card indexing the records. This has proved to be one of the most important single sources of information and, whilst containing many records subsequently published in the scientific literature, includes much unpublished material. Vertebrate records dating from 1800 were contributed by a succession of naturalists of the calibre of Dr. H. H. Corbett (1865–1921) (first Curator of Doncaster Museum and President of the Y.N.U. for 1921), A. A. Dallman (Editor of the *North Western Naturalist*) and Alfred Hazelwood (1913–1961) (member of the rarities Committee of the B.O.U.). A further source of data was a copy of the 1935 British Museum (Nat. Hist.) *List of British Vertebrates*, anonymously annotated with local records relating to the 1920s and 30s. The records appear to be reliable as many are borne out by information already in the Museum's files.

A useful survey of captive ornamental herds of deer was carried out by examining old prints, engravings, etc., of the many local estates and stately homes. Although in themselves unreliable evidence, in that artists may have flattered their patrons by including herds of deer for opulent effect, the illustrations provided clues which were verified through contacting estates trustees and managers and searching through family archive material. For this I am greatly indebted to Mr. Gordon Smith of "The Lodge Gallery", Cusworth.

All data accumulated so far has been included in the Museum's card index, selected records from which form the basis of this paper. No doubt much new information will come to light in due course through the examination of old labelled specimens, naturalists' notebooks and correspondence, society minute books, newspapers and magazines of the 19th century etc. The following compilation probably only represents the "tip of an iceberg"; clearly there is much useful work to be done both in this and other areas of Yorkshire.

The arrangement and nomenclature follow that used by Corbett (1969). In that this is an historical account, the records only date up to the 1950s. Abbreviations of sources are as follows:—

(Don. Nats.) = Minutes of the Doncaster Naturalists' Society.

(B.M. 1935) = Annotated copy of the British Museum (Nat. Hist.) *List of British Vertebrates* (1935).

(Nat.) = *Naturalist.*

(*North Western Nat.*) = *North Western Naturalist.*

(*Notts. Nat.*) = *Annual Report and Transactions of the Nottingham Naturalists' Society.*

(*Nat. Hist. Journ.*) = *Natural History Iournal and School Reporter* 1-22: 1877–1898.

Order Insectivora

Hedgehog *Erinaceus europaeus*

Listed for the Askern area (Lankester 1842). Wilkinson (1872) notes that there are many accounts of hedgehogs "urchens" for the Worsborough district during the 18th century. Roberts (1882) lists hedgehogs as "frequent" in the Lofthouse district and cites the following extracts from the Wakefield Church warden's accounts:—

	s.	d.
1682 paid to Nolson lad for 4 heighodgs	0	8
1683 paid to Marsh lad for 1 urchon	0	2
1683 To Grace Casson lad of Stanley, frooms and urchon	0	6

In the Doncaster district Miller (1804) notes that "These animals are very common in the neighbourhood".

Mole *Talpa europaea*

Listed for the Askern area (Lankester 1842), noted as "common" in the Lofthouse district (Roberts 1882), listed for the Doncaster district (Donc. Nats. 1910 and B.M. 1935) and noted as "universally distributed in the Sheffield area" (Denny 1910). References to the professional mole-catchers come from Wilkinson (1872), who relates that "mole catcher is still an official connected with the township (Worsborough). His name is Henry Woodhead and he is paid £8 a year for his services out of the rates". In cynical vein Wilkinson notes that "the Corporation of Doncaster pay their mole killer £3 12 0 a year". A note in Donc. Nats. 7/3/1927 records that mole hills in Askern (Shirley Pool) had turned up sub-fossil molluscs including *Vivipara contecta.*

Common Shrew *Sorex araneus*

Listed for the Askern area (Lankester 1842). Roberts (1882) notes it as common in the Lofthouse district and notes that a smoky-white variety, which he attributes to *Sorex rusticus* Jenyns, was captured at Lofthouse in 1883. Denny (1910) records it as universally distributed and abundant in the Sheffield area and it is noted for the Doncaster district (Donc. Nats. 1910 and B.M. 1935).

Pygmy Shrew *Sorex minutus*

Few early authors appear to have distinguished between this and the previous species. However, Roberts (1882) records it under the name of "Lesser Shrew", noting it to be frequent in the Lofthouse district. Denny (1910) notes that it is "usually described as scarce and local", and "is probably not uncommon". It is also noted for Doncaster (Donc. Nats. 1910 and B.M. 1935).

Water Shrew *Neomys fodiens*

Listed for the Askern area (Lankester 1842); noted as "frequent" in the Lofthouse district (Roberts 1882), and listed for the Doncaster district (Donc. Nats. 1910 and B.M. 1935).

Order Chiroptera

Greater Horse-Shoe Bat *Rhinolophus ferrum–equinum*

The only South Yorkshire record is of a non-Yorkshire specimen kept as a pet by Mr. Arthur Whitaker of Worsborough. The bat escaped on 28th July, 1907, and was observed feeding along railway embankments of Worsborough Bridge. The specimen is known to have survived for up to five weeks after its escape (Whitaker 1909).

Whiskered Bat *Myotis mystacinus*

Clegg (1963) noted that it had been recorded at several sites near Barnsley fifty years earlier and that one specimen had been recorded in Sheffield in 1919. Denny (1910) records them from Barnsley and also from Doncaster where they are noted as "not common" (B.M. 1935).

Natterer's Bat *Myotis natteri*

Denny (1910) notes that "it occurs from Sheffield eastwards as far as Doncaster" and, referring to Worsborough, Whitaker (1913) comments "it occurs very commonly in the district".

Daubenton's Bat *Myotis daubentonii*

Whitaker (1907) recorded it at Barnsley and Stainborough in 1906 and Denny (1910), who no doubt obtained his information from Whitaker, notes that "it is probably not uncommon around Barnsley".

Leisler's Bat *Nyctalus leisleri*

Comments on the distribution of this species by Denny (1910), the annotator of B.M. 1935, and Clegg (1963) appear to be based on records from Mexborough in 1890 (*Zoologist* 1892, 329), Stainborough in 1904, and a roost of six females in a dead tree near Barnsley (Whitaker 1907a).

Noctule *Nyctalus noctula*

As with other tree roosting species, the Noctule was probably much more common in the days when the Doncaster district was noted for its deciduous afforestation. Lankester (1842) records a colony of nine in an old tree near Askern. Whitaker (1907 and 1909) located a number of colonies in old beech and oak trees in the Barnsley and Stainborough areas. Denny (1910) notes it as "common and generally distributed" in the Sheffield area and it is noted for the Doncaster district (B.M. 1935) and Sprotborough (*Nat.* 1932, 338).

Pipistrelle *Pipistrellus pipistrellus*

Appears to have been abundant and widespread. It is listed for the Sheffield district (Holland 1843), noted as common in the Lofthouse area (Roberts 1882) and common everywhere in the Worksop district (*Notts. Nat.* 1903-4, 21). Whitaker (1907) noted it at Worsborough reservoir and recorded a colony of over 60 in a cottage roof at Stainborough. About 103 were recorded in a 40 year old colony in a farm building at Gringley-on-the-Hill near Doncaster (*Nat.* 1932, 338).

Long Eared Bat *Plecotus auritus*

Appears to have been widespread and abundant. It is listed for the Askern area (Lankester 1842), noted as common in the Lofthouse district (Roberts 1882) and common and generally distributed in the Sheffield area (Denny 1910). It is also recorded from the Worksop area (*Notts. Nat.* 1903-4, 12), the Don Valley (B.M. 1935), the Sprotborough area and near Barnsley where a colony of 34 were discovered in the roof of a small church (*Nat.* 1932, 338).

Order Carnivora

Wolf *Canis lupus*

No doubt archaeological investigations will in time throw light on the past distribution of the Wolf in South Yorkshire, but to date the only references to its occurrence come from Clerck and Roebuck (1881) who note it as having been at Roche Abbey in 1186, and Denny (1910) who notes that they are said to have inhabited Woolley, Dodworth, Aughton, Ulley and Slade Hooton.

Fox *Vulpes vulpes*

The earliest references located come from the 17th and 18th centuries where numerous entries are made in the church warden's accounts of bounties paid for foxes heads. Both Wilkinson (1872) for the Worsborough area and Roberts (1882) for the Lofthouse area quote extracts from ecclesiastical accounts, the earliest being for 1682. Of the large scale slaughter of foxes in Worsborough district during the 18th century, Wilkinson comments "but what would our modern foxhunter say of the wholesale destruction of Foxes?". No doubt foxes were always abundant and widespread being noted as common in the Doncaster area (Donc. Nats. 1910 and 1944), Askern (Lankester 1842) and Sheffield (Holland 1843 and Denny 1910).

PINE MARTEN *Martes martes*

This species appears to have been well on the decline in South Yorkshire by the early 19th century and very thinly distributed by the beginning of the 20th century. In the Sheffield area Holland (1843) notes it as "very rare" and Denny (1910) considered it to be "now probably extinct". Hatfield (1866) confirms the persecution of the Pine Marten by recording that Hugh Reid, the Doncaster taxidermist, had within the last twenty years had the following forwarded for preservation, two from Brodsworth and one from Kirk Sandall on 15th April, 1843; two from Sir William Milner, Bart, of Nun Appleton; and in April 1845 another from Mr. Masters of the same place. J. R. Goodman, Esq., sent him a specimen killed near Loversall in 1852 and Pemberton Milnes, Esq., of Fryston Hall, one in 1854. That from Mr. Milnes was the last Reid received. The latest occurrence noted by Hatfield was at Westwoodside, Isle of Axholme, on Shrove Tuesday 1862, when "some boys climbing a tree . . . in search of a Magpie's nest were surprised when an animal jumped from it to the ground. It ran, but was pursued in the open field and caught. It turned out to be a Pine Marten. The animal measured 32″ from nose to tip of tail".

Pine Martens occurred at Canon Hall, Barnsley, until about 1878 and were noted as very rare in the Lofthouse area by G. Roberts (1882). Very few records have come to light for the first half of the 20th century. A specimen in Sheffield Museum was killed at Broomhead in 1927 and individuals were noted at Dunford Bridge in 1936 (*North Western Nat*. 1936, 356) and Highbridge Wood, Skelmanthorpe 19/11/1936 (*Nat*. 1937, 35).

STOAT *Mustela erminea*

Old records come from Askern (Lankester 1842), the Lofthouse area (Roberts 1882), Wheatley Wood, Doncaster (a white specimen) (Donc. Nats. 14/3/1900), and Kirk Smeaton (*Nat*. 1901, 290).

WEASEL *M. nivalis*

Old records come from Askern (Lankester 1842), the Lofthouse area (Roberts 1882), Wadworth Wood (*Nat*. 1891, 333), Kirk Smeaton (*Nat*. 1901, 290), and Doncaster (Donc. Nats. 1910).

POLECAT *M. putorius*

From the frequency with which the Polecat features in church wardens' accounts of the 17th and 18th centuries, it was clearly widespread and abundant. They appear to have been distributed throughout the region until the first half of the 19th century, after which time authors began to remark on their decline. Wilkinson (1872) writes "the cultivation of the land has been a most formidable enemy in its destruction and as the hand of industry is brought into exercise with all the improvement of the day the foulmart deserts the district (Worsborough) and seeks home elsewhere". Of its status in the Sheffield area, Denny (1910) records "It was formerly widespread but is now on the verge of extinction". Roberts (1882), writing of the Lofthouse area, also notes its decline.

The Polecat's presence in the Doncaster area was confirmed by two stuffed specimens collected in the Hatfield Chase district which were exhibited at the Y.N.U. meeting on Hatfield Chase in 1887, (*Nat*. 1885, 83), and the annotator of the 1935 B.M. list notes that they had certainly occurred within living memory. Other Polecat records come from Askern (Lankester 1842) and Hooton Pagnell, where two were shot in 1868 (Ruston and Witney 1934).

BADGER *Meles meles*

Past records of this species show it to have been widespread, abundant and especially noted for the magnesian limestone areas and coal measure sandstone outcrops to the west of Doncaster. They were much maligned animals with a history of being vigorously and brutally hunted. Unlike some of the more "sport" orientated authors of the past, Miller (1804) regarded the Badger as "an inoffensive animal" and observed that "it inhabited woody places in the cliffs and rocks and is often seen about Conisborough Cliffs". Of the hunting of Badgers he records "the usual mode of taking the animal is when the den is discovered and when they are abroad at night, a sack is fastened to the mouth of their den and a person remains near the hole to watch while the others beat around the field with a dog to drive him home. As soon as the man at the hole hears the Badger run for refuge he immediately seizes the mouth of the sack, ties it up and carries it off . . . sometimes they are caught in steel traps placed in their haunts".

Phillips and Danby (1921) record that "Badgers were quite common and were hunted regularly on the Edlington and Wadworth side of town (Doncaster)". Hatfield (1866) noted that Hugh Reid, the Doncaster taxidermist, from 1830–1846 had several Edlington Badgers sent to him for preservation. Wilkinson (1872) notes that entries in church wardens' accounts during the 17th and 18th centuries showed that bounties were paid for the heads of Badgers. Of its distribution in the Worsborough area he comments "its dark tortuous holes were on the sides of every hill where copse wood, growing thick, affords more secure shelter". Wilkinson reflects the popular feeling towards Badgers during the 19th century by noting that "it was held to be so obnoxious a pest that the law of trespass was not maintained for following the Badger into the grounds of a stranger, digging it out, and accomplishing its death".

From elsewhere in the region, Badgers are recorded from Worksop and Gringley (*Notts. Nat.* 1903-4, 21), Campsmount (*Nat. Hist. Journ.* 1880, 106), Askern (Lankester 1842), Wentworth and Rainborough Parks (*Nat.* 1885, 309), Sheffield (Holland 1843 and Denny 1910), Wortley (*Nat.* 1884, 34) and Brockadale (*Nat. Hist. Journ.* 1887, 80).

Examples of place names derived from "Brock" the old name for the Badger, which infers the past or traditional presence of Badgers are Broxholme Lane, Doncaster (Phillips and Danby 1921), Brockodale in the Went Valley, Brockholes near Rawcliffe, and Brockholes near Branton.

Wild Cat *Felis felis*

Wild Cats were apparently sufficiently abundant along the densely wooded Don and Dearne valleys to have been considered a nuisance, but their extermination seems to have been completed by the mid 17th century.

Local folk legend in the form of the Barnburgh "Cat and Man" legend infers the past existence of the wild cats. The story describes how a Sir Persival Cresacre, returning on horseback from Doncaster through the thickly wooded areas of Sprotborough and High Melton, was attacked by a wild cat. A long battle ensued terminating in the deaths of both knight and cat. Although the legend in its various versions is fraught with historical contradictions, the woods in the area certainly abounded with wild cats. Large (1954) discovered in manorial documents that in 1205 a certain Gerrard Canville was granted a licence to hunt the "Wilde Cat" in the Barnburgh area. In 1237 one of the Earles Warenne of Conisburgh had leave to hunt many wild animals including wild cats, and licences of a similar nature were granted in 1274 and 1337.

Denny (1910) notes that "there is evidence of the former existence of the Wild Cat in the Sheffield district in the church wardens' accounts of Ecclesfield where sums were paid in 1589 and 1621 for the destruction of the wylde cats". These appear to be the last records of true wild cats in South Yorkshire. The 31 cats listed amongst game and vermin shot on an estate at Hooton Pagnell in 1868 (Ruston and Witney 1934) were almost certainly from domestic stock.

Order Pinnipedia

Common Seal *Phoca vitulina*

There are several documented instances of seals coming many miles inland along river systems; two instances are relevant to this study. The first, recorded by Thomas Bunker (*Nat.* 1888, 226) who wrote "a short time ago a large seal made its appearance in the Aire at Rawcliffe having come up the Ouse. It was first seen passing through "Hook Bridge". After rounding Howden Dyke it was lost sight of but reappeared in passing Boothferry and was followed from Airmyn to Rawcliffe by a crowd of people on the bank. At Rawcliffe it was shot and drifted with the tide towards Howden Dyke sands where it stranded". The second was recorded in *Notts. Nat.* (1908-9, 29), the account reading "The seal was shot in the Trent near Hazelford Ferry on September 4th, 1909. It is an adult female 4′ 3″ in length 2′ 6″ in girth and weighed nearly six stones. The body was secured by the proprietor of the Hotel at Hazelford Ferry, who had it stuffed and mounted for exhibition". A photograph of the mounted specimen forms the frontispiece to the publication.

Order Artiodactyla

Red Deer *Cervus elaphus*

From two large centres of population, one on Hatfield Chase and the other to the west of our region on the Wharncliffe Chase, Red Deer probably roamed over most of South Yorkshire at least until mediaeval times. The enormous Royal Deer chase of Hatfield was famed as the largest Red Deer chase in all England covering, during the reign of Henry VIII, an area of about 190,000 acres. References to its deer, their protection, and the Royalty who came to hunt them, are numerous, the majority coming from Stonehouse (1839) and Tomlinson (1882). Hatfield Chase had long been noted for its game; even from the time of the early Norman Kings large numbers of retainers were constantly resident in the area for the protection and management of the deer. Although references during the reigns of Henry VIII and James I are made to the abundance of deer, only one actual count, that of the inquisition of 1607, appears to have been made, when about 1000 were recorded and said to be much impaired by depredation of the borderers. Reminiscences of the Deer entered in the diaries of Abraham De la Pryme, vicar of Hatfield from 1698-1704, and quoted by Tomlinson (1882), relate "If it is to ye honour of chase or park to be well furnished therewith, this chase was then the most honourable of any in ye whole land, for as I have heard old people say if you had walked into what part of it you would, you would have found deer in great numbers together as sheep upon ye hills of most places in England . . . It was a common thing in every year to hear that ye deer had destroyed one body's crops or other, and sometimes many peoples at one time; so that there was a few of ye inhabitants of this town refrained from sowing the grounds and closes for no other reason than the great trouble they were put in keeping them from ye deer." Of deer poaching De la Pryme wrote "Amongst such a plenty of deer that there was you cannot concive, but there would be some people that would venture to make bold to take now and then the Kings dainties . . . every poor man almost lived there of (indspight of ye law), so here before this chase was destroyed ye poor people got a good living out of ye same and venison was no greater rarity then in a poor mans kitchen than mutton is now". "No doubt" writes Pryme "when a deer stealer was caught it was bad for him . . . orders were issued from the Surveyor General to the Kings Bailif to apprehend delinquents and keep them prisoner until they should be freed according to the law". At Thorne a special prison for deer poachers was built behind the parish church, but this had fallen into ruin by Pryme's day. As an indication of the past range of the Red Deer in the Hatfield Chase area the "Black Book" of a "Swanimote Court" held on the 5th June 1538, in the reign of Henry VIII, records poaching activities at Sykehouse, Rawcliffe, Ayrmin, Hawke, Goole, Howden and Fishlake.

Probably due to the inundation of the chase during the reign of Elizabeth I, the large herds went into decline; certainly the area's swampy nature rendered it too difficult for stag hunting and it fell from favour as a Royal hunting ground. According to the literature the last stag hunt took place in 1609 when Henry Prince of Wales and his company chased five hundred out of the surrounding forest into Thorne Moore where the fattest deer were killed. How long after this date deer persisted on the chase, seems not to have been recorded. A reference extracted by Peck (1815) from the Finningley Parish registers, cites five stags rounded up at Auckley "colt field" in July 1707 by a certain Zacharia Bolton. Probably one of the last to see red deer in the area was Abraham Crowder, a relative of Doncaster botanist Samuel Appleby, who saw them on Potteric Carr and Doncaster Moor in 1752 (Hatfield 1868).

During the mid 16th century Red Deer, presumably emanating from the Wharncliffe stock, abounded in the woods on Sir Henry Savile's estate at Thornhill, Tankersley. Wilkinson (1872) quotes a letter dated 1744 from Sir Henry to his cousin Plumpton describing the fine condition of the Red Deer in his grounds.

Of the many deer parks established in South Yorkshire during the mid 18th century, only Wentworth Woodhouse appears to have been stocked with Red Deer. The date of the formation of this herd has not yet been discovered, though a print dated 1860 of the house and grounds shows them to be present.

Fallow Deer *Dama dama*

Fallow deer appear to have been far less frequent than the reds, and though skeletal remains were found on Goole Moors in 1891 (*Nat.* 1892, 167), the only recorded wild Fallow deer herds seem to be those noted by Wilkinson (1872) as being in the woods at Thornhill, Tankersley in 1544 (see Red Deer).

During the mid 18th century, many ornamental herds of Fallow deer were established on estates and in the grounds of stately homes in South Yorkshire and Nortn Nottinghamshire. The following is a synopsis of a preliminary survey carried out oh these herds by the author and Mr. G. Smith.
Bretton Park—herd present in 1890 (*Naturalist* 1890, 224).
Brodsworth Hall—herd present, late 18th century.
Clumber Park—herd present, late 18th century.
Cowick Hall—Deer shelters of about 1750 suggest that deer may have been kept.
Cusworth Park—In 1763 the Park, then two hundred acres in extent, was stocked with a herd of two hundred Fallow deer brought from Chertsey in Surrey. A pre-war photograph of the park only shows about 40 head remaining. The herd escaped towards the end of the Second World War when the park gates were left open. Subsequent to the escape animals were seen 8/1/1944 in the woods at Sprotborough (Donc. Nats.). Animals also escaped from time to time during the 20s and 30s (B.M. 1935).
Frickley Hall—herd present *ca.*1750.
Hickleton Hall—Deer shelters of *ca.*1760 suggest that deer may have been kept.
Melton Hall—herd present *ca.*1750.
Nostell Priory—herd present *ca.*1830.
Sandbeck Park—herd present until 1920.
Serlby Hall—A print of *ca.*1750 shows Fallow deer present.
Sprotborough Hall—Deer of undetermined species feature on an engraving *ca.*1705 of the "Don-Side" estate. Local (Sprotborough) people maintained that the herd persisted until the late 19th century.
Thoresby Park—Noted as a Fallow deer park (Whitaker 1892).
Welbeck Park—A herd containing 130 white Fallow deer noted in Whitaker (1892).
Wheatley Hall—A print of 1790 shows deer present.
Womersley Park—Deer shelters of the late Georgian period shows that deer may have been kept.

Order Lagomorpha
Brown Hare *Lepus capensis*

Old records from Askern (Lankester 1842), Sheffield (Holland 1843), the Lofthouse area (Roberts 1892) and Doncaster (Donc. Nats. 1910).

Rabbit *Oryctolagus cuniculus*

A serious pest affecting both grain and root crops and the development of plantations.

Opinion had it that laws affecting the taking of rabbits was a major factor contributing to their abundance; the *Doncaster, Nottingham and Lincoln Gazette and Advertiser* for 13th March, 1812, reporting "since wild rabbits have been put under game laws they have increased greatly". Consternation over the enormous rabbit populations is recorded in the following extracts from letters relating to the Rossington Estate (*Doncaster Museum Archives* No. P.5).
1822 "Rabbits on this estate have done much damage last winter especially to Larches at the top of Hunster Wood".
1822 "Great cause to regret the increase of rabbits on the Rossington estate. The Hunster Wood and Pheasant Bank with that part of Holmes Carr Wood adjoining Mr. Butterill's farm are most wretchedly infested by them".
1823 "Numbers of rabbits on this estate are greater than I ever saw them. Hunster Wood and Will Hill Plantings are quite overrun, also the Park Wood and planting, in fact there is scarcely a hedge in the estate clear of them".
1824 ". . . still on the increase. Pheasant Bank and Park Wood are full of them and Mr. Butterfield's turnip fields are injoured by them".
1825 ". . . less in numbers than I ever saw them and underwoods are growing very well indeed".

A further indication of the abundance of rabbits is quoted in Rudston and Whitney (1934) where 6,108 were shot over a period of fourteen months c.1867 on an estate at Hooton Pagnell.

Order Rodentia
Red Squirrel *Sciurus vulgaris*

The red squirrel must have abounded in the once heavily wooded parts of South Yorkshire, records coming from most of the documented localities. Records of squirrel up to the 20th century from Lofthouse (Roberts 1882), Askern (Lankester 1842 and

Nat. 1893, 293), and Sheffield (Holland 1843) all pertain to *S. vulgaris*. Denny (1910) records them as being common in the Sheffield district. In the Rotherham area Bramhill (1959) records them from the Grange Park district. In Kings Wood Sandbeck they were recorded in 1913 (*Nat.* 1913, 206); in the Y.N.U. circular No. 430 for 1941 they are noted as "formerly common but seldom now seen"; they were also recorded in 1951 (Bramhill 1952). Red Squirrels seem to have been abundant in the woods around Doncaster and along the Don Valley up to the 1930s. They were recorded from Wadworth and Edlington Woods on the Y.N.U. visit of June 15th, 1893 (*Nat.* 1891, 333) and in 1951 by Bramhill (1952). Records also came from Wheatley Wood and Cantley (B.M. 1935) and several Doncaster naturalists remember them in these and Sandall Beat Wood before the Second World War. They were present at Bentley Park ca. 1890 (a mounted specimen in the possession of the author) and the woods at Levitt Hagg and along the Don gorge from Sprotborough to Conisborough in 1932. (*Nat.* 1932, 337).

GREY SQUIRREL *S. carolinensis*

The first report of a grey squirrel in the Doncaster district was from Wilsick Hall near Wadworth in September, 1935 (*North Western Nats.* 1936, 45). They were present in Kings Wood, Sandbeck in 1951 (Bramhill 1952) and by 1958 they had become established in "most woods around Doncaster" (Donc. Nats.).

DORMOUSE *Muscardinus avellanarius*

Earliest records come from Sheffield where Holland (1843) lists them amongst local mammals. Denny (1910) comments that they appear to be local and scarce though often overlooked. Clegg (1963) notes Dormice at Norton in 1877, Heeley in 1892 and Millhouses in 1958. Roberts (1892) notes them as being rare, occurring at Woolley and other places south of Wakefield. It was recorded from the Worksop area in 1885 and at Skelmanthorpe in 1919 (*Nat.* 1919, 46) where Mr. Fred Lawton noted an increase in its numbers. In the Doncaster district, Edlington and Wadworth Woods are known as a traditional site for Dormice. The report of the Y.N.U. visit to these woods on 16th–17th September, 1890 (*Nat.* 1891, 333) records that Mr. Waite, after leaving the wood called on the woodman (Mr. Clayton) who had two or three Dormice alive which he himself had taken in Wadworth Wood. Dr. H. H. Corbett noted it here (Denny 1910), also in the list of Doncaster mammals (Donc. Nats. 1910). The annotator of B.M. 1935 notes that they are "very scarce if any"(There are no subsequent records published for the Doncaster district though at the meeting of the Doncaster Naturalists Society on 26th March, 1941, Mr. E. H. Forrest gave particulars of a nesting Dormouse, unfortunately the minutes of the meeting do not record any further information.

HARVEST MOUSE *Microtus minutus*

It is known from the Hatfield Chase area where it is noted as "formerly common but now very scarce". (B.M. 1935). Mr. William Bunting of Thorne, up until 1959 regularly found two or three nests on the edge of the cornfields near the southern tip of Hatfield Moors. Holland (1843) lists it for the Sheffield area though no localities are given.

LONG-TAILED FIELD-MOUSE OR WOOD-MOUSE *Apodemus sylvaticus*

Noted for the Sheffield area (Holland 1843 and Denny 1910), the Lofthouse area (Roberts 1892) and Doncaster (Donc. Nats. 1910). Miller 1804 in his notes on the Short-eared Owl records that "It was observed for a few years when the country swarmed with incredible numbers of Long-tailed Field-mice, that great numbers of Owls were found in the country". Miller's determination of Long-tailed Field-mouse may be in error as plagues of rodents, particularly those in areas where predation by short-eared Owls is likely are usually ascribed to the Field Vole *Microtus agrestis*.

BLACK RAT *Rattus rattus*

The species appears to have died out in inland sites by the end of the 19th century. Roberts (1892) noted that it was once frequent in the Lofthouse area but that it is now probably extinct. Intermittent re-introductions at the ports Goole, Keadby, Thorne and along the South Yorkshire canal systems, undoubtedly took place; Denny (1910), recorded the sighting of one at West Bank Sheffield in 1876. The discovery of a mum-

mified specimen in an 18th century chimney above an Adam fireplace (ca. 1780) in a shop in Finkle Street, Thorne* reflects the former history of Thorne as a port.
*specimen presented to Doncaster Museum by Mr. H. Roscoe, 1970.

BROWN RAT *Rattus norvegicus*

Unfortunately the records do not reflect the introduction and spread of this species. It is noted as common in the Lofthouse area (Roberts 1892), Askern (Lankester 1842) and Doncaster (Donc. Nats. 1910).

WATER VOLE *Arvicola terrestris*

A few black specimens noted in the Doncaster district (B.M. 1935).

MUSK RAT *Ondatra zibethica*

Its presence was suspected in the Doncaster district ca. 1935 (B.M. 1935) and Mr. W. Bunting of Thorne tells me that it occurred in Swinefleet warping drain but had been exterminated prior to the Second World War.

COYPU RAT *Myocastor coypus*

A note appeared in the *Yorkshire Evening Post* for 27th May, 1938, of a specimen thought to be a large rat being found at the Sandhouse, Doncaster, (now Balby Flats). It was removed to Doncaster rubbish tip where it was again found and brought to Doncaster Museum where it was identified as a Coypu.

Order CETACEA

LESSER RORQUAL *Balaenoptera acutorostrata*

One found dead in January 1902 in the Ouse near Swinefleet (*Nat*. 1905, 168).

SEI WHALE OR RUDOLPHI'S RORQUAL *B. borealis*

"A half grown specimen . . . ventured into the Humber on 5th September, 1884, and was caught in the barge lock at Goole". The specimen measured 35′ 6″ in length and weighed nine and a quarter tons. Its skeleton is now in the British Museum (Nat. Hist.), (*Nat*. 1885, 309). According to Spalding (1966) this is the only Yorkshire record.

BOTTLE-NOSED WHALE *Hyperodon ampullatus*

In 1863 or 4 a school of twenty-five occurred in the Ouse at Goole; twenty-three were killed (Spalding 1966). Many were again seen at Goole in 1886 (*Nat*. 1886, 309), and a 15′ specimen appeared in the Trent between Amcotts and Keadby in 1877 (*Nat*. 1901, 172).

PORPOISE *Phocaena phocaena*

There are several references to Porpoise following shoals of salmon up the Humber and into the Rivers Ouse, Trent and even the Don. In the Trent they have been recorded from Butterwick, where three specimens were shot in 1891, one of which measured 5′ 6″ in length (*Nat*. 1901, 172) and from Owston Ferry (Spalding 1966). The annotator of B.M. 1935 notes that porpoise "formerly occurred in the River Don at odd times". Confirmation of this comes from the Doncaster Scientific Society Minutes which record that in 1898 an immature specimen from the River Don was purchased by the society with a view to its skeleton being preserved for the Museum.

BOTTLE-NOSED DOLPHIN *Tursiops truncatus*

Usually only recorded off the south and west coasts of Britain a specimen was stranded at Goole Ness in the Ouse during October 1881. (*Nat*. 189, 69).

KILLER WHALE OR GRAMPUS *Orcinus orca*

One was captured at Whiston Ness at the confluence of the Ouse and Trent on 1st November, 1885, and was taken to Hull where it was exhibited in various parts of the city as a "Zebra Whale". The 21 ft. specimen was disembowelled and a foetus 6′ in length was taken from it. (*Nat.* 1886, 81). A second killer whale occurred in the Ouse at Swinefleet on 29th May, 192(8)? The specimen measuring 16′—18′ in length was towed to Goole where it escaped up stream!

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LICHENS FROM THE TANFIELD AND MASHAM AREAS OF NORTH YORKSHIRE

P. M. Earland-Bennett

During the 1972 Y.N.U. excursion to Masham, I made a study of the lichen flora, endeavouring to obtain a general picture of the area. Ecological and phytosociological aspects were considered; 81 different taxa were recorded from the two 10 km. squares studied (76 taxa from 44/27 and 41 from 44/28), although many were stunted, depauperate, moribund or rarely seen.

Throughout the area covered, there was a conspicuous lack of foliose species, especially on siliceous substrates, where their distribution was very localized and the number of species was very small. On corticolous substrates, the situation was much the same, with the fragmentary and impoverished communities restricted to the bole and lower parts of the trunks.

This impoverishment is due to the effects of air pollution, particularly the sulphur dioxide content of the air. Lichen sensitivity to these effects have been studied in considerable detail in recent years and it has become clear that lichens can be used as accurate indicators of air pollution (e.g. Gilbert, 1965; Le Blanc & Rao, 1966; Skye, 1968). As a result, various qualitative scales have been formulated using lichens and bryophytes (Gilbert, 1970) or only lichens (Hawksworth & Rose, 1970). For an account of the literature on these subjects, see Hawksworth (1971).

The lichen communities seen on both non-eutrophiated and eutrophiated bark in the Tanfield and Masham areas, were those indicative of zone 5 (i.e. mean winter sulphur dioxide levels of about 60 $\mu g/m^3$) of the ten-point scale of Hawksworth & Rose (1971). This scale uses corticolous lichens on mature trees in open situations. Topographical variations in this area are only small and the wide, mature valley of the River Ure did not protect the trees from the prevailing westerly winds. Gilbert (1968) showed that air pollution in ravines can be less than on surrounding plateaux and I have noted this in many of the Yorkshire valleys I have visited, even in the very heavily polluted parts of the West Riding e.g. the Hebden Valley (Earland-Bennett, 1971).

Using the especially pollution-sensitive corticolous lichens, a general picture of the effects of air pollution on the lichen flora of the whole of Yorkshire can be made. The south-west and central-southern areas have the poorest lichen flora, and corticolous species, except the toxi-tolerant *Lecanora conizaeoides* (and not forgetting the species in the special microclimatic areas mentioned above) are virtually non-existent. Here zones 1-2 (= about 170 $\mu g/m^3$ SO_2 or more to about 150 $\mu g/m^3$ SO_2, as it is a descending scale) are the norm. The flora gradually improves both eastwards and northwards (except near such areas as Humberside and Teesside). The Tanfield and Masham areas lie within zone 5, but it is only near the northern boundary of the county that zones 7-8 (= about 40-35 $\mu g/m^3$ SO_2) are present, with their correspondingly more luxuriant lichen communities, both qualitatively and quantitatively.

The exceptionally pollution-sensitive lichen species indicative of zones 9-10 are now absent from the county, although published records suggest that this has not always been the case, even in the now most polluted areas. Most of these records were made prior to or during the early years of the industrial revolution e.g. by Bohler (1835-1837) from Roche Abbey; by Bolton from the Halifax region, in Watson (1775), Crump & Crossland (1904), Watling (1967) and Seaward (1972a); by Stansfield from the Todmorden and Hebden areas, in Lees (1888), Crump & Crossland (1904), Watson (1946); by Brunton from an area very near to West Tanfield i.e. Studley Park and published in Withering (1796), Turner & Dillwyn (1805), Lees (1888), Watson (1946). Studley Park was recently re-examined by the British Lichen Society (Coppins, 1972) as was the Hebden Valley (Earland-Bennett & Seaward, in press) and by Earland-Bennett (1971). Rimington (1950) recorded a number of interesting species actually from Masham e.g. *Physcia aipolia* and *Phaeographis ramificans* and also visited the outcrop of Magnesian Limestone at Hackfall, just beyond the area covered by the present author.

The Tanfield and Masham areas lie on Magnesian Limestone and Millstone Grit strata respectively, although there is a lack of outcrop due to the overlying glacial deposits. During my brief study, I did not encounter any sizable outcrops, and consequently had to rely on pebbles and boulders on the ground and as wall rocks. The latter invariably consisted of a mixture of soft, buff, fine-grained Magnesian Limestone blocks and hard, smooth (probably mainly due to glacial transportation) sandstone rocks. These, together with the wall mortar, provided a good variety of saxicolous substrates.

The following account includes phytosociological details, an aspect of lichenology which has received little attention in this country compared with the rest of Europe, where it has been monographed by Klement (1955) and Barkman (1958). Laundon (1958, 1967) has studied the communities in the London area, and Hawksworth (1969) has studied the Derbyshire communities. Nomenclature in this account largely follows James (1965, 1966). A taxon not previously published as occurring in Yorkshire and V.C. 65 is prefixed by a dagger and asterisk respectively, but it is appreciated that lichenologists have worked in Yorkshire in recent years but have not published their data. Specimens now housed in the herbarium at Bankfield Museum, Halifax, are suffixed by the letters BMH. Watson (1946, 1953) relied mainly on literature sources for Yorkshire records (c.f. Seaward, 1972a) and did not examine the valuable herbaria within the county e.g. at Keighley (Seaward, 1971) and Leeds (Seaward, 1972b). Similarly, the herbarium of W. E. L. Wattam, housed at the Tolson Memorial Museum, Huddersfield, must also have been neglected by Watson, since a recent study of this material by myself and others has shown a great deal of the taxonomy to be erroneous. Unfortunately, this has far reaching effects, as Watson (1946, 1953) relied heavily on Wattam's published records. In the light of the present findings, any records by Wattam must be treated as suspect unless substantiated by herbarium material.

West Tanfield (27/5/1972)

At my first stop near Tanfield Lodge (44/257785) a species which was to be encountered throughout the area on small pebbles and boulders of Magnesian Limestone on the ground, namely *Verrucaria muralis*, was seen in plenty. At this locality, the bole of a mature *Acer pseudoplatanus* bore a predominantly nitrophilous community belonging to the *Xanthorion* federation (Barkman, 1958; Laundon, 1967). Species confined to the base included *Xanthoria candelaria*, *Physconia grisea* BMH, †*P. enteroxantha* BMH, *Physcia tenella*, *Ochrolechia turneri* (small and rare) and *Lepraria incana*. Species occurring both at the base and up to two metres on the north side of the trunk included *Buellia punctata*, *Lecanora expallens* and the nitrophobous species *Parmelia saxatilis* and *P. sulcata*, with the former being far more abundant than the latter, as it was throughout the area. Species confined to the trunk were *Parmelia glabratula*, *Lecanora chlarotera* (one thallus seen) and *L. conizaeoides*. Only the latter species colonized the tree above two metres, growing on the branches as well as the trunk. It was the sole lichen of the *Lecanoretum pityrae* union (Barkman, 1958) of the *Conizaeoidion* federation (Laundon, 1956). This federation was dominant on all the trees and palings throughout the area I covered, with the toxi-tolerant species *Lecanora conizaeoides* nearly always dominant and only locally replaced by *Lecanora expallens* e.g. at this locality, on an old gate at the edge of a small damp wood.

The unmade roadway leading through this wood was lined with concrete posts, the tops of which were covered with another nitrophilous community referable to the union *Physcietum caesiae* (Motyka, 1925) of the *Xanthorion*. At 44/257785 the main elements were *Physcia tenella* and *Caloplaca citrina* together with *Rinodina subexigua* BMH, *Lecidella stigmatea* BMH, *Lecanora dispersa* and *Candelariella aurella*. At 44/254783 the same species were seen on a similar post, but the community was richer in nitrophilous elements including *Xanthoria parietina*, *Physcia orbicularis* (dominant), *Caloplaca holocarpa*, *Lecania erysibe* BMH (both f. *erysibe* and f. *sorediata*) and also †*Verrucaria aquilella* BMH. *Physcia caesia* was absent, as was the case in most of the communities belonging to the *Physcietum caesiae* in this area, being replaced in particular by *Physcia orbicularis* (and/or *P. tenella* and/or *P. adscendens*). The lower parts of the posts at both of the localities studied, were covered only with *Lecanora dispersa* and a few thalli of *Candelariella aurella*. These two species are the characteristic components of the union *Lecanoretum dispersae* (Beschel, 1958) of the federation *Lecanorion dispersae* (Laundon, 1967); the latter is the initial colonizer of calcareous substrates such as concrete, mortar and asbestos, and at the above localities, could be seen to merge upwards into the *Physcietum caesiae*, which replaced it at the top of the posts.

The young *Populus* and *Fraxinus* which made up the principal part of this wood, were entirely covered with *Lecanora conizaeoides*. This was the case with all young trees and most mature ones throughout the area covered. However, at the edge of this wood at 44/256787, a rotting stump yielded *Cladonia coniocraea*, *Lecidea granulosa*, *Lepraria incana* and **Calicium abietinum* BMH, which are referable to the federation *Cladonion coniocraeae* (Laundon, 1967). This community was also seen at Tanfield

Lodge (44/250779) on the bole of a living *Quercus* and on a rotting prostrate trunk of the same species nearby. However, *Calicium abietinum* was not present here, although *Cladonia fimbriata* and *Buellia punctata* were seen on the rotting trunk.

At Tanfield Lodge (44/250779) an old wall was composed of hard, smooth sandstone and soft Magnesian Limestone blocks. The assemblage of species on the coping stones included *Caloplaca citrina, C. holocarpa, Lecanora dispersa, L. muralis, L. campestris, Candelariella aurella, Rinodina subexigua* and *Verrucaria viridula.* A similar lichen flora was also present on the mortar between the rocks on the south side of the wall, although *Lecanora muralis* and *L. campestris* were absent and *Verrucaria muralis* and *Leptogium schraderi* BMH were present. Species seen on the siliceous coping blocks included *Candelariella vitellina* (dominant), *Lecanora intricata* var. *soralifera, L. polytropa, L. muralis, L. campestris, L. dispersa, Caloplaca citrina* and *Lecidea fuscoatra* var. *grisella* BMH. *Lecidea tumida* was noted on the side of a nearby siliceous wall and *Lecidea lucida* at the base of a cottage wall.

Beside the River Ure a number of mature trees were examined, although none were of any great age. The main community was again the *Lecanoretum pityrae*, others being only fragmentary and restricted to the lower parts of the trunks. Only in one case did any of the latter assemblages ascend to a height of more than two metres, this being on the damp, mossy, northern side of an inclined *Ulmus* (44/250778). *Parmelia saxatilsi* was the dominant species, but *Parmelia glabratula, P. sulcata* and *Platismatia glauca* (only one small thallus seen) also occurred on this upper surface. The drier sides bore *Catillaria griffithii* BMH, *Schismatomma decolorans* BMH, *Phlyctis argena* BMH, *Buellia punctata, Pertusaria amara, P. pertusa* (rare), *Leconora expallens, Lepraria incana* and *Lecanora conizaeoides.* Only the latter species occurred higher than four metres up the inclined trunk (= about three metres vertically). Nearby, a deciduous tree stump bore *Parmeliopsis ambigua* BMH, *Ochrolechia androgyna* (rare), *Parmelia saxatilis, P. glabratuld, Cladonia fimbriata* BMH, *Lepraria incana* and *Lecanora conizaeoides.*

Further along the river bank (44/251779), a mature *Quercus* had two distinctly separate communities, one on the north side and one on the south side. The community on the north side was dominated by *Parmelia* spp., including *P. saxatilis, P. glabratula* and *P. sulcata*; other species seen were *Ochrolechia androgyna, Evernia prunastri* BMH (a few stunted thalli), *Xanthoria candelaria* (rare) and *Lecanora conizaeoides.* The drier south side yielded *Calicium viride* BMH (sterile), *Schismatomma decolorans* BMH and *Lepraria incana* in the deep fissures of the bark.

East Tanfield (28/5/1972)

At Rushwood House (44/295783) an interesting assemblage of species was seen on the partially shaded siliceous coping stones of the courtyard wall. Most of the lichens were particularly well developed, probably as a result of the beneficial affects of bird lime. *Physcia caesia* BMH was the dominant species, and a few thalli bore apothecia. The other main components were *Physcia orbicularis, P. tenella, Lecanora muralis, L. campestris, Candelariella vitellina, Trapelia coarctata* and *Parmelia exasperatula* BMH, the latter being of interest since there are few Yorkshire records and as it is more commonly a corticolous species. *Cladonia fimbriata* was particularly frequent on moss, and the only depauperate taxa seen were *Lecidea tumida* and *Lecanora intricata* var. *soralifera.* Two taxa, which were rare yet had very well developed thalli, were *Hypogymnia physodes* (one thallus only) and *Pseudevernia furfuracea* var. *furfuracea.* The latter taxon is also of interest as the chemotype var. *furfuracea* is less common than the chemotype var. *ceratea* in Britain (Hawksworth & Chapman, 1971). Rose, Hawksworth & Coppins (1970) recorded it from the northern borders of V.C. 65, and I have collected it from well lit siliceous coping rocks of a wall at Aysgarth (44/007886). *Lecanora conizaeoides* was not seen on the coping of the courtyard wall, but was common on the better illuminated side, while *Lepraria incana* was the solitary lichen at the base of the shaded side, being the only representative of the union *Leprarietum* (Almborn, 1955) of the *Leprarion* federation (Almborn, 1948). The *Lecanoretum dispersae* was present on the mortar between the rocks on the better lit side of the wall; species included *Lecanora dispersa, Caloplaca citrina, Candelariella aurella, Rinodina subexigua* and *Physcia caesia* (rare).

Lecanoretum pityrae was the predominant union on the fences around the fields here, with *Lecanora conizaeoides* often being the only species present. However, *Lecidea granulosa* and *L. uliginosa* often replaced this species when the wood was very damp and had started to decay, and also in the crevices of the end-grain of post tops (e.g. at 44/286787). At 44/295784 **Micaria denigrata* BMH accompanied *Lecanora conizaeo-*

ides on horizontal palings, and at 44/285788 *Buellia punctata* and *Xanthoria candelaria* did likewise, except that the habitat was the top of a gatepost. At 44/285782 a roadside fence, in close proximity to a farmyard, supported a community rich in nitrophilous elements. **Rinodina exigua* BMH and *Lecanora dispersa* BMH were dominant, but the nitrophilous species *Xanthoria candelaria, X. parietina, Physcia orbicularis, P. tenella, P. caesia* (rare) and *Caloplaca holocarpa* BMH were also present. The community is probably referable to the *Rinodinetum exiguae* (Klement, 1955), but would be a species-poor variant as it lacks the nitrophobous crustose species described by Klement and is richer in nitrophilous species here.

At 44/286787 a pathway through the fields was lined with concrete posts, all of which had *Lecanoretum dispersae* on their lower parts, merging into *Physcietum caesiae* towards and on the tops. The richest community of the latter union was beneath a little tree shade; species present included *Physcia orbicularis, P. adscendens, Xanthoria parietina* (rare), *Caloplaca citrina, C. holocarpa, Rinodina subexigua, Lecidella stigmatea, Candelariella aurella* and *Lecanora dispersa*. The latter species was dominant on the lower part of the post. Nearby, a low hedgerow with an old *Crataegus monogyna* (forced to grow almost horizontally) provided a substrate for *Parmelia subaurifera, P. sulcata* BMH, *Lecanora expallens, L. conizaeoides, Buellia punctata* and *Lecidea granulosa*, the latter species growing mainly on decorticated parts of the trunk.

In a disused gravel pit at 44/285789, an extensive stand of *Peltigera rufescens* BMH was seen on the ground together with *Peltigera polydactyla* and *Cladonia fimbriata*, the latter also growing over siliceous boulders on the ground. Other species on these rocks included *Trapelia coarctata, Lecanora polytropa, Verrucaria muralis* and **Lecidea soredizodes* BMH (with apothecia).

West Tanfield and Masham (29/5/1972)

At 44/268787 by West Tanfield church, twenty-two taxa were seen on a wall composed of both Magnesian Limestone and siliceous blocks, with mortar in between. The well lit, hard, smooth siliceous coping rocks yielded *Parmelia glabratula* subsp. *fuliginosa, P. saxatilis, Lecanora muralis, L. polytropa, L. intricata* var. *soralifera, L. conizaeoides* and *Candelariella vitellina. Parmelia glabratula* subsp. *fuliginosa* is exclusive to the *Parmelion saxatilis* (Klement, 1955), the latter being common on well lit coping stones on hard Millstone Grit (e.g. at 44/075518 and 34/995888) and Ordovician slates (e.g. 34/624996) in mid-west and north-west Yorkshire. On Millstone Grit rocks *Parmelia saxatilis* and *P. glabratula* subsp. *fuliginosa* are invariably the only foliose taxa, but on the Ordovician slates, *Parmelia conspersa* is also invariably present and dominant over the other two foliose taxa. It is interesting to note that in the Tanfield area the *Parmelietum furfuraceae* (Barkman, 1958) of the *Physodion* (Laundon, 1958) is conspicuously absent (except possibly in a fragmentary condition on corticolous substrates), and that the foliose lichens *Platismatia glauca, Hypogymnia physodes* and *Pseudevernia furfuracea* are all extremely rare, although these species together with *Parmelia saxatilis* and crustose species, comprise the commonest community on non-eutrophiated Millstone Grit rocks in West Yorkshire.

The Magnesian Limestone coping rocks on the wall outside the churchyard bore their characteristic association of species for this area, namely *Verricaria viridula* (dominant), *V. nigrescens, Caloplaca citrina, Rinodina subexigua* and *Lecanora dispersa*, although *Solenospora candicans* was also present here. The mortar near the top of the south side of this wall supported a more varied flora, with *Caloplaca saxicola, C. aurantia* and *C. decipiens* dominant; other taxa included *Caloplaca citrina, C. holocarpa, Candelariella aurella, Lecanora dispersa* (including f. *albescens*), *Lecania erysibe* (f. *erysibe*), *Lecidella stigmatea, Verrucaria viridula* and *Leptogium schraderi*.

Lobate *Caloplaca* spp. showed a definite preference for mortar, and this was seen again at 44/264787. Here *Caloplaca decipiens* was the only lobate species seen, and although present on the well lit, slightly convex concrete cap of a roadside wall, was more abundant on the vertical sides (about 0.2 metres high). On the latter, *Caloplaca citrina* and *Lecanora dispersa* were also equally common, and *Physcia orbicularis* and *Xanthoria parietina* also occurred where there was tree shade. On the top of the wall, other species seen included *Caloplaca citrina, C. holocarpa, Physcia orbicularis, Solenospora candicans, Rinodina subexigua, Verrucaria viridula, V. hochstetteri, Lecanora calcarea, L. dispersa, L. muralis* (rare) and *L. campestris*.

The sociological affinities of these concrete and mortar communities are difficult to interpret. Laundon (1967) considers *Caloplaca aurantia* to be exclusive to the *Caloplacetum heppianae* (Du Rietz, 1925), and the community at 44/268787 compares favourably with this union, although *Caloplaca heppiana* itself was not seen. The abundance of *Caloplaca decipiens* at both of the localities studied is of interest, as is its preference for vertical surfaces. The wall-top community at 44/264787 could also be referable to the *Caloplacetum heppianae*, although the presence of both *Lecanora calcarea* and *Solenospora candicans* thalli in considerable numbers is worthy of note. Both Laundon (1967) and Hawksworth (1969) consider that there needs to be further investigation into the delimitation of the *Caloplacetum heppianae*. Laundon (1967) suggests that the unions *Caloplacetum murorum* (Du Rietz, 1925) and the *Caloplacetum elegantis* (Motyka, 1925) of the federation *Caloplacion decipientis* (Klement, 1955) might be synonymous with the *Caloplacetum heppianae*, which Laundon puts into the *Xanthorion*. Hawksworth (1969) also suggests that the *Caloplacetum murorum* may better be placed in the *Xanthorion*, but also considers that the *Caloplacetum heppianae* may best be regarded as a species-poor variant of the *Lecanoretum calcarae* (Albertson, 1946) adapted to man-made habitats. My observations here seem to do little to help clarify this complex picture.

At 44/267788 the mortar on the coping of an illuminated wall, separating a road from a pasture, provided a substrate for *Caloplaca saxicola* BMH (sparse), *C. citrina*, *C. holocarpa*, *Lecanora dispersa*, *Protoblastenia monticola* BMH and *Leptogium schraderi* BMH, the latter species spreading onto soil as well. The siliceous coping blocks showed a strong nitrophilous influence, and species seen included *Physcia orbicularis*, *P. caesia*, *Physconia grisea* BMH, *Xanthoria parietina*, *Caloplaca citrina*, *Lecanora muralis*, *L. dispersa*, *L. atra* BMH, *L. calcarea*, *L. contorta* BMH and *Trapelia coarctata*. The latter species and *Physconia grisea* were also present on the side of the wall together with *Cladonia fimbriata*, *Lepraria incana* and *Physcia adscendens*. It is interesting to note that a number of these species are normally associated with calcareous substrates, especially *Lecanora calcarea* and *L. contorta*.

A little further along the road at 44/266787, the wall was shaded by trees and *Xanthoria parietina*, *Physcia orbicularis*, *Lecanora muralis* and *L. atra* were far more common on the siliceous rocks. **Collema crispum* BMH and *Leptogium schraderi* were also found here on old crumbling mortar. On the opposite side of the road, *Buellia canescens* was present on the vertical sides of a high sandstone wall.

In the churchyard (44/268787), twenty-three species were recorded. Some of the headstone tops yielded *Parmelia glabratula* subsp. *fuliginosa*, *P. saxatilis* and *P. sulcata* (rare); some supported such nitrophilous species as *Xanthoria candelaria*, *Physcia orbicularis*, *Acarospora fuscata*, *Candelariella vitellina* and *Lecanora muralis*, and others bore *Lecanora polytropa* and *L. intricata* var. *soralifera*. The latter two taxa, together with *Lecanora campestris* and *Lecidea tumida* were uncommon on the sides of the headstones. However, three species were far more common in this habitat, namely *Lecanora conizaeoides*, *Lepraria incana* and *Lecidea lucida*. Of these *Lecanora conizaeoides* was the most abundant, covering most of the vertical faces except near the base, where *Lepraria incana* was dominant. These two species showed the clear distinction between the *Lecanoretum pityrae* and the *Leprarietum*. However, *Lecidea lucida* was also present, particularly in the crevices formed by the engravings.

The horizontal surfaces of a low-walled vault composed of siliceous rock (with mortar at intervals where iron railings had once been) supported *Lecanora campestris*, *L. atra*, *L. intricata* var. *soralifera*, *L. muralis*, *L. dispersa*, *L. calcarea*, *Lecidea tumida*, *Caloplaca citrina*, *C. holocarpa* and *Parmelia saxatilis*, while the sides yielded *Ochrolechia parella* and *Lepraria incana*. Species on the mortar included *Caloplaca aurantia*, *C. citrina*, *Lecanora dispersa* and *Verrucaria viridula*. The occurrence of a number of calcicolous species on the siliceous substrate was probably due to lime run-off.

The only outcrop of Magnesian Limestone I encountered during this study was on a steep roadside bank at 44/263786, with *Verrucaria muralis* being the only species present BMH. However, this species was very common on small pebbles and rocks along the bank together with *Verrucaria hochstetteri* BMH (sparse).

On the siliceous buttercross and steps in the central square of Masham village (44/221808), ten species were seen, of which *Candelariella vitellina* and *Physcia orbicularis* were the most common, and mainly confined to vertical surfaces. Other species confined to the sides were *Lecanora dispersa*, *Lepraria incana* and *Cladonia fimbriata*, the latter two species also occurring on soil in crevices between the rocks. Species present only on horizontal surfaces were *Physcia caesia*, *Lecanora muralis* and *L. campestris*. *Lecanora conizaeoides* was not noted on these rocks, although it completely covered a nearby *Tilia*. *Physcia orbicularis* and *Lecanora dispersa* were only present on the sandstone where there was lime run-off from the mortar between the rocks. These species were more frequent on the latter substrate, and were associated with *Caloplaca citrina* and *Candelariella medians.*

On Masham Common a number of interesting corticolous, lignicolous and saxicolous communities were seen. Nearly all the mature trees had nitrophilous *Xanthorion* elements confined entirely to their boles, and above this only *Lecanora conizaeoides* and occasionally *Lepraria incana* were present. At 44/225810 the bole of a mature *Fraxinus* bore *Physconia grisea, Physcia tenella, Xanthoria candelaria, Buellia punctata, Ochrolechia turneri* (rare), *Evernia prunastri* (rare) and *Parmelia sulcata* (rare). Beside the River Ure on the bole of a mature *Acer, Xanthoria candelaria, Physconia grisea, Physcia tenella, Lecanora expallens, Candelariella vitellina, Buellia punctata* and *Parmelia exasperatula* were noted. In the river, sandstone boulders yielded the aquatic lichens *Verrucaria aquatilis* BMH and **V. elaeomelaena* BMH. On palings around the bowling green, a few depauperate thalli of *Xanthoria polycarpa* BMH, together with *Lecanora dispersa, Candelariella vitellina* and *Physcia orbicularis* were also seen.

On the other side of the river at 44/226811, the roadside wall was examined. As usual it was composed of both Magnesian Limestone and siliceous blocks, and the latter yielded *Candelariella vitellina* (coping), *Lecanora intricata* var. *soralifera* (rare on coping), *L. atra* (mainly on sides), *L. campestris* (mainly sides) and *Xanthoria parietina* (beneath *Ulmus*, on sides). The Magnesian Limestone coping stones bore a richer assemlage of species than had been seen elsewhere. *Candelariella medians* BMH and *Caloplaca decipiens* BMH were sparingly present together with *Caloplaca citrina, C. holocarpa, Physcia adscendens, Solenospora candicans* BMH, *Rinodina subexigua, Lecanora calcarea, L. atra, L. dispersa, Verrucaria viridula.* (dominant) and *V. nigrescens.*Lobate *Caloplaca* spp. again showed a preference for mortar as against Magnesian Limestone, with *Caloplaca decipiens* (common) and *C. aurantia* (sparse) being present, mainly on the sides of the wall; other species included *Caloplaca citrina, Lecanora calcarea* BMH (coping), *L. atra, L. dispersa, Verrucaria viridula* and *Placynthium nigrum* (coping).

At this same locality, palings yielded *Lecanora conizaeoides* (dominant), *Lecidea uliginosa, L. granulosa, Candelariella vitellina* (rare) and *Parmelia sulcata* (rare). The boles of a *Fraxinus, Alnus* and *Ulmus* by the River Ure all bore *Xanthoria candelaria* and *Physcia tenella*, but it was the latter tree which supported the richest flora; other species included *Xanthoria parietina* (decorticate wood), *Physconia grisea* (corticate and decorticate wood and on moss), *Physcia orbicularis* (corticate and decorticate wood), *Buellia punctata, Lecanora expallens, Catillaria griffithii* BMH, *Candelariella vitellina, Parmelia saxatilis, Lepraria incana* and *Lecanora conizaeoides.* The latter species was the only lichen on the trunk and branches, again showing the dominance of the *Lecanoretum pityrae.*

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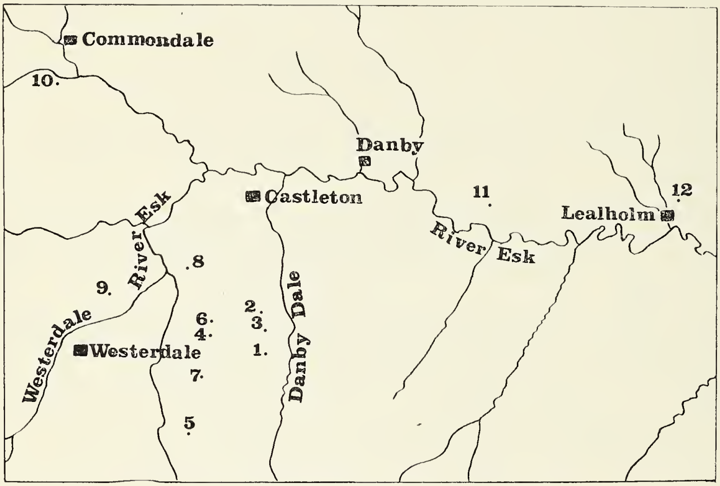
ABNORMAL COLOURED MOLES IN UPPER ESDKALE, NORTH YORKSHIRE

C. I. Massey

On the 5th January 1972 Mr. Bryan D. Ward, mole catcher of Chop Gate, trapped a sandy/apricot coloured mole on West Cliff Farm, Danby Dale. This was the first of fourteen similarly coloured moles that he was to trap during the first four months of 1972 at the following localities; Mole 1: 5th January 1972, West Cliff Farm, Danby Dale, 45/689050; Mole 2: 25th January 1972, Holly Lodge Farm, Danby Dale, 45/686064; Mole 3: 25th January 1972, Crag Farm, Danby Dale, 45/687061; Mole 4: 17th January 1972, Quarry Farm, Westerdale, 45/680061; Moles 5 and 6: 22nd February 1972, Quarry Farm, Westerdale; Mole 7: 22nd February 1972, Dale Head Farm, Westerdale, 45/678045; Mole 8: 24th February 1972, Millinder House Farm, Westerdale, 45/680062; Mole 9: 24th February 1972, Quarry Farm, Westerdale; Moles 10 and 11: 25th February 1972, Brown Hill Farm, Westerdale, 45/680049; Mole 12: 28th February 1972, Brown Hill Farm, Westerdale; Mole 13: 28 February 1972, Quarry Farm, Westerdale; Mole 14: 27th April 1972, Quarry Farm, Westerdale.

During the same period Mr. H. Cook, a retired farmer living in Westerdale village, trapped a sandy coloured mole at Ivy House, Westerdale, 45/678073. Mr. Cook remembers moles of that colour being trapped 50 years ago at Dale Head Farm, Westerdale (where he worked); Holly Lodge Farm, Danby Dale; Dale View, Westerdale, 45/665068 and Long Green Farm, Commondale, 45/661101.

In the *North Western Naturalist* (1937, 51) R. J. Flintoff refers to two cream coloured moles being caught in the same area. One in October 1936 at Oakley Side Farm, Lealholm, 45/727081 and one in April 1937 at Benwell Farm, Lealholm, 45/765082.



Sites of abnormal coloured Moles in Upper Eskdale.

1. West Cliff Farm.
2. Holly Lodge Farm.
3. Crag Farm.
4. Quarry Farm.
5. Dale Head Farm.
6. Millinder House Farm.
7. Brown Hill Farm.
8. Ivy House.
9. Dale View.
10. Long Green Farm.
11. Oakley Side Farm.
12. Berwell Farm.

Unfortunately seven of Mr. Ward's trapped moles were destroyed, but seven have been preserved and mounted. Five are in the possession of Mr. Ward, one is in the possession of Mr. Gordon Simpson, Head Forester, Great Broughton, and one is at the Forestry Museum and Information Centre, Low Dalby, near Pickering. All seven preserved specimens are extremely similar in colouration. The pelage of the back, sides, hind limbs and tail is sandy, the snout is off-white and there is an apricot coloured "collar" over the head and fore-limbs with a smaller "collar" at the base of the tail. The ventral surface is apricot.

Abnormal coloured moles occur rarely but probably with a higher frequency than in any other of our native species of mammal. Over the country as a whole they certainly occur less often than once in a thousand animals (Balli, A. Observazioni biologiche su *Talpa europaea* L. *Riv. Biol.* 29 (1939)), but in any one locality they may occur more often. They should not be referred to as mutants for their coloration is undoubtedly due to the emergency of recessive characters. A number of authors have suggested that these recessives have been less rigorously weeded out by natural selection in the mole than in surface living mammals because of its relative freedom from predators.

SPECIES OF PLANT FOSSILS COLLECTED FROM THE MIDDLE JURASSIC PLANT BED AT HASTY BANK, YORKSHIRE

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The Yorkshire Jurassic flora became first known scientifically almost 150 years ago, and soon came to be a world standard for the Middle Jurassic. Knowledge of the flora is based mainly on about eight major plant beds which were formed 150 million years ago in a large fresh-water delta. The delta sediments now form the solid rocks of the "Deltaic Series", which is divided into 4 units by marine incursions (Hemingway, 1949). Like the similar locality at Roseberry Topping, the Hasty Bank plant bed occurs at the base of the lowest unit ("Lower Deltaic") and its age is lower Bajocian.

The exposure at Hasty Bank was made by alum workers in the 19th century, but its discovery as a major plant fossil locality (by Dr. M. Black in 1927) was relatively recent. The bed is remarkable for its unusually extensive exposure (over 100 metres long and 7 metres thick) which gives evidence of the conditions of deposition, the wealth of its flora (70 species) and for the presence of some marine microfossils amongst the terrestrial plant fragments. Since whole plants were usually fragmented before being preserved as fossils, the special interest of Hasty Bank to palaeobotanists is the presence of reproductive organs, associated with the more common leaves and shoots. When evidence of association is strengthened by agreement in structure (cuticles) the plants can be partially reconstructed and more learnt about their classification than is possible merely from isolated fragments.

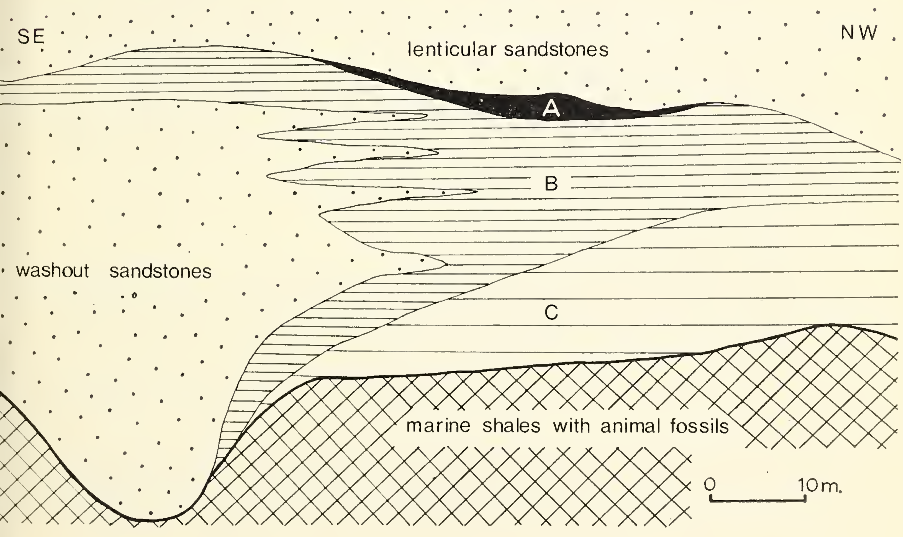

Fig. 1. Diagram of the Hasty Bank exposure (038 568) and its geology. Vertical scale exaggerated 4 × horizontal.
Fragments of fossil plants are abundant in the dark clay (A) the siltstone (B) and claystones (C). These three rock types form the main plant bed.

Depositional Environments (fig. 1)

The main bed (Ordnance Survey ref. NZ 038 568) consists of three rock types, one of which (the siltstone) was probably the slow part of a river channel (Hill, unpublished). Immediately to the south-east of the siltstone, the parent channel is represented by a sandstone-filled "washout" (an erosive river channel—see Black, 1928).

The occurrence of some marine algal microfossils in the lower (claystone) part of the bed (Muir, 1964) may indicate that it was sometimes flooded by sea water. On evidence of structure and widespread association with these microfossils Harris (1964) has suggested that one of the commonest species (*Pachypteris papillosa*) was a mangrove-like plant of tidal channels.

The Flora

Like other rich Jurassic floras, that at Hasty Bank is composed mainly of forms which cannot be assigned to living genera and shows no convincing evidence for the presence of Angiosperms (flowering plants). Many species are referred to extinct and apparently isolated groups (e.g. Caytoniales and Bennettitales), though others show characters of certain living plant groups but not of any one modern genus (e.g. *Nilssonia kendalli*). In only three cases are the fossils so like living species that they have been given the same generic name (*Marattia*, *Dicksonia* and *Equisetum*).

Two specially interesting recent discoveries are known only from Hasty Bank. One is a primitive eusporangiate fern (van Cittert, 1966) which appears to be intermediate between older genera and the living *Angiopteris* (Hill, *in* MS). The other is a cone, *Hastystrobus muirii* (van Konijnenburg, 1971, 1972) which produced the pollen *Eucommiidites*. *Eucommiidites* is widespread in Jurassic rocks and because it superficially resembles the pollen of certain Angiosperms was at first thought to be evidence that Angiosperms existed in the Jurassic. However, this evidence is not now generally accepted, following a reinterpretation of the form of the pollen grain, and its discovery both in the micropyles of gymnospermous seeds and in the apparently gymnospermous male cone *Hastystrobus*.

Species List

All identifications have been supported where possible by preparations of cuticles and spores or pollen. The current name and literature reference are followed by location of vouching specimens in museum collections, with catalogue numbers of type specimens from Hasty Bank.

U: University of Utrecht
BM: British Museum (Natural History), Department of Palaeontology
LDS: University of Leeds (Palaeobotanical collections)

Work in progress is designated "MS", and estimates of abundance are given according to the following scale.

(1) Less than 5 specimens known at time of press
(2) 5–100 specimens known (or seen during fieldwork)
(3) 100–500 specimens
(4) 500 or more specimens
(5) Many thousands of specimens seen

Most of the species are unevenly distributed through the bed, so that even those known from many thousands of specimens may be dominant and abundant locally but rare or absent elsewhere. Only one species (*Phlebopteris woodwardi*) is more or less evenly distributed throughout.

Finally, we hope that this list (which has doubled known species records in the last five years) will soon be longer. The Hasty Bank plant bed is far from exhausted.

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JHAvK thanks Mr. J. van der Burgh (Utrecht) for his assistance with Museum numbers; and CH the administrators of the Leeds University Parkinson fund for financial support and Mr. A. Wesley for supervision and help with nomenclature. We both thank Professor T. M. Harris F.R.S. for help with the manuscript, permission to publish manuscript records, and for checking some of the determinations.

PTERIDOPHYTA

Equisetales

Equisetum columnare Brongniart (Harris, 1961, 15–20), U, BM, LDS, (5).

Marattiales

Angiopteris neglecta van Cittert (van Cittert, 1966; Hill, MS—to be given a new generic name), U 1371 (type specimen), LDS, (3).

Marattia anglica (Thomas) Harris (Harris, 1961, 72–75; van Cittert, 1966), U, BM, LDS, (4).

Osmundales

Osmundopsis sp. (cf. Harris, 1961, 99–100), LDS, (1).

FILICALES

Matoniaceae

Phlebopteris woodwardi Leckenby (Harris, 1961, 106–109), LDS, (2).

Dipteridaceae

Dictyophyllum rugosum Lindley & Hutton (Harris, 1961, 117–123), U, LDS, (3).

Clathropteris obovata Oishi (Harris, 1961, 123–126), U, BM, LDS, (3).

Schizaeaceae

Stachypteris spicans Pomel (isolated fertile pinnae) (Harris, 1961, 135–140), LDS, (1).

Dicksoniaceae

Coniopteris murrayana (Brongn.) Brongniart (Harris, 1961, 158–164), BM, LDS, (3).

Dicksonia kendalli Harris (Harris, 1961, 179–181), U, LDS, (1).

Unclassified Ferns (sterile foliage)

Cladophlebis denticulata (Brongn.) Fontaine (form with rather small teeth) (Harris, 1961, 78–87), LDS, (1).

C. aktashensis Turutanova—Ketova (Harris, 1961, 190–192), LDS, (1).

C. harrisii van Cittert (van Cittert, 1966) (= *Selenocarpus muensterianus* (Presl) Schenk of Harris, 1961), U, BM: V.52136 (type specimen), LDS, (4).

Sterile foliage similar in form to that of *Dicksonia kendalli* is also known, but it is indistinguishable from certain other species (see Harris, 1961, p. 176). (3).

GYMNOSPERMS

CAYTONIALES

Sagenopteris colpodes Harris ("large form" of leaf) (Harris, 1964, 4–8), U, BM, LDS, (4).

Caytonia kendalli Harris ("fruit") (Harris, 1964, 24–27), U, BM, LDS, (4).

CYCADALES AND PTERIDOSPERMS (foliage)

Nilssonia tenuinervis Seward (Harris, 1964, 33–37), U, BM, LDS, (5).

N. thomasi Harris (Harris, 1964, 37–39), BM, (1).

N. syllis Harris (Harris, 1964, 42–46; 176), U, BM, LDS, (3).

N. tenuicaulis (Phillips) Fox-Strangways (Harris, 1964, 46–49), U, (1).

N. compta (Phillips) Bronn. (Harris, 1964, 50–54), U, LDS, (1).

N. kendalli Harris (Harris, 1964, 55–58), U, BM, LDS, (5).

Paracycas cteis (Harris) Harris (Harris, 1964, 67–70), U, BM, LDS, (2).

Pseudoctenis oleosa Harris (Harris, 1964, 78–82), BM, LDS, (3).

P. lanei Thomas (Harris, 1964, 82–86), U, BM, LDS, (4).

Ctenozamites cycadea (Berger) Schenk (Harris, 1964, 95–99), U, BM, LDS, (4).

Ctenis kaneharai Yokoyama (Harris, 1964, 112–117), U, BM, LDS, (3).

Pachypteris papillosa (Thomas & Bose) Harris (Harris, 1964, 125–136), U, BM, LDS, (5).

P. lanceolata Brongniart (Harris, 1964, 137–147; 176), LDS, (1).

CYCAD–LIKE REPRODUCTIVE ORGANS

Androstrobus wonnacotti Harris (male cone) (Harris, 1964, 159–160), BM, LDS, (2).

A. prisma Thomas & Harris (male cone) (Harris, 1964, 160–161), U, BM, LDS, (3).

A. sp. A Harris (male cone scale) (Harris, 1964, 163), BM, LDS, (2).

A. major van Konijnenburg (male cone scales) (van Konijnenburg, 1968) U 2964 (type specimen), LDS (including sterile scales), (2).

Hastystrobus muirii van Konijnenburg (male cone) (van Konijnenburg, 1971, 30–33; 1972), U 1496 (type specimen), (1).

Beania spp. (female cones) (Harris, 1964, 169–170), U, BM, LDS, (3 or less).

Palaeocycas sp. nov. (megasporophyll) (Hill, MS; cf. Florin, 1933), LDS, (2).

Allicospermum spp. (isolated seeds) (Harris, 1964, 164), BM, LDS, (3).

PTERIDOSPERM–LIKE REPRODUCTIVE ORGAN

Pteroma thomasi Harris (male) (Harris, 1964, 170–175), U, BM: V.45493 (type specimen) LDS, (3)

BENNETTITALES (foliage)

Zamites gigas (Lindley & Hutton) Morris (F. M. Quin, in Harris, 1969, 4–8), U, (1).

Zamites sp. (Hill, MS), LDS, (1).

Otozamites graphicus (Leckenby) Schimper (Harris, 1969, 16–21), LDS, (2).

O. leckenbyi Harris (Harris, 1969, 23–26), BM, (1).

O. gramineus (Phillips) Phillips (Harris, 1969, 29–33), U, (1).

Ptilophyllum pectinoides (Phillips) Phillips (Harris, 1969, 56–61), U, BM, LDS, (5).

Nilssoniopteris vittata (Brongn.) Florin (Harris, 1969, 68–72), U, BM, LDS, (4).

Anomozamites nilssoni (Phillips) Seward (Harris, 1969, 79–84), U, (1).

Pterophyllum thomasi Harris (Harris, 1969, 93–97), U, (1).
P. sp. nov. (Hill, MS), LDS, (1).
BENNETTITALEAN REPRODUCTIVE ORGANS
Cycadolepis hypene Harris (female flower perianth scales) (Harris, 1969, 114–117), U, BM, LDS, (4).
C. sp. (hairy) (Hill, MS; Harris, 1969, 103), LDS, (1).
Williamsonia hildae Harris (female flower) (Harris, 1969, 135–139), U, BM, LDS, (3).
Weltrichia spectabilis (Nathorst) Harris (male flower) (Harris, 1969, 166–168), U, (1).
W. whitbiensis (Nathorst) Harris (male flower) (Harris, 1969, 171–172), U, BM, LDS, (3).
GINKGOALES (leaves)
Ginkgo huttoni (Sternberg) Heer (Harris, 1948; 1973, *in press*), U, BM, (1).
Eretmophyllum whitbiense Thomas (Thomas, 1913; Harris, 1973 *in press*), BM, LDS, (3).
Solenites vimineus (Phillips) Harris (Harris, 1951; 1973 *in press*), U, BM, LDS, (2).
Sphenobaiera gyron van Konijnenburg—*nomen nudum*, in van Konijnenburg, 1968. (Harris, 1973, *in press*), U, BM, LDS, (5).
TAXADS AND CONIFERS
TAXADS
Marskea thomasiana Florin (shoots and leaves) (Florin, 1958, 301–303), BM, (2).
CONIFERS
HIRMERELLA (*Cheirolepis*) GROUP
van Konijnenburg, 1971, 59–65, gives a useful summary of recent research on this extinct group of early conifers.
Brachyphyllum crucis Kendall (shoots) (Kendall, 1952), U, BM, LDS, (5).
(this species was recorded in error as *Brachyphyllum expansum* by Harris, 1964, 176.)
B. crucis (male cone) (van Konijnenburg, 1971, 1972), U 2984, (1).
Hirmerella sp. nov. (female cone of *Brachyphyllum crucis*, with cone scales of *Cheirolepis* form) (Hill, MS), U, LDS, (2).
Araucariaceae
Brachyphyllum mamillare Brongn. (shoots) (Kendall, 1947, 1952), U, BM, LDS, (3).
B. mamillare (male cone) (van Konijnenburg, 1971, 51–57), U, LDS, (2).
Araucarites phillipsi Carruthers (female cone scale of *Brachyphyllum mamillare*) (Kendall, 1947), LDS, (2).
Palissyaceae sensu Florin
Palissya sp. nov. (female cone) (Hill, MS; Florin, 1958, 267–276), LDS, (2).
Taxodiaceae
Elatides sp. nov. (shoots, with male and female cones often in attachment) (Harris, MS; cf. *E. williamsonii*, Harris, 1943), U, BM, LDS, (5).
Haiburnia setosa (Phillips) Harris (Harris, 1952), T. M. Harris collection, University of Reading. (1).
UNCLASSIFIED CONIFERS (shoots and leaves)
Bilsdalea dura Harris (Harris, 1952; Florin, 1958, 314–317), LDS, (2).
Sewardiodendron laxum (Phillips) Florin (Florin, 1958, 303–307; Hill, MS—foliage attributed to *Palissya sp. nov.*), BM, LDS, (2).

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THE PROBLEM OF COLOUR PATTERNS AND THEIR VARIATION IN THE GENUS *VESPA*

T. R. Birkhead

Several authors have produced keys for the social wasps, Vespinae (Laidlaw 1934 Smith 1963). However, these do not appear to be totally reliable since the British species (excluding the Hornet *Vespa crabro*), *V. vulgaris*, *V. germanica*, *V. rufa*, *V. sylvestris*, *V. norvegica* and *V. austriaca* are very similar and because the markings of each species are not consistent. Variations of colour patterns of *Vespa* spp. have been recorded by a number of workers (Laidlaw 1934, Robson & Richards 1936: 173, Wynne-Edwards 1963), but no explanation for this variation has been offered. The present paper presents suggestions for how and why such variation should occur.

Although very little is known about the evolution of the genus *Vespa* it seems likely that any common ancestor would have already possessed the striking black and yellow aposematic (i.e. warning) colouration in conjunction with a powerful sting. As the different species evolved it remained advantageous to maintain this colouration. It would be of further benefit if, as the number of species increased they remained similar; thus enhancing the advantages conferred by Mullerian mimicry (see Ford 1964), since predators would only have to encounter a few individuals of *any* species in order to learn to avoid them *all*.

Variations in the colour patterns of the *Vespa* spp. prevents humans from rapidly and effectively separating the different species, and potential predators with similar visual systems are likely to experience similar difficulty, particularly when the insects are in flight. Selection will therefore tend to favour variability as long as it results in a confusing similarity between species. This is unlikely to be disadvantageous to the wasps themselves since species recognition is probably by other means, such as olfactory or auditory.

Laidlaw (1934) has discussed variation in the male caste. Males are produced from the unfertilized eggs laid by workers (Spradberry 1965) and are therefore haploid. The fact that variation is extensive in males, suggests that the variability of workers' colour patterns may directly effect the colour patterns of the males they produce. Figure 1. shows the possible genetic relationships between the different castes. Thus if males always mate with queens from their own colony, this may tend to restrict variation by increasing homozygosity. Whereas males mating with queens of other colonies would probably favour variation by increasing genetic diversity. However, a rigorous control mechanism must operate in order to maintain a balance, since variation must only be such as to confuse potential predators, too much or too little would result in the loss of this ability. Unfortunately, at present, reproductive strategy and the extent of in-breeding and out-breeding in *Vespa* spp. is poorly known.

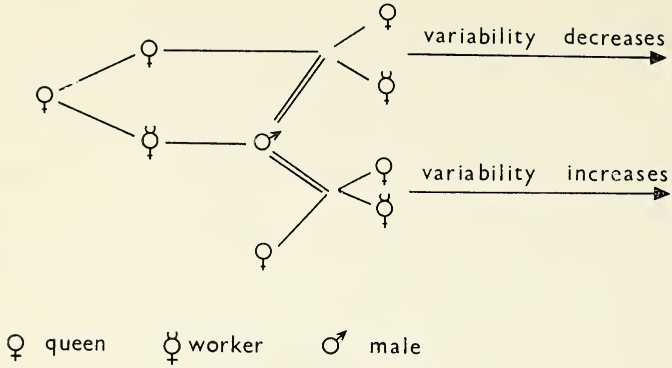

Figure 1. Possible genetic relationships between different castes over two seasons Double lines indicate alternative mating for males.

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The Sixth Sense of Animals by **Maurice Burton.** Pp. 182, with 16 pages of black and white photographs and 41 illustrations in the text. J. M. Dent and Sons Ltd., 1973. £2.50.

This, the latest book on broad fields of animal behaviour, summarises the current state of research on the five basic senses of animals and points the way to a sixth, as yet undescribed, sense. For those who are already acquainted with Dr Burton's masterly expositions this book will be found to continue the pattern of its predecessors for scholarly yet eminently readable accounts of animal lives.

The sixth sense, about which only fragmented information exists is the functions of the pineal eye, the so-called "third eye" which after being known for two thousand years returned to the biological limelight in 1910 when Arthur Dendy's work on the Tuatara lizard of New Zealand was published. The pineal appears most likely to supply the long sought-after "biological clock" which has plagued workers concerned with seasonal and cyclical activities in animals for so long. The onset of breeding seasons and the timing of migrations may well be governed by the pineal in association with normal senses and the length of days as the appointed season approaches.

In spite of the title, it is the other five senses which occupy the bulk of this book and each is dealt with in turn. Each chapter is stimulating and none more than those in which the author allows himself a little digression — "keeping the right way up" and "electric biological clocks" were my two favourites after first reading.

T.M.C.

DECREASE IN ABUNDANCE OF THE FRESHWATER OSTRACOD *CYPRIA OPHTHALMICA* (JURINE), (CRUSTACEA, OSTRACODA) IN A SMALL LAKE

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Freshwater Biological Association

Esthwaite Water is about 1 km. long, has a maximum depth of 15 m. and is located in the southern part of the English Lake District.

The bottom sediments have been sampled with a Jenkin surface-mud sampler (described by Mortimer 1971). Sampling was done each week (occasionally every other week) at a fixed station in the deepest part of the northern end of the lake from January 1956 up to the present time. In late 1958 and for most of 1959, additional samples were taken on transects running shorewards up the slope of the lake-bottom into shallow water. The lake lies on a north-south axis, so transects running north, east and west from the fixed station at 15 m. were sampled, but not that to the south which followed the main axis of the lake (Fig. 1). These extra samples were taken at depths of 2, 4, 6, 8, 10 and 12 m. below the surface

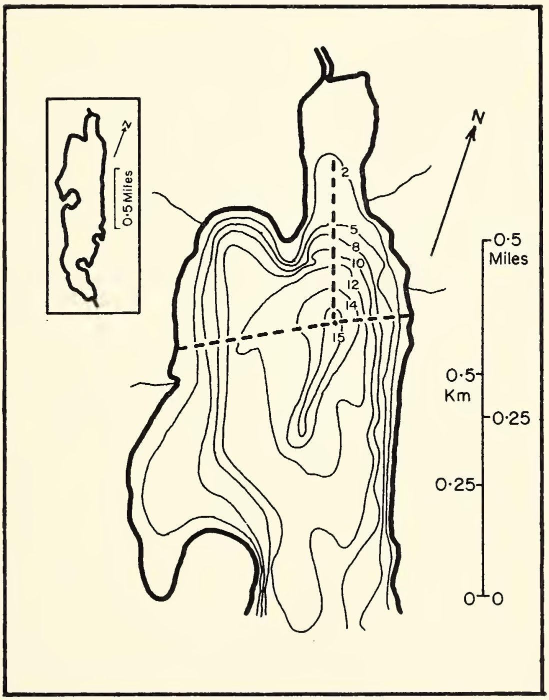

Figure 1. Map of the north end of Esthwaite Water to show the three sampling transects (dashed lines).
The inset shows the whole lake in outline.

Table 1, shows that the mean annual abundance of *C. ophthalmica* at 15 m. rose from 8.9 per dm^2 in 1956 to a maximum of 26.5 per dm^2 in 1958 and thereafter declined to a low level in 1964. Since then it has been found only sporadically, and in 1967 none were caught. No obvious seasonal rhythm of abundance is apparent.

Table 2, shows that *C. ophthalmica* was distributed unevenly down the slope of the lake in late 1958 and in 1959. From 2 to 8 m. it was absent or very scarce on all three transects. On the north and east slopes at 10, 12 and 15 m., it was scarce. On the west slope, it was more numerous at 12 m., and also at 10 m. (but less frequently than at

TABLE 1. Mean number of *C. opthalmica* (individuals per dm^{-2}) in each month and year at 15 m. on the bottom of Esthwaite Water.

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
January	0.7	17.1	5.2	51.9	33.8	10.4	2.6	9.5	1.3	0	0	0	0	0	0
February	3.3	5.8	30.3	32.9	30.0	4.0	0	5.8	0	0	0	0	0	0	0
March	4.5	4.5	24.0	14.5	9.9	1.3	3.3	0.9	0	0.5	0	0	0	0	0
April	5.8	16.6	35.3	3.5	2.0	5.2	2.1	1.6	1.3	0	0	0	1.0	0	0
May	3.1	3.3	42.2	2.0	8.8	2.6	3.3	0.7	0	0	0	0	0	1.3	0
June	3.3	5.2	29.6	2.6	51.9	1.7	3.3	2.0	1.6	0	0	0	0	0	0.5
July	15.1	10.9	28.6	24.7	5.8	5.2	4.2	6.2	0.7	2.0	0	0	0	0	0
August	13.0	14.9	24.7	4.7	23.4	14.9	0.7	0.7	0.7	2.6	0	0	0.7	0	0
September	13.6	48.7	51.4	5.8	11.0	5.2	3.3	3.9	2.6	0	0.7	0	0	1.0	0
October	8.3	13.0	36.4	8.4	5.8	6.2	0.5	5.7	0	0	0	0	0	0	0
November	16.9	4.5	6.5	1.0	7.1	7.8	0.7	8.4	0	0	0	0	0	0	0
December	16.4	5.2	8.3	2.0	7.1	2.0	0.9	0.7	0	0	0	0	0	0	0
ANNUAL TOTALS Individuals	426	662	1379	447	769	218	99	187	31	23	3	0	3	10	3
ANNUAL TOTALS Samples	48	53	52	48	49	37	46	49	46	49	43	45	52	48	49
Means	8.9	12.5	26.5	9.3	15.7	5.9	2.2	3.8	0.7	0.5	<0.1	0	<0.1	<0.3	<0.1

TABLE 2. Mean number of *C. ophthalmica* (individuals per dm2) on the bottom at different depths on transects running west, north and east from a station at 15 m. in the deepest part of the northern end of Esthwaite Water.

1. West transect

Depths, m.	2	4	6	8	10	12	15
Dates 1958							
30 September	0	2.6	5.2	5.2	5.2	13.0	5.2
28 October	5.2	7.8	2.6	5.2	5.2	54.5	5.2
25 November	1.8	0.8	1.8	10.4	13.0	5.2	1.8
23 December	0	0.8	0	18.2	70.1	57.1	5.2
1959 24 February	0	0	0	0.8	5.2	7.8	5.2
24 March	2.6	0	0.8	20.8	62.3	88.3	18.2
21 April	0	0	0	0.8	13.0	31.2	13.0
26 May	0	0	1.8	5.2	10.4	39.0	15.6
9 June	0	0.8	0.8	5.2	13.0	31.2	20.8
23 June	0	0	0	2.6	10.4	10.4	2.6
21 July	0	0	0	5.2	2.6	15.6	18.2
4 August	0	0	0.8	0	0.8	13.0	2.6
18 August	0	0	0	5.2	7.8	18.2	7.8
28 August	0	1.8	0	0	10.4	33.8	2.6
15 September	0	0	0	0.8	0.8	7.8	2.6
29 September	1.8	2.6	0	2.6	1.8	10.4	5.2
14 October	0	1.8	0	2.6	5.2	18.2	7.8
29 October	2.6	2.6	0.8	0.8	5.2	0	2.6
26 November	0	1.8	2.6	0.8	2.6	2.6	2.6
Total individuals	14.0	23.4	17.2	92.4	245.0	457.3	144.8
Number of samples	19	19	19	19	19	19	19
Mean	0.7	1.2	0.9	4.9	12.9	24.1	7.6

12 m.), than at 15 m. The gradient on the western transect, especially between 10 and 14 m., is less steep than on either the northern or eastern transects, and associated differences in bottom deposits, on which *C. ophthalmica* feeds, could be expected. Differences in seasonal rhythm in water-temperature and amounts of dissolved oxygen at the same depth on different transects were negligible. In regard to water temperature and dissolved oxygen at 15 m., Esthwaite Water has not changed at all in the years under review.

2. North transect

Depths m.	2	4	6	8	10	12	15
Dates 1958 4 November	0	0	0	0	2.6	0	0.8
2 December	0	0	0	0	0	1.8	2.6
30 December	0	0	0	0	0.8	0.8	0
1959 3 March	0	0	0	0	0	10.4	7.8
1 April	0	0	0	0.8	0	7.8	1.8
28 April	0	0	0	0	0.8	5.2	10.4
Total individuals	0	0	0	0.8	4.2	26.0	23.4
Number of samples	6	6	6	6	6	6	6
Mean	0	0	0	0.1	0.7	4.3	3.9

3. East transect

Depths m.	2	4	6	8	10	12	15
Dates 1958 14 October	0	0.8	0	7.8	5.2	5.2	2.6
11 November	0	0	0.8	2.6	10.4	7.8	2.6
9 December	0	0	0	2.6	5.2	7.8	2.6
1959 6 January	0	0	0	1.8	2.6	0	5.2
10 March	0	0	0	1.8	2.6	0.8	2.6
7 April	0	0	0	0.8	0.8	0	0.8
12 May	0	0	0	2.6	5.2	7.8	18.2
Total individuals	0	0.8	0.8	20.0	32.0	29.4	34.6
Number of samples	7	7	7	7	7	7	7
Mean	0	0.1	0.1	2.9	4.6	4.2	4.9

It is evident that *C. ophthalmica* is unevenly distributed over the bottom of the lake and that the main series of samples at 15 m. was not taken in the area where *C. ophthalmica* was most abundant (at least in 1959). Nevertheless the main series of samples at 15 m. is valid evidence of a general decline in abundance of *C. ophthalmica* in this lake. In August 1972 further sampling was done to check whether or not a corresponding decline had taken place on the western slope at intermediate depths. At 12 m., 3.9 individuals per dm^2 were found, which is more than the density found at 15 m. but less than 21.6 per dm^2 observed at 12 m. in August 1959.

C. ophthalmica is a detritus feeder. Decline in abundance over the period of observation is unexpected because Esthwaite Water is relatively productive. At present, no reason for this decline can be given. *C. ophthalmica* has been found in the deeper parts of all but four of the larger lakes of the English Lake District, (Smyly 1968) and is said to be one of the commonest of the British species, occurring everywhere, in ditches, ponds, and lakes (Brady & Norman 1889).

In Germany it is a perennial form with two generations in the year and occurs in a variety of habitats (Hiller 1972). Wolf (1919) attributed its widespread distribution to its ability to withstand large changes in water-temperature, drought, and excessive fouling of the water.

Acknowledgements

I am greatly indebted to Dr. J. W. G. Lund, F.R.S. and Dr. V. G. Collins for their valuable criticisms, to Mr. A. E. Ramsbottom who provided the map, and to the laboratory steward of this Association for help in sampling.

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FIELD NOTES

Pectoral Sandpiper at Birkin

On Monday, 17th July, 1972, Stephen Gwillam and R. F. Dickens. together with two schoolboys, called briefly at Birkin at about 21.15 in failing light. A bird seen on mud in the middle of the pond looked superficially like Common Sandpiper but had a more upright stance and even in the poor evening light a more scaly-textured back. Further, when it flew it "towered" with Ringed and Little Ringed Plovers with a flight quite untypical of Common Sandpiper and with no call. There was a suggestion of a faint wing-bar (not conspicuous as in Common Sandpiper) and the tail feathers were dark with a somewhat paler patch at the sides of the tail. In the circumstances its identity was not established.

Revisiting the area on Tuesday 18th July, earlier in the evening we found what was obviously the same bird, again in the same place. From about 20 yards in good light the following points were noted. There was a definite speckling to the upper breast forming a gorget which contrasted with the white underparts. In this respect the bird resembled Common Sandpiper, but appeared somewhat larger or taller and more erect. The upper parts were generally a dark brown with a definite mottled overall impression, or a scaly effect produced by buff edgings to the coverts. In this respect the bird was like a small Reeve. A pale stripe over the eye was not very pronounced and there was a darker line through the eye. The bill appeared dark but paler at the base and was possibly slightly decurved at the tip. Bill-length was proportionately about the same as that of Reeve. The legs were dark brown with a paler brownish colouring towards the body, possibly where they had not been in the wet mud.

We moved from the roadside towards the pond in order to get better views. Other species present flew up, disturbing the bird we were watching. This flew *towards us* and settled temporarily at about 25 feet. Again a thin pale but not conspicuous wing-bar was noted and lighter patches at the sides of the base of the dark tail or on the rump.

Having seen the species previously in September—October 1959 at Fairburn, R.F.D. was by this time convinced that the bird was Pectoral Sandpiper. When it flew up again and gave a sweet clear "twheet-twheet" call it further convinced him and we went straight to Fairburn where C. Winn and other bird-watchers were asked to go and provide corroboratory evidence. The bird was clearly seen by Dr. J. D. Pickup on the afternoon of 19th July and in the following few days by J. Cudworth and several other observers.

Although an arctic species with a limited North American range, the Pectoral Sandpiper is possibly the commonest trans-Atlantic vagrant. Nelson mentions six occurrences in Yorkshire prior to the turn of the century with dates between August and October. There are apparently no records for the county between 1897 and 1948 when two birds *in early spring* were thought to be Pectoral Sandpipers but were not confirmed. It is perhaps significant that all other Yorkshire records which we have been able to trace have been of *autumn* birds; and the six confirmed records since 1951 all occurred between September and October. Indeed the Birkin bird, confirmed by a number of observers, was exceptional in that it appeared as early as mid-July.

R. F. Dickens and S. Gwillam

The occurrence of *Boettgerilla pallens* Simroth, a slug new to Britain, in the English Lake District

On the 3rd September 1972, Dr. Barry Colville of Leeds located three specimens of a slug, which he was unable to identify, under stones amongst nettles by the side of an old dry stone wall near The Abbey, Windermere (Grid Ref. 34/403985). The specimens were handed to one of us (A.N.) for identification and it was concluded that the only species they could be was the continental *Boettgerilla pallens* Simroth (= *B. vermiformis* Wiktor).

The occurrence of this species is an interesting addition to our fauna, and its spread on the continent of Europe suggests that it may soon become one of the more common and widely distributed slugs in Britain, in much the same fashion as *Agriolimax caruanae* Pollonera and *Milax budapestensis* (Hazay).

In general appearance *Boettgerilla* resembles a small, slender specimen of *Milax gagates* (Drap.), much more slender and graceful than even *M. budapestensis*. It can be distinguished from *M. budapestensis* by its dark-coloured keel (young specimens of *M. budapestensis* have a light-coloured keel) which runs the whole length from the hind end of the mantle to the tip of its tail and is compressed from side to side causing it to stand out like a sharp fin. *M. gagates* is distinctly plumper; its foot-sole is broader; its mantle shield is rounded behind and distinctly shagreened and it is buckled by the rather large shell. *M. gagates* is rather more greenish-brown and less bluish-grey than *Boettgerilla* and the keel is of the same colour as, or darker than, its background. *Boettgerilla* by comparison is more slenderly built with a narrower foot-sole. The mantle shield is in the form of a slightly rounded V at the hinder end and shows fine concentric grooves. The very small shell is placed towards the back of the mantle and does not bulge up. Juvenile specimens of *Boettgerilla* are of a creamy-white colour turning bluish-grey towards maturity. The keel is darker than the background and very sharp.

Field Characters

No external shell; mantle concentrically ridged; respiratory orifice behind the centre of the mantle. The sharp, dark, dorsal keel does extend to the posterior margin of the mantle; tail slightly obliquely truncated; posterior margin of the mantle angled. Colour bluish-grey; length 30-40 mm; breadth 3-5 mm.

Prior to publication of this find in the *Journal of Conchology*, the authors of this note would like to see any specimens which collectors may suspect as possibly being this species, and would be grateful if they could be forwarded to Mr. Adrian Norris at the Leeds City Museums, Municipal Buildings, Leeds LS1 3AA, either alive or preserved, for verification.

References

Schmid, G., (1963). Zur Verbreitung und Anatomie der Gattung *Boettgerilla. Arch. Moll.* 92, 215-225.

Wiktor, A., (1972). *Boettgerilla pallens* Simroth, 1919. *Informations de la Societe Belge de Malacologie, Bulletin mensuel,* serie 1, 145-148.

B. Colville, L. Lloyd Evans and A. Norris

Saltwort found Inland

In late October, 1972, when clearing a flower bed of annuals from the school garden at Airedale High School, Castleford, I came across a single poor specimen of Saltwort (*Salsola kali*). Whilst I do not entirely rule out the possibility that I unwittingly brought the seed to the area, I consider this unlikely since I now visit Spurn only infrequently. In 1953 or 1954, my attention was drawn to a plant of this same species growing in the spoil-heaps which form a part of the Fairburn Ings Nature Reserve. As far as I am aware this record was never published. At the time we considered it likely that seed had been carried ai the feet of a gull, many of which form pre-roost gatherings on the spoil-heaps.

R. F. Dickens.

CONCHOLOGICAL SECTION: MARINE SURVEY

Report of field trips to Scarborough, South Bay; Thornwick Bay, Flamborough and Filey Brigg, 1972

ADRIAN NORRIS

The introduction of the new 80 column marine survey cards, and the field check list for marine mollusca, signals the start of a national survey, to be carried out over the next ten years, to plot the distribution of all the British marine mollusca, on a 10 kilometre square basis. The Yorkshire coast has always been known for its very rich and varied fauna, but no systematic survey has even been carried out to plot the distribution of even our more commonly recorded species. The publication in 1956 of the two volumes on the *Natural History of the Scarborough District* by the Scarborough Field Naturalists' Society produced the first and only satisfactory account of the marine mollusca recorded from our coast. Checking through this publication however reveals a number of interesting points, perhaps the most startling of which is the lack of information. Very few species seem to have any published information post-1915, either about the localities in which they can be found, or about the type of habitat needed for them to sustain life. Many of the records are based on only one or two sobervations, and in some cases only on the records of the late William Bean of Scarborough who's records are noted for being unreliable.

The Conchological Section therefore decided to hold three field trips to the coast in 1972 with the intention of introducing its members to the more familiar species of mollusca inhabiting our rocky shores. These meetings, although held on a rather casual basis, did produce some interesting observations and records, the results of which are published below. In order to correct some of the misleading impressions people have as to the types of localities, or habitats, in which even some of our more common species can be found, I have made a few personal observations. These observations are intended to help those people who would like to take an interest in locating and recording marine mollusca, but who do not have the time to spend systematically searching all possible habitats at different periods of the year.

LOCALITIES VISITED

Scarborough, South Bay. (Grid Ref. 54/0–8–) 1st July 1972. Tide H.W., 8.34 p.m., Ht. 14.7 ft. Area eaxmined, H.W.M. to L.W.M. between the Bathing Pool and White Nab, the area known as Black Rocks.

Thornwick Bay, Flamborough. (Grid Ref. 54/23–72–) 2nd July 1972. Tide H.W., 9.21 p.m., Ht. 14.3 ft. Area examined, intertidal rocks on the eastern side of Thornwick Nab·

Filey Brigg, Filey. (Grid Fef. 54/13–81–) 25th November 1972. Tide H.W., 8.23 p.m., Ht. 16.1 ft. Area examined, the north or seaward side of the Brigg and a small area of wet sands between the cable landing and the Brigg at L.W.M.

Note: All the tide information is based on the tide tables for Scarborough, as published, and allowance should be made for G.M.T. where necessary. Tide depths are for afternoon tides.

All the records listed below are based on living material only, no record of dead shells are included.

Lepidochitona cinereus (L.) Common at all three localities. This is the commonest of the chitons by far, and it can be found in large numbers under stones from just below H.W.M. downwards. It varies considerably both in colour and in size and can easily be mistaken for other less common species if care is not taken over identification.

Acanthochitona crinitus (Pennant) Scarce, Scarborough, South Bay, under large stones in deep rock pools, mid-tide level.

Patella vulgata (L.) Common at all three localities. This species varies considerably in colour and care should be taken when separating out *P. aspera.*

P. intermedia Jeff. Abundant in rock pools, mid-tide level and below. Thornwick Bay and Filey Brigg. This is by far the most abundant species of limpet in many of the rock pools in and around Thornwick Bay and can very easily be distinguished by its opaque white pallial tentacles. Alastair Graham in his book on *British Prosobranchs*, (Synopsis of the British Fauna, New Series No. 2, Linnean Society, London. 1971), states that *P. intermedia* is found in S.W. England, Wales and Westen Ireland only, even though it has been known from the Yorkshire coast since 1910.

P. aspera Roding Fairly common in deep rock pools towards L.W.M. Thornwick Bay and Filey Brigg.

Patina pellucida (L.) Common at all three localities, on *Laminaria* at L.W.M. or in deep rock pools in which the *Laminaria* has become established.

Tectura virginea (Muller) Fairly common at all three localities at low water mark and a little above, but it is often very difficult to locate amongst the pink calcareous growths, into which it matches perfectly.

Margarites helicinus (Fab.) Very common at Thornwick Bay where it was found in large numbers in small rock pools just above L.W.M. Rare at Filey Brigg.

Gibbula cineraria (L.) Common in all three localities.

Lacuna vincta (Mont.) Common in all three localities.

L. pallidula (da Costa) Common on serrated wracks at Thornwick Bay where it was breeding in large numbers.

Littorina littorea (L.) Common at all three localities.

L. saxatilis (Olivi) Common at all three localities.

L. s. tenebrosa (Mont.) Common at all three localities. This form has always been known as a variety of *L. saxatilis* but it is now thought to be a species in its own right. It can easily be located in the old barnacle cases in more exposed and dryer situations just below H.W.M.

L. neritoides (L.) Common at all three localities on damp areas of cliffs around H.W.M. and above, also in the dryer more exposed areas below H.W.M. often in company with *L. tenebrosa.*

L. littoralis (L.) Common on serrated wracks in or near rock pools, mid-tide level. Thornwick Bay and Filey Brigg.

Cingula semicostata (Mont.) Rare, under tightly wedged stones at L.W.M. Filey Brigg.

Rissoa parva (da Costa) Fairly common under stones lying on muddy sand in the serrated wrack zones. Thornwick Bay and Filey Brigg.

Skeneopsis planorbis (Fab.) Fairly common but difficult to locate due to its fairly small size. Found on fronds of *Laminaria* and under tightly wedged stones, mid-tide level and below.

Nucella lapillus (L.) Common at all three localities.

Nassarius incrassatus (Strom) Scarce under large stones near the waters' edge L.W.M. Scarborough, South Bay.

Odostomia scalaris (Macgillivray) Common amongst the clusters of small mussels upon which it lives as an ectoparasite. Thornwick Bay.

Archidoris pseudoarqus (Rapp.) Common, and very large, mid-tide level to L.W.M., Scarborough, South Bay. Fairly common but small, Filey Brigg.

Polycera nothus (Johnston) One specimen of this very fine sea slug was located on the underside of a large stone in a deep rock pool at mid-tide level, South Bay, Scarborough. Confirmed by Dr. T. E. Thompson of Bristol University.

Onchidoris fusca (Muller) Common on the undersides of large areas of rock, at L.W.M., Filey Brigg.

Goniodoris castanea (A. & H.) Scarce; two specimens were located in association with *P. nothus* under a large stone in a deep rock pool at mid-tide level, Scarborough, South Bay.

Facelina auriculata (Muller) Scarce; under stones in deep rock pools, near L.W.M., Scarborough, South Bay.

Aeolidia papillosa (L.) Common; South Bay, Scarborough and Filey Brigg, but scarce in Thornwick Bay. Under deep set stones, mid-tide level and below.

Phytia myosotis (Drap.) v. *denticulata* (Mont.) Fairly common on the cliffs between Scarborough and White Nab at about extreme H.W.M. deep inside horizontal fissures which always retain moisture, and thus appear darker than the surrounding rocky faces. In association with the sea slater, *Ligia oceanica* (L.)

Myilus edulis (L.) Common at all three localities.

Motdiolus modiolus (L.) Fairly common at South Bay, Scarborough, where it occurs in rock pools up to H.W.M. Scarce at Thornwick Bay and Filey Brigg.

Lasaea rubra (Mont.) Abundant under tightly wedged stones, mid-tide level and below, Filey Brigg.

Donax vittatus (da Costa) Fairly common but difficult to locate, Filey sands.

Tellina tenuis (da Costa) Common at Filey sands.

Hiatella arctica (L.) Fairly common in rock fissures, mid-tide level and below, Thornwick Bay and Filey Brigg.

Zirfaea crispata (L.) Fairly common but often difficult to locate. Embedded in soft rock in deep rock pools, mid-tide level and below.

The systematic order and the names used in the above list are those published in the Check List of British Marine Mollusca by R. Winckworth, *J. Conch.* 19: 7 June 1932.

As recorder for the Conchological Section I would like to thank all those who have helped with the collecting, identifications and the compiling of this report. I would also like to take this opportunity to invite any persons wishing to help in the marine recording scheme, or who would like to attend the proposed marine survey field meetings in 1973 to write to me at the Leeds City Museums, Municipal Buildings, Leeds, LS1 3AA, for further details.

CORRESPONDENCE

Pesticides and Wildlife

Sir,

I have read the paper "Effects on wildlife of aerial spraying of Tetrachlorvinphos" (1972, *The Naturalist*; 135-140) with some concern. The authors' "conclusions" state that the "observations indicate that tetrachlorvinphos had little impact on wild life populations in the sprayed areas" which seems to me to be a very sweeping statement to make on the basis of the evidence presented here. The two groups of insects sampled, the butterflies and the hoverflies, are among the most mobile forms that it would have been possible to select and, in view of this, the results could be interpreted to support a thesis on the speed with which they can repopulate areas. The exercise would have been more convincing had less mobile forms been chosen for the work. There are many such forms that are normally present in adequate numbers for this purpose in the forests in that area and at that time. These forms include lacewings (Neuroptera) and their arboreal larvae, mirid bugs and their larvae in the herbage of the rides, adult ladybird beetles (*Aphideita obliterata* is common there) and, of course, the hoverfly larvae. Bad weather would not have affected the sampling to the extent that it clearly would in the case of forms that are normally seen when they fly in warm and sunny conditions. What was the effect of the spray on these insects? Did it deal as effectively with the larvae of all the other moths and sawflies, harmful and harmless, as we are told it did with those of the Pine Looper? We are not told.

"Birds were unaffected by the spraying." Do we know that? We are told they were as abundant after the operation as before it. But did the insectivorous birds eat insects affected by the spray and what is the ultimate effect on birds which eat insects which have been poisoned by an organophosphorus compound?

I read of the total extermination of the *Daphnia* in the pond, the extinction of the grasshoppers, the "satisfactory control" of the *Bupalus* larvae, the "few other dying insects", and compare this with the rest of the evidence presented and do not find this adequate to justify the statement that the spraying had "little impact on wild life."

Yours faithfully,
J. H. Flint

MEETING OF THE MAMMAL AND LOWER VERTEBRATE SECTION SKIPTON, 17th MARCH, 1973

The Section met at the Craven Institute of Further Education as guests of the Craven Naturalists' and Scientific Association, whose President, Mr. K. Lumb extended a warm welcome to members and friends, representing 27 Affiliated Societies.

Mr. J. E. Knight, in the Chair, introduced Mrs. Grace Hickling, who spoke of the recent cull of seals in the Farne Islands. Mrs. Hickling said the world population of the Grey (Atlantic) Seal (*Halichoerus grypus*) was between 60 and 70 thousand, of which two-thirds were found in British waters. They had been protected during the breeding season since the first Seal Protection Act of 1914. The close season was extended by a further Act in 1932 and additional protection was afforded by the Conservation of Seals Act, 1970.

The Farne Island colony was unique in that it was near the mainland, easily visited, and only some 15 miles from rich fisheries on the east coast of Scotland — and seals undoubtedly do damage both nets and fish. Records of seals go back some 800 years, but until the late nineteenth century they were greatly exploited and numbers remained small. In the early years of this century the colony numbered only about 100, and only 600 to 800 in the late 1930s. Regular counts started in the 1950s, when the colony numbered 1,500 to 2,000, with about 450 to 500 calves born each year. In 1960 there were 3,500 seals; in 1970, 7,000. Thus we now had an annual increase of 10 per cent and could expect the population to double every ten years.

The Seal Research Unit and the Northumberland and Durham Natural History Society had undertaken a joint research project into the situation and had eventually recommended that the seals should be culled — a recommendation agreed to and carried out under strict supervision last winter. Mrs. Hickling stressed that the cull had not been carried out under pressure from the fishery interests, but solely on account of the pressure of the rising seal population on the general ecology of the islands. Slides illustrated the great damage to vegetation, particularly to large areas of Sea Campion (*Silene maritima*). This in turn was leading to serious erosion of the already meagre soil, and was seriously affecting some of the birds, particularly the Puffins, whose nesting sites were being destroyed. The seals too were affected. Due to overcrowding some cows were becoming increasingly aggressive, preventing less aggressive animals from returning from the sea to feed their young. Thus many calves were dying of starvation, others were grossly underweight at weaning with a poor chance of survival to the next season. The ground was heavily contaminated and wounds from bites or other causes rapidly turned septic.

The cull, carried out by expert Norwegian sealers, had aimed to reduce the population to the 1960 breeding potential. This goal was not achieved, but 132 bulls, 603 cows and 575 calves had been taken and a great deal of valuable research material had been obtained.

The next speaker, Mr. Peter Wright, gave a most interesting talk on the "Birds of Craven", illustrated with slides. The Craven area is richly endowed with a wide variety of habitats and it is, therefore, a very rewarding area for the bird-watcher, and indeed for all naturalists. It was good to hear that Goldfinches are on the increase, that the heronry at Coniston Cold continues to flourish, and that the Raven is still to be heard and seen in certain favoured places.

Mr. John Cudworth, speaking about "Rarer Birds of Spurn", emphasised that the most important work there was concerned with the study of common migrants. Nevertheless, to see a rare migrant at close quarters must thrill all but the most blasé of birdwatchers. Mr. Cudworth gave a chronological catalogue of rare birds seen at Spurn since 1960, and whilst no definite conclusions could be drawn as yet, the results suggested at least two lines where further study may prove rewarding. The arrival of many of these rareties suggests that they "overshot their mark". Many spring migrants from Africa to Southern Europe get carried too far north, perhaps due to weather conditions, perhaps because they inadvertently find themselves tagging along in company with one of their close relations with a more northerly distribution. More remarkable are the birds that just seem bent on going the wrong way. When they should be going south and east from say, Central Russia, they go north and west, to arrive at Spurn!

Mr. John Mather, of the Knaresborough Ringing Station, brought the meeting to a close on a light-hearted note, with an invitation to members present to identify a selection of bird skins.

Chislett Memorial Lecture 1973: Dr. Eric Ennion

Following the Vertebrate Section meeting, Miss Eva Crackles, President of the Union, in the Chair, recalled her own very close association both with Ralph Chislett and with Dr. Ennion, famous bird artist and former Warden of Flatford Mill and Monk's House.

Dr. Ennion, speaking about "Sketching the Living Bird" also paid tribute to Mr. Chislett, whose pioneering trips to Lapland in the 1930s had aroused his own interest in northern areas such as Lapland and Iceland. Some of the field studies he had made then were on display at the meeting.

Dr. Ennion sketched the development of bird and wild life painting in Britain from the time of Bewick and Gould, who, with his collaborators produced over 3,000 works in 20 years. The early artists worked of necessity from skins and though the colour and rendering of plumage was unrivalled, many of their works had a posed and slightly artificial look today. Thorburn and later Frank Southgate were the first to break away from the posed portrait and modern artists, like John Busby, followed this later tradition.

Turning to the practical side of bird sketching, Dr. Ennion stressed the need for constantly making field studies. Only through his sketch book can the bird artist acquire the quickness of hand and strong visual memory necessary for success. He must learn what to leave out, to simplify, to seize on the essentials so that his drawings have life. Weak sketches should be ruthlessly destroyed. Successful ones should be filed for future use. Dr. Ennion described his own methods, his use of tinted paper, Chinese White and water colour.

Perhaps the most valuable part of the meeting for the would-be artist was the informal "walk-about", when members had the opportunity of more closely examining the material on display and of seeking Dr. Ennion's personal advice.

Before that, Miss Crackles brought the formal part of the proceedings to a close by asking Mr. Roy Crossley to move a vote of thanks to Dr. Ennion and to the Craven Naturalists' and Scientific Association for their hospitality in providing such a delightful venue for the meeting.

Christine Shaddick

G. H. AINSWORTH: AN APPRECIATION

In December 1972, the Annual General Meeting of the Yorkshire Naturalists' Union conferred Honorary Life Membership on George Ainsworth of Hull, in recognition of his services to the Union over many years. It was at G.H.A.'s instigation and through his initiative that the Bird Observatory was established at Spurn in 1945, and the Spurn Bird Observatory Committee of the Ornithological Section of the Union came into being. He was the first secretary of this committee and continued as a member until ill-health caused him to resign in 1972.

The Observatory was singularly fortunate to have had a man of George's calibre in its early days. Drive and enthusiasm were so necessary in getting things done; in persuading people to help; and in conjuring up materials at a time when, immediately after the war, supplies were difficult. He had the happy knack of enlisting voluntary labour for working parties, of persuading people to undergo inconvenience in order to man the Observatory, and of engendering the sort of optimism which would induce them to drive the traps just one more time. On more than one occasion, when everyone else had decided to "call it a day," George has been known to slip off through the Warren trap on his own and then re-enter the cottage triumphantly bearing some rare trophy.

The ringing of birds, with its tangible results of a total number ringed in any one year (and to be surpassed the next!) and of precise information gleaned from recoveries was G.H.A.'s particular line of observatory business. Any report to him of an unusual or interesting species was inevitably greeted with the question "Did you ring it?" Those who have only known the Observatory in recent years—it was established and had achieved a high reputation even before the Y.N.T. acquired Spurn Peninsula—and those present day ringers who rely almost exclusively on mist-nets will find it difficult to appreciate how much necessary work G. H. Ainsworth organised and how much he put in himself. It is difficult, too, to realise how much physical effort was involved in reaching the ringing totals of those early years when all the birds were caught only by visiting time and time again widely separated traps.

It would be wrong however to leave the impression that George Ainsworth's chief contribution has been in getting birds ringed. Until recent years he has been a regular attender at the spring and autumn meetings of the Ornithological Section which were frequently enlivened by his up-to-date reports of what had been going on at Spurn. Usually they were designed to attract members for the following week or week-end, when perhaps he had no one booked to stay at the Observatory. That there is a Bird Observatory at all at Spurn is due to G.H.A., and it is appropriate that the Union should honour him.

J. Cudworth
Chairman of Spurn Bird Observatory Committtee
R. F. Dickens
Chairman of Ornithological Section

BOOK REVIEWS

Flora Europaea: vol. 3, Diapensiaceae to Myoporaceae, edited by **T. G. Tutin, V. H. Heywood, N. A. Burges, D. M. Moore, D. H. Valentine, S. M. Walters** and **D. A. Webb.** Pp. xxx+370 with five maps. Cambridge University Press, 1972. £12.

The appearance of each successive volume of *Flora Europaea* is an event of major interest to systematic botanists; and not only to European botanists, for this great undertaking has stimulated botanists in at least one other continent to contemplate a comparable project for their own area. One of the many merits of this work also is the catalytic effect it is having on floristic research in many parts of Europe through focussing attention on critical groups and stimulating a wider phytogeographical outlook in their investigation than has often been accorded to them in the past.

The present volume covers 31 families. The major part is devoted to the Tubiflorae, the principal other orders included being the Ericales, Primulales and Gentianales. None of the genera covered in this part raise quite the same difficulties of treatment as the apomictic groups of the Rosales though several are complex, including many taxa of dubious status which require much further study. *Rhinanthus* and *Melampyrum* are two genera in which large numbers of species have been described many of which are now regarded as no more than recurrent ecotypic variants associated with autumnal or aestival flowering and lowland or montane habitats. The treatment of the Yellow-rattles in this account purges the British list of our supposed endemic species (these do not even merit mention amongst the synonyms in the index) and leaves us once more with two species only though the name of one of these is no longer either *Rhinanthus major* or *R. serotinus* but *R. angustifolius* C.C.Gmel.

The account of the Eyebrights constitutes a substantial forward step in the understanding of this difficult genus. Of the 46 species recognised in Europe, 19 are accepted as "good" British species. This compares with 25 species in Dandy's list. Of these 19 species several appear under new names; the species long known as *Euphrasia borealis* and *E. brevipila* now being listed as *E. arctica* ssp. *arctica* and ssp. *borealis* respectively.

The largest genera included in this volume are *Limonium* and *Verbascum* each with 87 species. Other genera with 50 or more species are *Linaria* (70), *Thymus* (66), *Veronica* (62), *Stachys* (58) and *Pedicularis* (54). There are, as in previous volumes, numerous name changes affecting British species; *Utricularia australis* replaces *U. neglecta* and *Limosella australis* replaces *L. subulata*; *Thymus drucei* goes in favour of *T. praecox* ssp. *arcticus* and *Myosotis brevifolia* becomes *M. stolonifera*. Nine species of *Callitriche* are credited to Britain—a 50% increase. This is largely accounted for by the reappearance of *C. palustris* and *C. polymorpha* (as *C. cophocarpa*), two species which were included in earlier British lists but which have always been so confused and ill-understood by British botanists that recent lists have dropped them. *Empetrum hermaphroditum* is reduced to a subspecies of *E. nigrum* and *Veronica hybrida* which has been treated as a species or subspecies by British botanists is not recognised as taxonomically distinct from *V. spicata* (unless it be as a variety—a grade excluded from this work). On the other hand *V. hederifolia* which British botanists have not subdivided is here treated as made up of three subspecies two of which are said to occur in Britain.

At the generic level the Yellow Archangel becomes *Lamiastrum galeobdolon* and the genus *Lithospermum* is left with only one European species, *L. officinale*, the two other British species previously included in this genus being transferred to *Buglossoides*. The new liaison between *Lathraea* and the Scrophulariaceae with raise a few eyebrows, but by contrast the two Bearberrys after a period of divorce have been reunited in the genus *Arctostaphylos*.

In view of the magnitude of this work it is scarcely surprising that the original time schedule envisaged for finishing it has already been exceeded and that five volumes instead of the four at first planned will be required for its completion. Its escalating price is its worst feature and since this volume costs more than the combined prices of the previous two one shudders to think of how much volume five will cost. Any feelings of impatience however occasioned by having to wait three years for this volume are more than offset by one's increased admiration for the uniformly high standard and consistency of presentation and the extreme care which has been taken in the editing and proof-reading of the work. *Flora Europaea* is a triumph of international organization and cooperation as well as a work of exceptionally high value and importance. The publishers as well as the editors deserve their full share of congratulations, for the high standard of its production does full justice to the high quality of its contents.

W.A.S.

Drawings of British Plants. Part 30: Juncaceae, Typhaceae, Sparganiaceae, Araceae by **Stella Ross-Craig.** 41 plates, G. Bell & Sons. £1.25.

Three-quarters of this part consists of drawings of rushes and wood-rushes, the reed-maces, bur-reeds and cuckoo-pints being covered by nine plates. Twenty-three species of rush are illustrated; the details of enlarged flowers, perianth segments and capsules of these affording the information which will probably most often be referred to by users of this part. A few points of diagnostic value in these rush illustrations seem to the reviewer to be less than perfect. The very dark, purple-black basal sheaths of *J. inflexus* are not indicated nor is any indication given either in the figures or the accompanying texts of the ribbed and non-ribbed stems of *J. conglomeratus* and *J. effusus* or the presence or absence of pith diaphragms in stems or leaves. *J. articulatus* is normally decumbent at the base not strictly erect as in the plant illustrated and neither in this or other species is any indication given of the lateral compression of the leaves. The illustrations of wood-rushes include plates of *L. luzuloides* and *L. pallescens*. The inclusion of these introduced species is welcome but it lends emphasis to my comments on the exclusion of some native species from the preceding part. These are small points however by comparison with the general excellence of these drawings.

W.A.S.

The Naturalist in the Isle of Man by **Larch S. Garrad.** Pp. 224 with 16 pp. plates and 6 maps. David and Charles, Regional Naturalist Series, 1972. £3.75.

This is a timely work by the curator of the Manx Museum in Douglas, bringing together many elements of the natural history of this surprisingly little-known island. It might be said that since Quiggins' holiday guides there has been no compendium like this for the visitor, but there is really no comparison to be made. Apart from such works as those on the birds of the island and several papers in the now defunct *North-western Naturalist* and the island's own *Peregrine*, there is no other ready source of information on the natural history of the Isle of Man.

The treatment is by natural district, which the island breaks down into quite readily and there is a historical perspective which helps a great deal in rounding-up the picture. We learn, for example, that the Isle of Man was treeless by the eighteenth century, when even its "hedges" were of stones and earth. "Intacks" are familiar to north countrymen elsewhere but "sheadings" are less so, and our "shieling" is the Manx "eairy". From the "curraghs" (willow bogs) and the coasts to the hilltops we are introduced to quite different suites of plants and animals in close proximity, and there is an excellent chapter on the northern raised-beachlands of the Ayres.

There are tiny blemishes of print, as "clearwig" for "clearwing" on p. 56, "pine-martin" on p. 147. "*SCUBA*" (p. 23) is not explained, and neither is "P.C.B." (p. 41). The maps are generally rather poor and there seems small excuse today in publishing maps of heronries and peregrine eyries. On p. 79 the author supports E. Forbes' view that there are Sand Lizards on Man despite the review of evidence published in this journal (C. Simms, 1968). One unanswered question for Man is still whether there are any newts. That a very special orthopteran could escape notice there until 1962 might give some hope for yet further exciting discoveries. This book will stimulate them; let us hope it will also help prevent too heavy a hand of man on Man.

C.S.

Project Earth by **Graham Searle.** Pp. 127 with photographs and drawings. Wolfe Publishing Co. £2.00.

This little book, written by the British organiser of the conservation group "Friends of the Earth", is called "an action guide for young people." It begins by explaining some of the problems of pollution and spoilation on the land, in water and in the air, with both photographs and diagrams to illustrate some of the points made. In these and following pages, there are practical suggestions as to ways in which young people can help. These include specific hints on how to keep a look-out for cases of pollution, even if it be caused by a large ship or a big firm, and where to write with information recorded. There are also positive suggestions for aiding the natural cycles and slowing down their destruction, ranging from how to make nesting-boxes for garden birds to making a garden pond or adopting an existing pond. Throughout, there is much to exercise the mind and the conscience of both young and older people. The book should be in every school library. It is a pity that the price is high enough to discourage wider use. In a cheaper, paper–back version it could provide a textbook for many young and middle-school classes in environmental studies.

N.V.M.

A Field Guide to Birds' Nests by **Bruce Campbell** and **James Ferguson-Lees** with the assistance of Henry Mayer-Gross. Drawings by D. I. M. Wallace. Pp. 545 with 8 black and white plates, numerous drawings and 185 maps. Constable, London, 1972. £2.50.

As one would expect from the two distinguished authorities Bruce Campbell and James Ferguson-Lees, this book is the most comprehensive summary yet produced of the nests and nesting habits of British breeding birds. The information is up-to-date and concise. The maps indicate the density of breeding and are of relatively large size giving a clear picture of the distribution of all the commoner species. There are seasonal charts showing the incubation and fledgling periods. Ian Wallace's drawings are delightful and give wonderful impressions of the "jizz" of birds in the field.

Whilst being unreserved in priase of the book as well produced and a clear accumulation of the known scientific facts on birds' nests, one has some unease about the wisdom of presenting this information in so convenient a form to the uninformed as well as to the informed reader. The depredations of the bird-nesters are at times frightening. The authors refer to the need for leaving the nest "tidily" and also to the implications of the Protection of Birds Act 1967 but it would be better if the need for care was stressed more positively, especially with sensitive species. The section on the Red Kite (*Milvus milvus*) does stress that 'observers should not attempt to look for Kite nests in Wales and if they stumble on one, should leave the vicinity quickly without trying to reach it, because Welsh population liable to desert". Later comes the surprising statement "we include full details not merely for completeness but because odd pairs may be found nesting outside Wales and because we hope this book will be used abroad". Surely Red Kites are just as liable to desert outside Wales and abroad and our responsibility for care is great wherever birds nest.

In the section on the Peregrine (*Falco peregrinus*) the quotation "Sometimes forsooth a hole breeder utterly ignores showers of rubble dropped past it's haven and been stranger still, repeated shots from a revolver (Walpole-Bond)" should have even omitted for the safety of human beings if not for the safety of the Peregrine who wisely "ignores" such stupid behaviour.

Careless people using the techniques repulsively described as "hot searching" with sticks or dragging a rope over open country without proper control could cause considerable damage to species already under much pressure from human interference. Perhaps the authors who are well known for their work for conservation would consider re-emphasising these aspects in future editions?

These criticisms apart, this is a most useful reference book on nests; it has very detailed descriptions of the breeding habits of British birds, and is likely to find a place on book shelves of many ornithologists.

J.D.P.

The Dotterel by **Desmond Nethersole-Thompson.** Pp. 288 with 14 figures, a colour frontispiece and 15 black and white plates. Collins, London, 1973. £3.50.

The Dotterel (*Eudromias morinellus*) is a bird of the high mountains of the north and Desmond Nethersole-Thompson is supremely well qualified after a lifetime of observation to write this monograph on the life, habitat and breeding biology of this species. In spite of persecution by egg collectors and the slaughter of the large spring gatherings on the Solway and Yorkshire Wolds in the nineteenth century, the bird has held its own and is probably increasing in numbers and range due to the cooler climate of recent decades. The "petticoat government" of the dotterel's world is explained in detail. The birds are personal friends known by individual names to the Nethersole-Thompson family.

D. A. Ratcliffe contributes chapters describing the montane zone in which the species lives and on the dotterel as a breeding bird in England. The decline in population in Northern England is due to a complex mixture of factors, and as the author says "we always scorn the follies of our fathers and are quite blind to our own. New pressures are likely to become more deadly to the dotterels than the worst that the old eggers and trophy hunters ever inflicted on them." Chair lifts, skiers, roads and toxic chemicals invade the windswept territory of one of Britain's most charming birds.

Throughout this book the impressive personality of its author is stamped on every page. Every ornithologist who loves the birds of the north should possess a copy. It will be a constant source of information and delight.

J.D.P.

The Oxford Book of Vertebrates by **Marion Nixon,** illustrated by Derek Whiteley. Pp. viii+216 including 96 colour plates. Oxford University Press, 1972. £3.50.

This volume covers the British vertebrates except for birds in the usual pattern of this series, colour plates with facing pages of explanatory text on the species figured. The whole success of this type of book depends on the quality of its illustrations, and many of these, particularly the land mammals, are very poor indeed. In some the unnecessary background of rocks, sand or vegetation, obscures the outline. The text is concise, relevant and mainly accurate, but several inaccuracies occur in the section on fishes. It is stated that there is still an annual meeting of game fishermen at Scarborough and Whitby for catching tunny *Thunnus thynnus* (page 26), something that has not taken place for 20 years. One gets the impression that only two hagfish *Myxine glutinosa* have been caught in British waters (p. viii) and the flying fish *Exocaetus volitans* is said to "Occasionally occur on the south west coasts of the British Isles" (p. 32). This is a species now thought not to occur north of the Canaries. Several fairly common or annual visitors to the British Isles, such as the catfish *Anarhichas lupus*, starry ray *Raja radiata* and the dealfish *Trachipterus arcticus* are not included.

In view of the amount of literature available on British fishes these errors were avoidable. This volume is not as successful as others in this series and is certainly the dearest so far.

C.I.M.

Key to British Freshwater Fishes with notes on their distribution and ecology by **Peter S. Maitland.** Pp. 140 with 64 figures, 1 black and white plate and 55 distribution maps. Freshwater Biological Association Scientific Publication No. 27, 1972. £1.20.

This excellent work contains far more than its modest title suggests. After a short introduction containing notes on structure, collection and preservation and a check list of British species there is a Key to Families; a Key to Species (containing some excellent figures of all the British species); a Preliminary Key to Fish Eggs by families; a Preliminary Key to Fish Larva by families and a Preliminary Key to Fish Scales by families. Finally, there are 55 maps indicating by a symbol the presence of each species in every 10 kilometre square of the Ordnance Survey National Grid in which it occurs. These maps have been reproduced the same size as those in the *Atlas of the British Flora* and the transparent overlays showing rivers, altitude, geology, rainfall, temperature and humidity included in that work fit these maps also. Basic details on the ecology of each species accompany the maps. The most obvious conclusion from the publication of these preliminary distribution maps is that much more recording is necessary particularly in Yorkshire.

This is a worthy addition to the list of keys published by the Freshwater Biological Association and should stimulate interest in what has for many years been a neglected vertebrate group.

C.I.M.

Pierre Teilhard de Chardin's Philosophy of Evolution by **H. James Birx.** American Lecture Series Pub. No. 852. Pp. 163. Charles C. Thomas, Springfield, Illinois. 1972. $9.75.

Scientist, philosopher, theologian and mystic, Father Pierre Teilhard de Chardin, S.J., was certainly one of the most interesting men our century has yet produced. One recalls with vexation that his views remained unacceptable to his Society and his Church throughout his life. It is arguable that this rejection was due less to misunderstanding of his philosophy than to the implications of its evolutionary content being only too clearly appreciated, but there is no doubt that in general there remains much confusion regarding the true nature of Teilhard's thesis.

Dr. Birx's aim is to provide an evaluation of Teilhard de Chardin's philosophy in the context of contributions of other philosophers. His approach is scholarly, both in its breadth of reference and accuracy of documentation. He makes few concessions to the layman, and readers unused to the terminology of this field of philosophy will regret the absence of a glossary. However, Dr. Birx provides a valuable analysis of the main features of Teilhard's philosophy, treating in turn his Law of Complexity-Consciousness, and the concepts of Critical Thresholds and the Omega Point. Those who have attempted but failed to comprehend fully *The Phenomenon of Man* will appreciate this latest analysis.

J.D.L.

Biological Management and Conservation by **M. B. Usher.** Pp. xiii + 394 with 19 plates and 93 text figures. Chapman and Hall, 1973. £6.40.

Michael Usher will be well known to many readers of *The Naturalist* for the work which he has done in recent years for the Yorkshire Naturalists' Trust. In particular, members of management committees of the Trust nature reserves have cause to remember his help in the drawing up of management plans. Dr. Usher is also a professional ecologist in both teaching and research and is therefore remarkably well placed to write a book the basic aim of which is to integrate ecological theory and the conservation of wild life.

After an introduction which places man in his ecological context, the book is divided into three main sections. The first section is called Ecological Theory and, broadly, is concerned with the dynamic nature of plant and animal associations making up the ecosystem. It deals with such varied topics as the detection, analysis and ecological implications of small-scale pattern, the distribution of organisms in time, the concept of the ecosystem and the response of ecosystems to exploitation. Much of this section is dealt with in a highly mathematical way since Dr. Usher believes that management for biological conservation must be based on accurate data and on good predictions. The mathematics, however, will not obscure the biological meaning for the non-mathematical reader. The second section is headed Application and follows the idea that conservation should be based on ecological theory as propounded in the first section. It is concerned with conservation in relation to biological management, preservation, education and recreation and stresses the close association between the latter two and wild life protection. The third part of the book, Planning, is taken up with a detailed account of the Management Plan of the Aberlady Bay Local Nature Reserve. This is an excellent example of a management plan and has been used as the basis for a number of others.

This is an excellent book which will appeal to a variety of readers. It should be used widely by university and college students and the latter part especially will be of interest to those naturalists who are interested in conservation and in the work of Naturalists' Trusts.

D.D.B.

Populations in a Seasonal Environment by **Stephen D. Fretwell.** Pp. xxiii + 217. Princeton University Press. London: Oxford University Press. 1973. £5.75.

The healthy state of development of present-day ecology is attested by the formulation and elaboration of models of many kinds of ecological phenomena. The successive elaborations of these various models in recent years reflects the attempt to understand the dynamics of more and still more complex ecological systems. Dr. Fretwell is here concerned primarily with models of the regulation of size of populations in complex environments. The book is divided into two sections. In the first, the complex environment referred to is the seasonal environment, where regular fluctuations occur in resource quality and abundance. The author explores theoretically the implications of two different generation lengths, one where generation time is about equal to the seasonal cycle and the other where generation time is much shorter than the seasonal cycle. He then re-examines, from this point of view, several published empirical studies of life systems including Lack's data on the Great Tit at Marley Wood, Oxford, and Davidson and Andrewartha's data on *Thrips*. The second section deals with the further complexities which arise by considering organisms which disperse or migrate to different habitats at certain times of the year to avoid periodic hardships. A theory of habitat distribution is evolved and again empirical data from the literature, in this case with reference to birds, is drawn upon to explore the usefulness of these theoretical ideas.

This is a book directed primarily to ecological research workers. It is carefully written. The explicit statement of the assumptions of the theoretical models is welcomed and the summaries at the end of each chapter are most helpful. It is a stimulating and important volume.

E.B.

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Edited by
W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

CONTENTS

Published by
THE YORKSHIRE NATURALISTS' UNION

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Price 60p. plus 6p. postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

THE HARVEST MOUSE IN YORKSHIRE

C. A. HOWES
Museum and Art Gallery, Doncaster

The Harvest Mouse *Micromys minutus* (Pallas), once rather more widespread in Britain than today, is now generally regarded as being one of our rarer mammals and one which has almost completely receded in its range to the South East of England – all but three post-1960 records occurring below a line from the Humber to the Severn.

The presence of the Harvest Mouse in Yorkshire has for almost a century been viewed, at least in Y.N.U. circles, with reservation and doubt. Early records were reviewed by Clarke and Roebuck (1881) who stated in their celebrated work that it was 'very irregularly and thinly distributed and scarce'. Since this pronouncement, the absence of further evidence cast doubt on the continued existence of the Harvest Mouse in Yorkshire. Oxley Grabham in Barrett-Hamilton and Hinton (1914) writes that though he will not 'go so far as to say it never has been taken in the county, the few records are so unsâtisfactory that I hold it non-proven at present'. Bolder Riley Fortune (1916) did, however, go so far as to question its former presence. Despite this, claims as to its existence come from near Helmsley and in cornfields in Nidderdale, (Barrett-Hamilton and Hinton (1914)). With successive Y.N.U. vertebrate recorders requiring supporting evidence to accompany records of rarities, the handful of records which were from time to time sent in remained unconfirmed and largely unpublished. Dr E. W. Taylor (1955) in his painstakingly researched review of Yorkshire Mammals could add no further evidence to confirm Clarke and Roebuck's statement, and pleas

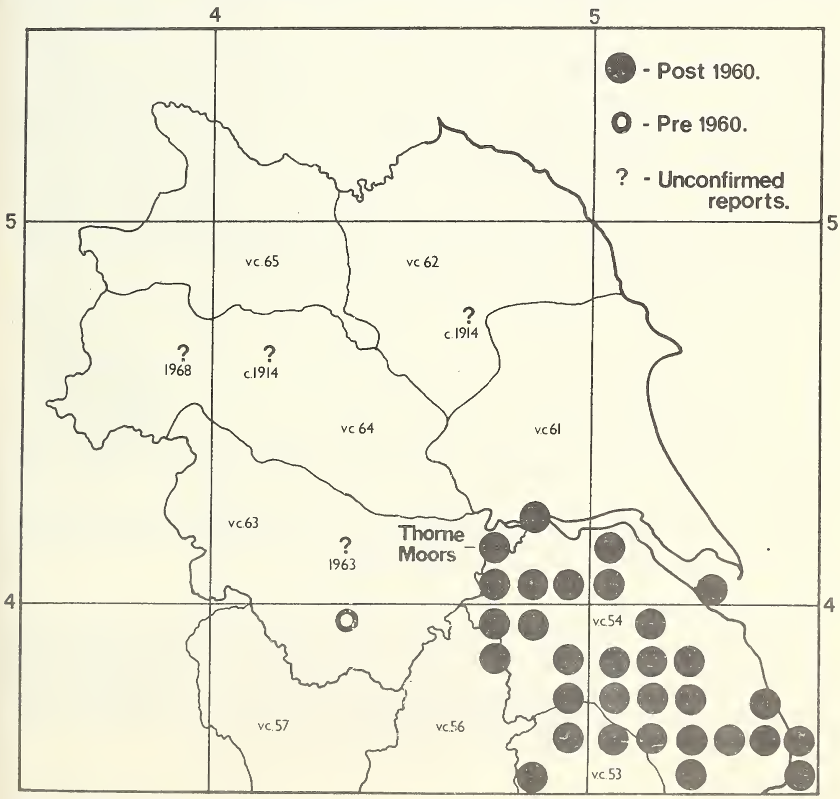

Fig.1. The Northern range of the Harvest Mouse in England.

for investigations (in *Naturalist* 1965 91-3 and Simms 1969) both failed to attract verifiable records although unconfirmed reports came in from High Hoyland for 1963 and from Littondale for 1968.

Since 1970, in connection with Doncaster Museum's South Yorkshire mammal survey, a number of references and records have come to light:– According to Holland (1843) the Harvest Mouse was noted for the Sheffield area; and Herringshaw (1968) has records of it at Southey, Parson Cross, Ecclesfield and Grenoside, during the late 1920s and early 1930s. It was recorded during the late 1930s as being 'formerly common but now very scarce' in the Hatfield Chase area (Howes 1973) and further records from the lowlands to the east of Doncaster came from Mr J. Verhees, a one time professional egg collector from Thorne, and Mr William Bunting the Thorne naturalist. Verhees remembers that between the First and Second World Wars he used to find the nests of Harvest Mice on the edges of cornfields and in *Phragmites* beds by the drainage dykes on the western fringes of Thorne Moors (*SE44* 7/1). Bunting in (Bunting *et al.* 1969) records that he knew them from the southern part of the Hatfield Chase (*SE44* 7/0) from the 1930s but that they had become scarce by 1953. He located nests regularly up till 1959 since which time records ceased only because he had not purposefully looked for them. He stresses (pers. comm.) that the fenland/agricultural fringes of Thorne Moors are patently suitable for the Harvest Mouse and that there is every reason to believe that they still thrive.

Supporting the records of Verhees and Bunting is the recent rash of evidence resulting from the analysis of Owl pellet contents in sites just over the West Riding border in North Lincolnshire (V.C. 54) and North Nottinghamshire (V.C. 56) (see Fig. 1). Mr Maurice Johnson, from evidence of nests and Owl pellet remains, has now (1972) established that the Harvest Mouse is widespread in Lincolnshire. With confirmed records coming from the 10 kilometre squares actually bordering V.C. 63 it seemed reasonable to assume that similar work would reveal its continued presence in Yorkshire. Added impetus was given to the investigation by the acquisition of a female Harvest Mouse found dead near rat poison on 20th December 1971, at the home of Mr N. Wood of Misterton Soss, North Nottinghamshire (*SK43 77 -95–*), about seven miles from the Yorkshire border. Through the good offices of Mr C. J. Devlin the specimen was acquired for Doncaster Museum where the following measurements were taken:– head and body 48.0 mm. [50-69 mm.]: tail 47.0 mm. [48-66 mm.]: hindfoot (excluding claws) 13 mm: ear (excluding hair) 7.0 mm. These measurements are slightly less than the range given in Southern (1964) (measurements in square brackets) which may infer that the specimen was sub adult and from a late brood.

Actual evidence of Harvest Mice in Yorkshire came in October when the author found skeletal remains in a batch of 56 complete and several fragmentary Barn Owl pellets collected by Mr M. Limbert from a site on the western edge of Thorne Moors near the area known as Inkle Moor. Out of some 222 prey items, three were of Harvest Mouse. Due to the delicate nature of the skulls, all had largely disintegrated, only the lower jaws and rather damaged fore parts of the skulls, including maxillae, palatine bones and frontal bones, were retrieved intact. Only in one case were the pre-maxillae and nasal bones found intact and complete with incisors. Identification was based on the small size of the teeth relative to those of *Apodemus sylvaticus* and *Mus musculus* and by examination of the roots of the first upper molar and corresponding sockets in the maxillae.

With these recent discoveries, it seems likely that with thorough investigation by field observation and Owl pellet analysis, further evidence may come to light in suitable sites in the Humberhead, Holderness and Wolds areas.

ACKNOWLEDGEMENTS

I would like to thank Messrs J. Verhees and W. Bunting for valuable comments on the Thorne Moors area, Mr N. Wood for collecting the Misterton Soss specimens and special thanks are due to Mr Martin Limbert for collecting the Thorne Moors Owl pellets. I am grateful to Mr H. Arnold of the Biological Records centre, Monks Wood, for supplying a map of pre and post 1960 *Micromys* records and to Mr M. Johnson of Lincoln Museum for supplying numerous recent Lincolnshire records.

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SMALL MAMMALS OF HOWSHAM WOOD

D. L. ASPINALL, and M. J. A. THOMPSON

Few long term systematic studies of small mammals have been undertaken in Yorkshire. This study is intended to be one of a series on small mammals, in various habitats, conducted by the Yorkshire Mammal Group.

Howsham Wood, O.S. ref. 44/746638, a Forestry Commission plantation, is a mixed woodland, covering the south-eastern slopes of the Derwent Valley, 24 km. north-east of York. After preliminary investigations, an area was selected measuring seventy yards by fifty yards.

The study area consisted of a young sycamore plantation. The prevernal ground flora includes wood anenome *(Anemone nemorosa)*, bluebell *(Endymion nonscriptus)* and dogs mercury *(Mercurialis perennis)*. There is a dense shrub layer of bramble (*Rubus* spp.) and briar *(Rosa canina)* with areas of nettles *(Urtica dioica)* and willowherb *(Chamaenerion angustifolium)* which becomes almost impenetrable in the summer months. The sycamore trees were planted before 1962 and their boles are sheathed with polythene, as an anti-vole measure. Prior to the sycamore planting, the area was a birch woodland and a few of these trees have remained standing, or after felling have been allowed to decay in the undergrowth. There are also scattered individual trees of rowan and hawthorn. The underlying soil is clay which becomes waterlogged after heavy rain. Shallow drainage channels run along the eastern boundary of the study area and several yards beyond that is an open field which, during the summer months, contained a cereal crop

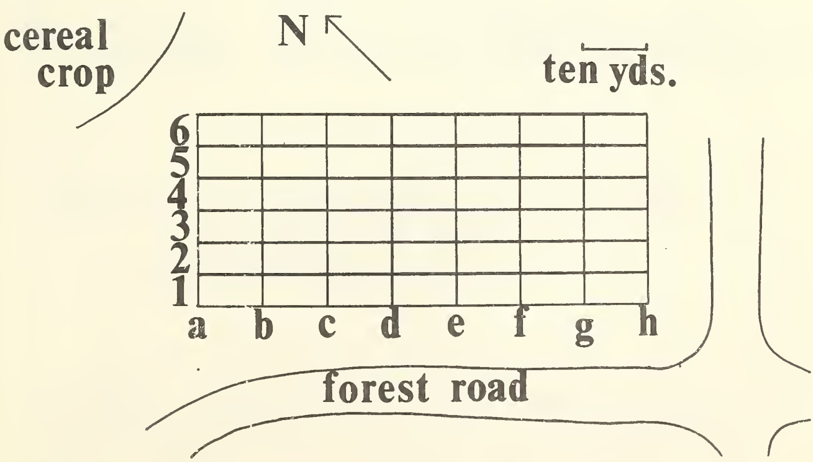

Fig. 1. The grid as laid out at Howsham Wood

The Purpose Of The Study

Preliminary observations had shown that the Bank Vole *(Clethrionomys glareolus)* was common and possibly the predominant rodent in the study area. Regular monthly trapping sessions were organised at Howsham Wood between May 1971 and May 1972 and data on population fluctuations, movements and weight changes of the voles were obtained. Considerable information on other small mammals was gathered and this is also presented.

Method

Fig. 1 shows how the study area was subdivided.

The vertical rows are marked A to H and are placed at ten yard intervals, and those rows marked one to six are at five yard intervals. Each point of intersection of these lines represents a trap site. The measures chosen correspond with the lines of planted sycamores, which helped with trap location; marked stakes were also placed at each site. The traps used were Longworth live, small mammal traps and two traps were placed at each trap site. Thus on each trapping session 96 traps were layed. The first Saturday and Sunday of each month were chosen for trapping sessions, the traps being set on Saturday evening and lifted on Sunday morning. The traps were baited with rolled oats; hay bedding was provided. There was no prebaiting period. Temperature and weather conditions were noted for the preceding week and during the trapping period. The mammals were extracted by hand from the nest box section of the Longworth trap, and after the tunnel had been removed. Each mammal was examined to determine its species, sex, maturity, reproductive state and pelage and then marked prior to being released at the point of its capture. Fleas were collected when specifically requested for student studies at St John's College, York; however, this was not always possible at each trapping session.

Results

1. Bank Vole *(Clethrionomys glareolus)*.

Fig. 2 shows the monthly fluctuation in members of this species, with a peak in December and the lowest level in May.

Animals were found to be in reproductive condition in April and May, but only in June was an increase in numbers detected. A similar time lag is evident from October, when mammals are still present in reproductive condition, to December when the peak occurs. Numbers remain high until February, when a rapid fall takes place in March and April. The Bank Vole was trapped on 286 occasions during the year. Of these 49 males and 51 females were marked.

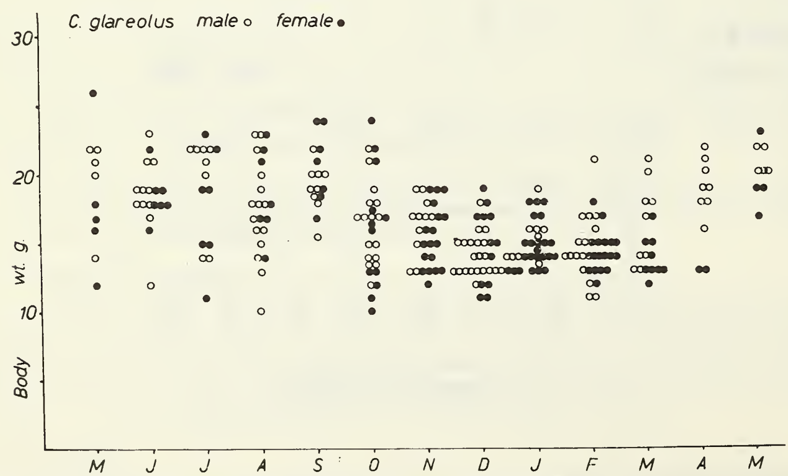

Fig. 2. The total monthly catch in relation to the weight and sex of *Cleth. glareolus* at Howsham Wood

CIRCULAR No. 678

YORKSHIRE NATURALISTS' UNION

President:
Miss F. E. CRACKLES, B.Sc., F.L.S.

Administrative Officer:
D. BRAMLEY, B.Sc., A.R.I.C., c/o Doncaster Museum, Chequer Road, Doncaster DN1 2AE

The 112th Annual Meeting

WILL BE HELD AT

DARLINGTON

by invitation of the Darlington and Teesdale Naturalists' Field Club

on Saturday, 1st December, 1973

HEADQUARTERS.–The COLLEGE OF EDUCATION, VANE TERRACE, DARLINGTON. Car parking in or near to the College grounds.

PROGRAMME

11-15 hrs. Executive meeting in the College.

12-30 hrs. Lunch will be served in the College Dining Hall (at approximately 65p per head). Persons requiring lunch please notify Mrs. P. Moses, 1 Abbey Road, Darlington DL3 7RH, (Tel. 69764) not later than Saturday, 17th November.

14-30 hrs. Welcome by the Mayor of Darlington, Councillor J. S. McLoughlin, J.P. The Annual General Meeting of the Yorkshire Naturalists' Union. The President Miss F. E. Crackles will deliver her Presidential address 'SEEKING TO UNDERSTAND THE FLORA OF THE EAST RIDING.'

At the close of the meeting tea and biscuits will be served.

Location of the College:– Near Trinity Church approximately half a mile west of the town centre. Vane Terrace is off Woodland Road – the A68 Darlington/Bishop Auckland road. From the railway station, Corporation buses No. 5 and 5a (at Parkgate exit) and Nos. 4 and 9 (at Victoria Road exit) pass Trinity Church.

2. Wood Mouse *(Apodemus sylvaticus)*

Numbers of this rodent were small in the study area from March to August, but then there was rapid increase to a peak in November. This is illustrated in Fig. 3.

Wood mice were found in reproductive condition from April to October; there was no evidence of winter breeding of this species, during the winter 1971-72. The Wood Mouse was trapped 86 times on the grid and 29 males and 21 females were marked.

Increases in the 10–14.5 gms and 15–19.5 gms categories occurs in November and December. It is possible that the increase in September onwards is due to an influx of wood mice from the neighbouring fields after harvesting.

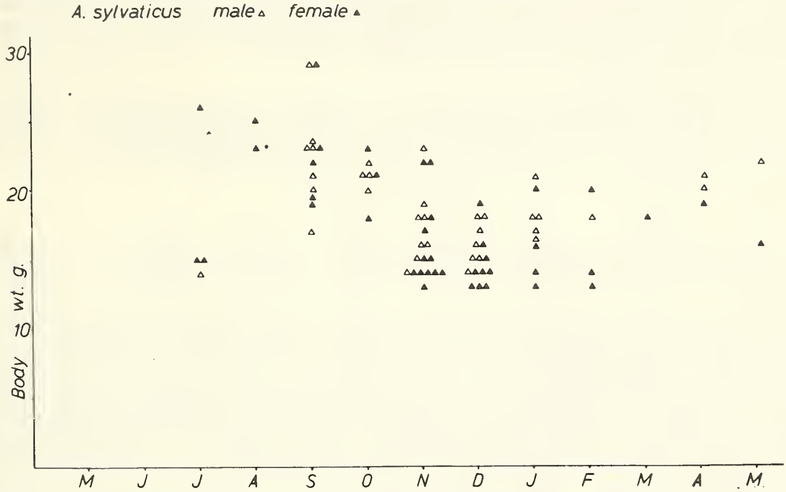

Fig. 3. The total monthly catch in relation to the weight and sex of *Apo. sylvaticus* at Howsham Wood

3. The Short-tailed Vole *(Microtus agrestis)*

There was a small vagrant population associated with the adjacent field. The most present in any one trap being six. Their weights ranged from 8 to 36 grams and both sexes were present in equal numbers.

4. The Common Shrew *(Sorex araneus)*

Many Common Shrews were caught in the traps, mainly from July to September. The weight charts indicate the presence of mature individuals in May and June. There was then an increase in the numbers in the 7.0–8.5 grams group during July and September: this was followed by a fall off in numbers. To some extent the rodent figures may have been affected by the presence of *Sorex araneus* in the traps, during the July to September period.

5. The Pygmy Shrew *(Sorex minutus)*

Ten specimens were trapped during the year.

6. The Water Shrew *(Neomys fodiens)*

Only one animal was caught during the trapping programme. That was in October 1971.

DISCUSSION

The analysis of the trapping results presents many problems, dependent on the area studied, the mammals living in the area, and the trapping method. The trapping method may be varied, each change producing different results e.g. the spacing of traps and the number at each trap site. Other factors that affect the results are prebaiting (already mentioned) and weather conditions. It would appear that the greater the rainfall during the week prior to the trapping session, the bigger was the catch. The time of setting and lifting of the traps, location and camouflage of trap, must all be taken into account when comparing trapping results.

If studying one species, the presence of other mammals, dominance amongst the males of that species and territorial marking of traps may affect the single species surveys. No attempt was made to assess longevity of life, as the total duration of the project was one year only. It was felt that insufficient data had been collected to make accurate assessments of movements.

CONCLUSION

Using live animal traps, on the basis of a grid, variations in the number of different species over a twelve month period, have been demonstrated. Although the Bank Vole was the most frequently trapped species, the Wood Mouse and Common Shrew were also common in this habitat at certain times of the year. Both the Field Vole and Pygmy Shrew occurred regularly, but in small numbers.

ACKNOWLEDGEMENTS

The Yorkshire Mammal Group would like to thank the Biology Dept. of St John's College for providing field study facilities, The Yorkshire Philosophical Society for their grant for purchasing the Field Study Hut and the Forestry Commission for granting permission to the Group to carry out its work at Howsham Wood.

ARTHUR GILPIN

On May 17th 1973 the degree of Master of Science *honoris causa* was conferred on Arthur Gilpin by the Chancellor of Leeds University, Her Royal Highness, the Duchess of Kent.

Mr Gilpin has been on the administrative staff of the University since 1946 but it was for his services to ornithology and particularly to the photography of birds that he was honoured. As a medallist of The Royal Photographic Society, a Past-President and now Secretary of the Zoological Photographic Club; as council member of the R.S.P.B. and Y.N.T. and as a writer, lecturer and teacher in evening classes on ornithology as well as a bird photographer, Mr Gilpin is well known and highly respected. In presenting him for the degree, Professor Alexander said "His photographs are notable for the combination of technical excellence and sensitive composition...... Mr Gilpin's career in ornithology may seem sharply distinct from his career in the Fabric Office, but just occasionally the two have, happily, met. It is for instance recorded in one of the ornithological journals, that at ten to four one Wednesday afternoon in 1968 Mr Gilpin was passing through a Court in the University. He was presumably going about his University business, but at that precise time he heard the excitement call of a Collared Dove. He paused long enough to make a series of observations of sufficient interest to merit publication. This afternoon the University pauses to take note of Mr Gilpin's distinguished work in ornithology and bird photography".

Members of the Y.N.U. will have been pleased to hear that Mr Gilpin's distinction as ornithologist and bird photographer was to be recognized by his inclusion in the list of those to receive honorary degrees at Leeds and we offer him our warmest congratulations upon the conferment of this well-deserved honour.

Dune and Moorland Life by **Leif Lyneborg.** Pp. 136 including 47 pp. of coloured illustrations. Blandford Press Ltd., 1973. £1.45.

This small volume is another in the colour series originally published in Danish. In this instance the English version is edited by Arnold Darlington and the translation is by Kirsten Campbell-Ferguson. The book deals exclusively with the invertebrate life of dunes and moorlands and a wide selection of representative species is illustrated and then subsequently described in the text. The paintings of some 350 species by Henning Anthon are beautifully executed and with a few exceptions the colouring is accurate. Some non-British species are figured and reference to these is made in the text.

Unfortunate errors occur in the text from time to time which may be due to faults in translation or careless editing; *Acalypta parvula* is not the commonest assassin bug in Britain. Indeed, it is a lacewing and not an assassin bug at all, and the hover fly *Sericomyia silentis* is not only similar to *S. borealis* as stated, it happens to be the same species under another name. Provided that some of the statements concerning distribution are regarded with caution the book provides a useful introduction to the subject, although I must confess that the short chapter which deals very briefly with dune and moorland ecology still had me baffled after four or five attempts to make sense of it. R.C.

A COMPARISON OF BREEDING SUCCESS OF THE OYSTERCATCHER BETWEEN INLAND AND COASTAL AREAS IN N.W. ENGLAND

M. E. GREENHALGH
Department of Biology, Liverpool Polytechnic

In an analysis of a breeding study of Oystercatchers *Haematopus ostralegus* in north-west England (*Naturalist*, 909: 43-47, 1969) I did not deal separately with coastal and inland breeders. Since then I have obtained full details of 20 more nests, giving a total of 71 with full data. This paper presents breeding success of all these.

Nearly all the 36 coastal nests are from saltmarshes or fields lying behind saltmarshes. The 35 inland nests are mainly from the Ribble and Lune Valleys, with three nests five miles from the coast on the South Lancashire plain. The data obtained in the study are shown in table 1.

Table 1. Breeding success of coastal – and inland – breeding Oystercatchers in north-west England for the years 1967-72

	No. Nests	*No. Eggs*	*No. Hatched*	*% Eggs Hatched*	*No. Fledged*	*% eggs giving fledged young*	*No. young raised per pair*
Coastal	36	101	69	68	45	45	1.25
Inland	35	96	51	53	31	32	0.92
Total	71	197	120	61	76	38.5	1.1

There is no difference between the clutch size of inland and coastal nesters (inland mean clutch 2.75, coastal mean clutch 2.8), nor is there a significant difference between laying dates in the two areas, though there is some suggestion that inland birds tend to lay earlier than coastal ones (table 2).

Table 2. Distribution of laying dates (of first eggs) of Oystercatchers in coastal and inland areas of north-west England

	–30 April	*1-10 May*	*11-20 May*	*21-30 May*	*31 May-9 Jun*
Number of Coastal nesters	4	5	13	5	2
Number of Inland nesters	5	8	3	1	0
Total number of nesters	9	13	16	6	2

Note: The exact date when first egg was laid is not known for many nests observed during the study

Hatching success is lower inland than on the coast due to flooding of river-side nests during spates, loss during agricultural operations or direct human interference (riverside shingle and grass banks are very popular picnic areas). The coastal Oystercatchers tended to escape flooding by spring tides which occur just before peak laying. They also tended to nest on areas not subject to intense agricultural management (nest-sites and reasons for egg loss are given in Greenhalgh *loc. cit.*).

Coastal pairs produced a higher fledging success compared with inland pairs though this reflects the difference in hatching rate rather than a difference in survival rate between inland and coastal chicks. In coastal areas 65% of the eggs which hatched produced fledged young, the similar figure for inland sites being 61%. Two of the inland pairs however occasionally travelled up to six miles to the shore to collect food. All other inland pairs fed wholly on inland habitats. If these two nests are excluded, then the percentage of chicks which survive to fledging inland is increased to 68%.

Thus, at present, inland breeding Oystercatchers tend to hatch a lower proportion of eggs than coastal birds whilst they raise a similar proportion of chicks to fledging. Overall therefore, due to the difference in hatching success, coastal Oystercatchers raise more young than inland birds.

Oystercatchers have been breeding inland in this region since 1880 (Buxton, *Bird Study,* 8: 194-209, 1961) but most still nest fairly close to rivers. However, in an area where Oystercatchers have been breeding inland for many years (Dare, *Fishery Invest.* II, 25 (5): 1-69, 1966) in Aberdeenshire, P.B. Hepplestone (*Ibis* III: 42, 1969 and *J. Anim. Ecol.,* 41: 23-51, 1972) found that inland breeders 'raised almost twice as many chicks per pair as coastal birds'. He found that nearly all the nests were on farmland, out of the reach of rivers, whereas in north-west England 39 out of 44 found in my study (88%) were within 100 metres of a river and 33 of these (75%) were so close to the water that a large spate could have flooded them.

It may be therefore, that as Oystercatchers continue to increase and spread away from the rivers in north-west England, as they are still doing (Greenhalgh, *Naturalist,* 921: 45-51, 1972) then hatching and overall breeding success inland will be raised.

FIELD NOTE

Gull entangled by fishing-line

Travelling along the main road to Otley near Knotford Nook, I saw a gull in the road trying to fly, but rolling over when it landed after unsuccessful attempts to get air-borne. I flagged down a lorry, and the driver and I managed after a while to catch the gull. We found its legs bound together with fishing-line which was biting deeply into the flesh. This we managed to untangle, only to find the line passed also round the beak, with the hook embedded in the bird's throat. Its crop was empty, indicating that it had been in this condition for several days.

I took the bird to the vet, who removed the hook. I took the bird back to Knotford Nook and tried to feed it with chopped herring etc., but due to its injuries it was unable to swallow. As it was loth to leave the bank I was afraid that a dog might find and attack it so I remained in the area for a couple of hours; but sadly the gull died.

M. Whitaker.

Mrs Whitaker's first-hand account of the danger to birds of abandoned fishing lines gives added emphasis to the need for more information on this subject as a preliminary to drawing wide public attention to the matter. The Protection of Birds Act Committee of the Y.N.U. has already issued a press release about this danger, appealing for specific instances to be reported. This press statement runs as follows:–

The attention of the Y.N.U. Protection of Birds Act Committee has recently been drawn to the problem of birds being killed or maimed by abandoned nylon fishing lines. The Knaresborough Ringing Station report for 1971 (obtainable from J. R. Mather, 44 Aspin Lane, Knaresborough) gave details of eight birds so affected, seven blackbirds and one robin. The Knaresborough report for 1972 gives details of three further birds, badly entangled by nylon fishing line. The Committee has also heard of cases at Tadcaster, Fairburn and Knotford Nook.

What apparently happens is that inept casting results in a line being caught in some obstacle under water or in a bush on the banks. When it cannot be freed, the line is cut and subsequently birds like Robin and Blackbird take the maggot, get the hook embedded in their beaks and struggle, dangling from a bush, until they die. Stronger water birds may break the line, but with the hook embedded in their beak cannot feed or become inextricably entangled and suffer a slow death.

The Protection of Birds Act Committee of the Yorkshire Naturalists' Union is seeking the help of its members, of those members of affiliated Natural History Societies and indeed of the public in trying to ascertain how widespread this problem is, what birds are most affected and what proportion, if any, can be successfully "rescued" once ensnared by nylon fishing line. This survey is for the whole of Yorkshire and records should be sent to the Hon. Sec. of the P. of B. Act Committee, J. Hesslewood, 19 Laburnum Avenue, Garden Village, Hull.

TWO BIRDS NEW TO THE YORKSHIRE LIST

J. E. S. WALKER

Great Reed Warbler *Acrocephalus arundinaceus.* Adult Male.

On 29 May 1971 at 04.10 hours in the grounds of Grebe House, Hornsea the deep, harsh, churring and croaking song of a Great Reed Warbler was heard singing in Lesser Reed Mace *(Typha angustifolia)* by the writer. As it was approached it flew towards him and into a recently erected mist net.

In the hand it had the appearance of a very large Reed Warbler *Acrocephalus scirpaceus* with brown upper parts and orange buff-flanks and underwing coverts. There were faint dark flecks on the throat. The supercillium was cream and more pronounced than that of the Reed Warbler. The remiges and retrices were not abraded and the bird was considered to be adult. The first-winter Great Reed Warbler does not moult its wing and tail feathers in its winter quarters as does the adult, hence at this date as a second-year bird, its feathers would be heavily abraded [see Stresemann, E. & V., Die Mauser der Vogel. *J. Orn.,* 107 (1966)].

The bill was heavy and brown, with a flesh-coloured base to the lower bill; it was slightly angled on the inferior surface at about the commencement of the pink colouration. There were stiff dark rictal bristles. The mouth was orange, and the iris olive brown. The claws and feet were long and the grasp firm ; the legs were brownish grey. The wing measurements were those of a male; the notch on the inner web of the 2nd primary, 19 mm. from the tip, equalled the length of the 7th primary.

Wing (maximum chord)	98 mm.	Wing formula
Tail	81 mm.	2nd primary 2.5 mm. shorter
Bill (to base of skull)	23 mm.	3rd primary longest
Tarsus	31 mm.	4th primary 2.5 mm. shorter
Weight	36 grams	5th primary 6.5 mm. shorter
		6th primary 11 mm. shorter
		7th primary 19 mm. shorter
		8th primary 23 mm. shorter

On the above data it was considered to be an adult male Great Reed Warbler of the Mediterranean race *Acrocephalus arundinaceus arundinaceus.* Identification was confirmed by D. T. Ireland who was staying at Grebe House at the time. The bird was photographed and on release flew strongly towards Hornsea Mere. It was heard singing by D.T.I. on 30 May 1971 and retrapped at 05.10 hours on 31 May 1971 when it weighed 38 grams. It was seen on that occasion by E. Towne, G. Bird and J.E.S.W. It was subsequently heard singing in the areas of *Phragmites communis* which contained Great Reed Mace *(Typha latifolia),* within 300 metres of the site of capture, on 9 June 1971 (J.E.S.W.) and lastly on 19 June 1971 (D.T.I.). This species could be anticipated to occur in Yorkshire as it had already been recorded in most east coast counties as far as Northumberland and there were also four Scottish records.

Cetti's Warbler *Cettia cetti.* Juvenile.

On 2 November 1972 at 11.00 hours an untidy short-winged, brown and grey warbler (unlike any handled at Grebe House to date) was extracted from a mist net sited in a permanent ride in Great Willow-herb *(Epilobium hirsutum)* Umbelliferae and pollard willows *(Salix sp.).* It had the field characteristics of a Cetti's Warbler and was seen by G. Bird, Catherine F. Walker and J.E.S.W., and a full description of the bird is as follows:–

Crown, nape, mantle, back and rump darkish rufous-brown. Remiges and retrices dark brown. There was a pronounced greyish-white eye stripe and grey cheek. Feathers white in the 4 o'clock to 8 o'clock sector of the eye ring. Throat, breast, flanks and belly light grey. Undertail coverts chestnut with white crescentic tips, composed of large, loosely-constructed, fluffy feathers.

The wing was very short and rounded and showed no wear and the rounded tail contained only 9 feathers, the second right feather being missing (Cetti's Warbler has 10 retices, other Sylviidae have 12). They were broad with rounded ends. There was slight inphase fault barring in the tail, suggesting the bird was in its first year. The iris was dark brown. The bill brown, with a flesh coloured base to the lower bill. The legs were flesh pink, and mouth yellow.

The wing formula was as follows:–

1st primary	10 mm. longer than primary coverts.
2nd primary	11 mm. shorter
3rd primary	3 mm. shorter
4th & 5th primary	Longest
6th primary	2 mm. shorter
7th primary	4 mm. shorter
8th primary	6 mm. shorter
9th primary	8 mm. shorter
10th primary	10 mm. shorter

2–5th primaries were emarginated
Wing length (max chord) 59 mm.
Weight 12.3 grams.

2nd primary = 10th primary

After being photographed it flew straight into a Hydrangea where it remained hidden from sight.

This species occurred in a number of counties in the south of England in 1971 and bred in one of them.

FIELD NOTES

White-sided Dolphin stranded in Cayton Bay

On 19 March 1973 the Customs and Excise Officer at Scarborough reported a dolphin stranded in Cayton Bay about 400 yards south of the pumping station. On investigation this proved to be an immature female White-sided Dolphin [*Lagenorhynchus acutus* (Gray)] and from its excellent condition I think it would be safe to assume that it had been stranded at high tide on 18 March (5.55 pm).

The previous week another specimen had been stranded at Seaton Sluice, Northumberland, and apparently washed out to sea again. This may have been the same animal.

The weight of the dolphin, obtained by weighing sections of the body during the subsequent skeletonisation process, was approximately 118 lbs. Its horizontal length from the tip of the beak to the notch of the tail fluke was 5′6″, the curved length measured along the mid-dorsal line between the same two points was 5′10″. Colour and black and white photographs and a series of detailed measurements were taken of the dolphin in situ on the beach. The skeleton is now at Wood End, Museum of Natural History, Scarborough.

Previously the White-sided Dolphin has been recorded in Yorkshire on 16 June 1928, ½ mile N. of Whitby; 8 February 1930, Cayton Bay; 22 September 1933, near Scarborough; 11 July 1934, 27 miles N.E. of Scarborough; 23 September 1968, Jackson's Bay, Scarborough; and 4 June 1969, North Bay, Scarborough. This would appear therefore to be only the seventh record for the county.

C. I. Massey

Pectoral Sandpiper at Birkin

In view of the note on the above topic in the *Naturalist* (69-70, 1973) by R. F. Dickens and S. Gwilliam, it is of interest that the two same observers found a Pectoral Sandpiper on the same pool at Birkin at 07.00 on Friday, 25th May, 1973. It was in the company of 6 Dunlin and remained, certainly until late the same evening. During the course of the day other observers were informed and the identification was confirmed by B. Eaton, P. Kirk, J. D. Pickup, R. Swales among others. It is tempting to speculate on whether this was in fact the same bird which was seen at Birkin on 18th July of the previous year.

R. F. Dickens

REED WARBLER SURVEY, 1974-75

An enquiry is to be held into the status and distribution of the Reed Warbler *Acrocephalus scirpaceus* in Yorkshire. This enquiry should be of particular interest and value as the county forms part of the northerly limit of this species which has recently shown a gradual extension within Northern Europe. This seems an appropriate time, therefore, to establish its actual distribution and thus provide a basis for any comparative study of future trends. Societies and interested individuals should contact J. E. Dale, 158 Lindley Moor Road, Lindley Moor, Huddersfield HD3 3UE.

THE BRADY-WYER COLLECTION OF BRITISH MICRO-LEPIDOPTERA

P. SKIDMORE

During November 1965, Mrs M. Wyer of West Street, Bircotes (Notts)., contacted the Director of Doncaster Museum & Art Gallery, Mr E. F. Gilmour, with a view to selling to that institution a collection of micro-lepidoptera which had belonged to her husband who had passed away some time previously. The collection was duly examined by Gilmour and the writer and the appropriate transactions completed for its removal to Doncaster Museum.

Mr Wyer was a friendly man known to several of the Yorkshire lepidopterists with whom he shared many collecting trips; but, unlike the majority of his fellow enthusiasts, his real affections lay with the smaller moths rather than the larger ones. His love for this group of insects was immediately obvious when the initial examination of the collection was made at the request of his widow; for while it was evident that all of the specimens had not been collected by him, as the majority bore the initials L. S. B. and had been taken between 1890 and 1920, he had evidently treasured the collection and had kept it in immaculate condition. Clearly he had been very active with his favourite insects as he had added many specimens to the original series. A considerable number he had taken around his home at Bircotes and these records are of great value in building up a picture of the distribution of the smaller moths in that area.

Not being a lepidopterist it was not immediately apparent to the writer who L. S. B. could have been, but on looking through the collection a little more closely the mystery quickly unravelled. It was noted that very many of the moths bearing these initials had been taken in the Sheffield and Sunderland areas, and a perusal of Porritt's *Supplementary List of Yorkshire Lepidoptera* revealed the identity of the collector as L. S. Brady.

Born at Sunderland in 1867, Brady was a very highly respected and unusually capable lepidopterist who moved down from County Durham before the turn of the century to live at Endcliff Croft, in Sheffield. He was an extremely painstaking and methodical man who, early in his entomological studies, developed a fondness for the more obscure groups. In later years we are told, by his lifetime friend J. W. Corder who performed the sad task of writing Brady's obituary (*Nat.* 1921; 221), that he had started to work genitalic features amongst the "micros". In this, had he been spared a few more years, he would have been a pioneer. It is evident from the data labels in the collection that Brady was in touch with many lepidopterists, specimens from Corder of Sunderland, W. Purdey of Dover, and H. C. Hayward of Repton, being quite numerous. He kept in constant touch with Corder and made almost annual trips to his home county to visit him and arrange collecting trips. Similarly he travelled down to Kent to join Purdey in the field. On other occasions he went to Cornwall and up to Forres, to East Anglia and North Wales; in all a much travelled entomologist.

The writer understands from Mr T. Ford of Sheffield, himself a very active member of the lepidopterist fraternity in Yorkshire, that following the death of her husband in 1921, Mrs Brady moved to South Africa, where she is still living. She took with her all of her husband's notebooks for sentimental reasons.

In a letter dated 18/7/1971, Mrs M. Wyer tells me that she seems to recall that her husband bought the collection from Mrs Brady shortly after Brady died. However some other lepidopterist had evidently had a first picking since Brady's prize capture *Tortrix semialbana* Guenee from near Doncaster (*Nat.* 1907, 360) had been removed. Apparently Brady had an extensive collection of larger moths, including many of considerable scarcity. The whereabouts of this material is not known to the writer. One or two drawers and storeboxes of very old, poorly mounted moths, together with many of Wyer's larger species were present when the collection came to Doncaster Museum, but these did not have Brady's hallmark of perfection, nor his characteristic data labels.

The Brady-Wyer collection remains in its original cabinet and new material is being slowly added to it by the writer. It was felt however that since very few of Brady's records were ever published, it might be desirable to publish a list of species present in the collection when it arrived at the Doncaster Museum. The greatest value lies in the large number of records from the Sheffield district, an area from which very few records of the smaller moths have ever appeared in the literature. It was decided to restrict the list to those species which Brady (and Wyer) had taken in the northern counties of England.

A number of other lepidopterists provided specimens for Brady's collection and it seemed desirable to provide a little biographical information on these collectors also:–

HAROLD CARLYLE HAYWARD (1876-1935); born West Chimock (Somerset), taught at Repton School from about 1905 until his retirement in 1934. Founder member of Derbyshire Entomological Society. (Obituary in *N.W. Nat.* 1936, 371-4)

HENRY HERBERT CORBETT (1856-1921); born near Manchester, studying medicine there. Took practice in Doncaster where he became first honorary curator of Doncaster Museum. Highly competent in all fields of Natural History but mainly interested in Coleoptera and Microlepidoptera. (Obituary in *Nat.* 1921, 145-9).

JAMES WATSON CORDER (1868-1953); born Sunderland where mainly remembered as an antiquarian. A keen naturalist with particular interest in Lepidoptera; in 1908 presented 50 Lepidoptera to Sunderland Museum (personal communication to writer from Mr C. A. B. Steel of Sunderland Museum). Member of Sunderland Corporation Libraries Committee from about 1890 until 1947 when he retired to live in Over Stowey (Somerset). (Obituary in *Sunderland Echo*, Thursday, April 30th, 1953).

The writer is indebted to a number of people for helping to produce this article. Thanks are offered to Mrs M. Wyer for approaching the museum initially and providing subsequent information, to Mr T. Ford for supplying information on Brady and to Mr C. A. B. Steel of Sunderland Museum for information on J. W. Corder.

Finally acknowledgement must be made to the Chairman and members of the Doncaster Corporation Amenities Committee for allowing this work to be carried out at Doncaster Museum.

THE LIST

The following list only includes those records relating to the counties of northern England; for reasons of brevity those from other parts of the British Isles have been omitted but they could be provided to anyone specially requesting them. Unless otherwise stated all of the records are of specimens taken by Brady, save those from Bircotes which were collected by Wyer. The number of specimens per series and the dates of capture have been omitted. The nomenclature is according to Kloet & Hincks, *Check List of British Insects*, 1947.

MICROPTERYGIDAE:

Eriocrania semipurpurella (Stephens) Sheffield (Yorks).
E. rubromella (Haworth) (*purpurella* Haworth) Sheffield (Yorks).
Mnemonica subpurpurella (Haworth) Ecclesall Wood, Sheffield (Yorks): Newball Wood (Lincs).
Micropteryx calthella (L.) Wadworth Wood (Yorks).

PHYCITIDAE:

Salebria fusca (Haworth) Strines and Grenoside, Sheffield: Thorne Waste (Yorks).
S. betulae (Goeze) Wadworth Wood and Snainton (Yorks): Sherwood (Notts): Stoney Middleton (Derbys).
Hypochalcia ahenella (Schiff.) Stoney Middleton (Derbys).
Ephestia sericarium (Scott) Sheffield (Yorks): Sunderland (Co. Durham).
E. figulella Gregson Sunderland (Co. Durham).
E. cautella (Walker) Liverpool (Lancs), coll. F. N. Pierce.

CRAMBIDAE:

Crambus pratellus (L.) Wadworth Wood (Yorks): Stoney Middleton (Derbys): Bircotes (Notts).
C. culmellus (L.) Sheffield (Yorks): Bircotes (Notts).
C. hortuellus (Huebner) Greatham (Co. Durham).
C. falsellus (Schiff.) Skelwith Bridge (Westmorland); coll. J. W. Corder.
C. pinellus (L.) Wadworth (Yorks): Sherwood (Notts).
C. margaritellus (Huebner) Kildale (Yorks): Witherslack (Westmorland).
C. perlellus (Scopoli) Bircotes (Notts).
C. inquinatellus (Schiff.) Bircotes (Notts).
C. tristellus (Schiff.) Bircotes (Notts).

PYRAUSTIDAE:

Cataclysta lemnata (L.) Greatham (Co. Durham): Idle Stop (Notts), coll. Wyer.

Notarcha ruralis (Scopoli) Wadworth (Yorks). Specimens also taken by Wyer from Osberton, Worksop and Bircotes (Notts).

Eurrhypara urticata (L.) Snainton (Yorks): Bircotes (Notts).

Phlyctaenia lutealis (Huebner) Wadworth (Yorks): Sunderland (Co. .Durham); Bircotes (Notts).

P. prunalis (Schiff.) Edlington Wood (Yorks).

P. fuscalis (Schiff.) Wadworth (Yorks).

P. sambucalis (Schiff.) Sheffield (Yorks): Bircotes (Notts).

Pyrausta purpuralis (L.) Newball Wood (Lincs): Bircotes (Notts).

P. aurata (Scopoli) Stoney Middleton (Derbys); coll. H. C. Hayward.

P. olivalis (Schiff.) Attleborough (Lincs): Kildale (Yorks).

Scoparia resinea (Haworth) "Barton on Humber (Lincs), 18/7/04 G.W.M." The collector represented by these initials not yet ascertained.

S. murana (Curtis) Sheffield (Yorks) Ambleside (Westmorland) and Northumberland.

S. frequentella (Stainton) Sheffield and Snainton (Yorks): Ambleside (Westmorland).

S. centurionalis (Huebner) Ambleside (Westmorland) and Northumberland.

S. truncicolella (Stainton) Grenoside (Yorks): Bircotes (Notts).

S. cembrae (Haworth) Sheffield (Yorks): Staveley (Derbys): Bircotes (Notts).

S. dubitalis (Huebner) Sheffield (Yorks): Stoney Middleton (Derbys): Bircotes (Notts).

S. ambigualis (Treitschke) Grenoside, Wharncliffe, Strines, Sheffield and Kildale (Yorks).

S. atomalis (Dbldy). Strines (Yorks).

S. ulmella Knaggs Edlington Wood (Yorks): Derbyshire; coll. H. C. Hayward.

S. basistrigalis Knaggs Wadworth Wood (Yorks).

Mesographe forficalis (L.) Sheffield (Yorks): Bircotes (Notts).

PYRALIDIDAE:

Hypsopygia costalis (F.) Bircotes (Notts).

Pyralis farinalis (L.) Sheffield (Yorks): Bircotes (Notts).

Aglossa pinguinalis (L.) Sheffield (Yorks): Bircotes (Notts).

ALUCITIDAE:

Platyptilia acanthodactyla (Huebner) Sandburn (Yorks).

P. gonodactyla (Schiff.) Grenoside (Yorks): Greatham (Co. Durham): Bircotes (Notts).

P. ochrodactyla (Schiff.) Sheffield (Yorks): Hartlepool (Co. Durham): Bircotes (Notts).

Stenoptilia bipunctidactyla (Scopoli) Edlington Wood (Yorks): Bircotes (Notts).

S. pterodactyla (L.) Gorleston (Lincs): Wadworth and Snainton (Yorks).

Agdistis bennetii (Curtis) Greatham Marsh (Co. Durham).

Alucita pentadactyla (L.) Sheffield (Yorks).

A. galactodactyla (Schiff.) Newball Wood (Lincs).

Adaina microdactyla (Huebner) Sunderland (Co. Durham).

Oidaematophorus lienigianus (Zeller) Gorleston (Lincs): Bircotes (Notts).

O. osteodactylus (Zeller) Worksop (Notts): Ambleside (Westmorland).

PHALONIIDAE:

Phalonia rubigana (Treitschke) Castle Eden (Co. Durham).

P. smeathmanniana (F.) Staveley (Derbys).

P. affinitana (Douglas) Greatham (Co. Durham).

P. griseana (Stephens) Greatham (Co. Durham).

P. ciliella (Huebner) Elterwater (Westmorland); coll. J. W. Corder.

P. nana (Haworth) Sheffield (Yorks).

P. dubitana (Huebner) Sheffield and Wharncliffe (Yorks).

Cochylis subbaumanniana (Wilkinson) Stoney Middleton (Derbys).

C. hartmanniana (Clerck) Walton Moss (Cumberland).

Phtheochroa maculosana (Haworth) Wharncliffe (Yorks).

Euxanthis angustana (Huebner) Greatham (Co. Durham).

E. straminea (Haworth) Stoney Middleton (Derbys): Snainton (Yorks): Greatham and Sunderland (Co. Durham).

E. zoegana (L.) Staveley (Derbys): Bircotes (Notts).

E. hamana (L.) Wadworth (Yorks): Greatham (Co. Durham): Bircotes (Notts).

TORTRICIDAE:

Ditula angustiorana (Haworth) Middlesborough (Yorks).
Epagoge vulgana (Froelich) Eccleshall and Sheffield (Yorks).
Philedone prodromana (Huebner) Sheffield (Yorks): Sunderland (Co. Durham).
P. gerningana (Schiff.) Strines and Sheffield (Yorks).
Cacoecia oporana (L.) Sheffield (Yorks): Bircotes (Notts).
C. xylosteana (L.) Grenoside, Sheffield and Wadworth (Yorks): Attleborough (Lincs); coll. Wyer.
C. rosana (L.) Sheffield (Yorks).
C. hebenstreitella (Mueller) Sheffield (Yorks): Ambleside (Westmorland).
C. lecheana (L.) Sheffield (Yorks).
Pandemis corylana (F.) Eccleshall Wood and Sheffield (Yorks): Bircotes (Notts).
P. cinnamomeana (Treitschke) Strines and Sheffield (Yorks): Bircotes (Notts).
P. heparana (Schiff.) Eccleshall Wood, Sheffield and Seamer Moor (Yorks).
P. cerasana (Huebner) Eccleshall Wood, Snainton and Shawford (Yorks): Bircotes (Notts).
Tortrix viridana (L.) Eccleshall Wood and Sheffield (Yorks): Attleborough (Lincs).
T. paleana (Huebner) Stoney Middleton (Derbys): Strines (Yorks): Greatham (Co. Durham).
T. viburnana (Schiff.) Grenoside and Thorne Waste (Yorks).
T. rusticana Treitschke Strines (Yorks).
T. forsterana (F.) Strines and Sheffield (Yorks).
T. costana Schiff. Staveley (Derbys): Sheffield and Shawford (Yorks): Greatham (Co. Durham).
T. consimilana Huebner Sheffield (Yorks).
T. musculana Huebner Wharncliffe and Sheffield (Yorks): Edderacres (Co. Durham).
Eulia ministrana (L.) Strines, Sheffield and Wadworth (Yorks): Edderacres (Co. Durham).
Exapate congelatella (Clerck) Strines and Sheffield (Yorks): Bircotes (Notts).
Tortricodes tortricella (Huebner) Sheffield (Yorks): Sherwood (Notts).
Cnephasia osseana (Scopoli) Sheffield and Wadworth (Yorks).
C. incanana Stephens Eccleshall Wood (Yorks).
C. interjectana (Haworth) Stoney Middleton (Derbys): Sheffield, Thorne Waste and Snainton (Yorks): Sunderland (Co. Durham).
C. pasiuana (Huebner) Staveley (Derbys): Greatham (Co. Durham).
C. conspersana Douglas Sheffield (Yorks).
C. incertana (Treitschke) Staveley (Derbys): Sheffield and Snainton (Yorks): Greatham and Sunderland (Co. Durham).
Isotrias trifasciana (Donovan) Stoney Middleton (Derbys): Worksop (Notts): Greatham (Co. Durham).
Olindia ulmana (Huebner) Wadworth and Edlington (Yorks).
Argyrotoza forsskaleana (L.) Wharncliffe and Wadworth (Yorks): Sunderland (Co. Durham); Bircotes (Notts).
A. bergmanniana (L.) Sheffield (Yorks).
A. conwayana (F.) Seamer Moor and Kildale (Yorks).
Peronea emargana (F.) Seamer Moor and Scarborough (Yorks): Sunderland and Castle Eden (Co. Durham).
P. rhombana (Schiff.) Sheffield and Wadworth (Yorks): Sunderland (Co. Durham).
P. calidoniana Stephens Grenoside and Sheffield (Yorks).
P. ferrugana (Schiff.) Wharncliffe and Eccleshall (Yorks): Bircotes (Notts).
P. fissurana (P. & M.) Kildale (Yorks).
P. latifasciana (Haworth) "Derbyshire; coll. H. C. Hayward, 1920"
P. schalleriana (L.) Bircotes (Notts).
P. variegana (Schiff.) Sheffield (Yorks): Sunderland (Co. Durham).
P. sparsana (Schiff.) Eccleshall, Wharncliffe and Sheffield (Yorks): Sunderland (Co. Durham): Bircotes (Notts).
Spilonota ocellana (Schiff.) Sheffield and Kildale (Yorks): Greatham (Co. Durham).
Acrolita naevana (Huebner) Wharncliffe and Sheffield (Yorks).
Evetria pinivorana (Zeller) Strines (Yorks): Derbyshire; coll. H. C. Hayward.
Ancylis badiana (Schiff.) Staveley (Derbys): Wadworth and Sheffield (Yorks): Greatham (Co. Durham).
A. myrtillana Treitschke Wharncliffe, Strines, Grenoside and Sheffield (Yorks): Bircotes (Notts).

A. unguicella (L.) Kildale (Yorks).
A. uncana (Huebner) Upper Teesdale (Yorks).
A. diminutana (Haworth) Wadworth (Yorks).
A. mitterbacheriana (Schiff.) Strines and Sheffield (Yorks).
A. laetana (F.) "Derbyshire; coll. H. C. Hayward".
A. achatana (Schiff.) Strines (Yorks).
Gypsonoma sociana (Haworth) Staveley (Derbys): Eccleshall and Sheffield (Yorks): Bircotes (Notts).
Notocelia udmanniana (L.) Wharncliffe (Yorks).
N. rosaecolana Dbldy. Sheffield (Yorks).
N. suffusana (Duponchel) Snainton and Kildale (Yorks): Greatham (Co. Durham).
N. aquana (Huebner) Sheffield (Yorks): Sunderland (Co. Durham): Bircotes (Notts).
N. incarnatana (Huebner) Castle Eden, reared from Burnet Rose, 1907 (Co. Durham).
Eucosma cruciana (L.) Sheepbridge (Derbys): Castle Eden (Co. Durham).
E. friseana (Huebner) Sherwood (Notts): Strines, Kildale and Grenoside (Yorks).
E. nanana (Treitschke) Middlesborough (Yorks).
E. isertana (F.) Grenoside (Yorks).
E. trimaculana (Donovan) Eccleshall and Wadworth (Yorks): Sunderland (Co. Durham).
E. ustomaculana (Curtis) Strines (Yorks).
E. nigromaculana (Haworth) Staveley (Derbys).
E. cana (Haworth) Sunderland (Co. Durham).
E. fulvana (Stephens) Wadworth and Snainton (Yorks).
E. farfarae Fletcher Grenoside (Yorks): Stoney Middleton (Derbys).
E. luctuosana (Duponchel) Stoney Middleton (Derbys): Greatham (Co. Durham).
E. pflugiana (F.) Wadworth (Yorks)., Derbyshire; coll. H. C. Hayward.
E. costipunctana (Haworth) Kildale (Yorks).
E. subocellana (Donovan) Sheepbridge (Derbys): Kildale (Yorks).
E. cynosbatella (Wilkinson) Sheffield (Yorks): Greatham (Co. Durham): Bircotes (Notts).
E. penkleriana (F. & R.) Wharncliffe, Eccleshall and Wadworth (Yorks): Ambleside (Westmorland).
E. ramella (L.) Eccleshall (Yorks).
E. bilunana (Haworth) Eccleshall and Sheffield (Yorks).
E. nisella (Clerck) "Derbyshire; coll. H. C. Hayward"
E. tetraquetrana (Haworth) Eccleshall (Yorks).
E. triquetrana (Haworth) Sheffield (Yorks): Derbyshire; coll. H. C. Hayward.
E. proximana (H.–S.) Kildale (Yorks).
E. tedella (Clerck) Seamer Moor (Yorks).
E. maculana (F.) Sheffield and Kildale (Yorks): Derbyshire; coll. H. C. Hayward.
E. solandriana (L.) Sheffield, Strines, Wharncliffe and Wadworth (Yorks): Sherwood (Notts): Derbyshire; coll. H. C. Hayward.
E. semifuscana (Stephens) "Derbyshire; coll. H. C. Hayward".
Lathronympha strigana (F.) Edlington (Yorks).
Bactra lanceolana (Huebner) Strines, Sheffield and Kildale (Yorks): Ambleside (Westmorland).
Endothenia oblongana (Haworth) Eccleshall and Sheffield (Yorks).
Argyroploce corticana (Schiff.) Eccleshall (Yorks).
A. betuletana (Haworth) Wharncliffe, Eccleshall and Seamer Moor (Yorks): Bircotes (Notts).
A. sororculana (Zett.) Sheffield (Yorks).
A. nubiferana (Haworth) Middlesborough (Yorks).
A. pruniana (Huebner) Greatham (Co. Durham).
A. sauciana (Geyer) Grenoside, Strines, Wharncliffe and Sheffield (Yorks).
A. atropunctana (Zett.) Middlesborough (Yorks): Bircotes (Notts).
A. mygindana (Schiff.) Strines (Yorks).
A. arcuella (Clerck) Wadworth Wood (Yorks).
A. schulziana (F.) Kildale (Yorks): Walton Moss (Cumberland).
A. lacunana (Schiff.) Sheffield (Yorks).
A. aemulana (Huebner) Sheffield (Yorks).
Hemimene petiverella (L.) Staveley (Derbys).
H. flavodorsana (Knaggs) Staveley (Derbys).
H. sequana (Huebner) "Derbyshire; coll. H. C. Hayward".

H. tanaceti (Stainton) Sheffield (Yorks): Staveley (Derbys).
H. acuminatana (Zeller) Hart (Co. Durham).
H. plumbana (Scopoli) Grenoside (Yorks): Stoney Middleton (Derbys): Greatham (Co. Durham).
Pammene splendidulana (Guenee) Sheffield (Yorks): Derbyshire; coll. H. C. Hayward.
P. inquilana Fletcher Wharncliffe (Yorks).
P. argyrana (Huebner) Eccleshall (Yorks): Derbyshire; coll. H. C. Hayward.
P. rhediella (Clerck) Greatham (Co. Durham).
P. regiana (Zeller) Sheffield (Yorks).
Enarmonia formosana (Scopoli) Sheffield (Yorks): Derbyshire; coll. H. C. Hayward.
E. aurana (F.) Edlington (Yorks): Sunderland (Co. Durham): Bircotes (Notts).
E. pomonella (L.) Bircotes (Notts).
E. ulicetana (Haworth) Kildale and Middlesborough (Yorks).
E. jungiella (Clerck) "Derbyshire; coll. H. C. Hayward".
E. internana (Guenee) Kildale (Yorks).
E. dorsana (F.) Kildale and Middlesborough (Yorks).
E. coniferana (Ratzeburg) Strines and Wharncliffe (Yorks).

GELECHIIDAE:

Metzneria metzneriella (Stainton) Sunderland (Co. Durham).
Aristotelia brizella (Treitschke) Greatham (Co. Durham).
A. tenebrella (Huebner) Doncaster (Yorks): coll. H. H. Corbett.
A. stipella (Huebner) Greatham (Co. Durham).
A. hermannella (F.) Doncaster (Yorks); coll. H. H. Corbett.
Stenolechia gemmella (L.) Sheffield (Yorks).
Parachronistis albiceps (Zeller) Eccleshall (Yorks).
Exoteleia dodocella (L.) Sheffield and Kildale (Yorks).
Xenolechia proximella (Huebner) Eccleshall and Wharncliffe (Yorks).
X. luculella (Huebner) Wharncliffe (Yorks).
X. sequax (Haworth) Sunderland (Co. Durham).
Bryotropha affinis (Haworth) Ambleside (Westmorland).
B. senectella (Zeller) Staveley (Derbys).
B. terrella (Schiff.) Sheffield (Yorks): Staveley (Derbys).
Gelechia mulinella Zeller Sunderland (Co. Durham).
G. longicornis (Curtis) Kildale (Yorks).
G. betulae (Haworth) Sheffield and Kildale (Yorks).
G. pinguinella Treitschke Sherwood (Notts).
Phthorimaea plantaginella (Stainton) Greatham (Co. Durham).
P. salicorniae (Hering) Greatham (Co. Durham).
P. atriplicella (F. & R.) Sunderland (Co. Durham).
P. fraternella (Douglas) Hart (Co. Durham).
P. marmorea (Haworth) St. Helens (Lancs).
Anacampsis populella (Clerck) Eccleshall and Wadworth (Yorks).
Hypatima conscriptella (Huebner) Eccleshall and Sheffield (Yorks).
Brachmia rufescons (Haworth) Middlesborough (Yorks).

COSMOPTERYGIDAE:

Blastodacna hellerella (Duponchel) Middlesborough (Yorks).
B. atra (Haworth) Middlesborough (Yorks).
Spuleria flavicaput (Haworth) Kildale (Yorks): Greatham (Co. Durham).
Mompha terminella (Westwood) Hart (Co. Durham).
M. raschkiella (Zeller) Sheepbridge (Derbys).
M. fulvescens (Haworth) Staveley (Derbys).
M. miscella (Schiff.) Sunderland (Co. Durham).
Batrachedra praeangusta (Haworth) Sheepbridge (Derbys).

OECOPHORIDAE:

Dasycera sulphurella (F.) Sheffield, Wadworth, and Barkwell (Yorks): Bircotes (Notts).
D. oliviella (F.) Some specimens standing in the collection had a label beside them saying Rotherham; the rest of the series were from Barham in Kent. It is hardly likely that the species occurs in Yorkshire its range in Britain extending from Kent to Hampshire north to Essex (Meyrick, E. *A Handbook of British Lepidoptera*, 1895). Odd records in the literature for Yorkshire have always been erroneous.

Endrosis sarcitrella (L.) Sheffield, Wadworth and Middlesborough (Yorks): Bircotes (Notts).
Borkhausenia fuscescens (Haworth) Sheffield (Yorks).
B. similella (Huebner) Kildale (Yorks).
B. pseudospratella (Stainton) Sheffield and Grenoside (Yorks): Bircotes (Notts).
Diurnea fagella (Schiff.) Sheffield (Yorks): Carlisle (Cumberland): Sherwood and Bircotes (Notts). Carlisle specimens very pale, others much darker, approaching melanistic.
D. phryganella (Huebner) Sheffield (Yorks).
Pleurota bicostella (Clerck) Strines (Yorks).
Carcina quercana (F.) Sheffield and Wadworth (Yorks).
Exaeretia allisella Stainton Hartlepool (Co. Durham).
Depressaria heracliana (L.) Sheffield (Yorks): Bircotes (Notts).
D. costosa Haworth Sheffield and Seamer Moor (Yorks): Sunderland (Co. Durham).
D. liturella (Schiff.) Stoney Middleton (Derbys): Sunderland (Co. Durham).
D. angelicella (Huebner) Sunderland (Co. Durham).
D. applana (F.) Sheffield and Wrawby Moor (Yorks): Sunderland (Co. Durham): Bircotes (Notts).
D. alstromeriana (Clerck) Staveley (Derbys): Sunderland (Co. Durham): Bircotes (Notts).
D. ocellana (F.) Elterwater (Westmorland); coll. J. W. Corder; Bircotes (Notts).
D. conterminella (Zeller) Seamer Moor (Yorks).
Semioscopis steinkellneriana (Schiff.) Greatham (Co. Durham).
S. avellanella (Huebner) Eccleshall and Sheffield (Yorks).

SCHRECKENSTEINIIDAE:
Pancalia leuwenhoekella (L.) Kildale (Yorks).
Schreckensteinia festaliella (Huebner) Elterwater (Westmorland).

GLYPHIPTERYGIDAE:
Anthophila fabriciana (L.) Sheffield and Wadworth (Yorks): Greatham (Co. Durham).
Glyphipteryx fuscoviridella (Haworth) Sheffield, Seamer Moor and Kildale (Yorks): Sherwood (Notts).
G. thrasonella (Scopoli) Kildale (Yorks).
G. cramerella (F.) Greatham (Co. Durham).
G. equitella (Scopoli) Ambleside (Westmorland).

ELACHISTIDAE:
Elachista apicipunctella Stainton Sheffield "blck.bk." (Yorks): Staveley (Derbys).
E. luticomella Zeller Kildale (Yorks): Greatham and Sunderland (Co. Durham).
E. kilmunella Stainton Elterwater (Westmorland).
E. cerusella (Huebner) Middlesborough (Yorks).
E. rufocinerea (Haworth) Sheffield (Yorks): Greatham (Co. Durham).
E. argentella (Clerck) Sheffield (Yorks): Greatham (Co. Durham): Bircotes (Notts).

YPONOMEUTIDAE:
Oedistis farinatella (Zeller) Sheffield and Kildale (Yorks).
Swammerdamia heroldella Huebner Sheffield (Yorks).
S. pyrella (de Villers) Sheffield (Yorks): Greatham (Co. Durham).
Atemelia torquatella (Zeller) Edderacres (Co. Durham).
Prays curtisellus (Donovan) Sheffield and Kildale (Yorks): Ambleside (Westmorland): Bircotes (Notts).
Yponomeuta padella (L.) Grenoside (Yorks): Bircotes (Notts).
Y. cognatella Huebner Worksop (Notts).
Y. evonymella (L.) Walton Moss (Cumberland).

COLEOPHORIDAE:
Coleophora spissicornis (Haworth) Kildale (Yorks).
C. alcyonipennella (Kollar) Sunderland and Greatham (Co. Durham).
C. nigricella (Stephens) Staveley (Derbys).
C. vitisella Gregson Strines (Yorks).
C. viminetella Zeller Sheepbridge (Derbys).
C. fuscedinella Zeller Sheffield and Kildale (Yorks).
C. lutipennella Zeller Sheffield (Yorks).
C. laricella (Huebner) Sheffield (Yorks).

C. discordella Zeller Greatham and Sunderland (Co. Durham).
C. albicosta (Haworth) Kildale (Yorks).
C. laripennella Zett. Greatham and Sunderland (Co. Durham).
C. salinella Stainton Greatham (Co. Durham).
C. artemisiella Scott Greatham (Co. Durham).

GRACILARIIDAE:
Lithocolletis harisella (L.) Sheffield (Yorks).
L. quercifoliella Zeller Sheffield (Yorks).
L. faginella Zeller Sheffield (Yorks).
L. blancardella (F.) Castle Eden, Wellfield, ex *Crataegus* (Co. Durham).
L. junoniella Zeller Strines (Yorks).
L. ulmifoliella (Huebner) Sheffield (Yorks).
L. nicellii Stainton Kildale (Yorks).
L. corylifoliella (Haworth) Sheffield (Yorks).
Ornix guttea (Haworth) Hart (Co. Durham).
O. anglicella Stainton Snainton (Yorks): Greatham (Co. Durham).
O. scoticella Stainton Sheffield (Yorks).
O. torquilella Zeller Kildale (Yorks): Greatham (Co. Durham).
Gracilaria auroguttella (Stephens) "Derbyshire, June 1915".
G. syringella (F.) Sheffield (Yorks).
G. tringipennella Zeller Sunderland (Co. Durham).
G. elongella (L.) Sheffield (Yorks).
G. alchimiella (Scopoli) Sheffield (Yorks).

PLUTELLIDAE:
Ypsolophus xylostellus (L.) Sheffield, Wadworth and Edlington (Yorks).
Y. nemorellus (L.) Sheffield (Yorks).
Y. parenthesellus (L.) Grenoside, Eccleshall and Edlington (Yorks): Sheepbridge (Derbys).
Y. ustellus (Clerck) Sheffield (Yorks).
Y. sequellus (Clerck) Edlington (Yorks).
Plutella porrectella (L.) Sheffield and Middlesborough (Yorks): Sunderland (Co. Durham).
P. maculipennis (Curtis) Sheffield and Wadworth (Yorks).
Acrolepia granitella (Treitschke) Snainton (Yorks).
Argyresthia laevigatella (H.–S.) Kildale (Yorks).
A. dilectella Zeller Middlesborough (Yorks).
A. quadriella (Haworth) Wharncliffe (Yorks): Elterwater (Westmorland).
A. brockeella (Huebner) Sheffield (Yorks): Sherwood (Notts).
A. goedartella (L.) Sheffield (Yorks).
A. pygmaeella (Huebner) Strines (Yorks): Sheepbridge (Derbys).
A. sorbiella (Treitschke) Sheffield, Wharncliffe and Kildale (Yorks).
A. cornella (F.) Kildale (Yorks).
A. retinella Zeller Sheffield and Wharncliffe (Yorks).
A. mendica (Haworth) Kildale (Yorks).
A. semifusca (Haworth) Middlesborough (Yorks).
A. conjugella Zeller Sheffield (Yorks).
A. spiniella Zeller Eccleshall, Wharncliffe and Sheffield (Yorks).
A. pruniella (Clerck) Edlington and Snainton (Yorks): Sunderland (Co. Durham).
A. curvella (L.) Sheffield (Yorks): Greatham (Co. Durham).
A. albistria (Haworth) Middlesborough (Yorks).
A. semitestacella (Curtis) Sheffield (Yorks).

LYONETIIDAE:
Opostega salicella (Treitschke) Middlesborough (Yorks): Bircotes (Notts).
Leucoptera laburnella (Stainton) Sheffield (Yorks).
Lyonetia clerckella (L.) Snainton (Yorks): Sunderland (Co. Durham).
Bucculatrix maritima Stainton Greatham (Co. Durham).

TINAEIDAE:
Monopis rusticella (Clerck) Sheffield and Middlesborough (Yorks).
M. weaverella (Scott) Kildale (Yorks).
Tineola biselliella (Hummel) Sheffield (Yorks): Bircotes (Notts).

Tinaea emortuella Zeller Eccleshall and Edlington (Yorks).
T. picarella (Clerck) Durham; J. W. Corder.
T. cloacella (Haworth) Wharncliffe, Sheffield and Kildale (Yorks): Greatham (Co. Durham).
T. pallescentella Stainton Sheffield and Snainton (Yorks).
T. ganomella Treitschke Greatham (Co. Durham).
Taleporia tubulosa (Retzius) Sherwood (Notts).

LAMPRONIIDAE:
Incurvaria masculella (F.) Sheffield (Yorks).
Lampronia praeletella (Schiff.) Newball Wood (Lincs).
L. rubiella (Bjerkander) Middlesbrough (Yorks).
L. morosa Zeller Greatham (Co. Durham).

ADELIDAE:
Nemophora degeerella (L.) Sheffield (Yorks).
Adela cuprella (Schiff.) Wharncliffe (Yorks).
A. viridella (Scopoli) Eccleshall and Sheffield (Yorks): Bircotes (Notts).
A. rufimitrella (Scopoli) "Derbyshire".
A. fibulella (Schiff.) Snainton and Kildale (Yorks).
Nematopogon swammerdamella (L.) Sheffield (Yorks): Sherwood (Notts).
N. panzeriella (F.) Kildale (Yorks).
N. pilella (F.) Wadworth Wood (Yorks).
N. metaxella (Huebner) Eccleshall (Yorks).

RIPON FERNS

G. A. SHAW

In one of the predecessors of this journal bearing the same title, *The Naturalist,* conducted by the Rev. F. O. Morris, vol. VI, 1856, there appeared a paper entitled 'List of Cryptogamous Flora found in the neighbourhood of Ripon, Yorkshire', by Miss Emily E. Harrison, of Mickley. As this is perhaps not readily accessible to many members, it may be useful to reproduce her list here. The names and spellings used in the paper are reproduced as originally published.

Polypodium vulgare (Common Polypody). Very abundant on the roots of trees, and on most of the old walls.
Polypodium phegopteris (Beech Fern). Two or three large beds of it in Hackfall, opposite a stone quarry on the other side of the river.
Polypodium dryopteris (Tender Three-branched Polypody). Very luxuriant over the crags in Hackfall.
Cistopteris dentata (Brittle Bladder Fern). I found a few roots on some rocks near the river, and others in Mickley Lane.
Aspidium lobatum (Prickly Shield Fern). Extremely common in all the woods.
Aspidium aculeatum (Common Prickly Shield Fern). Very abundant in Hackfall and the hedgerows.
Aspidium angulare. Very luxuriant in Hackfall; a frond I gathered measuring more than a yard, and shewing very distinctly its difference from *aculeata.*
Lastrea Filix-mas (Male Fern). Very common.
Lastrea spinulosa (Narrow Prickly Toothed Fern). I have not gathered this myself, but was shewn some beautiful specimens that were gathered in Leckby Carrs, near Topcliffe, growing in a ditch. I hope to get some next year there.

Lastrea dilatata (Dilated Shield Fern). Very common, as also the varieties *Multiflorum* and *Recurvum*. Hackfall is beautiful at the east end of the wood with these most lovely of Ferns.
Lastrea oreopteris (Mountain Fern). On the side of a hill above Hackfall.
Lastrea Foenisecii. I have found several roots of this in Hackfall.
Asplenium Ruta-muraria (Wall Rue Spleenwort). Very common on old walls.
Asplenium trichomanes (Common Spleenwort). In a wood near Hackfall, and on Fountains Abbey, but not very abundant.
Asplenium adiantum nigrum (Black Maiden's Hair). Grows in Mickley Lane.
Athyrium Filix-foemina (Lady Fern). This graceful Fern makes almost every roadside lovely. Its var. *irrigum* is common in Hackfall.
Scolopendrium vulgare (Common Hart's Tongue). Grows in the greatest abundance at the west end of Hackfall woods, and scarcely a plant at the east end.
Scolopendrium multifidum (Cleft Hart's Tongue). In a wood near Mickley it is abundant.
Blechnum boreale (Hard Fern). Very common.
Pteris aquilina (Brake). Very common. The var. *caudata* I think I have found, but have not quite decided whether there is such a variety or not.
Botrychium vulgare (Common Moonwort). In some fields near Burneston and Bedale.
Ophioglossum vulgatum (Common Adder's Tongue). I have never found this yet, but was shewn some specimens gathered in the neighbourhood.
Pilularia globulifera (Creeping Pillwort). In a pond near the Leeming Lane; it is quite full of it. I have not seen it elsewhere.
Lycopodium clavatum (Stag's Horn Moss). Very common on some rough moorish ground not far from Hackfall. I doubt not but that some more of the Lycopodiums grow here, but I have not looked for them.
Equisetum fluviatile (Great Horse-tail). Common all over.
Equisetum arvense (Common Horse-tail). Very common.
Equisetum Hyemale (Rough Horse-tail). Very abundant in Hackfall.

The above list comprises all that I have found, but a closer search would discover many more I doubt not.

Mickley, near Ripon, December, 1855.

Dryopteris aemula (*Lastrea Foenisecii* of the list) is not known to present-day botanists in Hackfall; neither is *Equisetum hyemale.* Miss Rob tells me that *Pilularia* is no longer known in the Leeming area. As regards *Lycopodium clavatum,* it is interesting to note that this species was found by John Mather not far from Hackfall at our meeting there a few years ago, and this may well have been the "rough moorish ground" referred to by Miss Harrison. G.A.S.

In one of Dr F. A. Lees' notebooks and diaries of botanical excursions there appears the following entry:—

"July 18, 1881 Trip to Hackfall and Masham.
Lastraea foenisecii Wats. A few fine roots." A frond collected on this date is in the Lees herbarium at the Cartwright Hall Museum, Bradford, the label reading:—

"Hackfall, sheltered bank. Perhaps planted by the gardener-caretaker for Lord Ripon? Only three plants to be seen."

Dryopteris aemula had been recorded from here by Lees in Davis J. W., and Lees F. A., *West Yorkshire* p. 287, 1878, and had evidently been known here for some time since it was recorded from "Hackfall Woods nr. Ripon: T. Simpson" in J. G. Baker's Supplement to Baines' *Fl. Yorks* (1840). Baker's Supplement was published in 1854 and would hence be more or less contemporary with Miss Harrison's record. It is not included in the "List of rare plants found in Hackfall", presumably contributed by W. Brunton, in *History of Ripon,* 2 ed., 257-258, 1806.

Although this fern is very rare on the eastern side of the Pennines I see no reason to account for its presence at Hackfall by supposing it to have been originally planted there. Other rare species such as *Carex strigosa* and *Festuca altissima* occur here. The fact that *D. aemula* is not known there now may well be due to its not having been searched for. The woods are extensive and once a break occurs in the handing down of information as to the exact location of a species it may be a long time before the species is rediscovered. The refinding of *Orobanche alba* in Wensleydale was a case in point. W.A.S.

A CONTRIBUTION TO THE LICHEN FLORA OF THE WIRRAL PENINSULA, CHESHIRE

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Cheshire has long been a neglected county from the point of view of lichen studies and has not benefited until now from the increased interest in lichenology that has followed the foundation of the British Lichen Society in 1958. Two visits to the Wirral Peninsula in June 1972 (RHB) and July 1972 (PAS) were taken, therefore, as an opportunity to study the existing lichen flora of the area and immediately adjacent districts of Cheshire.

Neither the *Flora of Cheshire* by Lord de Tabley (1899) nor the more recent volume of the same title (Newton, 1971) treat the lichen flora of the county, Leighton (1879)

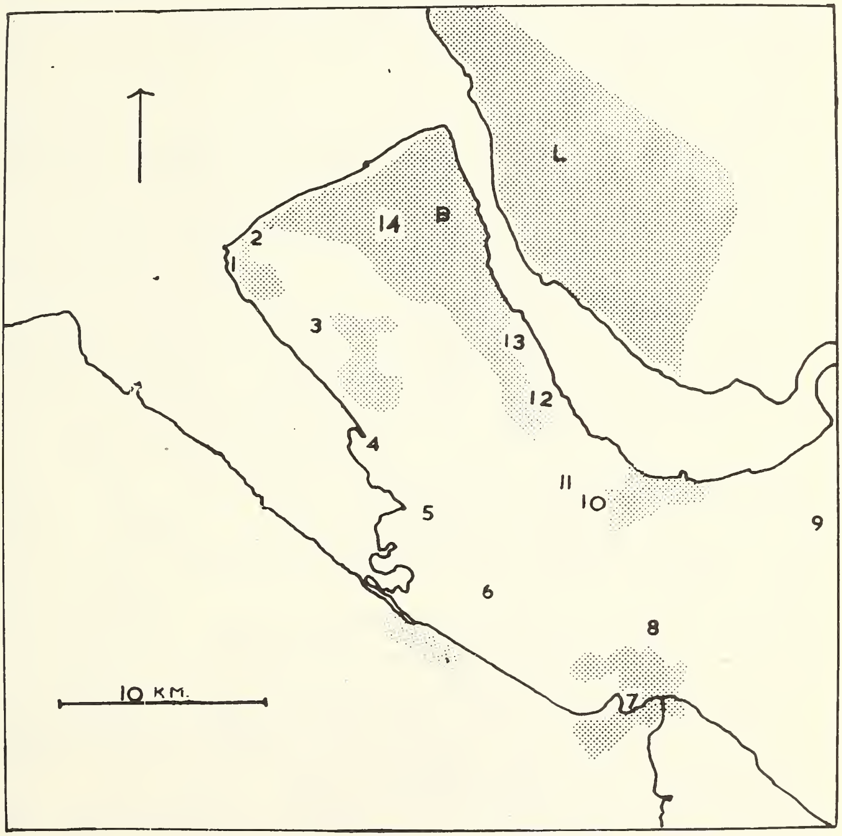

Fig. 1. Reference map for localities mentioned in the text.

1. Hoylake sand dunes; 2. Hoylake; 3. Thurstaston Common; 4. Parkgate; 5. Ness; 6. Shotwick; 7. Chester; 8. Chester Zoo; 9. Helsby Hill; 10. Great Sutton; 11. Little Sutton; 12. Eastham Ferry Woods; 13. Port Sunlight; 14. Bidston Hill.

Major urban areas are shown stippled.
B = Birkenhead/Wallasey conurbation; L = Liverpool

listed a number of Cheshire records in his *Lichen Flora of Great Britain;* these included his own collections of *Arthopyrenia antecellans* (as *Verrucaria antecellans*); *Bacidia umbrina* (as *Lecidea umbrina* f. *compacta*); *Catillaria griffithii* (as *Lecidea tricolor*); *Enterographa crassa* (as *Stigmatidium crassum*) and *Lecidea quernea*† made in May 1876 at Parkgate in Wirral. Further Wirral records, this time made by J. A. Wheldon, are given in the *Reports of the Lichen Exchange Club* (Horwood, 1908-1914). Among many early records from Wirral reported by Marrat (1860) those of *Parmelia conspersa, Umbilicaria polyphylla* and *U. pustulata* from Bidston Hill, Birkenhead, are confirmed by Travis (1915). A small number of Wirral records were also listed by Smith (1918, 1926) from Cheshire specimens then held by the British Museum herbarium. Apart from the records contributed as a result of the present studies no completed record cards from Wirral localities have been received by the British Lichen Society's Distribution Maps Scheme at the time of writing, October 1972. [The record for national grid square 33/39 in Seaward (1971) is an error, Seaward, *in litt.*]

The localities studied (Fig. 1) were chosen to include all major habitats occurring in the Wirral Peninsula. The ubiquitous man-made habitats of cement, concrete and asbestos sheet were examined at most sites visited. The nomenclature used is that of Duncan (1970) with later amendments – for which authorities are given. Taxa not recorded for Cheshire (V.c.58) by Watson (1953) are preceded by an asterisk (*) when the plant is first mentioned.

Fixed dunes near Hoylake (33/2088) yielded an abundance of *Cornicularia aculeata* and *Cladonia* species – *C. chlorophaea, C. coniocraea, *C. foliacea, C. furcata* (including ssp. **subrangiformis*) and *C. pyxidata. Hypogymnia physodes* (L.) Nyl. was also present. Lichens appear to be confined to trampled areas and the total lichen flora would seem to be reduced as much by competition from vascular plants as by air pollution from the Merseyside conurbation. These dunes are still receiving sand and are, as a result, less heavily leached and, therefore, more calcareous in nature than others in Wirral.

In contrast to these calcareous dunes areas of acid heathland were visited at Bidston Hill and Thurstaston Common, two major outcrops of Keuper sandstone on the Wirral Peninsula. At Bidston Hill (33/2889), now adjacent to Birkenhead, heathy soil and sandstone yielded only a poor lichen flora of *Cladonia chlorophaea, C. coccifera, C. floerkeana,* and *C. furcata* together with *Lecanora conizaeoides, Lecidea granulosa, *Lepraria incana, *Parmelia incurva* and *P. saxatilis.* The *Umbilicaria* species reported as recently as 1915 by Travis now appear to be extinct. This could well be a result of public pressure on the environment as much as air pollution. A discussion of the public interest in this area is presented by Langton (1972). At Thurstaston Common a much larger, but geologically comparable, area large tracts of outcropping sandstone are worn smooth and lichen-free by visitors. Sowter (1950) and Hawksworth (1969) noted similar effects on the lichen flora of Leicestershire and Derbyshire respectively. All those species (except *Parmelia incurva*) found at Bidston Hill were also present on Thurstaston Common (33/2485; 33/2484). However, the *Callunetum* supported additional species notably *Cladonia coniocraea, C. pyxidata, C. squamosa; Cornicularia aculeata, C. muricata; Hypogymnia physodes;* and *Lecidea uliginosa.* Tufts of *Cladonia arbuscula* (fertile) and *C. impexa* were found at one site. Sandstone supported *Acarospora fuscata, Candelariella vitellina, Lecanora calcarea* (on a small basic vein) and *Pertusaria corallina* where public pressure was sufficient to check the foliose *Hypogymnia physodes* and *Parmelia saxatilis* which otherwise dominated the substratum; an example of moderate human pressure tending to enrich the lichen flora. As a relatively isolated outcrop Thurstaston Common would seem too exposed to air pollution by its altitude (250 ft., app. 75 m.) to support a rich lichen flora. However, in a small valley well developed communities of the *Physodion* and *Cladonietum coniocraeae* on *Betula* added *Cetraria chlorophylla, Cladonia fimbriata* and *Ochrolechia androgyna* to the species list for the site.

The corticolous flora was also examined at Parkgate, Eastham Ferry, Shotwick and Ness (in the botanic gardens of the University of Liverpool). Eastham Ferry Woods (33/3681) supported only a small lichen flora (on *Fagus* and *Quercus*) of *Cladonia coniocraea; Lecanora conizaeoides; Lecidea granulosa* and *Lepraria incana* – species found on bark at each of the other three sites. Parkgate (33/2778) and Ness (33/3075) had, additionally, the following corticolous species in common: *Parmelia*

† Specimens supporting all these records are now in the British Museum herbarium. One specimen of *Catillaria griffithii* on *Fraxinus* also bears *Evernia prunastri* and *Lepraria incana,* a second, again on *Fraxinus,* includes *Lecanora expallens.*

glabratula, P. saxatilis and *P. sulcata*. At Parkgate the flora on *Ulmus* included **Buellia punctata* (also on *Ulmus* at Shotwick, 33/3371); *Evernia prunastri; Lecanora chlarona, *L. chlarotera, L. expallens* (also at Shotwick) and **Physcia adscendens. Hypogymnia physodes* and *Parmelia caperata* were found at Ness on *Salix* – the latter indicating a relatively unpolluted niche.

At Ness acid rocks were also examined adding **Acarospora smaragdula* and *Lecidea coarctata* to the saxicolous flora of the areas visited. The acid rocks of walls and memorials in Shotwick churchyard (33/3371) proved rich in species and their flora included **Lecanora atra, L. badia, L. polytropa; Lecidea lucida, *L. sulphurea; Ochrolechia parella; Parmelia glabratula* ssp. *fuliginosa* (which grew as circles of lobe tips only, indicating a relatively high level of air pollution, cf. Gilbert, 1971), *P. saxatilis* (growing more abundantly on the east-facing side of the churchyard walls – those facing away from the Shotton steelworks some 3.5 km. away) and *Rhizocarpon petraeum.*

Concrete and other artificial calcareous substrata supported a largely uniform, but interesting, flora. At Port Sunlight (33/3384) cement and mortar supported *Caloplaca citrina; *Candelariella aurella, C. vitellina; Cladonia coniocraea* and *Lepraria incana.* On concrete there were occasional plants of *Lecanora conizaeoides* (also found on bark and sandstone). In a less densely urbanized area, Little Sutton, (33/3676) all these species together with **Caloplaca aurantiaca, *C. heppiana, †*C. holocarpa; *Lecanora campestris, L. dispersa; Physcia adscendens, *P. orbicularis, P. tenella; Xanthoria aureola* and *X. parietina* were present on concrete and asbestos cement sheets. Not far away at Great Sutton (33/3775) *Lecanora muralis* var. *albomarginata; *Physcia caesia; *Verrucaria dufourii* and **Xanthoria elegans* were found on the same substrata. *Physcia adscendens* was found among roots of *Polypodium vulgare.* At Shotwick churchyard calcareous memorials and cement supported a comparable flora of *Caloplaca citrina, C. holocarpa; Candelariella aurella; Lecanora dispersa; Lepraria incana* and **Verrucaria nigrescens.* On the shore at Hoylake (33/2189) many of the species already recorded were found on cement rendering with the addition of **Caloplaca marina* and **Lecidella stigmatea* (Ach.) Hertel and Leuckert.

Outside a strict interpretation of Wirral, that is outside Wirral Hundred, brief visits were paid to Chester and its environs. At Helsby Hill (33/4975) a lichen flora closely akin to that of Bidston Hill was recorded: *Caloplaca citrina* and *Lecanora dispersa* on cement, with *Candelariella vitellina; Cladonia chlorophaea, C. coccifera, C. coniocraea, C. floerkeana, C. furcata, C. subcervicornis; Lecanora conizaeoides; Lecidea granulosa, L. uliginosa;* and *Lepraria incana* on soil and sandstone. As at Bidston Hill air pollution and exposure (Helsby Hill being 462 ft., app. 142 m., in altitude) appeared to be the controlling factors for the lichen flora.

At Chester the city walls (33/4065) yielded a number of interesting records including *Lecidea sulphurea* and *Pertusaria amara* on acid stone with *Caloplaca holocarpa; Candelariella aurella; Lecidella stigmatea; Physcia caesia, P. orbicularis; *Rinodina subexigua;* and *Verrucaria nigrescens* on cement and concrete. At Chester Zoo (33/4170) concrete bore *Caloplaca holocarpa; Candelariella aurella; Lecanora campestris; Physcia adscendens, P. caesia* and **P. grisea. *Stereocaulon pileatum* was found on sandstone.

The lists above record only the more interesting species from the sites visited. Complete lists have been incorporated in the British Lichen Society's distribution maps scheme.

The present study makes no claim to be a definitive work on the lichen flora of the Wirral Peninsula – although it is hoped that a realistic outline of its present state is indicated. While there may be but little more of interest to be discovered there are a number of sites that could well repay further study. Foremost amongst these is the area around Parkgate. The existence there of *Evernia prunastri* (and of *Parmelia caperata* close by at Ness) indicate a relatively low local level of air pollution – and most probably other factors which would encourage the maintenance of a relict lichen flora. Also it must always be worthwhile to investigate carefully any area studied by nineteenth century workers if only to establish with reasonable certainty that some species are no longer present. Other sites that might prove interesting are: Caldy Hill; Dibbensdale, Bromborough; Rabey Mere; Spital Park; Thornton Manor and Wallasey sand dunes – and in Cheshire outside the Wirral Peninsula, Delamere Forest and any old established parklands or churchyards.

† Although not recorded by Watson (1953) for V.c. 58 this species was recorded for that vice-county by Wade (1965).

The relationship of lichens to air pollution is now one of the most intensively studied aspects of lichen ecology. It is interesting to see how so many of the accepted lichenological indications of high air pollution can be found on Wirral. The corticolous lichen flora is not well developed but *Lecanora conizaeoides* is abundant not only on the twigs but on the boles of all trees examined. *Parmelia caperata*, and, to a much lesser extent, *Evernia prunastri* and *Cetraria chlorophylla*, the only indicators of moderately unpolluted air recorded were both present on old trees, and, in the case of *Parmelia caperata* and *Cetraria chlorophylla*, in slight hollows (cf. Gilbert, 1968). *Parmelia caperata*, especially, is a surprising species to find still surviving in north Cheshire midway between the Shotton steelworks and the Merseyside conurbation. These species were present only as small plants.

The lichen flora of the Wirral Peninsula overall indicates a level of sulphur dioxide air pollution approximating to an annual average concentration of 60-65 $\mu g/m^3$ according to the scale presented by Gilbert (1970). This scale is based upon the bryophyte and lichen floras of acid and calcareous stone (including old asbestos) and tree boles. More recently Hawksworth and Rose (1970) prepared an eleven point scale for estimating sulphur dioxide air pollution using epiphytic lichens only, based upon mean winter values. According to this latter scale the overall lichen flora of Wirral indicates a mean winter concentration of 125-150 $\mu g/m^3$ sulphur dioxide (zones 3-4) while Port Sunlight would appear to be in zone 1 (>170 $\mu g/m^3$), Parkgate and the hollows on Thurstaston Common in zone 5 (about 60 $\mu g/m^3$) and Ness in zone 6 (about 50 $\mu g/m^3$).

Even the old established parklands that might well retain any established lichen flora until pollution levels are relatively high – for example Arrowe Park and Hooton Park – contained only a handful of pollution tolerant species such as *Cladonia coniocraea*, *Lecanora conizaeoides* and *Lepraria incana*. The effects of pollution were especially noticeable on high ground at Bidston Hill, Helsby Hill and Thurstaston Common. At the latter site the presence of *Cetraria chlorophylla* in a slight hollow demonstrates that such topographical irregularities can moderate the effects of air pollution on the lichen flora. Perhaps, however, the most interesting indication of a high level of air pollution is the occurrence at Port Sunlight of *Lecanora conizaeoides* on cement. This plant is normally a species of bark, wood or acid stone and has seldom been reported from calcareous substrata. It would seem probable that the appearance of this plant on cement is due to a high level of acid pollutants partly neutralizing the basic substratum (cf. Brightman, 1959). In Britain this species has been reported from calcareous substrata in the London area (Bailey, 1963; Laundon, 1967). A similar habitat indication of high air pollution is the occurrence of *Lecanora muralis* on concrete at Great Sutton, this species being one of acid stone (or, rarely, of wood cf. Bailey, 1970) in unpolluted areas.

At Thurstaston Common the occurrence of a few plants of *Cladonia arbuscula* and *C. impexa* is also noteworthy. These are often (especially the first named) plants of moist heathy conditions and are probably now relict species on the Common in danger of extinction from drying of the whole area consequent upon increased urbanization and a general lowering of the water table. It is interesting to note that Thurstaston Common is the site of an important phanerogamic relict – *Gentiana pneumonanthe.* This species, and indeed many others, are thought by Newton (1971) to be in danger of extinction in Cheshire as a consequence of drainage and other operations affecting the water table.

At Bidston Hill the occurrence of *Parmelia incurva* is worthy of note. This plant appears to be reasonably tolerant of air pollution and is now accepted as a widespread, if uncommon, species of upland areas in highland Britain, (Seaward, 1970). It is interesting to note that the plant occurs at a low altitude in Wirral, especially as the same site formerly supported *Umbilicaria polyphylla* and *U. pustulata*, both high altitude plants.

In an area so modified by man it is indicative of the lack of attention given to the lichen flora that of the 25 new vice-county records 17 are of species characteristic in Wirral of man-made habitats. Amongst the lichens, as amongst other groups of plants and animals, some species seem to have evolved an intimate relationship with man – and in quantitative terms seem to have benefited thereby. Hawksworth (1969) considered that *Lecidea lucida* appeared to be exclusively associated with man-made habitats in Derbyshire and the same statement could be made about its distribution in Gloucestershire and Herefordshire as a result of the present authors' studies. Ahti (1965) has suggested that *Lecanora conizaeoides* is perhaps unknown from truly natural habitats.

As regards the Wirral Peninsula in the late twentieth century there can be no doubt that anthropogenic factors are by far the most important influence on the present day lichen flora. Among these air pollution must take first place but the changes inherent in drainage and recreational use of land must, together with the provision of new habitats, be considered significant.

We would thank our wives for their tolerance and support and also our respective relations in Wirral, Mr and Mrs P. Davis and Mr and Mrs J. Kennedy, for allowing us to collect and study material from their homes and gardens. Our gratitude is also due to Dr F. Rose and Mr G. F. A. Wilmot for reading and commenting upon the manuscript.

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UNUSUAL EGG SPOILAGE IN THE COMMON FROG

GEOFFREY FRYER

On 21 April 1973 I noticed that several clumps of spawn of the Common Frog (*Rana temporaria* L.) deposited in a small pool in Link Cove, Deepdale, Westmorland, at an altitude of c.2,100 ft. presented an opaque, white appearance and, to use a non-commital term, were obviously spoiled. When similar clumps were seen in an adjacent pool a search of several nearby pools revealed such spoilage to be widespread. In all, seven closed pools were found in which spawn had been deposited. None of these was more than about ten yards in length and most were much smaller than this. All were obviously acidic and *Sphagnum* was usually present. Of twenty-two clumps of spawn eighteen appeared to be completely spoiled, and the other four were spoiled at the periphery but the most centrally located eggs were apparently undamaged, the degree of spoilage varying from a clump in which only a few central eggs appeared unaffected to an apparently freshly deposited clump in which only a few peripheral eggs were spoiled. In one pool two dead frogs were seen but their presence may have been unconnected with egg spoilage. In a pool in the valley of Deepdale at c.800 ft. one clump of similarly spoiled eggs was seen, and in a probably temporarily flooded area containing many small tadpoles another small spoiled clump was seen.

The finding of the spoiled spawn caused me to recall that I had seen a similarly spoiled clump in a pool at c.1,400 ft. near Piked Howes, above Kentmere, Westmorland on 7 April, but whether this was an isolated case or one of a number of such clumps was not established. On 27 April, however, I encountered further spoiled spawn in three boggy pools, two closed, one with a flow through of water, and all with *Sphagnum*, lying at an altitude of between 1,600 and 1,700 ft. in the vicinity of Angle Tarn, near Hartsop, Westmorland. In all, seven completely spoiled clumps, two clumps spoiled at the periphery, and two apparently unaffected clumps were seen as well as one inaccessible clump perhaps also unaffected. Close examination of one of the clumps in which spoilage was confined to the periphery showed that here some eggs had become detached from the main mass and were lying singly on the bottom.

Microscopic examination of spoiled eggs revealed that in these, and presumably in the other cases, the whiteness was due to a fungus, kindly identified by Dr L. G. Willoughby as *Saprolegnia ferax* (Gruith.) Thuret, whose densely aggregated hyphae were growing from the central vitellus, from which they radiated outwards, each hypha standing more or less vertical in relation to the surface of the vitellus and thus producing what appeared to the naked eye as a white sphere. These hyphae readily penetrated the jelly which here appeared to break down. Whether the fungus was the cause of death or, as seems more probable from what is known of the biology of this species, was living saprophytically on eggs killed by some other agent, is unknown.

If one discounts the unspecifiable quantity of spawn that successfully produced tadpoles at the lower altitude in Deepdale, where some spawning at least had occurred earlier than in the other sites, the high incidence of spoiled eggs – twenty-eight completely and six partly spoiled clumps (involving several thousand eggs) compared with two, perhaps three, unspoiled clumps – is unusual. Savage, R. M. (*The ecology and life history of the Common Frog*, 1961) cites Witschi as pointing out that spoiled eggs are rarely found in the field and agrees with this statement. If it be assumed that the fungal infection was a consequence, and not the cause, of death, then the finding of spoiled eggs in four separate localities suggests the influence of some widespread factor. If climatic it is difficult to suggest what this may have been. Excessive cold can be ruled out, and so probably can high temperatures for although the early part of the year was in general very mild, lethal temperatures were hardly likely to have been reached in the pools in question and frost and snow were certainly experienced since the time of spawning. Rainfall was low in the early months of 1973 but temporary drying out of the eggs can be ruled out in the case of at least some, and perhaps all, of the spoiled clumps. That some central eggs of the clumps spoiling peripherally were developing suggests that infertility is an unlikely explanation. The apparently protective influence of peripheral on more centrally located eggs is noteworthy.

With current interest in the effects of pesticides, sheep dips and other man-made contaminants of the environment much in vogue, and evidence that the Common Frog is in decline in some areas (Cooke, A. S. *J. zool., Lond.* (1972) 167: 161-178) it is tempting to think of such substances as casual agents. While Cooke found little evidence of mortality of tadpoles or frogs attributable to such substances in nature, except where spraying with DDT to control mosquito larvae had taken place, he did not rule out the influence of sublethal effects. Experiments (Cooke, A. S. *Environ. Pollut.* (1972) 3: 51-68) showed that pesticides can cause abnormalities and death of tadpoles and that DDT can penetrate newly deposited spawn, but not spawn containing developing larvae, and give rise to subsequent temporary hyperactivity and subnormal weights. It is not suggested that the spawn mentioned here had been exposed directly to contaminants: in the remote sites in question this is improbable. Any effect of such substances is visualised as operating via the egg-laying females. As toxic contaminants find their way into the eggs of raptorial birds such as Peregrines and Eagles that breed in remote situations this possibility should be kept in mind. It would be of interest to know whether such spoiled eggs were noticed elsewhere in 1973 and to ascertain whether spoilage occurs in subsequent years.

ENTOMOLOGICAL SECTION FIELD MEETINGS, 1972

ROY CROSSLEY

Field meetings in 1972 were held at Ashberry Pastures Nature Reserve, by permission of the Management Committee, and at Thorne Moor. The meetings were spread over the period April to September, five being held at Ashberry Pastures and six at Thorne. The work of the former locality was under the direction of Mr J. H. Flint, the object being to continue investigations which began in 1971, whilst at Thorne Mr P. Skidmore had overall responsibility for collating records as part of the long-term study of this important area which is being undertaken by Doncaster naturalists.

Mr Flint reports on the work at Ashberry Pastures as follows:—

"The results of the 1971 field meeting indicated that the most interesting element in the insect fauna of the Reserve and the valley immediately above the Reserve is the population associated with the marsh plants on the one hand and the woodland plants and trees on the other. Most attention was paid to the insects on the vegetation and those flying freely in the sunshine. The stream and terrestrial insects, the water-beetles, ground-beetles, carrion and dung beetles, etc., were largely neglected.

The formation of the valley produces sheltered, sun-trap conditions and a number of insects which are usually more common in the south were found to be well-established here. Over the whole period of the investigation 396 species were listed of which six were new to the county and thirty-two were new to the vice-county. Most time was spent searching for the uncommon species and, with the wealth of insect life present on some occasions, many common forms were undoubtedly overlooked so the total list can very easily be increased by future workers.

Contributors in 1972 were Mr E. W. Aubrook, Mr R. Crossley, Mrs B. I. Frisby, Mrs H. E. Flint and the writer. The species listed below are additional to those published already (*The Naturalist,* 1972, 120-121). †New to Yorkshire. *New to vice-county 62.

NEUROPTERA

Raphidia notata F. 18/6/72; J.H.F.

HEMIPTERA

Acalypta carinata Pz. 29/9/72; E.W.A. In moss and litter, a rather uncommon bug.
Temnostethus gracilis Horv. 9/9/72; J.H.F. In lichens on trees.
Loricula pselaphiformis Curt. 29/9/72; E.W.A. In lichens on trees.
**Ceratocombus coleoptratus* Zett. 29/9/72; E.W.A.
Centrotus cornutus L. 18/6/72; H.E.F. The Pickering-Helmsley district seems to be the chief centre for this striking hopper in Yorkshire.

LEPIDOPTERA

Hamearis lucina L. (Duke of Burgundy) 20/5/72; J.H.F. Two examples seen. There are several colonies of this butterfly in the Helmsley-Pickering area and these may be the only ones north of the Trent. It was not previously known to exist at Ashberry.
Bapta temerata Hubn. (Clouded Silver) 18/6/72; J.H.F. Very local in Yorkshire.

COLEOPTERA

†*Hypocyptus punctum* Motsch. 29/9/72; E.W.A.
Hylecoetus dermestoides L. 20/5/72; J.H.F. Many examples were seen emerging from the trunk of a dead birch.
Phyllotreta flexuosa Ill. 20/5/72; J.H.F. On Cruciferae in a swampy area.

HYMENOPTERA: SYMPHYTA

**Pamphilius varius* Lep. 18/6/72; H.E.F.
†*Hartigia xanthostoma* Evers. 27/6/71; P. Skidmore. The larva mines the stems of *Filipendula ulmaria.*
**Empria pumila* Kon. 20/5/72; H.E.F. Possibly associated with *Filipendula.*
Tomostethus nigritus F. 18/6/72; H.E.F. Larva on ash.
**Rhogogaster chlorosoma* Benson. 27/6/71; P. Skidmore.
Tenthredo velox F. 18/6/72; H.E.F.
**Macrophya ribis* Schr. 27/6/71; P. Skidmore.
Pachyprotasis antennata Lep. 27/6/71; P.S. 18/6/72; H.E.F."

Mr Skidmore reports that the areas which received most attention at Thorne were the moor edges close to Moorends colliery and a little time was spent working around Inkle Moor which adjoins Thorne Moor just north of the colliery. The new records have been published, or will be eventually published, in the Entomological Annual reports in *The Naturalist* but a few are singled out for special mention by Mr Skidmore as follows:–

"Inkle Moor proved to be a most interesting site. Known for some time as the headquarters for the rare *Dromius sigma* (Rossi), several other fenland specialities were encountered here during the year, most notable being the fly *Anthomyza cingulata* (Hal.) and the bugs *Polymerus palustris* (Reut.), *Fieberocapsus flaveolus* (Reut.) and vast congregations of the Lygaeid *Ischnodemus sabuleti* (Fall.). Mr Crossley found a solitary *Trechus secalis* Pk., seemingly strangely out of place in this fenny situation.

The moor and its edges were worked over by most of those visiting the moor and a number of interesting insects were discovered. Mr Burn found a fine Red-tipped Clearwing (*Aegeria formicaeformis* Esper) on a hogweed near one of the old canals overgrown with *Salix* sp. In springtime the large Tachinid fly *Servillia ursina* Mg. was common all over the moor, but especially so along these old canals. Wm. Bunting jnr. did some valuable work on recording Coleoptera, his first full season with the group. Much of his material still awaits determination but one or two of his captures are noteworthy. *Ditoma crenata* (F.) turned up on a dead birch along with the usual (for Thorne Moor), *Triplax russica* (L.) and *Hypophloeus unicolor* Pi. He also took *Soronia grisea* (L.) in the same situation. On his last visit he took a female scorpion fly which, from the late date, was probably *Panorpa cognata* Rambur. A male specimen, taken some weeks earlier at no great distance away, was subsequently checked and found in fact to be that species.

Those uncommon insects for which Thorne Moor is known, such as the Large Heath butterfly (*Coenonympha tullia* Mull.), the flies *Ochthera mantis* Deg., *Stilpon sublunata* Collin, *Pogonota hircus* Zett., *Tabanus montanus* Mg., and such beetles as *Strangalia 4-fasciata* (L.), *Acilius canaliculatus* (Nc.) and *Cryptorrhynchus lapathi* L. and many others, were all noted in their due season in the usual abundance despite attempts by the peat cutters to drain this famous bog.

A number of species were noted from the moor during the past year which, though not constituting new vice-county records, were, nevertheless, noted with considerable interest. A notable example was the Muscid fly *Phaonia erronea* (Schnabl), a characteristic and decidedly local fly of wooded valleys in hilly areas in north-west Britain. At Thorne Moor it was seen in modest numbers in a very restricted corner of the moor under fairly high birch and sycamore canopy whilst nearby, in an equally restricted area, a fly having a similar British distribution, *Chrysopilus aureus* Mg. was also noted.

A single gall of *Saperda populnea* (L.) containing remains of the beetle was found in a twig of aspen on the moor edge.

At the beginning of the year it was found that the peat cutters had commenced massive drainage operations on the moor, across that area known for its interesting flora. These operations had unearthed many very large dead trees lying on the clays beneath the peat and it was observed that many of these were extensively attacked by beetles. It was guessed from the situation of these logs that they were probably of late Bronze Age date and it was evident that some most interesting scientific work could be done on these deposits. In consequence Mr Paul Buckland of the Department of Pleistocene Studies at the University of Birmingham was informed and on one of his frequent visits to Doncaster, he was taken out by Mr Wm. Bunting to examine these deposits. A very considerable quantity of this sub-fossilized wood was transported back to Birmingham for examination. Mr Buckland will be publishing the results elsewhere. It suffices here to say that several hundred beetle species have been found by the team in Birmingham to date and many of these are of extreme scientific interest in that they no longer occur in Britain. It would appear that these Thorne Moor deposits constitute one of the richest sub-fossil beetle faunas ever unearthed in Britain by palaeoentomologists. Hand in hand with the beetle study an intensive study of the pollen of these same deposits was undertaken by Birmingham and Sheffield University specialists."

MYCOLOGICAL SECTION EXCURSIONS IN 1972

W. G. BRAMLEY

SPRING FORAY, WAKEFIELD, 12-15 MAY

Ten members and friends together with some half dozen day visitors enjoyed a fine though cold Spring foray. The previous weather had been cold which did not make collecting particularly productive, though eventually a fair list was compiled. As usual when there is not a wealth of material a few uncommon species were found which would probably have been overlooked otherwise. A total of twenty-four species of agarics contributed by Dr Watling was perhaps impressive in view of the conditions.

We were pleased to welcome Mr R. Hilton and family of Perth, Australia, now at Bristol, who made the long journey to join us.

B = Bretton Hall Park
N = Newmillerdam
S = Stocksmoor Nature Reserve
H = Haw Park
D = Deffer Wood and Cawthorne

DISCOMYCETES (W.G.B. & R.W.)

Anthrocobia macrocystis, B.
A. maurilabra, B.
Pyrenopeziza digitalina, on *Digitalis* stem, N.
Belonium pilosum, on *Carex,* N.
Dasyscypha pudicella, on small grass stem, S.
Trichoscyphella calycina, on *Pinus,* D.

PYRENOMYCETES (W.G.B.)

Leptosphaeria typharum, on *Typha,* N.

AGARICALES (R.W.)

Clitocybe langei, N.
Panaeolina foenisecii, B.
Pluteus atromarginatus, B.
Conocybe aporus, B.
Panaeolus ater, H.
Psathyrella spadiceogrisea, B.S.N.

OTHER BASIDIOMYCETES

Sphaerobolus stellatus, S.
Dacryomyces dacryomitriformis McNabb, on *Pinus,* D.

AUTUMN FORAY, MIDDLESBROUGH, SEPT. 21-25

Once again conditions were rather against the appearance of the larger fungi and although a fair list was compiled, none were in quantity, and *Russula sardonia* was the only one of which more than a dozen specimens were seen together. The ground was rather dry, all the becks were low or had ceased flowing, normally marshy ground could easily be crossed dry-foot and there was not enough warmth to make lingering a pleasure. The area visited missed the sharp frosts of Sept. 7th and 8th that struck further south, blackening potatoes, beans, dahlias and other tender crops.

Attendance was about average and we were pleased to welcome some half dozen visitors at various times. Particularly pleasing were the two short visits of Mr Gordon Simpson, who is now back again in Yorkshire and in charge of the Forestry Commission's woods in the area. Unforeseen circumstances prevented his presence on other days.

Friday morning was spent at Ingleby Greenhow where the plantations are mainly young Sycamore and here there was not a great deal to be found. Some old *Polyporus squamosus* produced *Hypomyces aurantius* and *Nectria peziza.* After lunch a visit was made to the Kildale area where a dryish looking conifer wood produced a number of the larger agarics. A steep and slippery descent to the streamside hardly proved worth while and thankfully the return was by a much easier route.

Grinkle Park on Saturday provided a pleasant couple of hours' stroll with again not a lot of interest. *Pluteus atromarginatus* was found and its differing characteristics from the common *P. cervinus* pointed out. A colony several yards square of *Phycomyces nitens* at the base of a septic tank was an unusual sight. I cannot recall having seen it on a foray before and have no recent records. Conifer plantations on the roadside were not productive but it was here that the *Russula sardonia* was found. A bright purple patch on the ground was immediately recognised as *Hyphonectria violacea* growing on the Myxomycete *Fuligo septica.* This also has not been seen on a foray and there are only three unpublished records, all from the Pickering-Scarborough area.

A visit to Roxby Beck proved rather disappointing and somewhat muddy, and I think not quite the same area we visited in spring 1970.

Brignall Banks on Sunday told much the same tale and again much close searching for the smaller species had to be resorted to. Here *Paxillus rubicundulus* was found and its characteristics pointed out as it is easily passed over as a small *P. involutus.* A collection of *Heracleum* stems of the year when examined at home provided some Hyphomycetes and Discomycetes normally found later in the year when the stems have weathered more. A dry grassy bank with plenty of Devilsbit Scabious was well infected with its anther smut making the anthers white and conspicuous. It has been scarce for some years in my area but this year it was fairly frequent. A few of the party paid a visit to Deepdale near Barnard Castle with no better luck.

Those of the party returning southwards spent a couple of hours near Hasty Bank in Bilsdale and collected a few of the smaller fry and a large specimen of *Daedalia quercina* before ending a very pleasant week-end, unfortunately marred by two falls, which bruised the arm of one of our visitors and dislocated the thumb of the Chairman who however after treatment in hospital was able to drive safely home.

The compiler is grateful to those who collected and sent in lists of which the following are some of the less recorded species.

B = Brignall Banks
H = Hasty Bank, Great Broughton
R = Roxby Beck, Staithes
G = Grinkle Park and woods near
I = Ingleby Greenhow and Kildale
† = apparently new to Yorkshire

PHYCOMYCETES

Phycomyces nitens, round septic tank, G.

DISCOMYCETES (W.G.B.)

Dasyscypha grevillei, on *Heracleum,* B.
Helotium repandum, on *Heracleum,* B.

PYRENOMYCETES (W.G.B.)

Hyphonectria violacea, on *Fuligo septica,* G.
Hypomyces aurantius, on old *Polyporus squamosus*
Nectria peziza, on *P. squamosus*

USTILAGINALES (W.G.B.)

Ustilago utriculosa, on *Polygonum persicaria*
U. succisae, on *Scabiosa succisa*

AGARICALES (R.W. & P.D.O.)

Amanita excelsa, G.
Clitocybe suaveolens, G.R.
Conocybe appendiculata, G.
C. filaris, B.R.
†*Coprinus hemerobius sensu* J. Lange, G.
C. ellisii, B.
†*Galerina mycenoides,* G.
†*Hygrophorus insipidus,* G.
H. subradiatus, B.
H. hypothejus, G.
Lactarius cyathula, R.
Lepiota sistrata, B.
Marasmius recubans, G. On nerve of *Fagus* leaf.
Mycena olida, D.
†*M. tortuosa,* R.
Naucoria luteolofibrillosa, B.
N. striatula, B.R.
N. subconspersa, B.
Nolanea tenuipes, R.
†*Paxillus rubicundulus,* B.
†*Pholiota filia* (Fr.) P. D. Orton, G. Probably only 2nd British record.
Pluteolus aleuriatus, D.
Pluteus atromarginatus, G.
Russula caerulea, G.
R. sardonia, G.
R. velenovskyi, G.
R. aquosa, G.
Tephrocybe (Collybia) atrata, G.
T. plexipes, G.
Tubaria conspersa, R.

OTHER BASIDIOMYCETES (R.W.)

Auriscalpium vulgare, G.
Ganoderma europeum, G.
Merulius corium, R.
Polyporus nummularis, B.

FUNGI IMPERFECTI (W.G.B.)

Endophragmia elliptica, on *Heracleum,* B.
Isaria brachiata, on old agaric, I.

BRYOLOGICAL MEETING IN TEESDALE, SEPTEMBER 16-17, 1972

MARY DALBY

The autumn weekend meeting of the Bryological Section was held in Teesdale, based on Middleton-in-Teesdale but working the Yorkshire side of the Tees. Five members took part and we were glad to welcome Miss Lobley, Dr Hall and Mr and Mrs Cocking as visitors.

Saturday morning was spent in an old quarry just south of the village (G.R. 35/9424), an area which proved most interesting. The floor of the quarry was damp with several stretches of open water in spite of the prolonged dry spell. *Cratoneuron commutatum* was abundant, hanging in great festoons from the vertical walls and widespread over the floor of the quarry where its var. *falcatum* was also found. The two best finds were Mr Shaw's discovery of *Amblyodon dealbatus* growing in crevices of the vertical walls and also widespread over the floor and fruiting abundantly, and a patch of *Blasia pusilla* growing in a damp area on the floor of the quarry. Here also were *Fissidens adianthoides, Campylium stellatum, Philonotis calcarea, Aulacomnium palustre, Acrocladium cuspidatum, Bryum pseudotriquetrum, Drepanocladus revolvens* and its variety *intermedius, Riccardia sinuata, R. pinguis* and *Pellia endiviifolia. Sphagna* were not common and were confined to occasional tussocks but *S. squarrosum,* an unusual form tipped with orange, *S. cuspidatum, S. fimbriatum* and *S. plumulosum* were found. Drier areas of the floor had a carpet of *Nardia scalaris, Barbula fallax, Dicranella varia, Polytrichum urnigerum* and a little *Ptilidium ciliare.* Patches of *Rhacomitrium canescens, R. lanuginosum* and *Rhytidiadelphus triquetrus* covered some of the boulders, while *Eucladium verticillatum, Gymnostomum aeruginosum, Distichium capillaceum, Encalypta streptocarpa* and *Tortula subulata* were confined to the vertical faces. *Ptychomitrium polyphyllum* was found on one boulder and *Tortella densa* among scree at the eastern end of the quarry. The latter species was first recorded for V.C. 65 in 1949 from Cronkley Fell by Mr Shaw. *Rhacomitrium heterostichum var. gracilescens* and *R. fasciculare* were also noted.

After lunch a short visit to woodland near Mill Beck stream (G.R. 35/9126) produced additional species. One boulder near the stream was covered with *Lejeunea cavifolia* and on others grew *Eurhynchium riparioides, Brachythecium plumosum, Scapania undulata, Chiloscyphus polyanthos, Fontinalis antipyretica, Thamnium alopecurum, Rhacomitrium aciculare, Plagiochila asplenioides* and *Dichodontium pellucidum.* At the base of the trees *Scapania nemorosa* and *Isothecium myosuroides* were found and *Orthotrichum anomalum* was also noted. Small outcrops of rock in the rough pasture above the road yielded *Andreaea rupestris, Barbilophozia floerkei* and *B. attenuata* and a spring produced large masses of *Dicranella palustris, Philonotis fontana* and *Bryum pseudotriquetrum.*

From here we went on to Winch Bridge (G.R. 35/9027) where the rocky area near the bridge was rich in species. Among those noted were:– *Funaria obtusa, Amphidium mougeotii, Barbula ferruginascens, Dicranella rufescens, Blindia acuta, Bartramia pomiformis, Distichium capillaceum, Gymnostomum recurvirostrum,* and *Isopterygium pulchellum* and of hepatics:– *Blepharostoma trichophyllum, Frullania tamarisci, Leiocolea muelleri, Riccardia multifida* and *Solenostoma pumilum.*

Sunday was spent in Lunedale, starting from Fishlake (G.R. 35/8522) and walking upstream to Arngill Force. Extensive quarrying is going on round Fishlake which is almost overgrown and on disturbed soil *Oligotrichum hercynicum* was abundant, with *Barbula rigidula* frequent on walls and boulders and *Scapania irrigua* on wet ground near the entrance. In the stream the dark, spongy masses of *Solenostoma cordifolium* were striking and here also were *Fontinalis antipyretica var. gracilis, Hygrohypnum luridum* and *H. ochraceum.* Round the Force the unstable rock made it unsafe to approach too closely but large masses of *Eurhynchium riparioides, Chiloscyphus polyanthos, Dichodontium pellucidum* and a little *Fissidens osmundoides* were seen. Mr Branson reported *Philonotis caespitosa, P. calcarea, P. fontana* and its variety *tomentella* all confirmed by Mr J. H. Field. *Andreaea rupestris* was found on boulders as well as *Marsupella emarginata, Barbilophozia floerkei* and *Rhacomitrium heterostichum var. gracilescens.* Dr Hall found *Plagiobryum zierii* and *Splachnum sphaericum. Sphagna* were abundant and those noted were:– *S. palustre, S. magellanicum,* abundant among heather above the falls, *S. papillosum, S. squarrosum, S. teres, S. recurvum, S. cuspidatum, S. subsecundum var. inundatum* and var. *auriculatum, S. fimbriatum, S. girgensohnii, S. robustum, S. rubellum, S. capillaceum,* among the heather above the falls and *S. plumulosum.*

BRYOLOGICAL MEETING AT WATH, V.C. 64, 14 APRIL 1973

F. E. BRANSON

It was a delightful spring day for our visit to Dauber Gill, Wath, although the conditions were somewhat dry in this reputedly damp Nidderdale valley. About a quarter of a mile up the gill from the road is a steep waterfall with a basin of cliffs round it, making it appear as a dead-end, so to proceed further up the gill one must make a slight deviation to left or right. We did not go beyond the waterfall, but were able to form a good opinion of the bryophyte flora of this moorland valley. On an earlier visit in 1965 I gained an impression of what species existed. All the species collected on that occasion were seen again on the present visit with the exception of Scapania nemorea and Polytrichum aurantiacum. In the intervening years a few changes had come about. In 1965 I was impressed by the sight of the whole of the cliffs at the side of the waterfall being covered with a tapestry of the great scented liverwort, *Conocephalum conicum.* This has now vanished and I saw only one small piece of it at the base of the cliff.

The Y.N.U. had a general meeting here on 14th May, 1938, and in writing an account of this gill, Mr F. E. Milsom gives a short list of species seen. He says that *Hyocomium flagellare* is "abundant everywhere in a very luxuriant form." This is still abundant on rocks in the gill along all its length, and in the rush of water at the waterfall there was a solid mass of this golden-coloured moss. The two forms of it, i.e. the very pinnate form of rocks and slow-flowing water, and the more elongated, much less pinnate form of swift-running streams at the waterfall were both well developed. On the cliffs at the waterfall was a compact mass of *Pellia neesiana* with abundant perianths. Another plentiful hepatic on rocks in the stream was *Solenostoma sphaerocarpum.* Also on wet rocks was fine *Diplophyllum albicans* with perianths. *Scapania umbrosa* was noted on boulders in several places. I collected a very branched form of *Scapania undulata* from a submerged rock. Miss Dalby went further up the gill than the rest of the party to get to the moorland above to collect some Sphagna. From crevices of the cliffs at the waterfall she collected *Isopterygium pulchellum,* one of the highlights of the meeting. There was also quite a lot of *Pohlia wahlenbergii* on these cliffs, although no capsules were seen as stated in Milsom's report. Mr Shaw scraped non-fruiting *Tetraphis browniana* from rocks. One of the most abundant mosses of banks and boulders was *Isopterygium elegans.* Although Milsom reported the var. *collinum* of this species, none was seen on this occasion. *Dicranodontium longirostre,* recorded by Milsom, was also not seen on this occasion. *Campylopus flexuosus,* rarely seen with capsules, was seen in this condition. There was also much *Leucobryum glaucum.*

The species not mentioned above are tabulated below. Nomenclature follows *Census Catalogue of British Mosses* (3rd edition) by E. F. Warburg for mosses, and *Census Catalogue of British Hepatics* (4th edition) by J. A. Paton for hepatics.

I would like to express our thanks to Mrs E. M. Wheelwright of Sigsworth Lodge, Wath, the owner of the estate, for her kindness in giving permission for access to the area. My thanks are also due to Mr J. H. Field for assistance with the *Philonotis.*

HEPATICAE:

Lunularia cruciata
Marchantia polymorpha
Riccardia pinguis
Pellia epiphylla
Lepidozia reptans
Calypogeia muellerana
C. arguta
Lophozia ventricosa
Barbilophozia floerkei
Lophocolea bidentata
L. cuspidata
L. heterophylla
Chiloscyphus pallescens
Cephalozia bicuspidata

MUSCI:

Sphagnum palustre
S. recurvum
S. cuspidatum
S. subsecundum var. *inundatum*
S. subsecundum var. *auriculatum*
S. fimbriatum
S. girgensohnii
S. robustum
S. capillaceum
Atrichum undulatum
Polytrichum juniperinum
P. formosum
P. commune
Fissidens taxifolius
Ceratodon purpureus var. *purpureus*
Dicranella heteromalla
Dichodontium pellucidum
Dicranoweisia cirrata
Dicranum majus
D. scoparium

Bryum capillare
Minium hornum
M. undulatum
M. punctatum
Aulacomnium androgynum
A. palustre
Philonotis caespitosa
Thamnium alopecurum
Heterocladium heteropterum
Thuidium tamariscinum
Campylopus pyriformis
Tortula muralis
Barbula cylindrica
Rhacomitrium aciculare
R. lanuginosum
Funaria hygrometrica
Tetraphis pellucida
Orthodontium lineare
Pohlia nutans
Bryum pseudotriquetrum
Cratoneuron filicinum
C. commutatum var. *commutatum*
Hygrohypnum ochraceum
H. luridum
Acrocladium cuspidatum
Isothecium myosuroides
Camptothecium sericeum
Brachythecium rutabulum
B. rivulare
B. velutinum
B. populeum
Eurhynchium praelongum
E. riparioides
Pleurozium schreberi
Plagiothecium denticulatum var. *denticulatum*
P. succulentum
P. undulatum
Hypnum cupressiforme
H. cupressiforme var. *ericetorum*
Rhytidiadelphus squarrosus

WILLIAM S. BISAT

1886-1973

Probably no amateur geologist in recent years made such a significant contribution to British geology as W. S. Bisat. His work as a young civil engineer in reservoir construction near Masham introduced him to the geological problems of the Millstone Grit which had previously been found difficult to date by palaeontological methods. The value of goniatites for this purpose, which had been shown earlier by Dr Wheelton Hind, was proved to the full by Bisat for the whole of the North of England culminating in the publication of an epoch-making paper in 1924 in the *Proceedings of the Yorkshire Geological Society*. In this paper, the Grits were divided into four main zones known from that date as zones E, H, R and G from the initial letters of the characteristic goniatites. Bisat was further able to show that certain genera such, for example, as *Reticuloceras* showed clear evolutionary changes which were of prime zonal value. His divisions and sub-divisions of the Millstone Grit are now standard practice by the Institute of Geological Sciences in Great Britain and are capable of being used on the Continent. His services as a consultant were regularly in demand by the Geological Survey.

In his later years, Bisat took up the study of the Boulder Clays of East Yorkshire and applied to it the same care and detail as he had shown in his Carboniferous research.

For his services to geology, he received honorary degrees from the Universities of Leeds and Durham and was admitted to Fellowship of the Royal Society. The Lyell Medal from the Geological Society of London, the Clough Medal from the Edinburgh Geological Society, a Silver Medal from the Liverpool Geological Society and the Sorby Medal from the Yorkshire Geological Society all demonstrate the esteem in which he was held by his fellow-geologists in Britain while Honorary Membership of the Geological Society of Belgium shows his continental reputation.

All this list of honours is a wonderful tribute to the geological work of a man for whom, for much of his life, geology was a leisure time occupation. H.C.V.

ELIZABETH M. BLACKWELL

1889-1973

Elizabeth M. Blackwell died on Friday, 27th April, eighty-four years old, after long, happy and active service to British mycology through the pathways of both the Mycological Section of the Yorkshire Naturalists' Union and the British Mycological Society. Miss Blackwell was chairman of the Section in 1955 and at the autumn foray held that year at Pateley Bridge, she delivered an entertaining and informative address to the Section covering mycological activities in Yorkshire from the times of Robinson, Richardson and Bolton to Pearson and Watson. This was later published in the *Naturalist* (53-66, 1961) under the title "Links with Past Yorkshire Mycologists" and is a valuable bibliographical account to all those interested in British mycology.

Her academic interests covered many aspects in the study of the Phycomycetes and for twenty years her publication on "The haustoria of *Phytophthora infestans* and some other species" has been a library necessity. The Yorkshire Naturalists' Union, however, remembers her more for her regular attendance at forays and interest in beginners and amateurs, particularly the young. The present writer, being in the latter group when he first joined the Section, benefitted greatly from her encouragement. Her article on "Fungi as a Field Study" which appeared in the *Proc. Liverpool Nats. Field Club* (1950) was written in order to assist just such interested persons and attract them into the mycological field.

A graduate of Liverpool, with family ties in both Yorkshire and Lancashire, Miss Blackwell's roots were firmly in northern England. In 1922 she took up the position of head of the Botany Department in Royal Holloway College, London, a post which she held until 1949. She was President of the British Mycological Society in 1942. She returned to the family home at Woodsome Lees, Kirkburton in 1952 and continued her letter writing and the gathering and disseminating of mycological news and information, an activity which she had become noted for during her earlier period in London, when she had such successes as the finding of a suitcase full of Dr Benson's papers. On arrival in Yorkshire Miss Blackwell became closely associated with Miss Jennie Grainger during the fifties and sixties; both regularly sought out good collecting areas and accommodation to ensure that the autumn and spring forays were always successful. With the late A. Broadbent and Miss Grainger day forays were initiated by the Section and held at Woodsome Lees late in the autumn to explore the woods and fields close by Kirkburton. Miss Blackwell and her sister always provided afternoon tea, a very welcome conclusion to the day's activities. The same welcome was always extended to any mycologist passing through Kirkburton any time.

Her interest in young people resulted in several who are now professional biologists or in some botanical discipline being introduced to the Section. Miss Blackwell took a great interest in the history of the Section particularly in the period leading to the joint meeting with the Woolhope Club and the foundations 'over a cup of tea in the house of Mr Cheesman' of the British Mycological Society. In a series of articles dealing with the various branches of natural history covered in the 100 years of the Y.N.U. she discussed the development of the mycological committee and its associated forays. During the preparation of this paper I had many happy meetings with her and she visited many naturalists now dead who had, or might have had, connections with or memories of Crossland, Needham, Soppitt etc. Careful notes were prepared not only on their mycological interests but also their personal idiosyncrasies; papers were brought together which might otherwise have been lost, as Alfred Clark's herbarium was for a time until its refinding at the Tolson Museum, Huddersfield, by Miss Blackwell during her researches. Within a few months of her death she talked to me of her plans for bringing all the records of the Y.N.U. Mycological Section together, a ploy which I know will be taken up now that the seed has been sown.

For all her scholarship she remained a gentle, gracious, learned lady always with a smile and a twinkle in her eye, and a word of encouragement for the beginner or the diffident newcomer. I will always remember her at a Maltby-Roche Abbey meeting when after tea the finds of the day were listed. She asked me to recount the list of fungi and after, when a juke box started up in another part of the restaurant, she turned to me and said 'Roy, I am getting old and deaf, but sometimes I am relieved!' Her glance went in the direction of the 'machine', but if her ears were not as keen as a microphone her mind was quite clear until her death. We in the Section will always remember her with affection.

Roy Watling

It is with regret that we have learned of the death of G. R. Wilkinson of Harrogate. A member since 1956, Geoff's cheerful personality will be missed at the Vertebrate Section meetings which he attended so regularly, and at Spurn Bird Observatory where his congenial company was so valued on his frequent visits there.

BOOK REVIEWS

The Pollination of Flowers by Michael Proctor and Peter Yeo. Pp. 418 with 19 colour photographs, 181 photographs in black and white, and 134 line drawings. Collins *New Naturalist* series vol. 54. 1973. £4.00.

The diversity and ingenuity of evolutionary adaptations to specialised pollination mechanisms include some of the most fascinating and remarkable devices and stratagems in the whole world of living things. Almost a hundred years ago Darwin's work on pollination reawakened interest in a subject about which information had been accumulating over the past two centuries. In recent years plant and animal ecology have tended to converge and with the recognition of the importance of ecosystems there has been another revival of interest in pollination biology.

The reciprocal adaptations of flowers and flower-visiting insects has played an all-important part in the evolutionary history of both groups: following an historical introduction therefore about half the book is devoted to mechanisms of insect pollination and to the structure, senses and behaviour of the insect groups involved. A separate chapter is devoted to the British wild orchids and surely no more remarkable pollination mechanism exists than the so-called pseudocopulatory mechanism evolved by the 'insect orchids' of the genus *Ophrys*. The striking resemblance of their flowers to various insects had puzzled Darwin and had long been a matter of speculation before its significance was first elucidated fifty years ago and confirmed more recently by further observations on different species.

Pollination by wind and water, self-pollination and apomixis, and pollination in plant-breeding and commerce are then dealt with. Although the books in this series are devoted to British natural history, the authors of this one have, very rightly, gone beyond British plants in covering their subject. So information on pollination in many non-British orchids and in the taxonomically unrelated but functionally similar Asclepiads is included. So too are accounts of floral adaptations for bat and bird-pollination and the fly-traps of Birthworts and fly-trapping orchids as well as our Lords and Ladies.

The book concludes with a thought-provoking chapter on the evolution of the angiosperms and the probable role played in their diversification and in speciation by adaptations of floral biology to pollination systems and by reproductive isolation. The theme of the work is, as the authors say, an ideal one for study by amateur naturalists; patience and accurate observation are the only prerequisites. Yet few give much active attention to the subject and the bulk of the information in the book will probably be unknown to most field naturalists. It should open new horizons for them.

W.A.S.

Past and Present Vegetation of the Isle of Skye: a Palaeoecological Study by H. J. B. Birks. Pp. xii + 415 with 34 text figures and 7 plates. Cambridge University Press, 1973. £13.50.

The aim of the work reported in great detail in this book was the reconstruction of the landscape of the Isle of Skye during Late-Devensian (Last Glaciation) times, including its flora, vegetation, and climate. This was done by a comparison of the present day vegetation with the presumed vegetation derived from pollen analytical studies.

The book begins with an introduction to the geology, climate and land use of Skye, followed by an interesting discussion of methods of surveying vegetation. There is a very detailed description of the vegetation in the Continental phytosociological style using 550 releves separated into 81 units of vegetation. These units are described, their ecological relationships discussed and comparisons made with other parts of Scotland and Europe. The section on pollen analysis is extremely detailed and includes a study of the modern pollen rain which is used to interpret the fossil pollen assemblages. This part of the book is of considerable interest and illustrates the complexities and difficulties involved. Using all this information the author attempts to reconstruct the Late-Devensian vegetational history at a number of different sites and then correlates these into one consistent picture. This attempt is remarkably successful and gives considerable insight into the study of vegetation history. One drawback to this section is its rather repetitive nature which may deter people from reading it through.

For the specialist pollen analyst this is a stimulating and informative work; for the naturalist also there is much to be enjoyed but almost everyone is likely to be put off by the price.

D.D.B.

Environment and Plant Life by S. A. Searle. Pp. 278 with 48 plates. Faber and Faber. 1973 £4.50.

This book will appeal particularly to gardeners and horticulturalists keen to know more than their own observations have taught them about the effects of the physical and chemical factors of the environment on plant growth. In the first 10 chapters the author describes clearly and accurately in non-technical language, how temperature, solar radiation, light, humidity, precipitation and wind affect growth and reproduction and how the various climatic elements are measured. With this knowledge in mind, in the following 6 chapters he discusses the effects of aspect and slope and less satisfactorily, the effects of the environmental changes which bring about the onset of winter with particular reference to the deciduous versus the evergreen habit; the effects of frost; the advantages of dormancy and the mechanisms whereby it is achieved; cultivation under glass and juvenility in plants. The final chapter is a masterly discussion of most aspects of the edaphic environment. There is an appendix of 36 pages; the tables in it including lists of species suitable for different habitats.

The statements on pp. 139-40 that "Beech being the taller tree will usually overcome oak" and that "This appears to confirm that beech must have been dominant in the climax forests on the well drained soils of the English lowlands" are misleading. Since all present day beech woodland in England has been influenced by man often to a considerable extent, it is impossible to tell whether beech is the true climax species or whether it would eventually be replaced by oak in many of the habitats in which it is now the dominant tree. This being so it is unwise to imply that beech may have been dominant over extensive areas in the past especially as the palynological evidence suggests otherwise. On p. 164, the author implies that *Campanula rotundifolia* is a bulbous plant and on p. 216 in discussing mycorrhiza, he could have been more specific as to factors likely to be beneficial to the host plant e.g. the greater surface area of mycorrhiza available for nutrient absorption compared with non-infected roots and in particular their ability to accumulate phosphorus from extremely low levels in the soil.

The book is on the whole well produced. Photographic reproduction however is poor, this is unfortunate because the plates are interesting and well chosen. The price is high even by today's standards. Shorn of much of the appendix and some of the tables and diagrams in the text, since this data can easily be obtained in reference works and without the chapter on juvenility (Chapter 16) which is highly speculative and not relevant to the main theme, the book could have been produced more cheaply without detracting from its undoubted interest. S.C.C.

The Philosophy of Biology by Michael Ruse. Edited by S. Korner. Pp. viii + 231 with 8 text figures. Hutchinson & Co. £1.85.

It was Schiller who observed that "whilst philosophers are debating the government of the world, hunger and love are deciding the issues". The reviewer found himself repeatedly reminded of this commentary on the futility of certain forms of philosophy whilst reading Professor Ruse's book. It must not be concluded from this that the reviewer holds that there is no need for a close scrutiny of the philosophical foundations of biology; there exists a serious need for such work. Ruse however seems to be for ever playing with words, raising Aunt Sally's and side issues, apparently just in order to have something to knock down.

The book is divided into 10 chapters in which the main topics covered are Mendelian Genetics, Population Genetics, The Theory of Evolution, Taxonomy, The Problem of Teleology, and Biology and the Physical Sciences. In the chapters concerning Mendelian and Population Genetics the writing is prolix and tedious "The final task left in my programme at this stage of the book involves a consideration of the nature of explanation in Mendelian genetics. In order to give this consideration, it will be worthwhile if first we digress and discuss what is probably the most (philosophically) controversial topic in the whole of biology – natural selection. Having done so, the philosophical discussion can be enriched with a fairly sophisticated example of a genetical explanation (and, incidentally, we shall extend our coverage of the basic concepts and claims of Mendelian population genetics)". The author becomes unduly bothered with taking swipes at the work of J. C. Smart, in the course of which he creates the impression of a lightweight boxer who has wandered into the heavies class by accident. It may or may not be possible to have biological laws, and it may or may not be possible to axiomatise these. It is not good enough however to use, as Ruse does, the Hardy-Weinberg law as potential proof of this. Certainly this law can be axiomatised, but only in so far as it comprises a self-consistent mathematical proposition. The question for Smart would be how far does it hold true in practice – when one gets down to looking at gene frequencies in actual populations. The law is at once found to have only an approximate statistical validity and one has to come to grips with a host of modifying influences which cause departure from, hence in Smart's sense invalidate, the law as an exact description of the behaviour of genes in populations.

It is regrettable that the discussion of Taxonomy is left to the latter half of the book for it is the best section and one suspects that many readers may not get that far. Clear statements are given of the basic precepts of evolutionary and numerical taxonomy and a fair attempt is made to identify the good and bad features of each. The reviewer cannot agree however with Ruse's conclusion that a central failure of numerical taxonomy arises in the choosing and evaluating of unit characters.

In conclusion one may hope that this book may one day be re-written for it raises some important problems and if these were re-stated briefly and clearly the work would have a much greater impact. H.W.W.

Air Pollution and Lichens edited by **B. W. Ferry, M. S. Baddeley** and **D. L. Hawksworth.** Pp. 389. Illustrated. The Athlone Press of the University of London. 1973. £6.25.

The concern of many people for the effects of air pollution on living material is considerable. The measurement of air pollution by means of field recording gauges in the British Isles mainly over the past decade has proved valuable in the elucidation of general traits and trends over limited areas. Interpretation of air pollution data over wider areas is largely meaningless because of poor rural coverage due to the heavy expense of establishing and maintaining adequate recording equipment in such areas. There has been an increasing awareness in recent years of the value of both plants and animals in monitoring the distribution and severity of air pollution (= biological indication) and lichens have proved particularly effective in this respect. They have received considerable publicity through the press (epitomized by Dr K. Mellanby's statement in a letter to *The Times*, 31/8/1970, that "our environment will indeed be safe for man and fit for his civilized enjoyment" when the standards of "air fit for lichens" and "water fit for trout" have been attained), and through the British Lichen Society's distribution maps scheme, and major ecological/environmental publications.

Air Pollution and Lichens developed to some extent as a result of a symposium on this subject held during the First International Mycological Congress at Exeter in 1971. The book does not, however, suffer from a lack of co-ordination which is so often a feature of symposial publications. The editors are to be congratulated on the way in which they have presented such a wide coverage (involving 19 authors) in such a logical and well-balanced manner, and the authors are to be commended for their close collaboration. All chapters have excellent cross-referencing, comprehensive bibliographies and little overlap.

Chapter 3, "Mapping studies", is a particularly good survey of present knowledge. It is regrettable that amplification of certain points was not possible – for example, reference to there being "about 1300 volumetric recording gauges operating in 1968" (p. 59) needs adequate appraisal, for although this is an impressive number of gauges, many were inoperative for part or all of the year and the reviewer has determined that only 763 gauges gave sufficient data during the period April 1967 to March 1968 for the annual mean daily concentrations of sulphur dioxide to be calculated.

The book is well-illustrated, but errors, particularly in typography and of spelling, are numerous. One of the major reasons for this lies in the poor cross-referencing of authors' names and publication dates between text and bibliographies. Twenty-six such incorrect citations of authors and five omissions of cited works from the appropriate bibliographies were noted, whilst misquoted dates are: Hawksworth (1982) p. 93, Vandergrift *et al.* (1981) p. 192 & 208, Crombie (1773-4) p. 337 and Seaward (1971) p. 379, which should read 1972, 1971, 1883-4 and 1972 respectively. One error on p. 155 is of particular local interest and needs clarification: "collected in 1907 from East Yorkshire and now in the Thornton Herbarium" should read "collected in 1907 from Thornton, East Yorkshire and now in the University of Leeds Herbarium".

Although this book is fairly pricey and will not necessarily find its way onto the general biologist's bookshelf, it does deserve the widest possible readership. The book is recommended for purchase by lichenologists and those interested in biological indication, and by libraries in general for the many who thirst for authoritative information on environmental matters. M.R.D.S.

South's British Butterflies, by T. G. Howarth. Pp. 210 with 48 coloured plates, numerous black and white text figures, and 57 distribution maps. Frederick Warne £10.50.

The Butterflies and Moths of the British Isles, by Richard South, published by Warne early in the century, has become a standard reference work on the shelf of every lepidopterist and country lover alike. It was unfortunate that when a new edition of the moths was published in 1961 the opportunity was not taken to bring the text completely up to date (this was only done in part) and to ensure that the plates were at least equal to those of the previous editions. The volumes were, in short, disappointing. The publication of this new edition of the companion volume dealing with the butterflies has been eagerly awaited and one's first impression is an altogether happier one.

Not only is the book much bigger than the old *Wayside and Woodland* series, being 10¾" x 7½", but it has been completely recast and transformed in almost every way and is altogether a far more informative work. Apart from a few minor errors (p. 28 Lulworth Cove is in the county of Dorset) the printing is without blemish.

T. G. Howarth states that the text represents an attempt to bring the book up to date and yet retain the charm and character of the original. It could be he has retained a trifle overmuch of the charm at the expense of the factual. There seems to be no point in quoting Barrett at length (pp. 86/87, 124 and elsewhere), when he does not particularize the haunts in which the insects no longer occur. The reference to *Erebia aethiops* on p. 141, extracted from *The Entomologist* Nov. 1895, is a piece of charming writing but hardly accurate. The insect does fly well away from the proximity of woodland and is not truly sun-loving any more than several other members of the same group. By way of compensation, however, the author has made many important additions including useful references to more recent research. On p. 29 one comes across an apparently trivial yet important five-word addition to what South wrote about *Hesperia comma* – 'keeping close to the ground' – which is the real reason for its elusive flight. At several points, too, one notices the substitution of 'seen' and 'observe' for the words 'take' and 'collect' and in conjunction with the note on conservation on p. 12, a new outlook is reflected.

Turning to the plates of adult butterflies, these are from drawings by A. D. A. Russwurm whose work in this sphere is of the highest order. Perhaps because he is a life-long entomologist he has been successful in combining his talent with close observation in recapturing that subtle aspect of the original. They are truly superb and unlike much of Warne's recent colour work, are exactly on register. Apart from one or two cases, notably plate 42 where one has the impression of slightly heightened colour in reproduction, the plates are faithful representations of the originals. They contain many aberrations never before published and are a vast improvement on the former plates. There does not, however, appear to be anything gained by the x 1¼ fig. enlargements; a certain amount of space has been lost which could have accommodated further figures. Mr Howarth himself complains of wasted space in the old volume.

The 24 colour plates of the early stages by R. B. Davis copied from the originals of Frohawk are also absolutely first rate and far and away superior to anything previously offered by Warnes. Here the enlarged figures are splendid.

Several other new additions are featured including distribution maps with a note by John Heath which go to make the whole work the most informative that has yet appeared.

The price may cause some raised eyebrows but having regard to the general excellence, particularly of the 48 superb colour plates of wonderful educational value, one may still regard the book as a must for every entomologist and public library and a desirable acquirement for every naturalist. C.R.H.

Watching Wildlife by David Stephen. Pp. 256, with numerous black and white photographs and drawings. Collins, Glasgow and London, 1973. 75p.

This is the paper-backed edition of David Stephen's guide to watching wildlife. The original edition, which was reviewed in *The Naturalist* in 1964, went on to sell over 50,000 copies. The author's enthusiasm for bird and mammal watching is infectious. This book must by now have converted many thousands of people, who perhaps had only a casual interest to begin with, into devoted naturalists. It is chock full of practical hints, tempered by the author's experience, and is just the thing to put in the way of anyone starting to take notice of the wildlife around them.

The profusion of photographs, all by the author, and the drawings form a perfect complement to the text. T.M.C.

Fairburn and its Nature Reserve edited by **R. F. Dickens** and **J. D. Pickup**. Pp. 104 with black and white drawings by Peter Swayne. Dalesman Books, Clapham, 1973. 50p.

This book, which is a history and natural history of Fairburn Ings has already received high praise as a model of its kind. It is an ecological treatment of the wildlife of Fairburn Ings and its immediate vicinity with each of the chapters the work of a specialist in that field, and all are members of the Union too. The authors, editors and publishers must be congratulated at the start of this review, for this is a little gem of a book a veritable *vade mecum* for Fairburn visitors. Other nature reserves *please* copy.

The history of the Ings and area is dealt with by Bertha Lonsdale who starts with the battle of Winwoed in A.D. 655 and takes us through the mediaeval period to the Civil War with reference after reference to the persistent marshland of the area which influenced every army who had to fight or march over the terrain. The later history is more peaceful with the advent of coal mining and railway construction and the primeval ooze becomes progressively tamed. The last fifty years are mainly the province of the Y.N.U. and the N.C.B. culminating in the declaration of the reserve in 1957.

The botanical side of the reserve is dealt with by E. Thompson, W. A. Sledge and W. G. Bramley who treat general botany, new plants and fungi respectively. About three hundred species have been recorded on the 613 acres of the reserve to date as far as flowering plants are concerned. The list of fungi is short but the author points out that there have been no systematic studies. The lichen list too is brief and W. E. L. Wattam's list is that of a Y.N.U. excursion in June 1934. A nice piece of applied botany which is the work of D. F. W. Pollard is a summary of a report to the Wildfowl Trust in 1966 on the vegetation in relation to the wildfowl populations. This sort of pointed exercise allows the visitor to appreciate why places like Fairburn attract wildfowl as they do.

The invertebrates are, inevitably, sketched in but even so the variety is impressive and the significance of Fairburn in county terms is underlined. The vast crowds of mosquitoes and midges with which J. H. Flint opens his account of the insect life are put into an ecological context as the food source of the hirundines and other insectivorous birds which are such an obvious part of the Fairburn fauna. S. G. Appleyard covers the molluscs, C. H. Pickup gives a résumé of the moths and butterflies and E. Thompson gives an account of the occurrence of the land planarian *Orthodemus terrestris.* Fossil molluscs, and plant remains, are dealt with by Gillian Grainger – there need never be a dull moment at Fairburn, in the absence of everything else one can look for lamellibranchs along the coal heaps.

A brief account by J. Thourgood gives a list of the fishes present and also the conditions under which fishing is allowed. The agreement reached between the angling society and the reserve authorities has considerable significance in these days of multi-usage of amenity areas.

For most visitors to Fairburn the birds are the major attraction and these are the province of R. F. Dickens, J. D. Pickup and C. Winn. What a list it is, over two hundred species have been recorded and about 75 breed or have bred. The wildfowl populations are nationally significant and the hirundine roosts of a million birds of a few years ago are virtually unparallelled elsewhere. The check list is expanded by comments on status and the significance of occurrences and there is also a list of interesting ringing recoveries.

To sum up I would say that this book is the ideal companion for any visit to Fairburn. But it is really much more than that, it whets the appetite, answers questions and bolsters one's faith in conservation. This is a wetland with a past – let us hope that its future will be as long, and that more studies of Fairburn's wildlife will not be long in coming into print. T.M.C.

Garden Birds; Game Birds, two books by **Nicholas Hammond** and **Richard Porter,** each with p. 24 and 8 colour plates. Quartet Books Ltd., 90p. each.

These joint publications are intended as the first two in a series covering all the birds of Europe within their family groups. The illustrations "in superb 19th century style" can be extracted individually from the collection for mounting or framing as high-quality prints. What the blurb doesn't tell you is that if you mount the print of the blackbird for instance, you lose the text for the song-thrush. I feel that this publication falls between two stools. I'd prefer more life-like and exact colour plates to these pseudo-19th century ones, which should never have been married to the excellent text. The line illustrations by Ian Willis are more satisfying. R.F.D.

Pennine Birds, by **W. R. Mitchell** and **R. W. Robson.** Pp. 96 with 28 monochrome plates of birds and nests, 11 of habitats and 5 maps. A *Dalesman* paperback, 1973. 65p.

Intended as a handbook for bird-watchers in the area of the Pennines in which, in this volume, the Cheviots and Border Forest and the Trough of Bowland are included. There is basic information about the Pennines themselves, their geology, vegetation, climate, etc. Thereafter a series of Pennine habitats – the summits, tarns, crags, heather moorland, rough grassland, gills or cloughs, high pasture, woodland and scrub, water-courses – is considered in relation to the typical nesting birds of each. Inevitably this leads to some overlap, especially since specific well-known bird-watching haunts ("worth-while destinations") are also dealt with subsequently. New forests and reservoirs are taken separately, later. A classified check-list gives comments on the status of 80 "most significant" species.

There is a wealth of factual information, the whole made eminently readable by lacings of local lore, and comment such as "spring can be just a good-natured wink between winter and summer".

Two sections, "Bird Migration" and "Snow Buntings and Vagrants" are perhaps less satisfactory in some respects. How one quite separates "vagrants" of the latter from "involuntary migration" in the former I'm not sure; and there is an inconsistency where scientific names are suddenly introduced on p. 60 for *some* but *not all* of the geese. Whilst dates and details of petrel occurrences are given, the very important and well-recorded wader-migration gets scarcely a mention. R.F.D.

Land Use and Water Resources by **H. C. Pereira.** Pp. xiv + 246. Illustrated. Cambridge University Press. 1973. £4.75 hardback, £1.95 paperback.

This book is an authoritative account of a major aspect of environmental concern. The ever-increasing demand for pure water and the pressures imposed on the hydrological cycle are illustrated to good effect. The objectives, to provide "a summary in plain language of the information at present available to guide decisions on policy for land-use management in watersheds" and to describe "methods available for measuring the hydrological effects of land-use changes", are adhered to. However, in the reviewer's opinion, the section dealing with lysimetry would have benefitted from a consideration of the extensive work by F. H. W. Green on the measurement and interpretation of evapotranspiration.

There is a comprehensive bibliography and index, and the presentation is up to the usual high standards of C.U.P. Through the use of high quality paper the photographic plates are incorporated into the text, hence plates are not far-removed from the relevant sections of the text and the usual "glossy inserts" (often blank on the reverse and lacking pagination) are avoided.
avoided.

Although this book may have little general appeal to most readers of this journal, I am sure that many fundamental questions relating to the science of land use and water resources will be answered through consultation of this work in libraries.

M.R.D.S.

The Biological World by **Alvin Nason** and **Robert L. Dehaan.** Pp. 736. Illustrated. John Wiley & Sons, 1973. £6.50 hardback, £4.10 paperback.

The title of this work is rather misleading. Molecular, cytological, genetical, developmental, behavioural, physiological and evolutionary aspects of biology take up 85 per cent of this book, but are almost entirely exemplified by animals; only 4 per cent is devoted exclusively to plants, although the remaining sections (11 per cent) on concepts, classification and ecology draw examples from both the plant and the animal kingdoms. Furthermore, one third of the book deals with man, showing a somewhat unbalanced viewpoint for a work entitled *The Biological World*, but diversely supporting a rather weak introductory statement "Biology is the study of living things – of cats and caterpillars, of cactus and college students".

The presentation is on a relatively lavish scale, but paper is often wasted – in the interests of artistry no doubt! Twenty blank pages, eight full-page chapter-heads with prosaic quotations – the latter liberally scattered throughout the book – and six pages of illustration credits are all luxuries when one considers the unbalanced content. However, all the plates and figures compliment (and complement) the text and give the book a most pleasing appearance.

Despite some misgivings, this is a beautifully-produced work which would grace any library shelf, but at this price and with such a variety of comparable works available it will not be widely used as a standard text in schools and colleges in this country.

M.R.D.S.

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W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

CONTENTS

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THE YORKSHIRE NATURALISTS' UNION

The Naturalists' Yorkshire. Compiled by members of the Yorkshire Naturalists' Union and edited by W. A. Sledge. Pp. 96 with 15 photographic illustrations. Issued by the Dalesman Publishing Co. Ltd., Clapham via Lancaster and obtainable from The Editor, *The Naturalist*, The University, Leeds 2.
Price 60p. plus 6p. postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of all types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

Field Biology

The University of London awards a Certificate in Field Biology which is available to all persons interested in the study of living things in their natural habitats. The work involves a directed course of private reading at home, attendance at two Practical Courses each of two weeks held in the Summer of consecutive years, an approved plan of field-work suited to the student's locality to be written up in the form of an essay, and examinations.

The next Practical Course for new students will take place at the Slapton Ley Field Centre, Nr Kingsbridge, Devon, from 7-21 August 1974. As accommodation is strictly limited, early application is advisable.

The regulations and application form may be obtained from the Director, (Room 14), Department of Extra-Mural Studies, University of London, 7 Ridgmount Street, London WC1E 7AD.

Members' Subscriptions, £2.00, for 1974 should be sent to:

Mr. D. Bramley
c/o Doncaster Museum,
Chequer Road,
Doncaster DN1 2AE.

THE HISTORY AND DISTRIBUTION OF REPTILES AND AMPHIBIANS IN SOUTH-EAST YORKSHIRE AND THE DONCASTER DISTRICT

C. A. HOWES
Museum and Art Gallery, Doncaster

Few areas in Britain can, in recent historical times, have undergone the immense change in land use and suffered the amount of environmental degradation as South Yorkshire. In outline developments over the past three centuries which have affected the herpetofauna of the Doncaster District have been:

1) The ambitious, sometimes ill-conceived, schemes to drain the vast morasses of Hatfield Chase.
2) The re-routing and canalising of river systems.
3) The 'warping' by silt from the Don and Trent, and subsequent cultivation of acid peat lands of Hatfield Chase.
4) The construction of large air bases, notably at Lindholme and Finningley.
5) The decline in agriculture during the late 19th century with the consequent dereliction of farmland.
6) The rise and expansion of the South Yorkshire coalfield.
7) Mining subsidence and its attendant features of flooding.
8) The construction of canal systems and networks of railway, road and – latterly – motorway systems.
9) The rise of heavy industry connected with the availability of coal.
10) Widespread pollution of water by trade effluents.
11) Extensive quarrying activities connected with deposits of magnesian limestone, clay, sand and gravel.
12) The enormous expansion of urban development with its inevitable sewage and waste disposal problems creating further pollution of surface water.

Little effort is required to list the multiplicity of environmental pressures created by these factors both individually and collectively. With current demands on the remaining open spaces for new roads, urban and industrial development, together with the proposed link-up with developments on Humberside, one can safely predict that environmental pressures in this region will become still more acute in the future.

With this background Doncaster Museum's programme of surveys and biological documentation of South-East Yorkshire is viewed as a matter of urgency. Not only do surveys provide a 'yard-stick' against which future population and distribution trends can be compared but, from the conservation aspect, they give vital information on the location of populations so that measures can be taken to ensure their safety should they become threatened.

Although batches of local records from T. M. Clegg and the author have appeared in the annual reports on reptiles and amphibians in the *Naturalist* (1967-72) nothing has ever been published on the district's herpetofauna as a whole. Indeed the lack of information available, either from literature and, most particularly, from local naturalists, is surprising. The only herpetological study prior to this survey appears to have been that carried out in connection with the compilation of the *Outline Study of Hatfield Chase Part 1* (Bunting *et al.* 1969), subsequently offered as evidence at the Public Enquiry concerning the dumping of fuel ash on Thorne Moors. Several works concerning the herpetofauna of adjacent areas, i.e. the Sheffield area (Denny 1910; Herringshaw 1971), make vague and sometimes misleading allusions to the Doncaster District. Localised studies of reptiles and amphibians carried out contemporaneously with this survey have been concerned with Sandall Beat and Potteric Carr (Low Ellers) Nature Reserves in connection with the compilation of the *Outline Study of Hatfield Chase Part 2* (Bunting *et al.* 1971) which was offered as evidence at the public enquiry into the routing of the M18 motorway. Herpetological data was also collected during the Museum's study of the River Don banks from Sprotborough to Barnby Dun during 1970.

AIMS

The survey was undertaken in order to gather together all available data and stimulate local recording projects with a view to compiling a definitive work on the past and present distribution of reptiles and amphibians in South-East Yorkshire and the Doncaster District; and to identify the natural and anthropogenic factors affecting distribution trends.

METHODS

The survey was undertaken in two phases:—

1) Historical research. Local histories and works on the industrial evolution of South-eastern Yorkshire were consulted in order to gain a knowledge of the anthropogenic features and consequent environmental changes which could have influenced the distribution of reptiles and amphibians.

Review of old records. Scattered records and impressions were obtained by searching through runs of the *Naturalist* (1885-1972), *North Western Naturalist* (1930-1948) and (1953-1955), annual reports and transactions of the Nottingham Natural History Society (1894-1909), and *British Journal of Herpetology* (1949-1970). Records were also obtained from the minute books (1880-1971) of the Doncaster Naturalists' Society. The resultant information provided an invaluable, if fragmentary, background against which recent records have been compared. The plotting of old records was important in revealing original (natural) patterns of distribution and indicated where relict populations may still be found.

2) Doncaster Museum's Reptile and Amphibian Survey – The survey had a threefold purpose (i) to furnish the Natural History Department with current information; (ii) to encourage and promote the concept of public participation in Museum activities; (iii) to serve as one of the Museum's educational activities.

The following procedure was adopted:—

Publicity: A display entitled 'Be a nature detective' was mounted in the Museum drawing attention to the recording scheme and inviting the public to contribute records. Articles featuring the survey appeared in the local press. Schools throughout South-east Yorkshire were individually notified and encouraged to participate. Natural History Societies were similarly contacted.

Information-Recording Sheets: In connection with the Museum's European Conservation Year activities, about 1000 duplicated information-recording sheets were distributed to schools, scouting organisations, natural history societies and to the general public. The form carries line drawings of five species of amphibian and four species of reptile with brief notes on each species, emphasis being given to gaps in our knowledge of their local distribution. An attached record form was to be returned to the Museum when completed. During 1971 and 1972 the educational potential of the Information-recording sheets was realised, justifying the old format being enlarged into booklet form with improved line drawings and containing more enlightened information based on the results of the first year's survey. About 3000 booklets were duplicated and distributed in similar manner to the original sheets, though preference was given to schools etc., in areas poorly covered during 1970.

Field Surveys: Information was gathered from the Museum's programme of fieldwork and many of the sites recorded by school children were checked by the author.

Information from the survey has been entered into the Museum's vertebrate card indices and is available to bona-fide students only. Complete lists of records, both historical and up to 1972, have been deposited with the Y.N.U. recorder of reptiles and amphibians and the Biological Records Centre. Outline reports of the records for 1970 were included in Simms (1971), and those for 1971 in Thompson (1972).

THE STUDY AREA

The sixteen ten-kilometer squares of the study area cover most of the Doncaster ordnance survey sheet No. 103 and encompass the major part of lowland South-East Yorkshire, a narrow corridor of Lincolnshire, and overlap North Nottinghamshire and North Derbyshire (see fig. 1). The major rivers draining the area flow roughly from west to east and are the Went, Dearne, Don, Rother, Torne, Idle and Ryton. Water from much of the lowlands of the level of Hatfield Chase (the areas of the ancient Humberhead levels and Vale of the Trent which lie within the study area) is artificially drained by networks of dykes and pumped into either the Don or the Trent.

The area is divided longitudinally by three major geological formations (see fig. 1); the Coal Measures; the Magnesian Limestone and the marle of the Permian; and the Permo-Triassic Bunter sandstone and Keuper marles.

The Coal Measures form the relatively high hilly country rising to about 400 ft. O.D. to the west of the region. Prior to the industrial revolution, and certainly during mediaeval times, the region was thickly wooded and dissected by lush, marshy, river valleys, the Don, Dearne and Rother being sparkling salmon and trout rivers. Today it is densely populated and subject to the ravages of coal mining and the attendant heavy industries. Areas between the large conurbations, towns and pit villages fortunate enough to have escaped dereliction, are under arable or dairy farming, though pockets of heathland and wood still survive mainly on the steep ridges of Upper Carboniferous sandstone.

The ridge of upper and lower Magnesian Limestone which rises to about 350 ft. O.D. is dissected by the Rivers Went and Don, both producing steep and wooded valleys. The limestone is devoid of surface water except where overlaid with boulder clay. The area is thinly populated and is exploited by limestone quarrying and intensive arable farming.

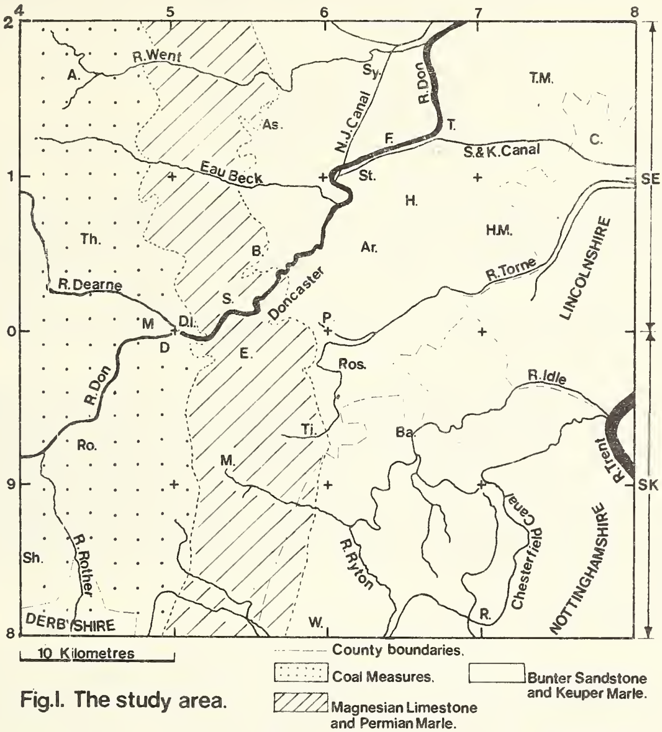

Fig.I. The study area.

Key to localities: A = Ackworth, As = Askern, Ba. = Bawtry, B = Bentley, C = Crowle, D = Denaby, DI = Denaby Ings, E = Edlington, F = Fishlake, H = Hatfield, H.M. = Hatfield Moors, M = Mexborough, P = Potteric Carr, R = Retford, Ro = Rotherham, S = Sprotborough, St = Stainforth, Sy = Sykehouse, Sh = Sheffield, T = Thorne, Ti = Tickhill, Th = Thurnscoe, T.M. = Thorne Moors, W = Worksop

The Permian marle which emerges along the eastern edge of the limestone is important in that it produces a spring line and consequently attracts amphibian populations. The marles give rise to acid soils supporting birch and oak-dominated woodland, which in the past have provided added records. These areas are now mostly under the plough though pockets still remain and may harbour unrecorded colonies.

The Bunter Sandstone on which Doncaster stands, and the Keuper Marles to the east, were largely inundated during the Elizabethan era by the enormous 'morasses' of Hatfield Chase. The area is now largely drained except for fragments of fen around the Doncaster Carrs and Askern and extensive fen-fringed raised peat bogs at Thorne, Crowle, and Hatfield Moors. Once east of the Magnesian Limestone, the rivers meander across the plain of the Hatfield Chase though the efficiency of drainage and navigable qualities have been improved by successive generations since Roman times (Bunting 1969) through re-routing and embanking. A complicated series of Pleistocene and Recent superficial deposits overlay the Permo Triassic strata, the most important being glacial sands and gravels, blown sand, boulder clay and peat. These are commercially exploited and will be discussed in later sections. Slight ridges of Bunter Sandstone run from Armthorpe through Bessacarr, south to Bawtry and Barrow Hills, and on to Worksop. Though only slightly elevated (up to 100 ft. O.D.) above the surrounding flatlands, they are well drained and give rise to pockets of dry, sandy heath and birch and oak-dominated woodlands. This feature figures in the distribution of adders and common lizards. The practice of 'warping' with base-rich silt from the tidal rivers Don and Trent, over the fringes of Thorne and its contiguous moors and Hatfield Moor, has given rise in inundated uncultivated places to rich areas of fen much beloved by amphibians and grass snake populations.

AMPHIBIANS AND MAN

The activities of man have had considerable repercussions both adverse and beneficial, on amphibian populations. Being totally dependent on the presence of relatively unpolluted water for breeding, they are far more sensitive to environmental changes than reptiles. The anthropogenic features most affecting amphibians are:– (a) Drainage, notably of the immense morasses of the level of Hatfield Chase, in about 1620, by Cornelius Vermuyden, and of Potteric Carr in the late 1760s by Thomas Tofield and the Potteric Carr drainage commission. (b) Quarrying of sand, gravel and clay deposits. (c) Coal mining, with its attendant tip heaps, water pollution and subsidence. (d) Industrial and urban development dating from the Industrial Revolution giving rise to widespread pollution of rivers (e.g. the Don, Rother and Dearne), through inadequate sewage and waste disposal systems, and the devastation of vast areas of land.

Population Decline

During the survey, reports of diminishing populations were received, though in the absence of earlier surveys the extent of any decline was difficult to ascertain. A review of old records and a knowledge of the development of the Doncaster district, however, provides a useful guide. We know that some river marsh breeding sites have now been dumped on by mountains of colliery waste and domestic and industrial refuse (e.g. on parts of Denaby Ings, Cadeby Flash and Hexthorpe Flats). Temporary breeding sites in clay pits are being filled in by domestic and industrial refuse (e.g. at Balby and Wheatley brick ponds); and countless dykes and ditches, no doubt originally used by amphibians, are now polluted.

Artificial Spawning Sites

1. Clay pits and sand and gravel quarries.

Amid the generally unfavourable conditions of South Yorkshire, certain human activities have provided artificial breeding sites of both a long and short term nature. It is often suggested that artificial garden ponds may provide refuge for amphibians in areas which have become polluted or drained. However, the middle class 'garden pond syndrome' is not a characteristic of the inhabitants of the pit villages and industrial areas around Doncaster. Consequently, artificial ponds are few and thus have little effect on the amphibian population as a whole. In contrast, the chain of claypits which exploited the glacial clay deposits at Askern, Balby, Castle Hills, Edlington and Moss, are of considerable importance. These sites provide alternative breeding sites and some have become traditional spawn-collecting places for local school children, but for how much longer?

To the east of Doncaster, on the Hatfield Chase area, the numerous quarries working the Bunter sands and gravels provide extensive breeding sites when flooded. The older flooded gravel pits locally re-create conditions which must have existed prior to the area being drained about 200 years ago. Currently these sites are additional to those in the network of dykes and ditches of the 'chase'. With the usage by the Trent River Authority of chemical herbicides to effect cheap clearance of aquatic plants from the dykes, at times rendering the water dangerous to cattle (*Doncaster Gazette* 22/7/1971), the unpolluted gravel workings could well become important amphibian refuges in future.

Although claypits and gravel quarries are currently important spawning sites, unless some can be retained for the wildlife they support they can only be regarded as temporary situations. Already claypits are widely in use as rubbish tips – usually with a view to complete infilling – and the gravel quarries in the Sutton and Lound areas are in demand by the C.E.G.B. for the dumping of the controversial power station pulverised fuel ash.

2. Artificial oxbows and riverside flashes.

The long history of re-routing, straightening and canalising the river systems of lowland South-East Yorkshire, together with extensive systems of flood embankments, has provided a number of artificial oxbows, ponds, and flood catchment areas. These relatively pollution-free situations have provided many secluded backwaters where the relict river marsh or riverside habitats have survived or regenerated. Notable sites along the Don are Bentley and Arksey Ings, the many waters from Thorpe Marsh through Stainforth and Fishlake to Thorne; and along the Went are the waters and marshes in the Eskholme, Sykehouse and Southfield areas.

Mining subsidence, creating the familiar 'flashes', has compensated to a significant degree for spawning sites lost through drainage. Subsidence has caused new flooding (e.g. Sprotborough Flash), extended existing areas of inundation (e.g. Wath and Denaby Ings), or re-flooded previously drained areas (e.g. Low Ellers). Although riverside 'flashes' are subject to periodic pollution from foul river flood water, the well vegetated sites still support large breeding populations.

REPTILES AND MAN

Apart from the obvious detrimental effects on reptile populations through needless killing and the destruction or impoverishment of habitat, the relationships between man and the reptiles are relatively obscure. As with the amphibians, man's activities can occasionally be beneficial if the species is capable of exploiting artificial situations.

Population Decline

Reports of diminishing populations of grass snakes have been received, though without any previous assessment of population it is difficult to determine the extent of any decline. Certainly amphibian populations on which grass snakes feed, have in some places declined or have been completely wiped out, but in other areas conditions for amphibians have improved, no doubt giving certain populations of grass snake the opportunity to expand. Unfortunately what meagre beneficial effects there may be are probably heavily outweighed by widespread and increasing destruction of habitats.

Although unreported, the range of adder has undoubtedly suffered a considerable recession. Over the years many of the moors, carrs, woods and heaths once occupied have been cleared for agriculture or devastated by urban and industrial development. To an extent the common lizard has shared the same fate as the adder, though being insectivorous and more tolerant of man's presence, it is still able to survive in areas from which adders have long since vanished. There is also evidence of lizards colonising new areas by migrating along systems of railway embankments on which thriving colonies can now be found, e.g. Low Ellers and Worksop.

Symbiotic Relationship With Man

Smith (1952) describes the phenomenon where grass snakes living toward the northern limit of their geographical range ensure the successful incubation of their eggs by employing the use of artificial incubation sites. These sites provide a temperature above 70° for a period of at least six weeks, thereby overcoming the disadvantage of a cold climate. Such conditions are created by the fermentation of organic material such as compost and manure, piles of rotting hay or domestic rubbish, situations which would most probably be rather scarce in the 'wild'. A study of the distribution of the grass snake in and around Doncaster shows that populations may occur in areas where there are amphibian concentrations near to allotment gardens, rubbish tips and large suburban gardens with compost heaps. Though as yet there is little local evidence, populations away from built-up areas appear to be orientated towards farms, where presumably manure heaps, hay stacks, potato clamps etc. are located.

It is worthy of note that perhaps without this relationship with man (since the deterioration of British climate subsequent to the Neolithic period), the grass snake might well have become a rare south of England species or indeed have by now been confined to the Continent. Certainly insects once present in the area during the Bronze Age have now receded southwards due to climatic deterioration.

Probably only of minimal survival value to local reptiles, though nevertheless of some local interest, are the often vast stacks of drying peat blocks to be found on Thorne and Hatfield Moors. In summer these stacks are used as 'sunning' places – notably by common lizard – and, according to the peat workers, provide hibernating cavities for hordes of lizards and adders. Possible survival features of the peat stacks could be that basking reptiles could, in the event of danger, find immediate refuge amongst the labyrinths between the peat blocks, and that they provide hibernation sites above the level of winter flooding – a traditional feature of these lowland peat bogs.

Great Crested Newt *Triturus cristatus*

Records of this species indicate a distribution trend associated with the water meadows, marshes and oxbows etc., of the main river system (see fig. 2), though dumping, infilling and pollution have greatly reduced the extent of available sites. On the low-lying, once extensively marshy, Hatfield Chase, they are still found in the drainage dykes, ponds and cattle 'drinking steads' in the remaining old pasture areas, notably around Sykehouse and Fishlake. Their survival here probably depends on the persistence of the existing type of land usage. The vast, intensively cultivated and efficiently drained, arable areas of the chase are now largely hostile to amphibian life. On higher land away from the main water courses, records come from marshes and claypits associated with areas overlaid with boulder clay.

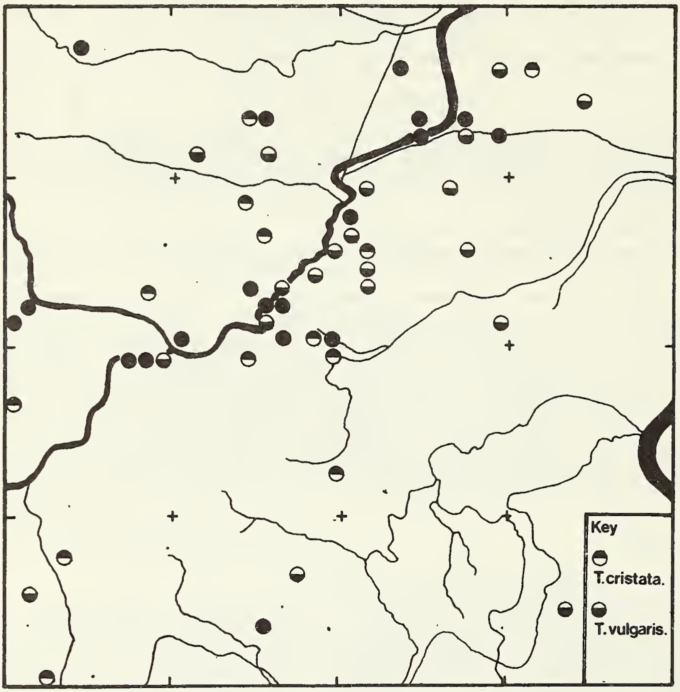

Fig. 2. Known sites for the Great Crested Newt and Common Newt.

Common or Smooth Newt *T. vulgaris*

The distribution of this species is similar to that of the Great Crested Newt (see fig. 2), though with less dependence on the presence of a persistent aquatic environment, it is probably better able to survive in more efficiently drained areas. The distributional range of the known sites fans out considerably once the west to east flowing rivers have broken through Magnesian Limestone. Populations probably survive in most of the suitable areas across the Humber head levels and the Vale of the Trent.

Palmate Newt *T. helvetica*

The Doncaster district is probably too low-lying and too far from its Pennine distribution range for the Palmate Newt to show more than marginal representation in the study area. To date it has not been located in the lowlands to the east of Doncaster, and the scattered records to the west probably represent the eastern fringe of its upland distribution; records increasing in frequency to the west through the Sheffield area and up onto the Pennines. The nature of the sites already located indicate that this species is one of isolated ponds i.e. claypits, rather than of marshland and river valley – as are the Smooth and Great Crested Newts – a feature further alienating it from the study area. Further investigations in the elevated areas to the west of Doncaster, especially those overlaid with Boulder Clay deposits, may help to elucidate the exact range of this species in South Yorkshire. The apparent scarcity of the Palmate Newt records may be due to under recording through being confused with the Smooth Newt. The identity of both these species needs careful checking.

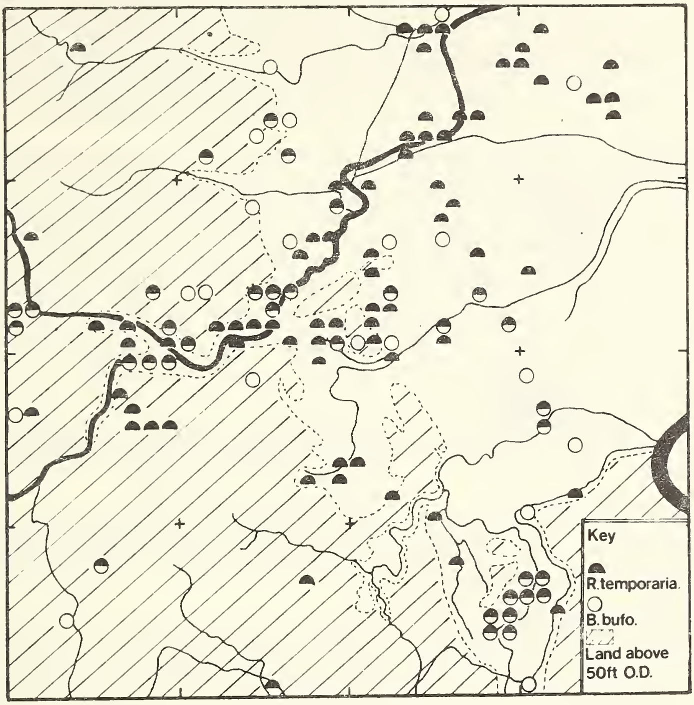

Fig.3. Known sites for the Common Frog and Common Toad.

Common Toad *Bufo bufo*

Common throughout the study area although the majority of available records portray the breeding localities rather than overall distribution. The true extent of their range is no doubt masked by their obtrusiveness at or near their spawning sites at breeding season and their retiring nocturnal habits out of season. With specimens having been found on elevated land far from water, it is probable that Toads have a potential for being more widespread, particularly in hilly areas, than the frog. Toads returning from the spawning grounds below 50 ft. O.D. at Old Denaby 'march' uphill through the village to the heights above Denaby Common, at an altitude of c.200 ft. O.D. Toads recorded from Melton Wood on the Magnesian Limestone at c.350 ft. O.D. can only have come from the spawning grounds at Cadeby Flash and Denaby Ings 1½ miles away at below 50 ft. O.D. Clearly there is scope for marking projects and out-of-season recording to determine the relative ranges of the two species. An investigation into avoidance of overlap of Toad and Frog populations differential reliance on water may be a possible avenue for further research.

In the breeding season the important, though largely diminishing, sites are distributed along the Dearne and Don in the flashes, marshes, ponds and oxbows, in the carrs around Doncaster, and the flooded gravel pits at Blaxton, Finningley, Sutton and Lound (see fig. 3). An example of the diminution of spawning sites is Hexthorpe Flatts, reduced to less than half its original size in recent years by in-filling.

Natterjack Toad *Bufo calamita*

"Four pairs purchased from a dealer, introduced into disused sand pits in the vicinity of Finningley" (Bunting 1949 and 1950). Despite periodic inspections of sites in the district there is no evidence of the toads having survived.

Midwife Toad *Alytes obstetricians*

In August 1947 five toads were introduced into an old mature garden some two acres in extent at Woodsets Grange near Worksop. The garden, containing a well vegetated artificial pond 15′ x 15′ and a large rockery, was stocked with specimens from a colony established fifty years earlier in Bedford. Well developed tadpoles from the Bedford colony were introduced into the pond in August 1948 and breeding was observed in 1949 and 1950, Smith (1950) recording that "on several occasions males carrying eggs were found buried in dry soil six inches below the surface".

Common Frog *Rana temporaria*

Widespread throughout the lowland regions of the study area particularly below the 50 ft. contour (see fig. 3), and locally around artificial reservoirs and lakes above 50 ft. e.g. Thrybergh (150 ft. O.D.) and Firsby (100 ft. O.D.) reservoirs and Wentworth Park Lakes (100 ft. O.D.). It is locally very abundant in the water meadows, marshes, flashes, ponds and oxbows adjacent to the main river systems, notably the Don. The remnants of the Doncaster Carrs also hold good populations; so too do the fenland edges of Thorne and Crowle Moors. In certain localities after good breeding seasons it is difficult to imagine larger populations existing and in all probability the Doncaster district represents one of the Yorkshire strongholds for this species. With a knowledge of the growth and development of the Doncaster district, it is certain that these thriving populations are, however, rather fewer and less extensive than formerly.

Edible Frog *Rana exulenta*

Eight pairs were taken from around Ham near Teddington and introduced into suitable waters near Thorne in 1949 (Bunting 1949 and 1950). The specimens appear not to have survived.

Marsh Frog *Rana ridibunda*

In 1949 eight pairs were taken from around Appleton and Romney, Kent, and were introduced into marshes at Thorne Waterside (Bunting 1949 and 1950). Unfortunately the experiment was terminated by unsympathetic local people who shot the frogs owing to the continuous noise of their croaking!

Slow Worm *Anguis fragilis*

Although the Slow Worm was reported as being 'common' to the south of the Doncaster district in the Sherwood Forest and the Worksop areas (*Victoria History of Notts* 1905), and to have occurred in the Askern district (Lankester 1842), it is now exceedingly rare within the study area, only being sporadically recorded from a handful of localities.

As with the Palmate Newt, the Slow Worm in lowland south-east Yorkshire is probably at the eastern fringe of an upland distribution range; reports increasing in frequency to the west through the Sheffield area. The majority of known localities within the study area are confined to a relatively narrow corridor running from Wentbridge and Stapleton Park in the north to Whitwell Wood and the Worksop area in the south. This range would seem to be associated with the Magnesian Limestone ridge where there are four localities, the Permian marles which outcrop along its eastern edge where there are four localities, and two Coal Measure localities immediately to the west of the Magnesian Limestone.

Sand Lizard *Lacerta agilis*

In 1949 a total of seventeen lizards, nine of which were gravid, were collected from colonies around Christ Church in Dorset and released on 'sandy wastes' around the Dunscroft area of Doncaster (Bunting 1949 and 1950). Although Common Lizards thrive in the sand pits in the area, the Sand Lizards appear not to have survived.

Common Lizard *Lacerta vivipara*

Locally abundant and probably occurring sparsely throughout the study area. Due to its efficient concealment techniques it is seldom observed, consequently much investigation is still required into its distribution. Available data portrays a distribution almost identical to that of the adder (see fig. 4) with the main centres of population on the peat moors of Thorne and Hatfield where Bunting (1969) notes that they are commonly found by peat workers when turning 'turfs' for drying. It also occurs on the turbaries of Haxey and Epworth and in the sand and gravel pits to the east of Doncaster. Records also come from the pockets of heath and dry open woodland on the Bunter sandstone. Permian marles and, if the Denaby record is any indication, the Carboniferous sandstones. No doubt more colonies remain to be discovered in these areas. It is probable that the Common Lizard also occurs in suitable areas on the Magnesian Limestone. Currently the well known Brockodale site is the only recorded locality, though it is likely that a detailed investigation would reveal its presence elsewhere.

Suffering less persecution by man than the adder, the Common Lizard has survived in areas from which adders have long since disappeared. It also seems to be expanding its range by colonising railway embankments, specimens having been recorded from embankments around Worksop and frequently noted on the complex 'Maltby limestone' embankments around the Doncaster Carrs.

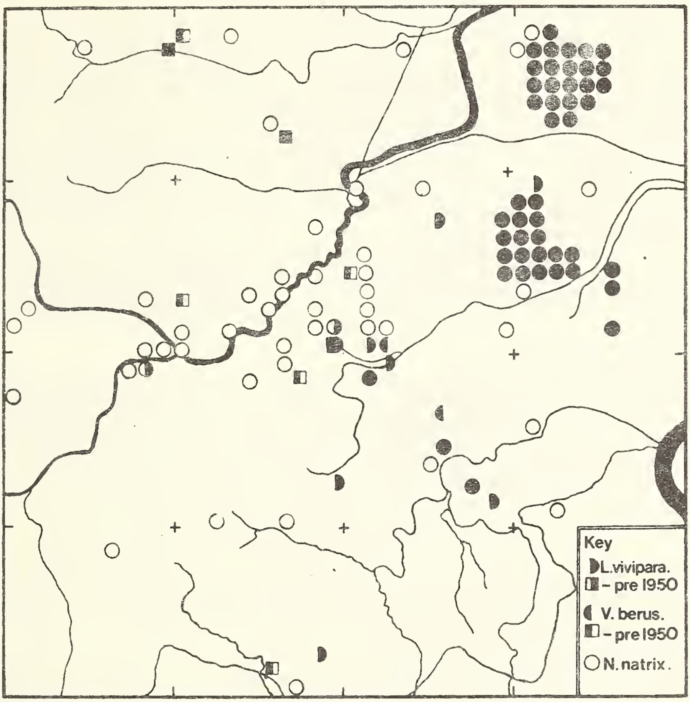

Fig. 4. Known sites for the Common Lizard, Grass Snake and Adder.

Grass Snake *Natrix natrix*

Common and locally abundant in the study area. Showing a preference for lowland areas associated with the main river systems (see fig. 4). The major concentrations are around the wet pastures, flashes and wash land adjacent to the River Don, the remnants of the Doncaster Carrs, and the fenland and uncultivated 'warp' areas around the peat moors of Hatfield and Thorne. The Don Valley, with an abundant food source in the large amphibian populations and availability of gardens, allotments and rubbish tips in which to breed, probably represents the Grass Snake's Yorkshire stronghold. Specimens are frequently come across by children and kept as pets, many finding their way into school vivaria. Specimens from the Doncaster and Denaby populations are sold from a Doncaster pet shop along with other locally procured reptiles and amphibians (Slow Worms, Great Crested Newt and Smooth Newt).

Although frequently recorded, few specimens have been closely examined and measured, the only measurements available are the following, Mexborough 1964, 90 cm; Sandbeck Park 1964, 90 cm; Sprotborough Road, Doncaster 1967, 90 cm; Bessacarr 1965, 84 cm; Wombwell Wood 1957, 73 cm; Maltby 1965, 71 cm; Sandall Beat Wood, Doncaster 1964, 61 cm; and Bessacarr 1965, 46 cm.

The diet of a Grass Snake is notoriously varied, Smith (1951) noting amongst stomach contents the remains of frogs, toads, lizards, mice and young birds. Tadpoles and fish are also known to be taken. Only occasionally are birds recorded as prey, however. An example of this behaviour was noted in Barnsley in July, 1957, when a specimen was seen to make an attack on Songthrush fledglings (Hazelwood 1958). The record of a large specimen at Misson being pursued and mobbed by a Skylark suggests that the bird recognised the Grass Snake as a potential enemy.

Distribution within the study area suggests that there may be an association between the breeding requirements of the Grass Snake and certain man-made features. This point is discussed in the section 'Reptiles and Man'.

Diced or Tessellated Snake *Natrix tessellata*

The Tessellated Snake is a continental species, naturally distributed across southern Europe, Asia minor, Southern U.S.S.R. and across Northern India to Western China. It is imported into Britain in large numbers for the pet trade and often features as an escape from captivity or accidental import.

To date there has been one record from Doncaster, that of a single specimen in the Beckett Road area in 1967. Eight other specimens have been recorded in Yorkshire – Vale of Pickering 1, East Riding 2, Hull 2, York 1, Cleveland 1, Goole 1. Simms (1968) commented that "it is conceivable that in future it may become established if introductions continue". Indeed in 1971 there was a report of breeding at Holme-on-Spalding Moor (Thompson 1972).

With the Tessellated Snake sharing many of the habitat requirements of its close relative the Grass Snake, it would seem that the low-lying areas around Doncaster where grass snakes abound may be suitable for the colonisation of this species if climatic conditions allow.

Adder *Viper berus berus*

Though abundant in certain areas, the Adder is now rather local in its distribution having disappeared from several of its former localities. It is currently known to occur on the peat 'wastes' to the east of Doncaster, two sites on the Bunter sandstone and two widely-spaced sites on the Coal Measures to the west of Doncaster (see fig. 4). To date there is no reliable evidence of adders occurring on Magnesian Limestone areas.

The main populations are centred on the vast contiguous peat 'wastes' of Thorne, Snaith, and Cowick, Goole and Crowle Moors, on Hatfield Moors and the turbaries of Haxey and Epworth. Despite commercial peat cutting and regular peat fires, the adder is probably as numerous today as formerly, forming a prominent feature of the Thorne Moor fauna. Adders have been recorded on almost every visit by individual naturalists and naturalists' organisations during the spring and summer seasons of recent years, and the fifty specimens recorded by Mr C. Cockburn one morning in March 1971, are probably not too unusual for the area.

Adders have been well known on Thorne Moors for centuries. In William Casson's *History of Thorne* (1829), vipers (adders) were stated to be ". . . very numerous in some parts of the morass but seldom attempted to bite anyone unless provoked". They were evidently in sufficient numbers to make their collection an economic proposition. Describing the activities of Mr Harry Warburton of Thorne, Casson writes that he was "the last in this part of the country who earned part of his livelihood by procuring vipers for the apothecaries and druggists". "With a stout stick and an old stocking, Harry used to sally forth onto the moor in search of reptiles and seldom returned without a capture". Up to the 18th century adders were in great demand for their supposed medicinal properties. Casson records that "Broth made from vipers was then in repute as a strengthening ointment and their fat much in request for the cure of tender eyes. Vinum viperum or wine of vipers was once accounted a great restorative". Rev. William Bingley F.L.S. of Doncaster, in volume III of his *Useful Knowledge of Nature* (1818), states that "The flesh of the common viper has been strongly recommended as a medicine in several complaints, such as leprosy, scurvy, rheumatism and consumption, though the virtues have been much exaggerated.

The assemblage of old records dating from the 1840s has revealed an unknown though predicted pattern of distribution. The areas once populated stretch along the ridges of Bunter sands and gravels running north from the Worksop area through Bawtry and up to Doncaster, on the Permian marles which outcrop in the Stapleton Park and Brockodale area and along the eastern edge of the Magnesian Limestone. The geological features along which records are scattered give rise to the characteristic 'adder' habitat of dry open woodland dominated by oak and birch. Where the old woodland areas have been cleared, sandy heaths and commons with gorse, heather and bracken develop. Old records are from the Worksop area and the northern fringes of Sherwood Forest, Wheatley Wood, Doncaster (cleared about 1935), Askern, Stapleton Park and Brockodale area. Although the exact position of the Brockodale adders could not be determined from the references (*Nat. Hist. Journal* 1886-1888), records of nightjars occurring near Brockodale house up to the late 1950s indicate that conditions may have been suitable on the heathy land created by a narrow strip of Permian marle which runs across the area.

Since these early records were made, the extension of farm land, considerable urban development, and the pressure of human disturbance, has greatly reduced the availability of suitable habitats. Despite this four relict populations have been located, these being at Barrow Hills, Austerfield, Rossington and Bessacarr; all on slightly elevated Bunter Sandstone.

It is conceivable that the heather and gorse clad heaths of Doncaster Common in the days before the disturbance from horse-racing and golfing would have supported adders as would the "warren", now also a golf course. South Moor with its heather and gorse, now sadly beneath Armthorpe colliery tip, was once known for its nightjars, well-known cohabitants of the adder; and doubtless Wheatley Hills – also an old site for Nightjars and of which Wheatley Wood was part – also supported populations of adders prior to the post-war housing boom. It is almost certain that adders would have occurred on the heather-clad areas of Potteric Carr before the 1760's when the drainage of the carrs was completed and the land subsequently put under the plough. Indeed there is one record for the 1930's (Hazelwood 1972) and a 19th century record from the adjacent Loversall Carr. Today with the effect of mining subsidence, subsequent inundation and neglect, relics of the original peat bog elements can again be seen in patches of cotton-grass and *Sphagnum*, heather and birch scrub, and the return of the common lizard, a favourite food of the adder.

Two unexpected records from the Coal Measures area to the west of Doncaster give a clue to what might have been a rash of isolated colonies associated with the numerous outcrops of Middle Coal Measures, sands and grits. The two known populations at Wombwell Wood near Barnsley and at High Melton are both on 'Woolley Edge Rock' – a substrate which gives rise to well drained acid soils supporting scrub oak wood with a predominantly bracken herb layer. Today the only undisturbed outcrops are those too steep to be conveniently exploited for farmland or building. It is likely that investigation of suitable sandstone outcrops may reveal still more colonies.

ACKNOWLEDGEMENTS

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BRYOLOGICAL OBSERVATIONS ON SOME OF THE BOGS AND FLUSHES OF ILKLEY MOOR

MARY DALBY

A number of springs along the northern escarpment of Ilkley and Burley Moors produce a series of flushes and bogs with an interesting variety of bryophytes. Because the existence of many of these bogs is threatened by the natural drying out of the Moor, the extensive spread of crowberry *(Empetrum nigrum)* (*Nat.* 1970, 41-48 & 1971, 49-56) and the artificial trenching and draining by various bodies, it was thought advisable to record the flora, especially the *Sphagna,* before much of it disappears.

Twenty two of these bogs and flushes have been selected for study. Most of them are small, some only a few yards in diameter, their altitude varying from 550 to 1150 feet and their pH from 3.0 to 7.1, even within the narrow range of some of the individual flushes. How much this variation is due to the plants that live there is a matter of opinion, but certainly, as far as the *Sphagna* are concerned, there is a definite zoning of some species according to the pH.

The lowest pH readings are in the true bogs, generally small hollows in the uneven ground, where *Sphagnum* species are limited to two or three in number. *S. recurvum* is abundant and ubiquitous, *S. palustre* on the drier ground or round the edges, and *S. cuspidatum* in the very wet areas and often submerged. It is only when the pH rises above 4.5 or 5.0 in the flushes that other species appear, often zoned in bands according to the feeding springs, so that one small flush can contain up to nine species of *Sphagnum.*

Details of some of these bogs and flushes are given below followed by a discussion on the species of *Sphagnum.*

1. **Weary Hill flush** (G.R. 44/108463). This lies near Weary Hill Quarries, at an altitude of 975', sloping down to Spicey Beck. It is fed by six springs along the upper edge which fan out and then coalesce to run into the stream at the bottom. During the dry summer of 1959 a trench was dug through the bog to the stream and this, although now partly overgrown, still leads a fair amount of water from the bog. The pH of the springs varies from 4.9 to 7.1 thus producing a "banding" effect on the species, especially the *Sphagna. S. teres, S. contortum, S. robustum* and *S. plumulosum* are confined to the more basic areas while *S. recurvum, S. palustre* and *S. papillosum* grow below the more acid springs. At the lower end of the bog the pH is 6.4 and *S. teres* and *S. plumulosum* dominate. Round one spring (pH 7.0) grow *Dicranella palustre, Philonotis calcarea, Bryum pseudotriquetrum* and *Riccardia pinguis,* round another (pH 6.7) *Acrocladium cuspidatum* and *Drepanocladus revolvens* and round a third (pH 4.9) *Drepanocladus exannulatus.* Additional bryophyte species in the bog include *Drepanocladus revolvens* var. *intermedia, Acrocladium stramineum, Aulocomnium palustre, Philonotis fontana, Pellia epiphylla* and *Chiloscyphus polyanthos.*

2. **Quarry Bog** (G.R. 108463). At an altitude of 950' a stream trickling down the face of the quarry fans out to form a wet area on the floor. *S. recurvum, S. cuspidatum, S. subsecundum* var. *inundatum, S. plumulosum, S. palustre* and *S. capillaceum* grow here and additional species are *Acrocladium stramineum, A. cuspidatum, Dicranella palustre* and *Riccardia pinguis.* The pH is 5.7.

3. **Silver Well flush** (G.R. 108468). This lies at an altitude of 750' on a slight slope but has a uniform pH of 3.7 and the sole *Sphagnum* is *S. recurvum.*

4. **Trichocolea flush** (G.R. 113468). At the same altitude about 300 yards to the east and on a similar slope this flush has a uniform vegetation of angiosperms, especially grasses, and a pH of 6.4. Seven species of *Sphagnum* occur, *S. teres* is frequent and widespread the rest localised, *S. palustre, S. squarrosum, S. recurvum, S. subsecundum* var.*inundatum, S. fimbriatum* and *S. plumulosum.* Other bryophytes include *Trichocolea tomentella, Acrocladium cuspidatum, Aulocomnium palustre, Thuidium tamariscinum, Mnium seligeri* and *Lophocolea bidentata.*

5. **Hawthorn flush** (G.R. 109465). A very small flush only about a yard across with a central area of pH 6.2 dropping to 4.0 and 5.7 on either side. *S. teres* and *S. squarrosum* are confined to the higher pH, *S. recurvum* and *S. palustre* to the lower.

6. **Spicey flush** (G.R. 114463). This lies on the stream bank with a stand of *S. robustum.* The pH is 7.0.

7. **Barmishaw flush** (G.R. 114463). At an altitude of approximately 1000' above Barmishaw Hole there is an extensive area of very wet ground covered with rushes *(Juncus effusus)* where the sole *Sphagnum* species is *S. recurvum* in large quantity.

At one point there is a spring which flushes out and where the pH is 6.7. Round the spring grow *Dicranella palustre, Philonotis fontana, Drepanocladus exannulatus* and *Bryum pseudotriquetrum* but below there are only isolated plants of the *Bryum* and *Riccardia pinguis.* Growing in a band approximately 2 feet wide where the pH is 5.9, *S. teres* and *S. plumulosum* grow in isolated tussocks. Outside this *S. recurvum* becomes the only species and the pH drops to 3.0.

11. **White Wells bog** (G.R. 117468). At an altitude of 600' this area is fed by a stream from the White Wells and has a pH varying from 6.5 to 7.1. *S. teres* is abundant with *S. plumulosum, S. palustre, S. papillosum, S. recurvum, S. fimbriatum* and *S. subsecundum* var. *inundatum* also present. Additional bryophyte species include *Cratoneuron commutatum, Aulocomnium palustre* and *Acrocladium cuspidatum.*

16. **Bog E. of Upper Tarn.** (G.R. 121468). This is fed by a small stream and lies at an altitude of 725'. The area immediately flanking the stream, whose pH is 6.2, has a narrow band of *S. teres* and *S. plumulosum* whereas the remainder of the bog has a pH of 3.8 and the *Sphagnum* species are *S. recurvum* and *S. palustre.*

18. **Cranshaw bog** (G.R. 122463). A true bog lying in a hollow at an altitude of 1075' where the pH is 3.1. *S. recurvum* is dominant with *S. palustre* in the drier areas and *S. cuspidatum* submerged in the small open pools. A little *S. girgensohnii* is also present and *Drepanocladus fluitans.*

19. **Lanshaw bog** (G.R. 134453). Lying to the north of Higher Lanshaw reservoir, at an altitude of 1150', there is an extensive boggy area mainly dominated by rushes and *S. recurvum* where the pH varies from 3.0 to 3.5. Due, possibly, to the nearby moraine of Lanshaw Delves where lime was burnt in former times, a series of springs bring the pH of one localised area to between 6.0 and 7.0. There is a flourishing colony of *Scorpidium scorpioides* here with *Ctenidium molluscum, Campylium stellatum, Riccardia pinguis, Fissidens adianthoides* and *Drepanocladus revolvens* also present. *S. plumulosum* is abundant with *S. tenellum, S. palustre, S. papillosum, S. recurvum* and *S. fimbriatum.*

20. **Sundew flush** (G.R. 143450). A series of springs producing a flush over a gentle slope leads to a "banding" effect as the pH varies from 3.5 to 6.8. *S. plumulosum* appears confined to the more basic areas and *S. capillaceum* grows in the drier places. *Mylia anomala* and *Riccardia pinguis* are additional hepatics.

22. **Carrbottom flush** (G.R. 147444). Near the S.E. corner of Carrbottom reservoir a mass of *Philonotis fontana, Dicranella palustre, Bryum pseudotriquetrum* and *Drepanocladus revolvens* marks a spring where the pH is 6.9. Around this area *S. teres* is abundant with *S. palustre, S. squarrosum, S. papillosum, S. plumulosum, S. recurvum, S. fimbriatum, S. subsecundum* var. *inundatum* and one tussock of *S. magellanicum.*

The remainder of the bogs and flushes examined have a low pH and none have more than four species of *Sphagnum.* In some cases *S. recurvum* is the sole species recorded.

Notes on Sphagnum species on the Moor

S. palustre – this species is found in all ranges of pH from 3.0 to 7.1, but only on the drier tussocks particularly at the edges of bogs and where the bog has become overgrown or dried out after trenching. It and *S. recurvum* are often the last survivors when a bog dries out.

S. magellanicum – found in only one station at Carrbottom where pH was 6.9.

S. papillosum – appears to be confined to the bogs with a more basic tendency and is not nearly so widespread as *S. palustre,* although abundant where it does occur.

S. teres – confined only to the more basic areas with a tight pH range of 5.9 to 6.5 where it occurs in seven of the series of bogs. Where conditions are favourable it is abundant and flourishing.

S. squarrosum – also confined to the less acid areas although with a wider range than the above, growing in a pH of 4.9 to 6.4 in the seven stations where it is found.

S. recurvum – abundant and ubiquitous, present in all the sites examined, often as the sole species in the more acid bogs but growing throughout the whole range of pH.

S. tenellum – found only in one station where the pH is 6.6.

S. cuspidatum – frequently submerged where there is open water in the bogs and always in the wettest areas. Generally in the more acid bogs. Many of the cotton grass bogs are drying out (*Nat.* 1971, 49-56) so it will probably decrease on the Moor.

S. contortum – found only once, at Weary Hill, where the pH is 7.0.

S. subsecundum var. *inundatum* – frequent and found in all ranges of pH from 4.0 to 6.5. Despite its name it was not found submerged but did favour the wetter areas of the bogs.
S. subsecundum var. *auriculatum* – although not mentioned in the details of the bogs above it is frequently present in the inlet or outlet streams. It appears to need some movement of water for survival and is often submerged.
S. fimbriatum – widespread and frequent in many sites it has apparently no specific range of pH.
S. girgensohnii – found in only one station of this series where the pH was 3.1.
S. robustum – found in only two sites, in both the pH is 7.0.
S. capillaceum – when present is confined to the edges of the bogs and drier areas.
S. plumulosum – frequent and widespread but generally confined to the more basic areas, ranging in this series from pH 5.7 to 7.0.

DISCUSSION

It was interesting to note how, in the more basic flushes, up to nine species of *Sphagnum* could be found within the very small area of a few yards, and how, in some cases, individual species were confined to a limited range of pH. *S. teres* is of particular interest as there are comparatively few records for Yorkshire and yet it was found in seven sites of this series, but in every case confined to a limited range of pH. Whether this limited range is due entirely to the pH of the source of water, whether the mineral content of the water plays any part or whether the plant itself can control the pH of its environment would need more research to solve; this paper is concerned only with conditions as they are on Ilkley Moor in 1972.

These bogs and flushes, especially the more basic ones, with their great variety of flora provide a most valuable area of study. Set in the midst of typical acid moorland they provide a contrast in vegetation which any student of ecology would value. They are threatened with extinction and it is in an attempt to record some of this interest that this paper has been written.

My thanks to Dr Bartley of Leeds University who made the long trek with me, using a portable pH meter, so that all the pH values could be recorded on the same day and under the same conditions. Nomenclature follows the *Census Catalogue of British Mosses*, E. F. Warburg, 1963.

Bog				*Sphagnum species*															*To-*
No.	*G.R.*	*Alt.*	*pH*	*pa*	*mg*	*pp*	*te*	*sq*	*re*	*tn*	*cu*	*co*	*se*	*fi*	*gi*	*ro*	*ca*	*pl*	*tal*
1.	107463	975	4.9–7.1	x		x	x		x		x	x				x		x	8
2.	108463	950	5.7	x					x		x		x				x	x	6
3.	108468	750	3.7						x										1
4.	113468	750	6.4	x			x	x	x				x	x				x	7
5.	109465	800	4.0–6.2	x			x	x	x										4
6.	109466	800	7.0						x										2
7.	114463	1000	3.3–6.7				x	x	x				x	x				x	6
8.	114464	900	3.4	x					x										2
9.	116467	750	3.0	x					x										2
10.	114469	600	3.9	x					x										2
11.	117468	600	6.5–7.1	x		x	x	x	x				x	x				x	8
12.	118468	600	4.8						x				x					x	3
13.	119469	550	4.3						x										1
14.	124469	525	4.2	x					x		x								3
15.	124468	575	4.0	x					x				x					x	5
16.	121468	725	3.8–6.2	x			x	x	x									x	4
17.	119465	800	4.9					x	x										2
18.	122463	1075	3.1	x					x		x				x				4
19.	134453	1150	3.5–7.0	x		x			x	x				x				x	6
20.	143450	950	3.5–6.8	x		x			x		x		x	x			x	x	8
21.	150451	900	3.6–5.0	x		x			x								x		4
22.	147444	900	6.9	x	x	x	x	x	x				x	x				x	9

DIPTERA AND LEPIDOPTERA REARED FROM DEAD SHREWS IN YORKSHIRE

R. H. L. DISNEY

Malham Tarn Field Centre, Yorkshire

Dead shrews are commonly found in the fen carr and woodlands on the Malham Tarn Estate in Yorkshire. These have usually been killed by one of the feral cats that are a pest in the Nature Reserve. Cats seem to commonly kill shrews and then abandon the corpses. Crowcroft (1957) wrote "it is a well known fact that domestic cats and dogs often kill shrews without eating them. This rejection is probably due to the secretion of the scent-glands". In 1971 a couple of such abandoned shrew corpses (of the common shrew – *Sorex araneus* L.) were collected and put in jars (containing damp, sterile soil and with the mouth closed with cotton gauze).

The first shrew had died and was collected in the first week of July. In September numbers of *Megaselia (= Aphiochaeta) errata* (Wood), of the family Phoridae, emerged. In October numbers of small moths of the family Tineidae emerged. These all proved to be *Monopis rusticella* Hubner, a species commonly reared from bird nests, owl pellets, dead mammals, dead birds, etc. (Adkin, 1923, Ford, 1949, Hinton, 1956, Wakely, 1958). The species does not appear to have been specifically recorded from dead shrews before.

The second shrew died and was collected in August. On 28 March 1972 a male *Acrophaga subalpina* Ringdahl (Calliphoridae) emerged. This species is "uncommon" in Britain (Van Emden, 1954) and has not previously been recorded at Malham Tarn. It is a species that is "rare or absent in the south, and commoner in the central parts of Britain than in the extreme north" and shows a preference for shade and sheltered habitats (Macleod and Donnelly, 1956, Macleod, 1963). In April and May 1972 sixteen Dryomyzidae belonging to the common species *Neuroctena anilis* Rond. emerged. This species is recorded by Séguy (1934) as visiting "les excréments et les matières en putréfaction". Oldroyd (1964) says it "has a liking for the stinkhorn fungus, *Phallus impudicus*".

These limited observations suggest that entomologists are likely to find that rearing insects from small corpses of named animals from different habitats and localities is likely not only to add new species to faunal lists for particular localities but also new information on the natural history of the insects obtained.

We still know very little about the larval habitats/pabula for most Diptera.

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Dr D. J. Carter (British Museum, Natural History) kindly identified the moths.

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YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1973

WILTON WOODS AND TEESMOUTH, V.C. 62 – May 26th - 28th

We were blessed with magnificent weather for our first summer excursion. The first day, led by Mr. Ian Lawrence and Mr. John Knight, we explored Wilton Ponds, an interesting habitat not far from Guisborough and immediately south of the Eston Hills. In the afternoon we went into the nearby Wilton Woods, well established, mixed, deciduous woodland on clay, with some calcareous flushes. On the Sunday, we walked through Eston Woods and then to the top of Eston Bank, where some interesting marshy areas still remain. The flora here was more calcifuge and we were able to add to our lists for the district and to survey industrial Teesside below us, to the north. For the last day, we visited the South Gare, Teesside, and enjoyed seeing the interesting flora and fauna of this well-known site. A surprising number of plants were already in flower including Purple Milk Vetch *(Astragalus danicus)*, Meadow Rue *(Thalictrum minus ssp. arenaria)* and the true Dog Violet *(Viola canina)*.

Our President, Miss Eva Crackles, took the Chair at the Meeting which followed tea. Mrs. Graham, President of the Cleveland Naturalists' Society, expressed a vote of thanks to Mr. Ian Lawrence, the Divisional Secretary, who had organised and led the meeting and to Mr. John Knight, Chairman of the Mammal Section, who had given much help, and to the I.C.I., the landowners, who had so kindly given us access to the area.

Flowering Plants and Ferns (I. LAWRENCE)

On Saturday morning the party visited several ponds to the south of Wilton Woods. The vegetation in the vicinity of each pond varied and most of the commoner marsh species were seen. *Agrostis stolonifera* (White Bent Grass) was locally dominant. Other species included *Equisetum palustre* and *E. fluviatile* (Marsh and Water Horsetail), *Epilobium palustre* (Marsh Willow-herb), *Hypericum tetrapterum* (Square-stemmed St. John's Wort), *Alopecurus geniculatus* (Marsh Foxtail) and local beds of *Ranunculus sceleratus* (Celery-leaved Crowfoot) and *Veronica beccabunga* (Brooklime). Aquatics noted included *Ranunculus trichophyllus* (Water Crowfoot), *Alisma plantago-aquatica* (Water Plantain), *Lemna trisulca* and *L. minor* (Ivy-leaved and Lesser Duckweed).

The afternoon was spent in Wilton Woods proper. This is mixed deciduous woodland set on the steep slopes of the Eston Hills range. Being on boulder clay there are several very wet patches and the rides very rarely dry out. *Chrysosplenium oppositifolium* (Golden Saxifrage) is plentiful in these wet situations with *Luzula sylvatica* (Greater Woodrush), *Cardamine flexuosa* and *Carex pendula* (Pendulous Sedge) in many parts of the wood. The remaining flora was very lush in the damp parts, often dominated by *Allium ursinum* (Garlic), *Mercurialis perennis* (Dog's Mercury) with many of the usual flowers one would expect in such a habitat. Here and there on the drier ground were good stands of *Veronica montana* (Wood Speedwell), *Melica uniflora* (Wood Melic), *Galium odoratum* (Woodruff), *Ranunculus auricomus* (Goldilocks) and *Campanula latifolia* (Giant Bellflower). The dominant trees were *Ulmus glabra* and *U. procera* (Wych and English Elm), *Quercus robur* (Oak), *Tilia europaea* (Common Lime), *Fraxinus excelsior* (Ash), *Acer pseudoplatanus* (Sycamore), *Fagus sylvatica* (Beech). Other trees included *Castanea sativa* (Sweet Chestnut), *Sorbus aucuparia* (Mountain Ash), *Prunus avium* (Cherry), *Taxus baccata* (Yew) and several species of *Salix*.

On Sunday the party took the ride from the top end of Wilton Bank that leads along the top of the hill escarpment towards Eston. Here the terrain was much drier and consisted mainly of Birch and Oak, with Bilberry and heath plants along with *Deschampsia flexuosa* (Wavy Hair-grass) as the dominant ground flora. Both *Betula pendula* and *B. pubescens* (Silver and Downy Birch) along with the hybrids were noted. Other species included *Agrostis tenuis* (Fine Bent-grass), *Calluna vulgaris* (Heather), *Erica cinerea* (Bell Heather), *Luzula pilosa* (Hairy Woodrush), *Holcus mollis* (Soft Grass), *Festuca tenuifolia* (Fine-leaved Fescue), and *Aira praecox* (Early Hair-grass). Of the ferns, *Dryopteris dilatata* (Broad Buckler), *D. borreri* (Golden Male Fern), and *Polystichum setiferum* (Soft Shield Fern) were noted in the damper and more shady places near to a small pond. In this area a few plants of *Orchis mascula* (Early Purple Orchid) were seen.

Whereas most of the plants were not new to the 10 km. square NZ51 some valuable lists were made for the tetrad recording system. Around 148 species recorded in 51Z and over 50 species for 51U. One or two members of the party tackled the steep climb to the moorland on top of the hills above Eston and visited an extensive area of fen in 51T. Here *Carex pilulifera* (Pill Sedge) and *Salix aurita* (Eared Sallow) in the fen itself had not been previously recorded, also *Ophioglossum vulgatum* (Adder's Tongue) from the moorland. So some good groundwork was accomplished for the tetrads in the north-east corner of NZ51.

Bryology (M. DALBY)

Miss Robertson reported on the bryophytes, and among her records were:–

WILTON PONDS. *Ricciocarpus natans, Acrocladium giganteum, A. cuspidatum, Bryum pseudotriquetrum* and *Drepanocladus aduncus.*

WILTON WOODS. Adjacent deciduous woodland with a typical bryophyte flora of *Mnium hornum, Plagiothecium succulentum, Atrichum undulatum* and in a calcareous flush, *Eucladium verticillatum* and *Cratoneuron commutatum.*

ESTON BANK WOODS. North-facing, mixed woodland with a flora including *Plagiothecium denticulatum, Dicranoweissia cirrata, Eurhynchium striatum* and *Lophocolea heterophylla* with *Eurhynchium riparioides* and *Chiloscyphus polyanthos* near a stream.

SOUTH GARE. Provided varied habitats and among the sand-dunes an unusual gemmiferous form of *Riccardia sinuata* (determined by Mrs J.A. Paton), *Marchantia polymorpha* and *Brachythecium albicans. Encalypta streptocarpa* was found on basic slag and *Barbula convoluta, B. unguiculata* and *Bryum argenteum* on waste ground.

Ornithology (J.E. KNIGHT)

WILTON PONDS

Glorious weather made the visit to the Wilton Ponds and woodlands especially enjoyable even though at times there were rather too many flies.

As expected the ponds contained many water birds with Moorhen and Coot breeding and young of both species being seen. Mallards, Teal and Tufted Duck, all known to breed in the area near to the ponds were also present together with one drake Shoveller. A rather surprising bird to be seen however was a drake Pintail; this bird flew over the ponds when disturbed by the party and was later seen swimming near to one of the two Mute Swans. These Swans gave a most impressive display flying over the party and making their characteristic wing-beat noise.

Sedge Warblers although plentiful were not as numerous as would be hoped but were certainly breeding. A nest of Willow Warbler containing six eggs was found close to one of the paths and several Garden Warblers and Blackcaps seen and heard. The climax of the day for several members was a Lesser Whitethroat which put on an impressive display for the Vice County Bird Recorder and his companions. Common Whitethroats were also seen but not in great numbers and Grasshopper Warblers were heard singing several times.

A nest of the ubiquitous Reed Bunting, containing four eggs was found not far from the Willow Warblers, the Reed Bunting being in parts the commonest bird.

A somewhat unexpected bird for this habitat was a Goldcrest which was seen amongst the hawthorn trees and gorse bushes. Hopes that it was a Firecrest were dashed when it started to call then eventually showed itself clearly.

Wilton Woods, adjacent to the pond area, had a full complement of Warblers and all the expected woodland birds including at least two Wood Warblers. Several times both Great-Spotted and Green Woodpeckers were heard but the leaf cover made it difficult to see many of the birds. The wood and scrubland to the west of the pond area again produced a Great-Spotted Woodpecker also a great number of Warblers with superb views of a Chiffchaff in full song. A party of Fieldfares rather late in their departure was seen by several members during the lunch break.

A disheartening aspect to the weekend was the number of vandals equipped with a full range of weapons. One man was seen with a shotgun in a cereal field overlooking a pond. He ran away when approached. A youth when questioned about his air rifle gave a feeble excuse before departing but the grande finale to the day was a party consisting of fathers, mothers and children, even the mothers having air pistols!

The Monday was spent at Teesmouth where a cold wind and some rain spoilt an otherwise pleasant day.

The small colony of Little Terns was visited and at least four pairs were seen over their breeding area. A few Cormorants were seen fishing and drying their wings on the buoys in the river. Skylarks and Meadow Pipits were noticable amongst the sand dunes and also several Reed Buntings one of which had a nest with young near to where the cars were parked for lunch.

Mammals & Lower Vertebrates

Large numbers of frogs and toads were found in the ponds and the surrounding undergrowth.

The ponds also provided both the Smooth and Crested Newts although not in large numbers. The fields close to the ponds had Rabbits and Hares on both days and several mole hills were seen, some in ground which appeared to be far too wet for moles.

Several dreys of Grey Squirrel were seen in the woods and in the coniferous plantation eaten fir cones littered the ground. Badgers were present in one set in the wood but it is unlikely that there were any cubs present since the signs of activity suggested a small adult population.

A dead Common Shrew was picked up on the path into the woods and on the roadside a dead Hedgehog was seen.

At Teesmouth signs of foxes, well known here, were observed. Rabbits were seen on the sand dunes and close to the slag tips and the runs of Longtailed Field Mice were everywhere.

Conchology (A. NORRIS)

The molluscan section concentrated its work on the proposed reserve to the east of Wilton Woods, NGR 45/5919, where a series of ponds and a marsh occur. Very few species of mollusca were found and nothing of particular interest occurred. The full list of species recorded is as follows:—

Potamopyrgus jenkinsi (E.A. Smith)
Carychium minimum Müller
Lymnaea truncatula (Müller)
L. peregra (Müller)
Planorbis crista (L.)
Cochlicopa lubrica (Müller)
Lauria cylindracea (da Costa)
Clausilia bidentata (Strom)
Helix (Cepaea) nemoralis (L.)
Punctum pygmaeum (Drap.)
Discus rotundatus (Müller)
Arion intermedius Normand
A. hortensis Ferussac
A. ater agg.
Euconulus fulvus (Müller)
Oxychilus cellarius (Müller)
Oxychilus alliarius (Miller)
Retinella radiatula (Alder)
R. nitidula (Drap)
Vitrina pellucida (Müller)
Limax maximus L.
Agriolimax reticulatus Müller
A. laevis (Müller)
Pisidium casertanum (Poli)
P. personatum Malm
P. optusale (Lamarck)
P. milium Held

The area of Wilton Woods and Guisborough was surveyed by the Yorkshire Conchological Society in 1972 and a full report of their finds can be found in the *Naturalist* for April-June 1973.

Entomology (L. LLOYD EVANS and BERNARD NORE)

The following dragonflies and bugs were recorded from within the area of ponds and marshes to the east of Wilton Woods, NGR 45/5919.

DRAGONFLIES
Pyrrhosoma nymphula
Ischnura elegans
Coenagrion puella

BUGS
Microvelia reticulata
Gerris odontogaster
Sigara praeusta
S. scotti
Chortoscripta cincta

The bugs *Anthocoris nemorum* and *Anthocoris confusus* were beaten from broom growing by the old railway track through Wilton Woods, and *Gerris lacustris* was found on a puddle on one of the woodland tracks through Wilton Woods.

From the pond to the north of the railway track NGR 45/583190 a rather rare bug in Yorkshire was recorded, *Gerris lateralis.*

COLEOPTERA

The following species kindly identified by Mr. P. Skidmore were all beaten from marram tussocks on the exposed seaward dunes.

Philopedon plajiatus (Schaller)
Calathus mollis (Marsham)
Micrambe villosa (Heer)
Phyllobius pyri (L.)
Aegialia avenaria (F.)
Demetrias atricapillus (L.)
Lathridius lardarius (Degeer)
Otiorrhynchus atroapterus (Degeer)

Arachnida and other Invertebrate Orders (C. HOWES)

As a whole the north-east of Yorkshire has been very scantily worked for its spider fauna, the only notable work having been done by J.W. Heslop-Harrison, G.B. Walsh and the great Yorkshire arachnologist William Falconer during the first twenty years of this century. Most of the work published by Harrison and Walsh concerned the Cleveland hills and North Yorkshire Moors areas, though the indefatigable Falconer, in addition, made visits during 1909 and 1910 to Saltburn, Marske, Redcar, Coatham marshes and Teesmouth, the highlights of his collecting being published in the *Naturalist* 1910 pp. 21-22 and 433-435. Falconer's collecting on the dune systems between Coatham and Teesmouth turned up some interesting and rare species together with numbers of new Yorkshire and vice-county records. As the area in question is under threat of destruction or radical change, for the use of those working to save the dunes I include the most notable of Falconer's records to help emphasise the scientific value of the site.

SPIDERS

Cornicularia vigilax B. ♀ 1909. New county record, a rare species throughout Britain.

Enoplognatha thoracica Hahn ♀ 1909. The second Yorkshire specimen and new record for V.C. 62.

Erigone longipalpis Sund. 4 ♀ 4 ♂ 1909. New V.C. 62 record. A characteristic saltmarsh and estuary species.

Clubiona phragmitis C. L. Koch = *C. holosericea* Degeer 1909. A new record for the North Riding.

Tapinocyba pallens Camb. ♀ 1909. A very rare species usually associated with pine needles and leaf litter, very much out of context at Coatham unless it represents a relict species.

Clubiona reclusa O. P. Camb. = *C. grisea* L. Koch 1910. A new North Riding record, marshy areas.

C. neglecta Camb. 1910. An uncommon species characteristic of coastal sandhill areas.

Robertus arundineti Camb.; and *Oedothorax apicata* Bl. are rare species.

The only collecting done during the Y.N.U. weekend was during a very short visit to the superb and potentially very rich dune system between Coatham and Teesmouth. The dune systems with the adjacent remaining mud flats of the Tees estuary present an ecological situation unique in Yorkshire and are consequently worthy of further study. Very few species were collected but this merely reflected the briefness of the visit and the lack of suitable collecting equipment.

Ciniflo fenestralis (Stroem) Females amongst roots of marram and under well embedded driftwood.

Dyctina arundinacea (L.) Many webs in the dead inflorescences of composites.

Zora spinimana (Sund.) Female amongst leaf litter beneath shrubby sallow bushes.

Xysticus cristatus (Clerck) Many swept from grass.

Tibellus oblongus (Walck) Females amongst marram and other herbage.

Arctosa perita (Lat.) Males and females in good numbers. This typically heath and sand-dune species is usually found inhabiting a silk-lined T- or Y-shaped tube embedded into the sand. The only other known Yorkshire population is to be found at Spurn where it was first discovered in 1953 (*Nat.* 1953, 167-171) and its ecology studied by Dr. I. H. Sudd during 1968-70 (*J. Anim. Ecol.* 1972 41(1), 63-70).

Lycosa monticola (Clerck) Hunting on sunlit tidal debris and rubbish near the road.

Trochosa terricola (Degeer) Large specimens under refuse and well embedded driftwood.

Tarentula pulverulenta Females under refuse and well embedded driftwood.

Tegenaria artica C.L. Koch A fine female amongst matted marram roots overhanging an eroded section of the leaward dunes.
This species, popularly regarded as a household spider, may have been introduced into the area with garden or domestic refuse, though it could possibly be existing in the kind of natural situation it occupied before becoming 'domesticated'.

Robertus arundineti (O.P. Camb.) A single male amongst Marram. An exciting find confirming Falconer's discovery of this rarity here at Coatham in 1910. The only other Yorkshire records of this rarity are from Askham Bog (*Nat.* 1971, 18-23), Malham (*Field Studies* 1963, 1.5, 65-87) and Cautley Spout near Sedbergh, D. Mackie (pers. comm.).

Pachygnatha clercki Sund. Female amongst leaf litter beneath sallows in dried up marsh.
Dismodicus bifrons (B.I.) Female from saltmarsh plants.
Hypomma bituberculatum (Wid.) By far the most abundant species amongst the marram tussocks. Large numbers of both sexes were present, the males with their fantastic double-lobed heads being particularly spectacular.
Poeciloneta globosa (Wid.) Single female under refuse.

HARVEST SPIDERS

Platybunus triangularis (Herbst.) Under debris.
Oligolophus tridens C.L. Koch Under debris.
Nemastoma bimaculatum (Fab.) Amongst grass tussocks.

WOODLICE

Armadillidium vulgare (Lat.), *Philoscia muscorum* (Scop.) and *Porcellio scaber* Lat. Were all common species and are known to be tolerant of dry, dune conditions.

OTHER ORDERS

The centipede *Lithobius forficatus* and the millipede *Polydumus complanatus* were common under well-embedded driftwood and rotting rubbish.

ELVINGTON, NEAR YORK, V.C. 61, June 9th and 10th

This was a two day meeting for which we again had glorious weather. On the Saturday, members, led by our new Divisional Secretary for V.C. 61, Miss Myra Taylor, explored the east bank of the River Derwent, upstream from Elvington, and nearby Sutton Wood. On the Sunday, parties moved downstream from the village, along both banks. After lunch, the Wheldrake Ings Nature Reserve, owned by The Yorkshire Naturalists' Trust, was visited.

The Meeting, at which Miss Eva Crackles took the Chair, was held in the Parish Hall, Elvington, after a picnic tea. A vote of thanks was proposed by Mrs. Hilda Flint to Miss Taylor and to the many landowners who had so kindly given us access to their land.

Flowering Plants and Ferns (E. CRACKLES)

On Saturday, the botanists proceeded north along the west bank of the River Derwent. In the river were large beds of *Potamogeton lucens* (Shining Pondweed) and of *Ranunculus aquatilis* ssp. *peltatus* (Water Crowfoot), without floating leaves, but in good flower. There were occasional beds of *Potamogeton perfoliatus* (Perfoliate Pondweed) and of a long-leaved Water Crowfoot, not in flower, which may be *R. fluitans,* whilst *Nuphar lutea* (Yellow Water-lily) occurred rarely. Large beds of *Glyceria maxima* (Reed-grass) and *Sparganium erectum* (Bur-reed) occurred by the water's edge, with *Ranunculus sceleratus* (Celery-leaved Crowfoot), *Rorippa islandica* (Marsh Yellow-cress), *R. amphibia* (Great Yellow-cress), *Polygonum amphibium* (Amphibious Bistort), *Myosotis scorpioides* (Water Forget-me-not), *Scrophularia aquatica* (Water Figwort) and *Carex acuta* (Slender-tufted Sedge) also present. *Alnus glutinosa* (Alder) is frequent by the river. On the bank *Brassica rapa* (Turnip) and *Impatiens glandulifera* (Policeman's Helmet) were common and other species noted included: *Cardamine flexuosa* (Wood Bitter-cress), *Conium maculatum* (Hemlock), *Chrysanthemum vulgare* (Tansy), *Carduus acanthoides* (Welted Thistle) and *Cicerbita macrophylla* (Blue Sow-thistle).

In a field near Sutton Wood *Alopecurus* x *hybridus* was present with both parents, *A. pratensis* (Meadow Foxtail) and *A. geniculatus* (Marsh Foxtail); *Bromus commutatus* (Meadow Brome) also occurred. *Cardamine amara* (Large Bitter-cress) was seen in a dike by the wood, with *Barbarea stricta* (Small-flowered Yellow Rocket) present in fair quantity. *Humulus lupulus* (Hop) was locally frequent at the edge of the wood, with a few bushes of *Viburnum opulus* (Guelder Rose), whilst *Lonicera periclymenum* (Honeysuckle) and *Ribes sylvestre* (Red Currant) were also noted here.

Some members of the party explored part of the wood and Miss M. Taylor has supplied the following note: Sutton Wood was found to be largely coniferous, much of the lower vegetation being *Pteridium aquilinum* (Bracken), *Endymion non-scriptus* (Blue bell) and *Anemone nemorosa* (Wood Anemone). Most of the species found were on the rides and included: *Lysimachia nemorum* (Yellow Pimpernel), *Luzula pilosa* (Hairy Woodrush), *Milium effusum* (Wood Millet) and a single plant of *Lathyrus* *montanus* (Bitter Vetch). *Rosa dumalis* was reported as being seen. In one small area, alongside a wider ride, the following species were recorded: *Rumex acetosella* (Sheep's Sorrel), *Scrophularia nodosa* (Figwort), *Digitalis purpurea* (Foxglove), *Veronica officinalis* (Common Speedwell), *Carex pilulifera* (Pill-headed Sedge), *C. remota* (Remote Sedge) and *Calamagrostis epigejos* (Bushgrass). *Blechnum spicant* (Hard-fern) was noted in a ditch beside this ride.

The number of species in the river-side meadows north of Sutton Wood, was disappointing. *Rhinanthus minor* (Yellow-Rattle) occurred in abundance and *Silaum silaus* (Pepper Saxifrage) was noted. However, a small dike was in very good condition and contained many of the species which would formerly occur in the adjacent water meadows. The following species occurred here in quantity, at least locally: *Lychnis flos-cuculi* (Ragged Robin), *Stellaria palustris* (Marsh Stitchwort), *Hottonia palustris* (Water Violet), *Senecio aquaticus* (Marsh Ragwort), *Carex disticha* (Brown Sedge), *Glyceria fluitans* (Flote-grass) and *Alopecurus geniculatus* (Marsh Foxtail). Other species noted here were: *Equisetum fluviatile* (Water Horsetail), *Cardamine pratensis* (Cuckoo Flower), *Oenanthe fistulosa* (Water Dropwort), *Achillea ptarmica* (Sneezewort), *Carex vesicaria* (Bladder Sedge) and *Bromus commutatus* (Meadow Brome).

On Sunday morning both banks of the River Derwent, to the south of Elvington, were worked but yielded no species which had not been recorded elsewhere. In the afternoon, some members of the party visited Sutton Farm. *Lycopsis arvensis* (Small Bugloss) occurred in the sandy fields, and the following species were noted by a pond at the edge of the water meadows: *Alisma plantago-aquatica* (Water-Plantain), *Eleocharis palustris* (Common Spike-rush), *Carex acuta* (Slender-tufted Sedge) and *Phalaris arundinacea* (Reed-grass).

The most notable species recorded in quantity on the Wheldrake Nature Reserve were: *Lychnis flos-cuculi* (Ragged Robin), *Lotus uliginosus* (Large Birdsfoot-trefoil), *Sanguisorba officinalis* (Great Burnet), *Silaum silaus* (Pepper Saxifrage) and *Crepis paludosa* (Marsh Hawk's-beard). *Oenanthe silaifolia* was also noted.

Washlands near the waterworks, north of Elvington, were found to be dominated by *Glyceria maxima* (Reed-grass) beds, with *Carex acuta* (Slender-tufted Sedge) and *C. disticha* (Brown Sedge) frequent near the edge and *C. vesicaria* (Bladder Sedge) also present.

Ornithology (A.C.M. DUNCAN)

On Saturday we went upstream through water meadows adjoining the River Derwent, visiting plantations on the higher ground on the way. Our route on Sunday morning was downstream from Elvington Bridge and in the afternoon we went to Wheldrake Ings.

Five species were observed with fledged young – Mallard, Moorhen, Lapwing, Redshank and Blue Tit; seven species had a nest or eggs and 23 were heard singing (marked * in list).

List of birds noted:

Grey Heron, Mallard, Kestrel, Red-legged Partridge, Partridge, Pheasant, Moorhen, Coot, Lapwing, Redshank, Curlew*, Snipe, Black-headed Gull, Wood Pigeon, Stock Dove, Collared Dove, Turtle Dove, Cuckoo*, Swift, Skylark*, Sand Martin (colony), Swallow (nest), House Martin (nest), Tree Pipit, Meadow Pipit, Yellow Wagtail, Pied Wagtail, Wren*, Dunnock*, Sedge Warbler*, Garden Warbler*, Blackcap*, Whitethroat*, Lesser Whitethroat, Willow Warbler*, Chiffchaff*, Goldcrest*, Robin*, Blackbird*, Song Thrush*, Mistle Thrush, Long-tailed Tit, Blue Tit, Great Tit*, Tree Creeper, Corn Bunting*, Yellow Hammer*, Reed Bunting (nest with eggs), Chaffinch*, Greenfinch*, Goldfinch*, Linnet*, Redpoll*, Bullfinch, House Sparrow (nest with eggs), Starling (nest with eggs), Jay, Magpie, Jackdaw, Rook (nest with eggs), Carrion Crow.

Conchology (A. NORRIS)

The area proved very rich in mollusca, some 72 species being recorded during the weekend. This is 40% of the total list of land and freshwater species found in Britain and about 50% of the total list for Yorkshire.

The most interesting records were the occurrence of *Unio pictorum* and *Unio tumidus* in large numbers in the soft mud of the River Derwent at the entrance to Wheldrake Ings. *U. tumidus* is a very local species in Yorkshire and usually very difficult to find even in places in which it has been recorded. At the same locality the abundance of *Theodoxus fluviatilis*, the River Nerit, is perhaps worthy of note. Further up the

Derwent just below the lock near Elvington, specimens of the rare bivalve *Anodonta minima* were found; this extends its range in the Derwent down stream from Stamford Bridge.

The full list of species is as follows:–

	A	B	C	D	E	W
Theodoxus fluviatilis (L.)		B			E	W
Viviparus viviparus (L.)		B			E	W
Valvata cristata Müller		B		D		
V. piscinalis (Müller)		B	C	D	E	W
Potamopyrgus jenkinsi (E.A. Smith)		B	C		E	W
Bithynia tentaculata (L.)		B	C	D	E	W
B. leachi (Sheppard)		B				
Carychium minimum Müller		B	C	D	E	W
C. tridentatum (Risso)	A					
Lymnaea truncatula (Müller)		B	C	D	E	W
L. palustris (Müller)			C		E	W
L. auricularia (L.)		B			E	W
L. peregra (Müller)		B	C	D	E	W
Aplexa hypnorum (L.)					E	W
Physa fontinalis (L.)		B	C			W
Planorbarius corneus (L.)			C		E	W
Planorbis carinatus Müller		B		D		
P. planorbis (L.)			C		E	W
P. vortex (L.)		B	C	D	E	W
P. leucostoma Millet			C	D	E	W
P. albus Müller		B				
Segmentina complanata (L.)		B				
Acroloxus lacustris (L.)		B		D		
Ancylus fluviatilis Müller		B			E	W
Succinea putris (L.)			C	D	E	W
S. pfeifferi Rossmassler		B	C	D	E	W
Cochlicopa lubrica (Müller)	A			D	E	W
C. lubricella (Porro)	A				E	W
Acanthinula aculeata (Müller)					E	W
Vallonia costata (Müller)	A					
V. pulchella (Müller)			C	D	E	W
V. excentrica Sterki		B		D		
Ena obscura (Müller)	A					
Clausilia bidentata (Strom)	A				E	W
Arianta arbustorum (L.)	A				E	W
Helix (Cepaea) nemoralis (L.)		B		D		
Hygromia striolata (C. Pfeiffer)	A			D		
H. hispida (L.)	A		C	D	E	W
Monacha cantiana (Montagu)	A	B		D		
Punctum pygmaeum (Drap.)					E	W
Discus rotundatus (Müller)	A	B		D		
Arion intermedius Normand	A	B	C	D	E	W
A. circumscriptus Johnston	A					
A. fasciatus (Nilsson)	A	B			E	W
A. ater (L.)	A	B		D		
Euconulus fulvus (Müller)		B	C		E	W
Vitrea crystallina (Müller)		B	C			W
V. contracta (Westerlund)	A				E	W
Oxychilus draparnaldi (Beck)	A					
O. cellarius (Müller)	A			D	E	W
O. alliarius (Miller)		B				
Retinella radiatula (Alder)		B				
R. pura (Alder)	A				E	W
R. nitidula (Drap.)		B				
Zonitoides nitidus (Müller)		B	C	D	E	W
Vitrina pellucida (Müller)			C	D		W
Limax maximus L.	A			D		

	A	B	C	D	E	W
Agriolimax reticulatus Müller	A		C	D	E	W
A. laevis (Müller)		B		D		
Unio pictorum (L.)		B			E	W
U. tumidus Philipsson		B			E	W
Anodonta anatina (L.)		B			E	W
A. minima (Kennard)		B				
Sphaerium corneum (L.)		B	C	D	E	W
S. lacustre (Müller)		C				W
Pisidium amnicum (Müller)		B			E	W
P. casertanum (Poli)					E	
P. personatum Malm				D	E	W
P. subtruncatum Malm		B		D	E	W
P. henslowanum (Sheppard)		B			E	W
P. hibernicum Westerlund		B				
P. nitidum Jenyns		B		D	E	W

A =	ELVINGTON VILLAGE	44/70-47-	
B =	RIVER NORTH & SUTTON WOOD	44/7-4-	
C =	WHELDRAKE INGS	44/70-44-	
D =	KEXBY (Derwent)	44/7-5-	
E =	WHELDRAKE INGS & DERWENT	44/69-44-	
W =	Wheldrake Ings Nature Reserve only	44/6-4	44/7-4

Entomology (J.H. FLINT)

The high wind rather hampered insect collecting and insects generally, with the possible exception of the sawflies, were not particularly numerous. Most collecting on Saturday was done in the shelter of the alders along the bank of the Derwent and in the sunny rides of Sutton Wood (10 km. sq. 44/74). Along the Derwent many members saw examples of the beautiful Demoiselle *Agrion splendens* Harris, but only two species of damselfly were seen, the common *Ischnura elegans* Lind. and *Pyrrhosoma nymphula* Sulz. Other typical insects of the river included the water beetle *Platambus maculatus* L., the reed beetle *Donacia simplex* F., the water scorpion *Nepa cinerea* L. and plenty of the common mayfly *Ephemera vulgata* L.

Sweeping the alders produced four sawflies not previously reported from V.C. 61 of which *Croesus varus* Vill. was the most interesting. The adults are strikingly distinctive and the larvae conspicuous so that it is surprising that it has only been taken once before in Yorkshire in this century. Sutton Wood was not very productive of insects. There were plenty of lacewings among the pines, *Nathanica capitata* F. and *Chrysopa perla* L. plentiful, but the only insect of note that was taken was the sawfly *Cephus nigrinus* Thoms., a woodland species whose larvae mine the stems of *Poa pratensis* and this also has not previously been recorded in V.C. 61.

There was no lepidopterist present so the butterflies and moths reported are the result of casual observation by several members. Numbers were small but the high wind reduced their activity and so they would easily be overlooked. Bees and wasps were decidedly scarce. Four species of *Bombus* and two of *Vespula* were noted, but, apart from a number of *Andrena haemorrhoa* F. only a few odd aculeates were seen.

On Sunday the tiny pine sawfly *Xyela julii* Breb. was taken at Broomhill Plantation but on that day collecting was practically restricted to the shelter of a nearby hedge (in 10 km. sq. 44/64) and here sawflies and hoverflies were very active in the hot sunshine.

Five sawflies are additions to the vice-county and are indicated in the list below by an asterisk. Abbreviations to indicate locality are as follows:

A = River bank (square 44/74)
B = Sutton Wood
C = Near Broomhill Plantation (but in square 44/64)

HEMIPTERA HOMOPTERA

Cercopis vulnerata Ill (A)

Cixius pilosus Ol. (B)

LEPIDOPTERA
Euchloe cardamines L. (Orange Tip) (A)
Aglais urticae L. (Small Tortoiseshell) (A)
Pararge megera L. (Wall) (A)
Lycaena phlaeas L. (Small Copper) (A)
Polyommatus icarus Rott. (Common Blue) (A)
Ochlodes venata Br. (Large Skipper) (A)
Euproctis similis Fuess. (Gold Tail) (A, larvae)
Spilosoma lubricipeda L. (White Ermine) (A)
Episema caeruleocephala L. (Figure of Eight) (larvae, A)
Euclidimera mi Clerck (Mother Shipton) (C)
Odezia atrata L. (Chimney Sweeper) (A)
Plemyria bicolorata Hufn. (Blue-bordered carpet) (A)
Lomaspilis marginata L. (Clouded Border) (A)

COLEOPTERA
Podabrus alpinus Pk. (A)
Cantharis lateralis L. (A, B)
Pyrochroa serraticornis Scop. (A)
Sinodendron cylindricum L. (A)
Caenorhinus germanicus Hbst. (B)

HYMENOPTERA: SYMPHYTA
Xyela julii Breb.
Pamphilus sylvaticus L. (C)
**Cephus nigrinus* Thoms. (B)
Arge cyanocrocea Forst. (C)
A. ustulata L. (C)
Strongylogaster lineata Chr. (C)
Selandria sixii Voll. (A)
Dolerus sanguinicollis Klug (C)
Ametastegia equiseti Fall. (A)
A. glabrata Fall. (C)
**Eriocampa ovata* L. (A)
Rhogogaster punctulata Klug (C)
Tenthredo celtica Bens. (C)
Macrophya albicincta Schrk. (C)
**Nematinus abdominalis* Pz. (A)
**N. luteus* Pz. (A)
**Croesus varus* Vill. (A)

HYMENOPTERA: ACULEATA
Pemphredon lugubris Latr. (C)
Andrena armata Gmel. (C)
Nomada panzeri Lep. (C)

DIPTERA
Syrphus lunulatus Mg. (A)
Chrysogaster hirtella Loew. (A)
Volucella bombylans L. (A)
Eristalis intricarius L. (A)
Helophilus lineatus F. (A)
Xylota segnis L. (A)
Eumerus strigatus Fall. (A)

Spiders and other Invertebrate Orders (C.A. HOWES)

The following species were collected from the river bank, pasture and willow area below the old water mill.

SPIDERS
Dictyna arundinacea (L.) Fairly common, spun in the heads of composites.
Ciniflo fenestralis (Stroem) In the deep fissures of Crack Willow bark.
Oonops pulcher Temps. One under concrete slab in river-side mud.
Drassodes lapidosus (Walck) Under concrete slabs and masonry by the old mill.
Clubiona corticalis (Walck) Under loose bark of old Crack Willows.
Zora spinimana (Sund.) Along field-side path edge.
Xysticus cristatus (Clerck) Frequent amongst herbage.
Philodromus aureolus (Clerck) Swept from tall herbage.
Lycosa pullata (Clerck) and *L. amentata* (Clerck) Abundant on paths and bare river banks.
Theridion ovatum (Clerck) Large numbers of this very variable marked spider swept from tall herbage, especially nettle beds.
T. bimaculatum (L.) Abundant in herbage.
Tetragnatha extensa (L.) In tall shaded waterside herbage near the mill.
T. montana (Simon) Amongst herbage and low bushes.
Pachygnatha clercki (Sund.) Amongst river edge vegetation.
Araneus diadematus (Clerck) Young specimens on branches.
A. cornutus (Clerck) Amongst river edge vegetation.
A. cucurbitinus (Clerck) Beaten from apple tree foliage.

Araneus umbraticus (Clerck) Under loose bark of Crack Willows.

Zygiella x-notata (Clerck) Spun under guttering of sheds and outbuildings at the old mill.

Linyphia montana (Clerck) and *L. clathrara* (Sund.) Swept from herbage.

OTHER ORDERS

The Harvest spider *Platybunus triangularis* (Herbst.) was taken by D. Murray. The Centipedes *Lithobius forficatus* and *Haplophilus subterraneus* (Shaw), the Millipedes *Polydesmus complanatus* and *Cylindroiulus sp.* and the Woodhouse *Porcellio scaber* Lat. were collected from rotting Crack Willows and under stones and rotting logs.

LARTINGTON FOR DEEPDALE AND CRAG POND, V.C. 65, June 23rd

Members gathered at Barnard Castle in heavy rain, and then proceeded to Crag Pond, near Lartington, by car, led by Mrs. Burnip who was very kindly standing in for the Divisional Secretary, Mrs. Holloway, who was abroad. We spent the morning investigating the margin of the Pond and, after lunch, explored nearby Deepdale, with its old-established, deciduous woodland and sandstone quarries. After an excellent tea at Headquarters, Miss Eva Crackles, the President, chaired the Meeting. Mrs. Joan Duncan proposed a vote of thanks to Mrs. Holloway and Mrs. Burnip and to the landowner, Mrs. Field of Lartington Hall, who had granted us access to her estate.

Flowering Plants (J.E. DUNCAN)

Drenching rain in the morning limited the area covered, but an intensive search was made of the margins of Crag Pond and the nearby woodland and marshy places. In the afternoon the route taken was through Deepdale wood, returning across the moorland via the quarry pond. For recording the meeting was profitable, 22 species not mapped for the 10 Km square NZ/01 were noted. These are marked * in the account.

Between the wood and Crag Pond was a small bog; the plants seen here and in other marshy areas included: *Equisetum fluviatile** (Water Horsetail); *Hydrocotyle vulgaris** (Marsh Pennywort); *Salix pentandra** (Bay-leaved Willow); *Menyanthes trifoliata* (Bogbean); *Veronica scutellata** (Marsh Speedwell); *Valeriana dioica* (Marsh Valerian); *Dactylorchis purpurella** (Northern Marsh Orchid) and the two common Cotton grasses, *Eriophorum vaginatum** and *E. angustifolium, Ranunculus aquatilis** (Water Buttercup) and *Potamogeton natans** (Broad-leaved Pondweed) were found in Crag Pond, the latter also occurring in the quarry pond.

Eight species of Carex were recorded during the day: *C. sylvatica* (Wood Sedge), *C. rostrata** (Bottle Sedge), *C. pallescens** (Pale Sedge), *C. pilulifera* (Pill Sedge), *C. nigra* (Common Sedge), *C. remota** (Remote Sedge), *C. curta** (White Sedge) and *C. ovalis** (Oval Sedge).

The woodland of Deepdale had some fine Oak trees and amongst the ground flora were: *Corydalis claviculata** (Climbing Corydalis), *Geranium Sylvaticum* (Wood Cranes-bill), the two species of Avens, *Geum urbanum* and *G. rivale,* with the hybrid *G. intermedium, Epipactis helleborine* (Common Helleborine), *Dactylorchis fuchsii** (Common Spotted Orchid), and *Poa nemoralis* (Wood Poa).

Near the quarry a good find was *Lycopodium clavatum** (Stag's-Horn Clubmoss), and *Polygala vulgaris** (Milkwort) also grew here. Other species new to the Plant Atlas were: *Taxus baccata** (Yew); *Meconopsis cambrica** (Welsh Poppy); *Cerastium glomeratum** (Sticky Mouse-ear); *Epilobium palustre** (Marsh Willow-herb); *Rhododendron ponticum** (planted), and *Juncus squarrosus** (Heath Rush).

Bryology (M. DALBY)

In the birch wood near Crag Pool large tussocks of *Sphagnum capillaceum* and *S. palustre* grew with *Plagiothecium undulatum* and cushions of *Leucobryum glaucum,* and in the wetter areas *S. recurvum* and *S. fimbriatum* were abundant among the rushes. *S. squarrosum, Acrocladium cordifolium* and *Pellia neesiana* were found in a stretch of willow carr near the Pool. The rocks at the edge of the Pool were disappointing, only *Rhacomitrium aciculare* and *Fontinalis antipyretica* were recorded.

In the afternoon Deepdale was visited where the most interesting feature was the abundant growth of *Dicranum strictum.* This was a new vice-county record although it was well established in the habitat, growing on alder, ash and oak, dead branches and on the rocks in abundance.

Plant Galls (T.B. STUBBS)

Many birch trees carried the Witches' Broom, ascribed to the fungus *Taphrina deformans* Berk. Two hymenopterous examples were found on *Quercus* sp., the oak apple *(Biorhiza pallida* Oliv.) and the currant gall *(Neuroterus quercus-baccarum* L.) The only mite gall was that of *Eriophyes brevitarsus typicus* Nal., on *Alnus glutinosa,* and one aphid gall was seen on *Stellaria holostea,* ascribed to *Brachycolus stellariae* Hardy.

Ornithology (J.E. KNIGHT)

In spite of an extremely wet start to the day with torrential rain, the outing proved to be most enjoyable. The area was rich in bird life but a shortage of ornithologists meant that the overall number of birds seen was far less than the two main habitats justified.

The morning was spent around Crag Pond and the woodlands immediately adjacent to the water. At least three Mallard were seen with young of different ages and Coot could be seen still incubating. The larger trees and rather wet birch wood surrounding part of the lake had a number of smaller birds feeding young; Spotted Flycatchers, Blue Tits and Wrens were all seen with young or with food in their beaks. Two Redstarts' nests were found within a short distance from where the cars were parked and superb views of both the adults and young were seen; also along the road from the parking area to the farm a Yellow Wagtail was seen feeding in company with a Pied Wagtail.

The afternoon was spent in Deepdale Woods, these containing many beautiful mature oaks and the obviously high insect population being relished by the many Warblers and Pipits etc. The highlight of the afternoon was an excellent view of a Woodwarbler which was one of two singing throughout the afternoon. One hollow tree had all the signs of having been used as a nesting site of a Tawny Owl with several pellets at the base and although no owls were seen a Tawny was heard hooting just after midday.

Perhaps the bird of the day must be the Tree Pipit; these were seen and heard all the time and, although not the most exotic bird, they certainly added to the day's enjoyment.

Birds seen or positively identified by song were as follows:–

Blackbird, Blackcap, Cornbunting, Reed Bunting, Chaffinch, Coot, Carrion Crow, Cuckoo, Curlew, Dunnock, Spotted Flycatcher, Goldcrest, Greenfinch, Black-Headed Gull, Herring Gull, Lesser Black-Backed Gull, Heron, Jackdaw, Kestrel, Lapwing, Skylark, Linnet, Magpie, Mallard, House Martin, Moorhen, Tawny Owl, Oystercatcher, Pheasant, Wood Pigeon, Meadow Pipit, Tree Pipit, Redpoll, Redshank, Redstart, Robin, Rook, House Sparrows, Starling, Swallow, Swift, Mistle Thrush, Song Thrush, Blue Tit, Great Tit, Tree Creeper, Pied Wagtail, Yellow Wagtail, Garden Warbler, Willow Warbler, Wood Warbler, Great-Spotted Woodpecker, Wren and Yellowhammer.

Although many of the obviously commoner species are missed from the day's list, both Whitethroat and Chiffchaff were especially looked for in vain and if they are present in the area they certainly are not as abundant as would be expected.

Mammals & Lower Vertebrates

No reptiles were seen during the excursion which may not be too surprising due to the weather conditions, but the amphibians were represented by large numbers of tadpoles in Crag Pond many of them feeding on bread and other food matter thrown into the water as ground bait by the fishermen.

One Hare was seen in the field next to Deepdale Wood which contained large numbers of Rabbits, the burrows being in the field or at the wood edge. Three Squirrel's dreys were seen in the woods but no attempts were made to identify their occupants although it is probable that they were Grey Squirrel.

On the journey back to the meeting place a Weasel was seen running across the track in front of the car. It disappeared finally into a drain emptying from the road into a dry ditch.

MICKLETOWN, NEAR CASTLEFORD, V.C. 63, July 14th

A doughty band of members attended, for what proved to be a continuously wet day. Mrs. Freda Kemsley, the Divisional Secretary for V.C. 63, took us to a number of ponds near to the town, caused by subsidence, and along the banks of the nearby canal. After what proved to be a most interesting excursion we returned to Mickletown, where we had tea and the Meeting. The President Miss E. Crackles took the Chair and Miss J. Robertson expressed a vote of thanks to Mrs Kemsley for organising the day and to the local landowners who had given us permission to explore their land.

Flowering Plants (D.R. GRANT)

Mickletown Flashes are an area of relatively recent occurrence and the open areas of water have increased rapidly over the last few years. A typical marshland flora is to be found round the edges of the flashes.

There were a few interesting plants found alongside the lane leading to the flashes, these being the Barberry *(Berberis vulgaris)*, White Bryony *(Bryonia dioica)*, Black Horehound *(Ballota nigra)*, Columbine *(Aquilegia vulgaris)* and Lesser Meadow Rue *(Thalictrum minus)*. It is probable that these plants were introduced as seeds with Magnesian Limestone pebbles used as road ballast.

The eastern shoreline of the first flash was then explored and soon the party were rewarded by a fine show of Buttonweed *(Cotula coronopifolia)*. This was a new site for the plant in West Yorkshire discovered about five years ago by Mr. C. Hartley. This find stimulated recent botanical work in the area cumulating in this visit by the Union. This plant and its neighbour the Glaucous Bulrush *(Schoenoplectus tabernaemontani)* have no doubt been introduced in mud carried on the feet of wading birds. Other associated plants on the shore were Marsh Arrow Grass *(Triglochin palustris)*, False Fox Sedge *(Carex otrubae)*, Jointed Rush *(Juncus articulatus)*, Reed Grass *(Glyceria maxima)*, and the Reed *(Phragmites communis)*.

A few members crossed Caroline Bridge over the Aire and Calder Canal, a very busy commercial waterway, to look at the banks of the River Aire. Here a large colony of the Giant Hogweed *(Heracleum mantegazzianum)* was found in fruiting condition growing in the usual jungle of Himalayan Balsam *(Impatiens glandulifera)*. The party returned to the canal towpath and proceeded to walk towards Allerton Bywater. Meadow Cranesbill *(Geranium pratense)* was in full flower and in the side of the canal the Hemlock Water Dropwort *(Oenanthe crocata)*. Further along the canal we were fortunate in seeing a large plant of Angelica *(Angelica archangelica)* a plant which is occasionally cultivated as a herb. It has been known on this canal at Stourton for several years and it is obviously increasing downstream on the canal banks.

The next two flashes were then examined. The vegetation consisted of the Great Reedmace *(Typha latifolia)*, Water Plantain *(Alisma plantago-aquatica)*. Bur Marigold *(Bidens tripartitus)*, Water Forget-me-not *(Myosotis caespitosa)* and the Glaucous Rush *(Juncus inflexus)*. Associated plants in the damp areas were Gypsywort *(Lycopus europaeus)*, Skullcap *(Scutellaria galericulata)*, Marsh Ragwort *(Senecio aquaticus)*, and the Great Yellow Cress *(Rorippa amphibia)*. In the deeper water of the flashes the following plants were found, Common Pondweed *(Potamogeton natans)*, Horned Pondweed *(Zannichellia palustris)*, Mares' Tail *(Hippuris vulgaris)*, Spiked Water Milfoil *(Myriophyllum spicatum)*, and the Duckweeds *(Lemna minor* and *L. trisulca)*.

The heavy rain did not prevent the botanists making a further attempt at exploration after the lunch break. The canal bank yielded the Field Garlic *(Allium oleraceum)* and the Remote Flowered Sedge *(Carex remota)*. Another party went by car to the No. 6 Flash at Allerton Bywater where Arrowhead *(Sagittaria sagittifolia)*, and Horn-wort *(Ceratophyllum demersum)* occur in a dike. Waste ground in the village produced the Wild Carrot *(Daucus carota)* whilst a hedgerow was covered with the climbing Hop *(Humulus lupulus)*.

Lichens (P.M. EARLAND-BENNETT)

Only ten species were recorded during the day from 44/3927, this paucity underlining the degree of air pollution in the area. Only the toxi-tolerant species *Lecanora conizaeoides* was present on the trees and mainly restricted to their boles. With the exception of a few thalli of *Stereocaulon pileatum, Lecanora conizaeoides* was the only species seen on siliceous substrates. *Lepraria incana* was conspicuous by its absence despite favourable damp and shaded habitats. The majority of species seen were on calcicolous substrates i.e. asbestos, concrete and mortar.

Caloplaca citrina (Hoffm.) Th.Fr. Mortar of canal walls.

Candelariella aurella (Hoffm.) Zahlbr. Asbestos garage roof; mortared copings of walls; concrete posts.

Lecanora conizaeoides Nyl. ex Cromb. On boles and sparingly on trunks of *Ulmus, Fraxinus* and *Salix;* sandstone walls and loose blocks.

L. dispersa (Pers.) Sommerf. Asbestos garage roof; mortared copings of walls; concrete posts.

L. muralis (Schreb.) Rabenh. Asbestos garage roof; rare on concrete posts and mortar.

Lecidea granulosa (Hoffm.) Ach. Rare on rotting wood.

Physcia tenella (Scop.) DC. em Bitt. Rare on vertical surface of a concrete post.

Rinodina subexigua (Nyl.) Oliv. Rare on tops of concrete posts.

Stereocaulon pileatum Ach. Rare on loose sandstone blocks.

Verrucaria hochstetteri Fr. Mortar on loose sandstone blocks.

Ornithology (R.J. RHODES)

All parts of the area were visited – the four flashes, reed-fringed and with patches of half-submerged bushes, marsh, meadows and hedgerows bordering cultivated land – during continuous heavy rain which lasted all day. In such limited types of habitat and with the unrelenting rain which restricted bird-song and movement it is perhaps not surprising that the total of 37 species recorded was such a low one.

On the flashes a total of 120 Coot including a number of young were present, several Tufted Duck, 3 Pochard, 3 Great Crested Grebe, Little Grebe, Mallard, Moorhen and Mute Swan. Of the warblers, only odd birds of three species were seen, Whitethroat, Sedge Warbler and two singing Reed Warblers, the latter being of particular interest in view of the limited distribution of this species in V.C. 63. The largest flock of the day was one of 150 Lapwing resting on cultivated land. Other species recorded during the day were: Kestrel, Snipe, Lesser Black-backed Gull, Common Gull, Black-headed Gull, Wood Pigeon, Swift, Skylark, Swallow, House Martin, Sand Martin, Carrion Crow, Rook, Magpie, Wren, Song Thrush, Blackbird, Robin, Meadow Pipit, Starling, Greenfinch, Linnet, Reed Bunting, House Sparrow, Tree Sparrow.

Conchology (A. NORRIS)

The area has a very restricted molluscan fauna, partly due to the acid conditions prevalent on the Coal Measures and partly due to the generally poor condition of the water in these areas. The weather conditions on the day also did very little to help in the compilation of a molluscan faunal list. I would like to thank Dr. & Mrs. L. Lloyd-Evans for the following list of species.

Potamopyrgus jenkinsi (E.A. Smith)
Carychium minimum Müller
Lymnaea palustris (Müller)
L. stagnalis (L.)
L. peregra (Müller)
Physa fontinalis (L.)
Planorbis planorbis (L.)
P. crista (L.)
Arion intermedius Normand
A. ater agg.
Zonitoides nitidus (Müller)
Agriolimax reticulatus Müller
A. laevis (Müller)
Sphaerium corneum (L.)
Pisidium casertanum (Poli)

Plant Galls (F.B. STUBBS)

Two dipterous galls were seen: *Dasyneura crataegi* (Wtz.) on Hawthorn, a common species but apparently with gaps in its distribution; and *Dasyneura urticae* (Perris) on *Urtica dioica.*

LOFTHOUSE, UPPER NIDDERDALE, V.C. 64, July 28th

This last meeting of the summer, which was well attended, was held in glorious weather and the new Divisional Secretary for V.C. 64, Mr. John Hickson, led the party. The whole day was spent exploring parts of the Nidd valley upstream from Lofthouse as far as the Angram reservoirs.

Members met for tea at The Crown Hotel. Our President Miss Eva Crackles took the Chair at the meeting and Mr. George Shaw expressed a vote of thanks to Mr. Hickson and to the Bradford Waterworks Co. which had granted us access to the reservoirs. He also displayed circulars from previous Y.N.U. excursions in the area.

Flowering Plants and Ferns (J.R. HICKSON & Miss D.R. WALKER)

The area studied comprised a linear strip alongside the private road from Lofthouse to Scar House and the environs of Scar House and Angram reservoirs.

The roadside verges and embankments beside the lower sections of the road, which follows roughly the line of the old railway track, produced such species as *Equisetum sylvaticum* (Wood Horsetail), *Cystopteris fragilis* (Brittle Bladder-fern), *Linum catharticum* (Purging Flax), *Hypericum pulchrum* (Slender St. John's Wort), *Lathyrus montanus* (Bitter Vetch), *Leontodon taraxacoides, Carex laevigata, C. demissa, C. pallescens, C. remota, C. pulicaris* and *Dactylorhiza fuchsii* (Spotted Orchid), having something of the habit of *Gymnadenia conopsea.*

In the vicinity of Goyden Pot, where there is a considerable outcrop of limestone rock, *Arabis hirsuta* (Hairy Rock-cress), *Hypericum hirsutum* (Hairy St. John's Wort), *Prunus padus* (Bird Cherry), *Malus sylvestris* (Crab Apple), *Galium odoratum* (Sweet Woodruff), *Campanula latifolia* (Great Bellflower), *Carex sylvatica, C. caryophyllea, Melica uniflora* and *Helictotrichon pubescens* were seen, with *Epilobium palustre* (Marsh Willow-herb) and *E. parviflorum* (Small-flowered Willow-herb) together with intermediate forms in some of the wet hollows between the rocks.

Cardamine amara (Large Bitter-cress) and *Chrysosplenium alternifolium* (Alternate-leaved Golden Saxifrage) were noted in some damp pasture below Woodale Scar and in the reservoir area generally *Epilobium nerterioides* (New Zealand Willow-herb) was found to be very plentiful.

Around the site of the old village in the damp foundations *Equisetum fluviatile* (Water Horsetail), *E. palustre* (Marsh Horsetail), *Sagina nodosa* (Knotted Pearlwort), *Potamogeton polygonifolius, Scirpus setaceus* and *Eleocharis palustris* had established themselves together with *Aira praecox* on the stonework.

The area around the reservoirs, although at first sight appearing to be a habitat of poor quality, typically calcifuge, with a very restricted flora, actually produced over 70 different species. Only two of these were obviously introduced, *Linum catharticum* and *Briza media* having come in with road metal.

An outcrop of impure limestone rock on the north bank of Angram Reservoir at its western extremity and an associated man-made embankment produced a remarkable variety of ferns including *Phyllitis scolopendrium* (Hart's-tongue), *Asplenium adiantum-nigrum* (Black Spleenwort), *Cystopteris fragilis* (Brittle Bladder-fern), *Polypodium vulgare* (Polypody), *Polystichum aculeatum* (Hard Shield-fern) and although not seen on the day, *Dryopteris villarii* (Rigid Buckler-fern) was reported as having been seen here earlier in the year. In the marshy ground draining into the reservoir *Ranunculus omiophyllus* was observed.

Two of the more interesting finds of the day were *Lycopodium clavatum* (Stag-horn Club-moss) and *Cryptogramma crispa* (Parsley Fern) seen growing in an old quarry on the north side of Scar House Reservoir. In Speight's *Nidderdale,* published in 1894, the section on the botany of the area, supplied by F. Arnold Lees, gives *Cryptogramma crispa* as occurring "on the grit crags of Great Whernside above 1500 feet and rare". This is only the second record of this fern in Nidderdale by the Y.N.U., the previous one being on a Botany Section Meeting a few years ago in the Lofthouse area.

Ornithology (D. PICKUP)

In *The Naturalist* of 1886 (p. 193-211) W. Eagle Clarke and W. Denison Roebuck list 123 species of birds, of which 90 species breed annually, in Upper Nidderdale. In the same year the sixty-third meeting of the Y.N.U. was held in Upper Nidderdale and 56 species were recorded; in contrast on this, the six hundred and thirty-ninth meeting, 44 species were seen or heard. The disparity is due to the area covered being mainly higher up the valley, from Goydon Pot up to the Scar House and Angram reservoirs. The most abundant species on the reservoirs were Canada Geese with a party of 250 on Scar House and up to 50 on Angram reservoir; and large numbers of House Martins nesting on the dam at Scar House.

Partridges with young were seen at Scar House and also a family party of Spotted Flycatchers were seen below the dam there. Young Meadow Pipits abounded and juvenile Wheatears were noted. Waders were few in numbers, Golden Plover were calling above the old railway track and Curlew were heard in the distance. Two Lapwings and one Common Sandpiper were the sole waders on the margins of the reservoirs. Treecreeper, Blue Tit and Wren were seen up a wooded gill, the majority of the other birds being recorded in the more lush woods and meadows along the River Nidd above Lofthouse. No Swifts were recorded and this bears out Eagle Clark and Roebuck's comment; "not occurring above Ramsgill". The complete list of 44 species is as follows:–

Heron, Mallard, Canada Geese, Kestrel, Red Grouse, Partridge, Lapwing, Golden Plover, Curlew, Common Sandpiper, Black-headed Gull, Stock Dove, Woodpigeon, Skylark, Swallow, House Martin, Carrion Crow, Rook, Magpie, Jay, Blue Tit, Coal Tit, Treecreeper, Wren, Mistle Thrush, Song Thrush, Blackbird, Wheatear, Redstart, Robin, Willow Warbler, Wood Warbler, Goldcrest, Spotted Flycatcher, Meadow Pipit, Tree Pipit, Pied Wagtail, Starling, Linnet, Redpoll, Greenfinch, Bullfinch, Chaffinch, & House Sparrow.

Conchology (A. NORRIS)

The molluscan fauna of the area would have been very poor but for the isolated outcrop of limestone at an altitude of 1,200 ft. on Angram Low Pasture. This outcrop produced 14 species of mollusca, some of which, e.g. *Cochlicopa lubricella* and *Lauria cylindracea,* are difficult to locate outside limestone areas.

The following list of species was supplied by Dr. & Mrs. L. Lloyd Evans.

* = From isolated limestone outcrop, Angram Low Pasture NGR 44/030760

**Carychium minimum* Müller
C. tridentatum (Risso)
Lymnaea truncatula (Müller)
**Cochlicopa lubrica* (Müller)
**C. lubricella* (Porro)
**Lauria cylindracea* (da Costa)
Vallonia costata (Müller)
Ena obscura (Müller)
Clausilia bidentata (Strom)
Helix hortensis (Müller)
Hygromia striolata (C. Pfeiffer)
H. hispida (L.)
**Discus rotundatus* (Müller)
**Oxychilus cellarius* (Müller)
**O. alliarius* (Miller)
**Arion intermedius* Normand
**A. circumscriptus* Johnston
A. hortensis Ferussac
**A. subfuscus* (Drap.)
**A. ater* agg.
**Euconulus fulvus* (Müller)
Vitrea crystallina (Müller)
V. contracta (Westerlund)
**Retinella radiatula* (Alder)
**R. pura* (Alder)
R. nitidula (Drap.)
Vitrina pellucida (Müller)
Agriolimax reticulatus Müller
Pisidium personatum Malm

FIELD NOTE

Crepis mollis at Buckden

On July 4th 1973, during the second day of a field meeting attended by a party of members of the Wild Flower Society in the Yorkshire Dales, Lady Anne Brewis noticed about a dozen fine flowering specimens of *Crepis mollis* (Jacq.) Aschers. in a rough hill pasture, near Buckden. They were finer than the few seen the previous day at the edge of Colt Park Wood, where only one was in flower.

Usually cattle and sheep graze these hill pastures but the grasses and plants were tall and lush this year and no animals had been there for some time.

We are indebted to Dr. Sledge for the information that John Cryer first found *Crepis mollis* at Buckden, his record (in Rep. B.E.C. 1908, 383) reading "Plentyfully amongst limestone rocks in rough hill pastures at Buckden, Yorks., at alt. 900′ and upwards." Cryer's station was doubtless the same as that in which we reported it this year.

F. Houseman & Alan Leslie

BOTANICAL EXCURSION TO CANAL BANKS NEAR HEBDEN BRIDGE AND LUDDENDENFOOT, JULY 8th, 1973.

F. MURGATROYD

The length of canal visited first, east of Luddendenfoot bridge, had unfortunately been dredged earlier in the year, with the result that most of the plants mentioned in the circular as having been previously found in the canal were not seen. Some warning of the fact that dredging was likely to occur along various stretches of the canal was included in the circular, but it was not anticipated that it would already have been carried out before the meeting.

Neither *Potomogeton epihydrus,* known here for many years, nor *Ceratophyllum demersum* were found, but a number of plants of *Lemna gibba* were located, mixed with *L. minor. Sparganium emersum* with floating leaves was seen in flower but *S. angustifolium,* seen previously in another stretch of canal, was not found. On material dredged from the canal and tipped on the towpath, *Impatiens parviflora* grew in quantity, although it was more plentiful in the woodland across the canal. A few plants of *Sisymbrium altissimum* were found also on the dredged material. A short distance along the canal bank towards Sowerby Bridge, a few specimens of *Centaurium erythraea* were seen on ground where there were previously more.

The next length of canal visited, between Hebden Bridge and Todmorden, had also been partly dredged earlier in the year and a few short stretches, between locks, had been drained and were empty. These proved to be of interest, however, for *Luronium natans* was plentiful in some of them. It had been thought that the draining of the canal would bring about the disappearance of the plant, but it was flourishing and flowering freely on the wet mud. *Potomogeton epihydrus,* previously known here also, could not be found, and truly aquatic species of plants were very scarce, being represented by *Elodea* and *Callitriche stagnalis.*

Of marginal plants, *Glyceria maxima* was by far the most abundant, although there was some *Phalaris arundinacea* present. Other species growing along the edge of the towpath were: *Oenanthe crocata, Sparganium ramosum, Scutellaria galericulata, Stachys palustris,* and *S. x ambigua, Juncus tenuis, Carex remota* and *Geranium pratense.* The last named, seen near one of the locks, appeared to be of garden origin.

On a canal bridge a well-grown plant of *Ficus carica* had obviously been long established, and near a canal overflow channel a large plant of *Osmunda regalis* was pointed out by a member of the Todmorden Society but this, he knew, was an introduction, as was also *Thelypteris dryopteris* a small quantity of which still persisted after many years.

It was thought that at least some of the species not now in evidence, would reappear eventually.

FIELD NOTE

A recent record of *Philonotis fontana* Brid. var *ampliretis* Dixon IN YORKSHIRE

I have recently found a small quantity of the variety *ampliretis* intermingled with *Philonotis fontana* collected by Mr. F. E. Branson from a cliff ledge at Birk Gill, V.C. 65 on the 15th April 1967.

This variety was originally described by H. N. Dixon from material collected by J. Needham in Crimsworth Down, Hebden Bridge in 1900. As far as I am aware, the variety has not been collected in Yorkshire between 1900 and 1967.

Philonotis fontana var. *ampliretis* is one of a set of five parallel *laxa* varieties of *Philonotis* species. The set comprises:

Philonotis fontana var. *ampliretis* Dixon.
P. caespitosa var. *laxa* Loeske & Warnst.
P. calcarea var. *laxa* Dismier.
P. marchica var. *laxa* Loeske & Warnst.
P. seriata var. *laxa* J. H. Field

These varieties are collectively characterised by their distant leaves and very lax cells.

J. H. Field

SPRING FORAY, HEBDEN BRIDGE

W. G. BRAMLEY

This was the best attended Spring foray since they were restarted after the last war, and it was something none of the usual attenders had previously experienced to see over twenty people in the field during most of the meeting. In addition to the faithful, it was a pleasure to see a number of keen collectors from other parts of the country, including Mr. & Mrs. M. Clark from Birmingham, Mr. & Mrs. S. Wells of the Nature Conservancy, Mr. Houghton of Gainsborough, Mrs. Astley Cooper, and Mr. Rich of Middlesbrough, who helped us with the meeting there in 1970.

Mr. Earland Bennett, the Natural History Curator of the Bankfield Museum, placed a workroom at our disposal and also attended us in the field. An innovation kindly provided by Halifax Corporation was a small bar in the workroom which probably kept people working later instead of attempting to beat the closing hour. Mention may be also made of the front page article and picture in the *Halifax Courier.*

Hardcastle Crags was visited on the Friday and the early morning drizzle ceased as we started off. Fungi, after the previous cold and dry weather, were not plentiful but an early find of *Cordyceps gracilis,* new to most of us, confirmed an old record made by James Needham from the same locality sixty years ago. Some sunshine brought out the Black Ants from a large nest and fungi were neglected by several for photography. The afternoon was spent in the higher reaches of the valley after transportation by car to High Greenwood.

Saturday was nice and sunny with a gentle breeze on the tops to temper the heat. Meeting at Crag Vale the party went over the tops to Crag Hole, a wettish *Sphagnum* bog caused by slipping of the softer strata, where several species which are only happy in these conditions were found. Returning to the cars three of the party were threatened for trespass by straying from the straight and narrow path though the field was so bare a mouse could have been seen yards away. Ironically the three following were left severely alone.

On Sunday, in slight drizzly rain, we set off for Castle Carr. This area has always been kept strictly private and the other naturalists hardly ever visited it, and only recently has access been allowed. The rain ceased as we arrived. The ground here was much damper, especially by the stream, though the going was a bit rough. Half a dozen species of *Coprinus* were soon collected and the epithet *"grandis"* was appropriate to the group of apothecia of this variety of *Helotium clavus,* some of the specimens being over an inch across and correspondingly thick.

Crimsworth Dene was visited on Monday but the writer had to miss that excursion. The recorder, who did little collecting, greatly appreciates those who did and forwarded lists, especially Dr. R. Watling, Mr. Clark and Mr. Houghton.

Dr. R. Watling writes: Three species of Myxomycetes, *Reticularia lobata, Prototrichia metallica* and *Trichia floriformis* were new records for the Halifax Parish. The first two are uncommon and the latter, unfamiliar to forayers of twenty years ago, has been more in evidence of recent years. Three parasites of *Rhododendron, Mycosphaerella rhododendri, Gloeosporium rhododendri* and *Phoma rhodora* caused excessive blotching of the leaves at Castle Carr and winter damage, and *Botrytis cinerea* was noted causing bad damage in all areas. The early appearance of *Phallus impudicus* was notable (the Yorkshire records have appearances in April and May).

C.C. = Castle Carr — C.D. = Crimsworth Dene
C.V. = Crag Vale — H. = Hardcastle Crags
*not listed in Halifax Fungus Flora (Watling 1966)

MYXOMYCETES (M.C. Clark & H. Houghton)

Comatrichia typhoides C.C.
Didymium squamulosum C.V.
Physarum leucophoeum C.C.
**Prototrichia metallica* C.C.
**Reticularia lobata* H.
**Trichia floriformis* C.C.

DISCOMYCETES (M.C. Clark)

**Apostemidium leptospora* H.
Dasyscypha acutipila C.D.
D. apalus C.C.
D. brevipila C.C.
**Micropodia pteridina* C.C.
Mitrula paludosa C.V.
Pezizella alniella H.
**Phialea turbinata* H.
Psilopeziza babingtonii H.
Vibrissea truncorum C.V.

PYRENOMYCETES (W.G.B., M.C.C., R.W.)

**Chaetosphaeria myriocarpa* on *Rhododendron*, H.
Cordyceps gracilis H.
Endodothella junci C.C.
**Gnomonia inclinata* C.C.
**Hypocrea pilulifera* H., C.C.
**Leptosphaeria coniothyrium* C.C.
**Nectria pinea* on *Pinus*, H. (*certe* C.M.I.)
**Rosellinia thelena* C.C.

UREDINES (M. Clark)

Puccinia chaerophylii 0I, Salterhebble
P. obscura II, H.
Uromyces muscari C.D.

AGARICALES (R. Watling)

**Conocybe aporus* H., C.D.
**Coprinus acuminatus* C.C.
C. cordisporus (= *patouillardii*) C.C.
**C. laani* Kits van Wav., C.C.
C. miser C.C., Broadbottom
**C. utrifer* Watling, Broadbottom
Crepidotus herbarum C.D.
**Flocculina ferruginea*, Broadbottom
**Galerina calytrata*, Broadbottom
**G. clavata* C.C., C.V., Broadbottom
**G. nana* C.D., Broadbottom
Lyophyllum decastes C.V.
**Mycena oortiana* C.D.
**M. pudica* C.D., H.
Paneolus fimicola C.D.
**Pseudohiatula tenacella* H.

OTHER BASIDIOMYCETES (R.W.)

Scleroderma verrucosum C.C.
Peniophora sanguinea
*A number of more obsc*ure species are still awaiting determination.

FUNGI IMPERFECTI (W.G.B. & M.C.)

**Acladium conspersum* C.C.
**Actinothyrium graminis* on *Molinia*, C.V.
Botrytis cinerea causing damage to *Rhododendron* buds, C.C.
**B. globosa* on *Allium ursinum*, C.D.
*B. stage of *Botryotinia calthae*, C.D.
**Didymostilbe sp.* on *Pinus*, H. (not known at C.M.I.)
**Gleosporium rhododendri*, C.C., H.
**Phoma rhodora* on *Rhododendron*, C.C.

Lichens (P. M. EARLAND-BENNETT)

Probably the most interesting lichen seen was *Lepraria zonata* Brodo, which was a new species for Britain and Europe when I first found it in the Hebden Valley (34/971301) on 19/1/72. We saw it throughout this valley occurring commonly on damp Millstone Grit rocks and walls, and also on the bole of a young *Acer pseudoplatanus* at the same grid reference as above (the only corticolous record I am aware of). This lichen was also seen in Crimsworth Dean, but was far commoner at Castle Carr (e.g. 44/022292) on the coping stones of Millstone Grit walls and on boulders on the ground.

In the Hebden Valley, other lichens seen included *Parmelia incurva* (Pers.) Fr. (34/971301) on a Millstone Grit boulder and *Cladonia luteoalba* Wheld. & Wils.. The latter was growing in profusion on soil between the rocks of the Millstone Grit walls at High Greenwood (34/969297). It was also noted in Crimsworth Dean, but was more abundant on the Millstone Grit walls at Castle Carr (e.g. 44/021294). At 44/020296, it not only occurred on the walls, but also on the ground and on decorticated wood.

In the Hebden Valley, the temporary diversion of Hebden Water by Gibson Mill (34/972298) enabled me to make my first thorough investigation of the river bed. Here, *Lecanora lacustris* (With.) Nyl. was covering large areas, but two species previously unrecorded for the Halifax area were also found, namely *Bacidia inundata* (Fr.) Körb. and *Verrucaria elaeomelaena* (Massal.) Arnold.

At Castle Carr, a 'relict' flora was seen on large old Acer stumps (44/021296-7). Minute thalli (1-2 cms.) of *Usnea subfloridana* Stirt., *Ramalina farinacea* s.l. and *Evernia prunastri* (L.) Ach. were of particular interest, as no corticolous fruticose species (excepting the common *Cladonia* spp.) have been found in the Halifax area this century – these being the species most susceptible to the effects of air pollution. Many other corticolous species were seen here which are not, or only rarely, present in other parts of the Halifax area. Among these were *Parmelia subaurifera* Nyl., *P. sulcata* T. Tayl., *Ochrolechia androgyna* (Hoffm.) Arnold, *Mycoblastus sanguinarius* (L.) Norm., *Parmeliopsis ambigua* (Wulf.) Nyl., *Hypogymnia tubulosa* (Schaer.) Hav., and such *Xanthorion* species as *Xanthoria candelaria* (L.) Th. Fr., *Candelariella reflexa*

(Nyl.) Lett., *Physcia adscendens* (Th. Fr.) Oliv. em. Bitt. and *P. tenella* (Scop.) DC. em. Bitt.. The terricolous species *Peltigera spuria* (Ach.) DC. was also found here (44/021292), having remained unrecorded for the Halifax area until the week preceding this foray (at 44/116255, 12/5/73, F. Murgatroyd).

Little of interest was seen in Cragg Vale and Bell Hole, although the paucity of the lichen flora of this area compared with the other valleys visited on the north side of the River Calder is very striking indeed. The only lichen of note was *Bacidia chlorococca* (Stiz.) Lett. found on the stems of *Calluna vulgaris* at 44/005244.

BOOK REVIEWS

The Lake District: A Landscape History by W. H. Pearsall and Winifred Pennington. Pp. 320, with 32 monochrome plates and 21 text figures. New Naturalist series, No. 53. Collins, London. 1973. £3.15 net.

The late W. H. Pearsall, a native of the Lake District, had strong connections with Yorkshire, being for many years a member of the staff of Leeds University and later Professor of Botany at Sheffield before moving to University College, London. Undoubtedly one of the great English botanists of this century, his achievement was both diverse and significant including, inter alia, a classic pioneer study of the ecology and evolution of the English lakes. To many who know nothing of this his name is still familiar as the author of *Mountains and Moorlands,* one of the earlier titles to be published under the New Naturalist imprint and still one of the most admired and successful books in this remarkable series.

Professor Pearsall worked on this new book after his retirement but he did not live to complete it. In the event, the book might have contained more of his authorship than it actually does, because not long before his death, being unsatisfied with the quality of his achievement, Pearsall destroyed his partly-written text in order to make a fresh start. In consequence, to aid her in completion of the book, Dr. Pennington had only Prof. Pearsall's plan of the book and his notes, though for some chapters not even notes existed. It follows that this book is very largely the product of Dr. Pennington's own hand, though she has obtained the assistance of a formidable group of experts who have written chapters or sections on their own speciality. Thus there are contributions from Drs. J. W. G. Lund and H. M. Lund (lake algal floras etc.,), Dr. T. T. Macan (invertebrate fauna of lakes and streams), Dr. W. E. Frost (fish), Prof. Gordon Manley (climate), Prof. C. D. Pigott and Dr. D. A. Ratcliffe (ecology of some localities of particular importance), and Miss C. I. Fell (archaeology).

The subtitle of the book is significant, for this book is indeed natural history in a quite literal sense, tracing the development of the region from its first formation through the traumas of the Pleistocene glaciations up to the present day. Dr. Pennington is particularly well-equipped for this task, having herself conducted important studies on the sediments of several of the tarns and lakes. Her style is lucid and elegant and the outcome is a fascinating and authoritative account of the evolution of the lakes and their associated landscape and life, mindful throughout of its relevance in relation to the extremely difficult problem of conservation of the character of the district in the face of increasing pressures from different quarters. Dr. Pennington warns of continuing degradation of the fell grasslands and of the soil which supports them, due primarily to over-grazing with sheep, and makes a strong case for a sensitive re-afforestation of much of the land now taken over by bracken.

Dr. J. W. G. Lund contributes a brief but particularly important section, providing an objective appreciation of the recent enrichment of the lakes, pointing out incidentally that it is an error to use the words pollution and eutrophication as if they were synonymous.

A potential weakness of a book with several authors is that it is difficult to avoid some loss of consistency in style and it seems true of the contributions from Dr. Ratcliffe and Miss Fell that, faced with the awkward problem of condensing a subject in which they are expert into a strictly limited space, too much material has seemed indispensable, with the result that the density of factual information has rendered parts of their accounts uncomfortably opaque. Nevertheless, their contributions and those of the other secondary authors, add greatly to the value of a work which even if it will not necessarily be the definitive work on its subject (there are still too many unsolved problems for that to be possible today), will be extremely difficult to supercede.

There are a number of interesting and some unusual plates. I cannot be alone in regretting the decline over the years as the series has progressed in the number and quality of colour illustrations which were such a splendid feature of the early New Naturalist books. Here we arrive at the ultimate stage in this progression – all the plates are black and white.

This book can be recommended without reservation not only to all with an interest in the Lake District for itself, but also to those concerned with the conservation of water and landscape anywhere, for in this account of a region under particularly heavy pressure and threat, this book shows very clearly that an understanding of the natural historical development of a region is an essential pre-requisite if the right answers to contemporary problems of preservation of the environment are to be found.

Written with an impressive authority throughout, this book constitutes a worthy memorial to one whose own intellectual authority was never in doubt. Dr. Pennington deserves our congratulations and thanks. J. D. L.

Textbook of Theoretical Botany: vol. 4 by R. C. McLean and (the late) W. R. Ivimey-Cook. Pp. viii + 597 with 85 illustrations. Longman. £12.

The fourth part of this voluminous survey covers ecology and plant geography. The ecological section is devoted to general principles, the concept and analysis of plant communities and subaerial, biotic and edaphic environmental factors. Descriptive accounts of communities are only incidental to discussions of the conditions which determine their occurrence. Though separate chapters are devoted to freshwater and marine environments and to sea beaches, the emphasis as elsewhere is on significant ecological factors and not on descriptions of types of vegetation. The treatment is thorough. A multiplicity of outlooks and conflicting views are discussed. At times, and more especially in the section on community analysis, all but the most dedicated ecologists must sometimes wonder if, in the lengths to which statistical analysis of communities has gone "the information they retrieve is of a sufficiently high order to justify the labour involved." But this is to cast doubt on the utility of some procedures; certainly not on the competence with which they are covered.

The treatment of plant geography, although it occupies only a quarter of the volume, is perhaps the most valuable section; for this is a subject in which a unified and satisfactory account of principles and problems which integrates modern ideas and is suitable for degree students, is less readily available than in any other branch of botany. It is one in which notable advances have been made in recent years especially as regards an understanding of geological evidence vindicating older ideas about continental displacement; and the original and massively documented contributions of Leon Croizet, the importance of whose writings has been somewhat clouded by their prolixity. Following a historical introduction and a discussion of aims, methods and principles, there are chapters on the geological background, climate and floras, distributional areas, migration and dispersal, discontinuity, floristic components in vegetation, floristic provinces and the influence of man. The mass of information which is assembled under these topics is set out in a manner which consistently holds the reader's attention; which is no small tribute to the authors' staying power since the work now runs to 3912 pages with another volume still to come. W. A. S.

A Dictionary of the Flowering Plants and Ferns by J. C. Willis. Eighth edition, revised by **H. K. Airy Shaw.** Pp. xxii + 1246 + lxvi. Cambridge University Press, 1973. £10 hardback: £4.80 paperback.

Willis's *Dictionary* belongs to that select body of books which, in its own subject, has become universally accepted as an indispensable reference work. It first appeared 76 years ago and in its author's own life-time ran through six editions. After an interval of 35 years the seventh edition, prepared by Mr. Airy Shaw and radically altered in several respects, appeared. The prodigious quantity of information which this edition incorporated inevitably involved there being some errors and omissions. These have now been corrected and the addenda of the previous edition have been incorporated together with much supplementary matter – adjustments which increase the book by a further 32 pages. There is in addition, following the traditional appendix giving synopses of the Engler and Bentham and Hooker classifications, a useful list of family equivalents in these systems and those employed in this edition of the Dictionary which are based on most recent views. W. A. S.

The Status and Distribution of Birds in Lancashire by **K. G. Spencer.** Published by the author and obtainable from him at 3 Landseer Close, off Carr Road, Burnley. Price £1.

This book is intended primarily for birdwatchers in Lancashire and is far from a complete, detailed account of the county's avifauna. As the author points out, the book presupposes a good knowledge of the county and "cannot be read to its full depth without constant reference to the works of other people". A special list is given of some of the major publications dealing with either certain parts of the county or certain groups but it is a pity that far more references relating to individual species were not given: new watchers in the county will often find these hard to trace.

In general this is a very good survey, giving brief statements of the status of each species. For some better-worked groups (e.g. wildfowl, waders and gulls) the account gives a very accurate estimate of the numbers breeding. It is also good to see the incorporation of data from the B.T.O. Estuaries Enquiry and other projects. To many people the only interesting birds are, unfortunately, rare ones and it is here that Mr. Spencer has done the county a great service by carefully checking many of the old records, even to the point of tracing specimens. Some he has accepted (e.g. the 1832 Gull-billed Tern and 1843 Red-footed Falcon) whilst others have been wisely rejected (e.g. the old Walney Wilson's and Frigate Petrels (following the advice of Dr. Bill Bourne in *Ibis* 109: 158) and the Spotted Eagle). He has also firmly placed on record some modern records upon which doubt has been cast by some bodies (e.g. the 1957 Ring-necked Duck, the 1959 Great Snipe and the 1929 Great Shearwater). In the reviewer's opinion these are welcome. However it is certain that some recent records included are not acceptable, judging from the details submitted by the observers (e.g. the Liverpool Baird's Sandpiper, Mersey Alt Sabine's Gulls and St. Annes Black-throated Thrush). Many experienced Lancastrians are also sorry to note the doubt cast on the wildness of the Harlequin Duck record: as has been pointed out several times, it was impossible to keep this species in captivity at the time the Crossens bird was shot.

On balance the book is a good one yet there are some shortcomings; but which ornithological book does not have these? In this county which is ornithologically dissected into at least four rival bodies which co-operate little with each other it is very difficult to objectively collect all the records: Mr. Spencer has managed to do this. The Government has decided to make the job more difficult by breaking up the county in its new regional organisation: the book is thus timely. At the cost the book is well worthwhile and everyone is advised to get their copies while stocks last.

M. E. G.

Wanderings in South America by **Charles Waterton,** edited with an introduction by L. Harrison Matthews. Pp. xxvi + 230 with 12 plates. Oxford University Press: 1973. £3.50.

Yorkshire naturalists feel a proprietary interest in the eccentric squire of Walton Hall which the Union visited in 1965 a few days after the anniversary of Waterton's death there in 1865. His exuberant personality and infectious delight in the animals and birds he encountered in his travels are plainly apparent in his writings. He was heedless of dangers and discomforts and more interested in observing living creatures than in securing specimens for museums. He was in fact one of the earliest conservationists. But he was also full of prejudices and unconventional to the point, sometimes, bordering on foolishness. He was in short an enthusiastic and able amateur rather than a disciplined scientist. As Harrison Matthews says in his preface "Waterton, in effect, never grew up".

Yet he wrote with gusto and his *Wanderings* are very readable if too profusely larded with Latin tags. One wishes the Latin had extended to the scientific names of the animals and plants he refers to, but vernacular names are always employed since he regarded Latin binomials as part of the insignia of "cabinet naturalists" of whom he was scornful. The defects of the book, however, are more errors of omission than of commission. He enlarges on episodes and tells us too little about some of the then unknown areas he visited. Even so Waterton's *Wanderings in South America* contains so many acute observations and descriptions and so much incident, all told with such refreshing vigour that the book will live on as a minor natural history classic. The present handsomely produced book is a reprint, with introduction and notes, of the first edition published in 1825 and it forms one of the volumes in the *Oxford English Memoirs and Travel Series.*

W. A. S.

Birds, by **Claus König** (Translated from the German by H. Mayer-Gross) two vols.: **1, Divers to Owls**, Pp. 256, 150 colour photographs; **2, Swifts to Finches**, Pp. 256, 136 colour photographs. Collins Colour Guides, 1973. £1.50 per volume.

My first reaction to yet another product of this kind was one of suspicion regarding its real value to those wishing to learn more about birds in the field. Any such suspicions were totally unfounded and the two volumes form a very useful and accurate reference for those who would watch birds in this country and in Europe. Being of continental origin, all the non-British species which are to be found in other identification guides are included. The photographic illustrations are first class and every species which is fully described is illustrated, in some cases by more than one photograph. A few are of captive birds, some waterfowl and raptors for example, but this is unimportant and a good photograph is easier to relate to a bird (or mammal and insect) than is a drawing.

Each volume includes a brief review of the Orders therein and the text under each species follows the usual format, giving Family, Description, Distribution, Habitat, Food and Allied Species. Volume two ends with a topographical drawing of a typical perching bird and five pages are devoted to explaining the meaning of scientific names – something I have not seen elsewhere which should be of interest to those likely to use this book.

Written for beginners, this publication is real value for money and the wealth of colour photographs, some of which are superb, make it a very useful reference which compares favourably with the more sophisticated field guides and will perhaps have more appeal to those who are simply interested in being able to put a name to what they see at close quarters. J. R. M.

A Study of Bird Song by **E. A. Armstrong.** Dover Publications. £2.00.

This revised edition of a book which first appeared in 1963 is an essential reference for all serious ornithologists. The first three chapters deal with the basic topics of the language, structure and development of bird song. These are followed by chapters on the better-known characteristics of mimicry, subsong, duetting and also song in relation to territory, the birds' annual cycles, habitat and weather variations. An appendix deals with acoustic communication in the whole of the animal kingdom, whilst two addenda cover recent discoveries not included in the main body of the book.

Over 1000 references are quoted and this makes the book especially valuable. However, when dealing with ten or more such references in one page there is necessarily a reduction of critical treatment and just a bald summary of the worker's findings. This may lead to some confusion. For examples, we read "dark breast of waders must be functional in display" – which some workers may have cause to question; and a garbled statement on the presence or lack of territory in the Redshank and the importance of song in the species. Some of the quotations are however most charming: a pet fox which learned to hum scales, a bulldog which could "pronounce 20 words" and "a parrot, bought by a cardinal, is reputed to have been able to recite the Apostles' Creed correctly (Kircher 1650)."

An excellent study, especially acceptable in its new, typically well-produced Dover format; and the price seems almost anti-inflationary! M.E.G.

Background of Baobabs by **Charles Sweeney.** Pp. 240 with 12 pages of photographs, 17 line drawings and endpaper maps. Constable. £3.50.

There are still some remote and unfrequented places left on this hard-used planet and anyone with a taste for vicarious travel to such places in the company of a trained naturalist will enjoy this book. The scene is set in the Nuba Mountains of Southern Sudan from where Mr. Sweeney made journeys to the vast *Sudd* or reed swamps of the upper Nile and to the province of Darfur bordering Chad – two areas which are the same today as when Europeans first set foot in Africa. Birds, mammals and insects are the chief quarry – pursued with a land rover, canoe and binoculars not with a gun – but plants, native tribes and the countryside all engage his observant eyes. This is not a 'safari book' based on a short visit. Mr. Sweeney was a research entomologist based on Kadugli in Kordofan and he had the time as well as the urge and ability to observe closely. The result is a notable account of the wild life and natural features of a little-known region. W. A. S.

Animal Cytology and Evolution by **M. J. D. White.** Third Edition. Pp. 961, with 261 figures and 38 tables. Cambridge University Press, 1973. £19.00 net.

The earlier editions of this book established its reputation as an indispensable source for cytogeneticists, but nearly twenty years have passed since the publication of the last edition. This third edition has been revised to the extent that it has become in effect an entirely new and much larger book, which there is no doubt will be just as valuable as the earlier editions were in their day. Unfortunately, the increase in price of this edition is out of all proportion to the increase in the size of the book. Only the most dedicated or well-endowed professional cytogeneticists will be able to justify the outlay involved in the purchase of personal copies, and in consequence one can only assume that the publishers have calculated that they can obtain an adequate return for their investment from sales to libraries alone. J. D. L.

British Butterflies, Books 1 & 2. Text and photographs by **G. E. Hyde.** Jarrold Publications, Norwich. 20p. each.

These Jarrold nature booklets depict species of British butterflies from life studies in colour photography. Bearing in mind the amazingly low price, the uninitiated at first glance might suspect them of being two chatty little glossies, not to be taken too seriously. In fact, quite the reverse is the case. All the species are expertly photographed against a typical natural background. With the exception of three or four examples where some distortion is present, the colour reproduction is excellent. The Large Copper with background is especially fine.

The text, although brief, is sound and correct in virtually every particular. In his general remarks the author touches on several allied issues, including breeding and photography. He has also been courageous enough to indicate a balanced view in the conservation of our precious fauna and point out the real elements above all else which are reducing our butterfly population. A foreword by our old friend Dr. De Worms stamps a note of further authority on these two sunny little books. C. R. H.

Wild Flowers of the Moors and Heaths. Text by **E. A. Ellis.** Jarrold Publications, Norwich. 20p.

This is a most attractive little booklet; the photographs are excellent and some, for example those of Bilberry and Crowberry, are superb. The brief texts give the main characteristics of each plant and details of its usual habitat. A botanist from the north might perhaps criticise the selection of species, for on his local moors he will never come across *Erica ciliaris, Daboecia cantabrica, Arbutus unedo, Lobelia urens* or *Pinguicula lusitanica.* The inclusion of a Rush or two, and perhaps a Sedge, might have been advantageous. The booklet is a pleasure to read and handle and at the price is a bargain. G. A. S.

The Olympic Rain Forest by **Ruth Kirk** and **Johsel Namkung.** Pp. 86, copiously illustrated with colour and monochrome photographs. University of Washington Press. 1973. Paperback. $4.95.

This charming book, first published in 1966, is now available in a paperback edition. Reviewing it is made all the more pleasurable for the writer, who visited this area in 1969, since the photographs and accompanying captions and text truly capture the magic of this unspoilt part of the United States. For those who know, or wish to know, of the beauty and salient features of a remnant virgin rain-forest, or for those who just like to goggle at superb photography, then this work will adequately serve these needs. M. R. D. S.

The River Foss from Yearsley Village to York – Its History and Natural History by **Michael Fife and Peter Walls.** Pp. 68 with illustrations. Ebor Press, York. 1973. £1.00.

This is a nicely presented booklet, with an excellent historical section. Unfortunately, the natural history section which follows it does not reach the same standard, being mediocre in basic scientific content, and containing many errors of fact, spelling and typography which should have been spotted at proof stage. The bibliographies for both sections are superficial and inconsistent in presentation. However, in spite of the drawbacks of this particular work, the idea of such inter-disciplinary publications is an admirable one which deserves to be encouraged. M. R. D. S.

The King's England: Lancashire by **Arthus Mee.** Second Edition by F. Beckwith. Hodder & Stoughton. £2.50.

Natural Historians ought to know something of the history of the areas in which they make their modern observations and this series is the one to start with. It gives a brief account of the background of towns and villages, famous persons and buildings worthy of visit; places and persons who have produced the Britain in which we live. In this one dealing with Lancashire I have noticed only six places I would have liked to read about and which really ought to have been included whilst about 225 are given some account.

This revised edition deserves a place on the bookshelf of all who love this great county. M. E. G.

The Geographical Magazine, vol. XLVI, no. 1. Pp. 80. October 1973. 30p. Back issues 40p each including postage (cash with order) available from: IPC Magazines, 66-69 Great Queen Street, London WC2E 5DD.

This issue will be of particular interest to the natural historian and the conservationalist since it includes a free map entitled 'Cherished Land' as well as the usual range of well-illustrated articles. The 30" x 20" map gives a detailed analysis of the status (especially in terms of recreation and leisure) of land throughout the United Kingdom, and highlights such features as national parks, areas of outstanding natural beauty, green belt, heritage coast, National Trust property, national and local nature reserves, forest and country parks, picnic sites, nature trails, field study centres and youth hostels. This map provides a wealth of information in a clear and convenient form. M. R. D. S.

The Butterfly Ball and the Grasshopper's Feast by **Alan Aldridge** with verses by William Plomer and nature notes by Richard Fitter. Pp. 70 with 28 colour plates. Jonathan Cape. £1.95.

A most unusual book, intended for children but recommended to all age groups from 5 – 85. Both the illustrations and accompanying verses will appeal hugely to a child's imagination and all adults who are free from mental blockages or not incurably blasé, will marvel at the combination of creative imagination, technical skill, inspired sense of design and perfect colour reproduction which has gone to produce these truly remarkable plates. It will solve the Christmas and/or birthday present problem in entomologists' households in particular since it does not matter who gives it to whom. Father's library will certainly not be quite complete without it. W. A. S.

East Yorkshire Field Studies, No. 4. Pp. 28. 1973. Hull Geological Society. 30p. Available from the Keeper of Geology, Hull Museum, 23/26 High Street, Hull.

This nicely produced and well-illustrated booklet, which is edited by M. A. J. Piasecki, contains three articles on (1) The invertebrate fauna of the River Hull, (2) Pollen analysis of the Faxfleet peats, and (3) Temporary exposures in the Jurassic rocks around Elloughton, East Yorkshire. It is a worthy successor to previous issues, numbers 2 and 3 of which are still available (33p including postage) from the above address.

Also received:–

Bioassay Techniques and Environmental Chemistry edited by **Gary E. Glass.** Pp. x + 500 with 127 text figures. Ann Arbor Science Publishers Inc. and John Wiley. £9.

Minerals and Precious Stones by **Rudolf Metz,** translated from the German by G. A. Wells. Pp. 250 with 150 colour photographs. Collins Colour Guide. £1.50.

Southern England: an archaeological Guide by **James Dyer.** Pp. xivi + 380 with 76 photographic illustrations, 29 figures and 6 maps. Faber & Faber. £1.95 paperback, £5.50 hardback.

The Artist and his Studio by **Rainer Behrends** and **Karl-Max Kober,** translated by Neil Jones. Pp. 60 with 32 illustrations, some in colour. **Through Artists' Eyes** Series No. 1. Dent. £1.25.

The Living Countryside by **Wolfgang Hutt,** translated by Neil Jones. Pp. 60 with 35 illustrations, some in colour. **Through Artists' Eyes** Series No. 2. £1.25.

Solo: The story of an African Wild Dog by **Hugo van Lawick.** Pp. 159 with 8 colour plates and 42 drawings. **Collins.** £2.25.

Understanding Your Dog by **Eberhard Trumler** with a foreword by **Konrad Lorenz.** Pp. 264 with 23 photographs and 39 line illustrations. Faber and Faber. £2.95.

CONTRIBUTORS

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compiled by G. A. Shaw

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of Natural History for the North of England

Edited by

W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

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THE NATURALIST

SEEKING TO UNDERSTAND THE FLORA OF THE EAST RIDING OF YORKSHIRE

EVA CRACKLES

Presidential Address to the Yorkshire Naturalists' Union, Darlington, 1st December, 1973

I should like to begin by thanking you for the honour you have conferred upon me in electing me as your President and also by thanking all those who have done so much to make my year of office such a happy and memorable one. I had no difficulty in deciding on the title of my Presidential Address, as after studying the flora of the East Riding for almost a quarter of a century, a deepening of understanding has come in recent years as a result of many different lines of inquiry. It is this diversification of approach which I wish to illustrate.

Understanding must be based on knowledge; correct identification, careful observation and accurate recording are essential in any study in the field of Natural History. Therefore, I propose to outline the history of botanical recording in the area and to ask what the aims of past recorders have been, so that we can eventually examine our own aims as naturalists to see whether we need to modify these aims and redirect our observations. My personal interest in the history of recording of flowering plants is comparatively recent, beginning in 1966 and my research has been most exhaustive for the period 1597-1800, the first known E. Yorks. record being in Gerard's Herball published in 1597.

Early Recording

The two most notable contributions to our knowledge of flowering plants in the area during this period were made by Rev. William Whytehead (1729-1817) and Robert Teesdale (c. 1740-1804). Rev. Whytehead, vicar of Atwick near Hornsea from 1756 to the time of his death, compiled a manuscript herball which was handed down in the family and presented to the University of Hull about fifteen years ago. William believed it was the proper function of a man of God to instruct his parishioners in the medical use of plants. In the old book he included a snippet of the plant, notes on where it occurred, together with its remedial and harmful qualities compiled from the herballs of Gerard, Johnson, Ray, Tournefort, Quincy, James and Hill. There are plant records for many scattered East Yorks. localities but the majority are for the Hornsea area. Robert Teesdale, who's work is much better known, once resided at Castle Howard but in 1775 he became a partner in a firm of seedsmen in the Strand, London. Whilst Robert was at Castle Howard some of his leisure hours 'were employed in herborising', but his business did not admit of long excursions. The Linnean Society was founded in 1788 and Teesdale, a founder member, later gave two papers to the Society: (i) *A Catalogue of the More Rare Plants which grow wild in the neighbourhood of Castle Howard* (1794) and (ii) *A Supplement to the Plantae Eboracenses* (1800). The first paper gave specific East Riding localities for only a few species (Crackles, 1967); the second paper contained about a hundred and forty records, mainly for Hull, Cottingham and Beverley. Teesdale's visits to the Hull area seem to have been made in the period 1790-96 and he was frequently accompanied in the field by Lt. Col. Machell of Beverley with whom he stayed. He was probably also combining botanical activities with visits to his widowed mother who died in Sculcoates, Hull, in 1796 or 1797 (J. Harvey in corr.). Machell appears to have been the most knowledgeable local botanist of the period under discussion but we would know little about his activities but for the writings of Teesdale.

The total number of records for 1597-1800 was about 270 for around 200 species, the majority of records being for uncommon species or ones with which the recorder was unfamiliar. By 1800 there had been extensive drainage of the marshlands and parliamentary enclosure of land, begun in 1731 at Catwick, had gathered momentum in the second half of the century to be virtually complete in the lowlands of the Riding by 1810. At that time 20,000 acres of the wolds still awaited inclosure, but by the mid-nineteenth century transformation of the medieval landscape was almost complete;

the essential features of the modern scene were established (Harris, 1961). Few of the East Riding's vast acres had been explored botanically before these drastic changes occurred. Observation and recording have continued to be inadequate to the present day. Likewise, the localities visited and the nature of the search have been determined often capriciously or by a variety of factors unrelated to the aims of botanical research.

In spite of their inadequacy examination of old records is nevertheless worth-while, even when no more than the presence of a species is given. Species completely lost to an area or severely diminished in their distribution, may be valuable indicators of the changes that have occurred. Teesdale for instance recorded *Glaucium flavum* (Yellow Horned-poppy) at the 'sea-side in various places', including Hornsea and Bridlington Quay and *Andromeda polifolia* (Marsh Andromeda) in bogs near Howden; neither of these species have been recorded for the vice-county since. Species lost from the River Hull valley include *Stratiotes aloides* (Water Soldier), *Peucedanum palustre* (Milk Parsley) and *Myrica gale* (Bog Myrtle). Many species once found as weeds of arable land, some not uncommonly, are now never seen. Thus we read that *Bromus arvensis* occurred in cornfields at Little Weighton, 'where it was six feet high' and *Camelina sativa* (Gold of Pleasure) grew 'among clover at Eske, near Beverley' (Teesdale, 1800). Species, apparently once not uncommon, which have not been recorded this century include: *Papaver hybridum* (Round Prickly-headed Poppy) and *Lolium temulentum* (Darnel). Baines in his *Flora of Yorkshire* (1840) described *Agrostemma githago* (Corn Cockle) as 'a troublesome weed'; it is now rarely seen – I have seen it twice, at North Cave in 1948 and at Wintringham in 1957.

Recent Recording

Much botanical recording continued to be concerned with individual, uncommon species as is seen by examining Annual Reports of the Y.N.U. Botanical Section and B.S.B.I. 'Plant Records' to the present day, as well as Robinson's *Flora of the East Riding of Yorkshire* (1902), although in the latter work an attempt was made to describe the distribution of the more frequent species. Interestingly additional native species continue to be discovered. At least sixteen new vice-county records have been made in the East Riding since 1950 and five of these have been new county records. These additional records are: *Ranunculus calcareus, Barbarea stricta* (Small-flowered Yellow Rocket), *Sagina maritima* (Sea Pearlwort), *Aphanes microcarpa, Oenanthe silaifolia, O. fluviatilis* (River Water Dropwort), *Rumex tenuifolius, Orobanche reticulata* (Thistle Broomrape), *Thymus pulegioides* (Larger Wild Thyme), *Epipactis phyllanthes, Eleocharis uniglumis, Carex vulpina* (Fox Sedge), *C. polyphylla, Glyceria declinata, Calamagrostis stricta* (Narrow Smallreed) and *Parapholis incurva.* Increased taxonomic knowledge and its dissemination, as well as improved travel facilities, have had a part to play in these discoveries.

Perhaps at this juncture I might be permitted a little autobiography. During school and college holidays I had explored the country-side in the vicinity of Hull in quest of plants, but during the nineteen forties the fires of botanical interest burned low and I became a very keen ornithologist. I was ambitious to add to knowledge but had no idea how this might be accomplished. I knew what I did not want. I did not want my natural history activities to consist only of identifying and listing organisms; nor did I want a rarity hunt which it seemed must follow the law of decreasing returns, not only in terms of numbers of species recorded but also in terms of satisfaction. I was extremely interested in bird behaviour but opportunities for continuous study were spasmodic, infrequent and unpredictable.

Fate played her part and in 1950 I belatedly responded to the call of the plants on the Hull bombed sites. There were two important features of the bombed site studies. One was that I accepted the challenge of identifying, or having identified, every plant met, the other that I began to ask the question 'why?'. Why was a plant in one place and not in another? In the circumstances, such questioning focussed attention on methods of dispersal and the most useful exercise was to plot the sites on which thirty or more species had been noted. No less than one hundred and twenty species had been recorded for the ancient High St., less than half-a-mile in length and running parallel to the wharfe by the River Hull on which grain had been landed for generations and which backed onto at least four seed warehouses. The next most important areas were East-Central and West-Central Hull, the distribution of species-rich sites reflecting the high degree of human activity, particularly between the docks and the old town. The occasional rich site in the more out-lying areas of the city was invariably near to a railway.

Strongly influenced by Tansley's book, *The British Islands and their Vegetation* (1949), I believed that the important species were those characteristic of any one habitat rather than the rarity, and I was interested in studying the constituent species of plant communities. From 1954 onwards I kept notes on the naturally defined plant associations of localities visited, noting dominants as well as the relative frequency of associated species. Rarely are two plant associations identical, even when environmental conditions appear to be the same. The number of published accounts of specified Yorkshire plant or animal community studies in the past three decades have been disappointingly few, although there has been some work of very high quality. It therefore came as a surprise on reading Dr. Woodhead's Presidential Address (1923) to discover how ecologically active our predecessors were in the early part of this century. As early as 1898, Dr. William Smith and his students had planned to survey the vegetation of the whole of Yorkshire. In 1904, at Smith's Leeds home was born the idea of 'A Committee for the Survey and Study of British vegetation' and it was this committee which was to develop into the British Ecological Society. Both Woodhead (1923) and Tansley (1949) give details of published accounts of Yorkshire vegetation studies. There was little ecological activity in the East Riding. Robinson in his *Flora* (1902) had listed members of types of plant associations in various parts of the Riding but accounts such as those of the vegetation of Flamborough Head (Wattam, 1912; Woodhead, 1912) are rare.

During the latter half of the nineteen fifties, botanists throughout the British Isles were busily engaged in collecting records for the Distribution Maps Scheme, organised by the Botanical Society of the British Isles and information was collected for all species. The resultant *Atlas of the British Flora* (1962) enables one to see the local distribution of a species in the context of its British distribution. Further the work of Matthews (1955) in classifying British species according to their European distribution enabled one to relate local distribution to an even wider context.

Several species of flowering plant are at or near their northern limit in East Yorkshire. *Trifolium suffocatum* (Suffocated Clover) and *Parapholis incurva* are at their northern known limit in the British Isles on Spurn Point. On examining maps in the *Atlas* it is seen that many species become coastal at the edge of their range. *Sison amomum* (Stone Parsley) and *Petroselinum segetum* (Corn Caraway) reach their absolute northern limit on the northern bank of the Humber, whilst *Lotus tenuis* (Slender Birdsfoot-trefoil) is locally frequent there and only rarely found elsewhere in the vice-county and then probably as a casual. A number of chalk species are at or near their northern limit in eastern England and many of them are classified by Matthews as of the Continental Southern Element, a group of species belonging mainly to south and central Europe. Many of these are rare and some occur only on south or south-west facing slopes e.g. *Asperula cynanchica* (Squinancy Wort) *Hippocrepis comosa* (Horse-shoe Vetch) and *Spiranthes spiralis* (Autumn Lady's Tresses). Some chalk species, although not at their absolute northern limit, show a preference in the East Riding for habitats where competition pressure is low. *Blackstonia perfoliata* (Yellow-wort), which is rare with us, has only been recorded in quantity on bare chalk, except at Spurn where it occurs in the grass sward. *Ophrys apifera* (Bee Orchid) formerly occurred in some quantity in chalk grassland in the Brantingham and South Cave areas but further north it occurs almost entirely on bare chalk in quarries. Very few species are at their southern-most limit in the East Riding, but *Dactylorhiza purpurella* (Northern Marsh Orchid) is one of these; it is frequent on the Flamborough headland but occurs rarely further south on the eastern side of Britain. Its distribution and that of *D. praetermissa* are given erroneously in the *Atlas*. A species which is seen by its distribution map to have a remarkably restricted distribution in the British Isles is *Actaea spicata* (Baneberry) which occurs only in Yorkshire, Westmorland and Lancashire. A scheme launched by Dr. Sledge in 1963 to study the distribution of *Actaea* intensively, revealed that it is a naturally occurring although uncommon species of the East Riding occurring not only on limestone but also on chalk, usually in Ash woods but also in Beech woodland (Garnett and Sledge, 1967).

In 1970 a scheme for collecting records on a tetrad basis was launched. A tetrad is 2km x 2km, so that each 10km square consists of twenty-five tetrads. Maps on this basis had already appeared in Dony's *Flora of Hertfordshire* (1967). When expressing the wish that I would like to see tetrad maps in the proposed East Yorkshire Flora, I recognise that such a scheme is a crazy one, as eight hundred and forty-eight tetrads are present, at least in part, in vice-county 61. However the scheme has potentialities which a less ambitious one lacks and man thrives on impossibilities: 'A man's reach should exceed

Carex Lepidocarpa Tausch (Yellow Sedge)

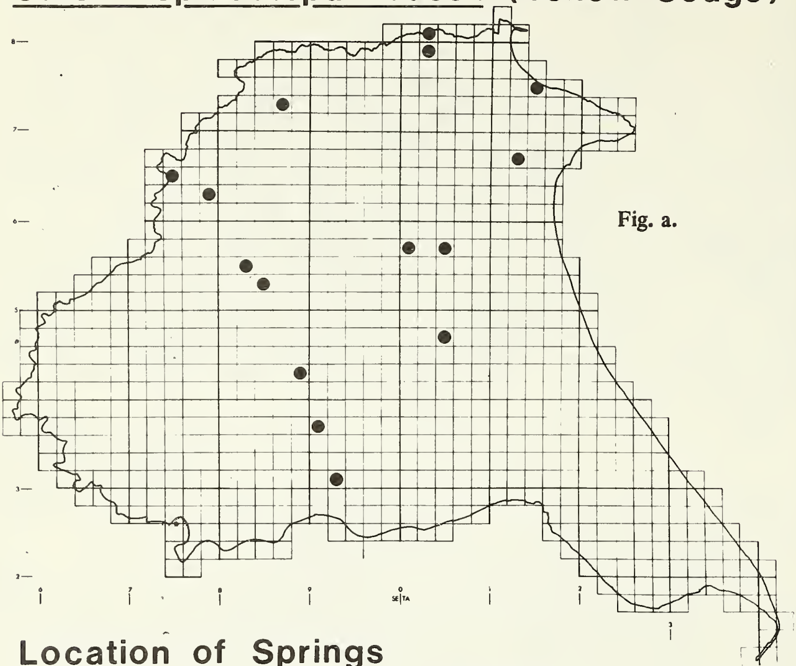


Fig. a.

Location of Springs

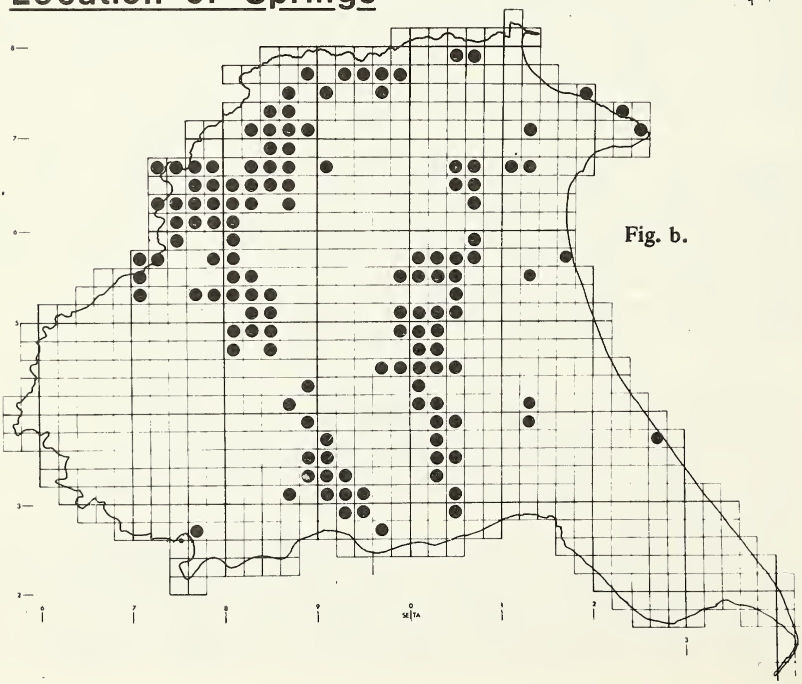


Fig. b.

Lycopsis Arvensis L. (Small Bugloss)

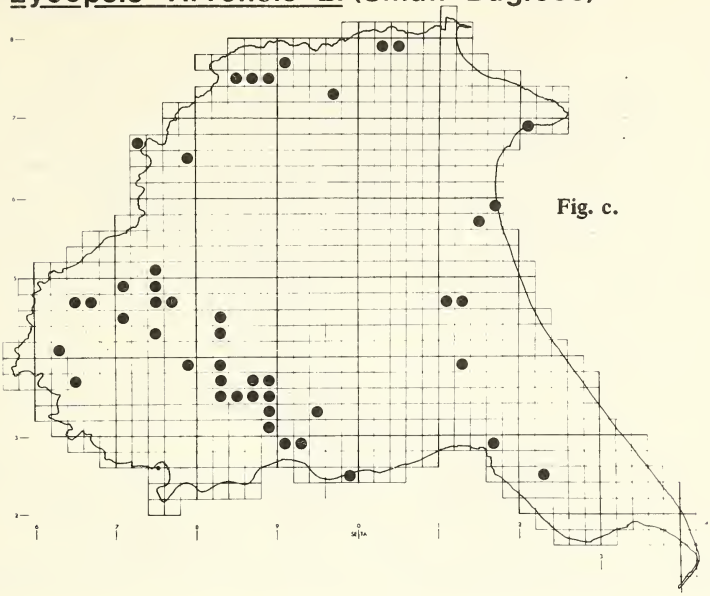


Fig. c.

Sand and Gravel

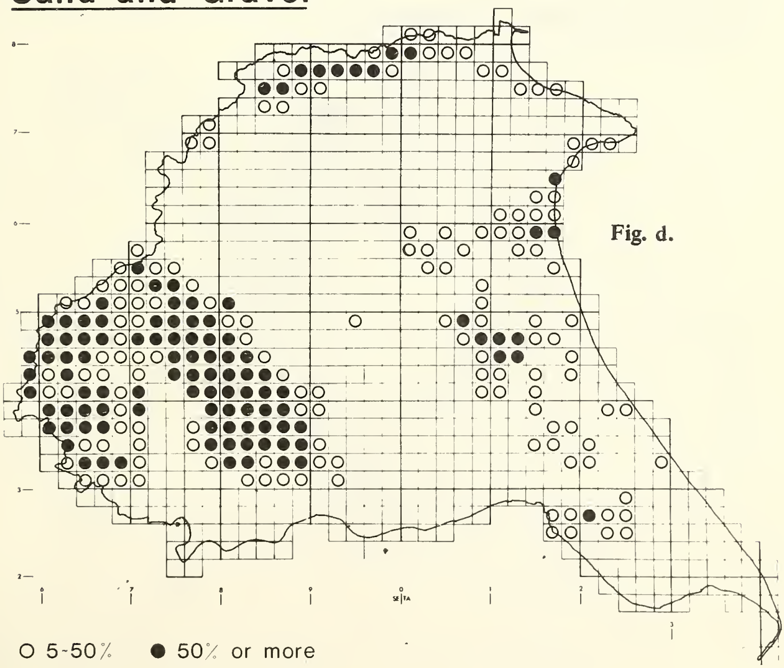


Fig. d.

○ 5-50% ● 50% or more

his grasp or what's a heaven for'.

Enough information is to hand to produce tentative maps and this has been done for many species and patterns of distribution are beginning to emerge (Fig. 1). The distribution of a species may be seen to be correlated with the distribution of a certain physical or edaphic factor, which can be mapped on the same basis. *Carex lepidocarpa* (Yellow Sedge), an uncommon but characteristic plant of calcareous flushes, is seen to be well distributed along the line of springs which occur at the foot of the chalk (Figs. 1a and 1b). *Lycopsis arvensis* (Small Bugloss) is seen to occur both on the glacial sands and gravels of Derwentland and on the post-glacial sands and gravels of Holderness, following there the line of morainic gravels (Figs. 1c and 1d). When *Brachypodium pinnatum* (Heath False-brome), a species which dominates much chalk grass-land, was mapped it was found to be confined to the higher parts of the wolds (Figs. 1e, 1f and 1g). The question arose as to whether altitude, steepness of slope, or absence of ploughing is the determining factor. These thoughts stimulated the mapping of species which are common in chalk grassland e.g. *Helianthemum chamaecistus* (Rock rose) (Fig. 1h) and *Thymus drucei* (Wild Thyme); unploughed grassland was indeed found to be mainly confined to the higher parts of the wolds.

It was appreciated at the outset that maps of common species of particular habitats e.g. marshes (Fig. 1i) and woodlands would be of value as these would be as useful to the future historian as place-name maps are to us. It may be that a modification of the tetrad scheme, making full use of characteristic species as indicators, will be the most effective way of mapping plant associations.

Interesting facts came to light as soon as the tetrad scheme was put into operation. *Silene dioica* (Red Campion) which is very common as a hedge-row plant in the vicinity of Hull, disappears from the hedges on the lighter soils of the chalk wolds and of Derwentland, suggesting that the species requires the extra humidity of a woodland habitat on such soils although there may well be other modifying factors. Gaps in distribution became obvious, thus *Geum rivale* (Water Avens) is seen to be absent from the well-worked River Hull valley, also apparently from the rest of Holderness (Fig. 1j).

Brachypodium Pinnatum

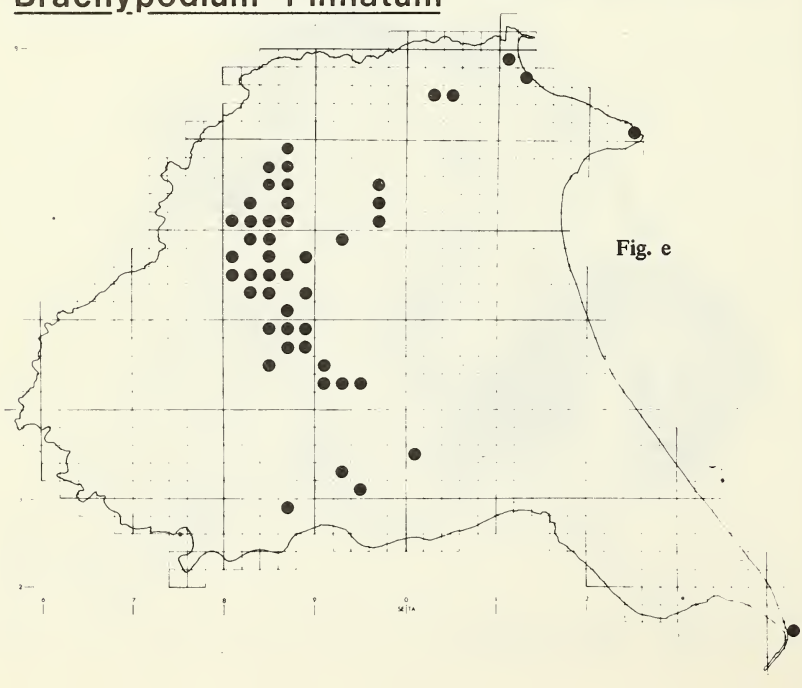


Fig. e

Chalk and Limestone

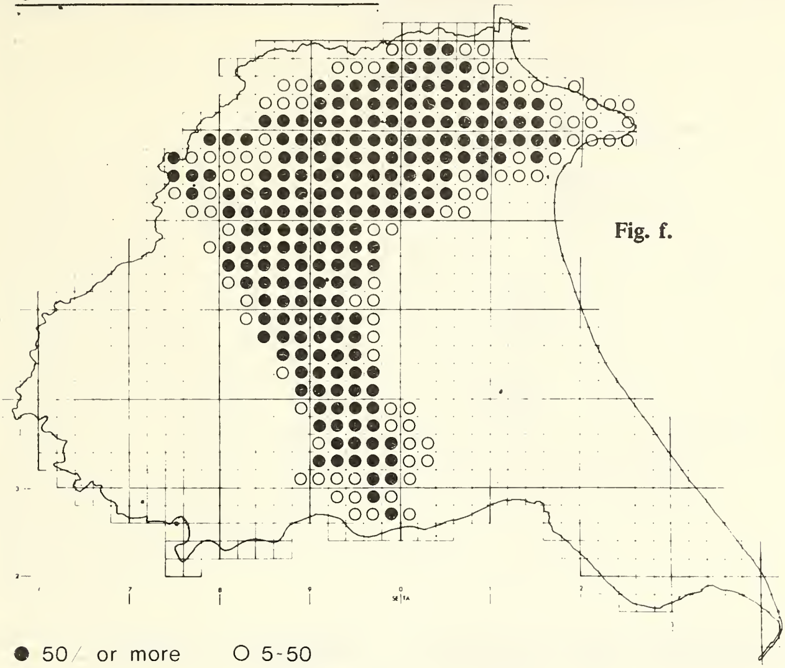


Fig. f.

● 50/ or more ○ 5-50

Altitude

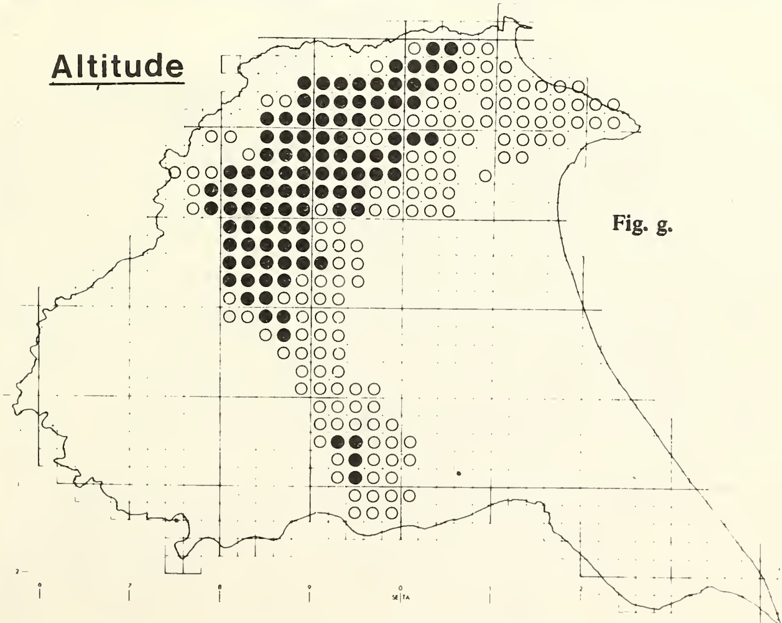


Fig. g.

○ Land between 250 & 500ft ● Land over 500ft

Helianthemum Chamaecistus Mill. (Common Rockrose)

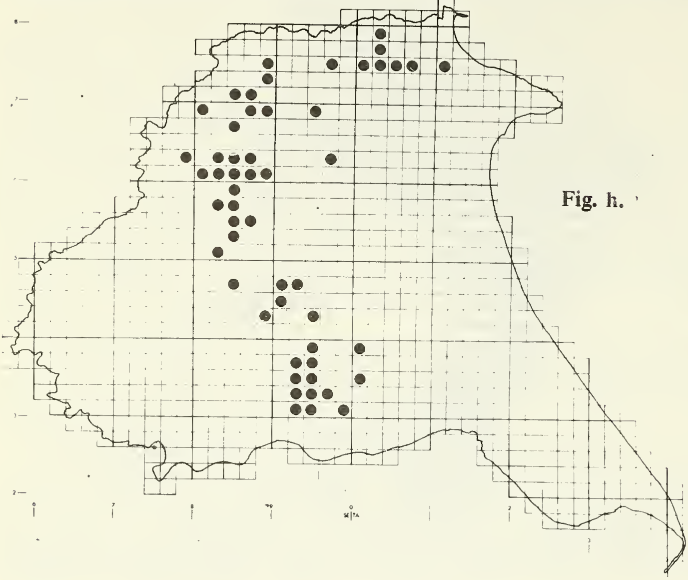


Fig. h.

Lychnis Flos-Cuculi L. (Ragged Robin)

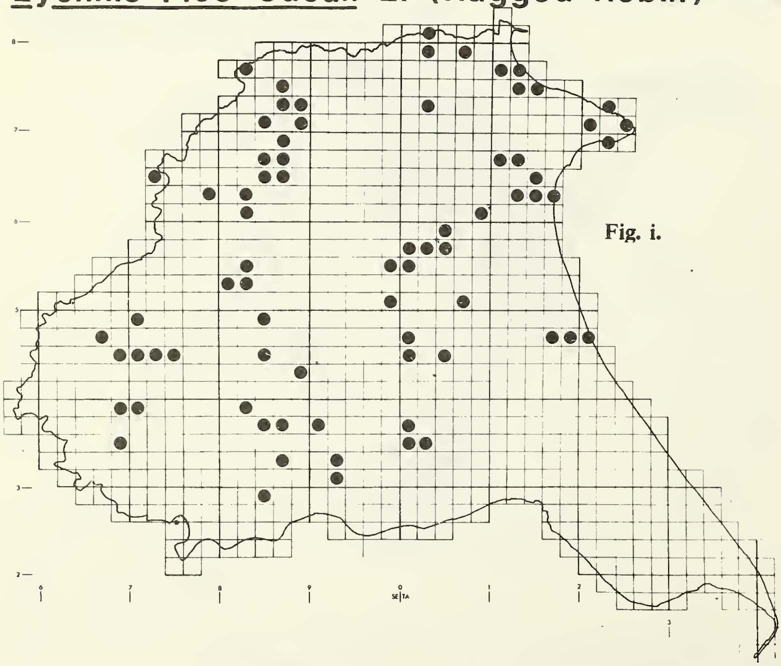


Fig. i.

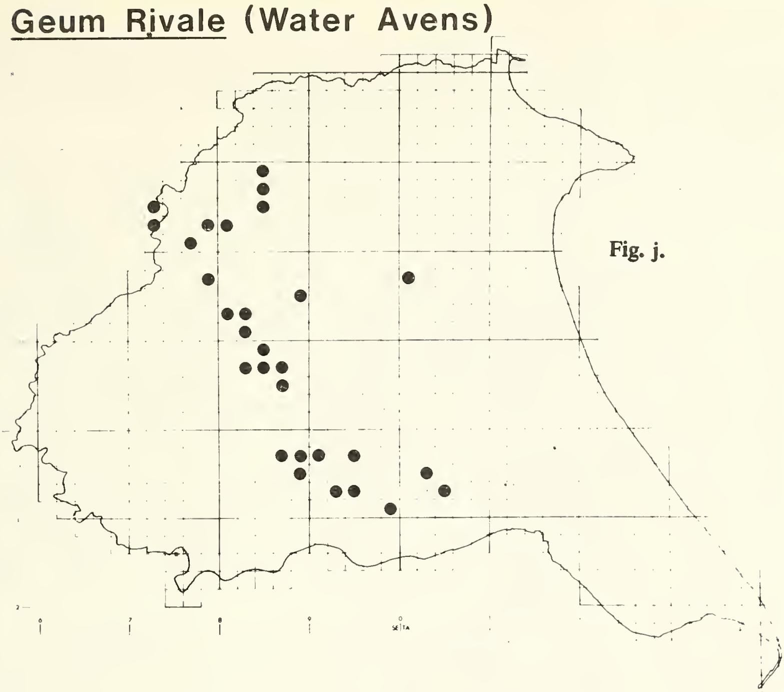


Fig. j.

Thus there is an explanation of a region's flora to be sought among factors operating in the here and now. There must be a source of seed and relative efficiency of seed dispersal and other biological factors have an effect on distribution. The seeds of some species can remain dormant in the soil for many years and still be viable (Salisbury, 1961, 322-9). It is this longevity of seed which sometimes offers the only valid explanation of the presence of rare native species on disturbed ground in areas where they are otherwise absent. For instance, two local British species have been found on the site of gravel workings in Holderness. One of these, *Carex serotina* has been found in two localities near Keyingham and in one at Brandesburton; it is a very rare Yorkshire species and there was only one previous vice-county record and that was for Skipwith Common (Lees, 1941). The other, *Alopecurus aequalis* (Orange Foxtail) had been seen twice previously in the vice-county, there being only one other recent record and that for Allerthorpe Common. Then again, soon after the East Coast floods of 1953, a canal was cut at Kilnsea in conjunction with construction of a new bank and on virgin marshy ground by the side of the canal there appeared in quantity two species only rarely recorded in the East Riding, *Carex extensa* (Long-bracted Sedge) and *Juncus maritimus* (Sea Rush); the latter had only been recorded once before, for just south of Bridlington in 1886!

Having arrived plants must be able to survive; climatic, physio-graphic and soil factors all play their part. Some species are widely tolerant of various conditions, others are more selective; some require a well-drained soil, others require a water-logged one; some occur only on calcareous soils, others occur only on non-calcareous ones; some require shade, others are unable to survive in such a situation. Some species compete well with other species, whilst others only survive in an open habitat. In addition factors interact and the presence of one particular factor may compensate for the lack of another. Further, plant communities are not static but are continuously subject to change.

The Historical Factor

We cannot look upon the vegetational picture of any area as a two-dimensional one; there is a third dimension, the present flora being the result of past history. It is of value to attempt to picture the changes which have occurred in an area in the course of time. I can best illustrate this line of approach by reference to the River Hull valley and by describing how I came to be interested in its history.

On July 30th 1951, I walked from the village of Leven to Beverley, determined to record all grass species present whilst ignoring all else. I made the notable discovery that *Calamagrostis stricta* (Narrow Smallreed) occurred by the side of Leven Canal. This sub-arctic species, with its stronghold in Scandinavia and other North European areas is a rare British plant with a remarkable, discontinuous distribution. It is recorded from twenty scattered localities in Scotland and England: four stations in Caithness, in northern-most Scotland; two localities near Forfar, in Angus; Loch Tay and Loch Tummel, in Perthshire; one locality in Ayrshire; two stations in Roxburghshire and one in Selkirkshire; two stations in West Yorkshire, including Malham; Leven, E. Yorks.; Oakmere, Cheshire; two Norfolk stations and two places in Suffolk. It also occurs in Ireland, being recorded for Lough Neagh and the adjacent Lough Beg only. What is the explanation of the plant's occurrence here by the side of an artificial canal? Had it been introduced by human agency? These and allied questions sprang to mind to be eventually dismissed. The plant associations of Leven canal and its banks contained a rich array of native species including uncommon or local British species; *Carex appropinquata* and *Sium latifolium* (Water Parsnip) on the banks of the canal and *Potamogeton alpinus* (Reddish Pondweed), *P. friesii* (Flat-stalked Pondweed) and *Myriophyllum verticillatum* (Whorled Water-milfoil) in its waters. Is it not far more likely therefore that the Narrow Smallreed had been long established here, but hitherto overlooked by local naturalists? Robert Meikle of Kew was encouraging: the species, once widespread around Lough Neagh, is now mainly restricted to man-made cuttings; it seemed that the plant will not stand competition at this latitude.

In 1968 whilst writing an article on *Some Plant Associations of the River Hull Valley* (Crackles, 1968) I re-read an article by June Sheppard on *The Draining of the Hull Valley* (1958). This is a fascinating story of opposition to draining by the shipping interests of Hull, whilst the only harbour for ships was the mouth of the River Hull. Little effective drainage of the Hull valley north of Beverley occurred until 1765 and Dr. Sheppard mentions that there is a plan of the Holderness Level, made about 1775, showing 'several irregularly shaped meres in Leven and Tickton Carrs'. Enlightenment came suddenly; sitting in my arm-chair I had made one of the most important and exciting discoveries that I have ever made: Leven Canal cut in 1802 must surely have passed through the former meres. I found a map such as June Sheppard mentions, by A. Bower, dated 1781, in the Hull City Local History Library and in the same library a later plan by E. Pearson, 1831, which showed not only the canal but also low-lying areas which bore the unmistakable shape of the former meres. Here was proof that the canal passed through two meres and, most exciting of all, it passed across the southern end of a mere a little to the west of Far Fox Aquaduct at the place where the Narrow Smallreed was first found.

Further Whytehead in his 'herball' states that both the White and Yellow Water Lilies and *Stratiotes aloides* (Water Soldier) occurred 'in Leven Carrs'. This implies permanent standing water on the Carrs and that a suitable habitat for *Calamagrostis stricta* existed before the canal was cut. I believe the grass is primarily a plant of lake margins where it forms pure beds, but it will only survive in the absence of taller, ranker grasses. There seems little doubt that Leven Canal inherited *C. stricta* from the former meres.

Such a discontinuous distribution as *Calamagrostis stricta* exhibits takes on meaning if thought of as a relict distribution of a species once widespread. Influenced by the writings of Pigott and Walters (1954) and Rose (1957), concerning the discontinuous distributions of certain British species, I put forward the idea that this arctic species has been in the British Isles since the Late Glacial i.e. period of cold conditions following the retreat of the ice. As the ice retreated, great floods of melt water would form extensive marshes and lakes on lower ground, such as occur today between the mountains of Scandinavia. Suitable habitats for the grass would abound. As the climate became warmer and extensive forest and peat formation followed, the species would be obliterated from most localities. It would persist only in those few places which escaped these and certain other changes. I suggest that the low-lying area of the 'Leven meres' was probably one of these and that the Narrow Smallreed has been in Holderness since the Late Glacial or early Post Glacial (terms as used in Godwin, 1956, 15-16).

Rose (1957, 70) points to evidence that highly calacareous water seeping steadily through the ground prevents the growth of coarse mesotrophic vegetation. In part of the 'Leven Mere' area, both annual flooding and the local effect of springs are likely to have played a part in checking the natural succession and in providing the open conditions required by *C. stricta.* A number of springs are known to have occurred in the area and in 1972 a spring was located in Leven Canal and the resulting waves of water were observed to reach the bank where the beds of *Phragmites communis* (Common Reed) cease and belts of *C. stricta* and *Scirpus lacustris* (Lake Club-rush) begin and more recently Haslam (1972) has confirmed that *Phragmites* cannot tolerate much water movement.

Let us then look more closely at the history of the area. During the last ice-age (Great Würm), the whole of the area now occupied by the River Hull and Holderness is believed to have been covered by ice (Penny, 1964, 390). Holderness is composed of boulder clays with here and there considerable quantities of glacial gravel and sand deposited by land-ice on an inclined plateau. As the ice retreated the pre-glacial river systems were re-established, but their courses were more or less obstructed or modified by gravel moraines and masses of boulder clays left behind by the melting ice. The waters of the Humber were held up by the Hilton-Paull-Goxhill moraine, causing the increasing volume of water to be pounded back to form the Hull Lake which occupied the site of the present River Hull valley (Palmer, 1939, 10). Gradually the land was elevated. Eventually the increasing force of waters in the River Humber breached the morainic barrier and the River Humber once more flowed into the sea and the channel of the spring-fed River Hull was established. The River Hull valley continued to be an area of extensive marshes and irregular meres with islands of higher ground here and there. Much of the valley was flooded for several months each year and the meres, variable in extent, represented the remains of the flood water which lingered in the lowest parts throughout the summer (Sheppard, 1957, 75). In arriving at her conclusions June Sheppard used the evidence of aerial photographs of flooding, geological 'drift' maps and place-name maps. Most villages and towns of the area were established by 900 A.D. and the distribution of Angle and Danish town and village place-names demonstrate the extent of uninhabitable regions, whilst the distribution of place-names indicating the presence of meres, marshes and water meadows provide direct evidence of these conditions (Smith, 1937).

With regard to flooding there are eye-witness accounts. Thus Edward Page who had taken 'views, surveys and levels' for the purpose of suggesting improvements in the drainage of the valley, writing in 1831, gives a vivid account of conditions which were probably not exceptional in early spring at that time. Page writes: 'I found the principle part of the low grounds covered with water to a great depth. They remained more or less in this state for five or six weeks'. A rapid thaw had been accompanied by heavy rains so that 'the water from the high grounds had poured into the Carrs for a week to ten days with amazing velocity'.

Increasing understanding of the history of the British Flora has resulted in recent years from the work of Godwin (1956) *et al.* in identifying pollen in peat deposits. Confirmation of my theories concerning *Calamagrostis stricta* are not forthcoming from such studies as species of grass are not identifiable from their pollen; also no such investigations have been carried out in the River Hull valley, and it may be that flooding has prevented the continuous deposition of peat. There is ample evidence that most common marsh and aquatic species have been in the British Isles since the Late Glacial at least (Godwin, 1956). At the East Riding boundary, on the site of Lake Pickering, is the famous Star Carr Site (Clark, 1954) and it is interesting to note that *Cladium mariscus* (Fen-man's Sedge) was frequent in the Pre-boreal and Boreal periods, zones iv, v, and vi; there is only one record for the species in historic times – it still survives at the edge of a fox-covert near Wilfholme, in the River Hull valley.

Historical and recent plant records add to the picture. In 1626, when Thomas Johnson visited an uncle at 'Rotsey, a small village in Holderness', *Stratiotes aloides* (Water Soldier) was 'found growing plentifully in the ditches' and the species was recorded later at Storkhill, Beverley (Camden's Britannia, 1789) as well as in Leven Carrs (Whytehead *ms*). In marshes near Beverley at the end of the eighteenth century, when Bittern could still be heard booming from the town, *Peucedanum-palustre* (Milk Parsley) and *Lathyrus palustris* (Marsh Pea) were not only present but 'abundant'; *Carex lasiocarpa* (Slender Sedge) was 'very common' and *Eleocharis quinqueflora* (Few-flowered Spike-rush) was 'not uncommon', whilst *Carex diandra* was 'abundant' on the near-by Arram Carrs (Teesdale, 1800). The only remaining evidence of this rich marsh flora is the survival of some of the above species in one or two localities only in the River Hull valley north of Beverley; also other rare or local British species: *Thelypteris palustris* (Marsh Fern), *Ranunculus lingua* (Great Spearwort), *Stellaria palustris* (Marsh Stitchwort), *Sium latifolium* (Water Parsnip), *Carex vesicaria* (Bladder Sedge) and *C. appropinquata*.

Some Further Research

Seventy-five per cent of the East Riding's three quarter million acres is arable and has often been 'written off' as of little botanical interest. Whilst saddened by many changes which have occurred during my life time, I have found no shortage of situations and events to arouse my scientific curiosity and many of the features of interest are the result of human activity. I have written elsewhere about the highly interesting and varied weed flora occurring on a variety of soils and associated with a variety of crops (Crackles, 1970). Also man's use of plants for a variety of purposes must have had an effect on the present distribution and relative frequency of many species. In addition, human interference with habitats has sometimes facilitated evolutionary change both by isolating habitats and by providing suitable habitats for plants of hybrid origin; it is this last phenomenon which I wish to talk about.

On returning to Leven Canal the day after I had found *C. stricta* I observed a bed of *C. stricta* x *C. canescens*, a hybrid which had not been noted previously in the British Isles. The hybrid is intermediate between the parents in a number of respects and grows on the sloping side of the canal, whilst *C. stricta* grows in standing water and *C. canescens* mainly on the top of the bank. Normally hybridization between these two species is prevented by differences of distribution, by different ecological requirements and by different flowering times, although there may be an overlap in certain seasons. Leven is one of three known localities in the British Isles where the two species grow in the same area and the canal bank brought into close proximity suitable habitats for both species. Anderson (1949) points out the need for 'hybridization of the habitat' i.e. the provision of new habitats where hybrids with ecological requirements intermediate between those of the parental species, can survive. Scarcity of naturally occurring hybrids is probably often due to the inability of hybrids to survive in stable closed communities, rather than to the inability of related species to hybridise. At Leven recent drastic disturbance of the canal banks by human agency is thought to have played an important part in enabling hybrid *Calamagrostis* taxa to survive.

In 1970 I was encouraged and assisted by Dr. Shimwell to begin biosystematic studies of the Leven *Calamagrostis* populations. I found a population on the side of the canal bank, essentially similar to the 1951 population, but more variable and I refer to this as the H_1 population. Later by the canal edge I found a second hybrid population, referred to as the H_2 population, which more generally resembles *C. stricta* in appearance but which on examination is found to be intermediate between the parents in a number of respects.

The Leven *Calamagrostis* populations have been studied using various methods of polygraphic analysis developed by Anderson (1949) *et al.* for the analysis of hybrid populations. Both hybrid populations, as well as populations of the two species were sampled at a random and a scatter diagram was constructed using the ratios of bract length to bract width and panicle length to length of bottom branch of panicle, as co-ordinates (Fig. 2). With the exception of one individual, there was no overlap between the two species and the H_2 individuals scattered out almost completely separately from the H_1 individuals, emphasising the essentially different nature of the two hybrid populations. Over half of the H_1 individuals occupy an intermediate position on the diagram, occurring between individuals of the two species, but there is some overlap of individuals of the H_1 with those of *C. canescens*. Other information is depicted on the scatter diagram i.e. ratio of glume length to width, awn length, position of awn insertion on the lemma and callus hair length in relation to lemma length. Intermediate characters tend to stay together but do not always do so, thus 58% of all hybrids earn four intermediate arms, 94% earn at least three intermediate arms and there is at least a sixty per cent tendency for all pairs of characters to stay together. It is this loose, non-random association of characters which Anderson (1949) claims to be critical evidence of hybridisation.

A polygonal graph has also been constructed for each Leven *Calamagrostis* population studied (Fig. 3). The polygonal graph provides a means of showing a number of characters at one and the same time as a shape which the human mind can rapidly grasp and hold. The polygonal graphs have been constructed using eight radii, the variation for each character being divided into six ranges for scoring. The polygonal graphs for H_1 and H_2 plants are seen to be somewhat similar in shape, the difference between them being mainly one of difference in size of parts which suggests a difference of vigour. In 1972, with the help of Mr. Nicholson of Hull University Botany Dept., a good chromosome preparation of H_1 plants was obtained and it was established that this taxon has 2n = 56 i.e. twice the chromosome number of that of the parents; the indications are that plants of the H_2 population are at the same chromosome level as the parents. Most of the differences between the H_1 and H_2 Leven *Calamagrostis* hybrid populations may be due to polyploidy: length of lemma which is greater than in either parent is almost certainly the result of polyploidy, as may be increased glume length and width and increased ligule length.

LEVEN CANAL CALAMAGROSTIS POPULATIONS

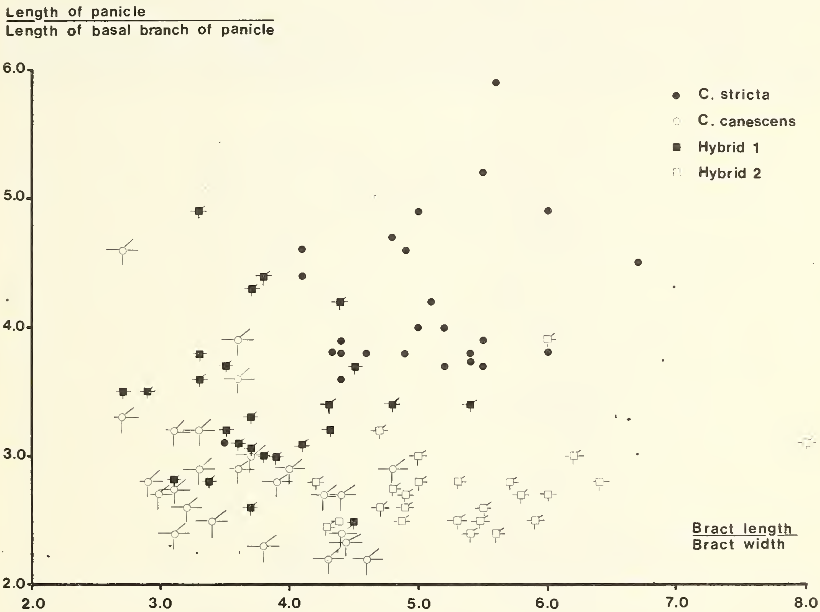
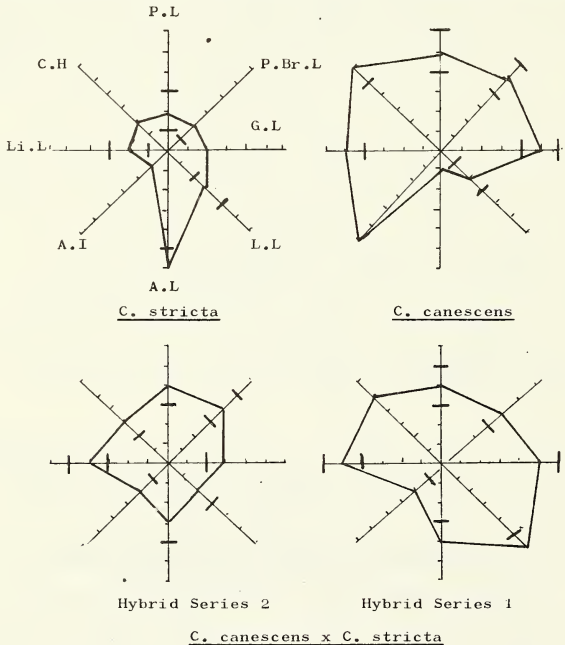


Fig. 2. Explanation of 'arms' used in scatter diagram

Callus hairs	shorter than lemma	Awn length	greater than 1.7mm
	± equal to lemma		0.9 – 1.7 mm
	longer than lemma		less than 0.9 mm
Awn insertion	from bottom third of lemma	Glume length / Glume width	less than 4.5
	from 0.375 – 0.75 way up lemma		4.5 – 6.7
	from near tip of lemma		greater than 6.7

The Leven *Calamagrostis* population studies have turned out to be of far greater significance than the study of unique local plant populations. The study provides the means of understanding the great variation exhibited by *Calamagrostis stricta sensu lato* in its different British localities and even at one station. In 1970 I visited the two Norfolk localities for *C. stricta* and my observations suggested that hybridization and introgression had occurred there in the past. In August 1971, Dr. C. E. Hubbard with whom I had been in regular correspondence collected a number of variants of *C. stricta sensu lato* from a small area of bog on the site of Hockham mere, Norfolk. On examination these specimens were found to be partial hybrids; they resemble *C. stricta sensu stricto* in a number of characters but also possess one or more features of the Leven hybrids in various combinations. This can be demonstrated by constructing polygonal graphs for each of these variants comparable with those drawn for the Leven *Calamagrostis* populations; a selection of these for Norfolk '*C. stricta*' is given (Figs. 4 and 5). It is of interest that a specimen of the shade form of '*C. stricta*' collected in 1970 also turned out to be a partial hybrid; I believe shade tolerance is inherited from *C. canescens*. A *Calamagrostis* specimen collected from the same Norfolk site by C. Townsend and which had been placed in the *C. canescens* folder at Kew, resembled the Leven H_2 individuals in a number of respects, but is not truly intermediate and is best considered as part of the Norfolk series of backcrosses from *C. stricta* x *C. canescens* to *C. stricta* (Fig. 5). Likewise, by means of the measurements obtained during the Leven population studies, it can be shewn that partial hybrids occur in most of the British stations for *C. stricta*. Even some *C. stricta* specimens from Ireland have long

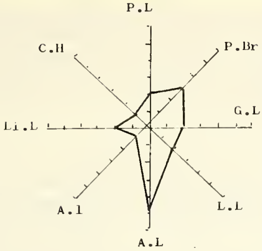


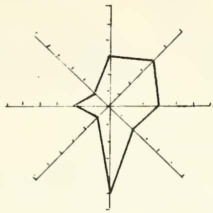
Polygraphs for Leven, E. Yorks. Calamagrostis populations

Figs. 3 – 5. **Abbreviations:** P.L. panicle length, P.Br.L. length of bottom branch of panicle, G.L. glume length, L.L. lemma length, A.L. awn length, A.I. awn insertion, Li.L. ligule length, C.H. callus hair length.

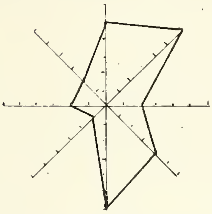
In the case of each Leven *Calamagrostis* population, the polygraph was drawn using the mean of the measurements for each character obtained from a random sample of twenty five individuals; the heavy marks depict the standard deviation.

In the case of Norfolk *Calamagrostis* taxa, each polygraph is drawn using measurements from one plant only.

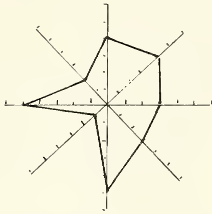




long bottom branch

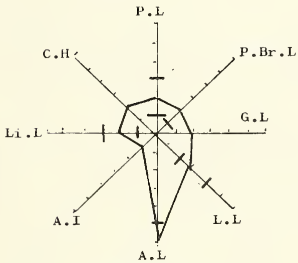


long panicle and
long bottom branch

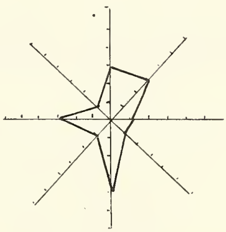


long panicle, long
bottom branch and
long ligule

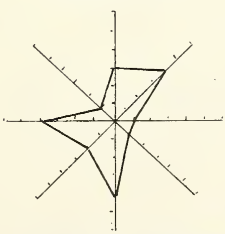
Polygraphs for Calamagrostis stricta and backcrosses from C. canescens x C. stricta to C. stricta. Cranberry Rough, Norfolk.



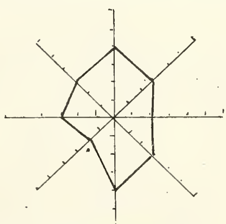
C. stricta
Leven, E. Yorks



Backcross to C. stricta
shade form, short awn



Backcross to C. stricta
short awn, high awn
insertion and long panicle
branch.



C. stricta x
C. canescens
coll. Townsend,
Kew Herb.

Polygraphs for Calamagrostis stricta, Leven, E. Yorks., and backcrosses from C. canescens x C. stricta to C. stricta from Cranberry Rough, Norfolk.

white hairs on their upper leaf surface, a characteristic feature of *C. canescens.* Hybridization and introgression, it is suggested, has had an important part to play in the survival of *C. stricta* in a region far to the south of its normal range, as well as in the necessary adaptation to different habitats as change occurred. Thus seeking to understand the flora of a region may involve one in seeking the solution of a much greater problem.

A President's Message

Sound taxonomy is essential but I have endeavoured to show in my address that Natural History can be enriched by regarding powers of identification as the means to further study and activity. Each individual with his or her own particular abilities and interests and doing the utmost to study an organism or group of organisms in a particular locality, over a sufficient period of time, must make a unique contribution to knowledge, as important perhaps as that of Gilbert White in *The Natural History of Selborne.* Yorkshire is a vast county with a richly varied flora and fauna and there is no shortage of research projects.

I wish to make a special plea for more naturalists to think in terms of plant and animal communities. This is not a new plea; Professor Valentine in his Presidential Address (1961) suggested that a survey of plant communities of Yorkshire might be put in hand by the Yorkshire Naturalists' Union as a long-term project. Descriptions of plant associations and the animals associated with them is the type of information required, often urgently, when potential Nature Reserves are being threatened. Individuals who train themselves as specialists in the study of a group or groups of organisms, in one type of habitat, would be able to give invaluable service. At present the gaining of expertise in most branches of Natural History is left to far too few people, as is recording. Every field naturalist should record his observations no matter how trivial they appear to be; even common species can no longer be taken for granted. With regard to recording, Professor Valentine has pointed out that there are a number of reasons why the herbarium specimen is still important (Valentine, 1961).

Think about your observations and ask yourself questions and go on asking them, even if no answers seem to be forthcoming. As Professor Robertson suggested in his Presidential Address (1967) in Natural History the highest scientific awards are open to the amateur if he learns to ask the right questions. I have endeavoured to show the variety of local information which can be pressed into service in seeking to understand the vegetation of a region. A piece of information although trivial in itself may provide a vital clue to understanding. In the course of time I have learned to value the rarity as there are reasons for both its presence and rareness, as the *Calamagrostis* story shows. I believe that co-operation between specialists interested in local studies; archaeologists, geologists, local historians, geographers, professional biologists and naturalists has great possibilities. My next plea is that naturalists should promote such co-operation by meeting other specialists and by learning something of their respective disciplines; if one is to gain co-operation one needs to know what to ask and who to ask.

The Yorkshire Naturalists' Union continues to have an important role to play in carrying out the aims of its founders 'to promote the thorough and systematic investigation of the flora and fauna and the physical features of the county of York'. There is still much to do; we are only just beginning to investigate the correlation of plant and animal distribution with physical and other factors, in addition to the ever-present need to study the effect of unceasing change.

The Yorkshire Naturalists' Union needs more active and knowledgeable field workers. One hoped that the rapid growth of Field Study Centres, which has taken place in the past fifteen years would have been reflected in an increase in the number of young naturalists joining the Union. Where are the experts of the quadrat and the transect which the schools, universities and field centres have been busy training? Are we failing to attract them? The Union also requires increasing financial and other support from all those in sympathy with its aims. By virtue of its constitution as a Union of affiliated societies, the Y.N.U. has been able to give great service. But with increasing rise of costs, particularly of printing, it needs an increasingly greater individual membership.

The Yorkshire Naturalists' Union must continue to be concerned with conservation which as a naturalist, I see as the maintenance of the maximum variety of habitats. If variation of vegetation can be maintained then diversity of animal communities should be assured. It is necessary to increase our ecological knowledge by experiment, so that we learn to impede the natural succession to a climax vegetation, and so learn to manage our nature reserves. It is recognised that close co-operation between the Y.N.U. and the Yorkshire Naturalists' Trust is essential; each needs the help of the other. The Trust has gained considerable support from people who are interested in the country-side for a variety of reasons and it will wish to create Reserves for their amenity and educational value, as well as for their scientific interest. It is the special responsibility of members of the Y.N.U. to seek conservation of sites for their scientific value, in a situation in which knowledge of that value is far from complete. I believe that conservation of scientific value must be the conservation priority if our country-side is not to be unnecessarily and unwittingly impoverished. Conservation must not be confined to Nature Reserves; unnecessary destruction must be resisted wherever and whenever possible; this we owe to future generations. Everyone has a part to play in being vigilant and in educating those who have the power to enrich or impoverish our country-side.

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ATTACHMENT OF BIVALVE MOLLUSCS TO CORIXID BUGS

GEOFFREY FRYER

On July 18th 1973 I noticed that many of the numerous corixid bugs swimming over the muddy bottom of the shallow village pond at Huggate, E. Yorks. appeared to be trailing either one or two light coloured objects as they swam. Examination revealed these to be small bivalve molluscs of the genus *Pisidium* which were present in abundance in the bottom mud. Several such burdened bugs were collected and preserved in alcohol. In most cases the bivalves remained attached. The corixids, kindly identified by Dr. T. T. Macan, proved to be *Sigara lateralis* (Leach) which is common and often found in large numbers in such ponds. The molluscs were determined by Mr. J. A. B. Bass as belonging to two species, *Pisidium milium* Held. and *P. nitidum* Jenyns, both of which are common and widespread in Britain. Both adult and nymphal bugs carried these small bivalves which were invariably attached to the slender claws borne by the tarsi of the second pair of legs. Presumably because the bulk of an attached bivalve physically prevented another from becoming attached, never more than one individual was present on a leg. When a bug carried two, each occupied a separate leg.

The most striking feature of the association was the large number of individuals involved. A random collection was not possible but a rough visual estimate suggested that perhaps 20% of the corixids in the pond were carrying at least one bivalve. Many hundreds, perhaps thousands, were being carried within the pond. Although similar associations of aquatic insects and bivalve molluscs have been noticed before, usually only isolated examples are involved, though Kew (1893), who gives an excellent summary of the records that he had traced, cites a report from Australia to the effect that "Mr. Whitelegge has frequently noticed hemipterous insects . . . laden with bivalves", and Fernando (1954) collected six corixids each bearing a single bivalve on two visits to a pond in Berkshire and saw "about 30 more". In addition to records cited by Kew, a single *Pisidium* was found by Landsbury (1955) attached to the first leg of *Corixa punctata* Illiger – a site never seen to be utilised in the Huggate pond.

That small organisms may be dispersed as a result of attachment in this way has long been appreciated (e.g. see Kew 1893, Talling 1951). The observation of such large numbers of potentially dispersive agents being victimised by bivalves suggests that the possibilities of such dispersal may at times be greater than is generally appreciated. While it should be noted that not all victims were capable of fulfilling this role, for nymphs as well as adults served as carriers and these cannot fly, nevertheless large numbers of adult corixids carried bivalves. *S. lateralis* is a species that frequently indulges in flight. That such flights may at times be wide-ranging is perhaps indicated by the fact that, although rare in the English Lake District, it has been taken there on the wing "in some numbers" at an altitude of 2,500 ft above sea level (Macan 1965).

The only examples of insects actually taken in flight while carrying bivalves that I have been able to trace refer to the beetle *Dytiscus marginalis* L. of which Kew gives two instances. A situation such as that prevailing at Huggate in 1973 – and perhaps in subsequent years? – where large numbers of potential disseminators were present would offer excellent opportunities to trap migrating corixids and ascertain whether attachment of bivalves leads to their dispersal, and if so with what frequency.

Water bugs appear to be particularly prone to victimisation of this kind. By virtue of the profusely setose nature of certain parts of their exoskeleton grasping is facilitated, not only by bivalve molluscs but also by ostracods which employ a basically similar means of attachment. I have myself seen *Cyclocypris laevis* (O. F. Müller) attached to *Notonecta glauca* L. in this manner and cited observations of other naturalists (Fryer 1953), since which time Landsbury (1955), who was unaware of previous records, has reported a similar association involving the closely related *Cyclocypris ovum* (Jurine).

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A SURVEY OF THE INVERTEBRATES OF THE POCKLINGTON CANAL

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The Pocklington Canal runs approximately east-west across the national-grid ten kilometers square SE 74, some ten miles south-east of the city of York. It is, or was, largely unused throughout most of its length, overgrown, rather beautiful and faunally rich. Plans to dredge and 'improve' parts of the canal were suggested two or three years ago and a programme of dredging was finally approved in April 1973. Because the dredging and disturbance would obviously influence the fauna considerably, it was decided to survey as much of the canal as possible during the summer of 1973 in order to provide a record of the fauna before any drastic alterations occurred.

The survey was carried out between July and September. In all, forty stations were sampled between Canal Head (SE 800473) and Hagg Bridge (SE 717452), a distance of approximately eight miles, leaving only a small part of the canal between Hagg Bridge and the river Derwent (some two miles away) unsurveyed (see Figure 1). Dredging started on these lower reaches of the canal in August and by December 1973 operations had reached beyond Hagg Bridge and were progressing steadily into the area surveyed during the summer.

All the samples during the present survey were taken with a pond net (20 meshes per inch) by sweeping in the vegetation or open water in a standardised manner. Three collections were made at each station, and the samples preserved in alcohol-formalin to be hand-sorted in the laboratory. All invertebrates large enough to be visible to the naked eye were removed, counted and identified, with the exception of the Hydracarines and larvae of Diptera and Trichoptera, which have still to be identified. The collecting method obviously excludes certain other groups, in particular the benthos from the deeper water, and small Crustacea. In fact, the Crustacea in the canal have been examined by Dr. Geoffrey Fryer (*pers. comm.*); his results reinforce the impression that the canal is indeed faunally very rich.

RESULTS

A list of the species recorded during the survey is presented in Table 1. Nomenclature follows the standard keys used to make the identifications; these are listed in the bibliography. Notes on particular species are presented below. Unless otherwise stated, it can be assumed that the species listed in Table 1 were reasonably abundant or common throughout the length of the canal.

TURBELLARIA

Planaria torva was collected in small numbers (between 1 and 4 individuals per sample) at seven stations distributed throughout the canal. Dr. T. B. Reynoldson has suggested to us that the distribution of this rather rare species in Britain may be influenced by it being imported on timber from the Continent. The connection of the canal via the river Derwent with the Humber ports may therefore be significant. He has also suggested to us that it may be in potential competition with *Dugesia polychroa*. Seven samples from the canal containing *P. torva* is too small a number to test this idea statistically, but it is suggestive that in six of these seven, *D. polychroa* was rare or absent, which was not the case at most of the other stations sampled.

Only three specimens of *Bdellocephala punctata* were collected, two at station 33 and one at station 17. The distribution and ecology of this species in Britain is very poorly understood (Reynoldson 1967).

HIRUDINEA

Glossiphonia complanata was the least common of the leaches recorded from the canal, although nationally it is widely and well distributed. All the specimens were confined to the section between the Bielby Arm and Hagg Bridge, whilst its close relative *G. heteroclita* was both much more abundant overall and tended to be most common in the upper reaches of the canal, above the Bielby Arm.

GASTROPODA

The canal supports a rich mollusc fauna. Most species were common and well distributed throughout its length, although three of the *Planorbis* spp. were rather more restricted; these were *P. contortus* (four specimens from stations 6 and 26),

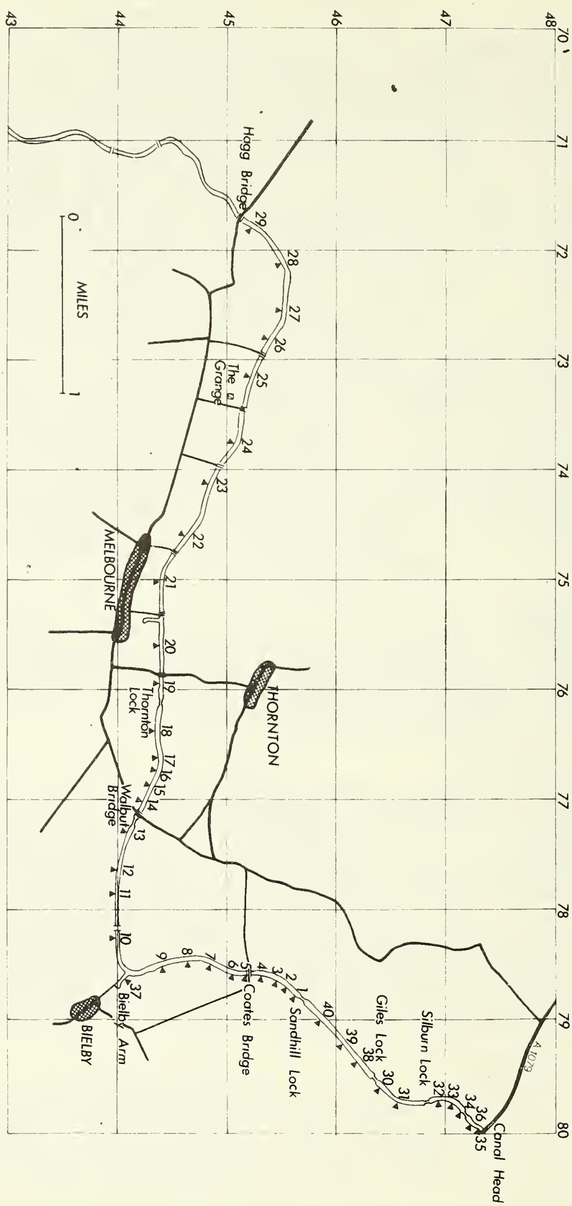

Fig. 1.

The canal in relation to the roads (solid black lines) and villages in the area, together with the stations sampled (arrows). The stations are numbered in the order in which they were sampled. The squares are the 1 km squares of the national grid and are numbered accordingly.

P. corneus (quite common in, but entirely confined to, the lower reaches between Hagg Bridge and The Grange), and *P. crista* (three specimens from stations 10 and 13). All three species are common nationally.

Bythinella scholtzi, in contrast, is an extremely rare species nationally, although one of the stations mentioned by Macan (1969) is again in canals (near Manchester). A total of only ten specimens were collected during the present study from stations 10, 13, 15, 16 and 20 suggesting that it is rather rare in the canal and that it may be confined to a region between the Bielby Arm and just below Thornton Lock. It is, however, very small and it may have been overlooked in some samples.

Three other molluscs that are all fairly common species were also rare in the canal; these were *Limnaea palustris* (a few isolated specimens from stations all down the canal), *Valvata piscinalis* (entirely confined to station 36 at Canal Head, where eleven specimens were collected) and *Viviparus viviparus,* one specimen taken at 26. This latter species is near the northern edge of its range in Yorkshire (Macan 1969).

Table 1. Species recorded from the canal; unless otherwise stated in the text, all species were common or reasonably abundant and occurred throughout the length of the canal.

TURBELLARIA
- *Bdellocephala punctata* (Pallas)
- *Dugesia polychroa* (Schmidt)
- *Planaria torva* (Müll.)
- *Dendrocoelum lacteum* (Müll.)
- *Polycelis tenuis* Ijima

HIRUDINEA
- *Theromyzon tessulatum* (Müll.)
- *Hemiclepsis marginata* (Müll.)
- *Glossiphonia heteroclita* (L.)
- *G. complanata* (L.)
- *Hellobdella stagnalis* (L.)
- *Erpobdella octoculata* (L.)

GASTROPODA
- *Viviparus viviparus* (L.)
- *Valvata piscinalis* (Müll.)
- *Bythinella scholtzi* (Schmidt)
- *Bithynia tentaculata* (L.)
- *B. leachi* (Sheppard)
- *Lymnaea palustris* (Müll.)
- *L. stagnalis* (L.)
- *L. peregra* (Müll.)
- *Physa fontinalis* (L.)
- *Segmentina complanata* (L.)
- *Planorbis carinatus* Müll.
- *P. vortex* (L.)
- *P. corneus* (L.)
- *P. contortus* (L.)
- *P. crista* (L.)
- *P. albus* Müll.
- *P. laevis* Alder
- *Acroloxus lacustris* (L.)

CRUSTACEA
- *Asellus aquaticus* L.
- *Daphnia longispina* Müll.
- *Simocephalus vetulus* Müll.
- *Eurycercus lamellatus* (Müll.)
- (The Crustacea, particularly the smaller species were not sampled or examined in detail)

INSECTA

MEGALOPTERA
- *Sialis lutaria* (L.)

EPHEMEROPTERA
- *Caenis horaria* (L.)
- *C. moesta* Bengtss.
- *Cloëon dipterum* (L.)
- *C. simile* Etn.

ODONATA
- *Coenagrion puella* (L.)
- *Enallagma cyathigerum* (Charp.)
- *Ischnura elegans* (Van der Lind.)
- *Pyrrhosoma nymphula* (Sulz.)
- *Erythromma najas* (Hans.)
- *Aeshna grandis* (L.)

HEMIPTERA
- *Nepa cinerea* L.
- *Notonecta glauca* L.
- *Cymatia coleoptrata* (Fab.)
- *Corixa punctata* (Illig.)
- *C. panzeri* (Fieb)
- *Hesperocorixa linnei* (Fieb)
- *H. sahlbergi* (Fieb)
- *Sigara dorsalis* Leach
- *S. distincta* (Fieb)
- *S. falleni* (Fieb)
- *S. fossarum* (Leach)
- *Callicorixa praeusta* (Fieb)

COLEOPTERA
- *Oulimnius tuberculatus* (Müll.)
- *Haliplus ruficollis* Degeer
- *H. obliquus* Fab.
- *H. confinis* Stephens
- *Noterus capricornis* Herbst
- *Hyphydrus ovatus* L.
- *Hygrotus versicolor* Schaller
- *H. inaequalis* Fab.
- *Deronectes duodecimpustulatus* Fab.
- *D. depressus-elegans* F. (*elegans* type)
- *Graptodytes pictus* Fab.
- *Scarodytes lineatus* Fab.
- *Hydroporus palustris* L.
- *H. pubescens* Gyllenhal
- *H. planus* Fab.
- *Illybius fenestratus* Fab.
- *Agabus sturmii* Gyllenhal

INSECTA

ODONATA. The most interesting species collected were larvae of the damselfly *Erythromma najas,* which is again very much on the northern edge of its range in Yorkshire. Larvae were fairly common at several stations in the upper and middle reaches of the canal, between Giles Lock and Walbut Bridge.

HEMIPTERA. A large number (over a thousand) of the juvenile Corixidae that were collected were not identified so that the distribution of certain species may not have been correctly evaluated on the basis of the adult material, particularly if the adults are the same size as some of the other species recorded, but appear later in the year. Two species that are common and widely distributed in Britain (*Sigara distincta* and *S. fossarum*) but which were rare in the canal and apparently represented by only one specimen each at only one station (11 and 39 respectively) may fall into this category. The distribution of a third species, *S. falleni,* may have been more correctly determined; adults were recorded at three of the stations between Giles Lock and just below Coates Bridge, (where the water is particularly clear with little organic matter) but nowhere else. This species is one that is most common in the south and east of the country (Macan 1965).

Callicorixa praeusta was very common in the section between Walbut Bridge and Thornton Lock, but only two isolated specimens were found outside this stretch. The much smaller, predatory *Cymatia coleoptrata* was reasonably common at stations 39 and 40 (a total of 29 specimens being collected) and isolated specimens were collected just above and below this same area at stations 38 and 2. Outside this section of the canal specimens were collected at station 28(4) and station 18(1), implying a peculiarly sporadic distribution down the canal. This species is again one that is near the northern edge of its range in Yorkshire. *Corixa panzeri* is a rare species in a national context (Macan 1965); five specimens were collected at station 26 near the lower reaches of the canal, but it was not recorded anywhere else. The reasons for these interesting patterns of distribution shown by the Corixidae along the canal are unknown. Careful study along 'linear' habitats of this kind in which distributions change markedly in response to apparently quite small habitat differences could throw considerable light on the ecology of the Corixidae. Unfortunately, the dredging operations mean that this will no longer be possible on the Pocklington Canal.

COLEOPTERA

Most of the species were fairly well distributed along the canal, although six were represented by a small number of specimens restricted to one or two isolated stations, mostly in the lower reaches. These include the *Oulimnius, Noterus, Agabus* and *Scarodytes* species as well as *Hydroporus pubescens* and *Deronectes 12-pustulatus.* A detailed analysis of the Dytiscidae collected, with particular reference to the Tribe Hydroporini will be presented elsewhere (Lawton *in prep.*).

The Possible Influence of Dredging on the Invertebrate Fauna of the Canal

The canal changes gradually in its appearance between Canal Head and Hagg Bridge, the water tending to become less clear and to contain more organic matter as one moves down its length. Within this general trend, it also tends to show rather marked differences in vegetation above and below each lock. One rather surprising feature of the survey was, therefore, the fact that many of the species were well distributed throughout the canal. This may also be true of some of the species which were rare and apparently confined to only one or two stations, because if they are generally rare throughout the canal, chance may have played an important part in determining whether or not we collected them at any particular station. This is an important consideration when we try to assess the effects of dredging on the fauna.

The distribution of species within various taxonomic groups down the length of the canal is summarised in Table 2. If any trend is apparent it suggests that the lower reaches may be rather richer in species than the upper, but not markedly so, and that the section between Giles Lock and Coates Bridge in the upper reaches may be almost as good. As far as is known at the present time, plans to dredge the canal exclude the

Table 2. The numbers of different species in various groups, recorded from different sections of the canal (see Figure 1 for the location of the sections along the canal).

Canal Section	Number of Stations sampled	Species of Corixidae	Species of Gastropoda	Species of Turbellaria and Hirudinea	Species of Dytiscidae	Total species in these groups
Canal-head to Giles Lock	7	1	12	10	2	25
Giles Lock to Coates Bridge	7	4	10	7	8	29
Coates Bridge to Bielby Arm	6	2	7	8	5	22
Bielby Arm to Walbut Bridge	4	1	13	7	5	26
Walbut Bridge to Thornton Lock	5	5	13	10	5	33
Thornton Lock to The Grange	6	2	12	8	7	29
The Grange to Hagg Bridge	5	4	15	7	8	34

Bielby Arm and extend no further than Coates Bridge Lock leaving the last mile and a half untouched. It is encouraging to note that these remaining sections appear to be fairly representative of the full length of the canal, at least in terms of the richness and variety of the invertebrate fauna which they contain. However, populations of two of the species that are rare or local in a national context appear to occur only within areas that will eventually be dredged so that if we have assessed their distribution correctly their future in the canal is uncertain. These are the small snail *Bythinella scholtzi* and the large corixid *Corixa panzeri.* Only one of the species whose occurrence in the canal is near the northern edge of its British range is similarly affected (the snail *Viviparus viviparus*), and since only one specimen was collected its future status must be precarious.

The most likely effect of the drainage would appear to be to restrict the total habitat available to the fauna, but without seriously endangering most of the species. The subsequent recolonisation and recovery of the dredged areas from the important undisturbed upper sections will be interesting to follow.

ACKNOWLEDGEMENTS

This survey was made possible by a grant of £100 from the British Ecological Society from a fund which it has established to encourage surveys of threatened habitats. Additional help was provided by the University of York; to both we are extremely grateful. Derek Ungley first drew our attention to the canal and encouraged us to carry out the survey.

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Mammals by Claus König. Translated from the German by R. W. Hayman. Pp. 250 with 130 colour plates. Collins' **Colour Guides** series, 1973. £1.50.

This book is an excellent buy; it has a number of beautiful colour photographs of most of Europe's mammals and the text is concise and accurate. The author hopes that his book will contribute to the protection of European mammals and its quality will no doubt help to do this.

The text is subdivided into description, distribution, habitat, habits, breeding behaviour, food and allied species of the 180 land and amphibious mammal species found in Europe. The whales and dolphins are not dealt with, nor are there any distribution maps. At the end of the book, as well as an index, there is an identification key for small mammals; front teeth and skull diagrams of small mammals; tooth patterns of voles and a section on the external identification characters of bats and methods of measurements of some of these. One small point of criticism concerns the mixture of imperial and metric measurements present in those sections dealing with descriptions of some of the mammals. The weights of most of the smaller mammals are correctly given in grammes, but others are in imperial ounces. For example, the Wood Mouse *(Apodemus sylvaticus)* is quoted as being between 14-28 grammes; whereas the Yellow-necked Mouse *(Apodemus flavicollis)*, is recorded as between 1 and 1½ ounces. Likewise, the forearm measurements for the bats are, in the field, more easy to measure in millimetre units than in fractions of an inch, which are the measurements given in the text. The weights of all the larger mammals are given in imperial pounds.

Some of the colour photographs are superb, especially those of the larger mammals and the bats. With the latter, facial features and ears, which are so important in field identification, are well displayed. If this pocket-sized guide is anything to go by, then the rest of the series of Collins' *Colour Guides* will be just as pleasing. M.J.A.T.

Studying Insects, A Practical Guide, by R. L. E. Ford. Pp. 150 with 47 line drawings and 16 pages of plates in colour and black and white. Frederick Warne, London 1973. £2.50.

This book is a fully revised edition of the 1963 Warne publication, *Practical Entomology,* by the same author. Directed principally at beginners, particularly young people, and devoted mainly to Lepidoptera, the author concentrates on the study of the living insect. The book contains chapters on collecting methods, breeding and rearing techniques and the care of collections. Useful appendices include the recently publicised "Code for Insect Collecting" and a list of books, magazines and supplies.

The author's enthusiasm for his subject is quite infectious and I should think that on reading this book few budding entomologists could fail to be fired with the same zest. They will also find it a very useful practical guide as claimed in the title. R.C.

THE OCCURRENCE OF SOME INVERTEBRATE ANIMALS IN THE LITTORAL ZONE OF SOME LOWLAND LAKES IN CHESHIRE AND SHROPSHIRE.

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The invertebrate fauna in the lowland, calcium-rich, "productive" lakes (meres) of Cheshire and Shropshire is poorly known; available information on the bottom fauna consists mainly of unpublished reports which usually comprise incomplete species lists. Publications include Macan (1967) who investigated the Corixidae of Crose Mere and Sweat Mere, and Young (1970; 1973) who studied the Microturbellaria in the lakes in this region. The present work reports on the occurrence of Gastropoda, Hirudinea, Malacostraca (Amphipoda and Isopoda) and Tricladida.

The lakes sampled in the investigation are listed in each of the Tables 1 – 4; Comber Mere and Hatch Mere are situated in Cheshire, the others in Shropshire. Descriptions of the meres and information on some of their physico-chemical and biological features are included in the following articles: Apampa (1967), Galliford (1954; 1960), Gorham (1957a, b), Griffiths (1925), Kennedy (1961), Lind (1944; 1949), Phillips (1884), Pickavance (1965; 1968), Reynolds (1971a, b), Rose and Bellamy (1959), Sinker (1962) and Wilson (1956; 1966).

Some records of species in the taxa considered in the present study from some of the lakes investigated appear in the following articles: Apampa (1967), Brinkhurst (1960), Cheese (1971), Kennedy (1961), Okorie (1971), Pickavance (1965; 1968), Reynoldson (1966; 1967; unpublished triclad data in 1961 and 1969), Reynoldson and Bellamy (1970), Reynoldson and Davies (1970), Reynoldson and Young (1966), Williams (1960; 1962a), Young (1963) and Young, Morris and Reynoldson (1964).

Sampling Methods

Samples were taken from the littoral zone of each of the lakes on three different occasions, viz. December, April, and September, during the course of 1 year (Dec. 1968 to Sept. 1969). Three sampling methods were used according to the nature of the lake bottom. In beds of vegetation, an F.B.A. hand-net (60 meshes per inch) mounted on a 5ft. pole was used to sweep through the plants for a certain length of time. The results are expressed in terms of numbers of animals collected in 1 hour. The inaccuracies inherent in this method are well known (see Macan, 1963). On a stony shore, stones were picked up carefully, held over an F.B.A. hand-net (60 meshes per inch) and washed thoroughly in polythene basins containing a little water from the lake. Again the results are expressed in terms of the number of animals collected in 1 hour. Shortcomings of this sampling method are well documented in Reynoldson (1958). A standard area sampler was used to take 2 samples from the substratum which was typical of the remaining area of the littoral zone. The sampler consisted of a galvanized iron cylinder (bin or drum), 2ft. in height and 13.5ins. internal diameter, which enclosed an area of approximately 1 sq.ft. (see Dunn, 1953). The results are expressed as the number of organisms obtained from two bin samples of 2 sq.ft. of the lake floor.

It is pertinent to point out that stony shores and vegetation beds were examined at intervals along as much of their length as time permitted, as Macan and Maudsley (1968), Macan (1970) and Chambers (1971) have emphasized the discontinuous nature of the distribution of invertebrates in the littoral of lakes. However, only time spent sweeping or dealing with stones was considered as "collecting time" and not the time in moving from area to area on the bed or shore.

Each entire sample was preserved in 5 – 10% formalin, and eventually animals of the various taxa were removed from the sample by a flotation technique using a saturated solution of magnesium sulphate. The samples were also sorted carefully by mechanical means to ensure the detection of snails which did not float using the above technique.

Results and Conclusions

It is pertinent to emphasise that repeated sampling of all the lakes included in the present study, by students (Hons. B.Sc. and M.Sc.) and the present authors in recent years, have added few records to lists obtained here: two additional records have been included in Table 1.

The full names of the species in the various taxa are given in the appropriate tables; in the text generic names are abbreviated to their initial letter.

Lakes	*Acroloxus lacustris* (L.) V	S	B	T	*Ancylus fluviatilis* (Müll.) V	S	B	T	*Bythinia leachii* (Shep.) V	S	B	T	*Bythinia tentaculata* (L.) V	S	B	T
Newton	4			4												
Blake	19			19		13		13					42	10	2	54
White	35			35									33	11	2	46
The Mere	24			24		360	1	361					52	17	3	72
Hatch	16			16									56	20	3	79
Comber	16			16									48	20	8	76
Cole	32			32	5	186		191	50	13	3	66	286	37	3	326
Crose	32			32		14		14					27	3	2	32

Lakes	*Lymnaea auricularia* (L.) V	S	B	T	*Lymnaea palustris* (Müll.) V	S	B	T	*Lymnaea peregra* (Müll.) V	S	B	T	*Lymnaea stagnalis* (Linn.) V	S	B	T	*Lymnaea truncatula* (Müll.) V	S	B	T
Newton									8			8								
Blake	5			5	7			7	7	3	1	11	9			9	4			4
White	4			4	4	4		8	19	4	1	24	8		1	9	20			20
The Mere	12			12	8	4		12	51	15	3	69	12		1	13				
Hatch	4			4	12	4	1	17	32	4	1	37	4			4				
Comber									44	4	1	49	16			16				
Cole					4		4	8	41	4	1	46	9			9				
Crose									27	8	1	36								

Lakes	*Physa fontinalis* (L.) V	S	B	T	*Planorbis albus* (Müll.) V	S	B	T	*Planorbis carinatus* (Müll.) V	S	B	T
Newton	100	12	1	113	216	20	1	237				
Blake					60	7	1	68	19	7		26
White					19	4	3	26	61	25	12	98
The Mere					44	4		48	20	11	1	32
Hatch	4			4	84	44	1	129	32	228	2	262
Comber					44	4	1	49	72	20	8	100
Cole	70	17	2	89	113	13	1	127	26	26	1	53
Crose	35	3	1	39	27	7	1	35	244	19	1	264

Lakes	*Planorbis contortus* (L.) V	S	B	T	*Planorbis crista* (L.) V	S	B	T	*Planorbis vortex* (L.) V	S	B	T	*Planorbarius corneus* (L.) V	S	B	T	*Potamopyrgus jenkinsi* (Smith) V	S	B	T
Newton	52	16	1	69													1628	1768	18	3414
Blake	63	4		67													296	57	316	669
White	48	11	3	62					14	4		18	4			4	656	47	1264	1967
The Mere					8			8	232	19	1	252					1452	299	214	1965
Hatch	16		1	17													104	200	294	598
Comber																	1308	80	1014	2402
Cole	17			17	8			8	286	42	1	329	8			8	656	323	174	1153
Crose	121	8		129					179	19	1	199					17652	43	43	17738

Lakes	*Segmentina complanata* (L.) V	S	B	T	*Valvata macrostoma* (Steenbüch) V	S	B	T	*Valvata piscinalis* (Müll.) V	S	B	T	*Viviparus viviparus* (L.) V	S	B	T	Total V	S	B	T	No. of spp.
Newton																	2008	1816	21	3845	6
Blake	33			33													564	101	320	985	13
White	25	4	1	30					8		1	9					958	114	1288	2360	15
The Mere	36	4	1	41			√		4			4			1	1	1955	733	226	2914	15 (+1)
Hatch	24	4		28					8			8					396	504	303	1203	13
Comber									4		1	5					1552	128	1033	2713	8
Cole	40			40					84	4	1	89			√		1735	668	191	2591	17 (+1)
Crose	26	4		30			1	1	7		1	8					18377	128	52	18557	13

Table 1. The number of individuals of each species of Gastropoda collected from the littoral region in the various lakes by three different sampling methods, viz. by sweeping vegetation for one hour (V), by searching stones for one hour (S), and in two bin samples (approx. 2 sq.ft.) from the typical substratum outside the vegetational and stony littoral (B), and the three sampling methods combined (T). Each number represents the average of three collections taken in April, September and December. The total number of snails of all species collected by each method and the total number collected by the three methods are also shown. The last column indicates the number of species taken from each lake. The lakes are listed in order of increasing calcium content of water. Values of 7.2, 13.2, 33.6, 35.6, 38.0, 48.8, 50.0 and 59.6 mg Ca/l were obtained by Young (1973). √ indicates record made by the authors outside the period of investigation.

GASTROPODA

Table 1 summarises the snail data. A total of 21 species was recorded. The most widely distributed species were *A. lacustris, L. peregra, P. albus* and *P. jenkinsi* and these were found in all the lakes examined. The number of species obtained from each lake varied from 6 to 17. With regard to distribution in the different habitats examined, most species occurred in all three. However, there was a tendency for a few species to occur mainly in vegetation, and *Ancylus fluviatilis* mainly on stones. The lowest numbers of snails were recorded from Blake Mere and Hatch Mere, the highest numbers from Crose Mere.

Consideration of the relative abundance of species in each lake indicates that in all lakes the numerically dominant species was *P. jenkinsi.* With regard to relative abundance between lakes *L. peregra* was most abundant in The Mere, *B. tentaculata* in Cole Mere, *P. jenkinsi* in Crose Mere. *A. fluviatilis* in The Mere, *P. fontinalis* in Newton Mere, *P. vortex* in Cole Mere, *P. albus* in Newton Mere, *P. carinatus* in Hatch Mere and Crose Mere, *P. contortus* in Crose Mere and *V. piscinalis* in Cole Mere. The other snail species either occurred in low numbers and/or were of equal abundance in the lakes in which they were found.

The observed occurrence of the various species agrees with the information on snail distribution in Britain given in Boycott (1936) and Macan (1950; 1969). However, the records of *V. macrostoma* in The Mere and Crose Mere, as was the record of this species from a pond in Caernarvonshire (see Young and Reynoldson, 1966), would seem to be outside the distribution range indicated in Macan (1969).

Brinkhurst (1960) records *B. leachii* in White Mere and Newton Mere, and *Planorbis laevis* in Cole Mere; the latter species is not common and has been recorded more frequently from the northern part of the British Isles (Macan, 1969).

HIRUDINEA

Table 2 summarises the leech data. A total of 9 species was obtained, *E. octoculata, G. complanata* and *H. stagnalis* were the most widespread species. The number of species

Lakes	*Bactracobdella paludosa* (Carena)				*Erpobdella octoculata* (L.)				*Erpobdella testacea* (Savigny)				*Glossiphonia complanata* (L.)				*Glossiphonia heteroclita* (L.)			
	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T
Newton					20	88	11	119					4	40	1	45		12		12
Blake					20	53	4	77					15	40	1	56				
White					25	95	3	123					11	131	1	143	4	7		11
The Mere					32	92	5	129	4			4	16	129	3	148	4	11	1	16
Hatch					20	99	3	122					16	72	1	89		12		12
Comber	4	36	1	41	12	56	2	70					4	4		8				
Cole					31	70	8	109	5			5	13	39	8	60		6		6
Crose					48	95	7	150	8		1	9	27	243	7	277			4	4

	Helobdella stagnalis (L.)				*Hemiclepsis marginata* (Müll.)				*Piscicola geometra* (L.)				*Theromyzon tessulatum* (Müll.)				Total				No. of spp.
	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T	
Newton	12	100	2	114									4	12		16	40	252	14	306	5
Blake	27	150	3	180		5		5	8	10		18		13	1	14	70	271	9	350	6
White	40	204	3	247									4	28		32	84	465	7	556	5
The Mere	64	125	3	192		21	1	22	8	7		15	12	32	2	46	140	417	15	572	8
Hatch	36	176	3	215		8	1	9									72	367	8	447	5
Comber	20	40	3	63	8	4		12					4	4		8	52	144	6	202	6
Cole	77	219	31	327	4	5		9	5	8	1	14	14	45		59	149	392	48	589	8
Crose	23	94	5	122					4	4		8	7	11		18	117	447	24	588	7

Table 2. Hirudinea data. Legend as for Table 1.

recorded from each lake varied from 5 to 8. In all of the lakes the leech species were found in all three habitats examined. The lowest numbers of leeches were recorded from Comber Mere, the highest from White Mere, The Mere, Cole Mere and Crose Mere.

Considering the relative abundance of species in each lake it is seen that in Newton Mere the species in order of abundance were *E. octoculata, H. stagnalis* and *G. complanata;* in Blake Mere, Hatch Mere and Cole Mere were *H. stagnalis, E. octoculata* and *G. complanata;* in White Mere and The Mere were *H. stagnalis* and *G. complanata* and *E. octoculata;* in Comber Mere were *E. octoculata, H. stagnalis* and *B. paludosa;* and in Crose Mere were *G. complanata, E. octoculata* and *H. stagnalis.*

With regard to relative abundance between lakes, *P. geometra* was most abundant in Blake Mere, *T. tessulatum* in Cole Mere, *H. marginata* in The Mere, *G. heteroclita* in The Mere, *G. complanata* in Crose Mere, *H. stagnalis* in Cole Mere, *E. testacea* in Crose Mere and *E. octoculata* in Crose Mere. *B. paludosa* was found only in Comber Mere.

Again, the observed occurrence of the various species agrees with the findings of Mann (1955; 1962; 1964), who studied the distribution of leeches in Britain.

MALACOSTRACA. AMPHIPODA.

Table 3 summarises the Amphipoda data. A total of 3 species was obtained; *G. pulex* was the most widespread species. The number of species recorded from each lake varied from 1 to 2. In all of the lakes, the recorded species were found in all three habitats examined. The lowest number of amphipods was recorded in White Mere the highest in Hatch Mere.

Considering the relative abundance of species in each lake, in the three lakes, Newton Mere, The Mere and Cole Mere, in which *G. pulex* and *C. pseudogracilis* co-existed, the latter was the most abundant species. In the one lake, Blake Mere, where *G. lacustris* and *C. pseudogracilis* were found, again the latter was numercially dominant. In the two lakes Hatch Mere and Crose Mere, where *G. pulex* and *G. lacustris* co-existed, the former was numerically abundant. In White Mere and Comber Mere only *G. pulex* was found. Considering relative abundance between lakes *G. pulex* occurred in lowest numbers in The Mere and highest numbers in Hatch Mere; *G. lacustris* in lowest numbers in Blake Mere and highest numbers in Hatch Mere; *C. pseudogracilis* in lowest numbers in The Mere and highest numbers in Newton Mere.

Hynes (1951; 1955a) and Hynes, Macan and Williams (1960) indicate that *G. lacustris* is found in lakes, and is at present being displaced by *G. pulex* perhaps. Certainly in the three lakes in which it was found in the present study it was not so abundant as *G. pulex,* though in Hatch Mere it was taken in substantial numbers. Brinkhurst (1960) recorded *G. pulex* in Blake Mere; it was not found here in the present work.

C. pseudogracilis lives in a variety of habitats and is in the process of spreading in Britain (Hynes, loc. cit., and Hynes et al, loc. cit.). It was found in four of the eight calcium-rich lakes studied in the present work. It is interesting to note that Brinkhurst (1960) did not record its presence in these lakes. On the other hand Brinkhurst (loc. cit.) did not record *G. lacustris* in Blake Mere and Crose Mere either. Thus, it is a matter for speculation as to whether or not *C. pseudogracilis* has invaded the four calcium-rich lakes in which it was found, since 1960. The species certainly has a high biotic potential (Hynes, 1955b).

ISOPODA

Table 3 summarises the Isopoda data. *A. aquaticus* was recorded in 7 out of the 8 lakes investigated and *A. meridianus* in 3 out of 8. In all lakes specimens were collected from all three habitats examined. In Comber Mere only *A. meridianus* was recorded and this occurred in relatively higher numbers than in Hatch Mere and Crose Mere, where both *Asellus* species were found; in the latter two lakes *A. aquaticus* was numerically dominant. Lowest numbers of *A. aquaticus* were recorded in Blake Mere, highest in Crose Mere.

The data agree with the findings of Reynoldson (1961) and Williams (1962a) on the distribution of *Asellus* in Britain. Williams (1960; 1962b; 1963) made a special study of the distribution and ecology of *A. aquaticus* and *A. meridianus.* He is of the opinion that *A. aquaticus* may be displacing *A. meridianus* from many habitats in Britain at the present time. Certainly, in the calcium-rich lakes studied in the present work, *A. aquaticus* is the most widespread, and more abundant where it co-exists with *A. meridianus,* i.e. in Crose Mere and Hatch Mere. This is in agreement with the observations of Kennedy (1961) and Williams (1963). *A. meridianus* was more abundant in Comber Mere where it occurred alone; perhaps *A. aquaticus* has not reached this lake yet.

Lakes	*Grangonyx pseudogracilis* Bous.				*Gammarus lacustris* Sars.				*Gammarus pulex* Schell				Total				No. of spp.
	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T	
Newton	636	64	7	707					100	16	7	123	736	80	14	830	2
Blake	264	107	10	381	12	3	1	16					276	110	11	397	2
White									155	36	6	197	155	36	6	197	1
The Mere	88	28	9	125					40	37	8	85	128	65	17	210	2
Hatch					1412	112	16	1540	1768	241	19	2028	3180	353	35	3568	2
Comber									264	72	14	350	264	72	14	350	1
Cole	133	46	15	194					40	78	8	126	173	124	23	320	2
Crose					19	29	2	50	131	104	13	248	150	133	15	298	2

	Asellus aquaticus (L.)				*Asellus meridianus* Rac.				Total				No. of spp.
	V	S	B	T	V	S	B	T	V	S	B	T	
Newton	116	88	8	212					116	88	8	212	1
Blake	103	67	10	180					103	67	10	180	1
White	219	187	15	421					219	187	15	421	1
The Mere	156	124	17	297					156	124	17	297	1
Hatch	280	148	16	444	92	20	2	114	372	168	18	558	2
Comber					300	116	9	425	300	116	9	425	1
Cole	178	179	20	377					178	179	20	377	1
Crose	264	277	20	561	15	3	1	19	279	280	21	580	2

Table 3. Amphipoda and Isopoda data. Legend as for Table 1.

TRICLADIDA

Table 4 summarises the triclad data. A total of 7 species was found. The most widespread species were *P. tenuis, D. polychroa* and *D. lacteum.* The number of species recorded from each lake ranged from 2 to 5. In all of the lakes triclads were found in all three habitats examined. Considering the total number of triclads collected by all three sampling methods, lowest numbers were recorded in Blake Mere and Hatch Mere and highest numbers in Cole Mere, which also harboured the greatest number of species i.e. 5.

TABLE 4

Lakes	*Bdellocephala punctata* (Pallas)				*Dendrocoelum lacteum* (Müll.)				*Dugesia polychroa* (Schmidt)				*Dugesia tigrina* (Gerard)			
	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T
Newton					32	32	4	68	40	48	7	95				
Blake					31	20	1	52	23	50	6	79				
White									67	132	11	210				
The Mere					76	152	6	234	80	196	22	298				
Hatch		24		24	12	24	1	37	64	104	9	177				
Comber		44	2	46					132	368	11	511				
Cole					42	82	12	136	104	278	8	390	4	6300	36	6340
Crose					11	31		42	123	129	11	263				

	Planaria torva (Müll.)				*Polycelis nigra* (Müll.)				*Polycelis tenuis* Ijima				Total				No. of spp.
	V	S	B	T	V	S	B	T	V	S	B	T	V	S	B	T	
Newton					58	135	19	212	592	452	18	1062	722	667	48	1437	4
Blake					11	20	3	34	65	103	14	182	130	193	24	347	4
White									311	849	27	1187	378	981	38	1397	2
The Mere									100	172	18	290	256	520	46	822	3
Hatch									96	240	6	342	172	392	16	580	4
Comber					28	44	9	81	44	176	9	229	204	632	31	867	4
Cole		21		21					229	536	30	795	379	7217	86	7682	5
Crose					20	27	9	56	159	640	35	834	313	827	55	1195	4

Table 4. Tricladida data. Legend as for Table 1.

With regard to the relative abundance of species in each of the lakes *P. tenuis* followed by *D. polychroa* were the most abundant species in Blake Mere, White Mere, Hatch Mere, Cole Mere (if *D. tigrina* which has a limited distribution is ignored), and Crose Mere. *D. lacteum* or *P. nigra* when present in these lakes were the next most abundant species. In The Mere and Comber Mere, *D. polychroa* was more abundant than *P. tenuis.* In Newton Mere while *P. tenuis* was the most abundant species *P. nigra* came next in terms of abundance. Considering relative abundance of each of the species between lakes, *P. nigra* was most abundant in Newton Mere, *P. tenuis* in White Mere, *D. polychroa* in Comber Mere, and *D. lacteum* in The Mere.

Reynoldson (1955; 1966) has investigated the distribution and abundance of lake-dwelling triclads in Britain. Since he included some of the lakes considered in the present investigation it is not surprising that the present data agree with his observations. Reynoldson (1966) has suggested that the distribution and abundance of *P. nigra, P. tenuis, D. polychroa* and *D. lacteum* are determined primarily by inter-specific competition for food. Little is known about the ecology of *B. punctata. P. torva* has a rather limited distribution in Britain and its taxonomy and occurrence has been studied by Ball, Reynoldson and Warwick (1969).

In the present work *D. lugubris* (Schmidt) was not differentiated from *D. polychroa;* the former has been separated from the latter in a recent paper by Reynoldson and

Bellamy (1970), and they record *D. lugubris* from Cole Mere, The Mere and White Mere. Apampa (1967), very surprisingly, records *D. lacteum* from Comber Mere; it is certain that this species does not occur there.

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A PERIOD OF WADER AND TERN PASSAGE IN THE FAIRBURN-BIRKIN AREA IN THE SPRING OF 1973

J. D. PICKUP and R. F. DICKENS

On Friday, 18th May 1973, Stephen Gwilliam arrived at Fairburn at 06.15 to find five Common/Arctic Terns and two Sanderlings present on the Nature Reserve. He was joined there at 07.10 by R. F. Dickens but by this time the birds had gone and the two observers moved on to Birkin where they found a single Black-tailed Godwit (which had been present since 16th May), together with three Greenshank, one Common Sandpiper and ten Ringed Plovers. Returning briefly via Fairburn at 07.50, they came across 25-30 "Commic" Terns and two Black Terns and saw three Black-tailed Godwits flying eastwards over the reserve, but did not visit the area where waders might have been feeding. (The term "Commic" is used for Common or Arctic Terns not specifically identified).

Obviously a period of passage of considerable interest was in progress and various other observers were alerted. It has, in consequence, been possible to build up a picture in some detail for this and subsequent days for these two adjacent areas. Numbers of Little Ringed Plover and Redshank are omitted from the account since these would in most cases be local breeding birds.

On the same day, at 09.00, J. D. Pickup found 27 "Commic" Terns and five Black Terns at the Newton end of the Main Bay at Fairburn. The five Black Terns were later joined by two others. Half an hour later in the Fairburn Cut area, there were seventeen "Commic" Terns, some of which may possibly have been additional to those already mentioned. Twenty-one Ringed Plovers and a Sanderling were also in this area.

At Birkin, by 10.15, a single Black Tern and a single Spotted Redshank were now present as well as those species seen earlier in the morning, and two additional Ringed Plovers had also appeared.

By 11.30, Black Terns at Fairburn had increased to nine, but no "Commics" were evident. Some of the variation in numbers may be due to birds being unobserved as they rested on the new islands under construction at the time, but it seems that many of the "Commics" seen earlier in the morning had in fact moved on and that there was a continuous passage of birds. B. Eaton recorded seven Black and eight "Commic" Terns between noon and 13.00 and identified one Roseate Tern. In the afternoon, by 16.30, there was a further increase in Black Terns to sixteen, possibly twenty, and five "Commics" were now present. These were joined by four others which flew in from the west at 17.30, and by 18.30 about 25 were again in the area.

On the following day, Saturday 19th May, no waders or terns were seen at Fairburn at 06.30, nor again at 07.30. But at the latter time at Birkin, Greenshanks had increased to four; and in addition to the Spotted Redshank, Black-tailed Godwit and Common Sandpiper present on the previous day, a Dunlin and a very tame and tired Wood Sandpiper had appeared. Later in the morning there was much calling and display from the four Greenshanks.

By afternoon, Fairburn had received its fresh quota of waders and now also had a Wood Sandpiper. (A check showed this not to be the Birkin bird which was still there). Seven Ringed Plovers, three Dunlin, six Sanderlings, one Little Stint and one Turnstone were also seen at Fairburn, and a Kentish Plover in front of the new hide gave good views to numerous observers.

This bird, like all the others except the Turnstone, was seen again on Sunday, 20th May when a Greenshank was an additional species for Fairburn. Wood Sandpipers had increased to two and Dunlin to fifteen. Six Sanderlings and two "Commic" Terns were also present.

Whilst J. D. Pickup and R. F. Dickens were watching from the new hide, a wader flew in at about 08.30 whose rapid wing-beat, comparatively small size and shortish, "angled" rather than gently decurved bill, immediately suggested Whimbrel rather than Curlew. We examined carefully for Whimbrel head markings and although there was a pale supercillium there was no central pale stripe on the darker crown. Neither we nor others who saw the bird later and who also considered it to be a Whimbrel because of its rapid wing-beat, small size and short bill, noted any diagnostic breast markings and the possibility of Slender-billed Curlew was not considered until too late.

Meanwhile birds at Birkin remained the same as on the previous day except that there were now only three Greenshanks, and it seems probable that the Fairburn Greenshank had come from Birkin (direct distance, four miles). The Wood Sandpiper was still present at Birkin both on this occasion and the following day (Monday, 21st) when there were still two at Fairburn. The Kentish Plover had gone but in addition

		"Commic" Tern		Black Tern		Ringed Plover		Black-Tailed Godwit		Wood Sandpiper		Common Sandpiper		Greenshank		Dunlin		Sanderling	
		F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B
Friday 18th May 1973	06.15	5	·	0	·	0	·	0	·	0	·	0	·	0	·	0	·	2	·
	07.10	0	·	0	·	0	·	0	·	0	·	0	·	0	·	0	·	0	·
	07.30	·	0	·	0	·	10	·	1	·	0	·	1	·	3	·	0	·	0
	07.50	25+	·	2	·	·	·	3	·	·	·	·	·	·	·	·	·	·	·
	09.00	27	·	7	·	21	·	0	·	0	·	0	·	0	·	0	·	1	·
	10.15	·	0	·	1	·	12	·	1	·	0	·	1	·	2	·	0	·	0
	11.30	0	·	9	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·
	12.00	8	·	7	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
	16.30	5	·	16	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
	17.30	9	·	6	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
	18.30	25	·	16+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
19th May	06.30	0	·	0	·	0	·	0	·	0	·	0	·	0	·	0	·	0	·
	07.30	0	0	0	0	0	0	0	1	0	1	0	1	0	4	0	1	0	0
	P.M.	0	0	0	0	7	·	0	1	1	1	0	1	0	4	3	1	6	0
20th May		2	0	0	0	6	0	0	1	2	1	0	1	1	3	15	1	6	0
21st May	07.00	·	0	·	0	·	0	·	1	·	1	·	1	·	3	·	1	·	·
	15.00	0	·	0	·	3	·	0	·	2	·	1	·	0	·	1	·	0	·
	15.30	·	0	·	0	·	3	·	1	·	1	·	1	·	3	·	1	·	·
22nd May		5	0	0	0	0	0	0	0	2	0	0	0	1	3	0	4	0	3
23rd May		1	0	0	·	·	1	·	0	·	0	·	0	·	0	·	5	·	0
24th May		1	·	0	·	0	·	0	0	0	0	0	0	0	·	0	0	0	0
25th May		1	·	·	0	·	1	·	0	0	0	0	0	0	0	0	6	·	0
26th May		·	·	·	0	·	1	·	0	0	0	6	0	0	0	0	6	·	0
28th May		·	·	·	5	·	3	·	0	0	0	0	0	0	0	0	1	·	0
29th May		·	3	·	0	·	0	·	0	0	0	0	0	0	0	0	0	·	0

Table summarising the observed numbers of Terns and of those species of Wader seen most frequently during the period 18th – 29th May, 1973 at Fairburn ('F' column) and Birkin ('B' column) to the Little Stint already noted, a further Stint was located which was subsequently identified as a Temminck's Stint. Whereas six Ringed Plover had been seen on 20th at Fairburn, there were now three at Fairburn and three at Birkin.

On Tuesday 22nd, five "Commic" Terns appear to have been the only new arrivals at Fairburn, but at Birkin Dunlin had increased from one to four, and three Sanderlings were now also present. It is of interest that these three Sanderlings were still in winter plumage.

Most birds had moved on by Wednesday, 23rd May, with one Oystercatcher and one "Commic" Tern the only species of note at Fairburn. Dunlin were now five at Birkin but all other species, other than local breeders, had left. After a quiet day on 24th May, Friday 25th showed a new influx of six Dunlin at Birkin accompanied by a Pectoral Sandpiper which was still present on the following day. There were five Black Terns at Birkin on 28th, and three "Commics" on the 29th May.

The long dry spell had left a good deal of exposed mud both at Birkin and in front of the hide at Fairburn. High pressure to the north and east of Britain and low pressure to the south-west at the beginning of and throughout the earlier part of this period produced easterly winds and resulted in a marked passage of waders and terns. It is hoped that members who have records which fit into this picture, or supplement it, either for Fairburn and Birkin or for other parts of the county will let vice-county recorders have their observations without delay.

We would like to thank Stephen Gwilliam, Richard Swales, and Brian Eaton for access to their records for the period.

Scientific names of species mentioned in the text

Oystercatcher – *Haematopus ostralegus*
Ringed Plover – *Charadrius hiaticula*
Little Ringed Plover – *C. dubius*
Kentish Plover – *C. alexandrinus*
Turnstone – *Arenaria interpres*
Curlew – *Numenius arquata*
Whimbrel – *N. phaeopus*
Black-tailed Godwit – *Limosa limosa*
Wood Sandpiper – *Tringa glareola*
Common Sandpiper – *T. hypoleucos*
Redshank – *T. totanus*
Spotted Redshank – *T. erythropus*
Greenshank – *T. nebularia*
Little Stint – *Calidris minuta*
Temminck's Stint – *C. temminckii*
Pectoral Sandpiper – *C. melanotos*
Dunlin – *C. alpina*
Sanderling – *C. alba*
Black Tern – *Chlidonias niger*
Common Tern – *Sterna hirundo*
Arctic Tern – *S. paradisaea*
Roseate Tern – *S. dougallii*

THE SHORT-EARED OWL ON THE SHEFFIELD MOORS IN 1972-73

D. HERRINGSHAW and D. GOSNEY

The Short-eared Owl (*Asio flammeus*) has been a regular winter visitor to the western moorlands of the Sheffield area for many years. However, until recently, little was known of the true status of this owl as a breeding species within the region. There seems little doubt that in recent years one or two pairs have nested annually with varying degrees of success. The remoteness of much of this moorland, however, coupled with limited public access has made definite evidence of breeding very difficult to obtain.

In the breeding season of 1972 an abnormally high population was noted on the moorlands to the west of Sheffield. A total of eight pairs were proved to breed, whilst additional sightings of birds hunting were received from two further localities. All eight pairs occupied territories in suitable habitats within an area seven miles square in the extreme south of Vice-county 63.

The moorland breeding habitat favoured by most of these eight pairs consisted largely of deep ling (*Calluna vulgaris*) and bilberry (*Vaccinium myrtillus*) at an average altitude of about 1000 feet above sea level. One pair nested amongst dense bracken (*Pteridium aquilinum*) with occasional large clumps of ling, and another breeding pair selected a large bed of soft rush (*Juncus effusus*) for the nest site. In each case the favoured hunting area was that dominated by a dense covering of either Sheep's Fescue (*Festuca ovina*) or Mat-grass (*Nardus stricta*).

Such was the density of the breeding population within this seven mile square area that several of the nest-sites were very near to public roads. Many of the adults hunted alongside these roads and the sight of a Short-eared Owl methodically quartering roadside verges for rodent prey, flapping over and between passing vehicles, was a common occurrence in the spring and summer of 1972. Not a few of the general public, on a Sunday afternoon excursion into the countryside, stopped their vehicles to watch this unusual sight.

An analysis was made of pellets collected by the writers and other local observers, from the bases of the many perching posts used by these owls. Almost all the remains identified within these pellets were those of Short-tailed Field Vole (*Microtus agrestis*) and the remainder (an extremely small proportion) were Common Shrew (*Sorex araneus*). Several of the pellets also contained the remains of insect exoskeletons, most of which were those of ground beetles (Carabidae) but the species were not identified. The apparent predominance of field voles in the diet was further supported by the identification, in the field, of prey items carried to the nest.

There seems little doubt that in 1972 an unusually high population of field voles was to be found on the moors to the west of the City. Amongst other bird and mammal predators, both the Kestrel (*Falco tinnunculus*) and the Weasel (*Mustella nivalis*) were in greater abundance in this area in 1972 than in the previous two or three years. It was a not unusual occurrence to sit awaiting the return of an adult owl to a nest-site and to have a number of field voles continually running across nearby open paths, on several occasions pursued by weasels.

There would thus seem to be some correlation between the high vole population and the unusually high population of Short-eared Owls in the district. However it must be stressed that such a relationship is largely based on the evidence outlined above and that the use of small mammal traps to estimate the density of small mammal populations in certain specific areas would have given more accurate data upon which to base any conclusions.

Short-eared Owls continued to be widespread and commonly seen within the area throughout the autumn and winter of 1972-73, but by spring of 1973 the great majority of the birds were gone. Evidence at present available points to only three pairs of these owls having occupied vastly larger territories in 1973, within the seven mile square previously occupied by a minimum of eight breeding pairs. Each of the three pairs probably had their nest-sites on remote moorland where there was no public access, thereby rendering observation difficult. We therefore have no detailed data to compare with that obtained in 1972.

It is interesting to note that this substantial increase in the 1972 population of the Short-eared Owl appears to be a purely local phenomenon, for the neighbouring upland areas of Derbyshire had no such great increase in numbers. There may well have been other factors which contributed to this temporary change in status which may have been overlooked. There seems little doubt that a careful monitoring of variation in density of local rodent populations would produce much valuable information on predator-prey relationships within the South Yorkshire region.

ACKNOWLEDGEMENTS

The careful and detailed observations given to the writers by several members of the Sheffield Bird Study Group did much to help build up a composite picture of the distribution of the Short-eared Owl within the Sheffield region in 1972. Without their valuable help much of the useful data accumulated in that year (of which this account is only a very brief summary) would have been lost. We owe them many thanks.

Welsh Wild Flowers, by A. R. Perry. Pp. 36 + 50 colour photographs. National Museum of Wales, Cardiff. 40p. (46p post free).

Like most publications emanating from the National Museum of Wales, this is an eminently sound and reliable little booklet. A brief introduction tells how the land came to be more or less deforested and what habitats now remain for the wild plants. Mr. Perry has avoided the temptation to select rare species which few would be likely to come across and gives a good cross-section of the commoner plants which may be found in the Welsh countryside. For the most part the colours have reproduced well, only one or two of the pink-flowered species looking a bit wan. Each plant is briefly described, accompanied by its English, Welsh and Latin name. G.A.S.

REPORT OF THE CONCHOLOGICAL SECTION: MARINE SURVEY

Report of field trips to Yons Nab, Cayton Bay and Scalby Ness rocks, Scarborough, Staithes and Fraisthorpe sands, Bridlington, 1973

The Conchological Section held four field trips to the coast in 1973 during which a number of varied habitats were examined. In order to keep the following report as short as possible only records of live material are included, and habitat data is only given for those species not dealt with in the 1972 report (*Nat.* 1973 (2), 71-3).

Localities Visited

A. Yons Nab, Cayton Bay, Scarborough (Grid Ref. 54/0984), 18th February. Tide H.W. 5.3 pm., Ht. 5.4 met. Area examined; large rock pools on Castle rocks.

B. Scalby Ness rocks, Scarborough (Grid Ref. 54/0390), 5th May. Tide H.W. 6.5 pm., Ht. 5.1 met. Area examined H.W.M.–L.W.M. north of the children's paddling pool.

C. Staithes (Grid Ref. 45/7819), 16th September. Tide H.W. 6.5 pm., Ht. 4.7 met. Area examined, rocks and rock pools south of the harbour.

D. Fraisthorpe beach, near Bridlington (Grid Ref. 54/1762), 29th September. Tide H.W. 6.6 pm., Ht. 5.2 met.

The tide information is based on the tide tables for the district and allowances should be made for G.M.T. where necessary. Tide depths are for afternoon tides.

List of Species Found

Acanthochitone crinitus (Risso)	A				
Lepidochitona cinereus (L.)	A	B	C		
Tonicella rubra (L.)		B	C		Scarce at extreme low-water amongst the pink calcareous growths.
Acmaea virginea (Muller)	A	B	C		
Cingula semicostata (Mont.)		B	C	D	
Gibbula cineraria (L.)	A	B	C		
Lacuna pallidula (da Costa)		B	C		
L. vincta (Mont.)	A	B	C		
Littorina littoralis (L.)	A		C		
L. littorea (L.)	A	B	C		
L. neritoides (L.)		B	C		
L. saxatilis (Olivi)	A	B	C		
L. s. tenebrosa (Mont.)	A	B	C		
Margarites helicinus (Fab.)	A	B	C		
Nassarius incrassatus (Strom)	A	B	C		
Nucella lapillus (L.)	A	B	C		
Patella aspera Roding		B	C		
P. vulgata L.	A	B	C		
Patina pellucida (L.)	A	B	C		
Rissoa parva (da Costa)	A	B	C	D	
Skeneopsis planorbis (Fab.)	A				
Acanthodoris pilosa (Abild.)			C		Fairly common under stones on muddy sand L.W.M. to mid-tide level.
Archidoris pseudoargus (Rap.)	A	B	C		
Goniodoris nodosa (Mont.)	A		C		Under stones in the *Laminaria* zone, fairly common but difficult to locate.
Odostomia scalaris Macgill.		B	C		
Onchidoris fusca (Muller)	A	B	C		
Abra prismatica (Mont.)				D	A single living specimen was found at the water's edge, L.W.M. This species is generally found below extreme low-water spring tide down to 30 fathoms.
Anomia ephippium L.				D	Found in the strand line near low-water mark, detached from their normal substrate but animals still inside.
Donax vittatus (da Costa)				D	
Ensis siliqua (L.)				D	Fairly common deep down in the sand at low-water mark. With a little practice several fine examples were dug out of their burrows.

Hiatella arctica (L.)	A	B	C		
Lasaea rubra (Mont.)	A	B	C		
Kellia suborbicularis (Mont.)		B			Several specimens were found deep inside cracks in the rocks at low-water mark.
Modiolus modiolus (L.)			C		
Mytilus edulis L.	A	B	C	D	
Tellina tenuis da Costa				D	
Turtonia minuta (Fab.)		B			Scarce in the cracks of rocks at low-water mark.
Venerupis pullastra (Mont.)	A				One specimen under a stone in a deep rock pool, this species often occurs in the holdfasts of *Laminaria.*
V. saxatilis (F. de Bell.)		B			Fairly common in boreholes deep inside the rocks, mid-tide level and below.
Zirfaea crispata (L.)		B			

The list is compiled according to that laid down in the Concordance to the field card for British Marine Mollusca published by the Conchological Society of Great Britain and Ireland, May 1973.

Adrian Norris, Recorder

MAMMALS AND LOWER VERTEBRATE SECTION FIELD MEETING AT MASHAM JULY 1st, 1973

We were fortunate to obtain permission to visit and lay traps in Swinton Park as part of the Section's programme for recording Yorkshire mammals; and to have a hot sunny day for the meeting which showed the park at its best. The results contribute to the Mammal Society Recording Scheme.

Sixty Longworth live mammal traps were laid and set on the evening of June 30th with the assistance of the head gamekeeper. The total catch from the Longworth traps consisted of nine mature mammals:–

Wood Mouse (*Apodemus sylvaticus*) – 5. One female had produced three young in the nesting box.

Common Shrew (*Sorex araneus*) – 3.

Bank Vole (*Clethrionomys glareolus*) – 1.

In the park the keepers had shot large numbers of grey squirrel (*Sciurus carolinensis*) and trapped many stoats, weasels and hedgehogs. Rabbits and Moles were plentiful. A badger sett near the castle was not visited but was reported to show signs of occupation. We unfortunately missed the head keeper's pet fox cub which had disappeared the previous week. Numerous bats were seen at the woodland edge in the evening of June 30th but firm identification was not possible.

The deer park gave us the opportunity of a close look at the large herd of fallow deer. Antlered bucks and does with well grown calves watched us suspiciously from the shade of the ancient parkland trees. Tracks, droppings and bole-scoring of trees were examined.

Common toad and common frog were found and an angler fished successfully in one of the lakes for the common eel.

We finally received instruction in the management of pheasants and assisted in the feeding of the young birds.

The following mammals had not previously been recorded from O.S. square SE 2070:– Bank Vole, Wood Mouse, Common Shrew, Hedgehog, Weasel, Stoat and Fox.

D. L. Aspinall

FIELD NOTES

Late young Great Crested Grebes fed on Jack Pike

While watching from the old hide on the south side of Fairburn Ings during the afternoon of Monday, 5th November, 1973, I observed the following interesting incident.

Directly in front of the hide was a family of one adult and two young Great Crested Grebes. The young were in juvenile plumage with striped necks but were nearly full-grown. They were about thirty feet away and, with good visibility and X12 field glasses, an excellent view was possible.

The adult bird was continuously diving for food and the two young were persistently calling and frantically rushing to their parent each time it surfaced, even when it had made no catch.

After a few minutes the adult grebe emerged with food for its young. In its bill it held a jack pike of about 7 inches (17¾ cm.) in length. The parent passed this head-first to one of the young, whose cries had become louder and more excited on seeing the food.

The young grebe attempted to swallow the fish but it suddenly wriggled and fell back into the water. Immediately all three birds dived, and within seconds the adult bird surfaced with the re-captured jack pike held head-first in its beak. It tossed the fish in its beak so that it was holding it by the middle. The parent bird then passed the prey head-first to one of the young which, with some difficulty, eventually managed to swallow it.

The *Handbook of British Birds* does not specify that pike is one of the fish on which the Great Crested Grebe feeds and the present specimen seems to have been a particularly large one for this bird to have taken.

L. S. Higgins

Egg spoilage in the Common Frog in high-level Pennine tarns

G. Fryer (*Naturalist* (1973) 926:105-106) recently recorded details of egg spoilage in Common Frogs *Rana temporaria* L. in some high-level tarns and was unable to correlate this with either climatic or pesticide effects.

On 14 April 1973 I visited several tarns on the tops of the Howgill Fells at 1900-2200ft. In these I found 19 clumps out of which eight were badly spoiled and all the others with just a few eggs affected. These were infected with a fungal mycelium identical with that described by Fryer and named as *Saprolegnia ferax* (Gruith) Thuret. At this site no dead frogs were found.

On 16 April 1973 I visited the Baugh Fell plateau and in the largest tarn on the north side of the plateau (1900ft.) about 25 spawn clumps were found, 22 with some spoilage. Examination revealed that some of the inner eggs of most clumps were not spoilt and the embryos were developing well: these were obviously successful for tadpoles were found here on 11 May. In this tarn were also found on the 16th five dead frogs and two live pairs, the females of which had not spawned (a late date). Three shallower tarns at 2000ft. had seven spawn clumps, all of which showed some spoilage.

During this period I visited several lower moorland areas (less than 1200ft.) including Cautley Valley, the lower slopes of Baugh Fell and Widdale Fell, Bowland and Rossendale in which frog spawn was found with little or no spoilage. Also I did not find spoilt eggs amongst several hundred clumps found on the Lancashire coastal plain in 1973. It would appear that spoilage on a large scale occurred only at higher altitudes. If pesticides were responsible for the spoilage then surely there would also be spoilage on the coastal plain where agriculture is more intensive.

More likely was this spoilage due to the very hard weather experienced on the tops in early April 1973. On 5-6 April I visited Frostrow and Baugh Fells, finding the areas covered in packed snow and ice. This was the hardest April weather I have experienced on Pennine moors in eight seasons' close observation and the only season I have noticed such egg spoilage.

M. E. Greenhalgh

Philonotis marchica Brid. in Yorkshire

Mr. G. A. Shaw recently sent me a sample of *Philonotis* material from the herbarium of the Botany Department, University of Leeds, collected by W. Ingham in 1903 from crevices in wet slate at Deep Dale, Bowes, V.C. 65.

The specimen is *Philonotis marchica*. There are, to date, only two other finds of this species in the British Isles (*vide* Field, J. H. in *Trans. Br. bryol. Soc.* 4: 429-433 (1963)). The first was by W. Wilson in Shanklin Chine (1859). This material was located in Warrington Museum by Mr. N. D. Atkins and sent to me for verification. A second record was found in the herbarium of J. Bellamy and sent by Miss E. H. du Feu. The specimen was collected in 1912 from a stone in a stream at Giffard Bay, Jersey.

J. H. Field

BOOK REVIEWS

Drawings of British Plants: Part XXXI by Stella Ross-Craig. Lemnaceae, Alismataceae, Butomaceae, Juncaginaceae, Scheuchzeriaceae, Potamogetonaceae, Ruppiaceae, Zannichelliaceae, Zosteraceae, Najadaceae and Eriocaulaceae. 46 plates. G. Bell & Sons 1974. £2.

This part brings to an end the long series of Stella Ross-Craig's drawings of British plants. The first part was issued in 1948 and the 31 parts together contain drawings of 1317 species. The final illustration is of the pipe-wort *Eriocaulon,* the sedges and grasses being omitted on account of the two available works on these groups which contain illustrations of comparable standard. Ferns and fern allies are also omitted.

Half the drawings in this part are of pondweeds and these are the ones which are likely to be most frequently consulted as an aid to identification. They bring out the distinctions in general appearance and of individual parts with all the accuracy and elegance which characterise the whole work. That of *Potamogeton coloratus* falls short of the rest in not showing the fine venation of the leaves. One wishes too that the widespread *P. nitens* had been included. Of the other illustrations those of the five duckweeds are perhaps the most interesting as all show flowering plants; those of *Wolffia,* which does not flower with us, being drawn from an African specimen. Incidentally *Wolffia* is misspelt *Woliffia,* this being the only misprint I recall noticing in the whole series.

Stella Ross-Craig's drawings have already won a high place for this series amongst works illustrating British plants. They delight the eye whilst informing the mind. Apart from her technical mastery she deserves our admiration and thanks for her unflagging perseverance in carrying through such a formidable undertaking; successive parts have appeared at fairly regular intervals throughout the entire progress of the series, which is no small tribute to her staying power. For very many years Fitch's neat illustrations, which formed the companion volume to Bentham and Hooker's *British Flora,* have held the field as the standard set of illustrations, the comparable figures for Fitch's work being 1082 drawings. The present series replaces that work and Stella Ross-Craig's drawings, of larger size and superior draughtsmanship, are likely to remain the standard series and to be equally popular for an equally long time. W.A.S.

Animal Camouflage by Otto von Frisch. Pp. 128. Collins, London 1973. £1.95.

This lavishly illustrated glossy book is a volume in *The International Library* series. These are said to be information books for young people in which five publishers in Europe and the U.S.A. have collaborated. The author's interpretation of his title is very liberal and subjects such as mimicry are reviewed as well as animal camouflage techniques in the more narrow sense of the term. The book is clearly written and the colour illustrations are beautifully reproduced. Unfortunately some of the species illustrated are wrongly named and in many cases there is no mention of the part of the world where they are to be found. R.C.

Waterside Birds, Woodland Birds, and Birds of Mountain and Moorland. Text by **Nicholas Hammond** and **John Andrews**; line illustrations by Ian Willis; each with eight "19th century style" full colour prints by Eric Malins. Quartet Books Ltd., 1973. 90p each.

These are additional collections of prints to the two previously published on *Game,* and *Garden Birds.* The colour prints can be extracted for mounting or framing – in which case one automatically covers up the text for the species depicted on the next print.

The text has sections on identification, call, distribution, habitat, food and breeding. In *Woodland Birds* there is also a paragraph on the protection afforded to each species, but in *Waterside Birds* (with such species as Great Crested Grebe and Kingfisher depicted) the position as regards protection is explained only for Mallard, whilst in *Mountain and Moorland Birds* (with Greenshank, Hen Harrier, Short-eared Owl etc.) all mention of protection is omitted.

I must confess that this type of "19th century style" illustration is not my cup of tea. I think that anyone who is less of a Philistine will still find it irksome that the prints have text for a different species on the reverse side – that is unless he has no intention of mounting them, in which case the present loose leaf system is pointless.

R.F.D.

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THE HISTORY AND DISTRIBUTION OF FISH IN THE DONCASTER DISTRICT

W. BUNTING JNR., M. HANSON, C. A. HOWES and A. KITCHEN

The results of negligence, greed, apathy and a shabby attitude of disregard for natural amenities, which have won for South Yorkshire its reputation for gross pollution and environmental degradation, have rendered the area substantially devoid of naturally fishable water. This background, patently obvious to those who live in the area, is confirmed by the Department of the Environment's 'Report of a river Pollution survey of England and Wales' published in 1970. The report classifies rivers into the following categories:— (1) Unpolluted or recovering. (2) Rivers of doubtful quality and needing improvement. (3) Rivers of poor quality requiring urgent improvement. (4) Grossly polluted rivers. Reporting on the survey, the *Angling Telegraph* (Jan. 1972) noted that of Yorkshire rivers "Almost all the polluted waters are to be found in the West Riding to the south of a line through Keighley, Leeds and Selby. For almost all its length the Don is class 3 or 4, the Dearne is class 3 for a third of its length and the Rother is class 4 for almost its entire length". "The Trent mostly fluctuates between class 3 and 4, ... on the tidal section it deteriorates to class 4 and continues thus to the Humber."

Although anglers of some years' experience who remember the days of clean water and rich fishing are somewhat embittered at the loss of amenity, angling is still exceedingly popular in South Yorkshire, the Doncaster Angling Association alone having a membership of 5,000. Angling today, however, is no longer a matter of a trip to the local pond, canal or river; enthusiasts being forced, through a shortage of unpolluted waters, to travel to artificially stocked waters, the Lincolnshire fenland rivers, the Vale of York rivers and, increasingly, to the Yorkshire coast.

Despite the large local angling fraternity, comprising individuals with considerable expertise and local knowledge, a comprehensive account of local fish has never been produced. Brief general information about waters controlled by angling associations and individual fishing clubs is usually published in annual membership books. Various popular angling gazeteers also include comments on a few local waters and the Doncaster press publish a weekly roundup of fishing conditions and match results. The detailed information about fish and fishable waters is not adequately dealt with by these media, but is traditionally passed down by word of mouth, the 'grape vine' being formed by members of district angling associations and a multitude of works and pub-based clubs. In order to place on record an outline of the history, current status and distribution of fish in the Doncaster district (see fig. 1), Doncaster Museum, in 1970, instigated a fish-recording scheme. This was organized by C. A. H., who also gathered historical records from the Doncaster and Yorkshire Histories, the *Naturalist* and the minute books of the Doncaster Naturalists' Society. A press campaign run by the *Doncaster Evening Post* brought to light invaluable old records and recollections of fishing and other amenity activities on the river Don. Hundreds of fish records covering the period from the 1950's to the present day resulted from the fish recording scheme and from publicity in the *Sheffield Angling Telegraph*. These records were considerably added to by A. K., W. B. and M. H., the source of much of the additional information being the massive collection of data on fish numbers and weights compiled from 1930 to the present day by A. K. These volumes of angling log books form an invaluable record and are worthy of much closer study than the mere abstraction of locality records.

The extent and nature of the study area is described in Howes 1973 (33) and illustrated in fig. 1.

History And Pollution (C. A. H.)

The old literature tells us that the larger South Yorkshire rivers (the Rother, Dearne and Don) were clean, sparkling waters with highly productive fisheries. Several lists of fish species have been published, the earliest to hand being in Harrison's 1637 survey of the manor of Sheffield (29). Harrison reports that "Ye chiefest fish within ye manor is in ye river (Don) that passeth the same, where are in great stores of Salmon, Trouts, Chevens (Chub), Eles (Eels) and other small fish". Edward Miller (37) in 1804 notes for the Don at Doncaster:— barbel, pike, bream, roach, perch, dace, eel and the three-spined stickleback. A list published in the *Doncaster Review* of April 1898 noted that "In former times the Don, even in the part which runs through Doncaster, not only did pike, bream, roach and dace etc., occur, but even salmon were in large numbers". Holland's 1843 list for the Don and its tributaries at Sheffield (31) is even more spectacular, with no less than nineteen species, adding to the total:— bullhead, carp, tench, minnow, loach, bleak, gudgeon, grayling and river lamprey. The numerous fish traps, the famous and lucrative Doncaster salmon hecks and the payment of manorial tithes in fish, (see sections on salmon and eels), also demonstrate the former richness of our major rivers.

Two of the earliest known Doncaster anglers, Charles Blyth (d. 7/7/1716) and Thomas Barrow (d. 7/6/1725), both keenly fished the Don and its offshoot, the Cheswold. Mr. Blyth, a whitesmith, also in his spare time a parish clerk, was an expert salmon fisher. He was very fond of the stretch from Doncaster to Sprotborough for which Sir Godfrey Copley (of Sprotborough Hall) allowed him the freedom of the river. Mr. Barrow, a pewterer by trade "was so eager for the sport that he ran down Parson's Croft as soon as he had finished his official duties and sometimes before he had finished to throw his line into the river Cheswold" (30).

Anglers were not alone in benefiting from the Don's teeming fish life; large populations of herons and kingfishers were able to thrive. Herons based at Edlington Wood were described in terms of 'vast multitudes' (34) and other heronries flourished at Rossington in Holmes Carr Great Wood, Denaby and at Fishlake. Otters abounded in the Don certainly up till the late 1700's but merciless persecution and possibly the effects of the first 'flush' of pollution had exterminated them by the 1850's. Even porpoises were attracted to the Don, following the salmon in from the sea, the last recorded being in 1898 (32). Porpoises, an assortment of other small whales and the odd seal, also periodically entered the Trent, cashing in on the abundance of fish.

Fish continued to be caught in the Don well into this century but by this time pollution had become a crippling though as yet rather spasmodic problem. By the 1850's fish were being reported in the local press because of their newsworthy appeal as oddities. The 1860's saw pollution tangibly taking its toll of the Don's fish. The floods of 1864 which flushed foul water down from the sewers and heavy industries of Sheffield left in its wake vast quantities of dead fish (41). At the time, Doncaster depended on the Don for its water supply (water pumps extracting up to 160,000 gallons per day), consequently considerable concern was shown about the purity and real health hazard of the water. Hatfield (30) vividly described the state of the water near to the water pumps as being polluted "by the sewers and accumulation of filth, the refuse of gasworks and a miasma enough to invite the presence of disease itself".

In 1868 Mr. F. J. S. Foljambe, M.P., complained that the large quantities of filth and sewage from Sheffield, Rotherham and other expanding industrial towns along the Don were poisoning the river and killing off the fish. He also made a plea for steps to be taken to abate the nuisance draining into the river (41) — a cry which has been made with monotonous regularity ever since. The public demand for safe water forced Doncaster Corporation to look further than the Don for the town's supply. In 1873 powers were obtained to construct the reservoir at Thrybergh — itself now a trout fishery.

Although by the turn of the century the Don was quite undrinkable it was still of considerable amenity value and still supported life. From about 1900 up till the 1940's the Don, for people living nearby, substituted as the local seaside. Symptomatic of the relatively good condition of the water were the number of recreational uses to which the river was put. Pleasure steamers operated from Doncaster and Sheffield; publicity for the Doncaster vessel, the 'Aqua Bus', boasted the beauties and delights of the river journey between Marshgate, Doncaster and Swinton, a stretch now famed for the effluent and flotsam of industry and vistas of quarries, mines and spoil tips. Rowing boats were hired out at Marshgate and Hexthorpe in Doncaster, Burcroft in Conisbrough, and between Mexborough and Swinton. On warm summer evenings hordes of youngsters swam and played in the Don, the stretch from Hexthorpe to Sprotborough Falls being particularly popular with children from the Doncaster area. Up till the 1930's an annual Don swim was held over a one mile course from below Sprotborough lock down to Hexthorpe boathouse. Swimmers of this period remember the water as being clear during the summer in times of low water, but in times of flood it became turbid and foul. According to local opinion river conditions deteriorated appreciably during the period of the 2nd World War and have continued to get worse ever since.

Anglers in decreasing numbers and with dwindling success fished the Don up till the 2nd World War; the last Don angling matches seem to have taken place in the Swinton area during the early 1940's (38). Gudgeon, perch, eels and sticklebacks were the last fish to survive, but persisted only in places influenced by influxes of clean water from inflowing drains etc. Such a place was Hexthorpe Boats where perch and gudgeon occurred up till the late 1940's.

The worsening condition of the river prompted the authors of the *Story of Doncaster* (39) to write what could have been the final epitaph to the river; "The Don today is a ghastly object lesson of what industrialism will do for one of nature's fairest streams. At Sheffield it receives its first flood of filth and pollution. It enters the city a sparkling moorland stream, it leaves it a gurgling and bubbling mass of....pollution, spoiled by the iron and steel works on its banks. By the time it reaches Doncaster it is worse. It pours over the weir at the old Mill bridge in a turbid flood of dirty water. The hand of man and the neglect of our ancestors have deprived us of a river which once must have been a vision of glittering beauty".

Current Pollution (C. A. H. and W. B.)

Despite frequent pleas made in the name of health and amenity, despite legislative powers, despite the installation of sewage treatment systems, the Don, Dearne and Rother are still grossly polluted, efforts to clean them up having been completely outstripped by the effects of demands by a growing population and changing technology. Of several notorious places along these rivers the words by J. B. Priestley in his *English Countryside* seem particularly appropriate — "The ugliness is so complete that it is almost exhilarating". The Don is still putrid with sewage effluent, rainbow-striped with oil slicks and at times resplendent with mounds of filthy detergent foam and, despite the efforts of river-board, pollution-prevention staff to detect and deal with pollution and polluters, periodic catastrophies set back potential improvement. Such an incident was the disastrous deterioration in river quality caused during the council workers' strike of October 1970 when many millions of gallons of untreated sewage effluent reduced the dissolved oxygen level to 1.1 milligrammes per litre (16), the Ouse River Board considering the Don at the time to be perhaps the most polluted river in Britain (5). The Don was dealt another blow in June 1973, when the negligence of a steel works was responsible for the liberation of about 10,000 gallons of oil into the river at Sheffield. Although the rapid construction of oil-retaining booms was carried out, large oil slicks fouled the river along its full length (3).

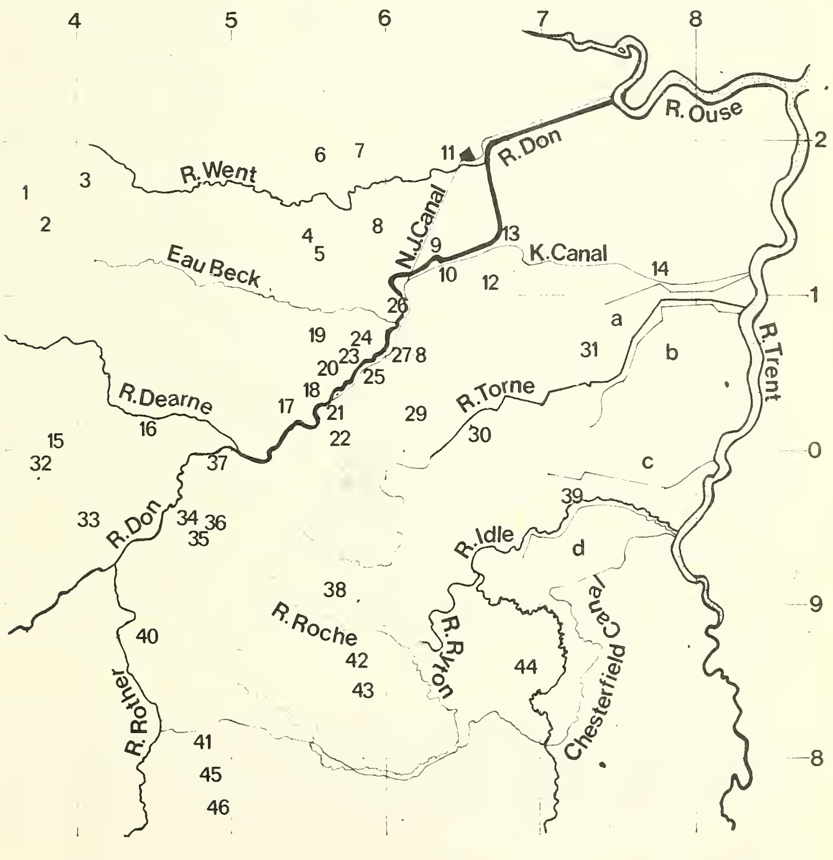

Fig.1 Map of study area showing major rivers and canals. The major Hatfield Chase Trains are a Dirtness Drain b. New Idle and Folly Drain c. Warping Drain and Snow Sewer d. New Idle River (other drain).

Unfortunately, as the Don is used on a massive scale by Sheffield for sewage effluent disposal, substantial improvements to its condition are largely dependent on improvements to the sewage systems. Downstream of Sheffield a rise in standard depends on the improvements in quality of the major tributaries, the Rother and the Dearne. The Rother, described as 'no more than an open sewer' (15), suffers acutely from gross pollution from coking and chemical plants which pump out acid wastes, compounds of toxic metals and oils. The Dearne is similarly endowed and can add to its recipe of noxious ingredients the washings from colliery spoil heaps and slurry lagoons. The large number of collieries in the Rother, Dearne and Don Valleys, is responsible for a very substantial proportion of South Yorkshire's river pollution problems. The reports of both the Trent and Yorkshire Ouse river Boards list numerous incidents of negligent, accidental, or persistent water pollution by N.C.B. establishments. Not only are the major industrial rivers affected by the extraction and processing of solid fuel, but the river Went, which meanders through beautiful pastoral country, has been ruined in recent years by gross pollution from the colliery and coalite plant at Askern. Conditions at times are appalling, the water being choked with the thick black sludge of colliery tailings. The Eaubeck also periodically receives severe flushes of colliery sludge. Even stretches of the cleaner and better-stocked rivers, the Ryton and the Idle, receive discharges of mine water which results in a fluctuation in water salinity. The river Torne, which suffers from pollution from Rossington Colliery, can list raw sewage amongst its harmful additives. In 1969 the river was treated to a massive dose of raw sewage emanating from Doncaster's Balby Sewage works. The works, unable to cope with demands placed upon it, spewed sewage sludge into the Mother drain (which flows through Potteric Carr joining the Torne at Rossington Bridge) and out over adjacent fields and marsh land. Sewage pollution also resulted at nearby Armthorpe when a breach in the council sewage works sludge lagoons released effluent into a series of dykes leading to the Torne.

Municipal sewage works are therefore another major source of pollution, short-sighted planning producing a situation where large numbers of sewage systems are periodically overloaded; even extensions and modifications are not able to keep pace with expanding urban and industrial demands.

As the N.C.B. and local authorities are gradually forced to co-operate and comply with statutory legislation, new forms of pollution threats are arising. River board reports are featuring an increasing number of cases where oil and toxic chemicals have leaked undetected into water courses from damaged pipes or tanks; and the rise in road tanker traffic carrying oil and corrosive substances is reflected in the increasing number of tanker accidents and spillages affecting surface water. Such an incident was experienced during 1972 on the Scunthorpe to Doncaster road where a tanker load of diesel oil spilled into the north Engine Drain and flowed into the river Torne (4). A new and growing competitor in the polluters' league is that of modern intensive and factory farming practices. Effluent problems from cow byres, piggeries, grass silos and vegetable liquor lagoons now regularly feature as a source of poisoning and deoxygenation of angling waters in rural areas. It is known that fertilizers leaching from agricultural land induce algal blooms which can suffocate fish. It could be that fertilizers contributed to fish kills attributed to photosynthetic activity, such as those reported during 1970 at Arskey pond where several hundred fish, mainly roach but including rudd and perch, died; Cusworth Lake, where 400 roach died; Nether Wood Hall pond where 3,000 roach died; and Elsecar reservoir, where 3,000 roach died (5).

The practice of utilizing flooded quarries and clay pits as municipal refuse dumps is becoming an acute problem. Great animosity is from time to time generated between anglers who stock these quarries and the local authorities, still committed to an archaic policy of open dumping, desperate to find new tipping sites. The case of the destruction of the splendid fishing ponds at Balby brick pits was a classic example of this wastage of amenity (2 and 21).

Habitat Improvements

Very occasionally and unfortunately on a relatively minute scale, developments associated with industrial practices and changes in land usage have been beneficial to fish life. The severing of bends in naturally meandering rivers like the Aire, Calder and Don, in the interests of navigation have accidentally created a series of artificial oxbow lakes. Being free from the putrescence contained between modern river flood embankments, these sites are able to develop into well-vegetated clean waters, stocked with roach, perch, tench and pike, and are ardently fished by anglers. Such waters are found in the old meanders of the Don at Newton Ings; Bentley Ings; West Ings; Stainforth and Thorne, and along the old course of the Dearne at Denaby Ings (see appendix 1). Coal mining areas have produced subsidence features known as 'Flashes' (13). These are usually river or canal side meadows or washlands which become permanently inundated with water which, if left unpolluted, develop into rich marsh and lake habitats containing a fair selection of coarse fish. Due largely to the efforts of works angling clubs, 'dugouts' containing power station cooling water are frequently pressed into service as angling ponds. Such is the case at Thorpe Marsh Power Station, Doncaster, where eight species have been stocked. Old clay, sand and gravel pits, are similarly stocked and used by anglers, Balby, Hatfield and Crowle brick ponds being notable.

An outstanding example of environmental reclamation and fish conservation is seen in the grounds of Doncaster I.C.I. plant. Due to the efforts of Mr. Fred Naull, the chief groundsman, the old course of the river Don, within the plant grounds once used as a copper sulphate dump, has been cleaned out, planted with aquatic vegetation and successfully stocked with coarse fish (K.S.).

Since 1969 local naturalists have drawn attention to evidence of life in the Don at Doncaster. Patches of water plantain *(Alisma plantago-aquatica)*, arrowhead *(Sagittaria sagittifolia)*, sweet flag *(Acorus calamus)* and reed grass *(Phalaris arundinacea)*, are occasionally seen struggling through the foetid liquor and the pollution resistant *Potamogeton pectinatus* floats like languishing fronds of sea weed amongst oily scum, tin cans and car tyres. Blood worms, characteristic of deoxygenated water, and the aquatic larvae of midges, have also come to light, but probably the most optimistic evidence of any improvement has been the discovery of three-spined stickleback at St. Mary's Bridge, Doncaster, Hexthorpe, Sprotborough Falls, Levitt Hagg and near Thorne, where one was watched swimming valiantly into the effluent from Stainforth sewage works. Whether these observations indicate a gradual return of life to the river or whether they merely reflect recent interest naturalists have been taking in the Don remains to be seen.

Fish Disease (C.A.H.)

Epidemics on the scale of that which ravaged red squirrel numbers early this century and myxomatosis which depleted rabbit populations, are exceptional. The only known epidemic to have affected local fish populations to this degree was the condition known as ulcerative dermal necrosis or U.D.N. on roach. Unfortunately, the origin and etiology of the disease are little known and its precise identification is as yet impossible as no causative organism or virus has so far been identified (17). The outbreak was first detected in 1966 in the great lake at Welbeck Park, Nottinghamshire. It spread rapidly, mainly to the southwest, encompassing most canals, many ponds and some rivers including the Trent, Wreake and Scar (19). U.D.N. also spread north into the Doncaster district, affecting the Chesterfield Canal and was probably active in the Keadby Canal and many of the Hatfield Chase rains (19). The result of the outbreak was to radically deplete fish stocks, affected fish showing severe fungal lesions. A characteristic feature of the disease was that its victims sank after death, presumably due to the lesion puncturing the swim bladder. Consequently the absence of floating fish corpses temporarily concealed the disease's presence, first indications of a depleted population coming from poor angling results. U.D.N. reached the Trent during the spring of 1967 and angling suffered to a catastrophic degree, complaints from the angling fraternity reaching a peak by the spring of 1968 (7). In order to assess the decline in the Chesterfield Canal, the Trent river authority carried out a series of electric fishings from June 1968 to June 1969. The results, expressed as a percentage of the presumed optimum, are as follows:— Above Worksop 30%, Bracebridge 40%, Osberton 50%, Ranby 60%, Welham Hall 65%, Clayworth 75% (7). Stocks in local waters continued to be very low during 1969 and 70 but according to angling reports had improved markedly by 1972.

Apart from the documentation of U.D.N. very little information is available on fish diseases and parasites locally. Outbreaks of fin rot noticed in angling species, fungal growths *(Saprolegnia)* on sticklebacks and fish kills caused by photosynthetic activity, are perhaps the only maladies noticed by the layman. Biologists have in addition found the eye fluke *(Diplostomum spathaceum)* to be widespread and very common in the district, being particularly severe in roach, bream, gudgeon, loach and ruffe sometimes causing total blindness (7). Attacks of parasitic copepods or fish lice are periodically noticed e.g. *Ergasilus sieboldi* on the gills of twelve dead trout at Howbrook reservoir near Barnsley (27) and *Achtheres percarum* on perch at Bretton Park Lake (28); and the sporozoan *Glugea anomala* is noted as being parasitic on sticklebacks at Potteric Carr (11).

SPECIES LIST

The cumulative total of species recorded in the Doncaster district comes to thirty-eight. Fundamentally responsible for this astonishingly high number is the diversity of aquatic habitats represented within the study area, ranging from bubbling calcareous streams to sluggish fenland drains and brackish reaches. The figure of thirty-eight is, however, rather misleading. Introductions for angling and ornamental purposes have added six alien species (common carp, crucian carp, goldfish, wels, golden orfe and rainbow trout) and a further three species are essentially marine or estuarine vagrants (whiting, angler fish and flounder). Of the remaining twenty-nine species a further eight have become rare, are verging on extinction or are extinct in the district (salmon, sea trout, sturgeon, barbel, burbot, sea, brook and river lampreys), and for reasons of limitations imposed by habitat requirements or distributional ranges a further two (spined loach and grayling) are only marginally represented.

Lampern or River Lamprey *Lampetra fluviatilis* (L.)

There are no definite records after the late 1800's though previously they made regular autumn runs up the major river systems of South Yorkshire. It is listed for the Don and its tributaries in 1843 and Thomas Bunker, the Goole naturalist, recorded it from the Ouse and Aire during the 1880's. Certainly during Bunker's day the migratory runs of Lampern were so renowned that Dutch fisherman visited the Ouse for the purpose of purchasing stocks for baits (12). With the erection of locks and weirs, and with the rise in river pollution, the migrating lamperns probably found it increasingly difficult to reach suitable spawning grounds. The only recent evidence of their continued existence was a suspected lampern scar on the side of a 4" perch caught in the Dirtness drain near Crowle on 4th September, 1971 (W.B.).

Brook Lamprey *L. planeri* (Bloch)

Not being a migratory species the Brook Lamprey does not have to run the gauntlet of the polluted rivers in order to reach its spawning streams. It still occurs to the south-west of the district in the tributaries of the Derwent (42) and could possibly occur in the unpolluted streams of the Firbeck and Thrybergh areas and the upper reaches of the River Ryton.

Sea Lamprey *Petromyzon marinus* L.

There are no recent records though in 1910 it was noted as an occasional visitor to the Trent (20). Evidence of it entering the tributaries of the Trent comes from a specimen, now in Sheffield Museum, (Museum ref. no. d.1904.2) which was captured in the River Ryton at Blyth near Worksop on 4th June, 1904.

Sturgeon *Acipenser sturio* L.

Up till the turn of the century it was infrequently, though regularly, reported from the Ouse, Trent and the Don, specimens migrating in from the sea during early summer. The Salmon nets on the Ouse at Goole and at various points along the Trent regularly caught specimens, though only a handful of accurate records are available. Individuals which were unfortunate enough to find their way up the Don were energetically and mercilessly harpooned, netted, shot, or stabbed to death whenever they reached the weirs and locks at Doncaster. The specimen now in Doncaster Museum had apparently been killed with a pitchfork and landed at Sandall lock during the 19th century and was for years displayed in Claybourn's fish shop in St. Sepulchre Gate, Doncaster. The following is a catalogue compiled by C. A. H. of recorded occurrences in the Ouse at Goole, the Trent and the Don. No doubt further investigation through old histories will reveal more.

1639, one in the Don at Mill Pit, Doncaster (6)
1670, one in the Don at Dockin Hill, Doncaster (6)
1688, one in the Don at Engine Dam, Doncaster (6)
1727, one in the Don at Engine Dam (30)
1824, one in the Don at Sandall near Doncaster (6)
1835, one in the Don at Sandall (30)
1842, one 7ft. specimen weighing 120lb. caught in the Don at Corn Mill Bridge, Doncaster. "Others were recently taken there" (41)
1858, one 7ft. specimen caught in the Don at Sandall on 25th June (37)
1870, one in the Don at Dockin Hill, (41)
1871, one 8½ft. specimen weighing 16 stones, caught in the Trent at Muskham near Newark on June 10th (26)
1885, several taken from the salmon nets at Goole (8)
1900, one 7ft 3in specimen weighing 9 stones was found dead in the Trent at Althorpe
1905, one 8ft 10in specimen weighing 16 stones caught in the Ouse at Goole

1911, one 9ft. specimen weighing 230lb. was caught in the Ouse at Goole on May 13th. The post-1960 record noted well up the Trent in Maitland (36) infers that vagrants still pass through the district.

Salmon *Salar salar* L.

Once in considerable numbers in all local rivers, the Ouse, Trent and even the Don supporting flourishing salmon fisheries. Symptomatic of the presence of salmon were the seasonal occurrences of seals in the Ouse and Aire and porpoises in the Ouse, Trent and Don. These marine mammals regularly followed the migrating shoals of salmon up the Humber and its major tributaries (32).

With the Don showing such economic potential as a salmon fishery, Doncaster Corporation in 1688 decided to exploit this natural resource by erecting salmon traps or hecks. In 1689 these were constructed at the Corn Mill dam, a site just below the existing St. Mary's bridge. Salmon was feasted upon at every occasion of rejoicing and festivity; apparently in the days of Izaak Walton (1593—1683), the author of the *Compleat Angler,* the Don was proverbial for the excellent flavour of its salmon. The history of the hecks, outlined in the *Borough of Doncaster Courtiers*, shows that from time to time they were rented out to individuals at what must by contemporary values have been large sums of money. A major blow to the Don salmon was dealt in 1729 when the tidal locks were constructed at Sandall. This, together with other alterations to the river prevented most of the annual migration of salmon from reaching Doncaster, though a few fish were still able to master these obstacles and were occasionally seen leaping the weirs at the Doncaster Corn Mill. The migratory runs consequently became unprofitable and the hecks were abandoned in 1776. Miller's 1804 list of Don fish leaves out salmon; however in 1843 it was noted that they were still present but "very rare" in the Don at Sheffield (31). Hatfield, in 1866 (30), wrote that although the Don still remained a good angling river the salmon had left by reason of "drainage, navigation and the erection of locks, impeding the flow of water from the Ouse". Even after this date odd specimens managed the journey and were eagerly reported as newsworthy oddities, the following being recorded:— A 6lb. specimen measuring 2ft. 10in. was caught in the Cheswold in 1844 (14). In 1847, a 13lb. specimen and one of 5lb. were taken from the Don at Doncaster and one was caught in the river Eaubeck, a stream which enters the Don at Thorpe Marsh (41).

Salmon continued to make their migratory runs up the Ouse, Trent and into the Torne, Idle and Ryton. Indeed in 1885 Thomas Bunker the Goole naturalist noted that the Goole salmon fishery was having a good season (8). An interesting record of salmon which made its way from the Trent was in 1912 when a specimen was stranded in a field at New Zealand on the edge of Thorne Moors during 'warping' or controlled flooding operations (10). A specimen was caught in the Idle at Bawtry on 31st May, 1922 (22) and local anglers (e.g. A. K. and M. H.) remember the species as a regular though uncommon visitor to the Idle and Ryton up till the drop gates were erected on their outfalls into the Trent about 1950. The Trent is still nominally regarded as a salmon river, a few individuals being recorded annually, though whether many survive the rigours of pollution in the tidal reaches is debatable. The only specimens recorded in 1971 were both dead; one was collected and proved to be a 10lb. male measuring 2ft. 5in. in length (4).

Trout *S. trutta* L.
(Sea Trout *S. t. trutta* L.)

This species seems to have shared the same fate as the salmon and several other migratory species. It occurred in all major local rivers until access was at various times barred by lock or sluice systems. In the Don they were no doubt taken in the salmon hecks though definitive records only appear after the days of the hecks when large fish were regarded as oddities and trouble was taken to identify them. Records appearing in the Doncaster histories are of an 11lb. specimen taken from the Don in 1847 and a 4½lb. specimen measuring 2ft. caught in the mill dyke off the Don on 18th December 1855. Like the salmon the sea trout was occasionally taken in the Idle up to about 1950.

(Brown Trout *S. t. fario* (Linn.))

Occurred in abundance in all local rivers and streams up till the early 1800's, even the Don and Rother held stocks. Since the mid-nineteenth century pollution has progressively eradicated stocks, the fish retreating further up stream to points above the influences of pollutants.

Trout still occur in the upper reaches of the Sheaf (which enters the Don in Sheffield) and stocks were introduced into the Don above Sheffield by the Yorkshire River Authority in 1972. In 1804 'very fine specimens' could be caught in the Eaubeck and in the small streams around Tickhill, Sandbeck and Firbeck. A sale bill dated 12th February 1851, of a farm at Tickhill noted that 'a well-stocked trout stream runs through the estate' (18). No doubt this stream refers to the Goole Dyke, a tributary of the River Torne, which still holds the odd trout. In 1910 trout were noted in the Chesterfield Canal (20), and specimens were being caught in the Went, the Idle above Bawtry, the Ryton and Roche up till the 1950's. Specimens still sporadically come down from its tributaries the Poulter and Meden and stocks are fished and artificially maintained in the upper reaches of the Dearne beyond the polluting influences of Barnsley and the Dearne valley collieries. Trout have been introduced into a limited number of ponds and reservoirs in the district though several schemes, notably Hatfield Brick Ponds, have been totally abortive due to inappropriate habitat and the presence of pike. Perhaps the most important local trout fisheries are at Thrybergh reservoir, where Lock Leven trout have been stocked, and at Clowne Dam where specimens of up to 8lb. have been taken (A. K.).

Rainbow Trout *Salmo gairdneri* (Richardson)

Specimens of up to 8 lb. are known from Clowne Dam and stocks are also in the reservoirs at Thrybergh and Firsby (A. K.) and stocks together with *S. t. fario* have been introduced into Cromwell lake, between Retford and Newark, by the Doncaster A.A. with a view to establishing the water as a trout fishery.

Smelt *Osmerus eperlanus* (L.)

An estuarine species migrating irregularly up into the Trent and probably entering the lower, brackish reaches of the rivers and drains connected to it.

Grayling *Thymàllus thymallus* (L.)

Apparently occurred in the faster-flowing, upper reaches of the Don and its tributaries around Sheffield before 1850 (31), and specimens occur in the Trent though well up stream of the study area. Grayling were caught in the upper reaches of the rivers Idle, Ryton and Roche up till the 1950's. It is possible that specimens from the Idle tributaries, the Poulter and Meden, may occasionally come down stream into the district, though their sensitivity to pollution would render their future somewhat insecure.

Pike *Esox lucius* L.

Except for the lakes and reservoirs near the Magnesian Limestone belt pike occur in abundance throughout the district being a characteristic species of the vast carr and fenland region of the Hatfield Chase and the slow-flowing rivers which drain through it. There are numerous allusions in historical works to pike in what are now grossly polluted waters. For example, several hefty specimens were caught in the Don during the late 19th century; these include a twenty-four pounder caught at Newton near Doncaster by a young Doncaster angler, Master Poppleton, on 24th December, 1855 (30); and a forty pounder caught by the Sheffield angler John Young, just below Doncaster on 6th April, 1866 (23). The floods of 1864 which brought down quantities of effluent and debris from Sheffield and Rotherham, also left in their wake large numbers of dead fish including many sizable pike (41).

Some of the major current sites are tabulated in appendixes 1 and 2 though they occur in virtually every suitable drain and dyke on the Hatfield Chase (and specimens have been introduced into angling stock ponds, occasionally with malicious intention, by rival angling groups). Fish of over 10lb. are not infrequently caught throughout the district and specimens of up to 30lb. have been taken from the warping drain at Owston Ferry.

Roach *Rutilus rutilus* (L.)

By far the commonest and most important local angling fish in both still and moving waters, occurring in abundance throughout the district in all but the badly polluted stretches of water (see appendix 1 and 2). Populations fluctuate according to pollution and epidemics like that of so called U.D.N. during the late 1960's.

Dace *Leuciscus leuciscus* (L.)

Formerly occurred in the Don and Went but is now regularly caught only in the rivers Torne, Idle and Ryton. It is present in the Chesterfield Canal and some of the drains entering the Trent but has only rarely been introduced into angling ponds e.g. Balby, Idle stop and Clowne.

Chub *Leuciscus cephalus* (L.)

Its main strongholds are in the rivers Torne, where a 3½lb. specimen was caught in 1971, and more particularly the Ryton and Idle. It is regularly fished from the Chesterfield and Keadby Canal and introductions are occasionally made into still water.

Minnow *Phoxinus phoxinus* (L.)

Probably once abundant in all suitable waters, being recorded from the Don above Doncaster up to about 1930, from the Rother during the 1920's and from the Went and Roche up to the 1950's. It undoubtedly occurred in the Dearne as stocks are still present in the old course at Denaby Ings. Other records to hand are from the Chesterfield Canal at Misterton in 1955 and the Kedby Canal at Crowle in 1934. Stocks still thrive in the Idle and Ryton where large shoals can on occasions be seen, particularly up stream of Bawtry.

Rudd *Scardinius erythrophthalamus* (L.)

Present in several angling ponds including Cowick Brick Ponds, Bentley Colliery pond, Bentley's railway cuttings and those listed in appendix 2. Excess stocks from Wheatley Park Lake, Doncaster's main stronghold, were introduced into the Torne at Wroot during 1972, and specimens up to 1lb. in weight salvaged from the Balby Brick Ponds pollution disaster were also stocked into the Torne. Stocks have also been recorded from the Keadby Canal and adjacent drains at Althorpe in 1948—9 (A. K.) and in the Chesterfield Canal at Barnby Moor in 1950 (M.H.).

Tench *Tinca tinca* (L.)

Occurs commonly in angling ponds (see appendix 2), and suitable stretches of the major Hatfield Chase waters (see appendix 1). Fish of up to 6lb. are known from Elsecar Reservoir (R. A.) and specimens up to 5lb. in weight were salvaged from Balby Brick Ponds and introduced into the river Torne at Wroot during 1972. The ornamental 'Golden Tench' occurs in the 'Sugar Ponds' at Rawcliffe Bridge (S. E. 69-21-) where specimens of up to 2lb. have been caught (W. B.).

Gudgeon *Gobio gobio* (L.)

Occurs commonly in the Torne, Idle and Ryton, in many of Hatfield Chase drains and in the Keadby and Chesterfield canals. Specimens are occasionally stocked into angling ponds (see appendix 2). It was once abundant throughout the district, surviving in the Don at Hexthorpe up till the late 1930's.

Barbel *Barbus barbus* (L.)

Probably occurred in suitable stretches of most local rivers in the past. Certainly historical records show the Don to have been a barbel river and it is likely that the Dearne and Rother also held populations before the days of pollution. Today the barbel is an extreme rarity, surviving naturally only in the Idle, and here only barely hanging on. Records to hand are of fish being caught near Bawtry about 1960 (the specimen was set up and is in the possession of Mr. Albert Grey of Doncaster) and 1965, and at Idle Stop on 29th November, 1970 (R. G.). Out of the district populations occur well up the Trent at Willington and Sawley. Attempts have been made to introduce further stocks into the Trent as low as Fiskerton near the mouth of the river Greet where 25 were liberated in 1965 (14). In 1972 specimens from the Swale were put into the Don above Sheffield in the hope of re-establishing the species in the river again (1).

Bleak *Alburnus alburnus* (L.)

Shoals occur in the major slow-running waters and waterways of the Hatfield Chase area (see appendix 1) and up into the Idle as far as Retford. It is traditionally known from the Trent and the fenland waters which connect with it. Little stocking of angling ponds has occurred.

Silver Bream *Blicca bjoernka* (L.)

A very local species; records are to hand for only eight localities most of which seem to have been artificially stocked.

In 1881 it was noted as being 'common about Goole' (12). This is not apparent today and there is no definite evidence of any truly wild stocks within the study area.

Common Bream *Abramis brama* (L.)

One of the commonest local angling fishes occurring in most relatively unpolluted slow moving or still waters (see appendix 1 and 2). Specimens salvaged from the Balby Brick Ponds and introduced into the River Torne at Wroot in 1972 weighed up to 4lb.

Crucian Carp *Carassius carassius* (L.)

A species occasionally introduced into angling ponds. To date five localities are known (see appendix 1 and 2), but others may be confirmed in due course through specimens require critical checking to distinguish them from feral golfish *C. auritus* L.

Goldfish *C. auratus* (L.)

Specimens are occasionally liberated into angling ponds but probably do not survive for long. Records to hand are from Balby Brick Ponds and the warm water outlet from the Bath House Showers at Stainforth Colliery (W. B.). As yet there is no definite evidence of feral populations within the district.

Carp *Cyprinus carpio* L.

Stocks are present in a limited number of angling ponds and reservoirs, angling clubs and syndicates being responsible for introducing forms like mirror and leather carp as well as the true common carp. Little information on weights is available. The heaviest specimens known to date are:— a 9lb. 4oz. specimen from Milton Ponds, High Hoyland in 1971; an 11lb. 5½oz. specimen taken at Elsecar Reservoir in 1967; a 22lb. 1½oz. specimen taken from the same locality in 1970 (R. D.); and a 17lb. specimen from a pond at Ravenfield about 1966. Scale readings on the 22lb. fish (a Yorkshire record at the time) showed it to be 11—12 years old (R. A.).

The ornamental golden carp and 'koi' forms have been introduced into a few ponds apart from those in gardens and parks, notably the recently renovated old course of the Don in the grounds of I.C.I. Fibres, Doncaster, where stocks were established about 1968 and are now breeding (K. S.).

Ide *Leuciscus idus* (L.)

A native of Europe and Asia, its ornamental form, the golden Ide or Orfe, is regularly sold by pet stores and aquarists for stocking garden ponds. To date Clowne Dam appears to be the only angling pond to have been stocked.

Stone Loach *Nemacheilus barbatula* (L.)

A local species often overlooked though probably more frequently than records suggest. Its distribution appears to coincide with the unpolluted streams of the Permian marls around Tickhill, the reservoirs and adjoining streams at Thrybergh, Ravenfield and Ulley, and streams and fast-flowing drains on the Bunter Sands and gravels from Scrooby and Mattersey through to Hatfield. It is also known from the Idle, Chesterfield Canal and the Ryton where Denny 1910 described it as occurring 'abundantly'. Care needs to be taken in distinguishing it from the rarer Spined Loach.

Spined Loach *Cobitis taenia* (L.)

A rarity known from some of the Hatfield Chase waters and from streams on the Bunter gravels near the Yorkshire and North Notts. border (W. B.). Further searching may show the species to be more widespread than current records indicate.

Wels *Silurus glanis* L.

A potentially spectacular continental introduction. A few specimens were stocked into Cusworth Park Lake during the late 1960's (25) and small specimens resulting from an unofficial introduction have been caught at Sanderson's Pond, Doncaster (A. K.).

Eel *Anguilla anguilla* (L.)

Ubiquitous, occurring in most waters through the district (see appendix 1 and 2). Eels appear to have played a not insignificant part in the 'game' economy of the Hatfield Chase and probably much of lowland Yorkshire during the Middle Ages. The large number of fisheries on the Chase produced many thousands of eels per year, the 20 fisheries around Tudworth alone yielding an annual crop of about 20,000 eels (40 and 43). Around 1190 Hamelin, Earle Warenne who owned the Manor of Hatfield, granted the tithe of his

Yorkshire eels to the convent which his family had founded in Lewes, Sussex. Later the annual tithe was granted to the monks of Roche Abbey for whom the eels were an important meat substitute in those days when abstinence from meat on Fridays was rigorously enforced by the church.

Eels were regularly caught in the Don; even as late as the 1920's they were trapped in sacks at the falls at Sprotbrough by lads from the now deserted village of Levitt Hagg (E. H.).

Burbot *Lota lota* (L.)

Probably now extinct in the district, though it persisted in the lower reaches of some of the fenland waters entering the Trent up to the late 1930's, A. K. remembering specimens in the Idle and M. H. recalling them from the New Idle Drain.

Perch *Perca fluviatilis* L.

Present throughout the district (see appendix 1 and 2), occurring in most waters capable of supporting fish life. It is a characteristic fish of the Hatfield Chase and second only to roach in importance as an angling species. Being relatively tolerant of pollution, with the roach and eel, it is one of the last angling fish to have survived in the Don, Rother and Dearne.

Ruffe *Gymnocephalus cernua* (L.)

Though present in most of the rivers and major drains of the Hatfield Chase, it is relatively sparse. Odd specimens have been released into several angling ponds (see appendixes 1 and 2).

Bull head *Cottus gobio* L.

Requiring clean, well-oxygenated water, this species is at something of a disadvantage in this district. It is largely restricted to the reservoirs and streams around Thrybergh, Ravenfield and Ulley. The Doncaster area may be on the eastern edge of its south Yorkshire distribution, populations being relatively frequent to the west beyond Barnsley.

Three-spined Stickleback *Gasterosteus aculeatus* L.

Ubiquitous, occurring often in considerable numbers in all but the grossly polluted waters. It now seems probable that at no time has the species been entirely absent from the Don and Dearne. Certainly it was well known in the 1920's to 1940's to generations of children at Hexthorpe, Doncaster, and recent investigations by C. A. Howes and B. Manders have located speciments surviving at Stainforth, Doncaster Power Station, Hexthorpe, Sprotborough Falls, Levitt Hagg and Sheffield, and in the Dearne near Denaby Ings.

Ten-spined Stickleback *Pungitius pungitius* (L.)

Currently the subject of a survey by C. A. Howes and B. Manders. Recent records suggest that it occurs in ditches and drains probably throughout the Humberhead levels and in the oxbows, ponds and flashes along the industrial Don, Dearne and Rother valleys. Some localities are shown in appendixes 1 and 2 but many more are known across the Hatfield Chase and the lower Went Valley.

Flounder *Platichthys flesus* (L.)

In summer it migrates in from the Humber and up into the Trent, entering its lowland tributaries, navigations and drains. Prior to the erection of sluice gates on the outlets into the Trent flounders were frequently caught, often far up stream, some moving up the Idle as far as Scrooby and up into the Ryton. Today flounders still occur in the same stretches but less frequently.

Whiting *Gadus merlangus* L.

Thomas Bunker noted that several were netted on the 30th April, 1881, in a warping drain which communicated with the Ouse at Goole (12).

Angler fish *Lophius piscatorius* L.

An 8in. specimen was captured at the mouth of the Don on 2nd May, 1905 (9).

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Species \ Water	R. Don	R. Rother	R. Dearne (main course)	R. Dearne (old course)	R. Eaubeck	R. Went	R. Torne	Goole Dyke (tributary of R. Torne)	R. Idle	R. Ryton	R. Roche (tributary of R. Ryton)	R. Trent	New Junction Canal	Keadby Canal	Chesterfield Canal	Dirtness Drain	New Idle River	New Idle and Folly Drain	Warping Drain and Snow Sewer
Barbel	/								●			○							
Bleak	/						●		●	●	△			●	●		●	●	
Bream, common	+			●		○	●	●	●	●				●	●	●	●	●	●
Bream, silver									●						△	●			●
Bullhead											△	△							
Burbot									△									△	
Carp, common	/			●								●		●	+				
Carp, crucian				●															
Chub	/		/				●		●	●		●			●				
Dace	/						●		●	●	△	●			●				
Eel	△				●	○	●		●	●	△	●	●	●	●	●	●	●	●
Flounder						○	●		●	●		●					●		
Grayling	/									○	△	●							
Gudgeon	+	/	/	●	●	○	●	●	●	●			○	●	●	●	●	●	●
Loach, stone	/					○			●										
Minnow	+	+		●	○	○			●	●	△	○		+	△				
Perch	△	/	/	●	●	○	●	●	●	●	△	●	△	△	●	●	●	●	●
Pike	+				●	○	●	●	●	●		●		●	●	●	●	●	●
Roach	+		+		●	○	●	●	●	●	△	●	●	●	●	●	●	●	●
Rudd							●							○	△				
Ruffe	/					○	●		●	●	△				●		●	●	●
Salmon	/				/				△			●							
Smelt												●							
Stickleback, 3 spined	●	●	●	●	●	●	●	●	●	●	△	●	●	●	●	●	●	●	●
Stickleback, 10 spined			●	●			●						●						
Sturgeon	/											○							
Tench	/			●	●		●		●	●				●	●	●	●	●	●
Trout, brown	/			●				●	○	○	△				+				
Trout, sea	/								△			△							
Number of species, recorded 1972	1	1	2	10	7	1	15	7	17	14	0	12	4	9	12	9	11	10	10

● = 1972 ○ = 1951-1971 △ = 1931-1950 + = 1851-1930 / = up to 1850

Appendix 1. Fish records from Rivers, Drains and Canals.

Map number	Grid reference	Locality \ Species	Stickleback, 3 spined	Roach	Perch	Pike	Tench	Bream, common	Carp, common	Eel	Rudd	Gudgeon	Trout, brown	Chub	Bream, silver	Bullhead	Dace	Loach, stone	Carp, crucian	Trout, rainbow	Ruffe	Bleak	Wels	Minnow	Goldfish	Golden Orfe
1.	S.E. 36-16-	Walton Hall	●	●	●	●			●																	
2.	S.E. 37-15-	Wintersett Res.	●	●	●	●	●																			
3.	S.E. 40-17-	Nostell Park	●	●	●	●	●	●																		
4.	S.E. 56-13-	Askern Lake	●	●	●	●	●			●																
5.	S.E. 56-11-	Shirley Pool	●	●	●	●	●	●		●																
6.	S.E. 56-18-	Wakefield's Pond	●	●	●	●	●	●					●													
7.	S.E. 58-19-	Balne Pond	●	●	●	●	●	●																		
8.	S.E. 58-14-	Moss Brick Pond	●	●	●	●	●	●	●																	
9.	S.E. 63-12-	West Ings	●	●	●	●		●				●														
10.	S.E. 65-12-	Ashfield Pond	●	●	●	●		●		●																
11.	S.E. 65-18-	Cowick Res.	●	●	●	●	●			●		●														
12.	S.E. 67-11-	Hatfield Ponds	●	●	●	●	●	●				●							●							
13.	S.E. 67-13-	Thorne Delfts	●	●	●	●	●	●		●	●															
14.	S.E. 77-11-	Crowle Brick Ponds	●	●	●	●	●	●																		
15.	S.E. 37-00-	Milton Pond	●	●	●		●		●		●	●														
16.	S.E. 46-03-	Bolton-on-Dearne Pond	●	●	●		●		●																	
17.	S.E. 53-01-	Scabba Wood Pond	●	●	●		●		●																	
18.	S.E. 54-03-	Cusworth Lakes	●	●	●		●	●	●	●				●									●			
19.	S.E. 56-09-	Bentley Tilts Ponds	●	●	●	●	●	●																		
20.	S.E. 56-06-	'Cementation' Pond	●	●	●	●																				
21.	S.E. 56-03-	Power Station Pond	●	●	●		●	●	●																	
22.	S.E. 56-00-	Balby Brick Ponds	●	●	●	●	●	●	●	●	●	●		●	●		●				●	●			●	
23.	S.E. 57-07-	Willow Garth	●	●			●	●	●	●	●		●						●							
24.	S.E. 57-06-	Arksey Pond	●	●	●		●	●	●	●	●															
25.	S.E. 58-05-	I.C.I. Pond	●	●	●	●	●	●	●	●		●		●										●		
26.	S.E. 60-09-	Thorpe Marsh Ponds	●	●	●	●		●	●	●	●				●											
27.	S.E. 60-05-	Wheatley Park	●	●	●	●	●				●															
28.	S.E. 60-05-	Sanderson's Pond	●	●	●		●	●			●	●											●			
29.	S.E. 61-02-	Cantley Park	●	●																				●		
30.	S.E. 65-00-	Auckley Pond	●	●	●		●	●							●											
31.	S.E. 73-06-	Lindholme Lake	●	●	●	●	●	●	●	●																
32.	S.K. 38-99-	Elsecar Res.	●	●	●	●	●	●	●																	
33.	S.K. 40-96-	Wentworth Park	●	●	●								●													
34.	S.K. 47-96-	Thrybergh Res.	●	●									●			●		●		●						
35.	S.K. 48-95-	Ravenfield Res.	●	●	●		●		●							●		●								
36.	S.K. 49-95-	Firsby Res.	●	●									●			●		●		●						
37.	S.K. 48-99-	Denaby Pond	●	●	●	●																				
38.	S.K. 57-90-	Sandbeck Lake	●	●	●	●				●																
39.	S.K. 71-96-	Idle Stop Ponds	●	●	●	●	●	●		●		●		●			●				●					
40.	S.K. 45-87-	Ulley Res.	●	●	●											●		●								
41.	S.K. 48-80-	Harthill Res.	●	●	●	●	●	●		●				●												
42.	S.K. 56-86-	Langold Lake	●	●	●	●	●		●	●																
43.	S.K. 58-83-	Carlton Lake	●	●	●	●			●																	
44.	S.K. 69-58-	Sutton/Lound Gravel pits	●	●	●	●																				
45.	S.K. 49-79-	Pebly Pond	●	●	●	●	●	●		●				●												
46.	S.K. 49-76-	Clowne Dam	●	●	●	●	●		●		●	●	●	●		●	●		●	●	●					●

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FURTHER PLANT FOSSILS FROM THE HASTY BANK LOCALITY

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A further eight species of plant fossils are recorded from the Middle Jurassic Hasty Bank locality (NZ 568 038), thus adding to the previous list of Hill and van Konijnenburg (1973).

Species marked * were found from bulk maceration (Harris, 1926) of a sandy 5cm thick coal which is rich in fragments of plant fossil material. The coal lies 21 metres above the base of the lenticular sandstones (see fig. 1 of Hill & van Konijnenburg, 1973) and its present outcrop extends for more than 34 metres. It is of interest because only a few of the species so far recorded are shared with the somewhat older main plant bed, and presumed mangrove-like species are lacking.

Species List

All identifications have been supported where possible by preparations of cuticles. Because detached leaves were identified only when both upper and lower cuticles agree perfectly with species known more fully from elsewhere, a number of undetermined fragments, mostly of Bennettitales, are left unrecorded.

The current name and literature reference are followed by an estimate of abundance according to the following scale:—

(1) Less than 5 specimens known at time of press

(2) 5 — 100 specimens known (or seen during fieldwork)

(3) 100 — 500 specimens

(4) 500 or more specimens

(5) Many thousands of specimens seen

All the specimens and preparations are lodged with the palaeobotanical collections of the British Museum (Natural History).

ALGAE

Chlorococcales

Botryococcus braunii Kützing See Harris, 1938; Traverse, 1955. (2)

PTERIDOPHYTA

Triletes areolatus Harris Megaspore; see Harris, 1961, 61-63. (2)

GYMNOSPERMS

UNCLASSIFIED

**Amphorispermum pullum* Harris Seed; see Harris, 1964, 28-30. (2)

CAYTONIALES

Sagenopteris colpodes Harris Axis with attached bud scales; see Harris, 1971. (1)

CYCADALES

Pseudoctenis herriesii Harris Leaf; see Harris, 1964, 72-76. (1)

BENNETTITALES

**Ptilophyllum hirsutum* Thomas & Bancroft Detached leaflets; see Harris, 1969, 61-64. (3)

Cycadolepis spheniscus Harris Perianth scale; see Harris, 1969, 104-106. (1)

Bucklandia pustulosa Harris Axis; see Harris, 1969 173-174. (2)

CONIFER (unclassified)

Pagiophyllum ordinatum Kendall Detached leaves; see Kendall, 1948; Harris, vol. V in preparation. (2)

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VAUCHERIA COLLECTIONS, 1973

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While travelling in England in 1973, mostly in northern parts of England and the Scottish highlands, the author made several collections of algal mats likely to contain or to consist of *Vaucheria* species. Most of these collections were vegetative at the time of collection, but they have been placed in culture and while not all have yet become sexual and thus determinable, many of them have. Number 3075 in the following list was reproductive at the time of collection. Sexual material of all the others has been found in the cultures. Collection numbers given are those of the author.

3071 *Vaucheria sessilis* (Vauch.) DC. In River Wear at Finchale Priory, near Carrville, Durham. July 5, 1973.

3075 *V. sphaerospora* Nordst. (= *V. subsimplex* Crouan) Estuarial, Fatfield, Durham, *leg*. B. Whitton and M. Wilkinson. July 7, 1973.

3080 *V. prona* Christensen and *V. alaskana* Blum On soil among mosses, along the road about 2 miles north of Spean Bridge, near Fort William, Inverness. July 16, 1973.

3082 *V. intermedia* Nordst. Estuarial collection, under graminoids, south shore of Loch Leven at Glencoe, Argyllshire. July 16, 1973.

3083 *V. repens* Hassall In stream in Kew Gardens, Richmond, Surrey. July 20, 1973.

3084 *V. canalicularis* (l.) Christensen (= *V. woroniniana* Herring). In stream in Kew Gardens, Richmond, Surrey. July 20, 1973.

THE LICHEN FLORA OF DERBYSHIRE — SUPPLEMENT I

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The available information on the lichen flora of Derbyshire up to the end of 1968 was compiled by Hawksworth (1969). In the last five years further field work has been carried out in the county which has led to the discovery of 27 species in it for the fist time and the rediscovery of several others. The total number of species now recorded for the county is 367 of which 263 have been seen since 1960; 47 have been found since 1960, 39 are doubtful for a variety of reasons and 18 are certainly erroneous. Additional sites for many species have also been discovered during this period. It should perhaps be emphasized that in general the increase in the number of post-1960 records from 218 in 1968 to 263 in 1973 does not reflect any increasing richness in the flora itself but rather a better understanding of it arising mainly from an increased knowledge of the British lichen flora generally which has been attained in the last few years.

Of particular note has been the discovery of a few small plants of *Usnea subfloridana* on an ash tree near the river in Lathkill Dale by Drs. M. S. Baddeley and O. L. Gilbert in March 1971; this species had not been recorded in the county since 1847. The Lathkill Dale plants are juvenile and it is consequently most probable that they represent recent arrivals in the county. The plants were 5-7 mm tall in 1971 and subsequent observations indicate that they are growing at the rate of about 2 mm per annum, suggesting that they may have become established here in about 1968—69. From the data of Hawksworth and Rose (1970) this area is probably one of the least affected by air pollution in the county. Unfortunately there is no air pollution gauge nearby but it is interesting to note that those at Buxton indicate that the very high levels of sulphur dioxide which occurred in 1967—68 in Buxton have not been approached in subsequent years (see Ross, 1972; Warren Spring Laboratory, 1969—72); the information from these gauges is, however, incomplete.

In contrast, there has been some deterioration in the lichen flora in the area around Darley Dale which may at least in part be attributable to changes in air pollution emissions in the area. The ancient oak trees in the Beeley Lodge area of Chatsworth, for example, appear to have lost a least five species between 1967 and 1972, including *Alectoria fuscescens, Cetraria chlorophylla, Lecanora chlarotera, Lepraria candelaris* and *Pertusaria amara*. Some of the species still present in this locality also showed signs of damage and the flora generally has declined from zone 5 to zone 4 of Hawksworth and Rose (1970) over this period. Extensive bleaching and reddening of some lichen species was also noted on the more exposed crags at Rowtor Rocks, west of Darley Dale. Little change has taken place in Stanton Park, however, where 28 species still occur on one ancient elm tree, which is sheltered from the industrial plants in Darley Dale by the massif of Stanton Moor. It is unfortunate that there are no air pollution recording gauges in this area.

It is not possible to review the present state of the lichen flora and vegetation in particular sites in detail here. Information on the major sites of importance for lichens in the county which fall within the boundaries of the Peak District National Park is, however, available elsewhere (Hawksworth, 1974).

The following list summarizes the additional records of Derbyshire lichens made or traced since 1968. Where the nomenclature used differs from that in James (1965, 1966) the names employed by James are placed in parentheses. Species not previously published as occurring in the county are prefixed by an asterisk (*) and notes on extinct species or erroneous reports are placed in square brackets. Each record is prefixed by the 10 km square grid reference as used in Hawksworth (1969); i.e. *07* = pre-1910, 07 = 1910—1960, **07** = post-1960). The word 'add' before one or a series of grid square number entries indicates that the species has not previously been published as occurring in that (those) square(s). Except in the case of a few very rare species additional records in squares from which the species was listed by Hawksworth (1969) are omitted.

The following abbreviations have been used in the list below:

BM = Herbarium, British Museum (Natural History), London
IMI = Herbarium, Commonwealth Mycological Institute, Kew
PDC = P. D. Crittenden
OLG = O. L. Gilbert
DLH = D. L. Hawksworth
MRDS = M. R. D. Seaward

Acarospora smaragdula var. *lesdainii* (Harm. ex A.L.Sm.) Magnusson, add **28**: Hallam Moors, millstone grit, 1973, DLH.

A. veronensis* Massal., **19: east side of Derwent Res. near Hancock Plantation, 1970, PDC.

Alectoria fuscescens Gyeln., add *25*: Cromford Moor, 1972, *J. E. Smith* (BM, fragment with specimen of *Parmelia omphalodes*). This species, found on an oak near Beeley Lodge, Chatsworth, in 1967 has now (1972) become extinct in this site; it is still abundant on one boulder at Rowtor Rocks, near Birchover (**26**).

Anaptychia ciliaris (L.) Körb., add *07*: near Buxton, on a wall, 18—, *H. B. Holl* (BM). **18**: near Mine Cottage, Perry Dale, south side of limestone wall amongst *Camptothecium sericeum*, 1971, *B. W. Fox* (IMI 157944); one patch of *c.* 10 cm², 1971, DLH. Previously considered extinct in Derbyshire.

Arthonia punctiformis Ach., add **27**: near Stoke Ford, Highlow Brook, rowan, 1973, OLG (IMI 176541).

A. spadicea Leight., add **16**: Lathkill Dale, base of elm, 1971, OLG (IMI 158116). Previously considered extinct in Derbyshire.

Arthopyrenia conoidea (Fr.)Zahlbr., add **06**: Parkhouse Hill, 1973, DLH.

A. fallax (Nyl.)Arnold, add **27**: near Stoke Ford, Highlow Brook, rowan, 1973, OLG (IMI 176540). Previously considered extinct in Derbyshire.

Bacidia chlorococca* (Stiz.)Lett., **18: Woodlands Valley, birch, 1973, PDC.

B. inundata* (Fr.)Körb., **18: Overdale, boulder in stream, 1972, OLG (IMI 170334). **27**: near Stoke Ford, Highlow Brook, 1973, OLG (IMI 176546). **28**: Burbage Brook, west of Fox House, boulders by brook, 1973, DLH.

B. muscorum (Ach.)Mudd, add **15**: Dovedale, 1971, DLH. **17**: Cressbrook Dale, 1973, DLH. **35**: near Whatstandwell, 1 mile east of Longway Bank, 1971, DLH (IMI 159095).

B. rubella (Hoffm.)Massal., add **17**: near Monk's Dale, on ash, 1972, DLH.

B. sabuletorum (Schreb.)Lett., add **06**: Parkhouse Hill, 1973, DLH (IMI 174611). **15**: by River Dove north of Milldale, 1972, DLH (IMI 171826). **17**: Cressbrook Dale, 1973, DLH. **25**: Via Gellia, 1970, DLH (IMI 152990). **26**: Bradford Dale, 1972, DLH. **28**: near Highlow Hall, 1973, OLG. **34**: Hazelwood church, 1970, DLH (IMI 153697).

B. umbrina* (Ach.)Bausch, *07*: Axe Edge, 18—, *H. B. Holl* (BM). **19: eastside of Derwent Reservoir, on wall, 1970 1970, PDC.

Botrydina vulgaris Bréb. ex Meneghini, add **07**: Deep Dale, 1973, DLH. **17**: Longstone Moor, 1973, DLH.

Buellia epipolea (Ach.)Mong. (*B. alboatra* (Hoffm.)Deichm. Br. & Rostr. p.p.), add **06**: Parkhouse Hill, 1973, DLH. **15**: Dovedale, 1973, DLH. **16**: Lathkill Dale, 1972, DLH. **33**: Breadsall Church, 1968, DLH (IMI 143567).

Calicium abietinum Pers., **27**: near Stoke Ford, Highlow Brook, abundant on one oak, 1973, OLG (IMI 176548); 1973, DLH (IMI 174624). The first specimens from the county seen by me. This species also occurs in the Peak District National Park in the Hamps Valley, Staffordshire (**05**: ash, rare, 1973, DLH, IMI 174619).

C. viride Pers., add **16**: Lathkill Dale, ash, 1971, DLH. **25**: Via Gellia, oak, 1970, DLH. **26**: Bradford Dale, ash, 1972, DLH.

Caloplaca aurantia (Pers.)Helb., add **07**: Deep Dale, 1973, DLH.

C. chalybaea (Fr.)Müll.Arg., add **16**: Lathkill Dale, 1972, DLH. **17**: Monk's Dale, 1972, DLH.

C. holocarpa (Hoffm.)Wade, add **07**: Deep Dale, 1973, DLH. **17**: Monk's Dale, 1972, DLH; near Laughman Tor east of Smalldale, 1972, R. H. Bailey; Cressbrook Dale, 1973, DLH. All records from limestone.

C. lactea (Massal.)Zahlbr., add **16**: Lathkill Dale, 1972, DLH. **17**: Cressbrook Dale, 1972, DLH.

C. saxicola (Hoffm.)Nordin (*C. murorum* (Ach.)Th.Fr.), add **07**: Deep Dale, 1973, DLH.

C. tetrasticha (Nyl.)Oliv., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH.

C. variabilis (Pers.)Müll.Arg., add **16**: Lathkill Dale, 1972, DLH.

Candelariella medians (Nyl.)A.L.Sm., although known to me from several sites in **16**, this species was found growing on natural limestone outcrops towards the west end of Lathkill Dale in 1972. This is of particular interest as this species is almost entirely restricted to man-made substrates in Britain and is known only from three other sites in Britain on natural rock outcrops (Hawksworth, 1973*a*).

C. xanthostigma* (Ach.)Lett., **26: Stanton Deer Park, elm, 1972, DLH.

Catillaria chalybeia* (Borr.)Massal., **07: Goyt Valley, 1972, DLH. **19**: by River Derwent near Slippery Stones, 1970, PDC; by Derwent Reservoir, 1973, OLG (IMI 172840). **25**: Via Gellia, ash, 1973, DLH (IMI 174608). **26**: Rowtor Rocks, 1972, DLH. **27**: Bretton Clough, 1972, DLH (IMI 171827). **28**: north of Padley Wood, 1972. DLH.

C. griffithii (Sm.)Malme, add **06**: Parkhouse Hill, ash, 1973, DLH (IMI 174612). **14**: Snelston Park, elm, 1972, DLH. **16**: Lathkill Dale, ash, 1971, DLH. **17**: Flag Dale, elm, 1972, DLH. **25**: Via Gellia, oak, 1970, DLH (IMI 152992). **26**: near Dale End, Elton, ash, 1973, DLH (IMI 174623).

C. lenticularis (Ach.)Th.Fr., add **07**: Deep Dale, 1973, DLH. **26**: Gratton Dale, 1973, DLH.

Cetraria chlorophylla (Willd.)Vain., add **27**: Padley Woods, rock, rare, 1972, DLH. **28**: Hurtling Stones, Derwent Edge, rocks, 1973, OLG.

C. islandica (L.)Ach., add **17**: Longstone Moor, near west end of Watersaw Rake, on edge of Rake with *Cladonia uncialis*, 1973, DLH (IMI 174620). **27**: east end of Longstone Moor, 1972, OLG (IMI 164042). This species is locally abundant in several sites on Longstone Moor. As this species is now known only from two other sites in lowland Britain (Linwood Warren, Lincs.; Ling Common, Norfolk) the Derbyshire records are of particular interest.

Chaenotheca ferruginea (Turn. ex Sm.)Mig., add **16**: Lathkill Dale, ash, 1971, DLH. **17**: Monk's Dale, ash, 1972, DLH. **25**: Via Gellia, oak and ash, 1970, DLH. **26**: Bradford Dale, oak, 1972, DLH. **27**: Coombs Dale, oak, 1971, DLH & OLG. **34**: near Shottle Hall, oak, 1972, DLH.

Cladonia chlorophaea (Flörke ex Sommerf.)Spreng., add **28**: Burbage Rocks, 1973, DLH.

C. coccifera (L.)Willd., add **28**: crags west of Fox House, 1973, DLH.

C. coniocraea (Flörke)Spreng., add **28**: crags west of Fox House, 1973, DLH.

C. digitata (L.)Hoffm., add **27**: Padley Wood, 1972, DLH.

C. floerkeana (Fr,)Sommerf., add **17**: Longstone Moor, 1973, DLH. **28**: crags west of Fox House, 1973, DLH. **32**: Repton, on thatch, 196—, *N. Wallace*(*in litt.*).

C. furcata (Huds.)Schrad., add **27**: Eyam, New Engines, 1969, *D. W. Shimwell* (herb. Shimwell).

C. furcata subsp. *subrangiformis* (Sandst.)Pisut (*C. subrangiformis* Sandst.), add **06**: Parkhouse Hill, 1967, DLH.

C. impexa Harm., add **16**: Hartington, below Cronkstone Lodge, 1969, *D. W. Shimwell*. **28**: crags west of Fox House, 1973, DLH (IMI 174621).

C. macilenta Hoffm., add **14**: Snelston Park, 1972, DLH. **16**: Lathkill Dale, 1972, DLH. **17**: Monk's Dale, 1972, DLH.

C. pocillum (Ach.)O.-J. Rich., add **07**: Deep Dale, 1973, DLH. **14**: near Mappleton, 1973, MRDS.

C. polydactyla (Flörke)Spreng., add **28**: crags north of Padley Wood, 1972, DLH. **17**: Longstone Moor, 1973, DLH.

C. pyxidata (L.)Hoffm., add **17**: Longstone Moor, 1973, DLH. Shimwell's (1969) records from limestone dales are probably *C. pocillum*.

C. rangiformis Hoffm., add **07**: Deep Dale, 1973, DLH.

C. squamosa (Scop.)Hoffm., add **17**: Longstone Moor, 1973, DLH. **28**: crags north of Padley Wood, 1972, DLH.

C. subcervicornis (Vain.)Kernst., add **27**: Padley Wood, 1972, DLH. **28**: crags west of Fox House, 1973, DLH.

C. uncialis subsp. *dicraea*, (Ach.)D. Hawksw., add **07**: Goyt Valley, 1971, *B. W. Fox*. **17**: Longstone Moor, 1973, DLH. **28**: crags west of Fox House, 1973, DLH. All Derbyshire records belong to this subspecies (see Hawksworth, 1973*b*).

Clathroporina calcarea W. Wats., add **06**: Parkhouse Hill, 1973, DLH. **15**: Milldale, 1972, DLH. **16**: Lathkill Dale, 1972, DLH. **17**: Cressbrook Dale, 1973, DLH. **26**: Gratton Dale, 1973, DLH. This species was originally described by Watson (1925) on the basis of Knight's 1924 collection from Dovedale and one from Winchcombe, Gloucestershire. British lichenologists have only recently come to recognize this species in the field and it proves to be not uncommon on vertical shaded highly calcareous rocks.

Collema auriculatum Hoffm., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **26**: Gratton Dale, 1973, DLH.

C. crispum (Huds.)Web., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **15**: Dovedale, 1971, DLH. **17**: Cressbrook Dale, 1973, DLH. **26**: Gratton Dale, 1973, DLH.

C. cristatum (L.)Web., add **07**: Deep Dale, 1973, DLH.

C. tenax (Sw.)Ach., add **07**: Deep Dale, 1973, DLH. **16**: Lathkill Dale, 1972, DLH. **17**: Monk's Dale, 1972, DLH.

C. tuniforme (Ach.)Ach., add **26**: Gratton Dale, 1973, DLH.

Cyphelium inquinans (Sm.)Trevis., add **07**: Doves Holes, lignum, 1972, *R. H. Bailey*.

Cystocoleus niger (Huds.)Hariot, add **27**: Padley Wood, 1972, DLH.

Dermatocarpon fluviatile (Web.)Th.Fr., add **17**: near Eyam, splash zone of waterfall, 1969, *D. W. Shimwell* (herb. Shimwell). **28**: boulders in Burbage Brook west of Fox House, very rare, 1973, DLH.

D. hepaticum (Ach.)Th.Fr. (correctly *D. lachneum* (Ach.)A.L. Sm. *fide* Weber, 1962), add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. The nomenclature of this species is in need of investigation.

D. miniatum (L.)Mann, add **06**: Parkhouse Hill, crags near the summit, rare, 1973, DLH (IMI 174610). Still present but very rare in Monk's Dale in 1972, DLH (found here by *P. W. James* in 1963).

Dirina stenhammeri (Fr.)Poelt & Follm. (*Lecanactis stenhammeri* (Fr.)Arnold), add **07**: Deep Dale, 1973, DLH. **17**: Monk's Dale, 1972, DLH.

Evernia prunastri (L.)Ach., add **16**: Lathkill Dale, ash, 1971, DLH. **25**: Via Gellia, ash, 1970, DLH. Now extinct at Rowtor Rocks but still present in **26** at Stanton Park, Bradford Dale and Gratton Dale (1972—3, DLH).

Fuscidea cyathoides* (Ach.) Vezda & Wirth (*Lecidea cyathoides* (Ach.)Ach.), **28: boulders to the north of Padley Wood, very rare and poorly developed, 1972, DLH (IMI 169400).

Gyalecta jenesis (Batsch)Zahlbr., add **16**: Lathkill Dale, 1972 DLH. **25**: Via Gellia, 1973, DLH.**26**: Gratton Dale, 1973, DLH (IMI 174603).

Haematomma ventosum (L.)Massal., add **26**: Rowtor Rocks, 1972, DLH (the grey, usnic acid absent, chemotype).

Hypogymnia physodes (L.)Nyl. (*Parmelia physodes* (L.)Ach.) add **16**: Lathkill Dale, 1971, DLH. **37**: near Totley, old pine stump, 1972, PDC.

H. tubulosa (Schaer.)Hav. (*Parmelia tubulosa* (Schaer.)Bitt.), add **16**: Lathkill Dale, 1971, DLH.

Lecanactis abietina (Ach.)Körb., add **15**: Dovedale, oak, rare, 1971, DLH (IMI 154373). **28**: Abney Clough, elm, 1973, OLG (IMI 180388). Previously considered extinct in Derbyshire.

Lecania erysibe (Ach.)Mudd, add **06**: Parkhouse Hill, 1973, DLH. **15**: Dovedale, 1972, DLH. **17**: Cressbrook Dale, 1973, DLH.

Lecanora atra (Huds.)Ach., add **28**: crags west of Fox House, 1973, DLH.

L. chlarona (Ach.)Nyl., add **27**: near Stoke Ford, Highlow Brook, rowan, 1973, OLG (IMI 176547).

L. chlarotera Nyl., add **16**: Lathkill Dale, ash, 1971, DLH. **26**: Stanton Deer Park, elm, 1972, DLH. **27**: near Stoke Ford, Highlow Brook, rowan, 1973, OLG.

L. cinerea (L.)Sommerf., add **28**: Highlow Hall, wall, 1973, OLG (IMI 180390).

L. crenulata (Dicks.)Hook., add **16**: Lathkill Dale, 1971, DLH. **17**: Monk's Dale, 1972, DLH.

L. expallens Ach., add **06**: Parkhouse Hill, ash, 1973, DLH. **07**: Doves Holes, lignum, 1972, *R. H. Bailey*. **16**: Lathkill Dale, 1973, DLH. **18**: Losehill Hall, Castleton, ash, 1972, *R. H. Bailey*.

L. contorta (Hoffm.)Steiner, add **07**: Deep Dale, 1973, DLH. **15**: Dovedale, 1973, *B. D. Walker*. **19**: by R. Derwent near Slippery Stones, concrete, 1970, PDC.

L. gibbosa* (Ach.)Nyl., **19: by R. Derwent near Slippery Stones, on millstone grit, 1970, PDC.

L. lacustris* (With.)Nyl., **19: by R. Derwent near Slippery Stones, on inundated rocks, 1970, PDC; 1972, DLH (IMI 171829).

L. laevata* (Ach.)Nyl., **19: by R. Derwent near Slippery Stones, on inundated rocks, 1970, PDC.

L. muralis (Schreb.)Rabenh., add **33**: Matlock, on asbestos-cement, 1973, MRDS. **37**: Chesterfield, on asbestos-cement, 1973, MRDS.

L. rupicola* (L.)Zahlbr., **07: Goyt Valley, 1971, DLH. **26**: Rowtor Rocks, 1972, DLH. **28**: crags west of Fox House, 1973, DLH.

L. polytropa (Hoffm.)Rabenh., add **28**: crags west of Fox House, 1973, DLH.

Lecidea albocaerulescens (Wulf.)Ach., add **07**: Goyt Valley, 1971, DLH. **28**: by Burbage Brook west of Fox House, 1973, DLH.

L. cinnabarina* Sommerf., **27: near Stoke Ford, Highlow Brook, oak, 1973, OLG (IMI 176539).

L. hydrophila Fr., add **08**: in R. Kinder below Kinder Downfall, 1970, PDC.

L. jurana Schaer., add **16**: Lathkill Dale, 1973, DLH. **17**: Monk's Dale, 1972, DLH.

L. lapicida* (Ach.)Ach., **18: Overdale, wall, 1972, OLG.

L. leucophaea* (Flörke ex Rabenh.)Nyl., **08: Kinder Downfall, 1970, PDC. **19**: rocks by R. Derwent, near Slippery Stones, 1970, PDC.

L. lithophila (Ach.)Ach., add **35**: 1 mile east of Longway Bank, near Whatstandwell, 1971, DLH (IMI 159096).

L. lucida Ach., add **14**: Snelston Park, brick, 1972, DLH. **28**: crags west of Fox House, 1973, DLH.

L. lurida (With.)Ach., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH (IMI 174625). **26**: Gratton Dale, 1973, DLH (IMI 174609).
L. macrocarpa (DC.)Steud., add **28**: crags west of Fox House, 1973, DLH.
L. plana (Lahm)Nyl., add **08**: below Kinder Downfall, 1970, PDC.
L. quernea (Dicks.)Ach., add **17**: Flag Dale, 1972, DLH.
L. scalaris (Ach.)Ach., add **17**: Monk's Dale, ash, 1972, DLH.
L. soredizodes* (Lamy)Sandst., **19: by R. Derwent near Slippery Stones, 1970, PDC. **27**: near Stoke Ford, Highlow Brook, 1973, OLG (IMI 176543). The nomenclature and status of this species require further study.
L. sulphurea (Hoffm.)Wahlenb., add **14**: near Mappleton, 1973, MRDS.
L. tumida Massal., add **14**: near Mappleton, 1973, MRDS. **15**: Milldale, 1973, DLH. **16**: Lathkill Dale, 1971, DLH. **27**: near Stoke Ford, Highlow Brook, 1973, DLH. **28**: rocks north of Padley Wood, 1972, DLH. **34**: near Shottle Hall, 1972, DLH.
L. uliginosa (Schrad.)Ach., add **06**: Parkhouse Hill, 1973, DLH. **14**: Snelston Park, 1972, DLH. **16**: Lathkill Dale, 1971, DLH. **17**: Monk's Dale, 1972, DLH. **28**: crags north of Padley Wood, 1972, DLH.
Lecidella stimatea (Ach.)Hertel & Leuckert (*Lecidea stigmatea* Ach.), add **14**: near Mappleton, 1973, MRDS. **17**: near Laughman Tor, Smalldale, 1972, *R. H. Bailey*.
Lempholemma myriococcum* (Ach.)Th.Fr., **16: Lathkill Dale, shaded limestone, rare, 1973, OLG (IMI 176552).
Lepraria candelaris (L.)Th.Fr., add **15**: Dovedale, ash, very rare, 1970, DLH. This species now appears to be extinct in its Chatsworth site.
L. crassissima (Hue)Lett., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **16**: Lathkill Dale, 1973, DLH. **25**: Via Gellia, 1970, DLH. **26**: Gratton Dale, 1973, DLH.
L. neglecta* auct., **28: north end of Burbage Edge, 1971, OLG (IMI 162261).
Leproplaca chrysodeta* (Vain. ex Räs.)Laund. *ined.*, **06: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **15**: Milldale, 1972, DLH. **16**: Lathkill Dale, 1973, DLH. **17**: Monk's Dale, 1972, DLH (IMI 171099). **25**: Via Gellia, 1967 DLH (IMI 143800). **26**: Winster, 1967, DLH (IMI 143799). **33**: Horsley, 1968, DLH (IMI 143801). The Derbyshire records of this species, which has only recently been recognised in the British Isles, were previously included within *L. xantholyta*. Both these species occur on shaded calcareous rocks, particularly limestone.
L. xantholyta (Nyl.)Hue (*Caloplaca xantholyta* (Nyl.)Jatta), add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **17**: Monk's Dale, 1972, DLH (IMI 171098). Delete **25** and **33** (specimens are *L. chrysodeta*).
Leptogium cf. *plicatile* (Ach.)Leight., add **17**: near Waterfall Farm, Eyam, 1969, *D. W. Shimwell* (herb. Shimwell; a poorly developed specimen).
L. schraderi (Ach.)Nyl., reported from Matlock (*35*) by Crombie (1870).
[*Lobaria pulmonaria* (L.)Hoffm., attention is drawn to the transplant experiments carried out with this species in Dovedale (see Hawksworth, 1971).]
Micarea lignaria (Ach.)Hedl. (*Bacidia lignaria* (Ach.)Lett.), add **19**: by Abbey Brook, 1973, OLG (IMI 176553). **28**: near Highlow Hall, 1973, OLG.
Mycoblastus sanguinarius (L.)Norm., add **28**: Burbage Edge, trees, 1971, OLG. Sir J. E. Smith's collection from Cromford Moor made in 1792 is illustrated by Smith and Sowerby (1794) who indicate that it was then 'Gathered copiously by Dr Smith on the granite rocks of Cromford Moor near Matlock, though rare elsewhere'.
[?*Nephroma resupinatum* (L.)Ach., 'Broadbottom Bridge' is in *09* on the Cheshire-Derbyshire border (43/020969) not in *33* as previously suggested.]
Ochrolechia androgyna (Hoffm.)Arnold, add **14**: near Mappleton, 1973, MRDS. **15**: Dovedale, oak, 1969, DLH. **16**: Lathkill Dale, 1973, OLG (IMI 176551). **17**: near Thornbridge Hall, Ashford, oak, 1972, DLH. **27**: near Stoke Ford, Highlow Brook, 1973, OLG (IMI 175797). **34**: near Shottle Hall, wall, 1972, DLH.
O. turneri (Sm.)Hasselr., add **15**: near Tissington Ford, ash, 1971, DLH (IMI 158825). **17**: Chee Dale, ash, 1972, DLH (IMI 171101). **26**: Bradford Dale, 1972, DLH. **27**: near Stoke Ford, Highlow Brook, 1973, OLG (IMI 175798). **28**: by R. Derwent below Hathersage, 1973, OLG (IMI 175797).
O. yasudae* Vain., **14: 0.5 miles north of Mappleton, near Ashbourne, oak, 1970, DLH (IMI 147705). **06**: near Earl Sterndale, 1967, DLH (IMI 167724). **15**: Dovedale, ash, 1972, DLH. **26**: 0.75 miles east of Alport, ash, 1973, DLH.
O. tartarea (L.)Massal., add **28**: crags west of Fox House, very rare and sterile, 1973, DLH. Previously considered extinct in Derbyshire. As Bohler is known to have collected some other species near Fox House last century (e.g. *Umbilicaria torrefacta*) it is conceivable that the material he distributed (Bohler, 1835—37) came from this area.

Opegrapha atra Pers., add **25**: Via Gellia, west end of Middleton Wood, ash, 1970, DLH (IMI 152991). This species was only noted on the base of one tree. No specimens of this species were seen from Derbyshire by Hawksworth (1969) although it was listed by Watson (1953).

O. lichenoides* Pers., **17: Flag Dale, elm, very rare, only on one tree, 1972, DLH (IMI 171104).

O. persoonii (Ach.)Ach., add **15**: Milldale, 1972, DLH. **16**: Lathkill Dale, 1973, DLH.

O. saxicola Ach., add **17**: Monk's Dale, 1972, DLH (IMI 171102). Although listed by Watson (1953) this is the first collection of this species I have seen from the county.

Parmelia acetabulum* (Neck.)Duby, **26: Stanton Deer Park, elm, very rare and poorly developed, 1972, DLH (IMI 169399).

P. glabratula subsp. *fuliginosa* (Fr. ex Duby)Laund., add **15**: Dovedale, 1969, DLH. **19**: east side of Derwent Reservoir, 1970, PDC.

P. incurva (Pers.)Fr., add **27**: Barbrook, 1973, OLG. **28**: north end of Burbage Edge, 1971, OLG (IMI 162260).

P. saxatilis (L.)Ach., add **17**: Monk's Dale, 1972, DLH.

P. subaurifera Nyl., add **26**: Stanton Deer Park, elm, 1972, DLH.

P. subrudecta* Nyl., add **18: Losehill Hall, Castleton, ash, 1972, *R. H. Bailey*. Although new to Derbyshire this species was noted by me on ash in the Staffordshire portion of the Peak District National Park near Ible (43/140507) in 1973.

Parmeliopsis ambigua (Wulf.)Nyl., add **15**: Lover's Leap, Dovedale, 1969, DLH. **16**: Lathkill Dale, 1971, DLH. **25**: Via Gellia, 1970. DLH.

Peltigera canina (L.)Willd., add **07**: Doves Holes, 1972, *R. H. Bailey*. **18**: Castleton, 1968, *D. W. Shimwell*. **27**: Coombs Dale, 1972, *D. W. Shimwell*.

P. polydactyla (Neck.)Hoffm., add **07**: Doves Holes, 1972, *R. H. Bailey*. **15**: Dovedale, 1971, DLH. **25**: Via Gellia, 1970, DLH.

P. praetextata (Flörke ex Sommerf.)Zopf, add **06**: Parkhouse Hill, 1973, DLH. **15**: Dovedale, 1971, DLH. **17**: near Eyam, 1969, *D. W. Shimwell* (Herb. Shimwell).

P. rufescens (Weiss)Humb., add **07**: Deep Dale, 1973, DLH. **27**: Calver Peak Quarry, 1969, *D. W. Shimwell*.

P. spuria DC., add **07**: Doves Holes, 1972, *R. H. Bailey*. **26**: Bradford Dale, 1971, *P. Holligan*.

Pertusaria albescens (Huds.)Choisy & Wern., add **17**: Chee Dale, 1972, DLH. The *var. *corallina* (Zahlbr.)Laund. occurs on elm in Stanton Deer Park (1972, DLH).

P. amara (Ach.)Nyl., add **28**: Highlow Brook, oak, 1973, OLG (IMI 180389). Now apparently extinct in its Chatsworth locality, this species still occurs in **26** on ash, in Bradford Dale (1972, DLH).

P. pertusa (L.)Tuck., add **26**: Bradford Dale, ash, 1972, DLH.

Phlyctis argena (Ach.)Flot., add **16**: Lathkill Dale, 1971, DLH. **17**: near Thornbridge Hall, Ashford, 1972, DLH. **26**: Stanton Deer Park, 1972, DLH.

Physcia ascendens Bitt. (*P. adscendens* (Th.Fr.)Oliv. p.p.), add **07**: Deep Dale, 1973, DLH. **15**: Dovedale, 1969, DLH. **17**: Monk's Dale, 1972, DLH. **18**: Loosehill Hall, Castleton, 1972, *R. H. Bailey*. The nomenclature of this species is in need of further study.

P. labrata* Mereschk., **18: Loosehill Hall, Castleton, ash, 1972, *R. H. Bailey*. Previously included in *P. orbicularis* by British authors.

P. orbicularis (Neck.)Poetsch, add **14**: Snelston Park, 1972, DLH.

Physconia farrea* (Ach.)Poelt, **26: Stanton Deer Park, elm, 1967, DLH (IMI 154950). Previously included in *P. grisea* by British authors.

P. grisea (Lam.)Poelt (*Physcia grisea* (Lam.)Zahlbr.), add **16**: Lathkill Dale, 1971, DLH. **27**: Coombs Dale, 1968, *D. W. Shimwell* (IMI 154953).

[*P. pulverulenta* (Schreb.)Poelt (*Physcia pulverulenta* (Schreb.)Hampe.), Shimwell's (1969) record from Coombs Dale is an error for *P. grisea*.]

Placynthium nigrum (Huds.)Gray, add **26**: Gratton Dale, 1973, DLH.

Porina chlorotica (Ach.)Müll.Arg., add **07**: Deep Dale, 1973, DLH. **15**: Milldale, 1972, DLH. The *var. *persicina* (Körb.) Zahlbr. occurs on hard limestones.

Protoblastenia immersa (Hoffm.)Steiner, add **07**: Deep Dale, 1973, DLH. **15**: Milldale, 1972, DLH. **17**: Monk's Dale, 1972, DLH. **26**: Gratton Dale, 1973, DLH.

P. monticola (Ach.)Steiner, add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **17**: Chee Dale, 1972, DLH. **28**: near Yorkshire Bridge, Bamford, 1970, PDC. **19**: by R. Derwent near Slippery Stones, 1970, PDC.

P. rupestris (Scop.)Steiner, add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. The var. *calva* (Dicks.)Steiner is not uncommon on hard limestones and has now been recorded from **06**, **07**, **15-17**, and **26**.

Pseudevernia furfuracea (L.)Zopf var. *ceratea* (Ach.)D. Hawksw. (*Parmelia furfuracea* auct. angl. p.p.), add **17**: Monk's Dale, ash, rare, 1972, DLH. The specimen from Chatsworth listed by Smith (1918) not found in BM by Hawksworth (1969) has been located there and was collected by Stark in 1844.

Psorotichia schaereri (Massal.)Arnold, add **17**: Monk's Dale, 1972, DLH.

[*Ramalina fraxinea* (L.)Ach., add *26*: Darley, 1873, *Wilson* (BM). This species is extinct in Derbyshire.]

Rhizocarpon lavatum* (Fr.)Hazsl., **19: rocks in R. Derwent near Slippery Stones, 1970, PDC; 1972, DLH (IMI 171830). **27**: Bretton Clough, 1972, DLH (IMI 171828).

R. obscuratum var. *reductum* (Th.Fr.)Eitner, add **15**: Dovedale, 1971, DLH. **28**: crags to the north of Padley Wood, 1972, DLH.

Rinodina subexigua (Nyl.)Oliv., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **14**: near Mappleton, 1973, MRDS. **16**: Lathkill Dale, 1971, DLH. **17**: Monk's Dale, 1972, DLH. **26**: Gratton Dale, 1973, DLH (IMI 174606).

Sarcogne regularis Körb., add **07**: Deep Dale, 1973, DLH. **15**: Dovedale, 1971, DLH. **17**: near Thornbridge Hall, Ashford, 1972, DLH. **19**: by R. Derwent near Slippery Stones, 1970, PDC. **28**: near Highlow Hall, 1973, OLG.

S. simplex (Dav.)Nyl., add **15**: Milldale, 1972, DLH. **16**: Lathkill Dale, 1971, DLH. **26**: Gratton Dale, 1973, DLH.

Solenopsora candicans (Dicks.)Zahlbr., add **17**: Monk's Dale, 1972, DLH. **26**: Gratton Dale, 1973, DLH.

Solorina saccata (L.)Ach., add **07**: Deep Dale, 1973, DLH (IMI 174601). **26**: Gratton Dale, 1973, DLH.

Stereocaulon dactylophyllum Flörke, add **19**: near Slippery Stones, wall, 1972, DLH (IMI 171832). On the same wall as S. *vesuvianum* (see Hawksworth, 1969); previously considered extinct in Derbyshire.

S. pileatum Ach., add **08**: Whaley Bridge, lignum, 1973, *J. E. & D. Milne* (herb. Fox).

S. vesuvuanum Pers., add **27**: near Stoke Ford, Highlow Brook, 1973, OLG (IMI 176545).

Thelidium papulare (Fr.)Arnold, add **07**: Deep Dale, 1973, DLH. **26**: Gratton Dale, 1973, DLH (IMI 174604).

Toninia aromatica (Sm.)Massal., add **07**: Deep Dale, 1973, DLH. **16**: Lathkill Dale, 1971, DLH. **17**: Chee Dale, 1972, DLH. **26**: Gratton Dale, 1973, DLH.

T. coeruleonigricans (Lightf.)Th.Fr., add **07**: Deep Dale, 1973, DLH.

T. lobulata (Sommerf.)Lynge, add **27**: walls of old ruin by Barbrook, Totley Moor, 1972, OLG (IMI 172842).

Trapelia coarctata (Sm.)Choisy (*Lecidea coarctata* (Sm.)Nyl.), add **14**: near Mappleton, 1973, MRDS. **16**: Lathkill Dale, 1971, DLH. **28**: crags west of Fox House, 1973, DLH.

T. ornata* (Sommerf.)Hertel, **27: near Stoke Ford, Highlow Brook, on millstone grit, 1973, OLG (IMI 176544). Previously included in *T. coarctata* by British authors.

Umbilicaria deusta* (L.)Baumg., **28: upper part of Burbage Brook west of Fox House, on rocks near and in the stream, 1972, OLG (IMI 164402).

U. polyrrhiza (L.)Fr., **28**: boulders to the north of Padley Wood, several small plants on one boulder, 1972, DLH (IMI 169398). The first specimens I have seen from the county although it was listed from Derbyshire by Kershaw (1961).

Usnea subfloridana Stirt., add **16**: Lathkill Dale, ash, very rare, 1971, *M. S. Baddeley &* OLG. Previously considered extinct in Derbyshire; this record is discussed further above.

Verrucaria coerulea DC., add **15**: Dovedale, 1972, DLH. **17**: Cressbrook Dale, 1973, DLH (IMI 174614).

V. glaucina Ach., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973, DLH. **16**: Lathkill Dale, 1971, DLH **25**: Via Gellia, 1970, DLH. **26**: Gratton Dale, 1973, DLH.

V. hochstetteri Fr., add **06**: Parkhouse Hill, 1973, DLH. **07**: Deep Dale, 1973. DLH. **15**: Milldale, 1972, DLH. **25**: Via Gellia, 1970, DLH, **26**: Gratton Dale, 1973, DLH.

V. muralis Ach., add **07**: Deep Dale, 1973, DLH.

V. sphinctrina Ach., add **07**: Deep Dale, 1973, DLH.

V. viridula (Schrad.)Ach., add **07**: Deep Dale, 1973, DLH. **15**: Dovedale, 1972, DLH. **16**: Lathkill Dale, 1971, DLH. **17**: Monk's Dale, 1972, DLH.

Xanthoria aureola (Ach.)Erichs., add **26**: Gratton Dale, 1973, DLH.

X. candelaria (L.)Th.Fr., add **14**: Snelston Park, elm, rare, 1972, DLH. **27**: 0.5 miles north of Calver, by Stoke Brook, willow, 1971, DLH.

X. elegans (Link)Th.Fr., add **28**: near Yorkshire Bridge, Bamford, concrete, 1972, PDC.

Dr M. R. D. Seaward (*in litt.*) kindly drew my attention to the fact that owing to an arithmetical error some of the values for the Sörensen coefficient (K) in Hawksworth (1969,

Table 14) were incorrect. The correct values for Angus, Carmarthenshire, Lincolnshire, Ireland and Germany should be 56.5, 59.6, 52.6, 44.2 and 21.0, respectively, indicating that the strongest affinity of the Derbyshire lichen flora is with that of Leicestershire (72.3) as was to be expected.

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Whose Countryside? by **George H. Haines.** Pp. 124. An Aldine Paperback. Dent, 1973. £1.25.

George Haines examines the dangers which threaten the beauty of Britain's landscape, and also the attempts to conserve both town and countryside. He is critical of the tendency to treat our countryside as a museum piece and is at pains to emphasise the need to maintain the economic and social life of a region rather than to preserve particular stones, buildings and 'views'.

The author comments on the growing demands for recreational facilities in all areas but it is both remarkable and sobering that he makes no mention whatsoever of the Nature Conservancy, the County Naturalists' Trust movement, or any organisation specifically concerned with natural history, ecology or geology. He may well entitle his book "Whose Countryside?" The balance of his judgement may not suit all naturalists but there is a lot of wisdom in many of his conclusions.

C.J.S.

A CENSUS OF ROOKERIES IN THE LEEDS AREA 1973

T. R. BIRKHEAD

An increase in the number of breeding pairs of Rooks *Corvus frugilegus* occurred over most of Great Britain between 1930 and 1960 (Parslow 1967). As part of this general trend, there was a 12.6% increase between 1945 and 1955 within a 15 mile radius of Leeds (Jackson 1959). However, it is not clear whether the trend of increase has continued since 1960. Several authors have recorded decreases in Rook numbers; for example, Lomas (1968) records a 22% decrease between 1944 and 1965/66 in Derbyshire, Henderson (1968) records a decrease of 32% between 1955 and 1960 in part of Cheshire, and Dobbs (1964) has recorded a dramatic decrease of 38% between 1958 and 1964 in Nottinghamshire.

A national census of rookeries was carried out in 1945. This census, covering nearly two thirds of Britain, serves as a useful baseline for the British Rook population. The aims of the 1945 census were to discover whether the Rook population was increasing significantly, and to assess the Rooks' economic status in relation to agriculture during the war. The former objective was achieved; it was found that the British Rook population had increased by about 20% since the last census in the 1930s. The result of the second objective was less

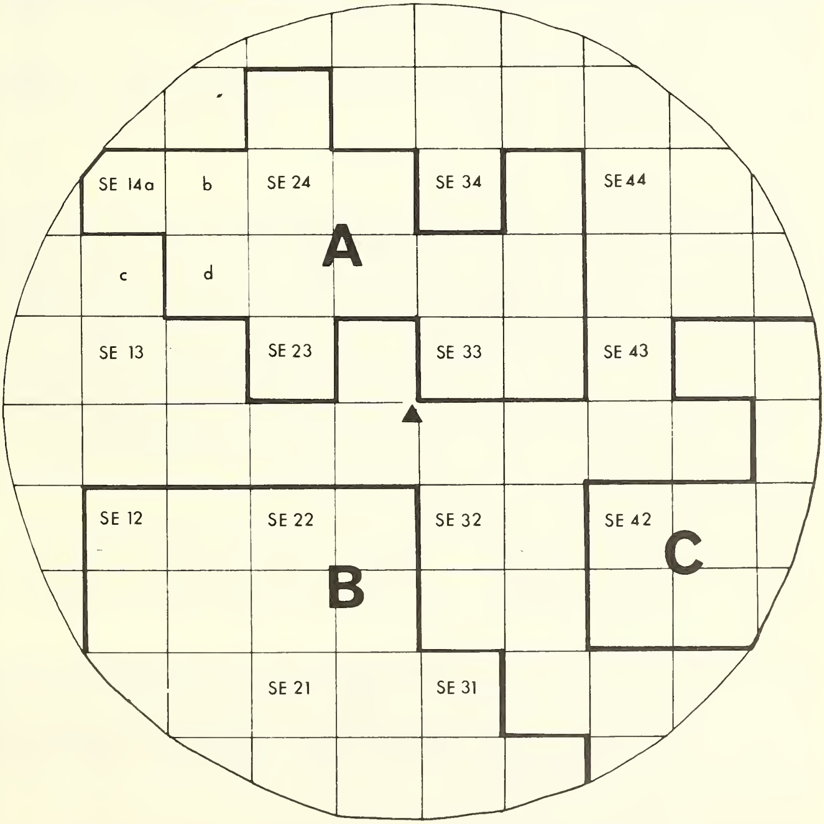

Fig. 1. The area within a 15 mile radius of Leeds Town Hall. The black triangle represents Leeds Town Hall. The whole area is divided into 25km² squares. The letters and numbers (eg. SE 34) refer to 100km² squares, and SE 14 (top left) shows how 100km² squares were subdivided to form four 25km² squares; *a, b, c,* and *d.* All other square numbers correspond to the *a* 25km² square.

clear and it is still disputed whether the Rook is a serious pest. However, at very high densities the Rook is an important economic pest in arable areas, for example in north-east Scotland (Dunnet & Patterson 1968).

The aim of the present investigation was to determine whether any changes in the Rook population had occurred since the last census in 1955.

METHODS

The area in which the census was carried out was a 15 mile radius of Leeds Town Hall, the same as that covered by Jackson (1959) in 1955. The area was divided into 100km² squares, each corresponding to a 2½" Ordnance Survey map, and numbered according to the Ordnance Survey system. These squares were further subdivided into four 25km² squares, numbered *a, b, c* and *d*. Thus each 25km² square was identified by its Ordnance Survey letters (in the present study these are all SE), a number and a small letter, eg SE 14*a* (see Fig. 1). Data were collected by a large number of individuals (see Acknowledgements), each covering at least one 25km² square. Counts of nests were made during early-mid April. Although errors in counting occur, many authors (eg Yapp 1934) agree that mistakes tend to counterbalance each other, and that overall the final results are not seriously affected. Observers were asked to record the precise location of each rookery and to count all nests in each. A rookery was defined as a group of nests within a minimum of 100m from the next nearest group of nests (Sage & Nau 1963).

In order to obtain some idea of fluctuations of Rook numbers within the area, a sample of eleven rookeries within a small area to the north-west of Leeds (within SE 24). were counted each year from 1970 to 1973 by the author.

RESULTS

Rookery Counts Over The Whole Area

Approximately 940km² were covered in the present investigation; that is about half the area within the 15 mile radius of Leeds. The 940km² is made up of three separate areas. Because the census did not cover the entire area it was not possible to make a direct comparison with 1955 figures. In addition, since the raw data for the 1955 census is unobtainable it is not possible to compare the 25km² squares covered in the present census with the same squares counted in 1955. However, despite this, the census has produced some interesting results.

The three areas counted in 1973 are shown in Fig. 1. Area A lies to the north of Leeds covering 350km², area B is an area of 412.5km² south of Leeds, and area C covers 175km² west of Leeds. Table 1 presents the number of rookeries and breeding pairs in the three areas. An overall density of Rook nests per km² for each of the three areas shows that areas A and B were similar with 7.8 and 6.9 nests/km² respectively, and area C had 2.7 nests/km². A comparison of the density of Rook nests per 25km² square in each area shows that there was no significant difference between areas A and B t=0.757 df 30 NS). However, the differences between areas A and C t=2.07 df 20 0.5>P>0.1) and areas B and C t=2.48 df 24 P<0.05) were similar.

In area A the mean size of rookery was 31.5 nests, in area B it was 46 nests and in area C, 19.6 nests. The mean size of rookery was significantly smaller in area C than in Area B t=2.22 df 90 P<0.05), but there was no significant difference between the other areas. Thus area C supported a significantly lower density of Rook nests, in smaller rookeries than in area B.

Counts At Eleven Rookeries Over Four Years

The results of counts at eleven rookeries over four years, in an area north-west of Leeds, are presented in Table 2. The totals for these years suggest an increasing trend between 1970 and 1972. However, this increase is not significant. Table 3 compares each rookery count for each year using a Matched Pairs '*t*' test. No significant change occurred between any of the years. The difference between 1970 and 1972 was not significant, even though an overall increase of 9.7% occurred between the two counts.

Counts In An Adjacent Area

As a further check to determine whether any changes in the Rook population have occurred in areas adjoining the 15 mile radius of Leeds, I have analysed data collected by Huddersfield Naturalists. In 1964 and 1973 twenty-eight rookeries were counted in the Huddersfield area. (Using the same method of numbering 25km² squares as in the present paper, the rookeries counted were found in the following squares; SE 01*b*, SE 11*a*, SE 11*c*, SE 11*d*, SE 10*a*, SE 10*b*, SE 21*a*, SE 21*c*, SE 12*c* and SE 12*d*). The number of nests in these rookeries

Table 1. Number of rookeries and nests in three areas in 1973. The location of areas A, B and C is shown in Fig. 1.

Area	No. Rookeries	No. Nests
A	98	2743
B	65	2832
C	24	471
TOTAL	187	6046

Table 2. Counts of nests at eleven Rookeries over four years, 1970-1973.

Location of Rookery (O.S. Reference)	1970	1971	1972	1973
249436	279	213	242	240
248428	147	188	221	236
281413	123	131	125	121
238456	44	48	50	39
264447/261448/258449/252449*	87	105	100	115
275452	51	65	65	50
238439	16	10	9	6
289423	45	43	46	37
234436	19	30	30	23
273425	19	27	25	15
244451	2	3	3	4
TOTAL	832	863	916	886

*I have combined rookery counts here to save space. Counts of rookeries are those along the A659 road, between O.S. refs. 248451 and 272448.

Table 3. Comparison of number of breeding pairs of Rooks in eleven rookeries between two year periods, over four years. Comparisons have been made using a Matched Pairs '*t*' test (df in each case = 10, NS = Not Significant).

Years for Comparison	*t* values	P
1970 v 1971	0.359	0.90>P>0.75 NS
1971 v 1972	1.207	0.50>P>0.10 NS
1972 v 1973	0.916	0.50>P>0.10 NS
1970 v 1972	0.970	0.50>P>0.10 NS

in 1964 abd 1973 have been compared using a Matched Pairs '*t*' test. The results showed that there was no significant difference between the counts for the two years (t=1.78 df 27 NS).

DISCUSSION

Although it has not been possible to make a detailed comparison with 1955 census figures, the data presented here indicate that the Rook population in the Leeds area may have remained approximately stable since the last census in 1955. The present investigation shows that in the three areas covered, overall the density of Rook nests per km² is 6.45. This figure is very similar to the figure calculated from Jackson's (1959) data for the entire area, which is 7.05 nests/km². Although it is not possible to compare these two figures statistically, it seems unlikely that any major change in the Rook population has occurred. Further evidence to support the suggestion that the population has remained similar, comes from the data from Huddersfield area, where no change was recorded between 1964 and 1973. Similarly, censuses of rookeries within a 10 mile radius of Doncaster in 1964 and

1970 (in Mather 1970) showed no change between the two counts. In addition my data collected over four years at eleven rookeries in a small area north-west of Leeds, show that individual rookeries may vary from one year to the next, but that no significant overall change occurred. Several authors have commented on the stability of Rook populations (Malmberg 1971, Yapp 1951), and Malmberg (1971) states that in most cases it is characteristic of changing Rook populations to increase or decrease slowly.

The overall density of Rooks in the Leeds area apparently has remained similar since 1955. However, there is evidence to suggest that there has been a change in the size of rookeries between the two counts. It is interesting that although only half the area within the 15 mile radius of Leeds was counted in the present study, 187 rookeries were located. Jackson (1959) found 222 rookeries within the whole area in 1955. In 1973 there were 6046 nests in 187 rookeries, but in 1955 Jackson found 14,316 in 222 rookeries. The average size of rookery in 1955 was 64.48, and in 1973 this was 32.33. These figues suggest that over the whole area the average size of rookery has almost halved since 1955. However, it is not known what criteria were used to define a rookery for the 1955 census, and the result suggesting a decrease in mean rookery size may be an artefact. Without more detailed information it is impossible to examine this further, but it would be of interest to know if factors were operating in bringing about a trend of decreasing rookery size, but maintaining a stable population.

It was concluded by Jackson (1959) that an increase in urbanization in and aroung Leeds did not have a detrimental effect of Rook numbers. The results of the present census confirm Jackson's findings. Jackson divided the area within a 15 mile radius of Leeds into three areas with two concentric circles at five mile intervals. The innermost area, incorporating most of the city of Leeds, was referred to as the 'industrial area'; the area between 5 and 10 mile radii of the city centre as the 'suburban area' (despite the fact that it included the centre of Bradford). The area between 10 and 15 mile radii was referred to as the 'agricultural area'. An examination of the Ordnance Survey map of the Leeds area (O.S. sheet 96) shows that this is a crude way of dividing the area, and that in general the area to the south of Leeds is more heavily built-up than the area to the north. In the present study area A lies to the north of Leeds and area B to the south. It is interesting that there is no significant difference in Rook density between the two areas, notwithstanding the difference in urbanization.

Clearly the best method of monitoring Rook populations is to carry out detailed censuses each year. However, this is very time-consuming, and is generally impracticable. Since Rook populations generally change slowly (Malmberg 1971), it seems likely that full-scale censuses at regular intervals (for example, every 10 years) would show population changes adequately. However, if regular full-scale counts were supplemented by counts of all rookeries within a number of small study areas, each year, over a number of years, a more accurate assessment of the population could be made. It is particularly noticeable that in the annual reports of local ornithological societies the Rook, together with other common birds, is frequently disregarded. Ornithological societies could play an important part in monitoring Rook populations by carrying out rookery counts each year.

SUMMARY

A census of rookeries was made within a 15 mile radius of Leeds Town Hall. Approximately half the area was covered. The density of Rook nests was 6.45 nests/km^2, very similar to a figure of 7.05 nests/km^2 calculated from Jackson's (1959) 1955 data, suggesting that no significant change had occurred between the two censuses. There was no significant difference between the density of rook nests in two areas; one north of Leeds and the other, much more built-up, south of Leeds.

ACKNOWLEDGEMENTS

Grateful thanks are due to the following individuals who colleced data for this census; P. Abbott, J. Ackroyd, J. S. Armitage, J. A. Booker, R. L. Brook, M. A. Brown, H. Bruton, Mr and Mrs A. J. Bullman, B. Caffrey, Mr and Mrs E. R. Day, E. Dearing, I. H. Dillingham, P. Doyle, P. Dunn, A. Fritchley, R. Hardcastle, G. H. Hinchcliffe, D. Hirst, B. S. Howarth, A. H. B. Lee, S. Maitland, D. Owen, Mr and Mrs B. Pepper, D. Proctor, M. Sergeant, E. Skinner, J. M. Smeed, G. Smith, P. Smith, G. Thrussell, P. Watson, T. J. Wilson, M. Wilson and D. Wright. I apologize if any names have been omitted. I am particularly grateful to J. E. Dale for continued support in the organization of the census and for providing additional data collected by the Huddersfield Naturalists. R. P. Prys-Jones kindly read the MS.

NOTE
The raw data for this census is stored at the Edward Grey Institute, in the Alexander Library, Dept. Zoology, South Parks Road, Oxford OX1 3PS.

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FIELD NOTES

***Saussurea alpina* in West Yorkshire**

Whilst examining a stretch of cliffs on Ingleborough on the 12th August, 1973, I was surprised to find a sizeable patch of Alpine Saw-wort (*Saussurea alpina* (L.) DC.). Mr. J. N. Frankland who has confirmed the record has also sent details of two previous records of *S. alpina* in the Pennines. In the book *Ingleton Bygone and Present* by R. R. and M. Balderston, published about 1888, *S. alpina* is given as occuring in 'rocky places.' Mr. Frankland has no doubt that this record has no foundation whatever. The only other record is by Christopher Merrett in 1666 from Lancashire 'In Brearecliffe near Burnley'. Although a possible habitat it has been dismissed as an error by later writers.

The present record then would appear to be the first confirmed for Yorkshire and the Pennines as a whole. The nearest localities for the plant are in the Lake District where it grows for instance on Helvellyn and Pillar, mostly on north and east-facing cliffs, and in Snowdonia.

On Ingleborough *S. alpina* grows in isolation, a carpet of its leaves covering an area of 2-3 sq. ft. On the date of finding five stems were in an advanced state of fruiting. The indicated flowering date is early compared at least with its Lakeland stations where a week later *S. alpina* was still in full flower on Pillar. This difference may well be due to the exposed nature of the Yorkshire station which receives sunlight for much of the day, as much as to its rather low altitude.

Saussurea alpina is an addition to the montane community for which Ingleborough is noted. More frequent mountain plants include *Saxifraga hypnoides* and *S. aizoides,* and others which are either unkown elsewhere in the Pennines or at least very local there, such as *Poa alpina* in its non-viviparous form, *Poa balfourii, Saxifraga oppositifolia, Rhodiola rosea* and *Salix herbacea.* This community owes its variety to the presence of limestone at high altitude, the Main Limestone of the Yoredale Series outcropping at about 2,100 ft. on Ingleborough providing basic ledges for some species, and mineraliferous seepage enriches lower sandstone cliffs. It is interesting to compare the Ingleborough cliff flora with that of Coombe Scar on Whernside at about 1,850 ft., a sandstone cliff without lime flushing.

We may presume that most of the rare montane species on Ingleborough have direct links with the arctic flora which occupied the Dales in early post-glacial times, the high cliffs having provided a continuity of exposed and basic habitats over the intervening mild periods, (see Walters, in Raven and Walters *Mountain Flowers,* Chap. 4: New Naturalist (1956). If *Saussurea alpina* also has such a long history on Ingleborough, I find it difficult to believe that it would have escaped detection over three centuries of intensive botanising. I must conclude that it is quite a recent immigrant. It will be interesting to see how the colony fares with time; certainly its present healthy state suggests that it has been established for some years.

I am grateful to Mr. J. N. Frankland both for confirming the record and for conducting a search for previous records.

F. J. Roberts

Pipistrelle Bat caught in fishing line

During the summer I found a Pipistrelle bat entangled in fishing line which was suspended from a tree over the deep, fast-flowing River Skirfare just above Hawkswick in Littondale. The bat was successfully dislodged from the line but fell into the river in mid-stream. It did, however, swim *strongly* to the bank, climbed a tree and suspended itself from a branch, seemingly none the worse for its adventures. Even bats are evidently not safe from discarded fishing lines.

Marion Ogilvie

Carrion Crow taking Redshank in flight

During a visit to Spurn Bird Observatory on Friday and Saturday 28/29th December 1973 a friend and I walked northwards on the Saturday afternoon along the coast to the lagoon at Easington.

Before we reached the lagoon we moved over into the dunes and looked over the fields westward from the North Sea shore. Across the field from where we were standing we saw two Carrion Crows flying low. Suddenly one of them veered upwards and I observed a smaller bird, which from a distance appeared to be a wader, apparently attacking the Carrion Crow. I had just focussed my field-glasses on the birds when the crow quickly turned in mid-air and caught the smaller bird in its feet. It landed and we immediately made our way to the spot where the crow had alighted.

The crow took flight again shortly after it had landed, presumably disturbed by our approach. On reaching the place we found a dead Redshank. Most of its back feathers were torn out and scattered around. Closer inspection revealed that it had a damaged skull and a torn abdomen.

I have not come across any information about Carrion Crows taking birds in flight. That the bird attacked was a largish wader is, I would have thought, very unusual.

Leonard S. Higgins

A REPORT ON THE FISHING LINE ENQUIRY

Following reports of birds becoming entangled in nylon fishing lines, the Protection of Birds Act Committee undertook a survey to discover how widespread this problem is in Yorkshire. A press release was issued and sent to every newspaper, local radio station and the secretary of all societies affiliated to the Union asking for specific instances to be reported. Apart from the birds mentioned in *The Naturalist,* 1973(3): 88, the Committee has received the following information.

Two Great Crested Grebes were reported dead at Scout Dyke Reservoir near Penistone entangled in fishing lines. In Hull a Coot was found dead in the lake in East Park. This bird had swallowed a hook and bait from an angler's broken line which was floating in a plastic bag in the lake. Ten yards of line were entangled round the bird, the plastic bag and a clump of weed.

A Mallard duck with six chicks was reported feeding at Plumpton Rocks pond near Wetherby with a length of nylon line hanging from its beak. This case was reported to the RSPCA.

Three instances of gulls becoming entangled were reported. A Black-headed Gull at Easington was found with nylon line wrapped round its wings so that it was unable to fly but when the line was removed it flew away without any apparent ill effects. Another Black-headed Gull at Blackmoorfoot Reservoir had swallowed one hook and had another embedded near a nostril and had entangled the line round its primaries and leg until it was unable to fly. The bird was caught and the hook extracted using a fisherman's gadget. The line was unravelled, the bird fed on bread and milk and subsequently it flew off strongly when released. An adult Herring Gull found at Askwith had not swallowed the hook but the abandoned fishing line was firmly wrapped round its wings. The line was easily removed whereupon the gull bit its handler and flew away strongly.

The Committee is grateful to the people who supplied the above information. Anyone else able to supply further records is requested to send these to the Hon. Sec. at 5 Antholme Close, Tween Dykes Road, Sutton on Hull, Hull HU7 4XX.

J. Hesslewood
Hon. Secretary

PLANKTONIC BACTERIA IN THE RIVER HULL

R. GOULDER, B. R. HEMSLEY-FLINT, P. R. TEMPEST and R. A. WOODFIELD
Department of Plant Biology, University of Hull

The quantity of information about the biology of the River Hull which is available to naturalists in the East Riding has been increased in recent years by papers on aquatic macrophytes (Crackles, 1968) and benthic invertebrates (Jones and Pearson, 1973). Also available are earlier accounts of algae growing on submerged glass slides in the Driffield Canal (Butcher, 1940) and of invertebrates in the Driffield Trout Stream (Whitehead, 1935). Information about plankton in the River Hull appears, however, to be in short supply, and the purpose of this article is to give an account of the planktonic bacteria in the river during January and February 1973. On three days, concentration of viable bacteria and biochemical oxygen demand (which is a measure of bacterial activity) were determined in the river water at 25 sites. Also determined were oxygen concentration, pH, chemical oxygen demand (a measure of organic content) and absorbance of light (a measure of turbidity).

Description Of Sites

Driffield Beck and Driffield Trout Stream arise from springs in the chalk and merge to form the River Hull or West Beck, which is later joined by Frodingham Beck (the Driffield Canal enters Frodingham Beck). The river then flows south to join the Humber close to Corporation Pier in Hull (see Fig. 1). Purified sewage effluent is discharged into the Driffield Canal from Driffield sewage works (4,500 m^3/day) and into the River Hull from Beverley sewage works (14,800 m^3/day) , Bransholme sewage works (4,100 m^3/day) and Beverley Road sewage works (390 m^3/day). The sites of the discharges are indicated in Fig. 1. There are also, perhaps, local discharges from piggeries into the Driffield Canal, and various industrial effluents enter the river as it flows through Hull. Below Hempholme Weir the river is tidal and the current speed depends on the state of the tide; at times there is a distinct upstream surface flow. Salt water probably reaches about Wawne at the highest tides. During January and February 1973 the river level was low and the flow over Hempholme Weir was constant at 91,000 m^3/day.

The approximate positions of the 25 sites are shown in Fig. 1. The conditions at these sites, in January—February 1973, were as follows.

Site 1 (Driffield Canal). The water was moderately transparent, the current was sluggish, and submerged macrophytes were abundant (mainly *Ranunculus aquatilis* L. and a *Callitriche* species).

Sites 2—4 (Frodingham Beck). The water was moderately transparent, the current was moderate, the bottom was silt or gravel, and submerged macrophytes were sparse (odd *Ranunculus*).

Sites 5—10 (Driffield Beck, Driffield Trout Stream and West Beck). The water was extremely transparent, the current was generally rapid, the bottom was usually of clean chalky gravel, and submerged macrophytes were abundant (mainly *Ranunculus. Callitriche. Elodea canadensis* Michx. and *Fontinalis antipyretica* Hedw.).

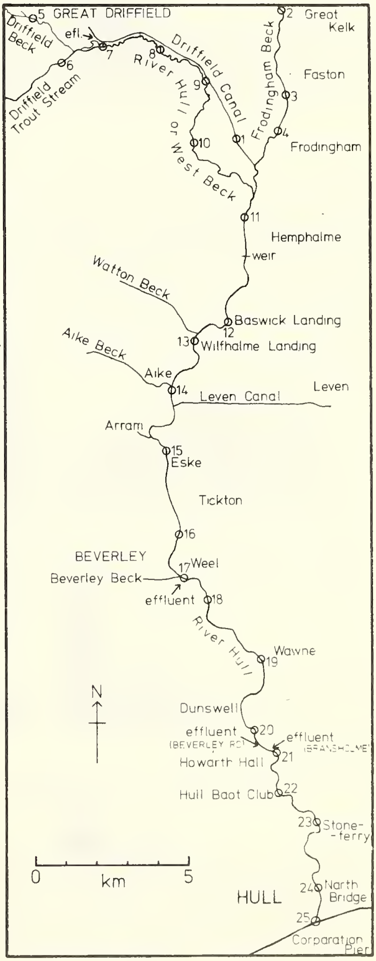

Fig. 1. The River Hull, showing positions of sampling sites and sewage effluent outfalls.

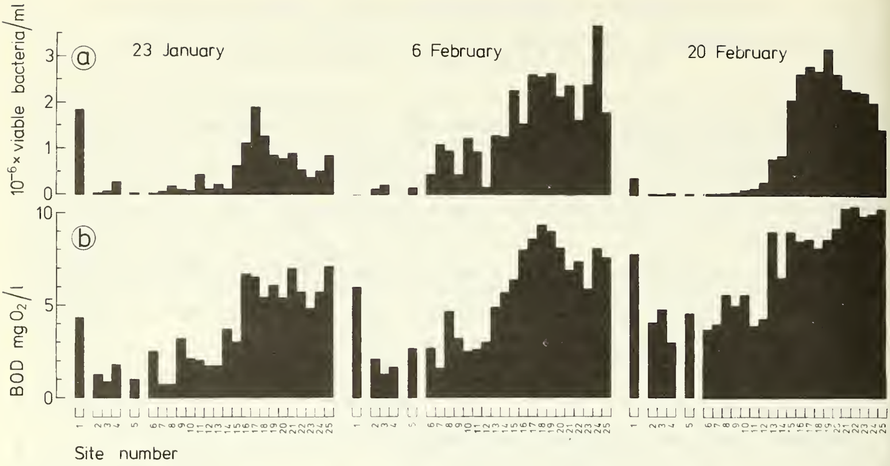

Fig. 2. The River Hull, January-February 1973. Concentrations of viable bacteria (a) and BOD values (b).

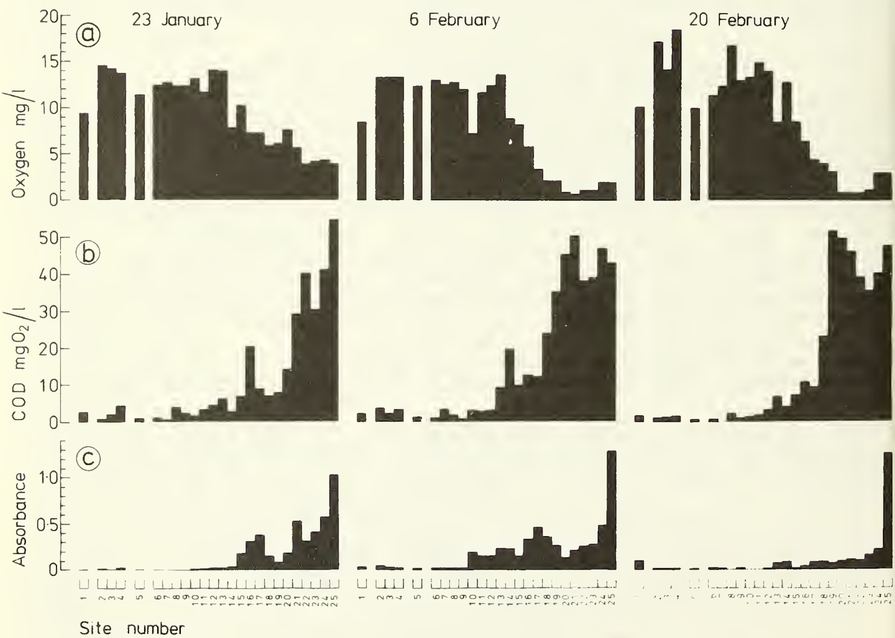

Fig. 3. The River Hull, January-February 1973. Oxygen concentrations (a), COD values (b) and values of absorbance at wavelength 450 nm and path length 1 cm (c).

Site 11 (River Hull above Hempholme Weir). The water was moderately transparent and was deep and slow flowing, submerged macrophytes (especially *Potamogeton* species and *Ranunculus*) were abundant and reed communities were obvious at the margins.

Sites 12—25 (River Hull below Hempholme Weir). The water was extremely turbid, being yellow-brown in colour, owing to silt in suspension which was probably stirred up from the bottom by turbulence beneath the weir, by the current, and by barge traffic below Beverley. The only aquatic macrophytes visible were reed communities present at the margins at some sites.

Methods

Field procedure

Samples were taken, between 10.00 and 15.00 hours G.M.T., on 23 January and 6 and 20 February 1973. These sampling days were two weeks apart, therefore the state of the tide was about the same on each day (high tide was between 08.10 and 09.20 hours). At each site, water was collected from about 5 m from the bank, or from the centre of the river if the site was beneath a bridge, using a well-rinsed polythene bucket attached to a length of cord. Two litres of this water were then transferred to a polythene bottle which had previously been washed with tap water and rinsed with water from the sampling site. The oxygen concentration at each site was measured with a Mackereth probe (Mackereth, 1964) and pH was determined using a field pH meter.

Viable bacteria

1.0ml from each sample was diluted 1000 times, in two steps, using sterile river water. A 0.1ml sub-sample, from the 1000 times diluted sample, was then spread onto each of ten plates of Oxoid CM3 general purpose nutrient agar. The plates were then incubated in the dark for 7 days at 13°C, colonies were then counted, and the mean number of viable bacteria per ml of river water was calculated (= mean count × 10^4/ml). Some plates, in which a large proportion of the agar surface became obscured by a single spreading colony, were discarded. It may be noted that the concentration of viable bacteria, determined by plate counts, is a measure of only a small proportion of the total bacteria present; that is, those which can grow to form a visible colony on the medium used and in the relevant incubation conditions. The concentrations recorded are probably, however, a reflection of total bacteria present (see Hayes and Anthony, 1959).

Biochemical oxygen demand (BOD)

The procedure was similar to that described by Mackereth (1963, pp.67—68). Three 100 ml reagent bottles, with ground glass stoppers, were filled with water from each site and stoppered (samples with a low oxygen content were first oxygenated using a stream of compressed air). The oxygen concentration in one of each set of three bottles was determined immediately, using the Winkler method as described in Mackereth (1963, pp.13—16), while the other two bottles were kept in the dark, for 7 days at 13°C, after which the oxygen concentration of their contents was determined. The difference between oxygen concentration at the start and mean oxygen concentration after 7 days was the BOD (mg oxygen consumed/1).

Chemical oxygen demand (COD)

100ml of each sample (diluted if necessary) were oxidised with potassium permanganate, for 30 minutes at 100°C, as described in Mackereth (1963, pp.60—61). COD was the quantity of oxygen (mg/1) consumed by the sample during this oxidation.

Absorbance

Each sample was shaken, and its absorbance (wavelength 450 nm and path length 1.0 cm) was then determined using a Unicam SP 600 spectrophotometer.

Results

Concentrations of viable bacteria and BOD values are given in Fig. 2. On each sampling day, although there were some irregularities, both concentrations of viable bacteria and BOD values tended to be low at the upstream sites (Frodingham Beck, Driffield Beck, Driffield Trout Stream and West Beck) and high at the downstream sites (below Hempholme Weir). The range of concentrations of viable bacteria was from 8.0 × 10^3/ml in the Driffield Trout Stream (site 6) on 23 January to 3.7 × 10^6/ml at North Bridge in Hull (site 24) on 6 February. It may be noted, that if significant contamination was caused by the use of non-sterile polythene sample bottles, then it is likely that the error was proportionally more important in results from upstream sites where bacterial numbers were low. The range of BOD values was from 0.7 mg/1 in West Beck (site 8) on 23 January to 10.4 mg/1 in Hull (site 22) on 20 February. In some of the reagent bottles, which contained water from downstream sites, virtually all the oxygen was used; it would, therefore, have been better if samples from these sites had first been diluted. Concentrations of viable bacteria and BOD values were higher in the Driffield Canal (site 1) than at the upstream river sites.

Oxygen concentrations, COD values and values of absorbance are given in Fig. 3. Oxygen concentrations were high at the upstream sites but were often low at the downstream sites. The range was from 18.5 mg/1 in Frodington Beck (site 4) on 20 February to 0.7 mg/1 in Hull (site 21) on 6 February. Both COD values and absorbance values tended to be low at the upstream sites and high at the downstream sites. The range of COD was 0.3 mg/1 in West Beck (site 7) on 23 January to 54.8 mg/1 at Corporation Pier (site 25) on 23 January, and the range of absorbance was from zero at several upstream sites to 1.28 at Corporation Pier on 6 February.

The pH values, on all three days at all sites, were in the range 7—8.

Discussion

Bacteria probably enter the river plankton in several ways: (1) In sewage effluents, drainage water and from the soil; (2) By becoming dislodged from populations which live in sediments or attached to surfaces in the river; (3) As a result of cell division by bacteria which are already in the plankton. The low concentrations of viable bacteria in the plankton at the upstream sites and the high concentrations at the downstream sites may, therefore, have been related to the following factors.

(1) Sewage effluents, which carry bacteria, are only discharged into the downstream section of the river.

(2) The silty bottom at the downstream sites perhaps supports considerably more bacteria per unit area than the clean gravel at the upstream sites and, therefore, perhaps releases more bacteria to the plankton. Also, when the silt itself becomes suspended it should take its associated bacteria with it. Spearman's rank correlation coefficient (r_s) was calculated between concentrations of viable bacteria and values of absorbance (a measure of the turbidity caused by suspended silt) on each day (see Table 1), using data from all sites, as described by Elliott (1971, pp. 120—121). On each day there was a significant correlation between these two variables (although this does not, of course, necessarily indicate a causal relationship).

(3) The organic content (as indicated by COD which is a measure of that fraction of organic matter which is oxidised by potassium permanganate) is higher at the downstream sites, probably because of sewage effluent, and organic matter might promote growth and cell division of bacteria both in the plankton and attached to the bottom. On each day there was a significant correlation between concentrations of viable bacteria and COD values (Table 1).

(4) The retention time of water in the downstream section is probably longer than in the upstream section, because of the holding-back effect of the tide, therefore there is probably more time for cell division by bacteria in the plankton.

BOD is chiefly a measure of bacterial respiration which, in part, depends on the size and composition of the bacterial community and on the quantity and quality of organic matter present. BOD values were, therefore, probably low at the upstream sites because numbers of bacteria and organic content were low; and high at the downstream sites because organic content and bacterial numbers were high. r_s was calculated between BOD values and concentrations of viable bacteria and between BOD and COD values. On each of the three days, there were significant correlations between these variables (see Table 1).

Table 1. Values of Spearman's rank correlation coefficient (r_s), 25 pairs of data were generally used (** indicates $P<0.01$, *** indicates $P<0.001$).

Variables	Values of r_s		
	23 January	6 February	20 February
Viable bacteria and absorbance	+0.66***	+0.60**	+0.67***
Viable bacteria and COD	+0.74***	+0.78***	+0.86***
BOD and viable bacteria	+0.78***	+0.68***	+0.74***
BOD and COD	+0.78***	+0.68***	+0.85***
Oxygen conc. and viable bacteria	-0.71***	-0.70***	-0.78***
Oxygen conc. and BOD	-0.84***	-0.77***	-0.87***

Downstream of Hempholme Weir (sites 12—25) there were no obvious relationships between the positions of sewage outfalls and concentrations of viable bacteria and BOD values (these did not increase markedly immediately below a discharge). This may have been because of the tide holding surface water back and, at times, moving it upstream. In the Driffield Canal (site 1) the relatively high concentrations of viable bacteria and BOD values were, perhaps, related to the following factors. (1) The presence of bacteria and organic material from the Driffield sewage outfall or from local discharges (not supported by COD Values). (2) The sluggish current and consequent lengthy retention time.

The low oxygen concentrations, at the downstream sites, were probably caused by high oxygen demand related to high bacterial numbers and high organic content. In contrast, at the upstream sites, oxygen demand was probably low while re-aeration was promoted by diffusion at the surface of the fast-flowing water and by photosynthesis of submerged macrophytes. On each day, there were significant negative correlations between oxygen concentrations and concentrations of viable bacteria and BOD values (see Table 1).

Acknowledgment

We are grateful to Mr. A. R. Hall for his technical assistance.

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AUTUMN FORAY, SCARBOROUGH

W. G. BRAMLEY

Though held rather later than usual (Sept. 27 — Oct. 1) attendance was well up to average and again it was pleasing to see quite a number of local Natural History Society members turn up, including some of the Scarborough College students. A welcome visitor was Miss E. Crackles, President of the Union.

The weather was fair though rather cold and most of the rain occurred either in the night or early morning. Fungi were not abundant but more numerous than in the past two years, though the damp state of the vegetation was not conductive to the collecting of some groups.

Friday was spent in the Wykeham Forest area, wholly coniferous and on the acid side and including some of the oldest of the Forestry Commission's planting in the county. Toadstools were not numerous and were mostly species that could have been predicted. *Microglossum viride* and *Psathyrella pennata* were the best finds.

Forge Valley was more sheltered and attracted some thirty people on the Saturday. The morning's collecting was at the lower end of the valley in mixed woodland on alkaline soil with alluvium in the valley bottom. Here fungi were rather more plentiful (Peter Orton had by now joined us) and *Paxillus rubicundulus* and *Clitopilus hobsonii* were added to the list. After lunch a move was made to the upper end of the valley and here *Coprinus lagopus* was seen in all stages from very juvenile to senile.

Darncombe the following day provided the best collecting of the foray, the area consisting again of mainly coniferous woodland but also several grass fields. A dozen species of *Mycena* (again P.D.O.), *Marasmius hudsonii* on leaves of Holly and *Mitrula abietis* amongst fallen Larch needles being found. Here were found the only *Cortinarius* species of the meeting and it is some years since the genus was seen in any numbers.

Monday proved to be meteorologically the best day, fine and sunny, but only four members were left to enjoy it. The official area of Castle Beck proved to be very dense and a move was made to Jugger Howe Beck nearby. The bridge across the beck having been washed away and the beck claiming a victim trying to cross, the better woodland on the other side was regretfully unvisited and the meeting terminated after lunch. *Agaricus campestris* is rather rarely seen on forays and we were too late here as earlier visitors had taken most of the supply.

An unusual happening was the appearance on the dining table of a centrepiece of autumnal fruits and fungi provided by Mrs Astley Cooper. Finally thanks are gratefully expressed by the recorder to Mr P. D. Orton and Mr. S. Porter for the lists supplied by them.

C = Castle Beck and Jugger Howe Beck
D = Darncombe
F1 = Forge Valley, lower part
F2 = Forge Valley, upper part
W = Wykeham Forest

+ = new to Yorkshire
o = not in *Natural History of Scarborough* Vol. 1

DISCOMYCETES (W.G.B. & S.P.)
o *Helotium calyculus,* F1
Microglossum viride, W.
Mitrula abietis (M.cucullata) on *Larix* needles, D.

PYRENOMYCETES
Cordyceps militaris, F2

AGARICALES (P.D.O. & S.P.)
Boletus variegatus, W.
+o *Clitopilus hobsonii,* W.
Collybia acervata (det. Kew), C.
C. cirrhata, D.
o *Conocybe appendiculata,* F2
o *C. pseudopilosella,* D.
Coprinus acuminatus, D.
o *C. angulatus,* F1
C. radians, F1
o *Cortinarius cinnamomeobadius,* D.
Galerina clavata, D.
Inocybe asterospora, F1
o *I. proximella,* D.
Lepiota euchroa, F1
Lyophyllum connatum, C.D. F2
Marasmius epiphyllum, D.
M. hudsonii, D.
o *Mycena fibula,* D.
o *M. inclinata,* D.
o *M. leptocephala,* C.D.
+o *M. pearsoniana,* D.
o *Naucoria bohemica,* D.
o *N. luteofibrillosa,* D.F1
o *N. striatula,* D.F1
o *Nolanea tenuipes,* F1
o *Paxillus rubicundulus* P.D. Orton, F1, D.
+ *Psathyrella bifrons,* D.
P. conopilea, F1.W.
P. pennata, W.
o *Russula betularum,* D.
R. puellaris, F2
Stropharia squamosa, F2
Volvariella speciosa, F1

OTHER BASIDIOMYCETES (W.G.B. & S.P.)
Lycoperdon excipuliforme, C.D.
o *L. pyriforme* (an oversight)
o *Clavaria pulchra,* C (=*C. persimilis*)
+ *Tremella encephala,* W.

Herbal Handbook for Farm and Stable by **Juliette de Bairacli Levy.** Pp. 320. Faber and Faber £3.95

The Illustrated Herbal Handbook by **Juliette de Bairacli Levy.** Pp. 200 with 16 plates. Faber and Faber £2.50.

The value of herbs for medicinal purposes is beyond question but it is equally certain that exaggerated and often spurious virtues have been attributed to many plants. Mrs. Levy has evidently had long experience of herbal remedies and is well acquainted with the manner of their use. The difficulty here is to distinguish the grain from the chaff, for one cannot escape the conviction that in her enthusiasm the boundary between fact and fantasy is blurred. The botanical misnomers do not increase one's confidence; on plate 12, fig. 3 is certainly not *Crocus sativus* nor is fig. 6 *Diotis maritima.*

ENTOMOLOGICAL SECTION FIELD MEETING BRETTON PARK V.C. 63, 30th June 1973

ROY CROSSLEY

This field meeting in the delightful surroundings of Bretton Park was by kind invitation of Mr M. T. Brook and the dozen or so members who attended were blessed with glorious hot sunshine although a breeze tended to keep down some of the flying insects.

The morning was spent working the north side of the lower lake and here a good variety of insects was found. Mr Flint reports that there were numbers of *Abia sericea* L., a handsome sawfly which he has not previously found to be so numerous, and also the alder feeding *Eriocampa ovata* L. The bee *Andrena ruficrus* Nyl. which is little known in Yorkshire and not previously recorded in vice-county 63, was reported by Mr Flint as nesting in the ground quite near to the lakeside. That lovely green moth the Forester (*Procris statices* L.) which is by no means a common species, was seen in small numbers by most of the party.

In the afternoon the woodland on the north side of the top lake was explored and also the land at the head of the lake. The most notable insect here was the conspicuous and active wasp-like sawfly *Tenthredo scrophulariae* L., a local species restricted to favoured localities where it is associated with figwort. Mr Flint was responsible for locating this apparently well established colony on the lakeside and a number of members were delighted to be shown these striking insects. On the umbelliferous plants in open parts of the woodland the large, slender longhorn beetle *Strangalia maculata* Poda was quite common, as were several species of hover flies. Of these, both in the woodland and the more open land immediately adjacent to the lake, the most remarkable capture was of *Helophilus trivitattus* Fab., taken by Mr Brook. Although there is a very old vice-county record of this species from Keighley, it is usually regarded as an insect of coastal salt marshes, the vicinity of the "Canal Zone" at Spurn being a typical habitat.

Of the many other insects reported the majority are common species of generally wide distribution and do not require special mention. A full list has, however, been prepared and deposited with Mr Brook.

BRYOLOGICAL MEETING AT SALTBURN SEPT. 15-16, 1973

M. DALBY

Eighty years ago Richard Barnes discovered in Coatham Marshes a number of rare bryophytes including *Bryum warneum, B. marratii* and *B. calophyllum,* all now believed to be extinct in the vice-county. His description of the locality then was a follows:—"Tod Point is situated somewhat west of Coatham and from this portion of the coast the estuary of the Tees is bounded for a considerable distance by a broad tract of sandy, marshy ground — usually known as Coatham Marshes." This area has now almost disappeared under the slag heaps and dumps of Teesmouth and the Bryological Section found that although many of the flowering plants had survived the moss flora was sadly depleted. *Drepanocladus aduncus* grew in abundance with *Scirpus maritimus* in the remnants of the brackish marsh and *Leptodictyum riparium* in a muddy pond. On the slag heaps grew such species as *Barbula hornschuchiana, B. unguiculata, Bryum argenteum, Tortula muralis, Encalypta streptocarpa, Rhacomitrium lanuginosum, Amblystegium serpens* and *Ceratodon purpureus,* which was abundant also over wide areas of slag debris, fruiting freely.

The most interesting areas were the few damp dune slacks where *Bryum pallescens, Pellia endiviifolii, Riccardia pinguis, R. sinuata* and *Barbula convoluta* were found with *Brachythecium albicans* abundant among the sand dunes. Many plants of *Bryum spp.* were seen but without fruit they were impossible to identify with certainty.

An old record of *Camptothecium nitens* from Cod Hill Bog promoted a visit to this locality on the Sunday but we were not able to refind the species. The drier, heavily grazed moorland slopes going down to the bog were covered with isolated plants of crowberry and stunted heather between which was a carpet of *Campylopus flexuosus* intermixed with *C. introflexus* fruiting abundantly. Other species found on the moorland were *Campylopus pyriformis, Dicranum bonjeanii, D. scoparium, Pohlia nutans* and *Plagiothecium undulatum*. Much of the bog was rushes with *Sphagnum recurvum* but springs on the further slopes above provided a more basic habitat and species found included *Dicranella palustris, Drepanocladus revolvens, Mnium subglobosum, Campylium stellatum, Aulacomnium palustre, Philonotis calcarea, Bryum pseudotriquetrum, Acrocladium* *cuspidatum, A. stramineum, Sphagnum teres* and *S. plumulosum,* together with the hepatics *Riccardia multifida, Chiloscyphus pallescens, Cephalozia connivens, Calypogeia muellerana, C. fissa* and *Lophocolea cuspidata.* Additional *Sphagna* species found were *S. palustre. S. papillosum, S. cuspidatum, S. subsecundum* var. *auriculatum, S. fimbriatum, S. girgensohnii, S. robustum* and *S. capillaceum.*

ACKNOWLEDGEMENTS

My thanks to Dr E. V. Watson and Mr J. H. Field for help with identification, and to Mr F. E. Branson, Mr G. A. Shaw and Mr E. Thompson for their records.

BRYOLOGISTS VISIT TO WHALLEY

JEFFREY G. DUCKETT

For their spring meeting, 31 March — 7 April, 1973, the British Bryological Society visited Whalley near Clitheroe (v.-c.59), making the Conference House in the Abbey grounds their headquarters. Although the main purpose was to redress the neglect of bryophyte recording in Lancashire (v.-cs. 59 and 60) the meeting also provided the opportunity to explore poorly known regions of Mid-West Yorkshire (v.-c.64) adjacent to the Lancashire border. The notable finds made in Yorkshire during the meeting form the basis of this account.

On the first day (April 1) Downham Bridge was visited. On the Yorkshire side of Ings Beck, which here forms the county boundary, finds included *Barbula spadicea* c.fr., *Brachythecium plumosum, Eurhynchium murale, Hygroamblystegium fluviatile, H. tenax, Isopterygium depressum, Mnium seligeri, M. stellare* and *Tortula subulata* var. *subinermis* new to v.-c.64 on the silt-covered roots of an elm tree.

Despite torrential rain, extensive recording was carried out on April 2 in the woods and limestone ravines ordering the River Hodder at Sandal Holme near Bashall Eaves. These revealed *Barbula spadicea* c.fr., *Cirriphyllum crassinervium, Mnium marginatum* c.fr., *Metzgeria conjugata, Porella laevigata, P. cordaeana, Solenostoma pumila* and *S. triste. Dicranum strictum* was found on a rotting stump and a single tuft of *Orthotrichum lyellii* on an old elder. Nearby fields produced *Pleuridium acuminatum, P. subulatum* and the rare *Weissia rostellata.*

Stocks Reservoir, the site for several outstanding bryophyte finds in recent years, was the venue on April 4. Although again hampered by atrocious weather members found *Archidium alternifolium, Blindia acuta, Dicranella rufescens, Fissidens minutulus, Hypnum lindbergii, Pohlia bulbifera, Weissia rostellata, W. microstoma* var. *brachycarpa, Pellia neesiana* and five species of erythrocarpous Brya including *B. bornholmense* new to v.-c.64. However, in order to see *Physcomitrium sphaericum* and *Ephemerum sessile* the site must be visited in the autumn. Woodland adjacent to the reservoir produced *Dicranum strictum, Hypnum cupressiforme* var. *mamillatum, Plagiothecium latebricola* (on a fern stool) and *Nowellia curvifolia*. Exploration of Otterburn near Hellifield yielded *Amblystegium varium, Barbula trifaria, Cinclidotus fontinaloides, Fissidens exilis, F. incurvus, Gymnostomum calcareum, Rhynchostegiella teesdalei, Seligeria recurvata* and *Tortula subulata* var. *graeffii.* Another party visited Holden Clough where *Calypogeia arguta, Barbula spadicea, Mnium longirostrum, Rhytidiadelphus loreus* c.fr. and *Seligeria pusilla* were recorded. Diligent search of a large number of old elders in this sheltered valley was rewarded by the discovery of small specimens of *Metzgeria fruticulosa, Orthotrichum diaphanum* and *Ulota bruchii* growing amidst abundant *Aulacomnium androgynum* and *Dicranoweisia cirrata.* Returning to Whalley via Newton Fell *Atrichum crispum* and *Solenostoma sphaerocarpum* were seen on the banks of a stream near the summit.

The final Yorkshire locality visited during the meeting was a limestone quarry near Rams Clough in the Trough of Bowland, which contained *Breutelia chrysocoma, Bryum pallescens, Ptychomitrium polyphyllum, Weissia controversa* var. *densifolia, Leiocolea badensis* and very fine *Preissia quadrata.*

Perhaps the most interesting bryological feature of this rural area is the almost total absence of epiphytes although *Aulacomnium androgynum, Dicranoweisia cirrata* and the spreading *Dicranum strictum* form notable exceptions. The bryologist is constantly remonded of the atmospheric pollution emanating from the adjacent industrial centres of the North of England.

BOOK REVIEWS

A Key to the Adults of the British Trichoptera by **T. T. Macan,** illustrated by C. Joan Worthington. Pp. 151, 5 plates, numerous line drawings. Freshwater Biological Association, Scientific Publication no. 28, 1973. £1.25.

Beginners who stumbled at the beginning of the key in Moseley's *The British Caddis Flies,* the division into Aequipalpia and Inaequipalpia, will rejoice that Dr. Macan uses characters that permit a reasonably safe start with a breakdown into five groups. Throughout the key the diagnostic characters are illustrated by an abundance of clear line drawings and can be appreciated readily. The figures of the complex male genitalia which are so important have been drawn from examples that have not been allowed to shrivel and in this respect they differ from those of Moseley which were drawn from dried examples and which were to some extent distorted in consequence. Careful planning of text and figures has ensured that the figures almost invariably face the corresponding references in the text, a feature for which all users of the key will be grateful.

This is a very fine addition to an excellent series of publications and very good value for money. The only criticism that one can make is that the plates, which consist of photographs of wings, contain too many examples that are lacking in definition.

J.H.F.

The Botanist in Ireland by **Robert Lloyd Praeger.** Pp. 460 with 28 text figures + 44 plates. Hodges, Figgis & Co., Dublin. 1934. Reprinted by EP Publishing Limited, Wakefield, 1974. £4.50.

It is a pleasure to record the reprinting of this long out-of-print work, a classic of its kind, and an invaluable aid to the botanist, field biologist and ecologist, who for far too many years have had to track down the rare surviving copies in the secondhand market at high prices.

Containing a detailed schematic appraisal of the major habitats and their topographical setting for the whole of Ireland, this work is still highly relevant to present day needs although originally published forty years ago, since sites and species for the most part have changed very little in the intervening years and there is no comparable work which would provide such a wealth of detailed information.

There are two major modifications to the original work in this reprint: the omission of the four coloured maps and of the 48-page checklist of flowering plants, ferns and charophytes. In the former case, it is a pity that no comparable cartographical substitute has been included, but as regards the latter the omission is no great loss as the original checklist is now out-of-date and has to some extent been updated by the recent publication of the *Census catalogue of the flora of Ireland* by M. J. P. Scannell and D. M. Synnott (Irish Stationery Office, Dublin, 1973). However, since the references to the original checklist are still included in the index, some measure of the Irish flora known to Praeger can be deduced although without vice-county details. As a result of these modifications it has been possible to produce a reasonably priced work in a handy size to accompany the botanist on his Irish excursions. It should be noted that the fuzzy definition of some of the plates is in no way the fault of EP Publishing Limited as many of the original photographs, especially those illustrating habitats, were mediocre.

M.R.D.S.

Edlington Wood edited by **Harold Phillips.** Pp. 238. Printed and published by Doncaster Rural District Council. Price not stated.

Edlington Wood has a long history. It is one of the largest surviving areas of deciduous woodland in the county, about 300 acres in extent, and has long been open to the public. Three years ago the wood was bought by a timber merchant. His declared intentions of exploiting the trees and the land for profit aroused indignation amongst the local public in general and naturalists in particular. The proposals covered not only tree felling but quarrying and "development" of the area for housing and agricultural purposes. The stage was thus set for open hostilities between developers and conservationists and the campaign for preservation has since been vigorously pursued by a determined group of people amongst whom our members Peter Skidmore and Colin Howes have played a leading part.

It is no adequate defence of threatened areas to claim that they are of great natural history interest and value. The claim must be substantiated. The present work is an assessment of the "recent history, archaeology, geology, natural history and educational and amenity value" of Edlington Wood. It examines in detail the scientific value of the wood and its importance to the local public of an area which is sadly deficient in such amenities. In drawing up the accounts under the several headings, the help was enlisted of a team of well-qualified contributors.

Archaeological sites in the wood have been known for a long time. Finds include flints of Palaeolithic and Neolithic age and three substantial hoards of Roman coins numbering over 600 pieces. Several Romano-British enclosures have yielded pottery and miscellaneous finds but more work is required before the sites can be regarded as thoroughly investigated.

The largest section is devoted to the flora and fauna. A major feature of ecological interest is the presence of semi-natural and spontaneous woodland in the northern part in which Yew and *Tilia cordata* are abundant. Evidence from pollen analysis indicates that these have existed at Edlington since Roman times. Similar types of woodland were probably once frequent on the Magnesian Limestone but have now largely vanished leaving Edlington as an important piece of relict woodland. The statement that equally old Yews are "unknown" elsewhere in the Doncaster area is however surely incorrect. Those at King's Wood, Roche Abbey (which surprisingly is not mentioned) are probably equally old. The detailed lists of species in all the major groups of plants and animals which follow the ecological section contain a wealth of detail, well documented throughout with comments on frequency, status, original discoveries of the rares species and notes on the biology or distribution of the more notable species.

This publication is impressive both for the quantity of information assembled in it and as an example of coordination of effort in the defence of a thoroughly worthwhile cause. It is stated that the Doncaster R.D.C. proposes to buy the wood from their own resources by means of a Compulsory Purchase Order. If this has now been done and the wood saved, a notable victory will have been won.

W.A.S.

Models in Ecology by **J. Maynard Smith.** Pp. 146. Cambridge University Press, 1974. £3.70.

This expensive little book is something of a disappointment for it is really misnamed; the title should be "Models in Animal Ecology". It is perhaps particularly unfortunate that the head of a Biology Department where one would expect to find an integrated view of biology and of ecology in particular, should have chosen to ignore the exciting developments in the modelling of photosynthesis, water balance and radiation balance in ecosystems. These topics have reached a substantial degree of sophistication in modelling studies, in particular the work of Laisk *et al*. relating modelling of biochemical functions to ecological performance would have provided a dimension quite lacking on the animal side.

With these reservations concerning content the book as it stands is good. It is clearly written, with lucid diagrams and well explained equations. The Introduction deals with types of models used in ecology and this is followed by sections on (2) Predator-prey systems without age structure, (3) Breeding Seasons and Age Structure, (4) Predator-prey systems with age structure, (5) Competition, (6) Migration, (7) Stability and Complexity — an introduction, (8) The Statistical Mechanics of Populations, (9) Complexity at a single trophic level, (10) Complexity with several trophic levels, (11) Co-evolution, (12) Territorial Behaviour.

This is an invaluable introduction for the would-be ecologist. If one has a minor criticism it would be that it lacks that feel for practical ecology which would lead a young naturalist-ecologist to see more readily the use of the formal structures in the analysis of every-day problems in his subject.

H.W.W.

1. Dolphins, Seals and other sea mammals. 2. Dogs. Both 88 pp. with numerous colour plates. General editor David Stephen. *Animal World Series.* Collins, London & Glasgow. £1.95 each.

These two books are both profusely illustrated with fine colour photographs. The quality of the text does not suffer by comparison with the splendid illustrations, the information being factual, concise and reasonably detailed. In the first, twenty-eight species of seals, fur seals, sea lions, walrus, sirenians, whales, porpoises and dolphins are described. The second covers over 160 breeds of dog. They are handsomely produced volumes and very reasonably priced having regard to the generous supply and high standard of the colour plates.

Also received:

Life and Tradition on the Cotswolds by **Edith Brill.** Pp. xiv+182 with 243 photographs, 19 drawings and a map. Dent. £5.50

Poorman's Nosegay: Flowers from a Cottage Garden by **Lesley Gordon.** Pp. 222 with 16 plates, 8 in colour. Collins & Harvill Press. £3.50.

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MYCOLOGICAL SECTION

The 91st Autumn Fungus Foray
will be held at
SHEFFIELD
from Thursday 26th to Monday 30th September, 1974

ACCOMMODATION has been arranged at the Earnshaw Hall of Residence of the University of Sheffield. The charges are: £2.10 for bed and breakfast, 90p for dinner. These figures are exclusive of a 10% Service Charge and 8% VAT. Bookings should be made through the Mycological Section Secretary (address below), and the Steward of Earnshaw Hall has requested that the final number of members attending should be known by the first week in September.

LABORATORY FACILITIES are provided in the Department of Botany, University of Sheffield, by kind permission of Prof. A. J. Willis.

Dr. R. C. COOKE has kindly agreed to give us a talk on Predacious Fungi, following the meeting on Saturday evening, 28th September.

FIELD PROGRAMME — The time of meeting will be 10.00 a.m. on each day.

Friday September 27th — *Chatsworth Park* — SK/264704 (Sheet 111)
Parking as directed by gardens staff. Meet on foot by the Stable Block.

Saturday September 28th — *Fox House/Padley Wood* — SK/267803 (Sheet 111)
Meet by Fox House Inn.

Sunday September 29th — *Ecclesall Wood* — SK/322827 (Sheet 111)
Meet at 10.00 a.m. at the road junction.

Limb Valley — SK/311827 (Sheet 111)
Meet at 2.00 p.m. on loop of road on right side of the A.625 from Sheffield.

Monday September 30th — *Anston Stones Wood* — SK/525834 (Sheet 103)
Access is from the A57 Sheffield to Worksop road. Parking at the junction of the B6059 with the A57.

Further information may be obtained from the Secretary:

Miss M. E. Blundell,
9 North Grange Mews,
Leeds LS6 2EW
(Telephone 785370)

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Chequer Road,
Doncaster DN1 2AE.

THE STATUS OF GOLDEN PLOVER *(PLUVIALIS APRICARIA)* AND DUNLIN *(CALIDRIS ALPINA)* IN THE PEAK DISTRICT

D. W. YALDEN

The institution of the Peak District National Park in 1950 recognised the importance of this 542 square miles as a recreational area and in particular its scenic attraction has been emphasised. But the Peak District is also an important area in natural history, for it forms a south-easterly edge of the range of a large number of species of animals and plants typical of north-western Britain. It is important that basic knowledge of the numbers and distribution of these species be available so that planning decisions which might affect them can at least be taken from a position of knowledge, not ignorance. The two most characteristic birds of the cottongrass mosses are the Golden Plover and its "page", the Dunlin; this paper attempts to provide the basic distributional information for these two rather neglected species.

Methods

Basically, the survey tried to cover each one-kilometre square of the National Grid in which the two species were believed likely on grounds of habitat to breed. Since all of the moorland had been covered during surveys of red grouse *(Lagopus lagopus)* and mountain hares *(Lepus timidus)* (Yalden 1971, 1972), knowledge of the vegetation of the area was already available. Within each square, birds which behaved as though they were holding territory were counted, either as pairs or as "Territorial males" if they seemed to be solitary. Golden Plover are, of course, most obliging when on territory; the plaintive warning "tiou" cry is often uttered from 400m or more away and the territorial bird, sometimes the pair, flies round the observer or stands nearby throughout his intrusion. An observer walking through a one-kilometre square is therefore sampling a band 800m or more wide and since the territories are usually along the ridges, a fairly complete count of territories is feasible. Any error is likely to be toward over-estimating the numbers of birds, particularly where the population is fairly dense and neighbouring territory holders could be confused. Fortunately there are only one or two areas where this is likely. The chances of underestimating Golden Plover numbers by missing the birds altogether are relatively slight. With Dunlin on the other hand underestimation is rather more likely, the breeding season is rather short, territorial "defence" against human intrusion is less obvious and the song flight is not so conspicuous, so that overlooking the birds completely is quite possible. On the other hand Dunlin have in fact been found fairly readily in virtually all squares where, on habitat, they were expected and fairly extensive searching in a limited area suggests that the recorded density is reasonably accurate. Because the territorial behaviour of the Dunlin is less overt than that of Golden Plover, there is in fact some possibility of overestimating the numbers by recording non-territorial birds, or females which have left territories (Soikkeli 1967), as territorial birds. I counted as territorial, Dunlin which stood their ground and gave their anxiety cry "quoi, quoi" or were in song, but not those which were apparently surprised, perhaps feeding, and flew away.

The rather short breeding season, especially of Dunlin, made it impossible to cover all the possible terrain in one season. Dunlin arrive on their breeding grounds in mid-April and most have left by mid-July, and although some Golden Plover regularly appear in mid-February, they usually get displaced by bad weather in March so do not settle until April; they too mostly leave by late July. In fact the three seasons 1971-1973 were needed, and some data for Golden Plover were obtained in 1970. Furthermore, help was kindly provided in respect of East Moor (R. A. Frost), Combs Moss (D. Alsop) and Goyt Valley (G. Howe), without which the survey would have taken even longer.

Distribution

Golden Plover is widely distributed on the main moorland of the Dark Peak from the Kinder Plateau northwards throughout the Bleaklow Plateau, the Longdendale Moors and Saddleworth Moors to the northern edge of the Peak Park (Fig. 1). To the east of the R. Derwent the species is somewhat more sparsely distributed on the Howden Moors, but is more common from Little Howden Moor south to Derwent Moor and there are a few pairs further south on Bamford and Hallam Moors. There is some uncertainty as to whether Burbage Moor is also a breeding ground, but there have certainly been about three males present early in the breeding season. Later visits (in June) have failed to find them and these may be in fact non-breeding birds; for the purposes of population estimation and analysis they have been counted as territorial. On the western side, Golden Plover certainly breed on Combs Moss, Goyts Moss and the Axe Edge Moors as far south as Birchenough Hill, Turn Edge and Wolf Edge. The southernmost birds appear to be a couple of pairs on the Middle Hills area of Morridge, in Staffordshire. In all, territorial Golden Plover have been recorded from 202 one-kilometre squares and there are less certain records from another four squares. A further eight squares, reported in response to the first draft of this paper, are included in Fig. 1.

Dunlin are not quite so widely distributed in the Peak District as Golden Plover, being more confined to the north (Fig. 2). Their main area of distribution runs north from Ashop Clough, across Featherbed Moss, the south side of Bleaklow, round Wike Head and Withens Edge onto the Longdendale and Saddleworth Moors. East of the Derwent,

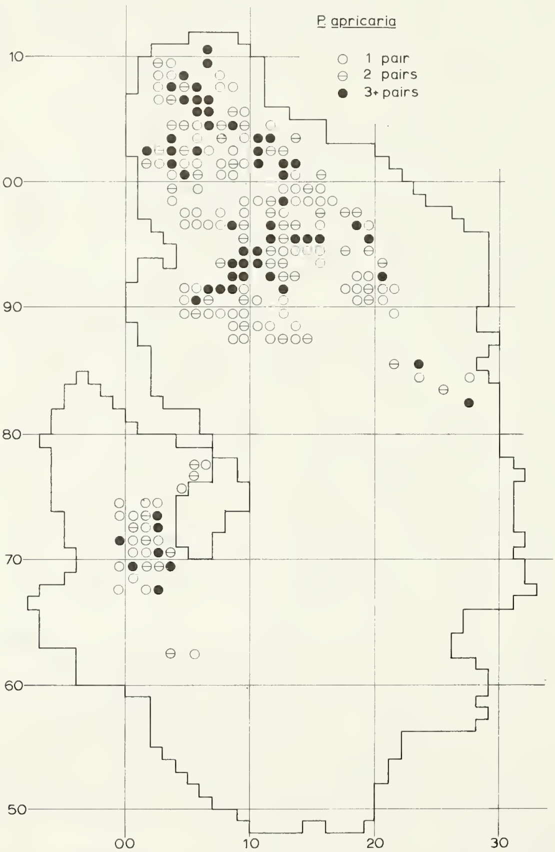

Figure 1. Recorded breeding distribution of Golden Plover, *Pluvialis apricaria*, in the Peak District, 1970-1973.

Dunlin only breed in four squares of the Howden Moors and four or five of the Hallam Moor squares. The main Kinder plateau is mostly unsuitable and Dunlin have apparently not been recorded there previously. However, in 1973 they were present in suitable habitat, in two separate areas and this may represent a recent extension of range. Further south, there is a small outlying colony of much longer standing on Axe Edge. In all, the Dunlin has been recorded from 89 one-kilometre squares, and Fig. 2 includes three additional squares reported in response to this paper.

Numerical Status

Because the survey could not be completed in one year, it is not possible to give figures for the populations directly, but two methods of estimation are possible. In each year, an adequate sample of the population was surveyed to provide an average survey density — that is to say, the average number of pairs in the one-kilometre squares visited. Multiplying these density figures by the total number of squares in which the species were recorded during the three years' survey gives an estimate of the breeding populations and partly allows for fluctuations in populations from year to year. It fails, however, to allow for the (observed) fact that in one year a square may contain no breeding territories though it does in other years and therefore may give a slightly

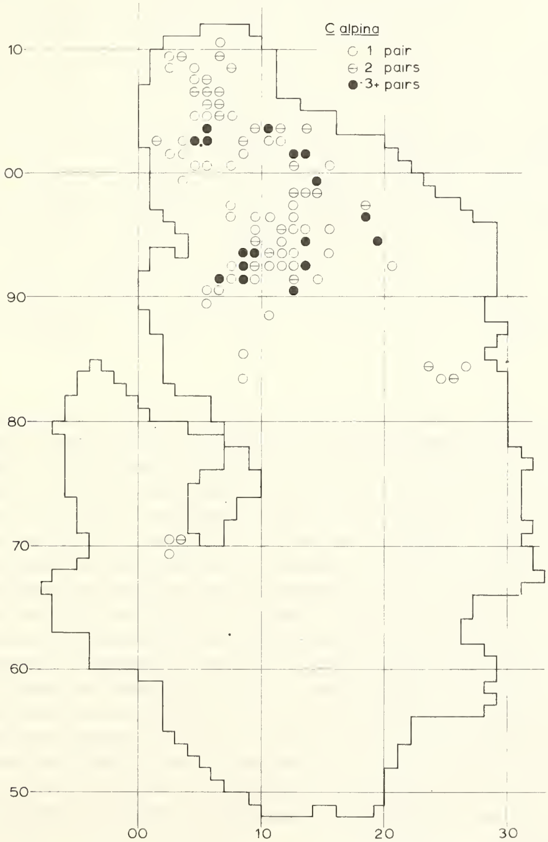

Figure 2. Recorded breeding distribution of Dunlin, *Calidris alpina*, in the Peak District, 1971-1973.

optimistic estimate. An alternative estimate is obtained by adding up the highest number of pairs (territories) recorded in each square, irrespective of the year in which the record was obtained. This method ignores possible annual variation and also gives an inflated estimate. A small moor of two square kilometres might have two pairs in one square one year, two pairs in the other square the next year, and one pair in each in a third year, but this stable population of two pairs would be accounted as four pairs by this method. However, the method might give an estimate of the maximum populations the terrain could carry.

Table 1. Population Censuses and Estimates of Golden Plover *(Pluvialis apricaria)* and Dunlin *(Calidris alpina)* in the Peak District.

Golden Plover	**1970**	**1971**	**1972**	**1973**	**Average**	**Maximum Estimate**
No. territories	121	154	152	198		
No. 1-km. squares	58	80	82	104		(202)
Density/km²	2.09	1.93	1.85	1.90	1.93	
Est. Pop. n.	422	390	374	384	390	432
Dunlin						
No. territories	(12)	48	75	76		
No. 1-km. squares	(10)	29	50	47		(89)
Density/km²	(1.2)	1.66	1.50	1.62	1.58	
Est. Pop. n.	—	148	134	144	141	154
G.P./Dunlin						
(on observed pop. n.)	—	3.21	2.03	2.61	2.77	2.81

The relevant data are presented in table 1. It will be seen that there were slight variations in population density from year to year, but these do not differ in statistical significance from the expectations calculated on the average population density (for Golden Plover, χ^2_3 = O.994, p = 0.8—0.9; for Dunlin, χ^2_3 = 0.338, p = 0.8—0.9).

For Golden Plover, the average population density of 1.93/km² spread over the total 202 squares in which the species was recorded suggests a population for the whole of the Peak Park of 390 pairs, with the extreme values, using the different density estimates, of 374-422 pairs. As expected the method of summing the maximum number of pairs for each square gives a slightly higher estimate of 432 pairs. There are at most perhaps 10 or 12 squares in which the species might also breed at present and therefore an outside figure might be 450 pairs. This is, however, likely to be an overestimate and it seems reasonable to assume a population of 380-400 pairs of Golden Plover currently breeding in the Peak District. In addition to the breeding birds, there were always a few pairs (c.10) which behaved as though they were non-territorial scattered around the moors. More important, there have been records at the height of the breeding season of non-breeding birds on five occasions in flocks of 9, 21, c.30, 36 and 43; these were southern-race birds and could well represent young birds which have not matured or early breeding failures.

For Dunlin, the average density of 1.58 pairs/km² over the 89 squares in which it was recorded gives an estimated population of 141 pairs, with the extremes of 134-148 pairs. The method of adding up the numbers of pairs for each square gives a slightly higher estimate of 154 pairs. There seem to be at most only one or two further squares which have suitable habitat for Dunlin, and a population estimate of 140 pairs seems most reasonable.

It was pointed out above that variations in observed density did not differ significantly from statistical expectations based on average density. This does not mean, however, that the populations of these two waders do not fluctuate from year to year. The method of working out the density (number of pairs observed divided by number of squares they inhabited) does not take note of the complete absence of birds from some squares in some years and the lack of significant variation in density may simply mean that territory size is fairly constant from year to year. Not many areas were surveyed with sufficient thoroughness in all three years to give a good indication of these fluctuations, but the four squares of Featherbed Moss, Snake Pass, gave counts of Golden Plover territories of 9 (1971), 1 (1972) and 10 (1973). Some nearby squares showed a stable population through the three years, others also indicated a low population in 1972. The ratio of Golden Plover to Dunlin also suggested that the Plover population was low in 1972; calculated on the average population estimates, the ratio should be 2.77, but the figures observed in the survey varied from 3.21 in 1971 down to 2.03 in 1972. The field data suggest that Dunlin may have been fewer in number in 1971, but more definite figures would be needed to substantiate this.

It was suggested above that the survey might give a fairly accurate count or slight overestimate of Golden Plover, but might overlook Dunlin because of their behavioural differences. A rough check of the ratio of Golden Plover to Dunlin is available from the finding of nests. I have never managed to locate a nest of either species by actively searching for it; in all cases I have "stumbled across" them. Finding a nest is therefore essentially a random event and the chances of finding the nest of one species as against the other should depend on their relative densities (always providing that the incubation periods are similar; that of Dunlin is given as 21-22 days, of Golden Plover 27-28 days (Witherby *et al.* 1940, Campbell and Ferguson-Lees 1972), making the latter a little more likely to be found). In fact, eleven nests of Golden Plover and four nests of Dunlin have been encountered, a ratio of 2.75. The sample size is of course very small, but does strengthen the supposition that Golden Plover are two to three times as numerous as Dunlin in the Peak District.

Habitat

In the Peak District the breeding distribution of both species follows rather closely the distribution of cottongrass mosses *(Eriophorum vaginatum)* (Fig. 3). This obvious correlation overlies, even obscures, variation both between and within the species which warrants a somewhat deeper scrutiny. The moorland squares have already been subjectively surveyed for their vegetation content and the distribution records can be analysed with respect to the percentage *Eriophorum* coverage of the squares in two ways. On the one hand, the number of pairs of birds which occur in squares of different percentage *Eriophorum* indicates where the birds are most likely to be found, their preferred habitat; to allow for variations in habitat availability this is presented as an "index of occupancy", % breeding pairs to %cottongrass squares (table 2). On the other, the number of squares of different percentage *Eriophorum* in which the birds do or do not breed may indicate their aversion to certain types of habitat (table 2).

The habitat of the Dunlin is rather easier to fix. Very few pairs breed in squares with less than 20% *Eriophorum* cover; even these few are, with perhaps one exceptional pair, still breeding in an *Eriophorum* dominated community, but at the edge of the moor where the square drops off into lower vegetation of a different type. In other words these birds are recorded in low *Eriophorum* areas only by the somewhat arbitrary method of habitat classification. The index of occupancy increases with the increasing coverage of *Eriophorum* indicating clearly this species' preference for high cottongrass coverage. Analysed the other way round, Dunlin breed only in 4% of squares which

Table 2. Distribution of breeding pairs of Golden Plover, *Pluvialis apricaria* and Dunlin *Calidris alpina* with respect to the percent coverage of the breeding squares by cottongrass, *Eriophorum*. The "0—10%" *Eriophorum* category, and the percentages based on it, includes only squares in which *Eriophorum* was recorded. Columns 4 and 9 are percentages of the appropriate values in column 1; columns 2, 6 and 11 relate to the totals of columns 1, 5 and 10 respectively.

			P. apricaria					*C. alpina*				
% Eriophorum cover	No. of squares with that % Eriophorum	(%)	No. of squares where breeds	(%)	No. of pairs	(%)	% Pairs / % Eriophorum	No. of squares where breeds	(%)	No. of pairs	(%)	% Pairs / % Eriophorum
	1	2	3	4	5	6	7	8	9	10	11	12
0 — 10	73	(21)	37	(51)	52	(12)	57	3	(4)	3	(2)	10
— 20	47	(14)	20	(43)	31	(7)	50	2	(4)	5	(3)	21
— 30	55	(16)	28	(51)	53	(12)	75	13	(24)	20	(13)	81
— 40	42	(12)	21	(50)	53	(12)	100	13	(31)	27	(18)	150
— 50	30	(9)	18	(60)	42	(10)	111	9	(30)	13	(9)	100
— 60	19	(5)	13	(68)	30	(7)	140	6	(32)	8	(5)	100
— 70	26	(7)	20	(77)	55	(13)	186	13	(50)	19	(12)	171
— 80	33	(9)	26	(79)	71	(16)	178	16	(48)	31	(20)	222
— 90	14	(4)	10	(71)	21	(5)	125	6	(43)	12	(8)	200
—100	12	(3)	9	(75)	24	(6)	200	8	(67)	16	(10)	333
Total	351		202		432			89		154		

have 20% or less *Eriophorum*, in 28% of squares with 30-60% and in 50% of the squares with over 60% cottongrass. The fact that 50% of the "high cottongrass" squares are not inhabited indicates that the vegetation alone is not the whole story. As has been stated many times before (e.g. Bannerman 1961. Witherby *et al*. 1940), the species requires areas which are broken up by small pools. The *Eriophorum* mosses are all poorly drained or they would not be dominated by this one plant, but the areas from which Dunlin is absent are completely covered by it, with no pools. It is evident that the Dunlin (Red-backed Sandpiper) relies upon crane fly larvae (Tipulidae) for the major part of its diet on the breeding grounds (Holmes, 1966a). Moreover, Coulson (1962) showed that *Tipula subnodicornis* is abundant in the peat of the Pennines, as late larvae and pupae in May and as adults at about the end of May. Another species, *T. paludosa*, is present in mineral soils, for example along stream beds, and although the adults emerging at the end of July would be too late for most Dunlin to prey upon, the late larvae would certainly be available. Both crane flies need damp conditions which would perhaps explain the Dunlin's requirement for areas of *Eriophorum* which are broken by pools. It is evident from Coulson's data that eroded peat-hag areas, which are drier, have fewer Tipulidae; this would explain the absence of Dunlin from, for example, the major part of the Kinder plateau and the north-west side of Bleaklow.

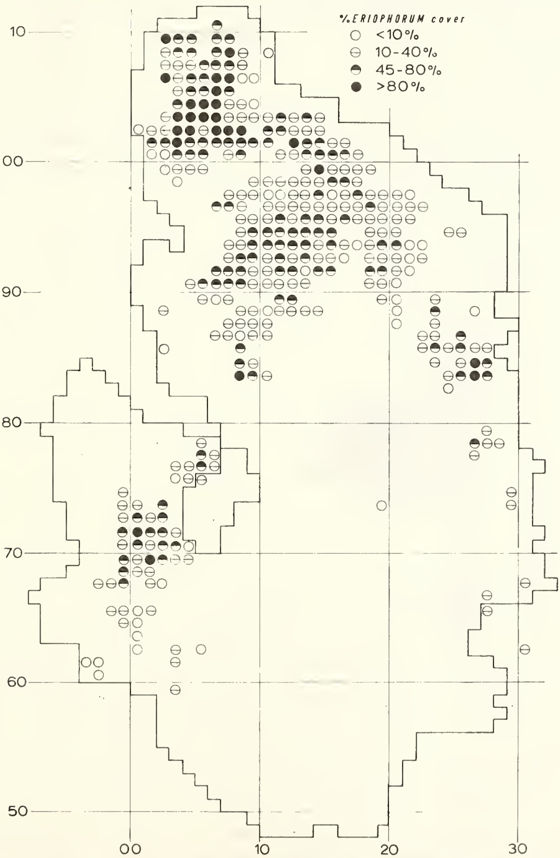

Figure 3. Distribution and percentage coverage of cottongrass, *Eriophorum* sp. by one kilometre squares in the Peak District.

The habitat of the Golden Plover certainly includes, in the Peak District, most of the *Eriophorum* mosses, but the bird is much more evenly spread across the spectrum of percentage *Eriophorum* cover; the index of occupancy does increase with increasing cottongrass coverage, but "low cottongrass" squares (<20%) still support 19% of the plover population. In contrast with the Dunlin, Golden Plover certainly do breed in areas completely lacking cottongrass. There are about 14 pairs of Golden Plover which breed on areas of burnt *Calluna* moor, often at low altitude. Other plovers breed on the *Empetrum-Vaccinium* heaths, for example the 16 pairs on Kinder and at least 9 pairs on the north-west side of Bleaklow. Expressed in terms of the percentage of *Eriophorum* squares, Golden Plover breed in 49% of squares with 40% or less, in 69% of squares with 50-60% and 82% of squares with 70% or more cottongrass coverage. There is no detailed information on the diet of Golden Plover on its breeding ground, but the diet recorded in winter and general anatomical considerations suggest that surface-active arthropods, especially beetles and spiders, are likely to be the main food. In this case, it may be that the physical structure of the vegetation is the most important feature for the Golden Plover, in that short vegetation, which characterises *Empetrum* heath, burnt *Calluna* moor and *Eriophorum* mosses, enables the bird to see and capture its prey as well as, perhaps, detect approaching predators.

The altitudinal distribution of the two species follows the distribution of available habitat. At the northern edge of the Peak District, *Eriophorum* mosses occur as low as 1300 ft, and both species breed in this area. Most of the mosses occur at 1500-1800 ft., and this altitudinal range also covers all but 12% of the Dunlin territories. Golden Plover are a little less restricted altitudinally, with 10% of pairs breeding above 1800 ft. and 14% below 1500 ft. (Fig. 4). Those breeding on the lower ground are mostly those pairs, already mentioned, breeding on areas of burnt *Calluna*, while those at higher altitude are mainly on the *Empetrum* heaths of the Kinder and Bleaklow plateaux.

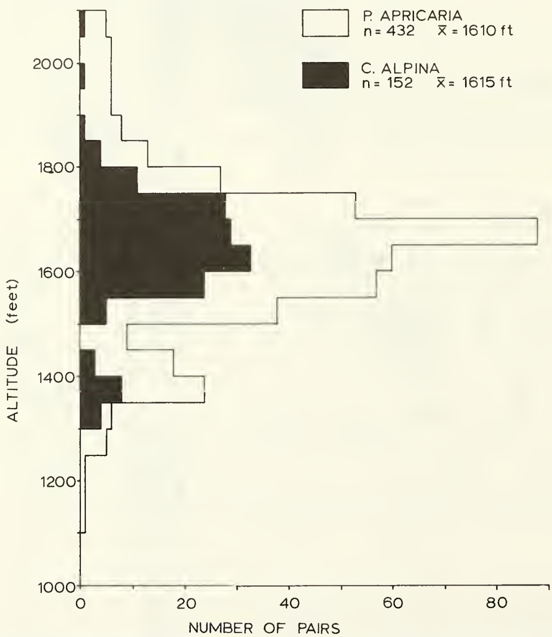

Figure 4. Altitudinal distribution of breeding pairs of Golden Plover and Dunlin in the Peak District (based on the "maximal counts", see text, of 432 and 154 pairs respectively).

Discussion

The numerical status of these two species in the Peak District has not been assessed previously and it is therefore difficult to draw any inference about the changes in populations which might have occurred. The high moors contain few species so have attracted few birdwatchers and the difficult terrain and the size of the area involved would have precluded a survey in pre-motorcar days. There are some comments in county bird reports which cover the Peak District; to aid a comparison, table 3 shows an approximate allocation of the breeding pairs to counties, though this is somewhat artificial because territories are often distributed along the very ridges which form the county boundaries. R. A. Frost has very kindly extracted for me notes published in the Annual Report of the Derbyshire Archaeological Society (1934-1954), and made available other comments from private correspondence.

Table 3 Approximate distribution of breeding pairs of Golden Plover *Pluvialis apricaria* and Dunlin *Calidris alpina* by (pre-1974) counties, to facilitate comparisons with county bird reports. Several pairs which breed along the county boundaries have been arbitrarily allocated. Based on "maximal counts" (see text) so perhaps 10% "optimistic" estimates for the three main counties.

	Derby.	Yorks.	Cheshire	Staffs.	Lancs.	Total
Golden Plover	195	158	71	6	2	432
Dunlin	67	61	26	—	1	154

Golden Plover were recorded by Coward (1910) nesting in small colonies in Longdendale and east of Macclesfield, and Bell (1962, 1967) reported essentially the same position. The present Cheshire population, about 70 pairs, suggests perhaps that the bird is more numerous, but this can almost certainly be put down to more thorough coverage. For Staffordshire, Smith (1938) reported a very few pairs nesting in the north of the county, which is consistent with Lord and Munns (1970) and the present survey. It is a little difficult to know what to make of reports of them breeding in fields near Alstonefield up to 1936 and in large numbers near Longnor in 1940. These records may both refer to the moors north of Leek (though the "large numbers" are quite inconsistent with other reports) or they might be pre-breeding flocks. Nelson (1907) regarded it as sparingly distributed on the south-west moors of Yorkshire. For Derbyshire, Whitlock (1893) considered the bird to be quite numerous on the moors in the Peak District, which seems to match the results of the present survey and current species heading in Amedro (1974) that the species is rare on the eastern moors, but more common on the northern moors. However Parslow (1967) writes that "relatively small numbers still breed on the Pennines south to Derby and north Stafford, but these, too, are currently thought to be decreasing". The evidence of a decrease is presumably that included in the notes supplied by R. A. Frost; in particular, about 20 pairs were reported nesting on Abney Moor in 1941 and about 12 pairs in 1944, but this population declined to extinction in 1952 (H. C. B. Bowles). Though not quantified, there are reports of a decline on the moors around the Derwent Valley at about the same time (E. H. Peat) and a few birds bred on Beeley Moor up to 1959 but not since (P. Shooter). It seems probable that this decline has affected particularly pairs which would have nested on areas of burnt *Calluna*, a habitat specifically mentioned in the case of the Abney Moor population. Picozzi (1971) has pointed out that moor burning in the Peak District is not as well executed as in Scotland and a decline in the numbers of gamekeepers as well as overgrazing by sheep has also been documented (Yalden 1972). It seems reasonable to conclude that the apparently large Golden Plover population recorded for the Peak District in this survey is in fact simply a result of the large area of suitable terrain, quite consistent with the earlier reports of a sparse population; and that the population has certainly declined locally where habitat changes have occurred. The evidence for a more general decline is not good, though this remains a possibility. There appear to be no other published density figures for this species, but M. E. Greenhalgh (pers. comm.) reports similar densities on similar habitats further north in the Pennines.

Dunlin were not known by Coward (1910) to breed on the Cheshire moors but Bell (1967) was able to report about five pairs breeding on three different moors in Longdendale. It has never been recorded breeding in Staffordshire, though it breeds very close to the county boundary. In Yorkshire, Nelson (1907) reported it breeding southward along the Pennines to the Sheffield region and in fact the earliest nesting record of the species in the Peak District came from the Hallam Moors in 1901. For Derbyshire, Whitlock (1893) suspected that it bred nearby, either in the north of the county or on the Wirral, but it was not until 1935 that breeding in the county was proved. From then to 1950 the county bird reports contain references to one or two pairs in most years, with the exceptional observation in 1942 that there was only one pair on the Derwent Moors in place of the usual twelve or so (E. H. Peat). In 1950 J. Armitage noted that several pairs bred regularly in the north-west of the county; in 1956 six pairs were located and in 1959 one report suggested about six pairs on one moor in May and twelve pairs in late June. (This latter is rather late in the breeding season and might have been an aggregation of postlaying females.) Even so, the species is still categorised as a scarce breeding bird in the county report and one wonders whether there might be a combination of better coverage with a genuine increase in numbers. R. A. Frost (pers. comm.) considers that there has been a genuine increase in numbers and points out that the older generation of egg collectors would surely have found at least some nests if the bird had been as common in 1900 as it is now. In support of this view, Soikkeli (1967) reported the species to be increasing its numbers and range in Finland and elsewhere around the Baltic. On the other hand Bell (1967) felt that the species had been overlooked in Cheshire and this is surely the main factor. Parslow (1967) considered the species to be declining, but this was a conclusion reached primarily on the coastal populations and he was forced to admit that there was little evidence on the status of the moorland colonies. Although the population is more sparse than that of the Golden Plover there is, again, a large area of ground available. Further north in the Pennines, M. E. Greenhalgh (pers. comm.) finds the density of Dunlin rather lower, but considers the terrain rather drier than the Peak District; in coastal Lancashire he also reported a density of $1/km^2$ (Greenhalgh 1969). Even so, the density of about $1.5/km^2$ which was recorded in the Peak District barely compares with densities recorded elsewhere; on the Alaskan tundra, Holmes (1966b) reported densities equivalent to 10-20 pairs/km^2, and Soikkeli (1967) had about 25 pairs on 60 hectares of coastal meadow in Finland, 41 pairs/km^2.

In the light of this survey the future of both species in the Peak District seems fairly secure and Parslow's (1967) comments somewhat pessimistic. In certain places main footpaths, particularly the Pennine Way, cross areas of prime breeding habitat and disturbance or, worse, erosion of the peat after the *Eriophorum* has been trampled to death, could lose some pairs, especially of Dunlin. However, so long as some of the ridges remain relatively uneroded, even the Dunlin will continue to breed in reasonable numbers.

Summary

The moorland areas of the Peak District National Park have been surveyed on a one-kilometre square basis for territorial Golden Plover and Dunlin. Golden Plover breed in about 200 such squares, and the breeding population is estimated to be 380-400 pairs. Dunlin breed in about 90 squares, and about 140 pairs are present. Dunlin are closely tied to wetter areas of cottongrass *(Eriophorum)* moss, but Golden Plover show a more catholic habitat, occupying most areas of cottongrass, including drier parts, and also patches of burnt *Calluna* and *Empetrum-Vaccinium* heath. Historical evidence on the status of the two species is not good; the difficult terrain has evidently caused both to be seriously overlooked. The Golden Plover has declined locally but its main population has probably been fairly stable and Dunlin may have increased somewhat in numbers since 1900.

Acknowledgements

Several members of the Derbyshire Ornithological Society have contributed records and the detailed coverage of their areas by D. Alsop, G. Howe and R. A. Frost is particularly appreciated. P. Shooter and R. A. Frost have also helped considerably with the historical aspects of this survey and I am grateful to M. E. Greenhalgh for discussion of his work on waders in the Pennines. I thank all the above, also J. E. Robson and Mrs. A. Shaw, for their comments on the first draft of this paper.

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THE CLADOCERAN *MOINA BRACHIATA* (JURINE) AND THE COPEPOD *CYCLOPS FURCIFER* CLAUS IN YORKSHIRE

GEOFFREY FRYER

On July 22nd 1973 I collected what in Britain are two uncommon crustaceans in each of two small adjacent ponds at Fir Tree Farm, near Spaldington, East Yorks. These are so little known in this country that the following notes are appropriate.

The cladoceran *Moina brachiata* (Jurine) — usually recorded as *M. rectirostris*, a name shown by Goulden (1968) to be invalid — is a warm-water Palaearctic and Ethiopian species which in Europe reaches the northern limits of its range in Britain, Central Sweden and Finland. Although further north than the British localities the two last-mentioned areas enjoy warmer summers. There are few published records for Britain and most of these are for the southern part of the country, including S. Wales. The only record for Northern England that I have located is that of Brady (1898) who found it near Brampton, Cumberland, in July 1897. I found it myself several years ago at what is actually a slightly lower latitude in Southern Scotland, from which country it has not previously been recorded (see below). Here it occurred in one (and only one) of several pools not far from the sea at Preston Sea Merse, Kirkcudbrightshire, in which I searched unsuccessfully for the rare notostracan *Triops cancriformis* (Bosc) that has been found intermittently in the area. A record for North West Scotland made by an undergraduate expedition (Dutton 1965) must be discounted. This, like a record of *Daphnia magna* Straus, is from a completely unsuitable habitat and is one of several clearly erroneous identifications — including even a marine copepod from a freshwater loch — in a list that includes several mis-spelled names.

M. brachiata is a species of small, shallow, often temporary, pools of various kinds. It particularly favours situations that are enriched by organic matter, in which it often develops in such numbers as to be important in the "self purification" of polluted waters and as a source of food in fish ponds devoted to intensive carp culture.

The copepod *Cyclops furcifer* Claus has hitherto been reported in Britain only from three small ponds near Marlborough, Wilts. (Lowndes 1926) and from a disused quarry at Bayworth, near Oxford (Gurney 1933). Its wider distribution includes the whole of Europe, whence it extends eastwards to Siberia, and North Africa.

Although situated within a few yards of each other the ponds referred to here differed markedly and had strikingly different crustacean faunas though *M. brachiata* and *C. furcifer* were common to both. One (A) consisted of the foul muddy remnant of an older, deeper, farm pond, now deliberately drained, where the water was nowhere more than about three inches deep and usually much less, whose bottom was composed of soft mud pock-marked by trampling cattle, and from which vegetation was completely absent. Where undisturbed the water was clear. Its pH was 8.3 but no chemical analyses are available. Its location, and analyses from elsewhere in the area, however, suggest a high level of nutrients. The other pond (B), only 10 or 12 yards distant at its nearest point, was a flooded grassy hollow, probably always wet and now filled by recent rain but still only a few inches deep in most places and perhaps not exceeding a foot or so anywhere. Its water, much fouled by cattle, of which many were present in the field, was brown in colour and had a pH of 6.8.

Dispersal of elements common to both ponds, especially those which possess resting stages, as does *Moina*, or can resist drought, as can *C. furcifer*, is easily accounted for by the peregrinations of cattle, but the striking feature of the two ponds, apart from the presence of the two rare species recorded here, was the difference in their crustacean faunas and the surprising richness of pond B which contained several unexpected, though common, species. Those recorded were:

Pond A

Cladocera
- *Moina brachiata*
- *Daphnia obtusa*

Copepoda
- *Cyclops furcifer*
- *Eucyclops agilis*
- *Acanthocyclops viridis*

Ostracoda
- *Heterocypris incongruens*

Pond B

Cladocera
- *Moina brachiata*
- *Daphnia obtusa*
- *Daphnia curvirostris*
- *Daphnia longispina*
- *Simocephalus exspinosus*
- *Ceriodaphnia laticaudata*
- *Chydorus sphaericus*
- *Pleuroxus aduncus*

Copepoda
- *Cyclops furcifer*
- *Acanthocyclops bisetosus*
- *Acanthocyclops bicuspidatus*
- *Acanthocyclops viridis*
- *Eudiaptomus gracilis*

Ostracoda
- *Heterocypris incongruens*
- *Cypria ophthalmica*
- *Cyclocypris laevis*
- *Cyclocypris ovum*

Apart from the two rarities the fauna of pond A was much as might have been predicted but the assemblage in pond B presents several peculiarities. Among its unanticipated wealth of species were those such as *Daphnia longispina* O. F. Müller and *Eudiaptomus gracilis* (G. O. Sars) which, while common, are generally to be found in more open situations and in perennial waters. Their presence may indicate temporary inflow from another source but, while no search for such was made, there were no apparent indications of such inflow. The presence of no fewer than three species of *Daphnia* in such a confined situation is also somewhat unexpected. It may also be mentioned that while, when I first found *Pleuroxus aduncus* (Jurine) in this area, the fact was thought to be worth placing on record as this species is known particularly from Southern and Eastern England (Fryer 1953), it now proves to be common in East Yorkshire for which area I have several records.

In both ponds *M. brachiata* was the most abundant of the swimming cladocerans and in both active parthenogenetic reproduction was taking place. Several specimens of *C. furcifer* were collected from both ponds but in neither was it abundant. Breeding was in progress. In Europe it is mostly a winter species occurring particularly between October and June (Dussart 1969) and its activity in July in Northern England may reflect climatic differences between here and the Continent. Alternatively it is possible that a rainy period such as had just been experienced had stimulated the recovery of dormant individuals, for continental reports reveal this as a species with a predilection for shallow temporary waters and the previous records for Britain are for pools that dry up in summer. Its remarkable drought-resisting ability was demonstrated by Roy (1932). Too much significance should not be attached to seasonal breeding patterns of pond-dwelling cyclopoids, however, as these seem often to vary according to local conditions. Thus I have frequently found *Cyclops strenuus* Fischer, a common relative of *C. furcifer*, reproducing in summer though it is reputedly a predominantly winter breeder.

Structurally members of both populations of *C. furcifer* were typical and could be easily picked out by their striking orange colour. This was cuticular but was enhanced by the many bright orange oil droplets that were present in the cephalothorax.

Although *C. furcifer* is probably truly rare in Britain it so happened that I encountered it in another locality on July 25 1973, namely in a grassy field pool opposite Marston Moor Farm, near Long Marston, West Yorks. This was similar in character to the grassy pool near Spaldington but was deeper and had obviously been much increased in size by recent rain, many grasses, buttercups and other terrestrial plants being submerged. The water was brown but clear and much polluted by pigs and perhaps cattle. No chemical data were obtained. Culicine mosquito larvae were abundant. The crustacean fauna contained several of the species present in the grassy pond at Spaldington but was less diverse, the following being found:

Cladocera
- *Daphnia obtusa*
- *Chydorus sphaericus*

Ostracoda
- *Eucypris virens*

Copepoda
- *Cyclops furcifer*
- *Acanthocyclops bisetosus*
- *Acanthocyclops bicuspidatus*
- *Canthocamptus staphylinus*

Only two individuals, a male and a female, of *C. furcifer* were found in the collection, which was preserved in the field so their presence was not immediately revealed. The female, much burdened by protozoans, was typical in all respects save that its furcal rami were only 6.25 times as long as wide. Kiefer (1929) gives the range as 7 to 8, Gurney (1933) as 8 to 9, and Dussart (1969) as 7 to 9, but Lindberg (1957) gives it as 6 to 9 and Lowndes (1932) began some of his breeding experiments with a female in which the ratio was only 6.66 : 1 and whose offspring included females in which it was as low as 4.66 : 1. In other experiments individuals with a ratio of as little as 5.7 : 1 were derived from a female with a ratio of 8 : 1. It therefore appears that the furcal rami are more variable in proportions, and can be somewhat shorter, than most monographs suggest. The female, incidentally, had a spine formula of 2. 3. 3. 3., which is almost never found in *C. strenuus*, the species with which confusion might arise. The male confirmed the identification.

I am grateful to Mr. J. T. Dealtry, who introduced me to the Spaldington ponds, for so doing and for information on East Yorkshire habitats in general.

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The Cairngorms, Their Natural History and Scenery by **Desmond Nethersole-Thompson** and **Adam Watson.** Pp. 286 with 7 colour and 36 monochrome plates. Collins, 1974. £3.50

Mention of the Cairngorms calls to mind in most people a high nountainous area in north-eastern Scotland inhospitable in winter, often dangerous at other times, now the centre of winter sports in Scotland. Naturalists and rock climbers of experience know differently and yet treat the area with respect and as can be seen by readers of this book, with affection and thought for the future. The two joint authors are well known ornithologists with years of research to their credit and with the assistance of others treat the birds, beasts and plants in a thorough manner. Besides the mainly granite mass of the Cairngorms proper, which embrace in their bounds four of the five highest mountains in Scotland, the area considered extends to Lochnagar, Glen Tilt and hills on Deeside on Moine and Dalradian schists. Granite is not thought to produce a rich subsoil for the alpine plants one associates with Ben Lawers, but the names of many plants included by Dr. D. Ratcliffe in his masterly exposition on the vegetation in Chapter 3 dispels that view. The inliers of base-rich rock in the vicinity of Glen Feshie and Glen Avon account for some very interesting plant occurrences.

There are chapters on the work of various naturalists who have observed and recorded during the last 200 years and on the human history of the area since the earliest times. The bird photographs emphasize the general excellence of the text. Chapters 11 and 12 on conservation and the future spell out a warning as to what will happen to the general wildness of the Cairngorms if the schemes for roads, chair lifts and bulldozed tracks up to above the 3,000′ level ever become a reality. It is shocking to read of the litter now to be seen even on the summit of Ben Macdhui; I never saw any there 40 years ago. The book ends with five chapters as appendices on special subjects and over 12 pages of bibliography, a testimony to the regard felt for the Cairngorms group by many naturalists and mountaineers. The dedication is to Seton Gordon, a friend of the Cairngorms for 70 years or more. The preface by Prof. V. C. Wynne-Edwards and the introduction are as enjoyable to read as the chapters that follow. All in all a book to be read again and again by all lovers of the most extensive mountain group in Scotland. E.C.W.

The Macro-lepidoptera of Spurn Head, E. Yorkshire
Check List with Notes

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It is 20 years since the last checklist of the Lepidoptera of the Spurn Peninsula was published (Hincks *et al.* 1951-54) and because of much recent work the time has come to bring it up to date, so far as the Macro-lepidoptera are concerned.

Generally the area covered coincides with the boundaries of the nature reserve established and owned by the Yorkshire Naturalists' Trust Ltd., but a handful of exceptionally interesting records from the hinterland around Kilnsea have been included.

We have chosen 1947 as the starting point for our list because that was when the late W. D. Hincks, H. N. Michaelis and others began their systematic study of the entomology of Spurn, establishing a tradition of invertebrate survey work which continues today. Visits were made every year until 1953 and occasionally thereafter. The main list and first supplement were published in *The Naturalist* between 1951 and 1954 and were later bound and published as a single separate with the title "The Entomology of Spurn" (entomology here receiving one of its broader definitions, as a list of mammals was included!). The usefulness of this document has not been diminished by the passage of time and it remains a tribute to the hard work and dedication of those who compiled it. One of its most useful features is the introductory account by G. H. Ainsworth of the habitats and ecology of Spurn, prior to the 1953 floods. A second supplement to the list appeared in *The Naturalist* in 1962. So far as the Macro-lepidoptera were concerned 182 specimens were listed and much information on distribution and larval food plants was given. Lepidoptera were not, however, worked as thoroughly as some other groups and it was clear to those taking part that many species had been missed, particularly those occurring only in spring and autumn. Twelve new species were added between 1953 and 1969, in which year we began an intensive recording campaign, using light traps. This has added another 108 Macro-lepidoptera to the list, making a grand total for 1947-1974 of 302. With the British total standing at 861 (the totals are for species listed in Kloet & Hincks, 2nd edition, *excluding* introduced aliens and the like denoted by asterisks) this means that about 35% of the British Macro-Lepidoptera have occurred at Spurn since 1947. On an area of 280 acres, without any woodland habitats and well to the north of the known range of a great many British species, this seems a very large figure. Many of these species have very specialised habitat requirements and therefore careful conservation of habitat resources is very much the order of the day. For example, *Cucullia asteris* (Starwort) feeds, at least in the north, only on Sea Aster growing along estuary margins and the drier parts of salt marshes. Such areas on Spurn are prone to damage from oil pollution and we are fortunate that the frequent oil spills the reserve has experienced in recent years have not apparently affected the *asteris* population (unlike that of the rare woodlouse *Armadillidium album*, which has not been seen on Spurn since an oil spill three years ago).

One of the smallest and most interesting habitats on Spurn is the *Phragmites* marsh by the Warren. Less than one acre in extent, it supports a number of notable moths, *Simyra albovenosa*, (Reed Dagger) discovered in 1970, occurs here in its only known northern locality; *Mythimna straminea* (Southern Wainscot), *M. obsoleta* (Obscure Wainscot) and *Chilodes maritimus* (Silky Wainscot) occur in only a handful of other Yorkshire localities, while *Rhizedra lutosa* (Large Wainscot) and *Arenostola phragmitidis* (Fen Wainscot) are also of interest. The occurrence of *albovenosa* so far to the north of its other sites suggests the possibility that the *Phragmites* bed on Spurn is a relict of a vast marsh that might once have been continuous with the Norfolk Broads in an age when the sea level was a good deal lower than it is now. For the moment, this is no more than speculation. Whatever the explanation, it is odd that *albovenosa* has not been found in other *Phragmites* areas nearby. It should be looked for intensively in the other reed beds along the Humber Shore and also further afield, around Hornsea Mere. This is particularly important because at the present time there is some concern over the future of the Spurn reed bed, due to rapid erosion of the North Sea shore, to the extent that the sea is now only separated from the marsh by a few metres of higher ground. In stormy conditions the sea already washes into the marsh at high water, and if this happens with encreasing frequency in the future, the *Phragmites* is likely to become stunted and less able to support populations of the moths mentioned above. The cost of sea defences is enormous, but sometime soon it may become clear that the only way to conserve one of Spurn's most important habitats is to build new sea walls and/or groynes.

Considerable habitat changes have occurred since 1947, as a result of the 1953 floods, the changing fortunes of the rabbit population, the spread of Sea Buckthorn and increasing human impact, one aspect of which is visiting by the general public. This last problem is the subject of a recent paper by Usher, Pitt and de Boer (1974). It is pleasant to report that in spite of all the turmoil and change the notable Spurn species which were well established in 1947 are still present in gool numbers and other residents have been discovered. The only likely residents of 1947 which have not been seen in recent years are *Euxoa obelisca* (Square-spot Dart), *Agrotis clavis* (Heart and Club), *Agrotis puta* (Shuttle-shaped Dart), *Coenobia rufa* (Small Rufous) and *Aspitates ochrearia* (Yellow Belle). Except for *A. puta*, which occurred in small numbers before 1953, each of these species was only found once, which suggests that they were not firmly established.

One particularly important feature of the Spurn Lepidoptera has yet to be mentioned, and that is the large number of species occurring nowhere else in Yorkshire. Rutherford (1971) carried out an analysis, based on the records of the Lepidoptera Committee of the Yorkshire Naturalists' Union up to 1969, into the number of species with one known breeding locality in Yorkshire. Of his total of 28 species, seven were confined to Spurn and seven to the Grassington district. Recent discoveries at Spurn and elsewhere have necessitated considerable changes to this list and of course everything depends on what one means by a "locality". In Tables 1 and 2, given below, "locality" means either a single site or a group of sites close to one another in space. For example, *Pseudopanthera macularia* occurs in both Grass Wood and Knipe Wood, which are three miles apart. These are regarded as one locality for present-purposes. In each case only those species for which there is recent evidence of an established population are admitted. The tables indicate that there are as many species (14) unique to Spurn as there are to all the other localities in Yorkshire put together. Nothing shows the significance of Spurn from the natural history point of view so strikingly — it is the uniqueness of Spurn that makes it so important in the Yorkshire context. We can only echo Rutherford's conclusions (1971) that "The Spurn Peninsula must be regarded as the most important locality in the whole County if this is to be judged by the number of unique species occurring there". In the national context it is also of great interest because of the curious mixture of species present and in being the most northerly locality for a number of species such as *Cucullia asteris* (Starwort), *Idaea emutaria* (Rosy Wave) and *Eupithecia extensaria* (Scarce Pug).

In the checklist, the order and nomenclature followed is that of the 2nd edition of Kloet and Hincks "Check List of British Insects", part 2, Lepidoptera, 1972 (Published by the Royal Entomological Society of London). All authors' names are given in full except for Denis and Schiffermüller (D. & S.) and Linnaeus (Linn.). In our list we have given, for moths, first and last dates recorded for each species, from trapping records kept between 1969 and 1973. Where two broods are easily separable we have given dates for each. For butterflies we have had to make do with less precise information and months only have been given. Symbols are used to indicate *probable* status, thus: R = resident; SR = scarce resident; M = migrant; SM = scarce migrant; V = vagrant; FR = former resident (i.e. prior to 1947). "M" is only used where a species is well known as a migrant from published accounts. Species of occasional occurrence, not known to be migrant and not thought to be

1.	*Scopula imitaria*	Small Blood Vein
2.	*Scopula emutaria*	Rosy Wave
3.	*Idaea fuscovenosa*	Dwarf Cream Wave
4.	*Epirrhoe rivata*	Wood Carpet
5.	*Eupithecia extensaria*	Scarce Pug
6.	*Agrotis ripae*	Sand Dart
7.	*Noctua interjecta*	Least Yellow Underwing
8.	*Mythimna litoralis*	Shore Wainscot
9.	*Cucullia asteris*	Starwort
10.	*Simyra albovenosa*	Reed Dagger
11.	*Apamea oblonga*	Crescent Striped
12.	*Photedes elymi*	Lyme Grass
13.	*Eremobia ochroleuca*	Dusky Sallow
14.	*Amphipoea fucosa*	Saltern Ear

Table 1. Species for which the Spurn Peninsula and its hinterland constitute the only known breeding locality in Yorkshire.

1.	*Idaea muricata*	Purple Bordered Gold	Thorne Waste
2.	*Idaea emarginata*	Small Scallop	Strensall
3.	*Perizoma taeniatum*	Barred Carpet	Grassington
4.	*Perizoma minorata*	Heath Rivulet	Grassington
5.	*Anticollix sparsata*	Dentated Pug	Askham Bog
6.	*Discoloxia blomeri*	Blomer's Rivulet	Scarborough
7.	*Trichopteryx polycommata*	Barred Tooth Striped	Grassington
8.	*Epione parallelaria*	Dark Bordered Beauty	Strensall
9.	*Pseudopanthera macularia*	Speckled yellow	Grassington
10.	*Clostera pigra*	Small Chocolate Tip	Strensall
11.	*Cerastis leucographa*	White Marked	Bishop Wood
12.	*Orthosia populeti*	Lead-coloured Drab	Bishop Wood
13.	*Polymixis flavicincta*	Yellow-ringed Carpet	Grassington
14.	*Photedes captiuncula*	Least Minor	Grassington

Table 2. Other species for which there is only one known breeding locality in Yorkshire.

breeding on the Peninsula are regarded as vagrants "V". The symbol "SS" (for Spurn species) denotes a species listed in Table 1, while "N" indicates that Spurn is at, or very near, the northern limit of breeding range. We wish to emphasize that where only one or two records are available the status given is highly provisional. It may be, for example, that *Eilema complana* (Scarce Footman), *Polia bombycina* (Pale Shining Brown), *Idaea marginepunctata* (Mullein Wave), *Mesotype virgata* (Oblique Striped) and *Semiothisa alternaria* (Sharp Angled Peacock) are all scarce residents rather than vagrants (in which case they would, of course, considerably augment the list in Table 1). It should be noted that status categories, given in this list, are in some cases different from those given in the checklist published in the Spurn Bird Observatory report for 1973. As with other changes, the present list should be regarded as being the less provisional.

Where there remain doubts as to identity the fact is noted, but no difficult species have been included unless there is very good reason to think that the identification is correct. In most such cases identity has been confirmed by genitalia examination, as stated. Shared dates are given for species difficult to separate in the field.

ACKNOWLEDGEMENTS

We should like to thank all those members of the Spurn Bird Observatory who have so carefully recorded trap catches and R. H. Poland for his detailed work in 1972. Helpful advice has been received from S. M. Jackson and other members of the Y.N.U. Lepidoptera Committee and we are particularly grateful to H. N. Michaelis for drawing our attention to the 1962 Supplement and for supplying details of further species recorded in 1963. We gratefully acknowledge the support of the Rothamsted Insect Survey, the Yorkshire Naturalists' Trust and the Department of Pure and Applied Zoology, University of Leeds, in supplying moth traps. Thanks are also due to the Rothamsted Insect Survey for help with some of the identifications.

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HEPIALIDAE

Hepialus humuli (Linn.) Ghost Moth. R; 18.vi — 7.viii.
Hepialus sylvina (Linn.) Orange Swift. R; 27.vii — 7.ix.
Hepialus lupulinus (Linn.) Common Swift. R; 22.v — 15.vii.
Hepialus fusconebulosa (DeGeer) Map-winged Swift. SR; 6.vi — 9.viii.

ZYGAENIDAE

Zygaena filipendulae (Linn.) Six-spot Burnet. R; vii.
Zygaena lonicerae (Scheven) Narrow-bordered Five-spot Burnet. R; vii Genitalia examination is needed to separate from *Z. trifolii*, but the latter probably does not occur in Yorkshire.

HESPERIIDAE

Ochlodes venata (Bremer and Grey) Large Skipper. SR; vi — vii.

PAPILIONIDAE

Colias croceus (Geoffroy in Fourcroy) Clouded Yellow. SM; viii — ix. Hardly seen in recent years.
Gonepteryx rhamni (Linn.) Brimstone Butterfly. V; one in 1968 and three on 4.ix.73. *N.*
Pieris brassicae (Linn.) Large White. M; v — vi/vii — ix. A notable migrant at Spurn, sometimes travelling along the peninsula in a steady stream.
Pieris rapae (Linn.) Small White. R & M; iv — vi — ix.
Pieris napi (Linn.) Green-veined White. R & M; v — vi/vii — viii.
Anthocharis cardamines britannica (Verity) Orange Tip. V; vi.64 and 11.vi.73.

LYCAENIDAE

Lycaena phlaeas eleus (Fabricius) Small Copper. SR; vi — viii.
Polyommatus icarus icarus (Rottemburg) Common Blue. R; vi—vii. Not very common.
Celastrina argiolus (Linn.) Holly Blue. V; once, 25.vii.71.

NYMPHALIDAE

Vanessa atalanta (Linn.) Red Admiral. M; vi — x. Often to be seen making its way south along the peninsula in autumn. On 4.ix.73 several thousand arrived from the east between 1200 and 1600 hrs., with ten times as many *A. urticae.*
Cynthia cardui (Linn.) Painted Lady. M; vi — x. Much less common than *V. atalanta*, mass movements not noted.
Aglais urticae (Linn.) Small Tortoiseshell. R & M; iv — vi/vii — x.
Inachis io (Linn.) Peacock. V; viii — ix.

SATYRIDAE

Lasiommata megera (Linn.) Wall Butterfly. R; v — vi/vii — viii.
Pyronia tithonus (Linn.) Gatekeeper. R; vii — viii. *N.*
Maniola jurtina (Linn.) Meadow Brown. R; vi — ix.
Coenonympha pamphilus pamphilus (Linn.) Small Heath. R; vi — vii/viii.

LASIOCAMPIDAE

Aphantopus hyperantus (Linn.) Ringlet. R; vii — viii.

Poecilocampa populi (Linn.) December Moth. R; 28.xi — 11.xii.

Trichiura crataegi (Linn.) Pale Oak Eggar. SR/V; 12.ix.70.

[*Eriogaster lanestris* (Linn.) Small Eggar. The record in the Provisional Atlas of the Biological Records Centre (1973) is erroneous.]

Malacosoma neustria (Linn.) Lackey. R; 6.vii — 26.viii. Spurn is the headquarters of this species in Yorkshire. *N.*

Lasiocampa quercus quercus (Linn.) Oak Eggar. R; 5.vii — 26.viii. To be seen flying in sunshine round the tip of the peninsula.

Philudoria potatoria (Linn.) Drinker. R; 8.vi — 20.ix.

DREPANIDAE

Cilix glaucata (Scopoli) Chinese Character. R; 24.v. — 28.v/21.vii — 3.ix.

THYATIRIDAE

Thyatira batis (Linn.) Peach Blossom. SR; 4.vii — 7.vii.

Habrosyne pyritoides (Hufnagel) Buff Arches. R; 26.vi — 1.viii.

Tethea ocularis (Linn.) Figure of Eighty. V; 29.vi.71. A further step in the northern spread of this species. *N.*

GEOMETRIDAE

Alsophila aescularia (D. & S.) March Moth. SR; 15.ii — 16.ii.

Pseudoterpna pruinata (Walker) Grass Emerald. SR/V; 20.viii.72.

Hemithea aestivaria (Hübner) Common Emerald. R; 6.vii — 24.viii.

Timandra griseata (Petersen) Blood-vein. R; 15.vi — 13.vii/9.viii — 12.ix.

Scopula marginepunctata (Geeze) = *conjugata* (Borkhausen) Mullein Wave SR/V; 16.viii.72. SS?

Scopula imitaria (Hübner) Small Blood-vein. R; 9.vii — 14.viii, SS, *N.*

Scopula emutaria (Hübner) Rosy Wave. R; 20.vi — 17.viii. SS, *N.*

Idaea biselata (Hufnagel) Small Fan-footed Wave. R; 16.vii — 9.viii.

Idaea fuscovenosa (Goeze) = *interjectaria* sensu Herrich-Schäffer Dwarf Cream Wave. R; 30.vi — 26.vii. SS.

Idaea seriata (Schrank) Small Dusty Wave. R; viii.49 and probably viii.71, but flew off before it could be confirmed.

Idaea dimidiata (Hufnagel) Single-dotted Wave. R; 19.vi — 7.ix.

Idaea aversata (Linn.) Riband Wave. R; 20.vi — 23.ix.

Mesotype virgata (Hufnagel) Oblique Striped. SR/V; once, 12.viii.69. Spurn is a suitable locality and it may become established here, SS? — 3.ix.

Orthonama obstipata (Fabricius) Gem. SM; 4.ix — 25.x.

Xanthorhoe spadicearia (D. & S.) Red Twin-spot Carpet. R; 24.v — 30.v/24.vii — 24.viii.

Xanthorhoe ferrugata (Clerck) Dark-barred Twin-spot Carpet. R; 6.v — 28.vi/18.vii — 3.ix.

Xanthorhoe montanata montanata (D. & S.) Silver-ground Carpet. R; 31.v — 31.vii.

Xanthorhoe fluctuata fluctuata (Linn.) Garden Carpet. R; 10.v — 17.ix.

Scotopteryx chenopodiata (Linn.) Shaded Broad-bar. R; 17.vii — 28.viii.

Scotopteryx luridata plumbaria (Fabricius) July Belle. SR; 6.vii — 8.vii.69. The dates strongly suggest that this is not *mucronata* (Scopoli), but genitalia have not been checked.

Epirrhoe alternata alternata (Müller, O.F.) Common Carpet. R; 7.vii — 4.ix.

Epirrhoe rivata (Hübner) Wood Carpet. R; 20.vi — 27.vii. A well established colony, SS.

Epirrhoe galiata (D. & S.) Galium Carpet. R; 24.vi — 18.vii.

Camptogramma bilineata (Linn.) Yellow Shell. R; 23.vii — 22.viii.

Larentia clavaria (Haworth) Mallow. SR; 17.ix — 11.x.

Anticlea badiata (D. & S.) Shoulder Stripe. R; 26.iii — 2.vi.

Pelurga comitata (Linn.) Dark Spinach. R; 9.vii — 13.viii.

Lampropteryx suffumata (D. & S.) Water Carpet. R; 2.v — 24.v. Normally a woodland species, and very local at that. There are no other V.C.61 localities.

Cosmorhoe ocellata (Linn.) Purple Bar. R; 6.vi — 22.viii.
Eulithis testata (Linn.) Chevron. R; 9.viii — 30.ix.
Eulithis pyraliata (D. & S.) Barred Straw. R; 21.vi — 16.viii. Recorded as *Lygris dotata* in Hincks (1951-54).
Ecliptopera silaceata (D. & S.) Small Phoenix. SR/V; 12.viii.73.
Chloroclysta miata (Linn.) Autumn Green Carpet. R; 21.ix — 10.x. A strange locality for this species, which is otherwise found in the hills. Provisional identification.
Chloroclysta truncata (Hufnagel) Common Marbled Carpet. R; 7.vi — 18.vii/28.viii — 10.x.
Cidaria fulvata (Forster) Barred Yellow. R; 10.vii — 16.viii.
Colostygia pectinataria (Knoch) Green Carpet. SR/V; vii.63 and 8.vi.71.
Hydriomena furcata (thunberg) July Highflyer. R; 8.vii — 25.viii.
Epirrita dilutata (D. & S.) November Moth. R; 9.x — 22.x. Provisional identification, genitalia not checked.
Operophtera brumata (Linn.) Winter Moth. R; 12.x — 15.i. Defoliates large patches of Sea Buckthorn in some years.
Perizoma alchemillata (Linn.) Small Rivulet R; 18.vii — 14.viii.
Perizoma bifaciata (Haworth) Barred Rivulet. R; 27.vii — 11.viii.
Perizoma albulata (D. & S.) Grass Rivulet. R; 31.v — 19.vii.
Perizoma didymata (Linn.) Twin-spot Carpet. V; once, vii.63. H. N. Michaelis.
Eupithecia linariata (D. & S.) Toadflax Pug. SR; 18.vii — 25.viii.
Eupithecia pulchellata (Stephens) Foxglove Pug. V; vii.63. H. N. Michaelis.
Eupithecia venosata (Fabricius) Netted Pug. V; not recent, vii.48.
Eupithecia centaureata (D. & S.) Lime-speck Pug. R; 26.v — 9.viii/3.ix — 7.ix.
Eupithecia absinthiata (Clerck) Wormwood Pug. R; not (confirmed) recent. At light 1948, larvae 1949.
Eupithecia vulgata (Haworth) Common Pug. R; provisional identification.
Eupithecia tripunctaria (Herrich-Schaffer) White-spotted Pug. R; vi.47. Not positively confirmed since, but most probably present.
Eupithecia icterata (Haworth) Tawny Speckled Pug. R; 9.vii — 28.viii.
Eupithecia succenturiata (Linn.) Bordered Pug. R; 4.vii — 14.viii.
Eupithecia simpliciata (Haworth) = *subnotata* (Hübner) Plain Pug. R; 13.vii — 9.viii. Provisional identification.
Eupithecia pimpinellata (Hübner) Pimpinel Pug. R; vi — vii. Provisional identification. *N.*
Eupithecia nanata (Hübner) Narrow-winged Pug. V; 18.vi.70.
Eupithecia extensaria (Freyer) Scarce Pug. SR; 10.vi — 12.vii. This species, which feeds on Sea Wormwood, was first described as British from a specimen taken at Spurn about 1870. Since then it has been found in other seaboard counties to the south. It seems well established on the peninsula but adults, at least, are seldom seen, SS, *N.*
[*Eupithecia innotata* (Hufnagel) Angle-barred Pug. Larvae most probably of *E. fraxinata*, from Sea Buckthorn, originally recorded as this species (*Ent. Rec.* 1961 *73:* 210, 261).]
Eupithecia fraxinata (Crewe) Ash Pug. R; 24.vi — 11.vii/9.viii — 14.ix.
Eupithecia virgaureata (Doubleday) Golden-rod Pug. ?R; not confirmed recently, vii.50.
Chloroclystis v-ata (Haworth) V-Pug. SR; 27.vi — 9.viii.
Chloroclystis rectangulata (Linn.) Green Pug. R; 9.vii — 19.vii.
Gymnoscelis rufifasciata (Haworth) Double-striped Pug. R; 1.viii — 9.viii.
Odezia atrata (Linn.) Chimney Sweeper. SR; vi.47. common. Only one record since, vi.69.
Asthena albulata (Hufnagel) Small White Wave. V; once, 20.vi.70.
Abraxas grossulariata (Linn.) Magpie. R; 16.vii — 17.viii.
Semiothisa alternaria (Hübner) Sharp-angled Peacock. SR/V; 1949 and 10.vi.70, not known elsewhere in Yorkshire, SS, *N.*

Semiothisa clathrata Latticed Heath. R; 22.v — 6.vi/13.vii — 18.ix.
Semiothisa wauaria (Linn.) V-moth. SR; 31.vii — 1.viii.
Petrophora chlorosata (Scopoli) Brown Silver-lines. V; 24.v — 1.vi.
Plagodis dolabraria (Linn.) Scorched Wing. V; 25.vi.70.
Opisthograptis luteolata (Linn.) Brimstone Moth. R; 26.v — 23.viii.
Ennomos alniaria (Linn.) Canary-shouldered Thorn. R; 10.viii — 11.x.
Ennomos fuscantaria (Haworth) Dusky Thorn. SR; 21.viii — 24.ix.
Selenia dentaria (Fabricius) = *bilunaria* (Esper) Early Thorn. R; 15.iv — 10.v/19.vii — 20.viii.
Odontopera bidentata Clerck) Scalloped Hazel. R; 11.v — 14.vi.
Crocallis elinguaria (Linn.) Scalloped Oak. R; 17.vii — 29.viii.
Ourapteryx sambucaria (Linn.) Swallow-tailed Moth. R; 6.vii — 30.vii.
Apocheima pilosaria (D. & S.) Pale Brindled Beauty. R; 24.ii — 12.iv.
Lycia hirtaria (Clerck) Brindled Beauty. V; 2 specimens on 29.iv.74 — the first in Yorkshire since 1902.
Biston betularia (Linn.) Peppered Moth. R; 27.vi — 27.vii. Only the melanic forms have been seen in recent years.
Agriopsis marginaria (Fabricius) Dotted Border. R; 8.iii — 11.v.
Peribatodes rhomboidaria (D. & S.) Willow Beauty. R; 4.vii — 3.ix.
Alcis repandata (Linn.) Mottled Beauty. R; 25.vi — 9.viii.
Cabera exanthemata (Scopoli) Common Wave. R; 18.vi — 24.vii.
Theria rupicapraria (D. & S.) Early Moth. R; 24.ii — 19.iii.
Campaea margaritata (Linn.) Light Emerald. SR; 8.vii — 19.vii.
Hylaea fasciaria (Linn.) Barred Red. V; 27.vi.70. Not a suitable locality although Scots Pine (the foodplant) has been planted.
Aspitates ochrearis (Rossi) Yellow Belle. V; once, 16.vi.51, found by S. M. Jackson at Kilnsea. It may possibly have been established in the Spurn area prior to the floods of 1953.

SPHINGIDAE

Agrius convolvuli (Linn.) Convolvulus Hawk Moth. SM; once, 9.ix.66.
Acherontia atropos (Linn.) Death's Head Hawk Moth. SM; once, 1.vii.51. S. M. Jackson.
Smerinthus ocellata (Linn.) Eyed Hawk Moth. SR; 22.vi — 16.vii.
Laothoe populi (Linn.) Poplar Hawk Moth. R; 1.vi — 29.vii.
Macroglossum stellatarum (Scopoli) Humming-bird Hawk Moth. SM; vi — viii.
Deilephila elpenor (Linn.) Elephant Hawk Moth. R; 2.vi — 24.vii.
Deilephila porcellus (Linn.) Small Elephant Hawk Moth. SR; 6.vi — 26.vi.

NOTONDONTIDAE

Phalera bucephala (Linn.) Buff Tip. R; 18.vi — 25.vii.
Cerura vinula (Linn.) Puss Moth. SR/V; 2.vi.70.
Eligmodonta ziczac (Linn.) Pebble Prominent. V; larvae, ix. 60 H. N. Michaelis.
Pheosia gnoma (Fabricius) Lesser Swallow Prominent. SR/V; 29.vii — 14.viii.
Pheosia tremula (Clerck) . Swallow Prominent. Sr/V; 28.vii — 28.viii.
Ptilodon capucina (Linn.) Coxcomb Prominent. R; 4.vii — 26.vii.
Diloba caeruleocephala (Linn.) Figure of Eight. R; 18.ix — 8.xi.

LYMANTRIIDAE

Orgyia antiqua (Linn.) Vapourer. R; 23.vii — 13.ix.
Dasychira pudibunda (Linn.) Pale Tussock. SR; 11.vi — 18.vi.
Euproctis chrysorrhea (Linn.) Brown Tail. V; 3 in vii.73
Euproctis similis (Fuessly) Yellow Tail. R; 6.vii — 3.ix.

ARCTIIDAE

Thumatha senex (Hübner) Round-winged Muslin. SR; 4.vii — 26.vii. The only other locality in the county is Askham Bog.

Nudaria mundana (Linn.) Muslin Footman. V; not recent, viii.49.
Eilema complana (Linn.) Scarce Footman. SR/V; once, 16.vii.70. First Yorkshire record this century. Genitalia checked. It is known across the Humber and may have wandered from there, but a small colony may exist on Spurn, SS, *N.*
Eilema lurideola (Zincken) Common Footman. R; 20.vi — 20.viii. Abundant.
Parasemia plantaginis (Linn.) Wood Tiger. V; once, mid.vii.63, H. N. Michaelis.
Arctia caja (Linn.) Garden Tiger. R; 6.vii — 2.ix.
Diacrisia sannio (Linn.) Clouded Buff. V; once, vi.47.
Spilosoma lubricipeda (Linn.) White Ermine. R; 18.v — 20.vii.
Spilosoma luteum (Hufnagel) Buff Ermine. R; 28.v — 29.vii.
Diaphora mendica (Clerck) Muslin Moth. R; 1.v — 11.vi.
Phragmatobia fuliginosa fuliginosa (Linn.) Ruby Tiger. R; 22.v — 24.vii./8.viii — 28.viii.
Tyria jacobaeae (Linn.) Cinnabar. R; 6.v — 31.vii. Abundant.

NOLIDAE

Nola cuculatella (Linn.) Short-cloaked Moth. R; 26.vi — 23.viii.

NOCTUIDAE

Euxoa obelisca (D. & S.) Square-spot Dart. V/FR; not recent, viii.49, one only. Perhaps resident prior to the 1953 floods.
Euxoa tritici (Linn.) White-line Dart. R; 10.vii — 30.viii.
Euxoa nigrieans (Linn.) Garden Dart. R; 18.vii — 20.ix.
[*Euxoa cursoria* (Hufnagel) Coast Dart. FR; early 1900's.]
Agrotis vestigialis (Hufnagel) Archer's Dart. R; 1.vii — 6.ix. This species is probably much more common on Spurn than elsewhere in the county.
Agrotis segetum (D. & S.) Turnip Moth. SR; 10.vii — 24.vii.
Agrotis clavis (Hufnagel) Heart and Club. V; not recent, 1.vii.50.
Agrotis exclamationis (Linn.) Heart and Dart. R; 19.v — 28.viii.
Agrotis ipsilon (Hufnagel) Dark Sword Grass. M; 2.vi — 6.xi.
Agrotis puta (Hübner) Shuttle-shaped Dart. V; not recent, viii.49. Like *A. clavis,* may have been resident before the 1953 floods.
Agrotis ripae (Hübner) Sand Dart. R; 8.vi — 27.vii, a thriving population, SS.
Axylia putris (Linn.) Flame Moth. R; 8.vi — 3.viii.
[*Ochropleura praecox* (Linn.) Portland Moth. FR; early 1900's.]
Ochropleura plecta (Linn.) Flame Shoulder. R; 22.v — 30.viii.
Noctua pronuba (Linn.) Large Yellow Underwing. R; 3.vi — 7.x.
Noctua comes (Hübner) Lesser Yellow Underwing. R; 7.vii — 23.ix.
Noctua fimbriata (Schreber) Broad-bordered Yellow Underwing. SR; 19.vii — 3.viii.
Noctua janthina (D. & S.) Lesser Broad-bordered Yellow Underwing. R; 9.vii — 24.ix.
Noctua interjecta (Schawerda) Least Yellow Underwing. R; 20.vii — 26.viii. Still flourishing in its only known Yorkshire breeding site, SS.
Spaelotis ravida (D. & S.) Stout Dart. R; 28.vii — 4.ix. Spurn is the headquarters of the species in the County.
Graphiphora augur (Fabricius) Double Dart. R; 18.vi — 15.viii.
Lycophotia porphyrea (D. & S.) = *varia* (Villers) True Lover's Knot. V; 16.vii — 1.viii. Heather and Ling are always given as the food plants. The adults regularly appear well away from moorlands and heaths and may quite possibly feed on garden varieties. There are no heathers on Spurn, which suggests the species is a wanderer.
Peridroma saucia (Hübner) Pearly Underwing. M; 4.ix — 4.xi.
Diarsia mendica mendica (Fabricius) Ingrailed Clay. R; 2.vi — 3.viii.
Diarsia brunnea (D. & S.) Purple Clay. SR; 17.vii — 23.vii.
Diarsia rubi (Vieweg) Small Square-spot. R; 18.v — 10.vii/2.viii — 12.x.
Xestia C-nigrum (Linn.) Setaceous Hebrew Character. R; 11.vi — 22.x.
Xestia triangulum (Hufnagel) Double Square-spot. R; 26.vi — 2.viii.

Xestia baja (D. & S.) Dotted Clay. SR; 23.vii — 8.viii.
Xestia sexstrigata (Haworth) Six-striped Rustic. R; 29.vii — 1.ix.
Xestia xanthographa (D. & S.) Square-spot Rustic. R; 6.viii — 10.x.
Naenia typica (Linn.) Gothic. R; 8.vii — 31.vii.
Eurois occulta (Linn.) Great Brocade. SM; 25.viii.70 and again in '72.
Cerastis rubricosa (D. & S.) Red Chestnut. R; 1.iv — 6.vi.
Discestra trifolii (Hufnagel) Nutmeg. R; 8.v — 10.vi/4.viii — 22.viii.
Hada nana (Hufnagel) Shears. V; 16.vi.73.
Polia bombycina (Hufnagel) = *nitens* (Haworth) Pale Shining Brown. SR/V; 17.vii — 21.vii.71. One of several species which seems to be spreading northwards. These are the first records for the County this century.
Sideridis albicolon (Hübner) White Colon. R; 20.v — 13.vii. Spurn is the County stronghold for this species.
Heliophobus reticulata (Goeze) Bordered Gothic. V; 9.vi.70.
Mamestra brassicae (Linn.) Cabbage Moth. R; 23.vii — 26.viii.
Melanchra persicariae (Linn.) Dot Moth. R; 26.vi — 3.viii.
Lacanobia thalassina (Hufnagel) Pale-shouldered Brocade. SR/V; 16.vi.
Lacanobia suasa (D. & S.) Dog's Tooth. R; 22.v — 13.viii. Like *S. albicolon*, almost restricted to Spurn, but well established there.
Lacanobia oleracea (Linn.) Bright-line Brown-eye. R; 23.v — 27.ix.
Ceramica pisi (Linn.) Broom Moth. R; 31.v — 31.vii. Larvae are sometimes very common on Sea Buckthorn, among the leaves of which they are very effectively camouflaged.
Hecatera bicolorata (Hufnagel) Broad-barred White. R; 12.vi — 20.vii.
Hadena rivularis (Fabricius) Campion. V; not recent, vii.50.
Hadena perplexa perplexa (D. & S.) Tawny Shears. V; not recent, vi.50.
Hadena confusa (Hufnagel) = *conspersa* (D. & S.) Marbled Coronet. V; 9.vii.69.
Hadena bicruris (Hufnagel) Lychnis. R; 12.vii — 23.vii.
Cerapteryx graminis (Linn.) Antler Moth. R; 14.vii — 3.ix.
Tholera cespitis (D. & S.) Hedge Rustic. R; 9.viii — 16.ix.
Tholera decimalis (Poda) = *popularis* (Fabricius) Feathered Gothic. R; 21.viii — 13.ix.
Orthosia gracilis (D. & S.) Powdered Quaker. R; 11.iv — 4.vi.
Orthosia stabilis (D. & S.) Common Quaker. R; 6.iv — 6.vi.
Orthosia incerta (Hufnagel) Clouded Drab. R; 6.iv — 15.vi.
Orthosia gothica (Linn.) Hebrew Character. R; 19.iii — 23.vi.
Mythimna conigera (D. & S.) Brown-line Bright-eye. SR; 3.viii — 14.viii.
Mythimna ferrago (Fabricius) = *lythargyria* (Esper) The Clay. R; 4.vii — 12.viii.
Mythimna straminea (Treitschke) Southern Wainscot. R; 19.vii — 21.viii. Recently discovered in a few other suitable localities in Yorkshire. It is not found further north. *N.*
Mythimna impura (Hübner) Smoky Wainscot. R; 5.vii — 30.viii.
Mythimna pallens (Linn.) Common Wainscot. R; 14.vi — 22.viii/5.ix — 8.x.
Mythimna litoralis (Curtis) Shore Wainscot. R; 8.vii — 12.viii. Well established but not frequently seen, SS.
Mythimna obsoleta (Hübner) Obscure Wainscot. R; 17.vi — 24.vii. An interesting recent addition to the Spurn list. Also known in Yorkshire from Skipwith Common, Muston near Filey and Thorne Moor.
Mythimna comma (Linn.) Shoulder-striped Wainscot. R; 1.vi — 21.vii.
[*Graphania dives* (Philpott) Maori Gothic. vii.50. Introduced, a new Zealand species (see *Entomologists Record* 1954, *66:* 20), one specimen only.]
Cucullia chamomillae (D. & S.) Chamomile Shark. R; 8.v — 1.vi.
Cucullia umbratica (Linn.) Shark. R; 21.v — 7.viii.
Cucullia asteris (D. & S.) Stawort. R; 20.vi — 2.viii. A fairly strong colony. *Aster tripolium* (Sea Aster) grows commonly in several areas of the reserve, SS, *N.*
Cucullia verbasci (Linn.) Mullein Moth. SR/V; once, 1.vi.70.
Brachylomia viminalis (Fabricius) Minor Shoulder-knot. V; viii.49.

Allophyes oxyacanthae (Linn.) Green-brindled Crescent. R; 25.ix — 29.x.
Dichonia aprilina (Linn.) Merveille du Jour. V; 9.x.73.
Blepharita adusta (Elsper) Dark Brocade. V; 18.vi.70.
Polymixis flavicincta (D. & S.) Large Ranunculus. SR/V; 20.ix — 23.ix.
Eumichtis lichenea (Hübner) Feathered Ranunculus. R; 3.ix — 13.x. This coastal species is probably better established on the peninsula than elsewhere in the County.
Eupsilia transversa (Hufnagel) Satellite V; x.69.
Conistra vaccinii (Linn.) Chestnut V; ix.60. H. N. Michaelis.
Conistra ligula (Esper) Dark Chestnut. SR; 3.xi — 6.xi.
Agrochola circellaris (Hufnagel) The Brick. R; 19.ix — 11.x.
Agrochola lota (Clerck) Red-line Quaker. R; 20.ix — 29.x.
Agrochola litura (Linn.) Brown-spot Pinion. R; 6.ix — 21.ix.
Agrochola lychnidis (D. & S.) Beaded Chestnut. R; 11.ix — 3.xi.
Atethmia centrago (Haworth) Centre-barred Sallow. V; 6.ix.73.
Omphaloscelis lunosa (Haworth) Lunar Underwing. R; 7.ix — 12.x.
Xanthia togata (Esper) Pink-barred Sallow. V; viii.50.
Xanthia icteritia (Hufnagel) Common Sallow. R; 12.viii — 24.ix.
Xanthia gilvago (D. & S.) Dusky Lemon Sallow. V; 20.ix.70.
Acronicta megacephala (D. & S.) Poplar Grey. V; 9.vii.72.
Acronicta tridens (D. & S.) Dark Dagger. R; 4.vii — 6.viii. Genitalia checked, likely to be less common than *psi*.
Acronicta psi (Linn.) Grey Dagger. R; 4.vii—6.viii. Genitalia checked, also larvae, viii.49.
Acronicta rumicis (Linn.) Knot-grass. SR; 13.vi — 21.vii.
Simyra albovenosa (Goeze) Reed Dagger. SR; 3.viii — 18.viii. The most interesting moth on Spurn. First recorded on 3.viii.70 it has appeared in twos and threes every year since, except for 1971, suggesting a small population resident in the *Phragmites* marsh. Elsewhere in Britain it is known only from fenland and a few localities in the south east, SS, *N*.
Cryphia domestica (Hufnagel) = *perla* (D. & S.) Marbled Beauty. SR; 14.vii — 21.vii.
Amphipyra tragopoginis (Clerck) Mouse Moth. R; 31.vii — 24.ix.
Rusina ferruginea (Esper) Brown Rustic. V; 28.vi.69.
Thalpophila matura (Hufnagel) Straw Underwing. R; 12.vii — 23.viii.
Euplexia lucipara (Linn.) Small Angle Shades. R; 14.vi — 3.viii.
Phlogophora meticulosa (Linn.) Angle Shades. R; 29.v — 16.xi.
Apamea monoglypha (Hufnagel) Dark Arches. R; 15.vi — 20.ix.
Apamea lithoxylea (D. & S.) Light Arches. R; 19.vi — 15.viii.
Apamea oblonga (Haworth) Crescent Striped. R; 7.vii — 14.viii. Probably occurs along the Humber shore quite extensively, but Spurn is the only *known* breeding site. It is plentiful, SS.
Apamea crenata (Hufnagel) Cloud-bordered Brindle. R; 20.vi — 25.vii.
Apamea remissa (Hubner) Dusky Brocade. R; 22.v — 29.vii. Genitalia checked.
Apamea unanimis (Hübner) Small Clouded Brindle. R; 8.vi — 21.vii.
Apamea anceps (D. & S.) Large Nutmeg. R; 10.vi — 10.vii. Spurn is the headquarters of this species in Yorkshire.
Apamea sordens (Hufnagel) Rustic Shoulder-knot. R; 20.v — 26.vii.
Apamea ophiogramma (Esper) Double lobed. V; 27.vii and 9.viii.71.
Oligia strigilis (Linn.) Marbled Minor. R; 6.vi — 29.vii. Genitalia checked.
Oligia latruncula (D. & S.) Tawny Minor. R; 6.vi — 29.vii. Genitalia checked.
Oligia fasciuncula (Haworth) Middle-barred Minor. R; 19.vi — 2.viii.
Mesoligia furuncula (D. & S.) Cloaked Minor. R; 22.vii — 24.viii.
Mesoligia literosa (Haworth) Rosy Minor. R; 21.vii — 14.ix.
Mesapamea secalis (Linn.) Common Rustic. R; 9.vii — 23.ix.
Photedes minima (Haworth) Small Dotted Buff. R; 3.vii — 20.viii.
Photedes elymi (Treitschke) Lyme Grass. R; 11.vi — 25.viii. The only recent Yorkshire locality. It is common, feeding on the grass after which it is named, SS.

Photedes pygmina (Haworth) Small Wainscot. R; 12.viii — 14.x.
Eremobia ochroleuca (D. & S.) Dusky Sallow. R; 7.viii — 25.viii. Apparently spreading north, it has reappeared in Yorkshire since 1970, and appears with sufficient frequency on Spurn to suggest that it is resident, SS, *N.*
Luperina testacea (D. & S.) Flounced Rustic. R; 20.vii — 8.x.
Amphipoea fucosa paludis (Tutt) Saltern Ear. R; 23.vii — 28.ix. Genitalia checked.
Amphipoea oculea (Linn.) Common Ear. R; 23.vii — 28.ix. Genitalia checked.
Hydraecia micacea (Esper) Rosy Rustic. R; 25.vii — 28.x.
Gortyna flavago (D. & S.) Frosted Orange. R; 19.viii — 4.x.
Celaena leucostigma leucostigma (Hübner) Crescent. R; 19.vii — 25.viii.
Rhizedra lutosa (Hübner) Large Wainscot. R; 9.ix — 25.xi. Feeds in *Phragmites* stems.
Arenostola phragmitidis (Hübner) Fen Wainscot. R; 18.vii — 2.ix. Abundant in the *Phragmites* marsh by the Warren. *N.*
Coenobia rufa (Haworth) Small Rufous. V; once, vii.53.
Charanyca trigrammica (Hufnagel) Treble Lines. V; not recent, vi.50.
Hoplodrina alsines (Brahm) Uncertain. R; 22.vi — 28.vii.
Hoplodrina blanda (D. & S.) The Rustic. R; 22.vi — 28.vii.
Caradrina morpheus (Hufnagel) Mottled Rustic. R; 30.v — 13.viii.
Caradrina clavipalpis (Scopoli) Pale Mottled Willow SR; 23.vii — 27.ix.
Chilodes maritimus (Tauscher) Silky Wainscot. SR; 26.vii — 9.viii. Another denizen of the *Phragmites* marsh — one of three County localities. It is said to feed on dead reeds and other insects. Outside Yorkshire this species is only found in fenland and some of the southern counties, *N.*
Pyrrhia umbra (Hufnagel) Bordered Sallow. R; 2.vii — 3.viii.
Eustrotia uncula (Clerck) Silver Hook. V; once, 10.viii.73. Only known to be established in three or four localities in Yorkshire.
Diachrysia chrysitis (Linn.) Burnished Brass. R; 19.vi — 9.viii.
Polychrysia moneta (Fabricius) Golden Plusia. V; once, vi.68.
Plusia festucae (Linn.) Gold Spot. R; 6.vii — 31.viii. Careful checking has failed to produce *Plusia putnami gracilis* (Lempke).
Autographa gamma (Linn.) Silver Y. M; 22.v — 2.xi. Occasionally arrives in extremely large numbers.
Autographa pulchrina (Haworth) Beautiful Golden Y. R; 13.vi — 21.vii.
Autographa jota (Linn.) Plain Golden Y. R; 16.vi — 24.vii.
Autographa bractea (D. & S.) Gold Spangle. R; 6.vii — 10.viii.
Abrostola trigemina (Werneburg) Dark Spectacle. V; ix.60. H. N. Michaelis.
Abrostola triplasia (Linn.) Spectacle. R; 28.v — 16.viii.
Catocala nupta (Linn.) Red Underwing. V; once, 2.ix.50. S. M. Jackson, Kilnsea, *N.*
Callistege mi (Clerck) Mother Shipton. R; 21.v — 8.vi.
Lygephila pastinum (Treitschke) Blackneck. V; once, 22.vii.71, *N.*
Scoliopteryx libatrix (Linn.) Herald. R; 2.vi — 12.vi/ix.
Rivula sericealis (Scopoli) Straw Dot. SR; 18.vii — 20.ix. It is only doubtfully resident in any Yorkshire locality. SS?
Hypena proboscidalis (Linn.) Snout. R; 26.vi — 22.viii.
Polypogon tarsipennalis (Treitschke) Fanfoot. V; 30.vii.72. Both this and the next species are apparently rare in S.E. Yorkshire.
Polypogon nemoralis (Fabricius) Small Fanfoot. SR; viii.49 and 1969.

FIELD NOTES

White-beaked Dolphin stranded in Cornelian Bay

On 17 April 1974 an immature male White-beaked Dolphin *(Lagenorhynchus albirostris* (Gray)) was found stranded on the rocks at the southern end of Cornelian Bay, Scarborough near Osgodby Point. It had obviously been dead for some time as there was extensive damage to the exposed left side and the back fin was missing, presumably cut off with a sharp knife. Its horizontal length from the tip of the beak to the notch in the tail fluke was 6′ 3″, the curved length measured along the mid-dorsal line between the same two points was 6′ 7″. The skull has been preserved at Woodend Museum of Natural History, Scarborough.

This species is one of our commonest dolphins sometimes occurring in very large schools in the North Sea.

C. I. Massey

Ripon Ferns

Readers will recall that in *The Naturalist*, July-September 1973, I published a short note on ferns noted by Miss Emily Harrison in the Mickley and Hackfall areas of Wensleydale, and listed by her in *The Naturalist* Vol. VI, 1856. Shortly after the publication of my note I received a letter from Mr. C. I. Massey, of the Woodend Museum, Scarborough, saying that they possessed a small collection of ferns made by Emily Harrison in the Hackfall area, which they had received in 1966 from Messrs. Laverack & Sons, Chemists, of Malton and which had once been the property of the former Malton Field Naturalists' and Scientific Society which was founded in 1800 but became defunct many years ago.

Through the kindness of Mr. Massey, Dr. Sledge and I have had the pleasure of looking through this collection. We found that most of the specimens were correctly named, though it was disappointing to find that her *"Lastrea foenisecii" (Dryopteris aemula)* was in fact *D. dilatata*. There was a good sheet, correctly named, of *Equisetum hyemale* from Hackfall, a Horsetail which does not appear to be known from that locality at present.

This incident shows the value of quoting old records, for one never knows from what unexpected sources information may come once the need for such information is made known.

G. A. Shaw

Abnormal Stinkhorns in Yorkshire

On 10 November, 1973, Douglas Horne and I visited Bishop Wood near Selby where we found Stinkhorns *(Phallus impudicus)* were still plentiful. On removing the honeycombed cap of one a white lacelike indusium fell clear, quite unlike the evanescent membrane, actually a remnant of the veil, which occurs regularly.

A further search revealed another specimen in which the indusium had slipped to the base of the fungus and towards nightfall a spectacular third was found and photographed and this example in perfect condition was later exhibited at an indoor meeting of Leeds naturalists.

John Ramsbottom in *Mushrooms and Toadstools*, confidently describes this form with a showy collarette as the North American *Dictyophora duplicata*, with British records from Yorkshire in 1915 and New Forest, Hampshire in 1934. The 1915 discovery was made in Forge Valley and correctly recorded as *P. impudicus* var. *togátus* and Harry Meyer's photographs of a New Forest specimen are reproduced in Dr. Ramsbottom's book.

Stinkhorns with a less impressive network indusium have shown up in Yorkshire on rare occasions and these prompted me to refer the 1973 Selby crop to Kew. Dr. R. W. G. Dennis has kindly cleared up the matter by stating that they are merely growth forms of the familiar stinkhorn. It seems likely therefore that this striking form was the outcome of a season when conditions were ideal for a prolonged fruiting period and abnormal development.

J. Armitage

NOTES ON THE PREY AND FEEDING BEHAVIOUR OF THE NOCTULE BAT

C. A. HOWES
Museum and Art Gallery, Doncaster

One of the first allusions in the British literature to the food and feeding of bats was made by Doncaster's William Bingley F.L.S. who in his *Useful Knowledge of Nature,* published in 1818, wrote "As all European species of bats feed wholly on insects which they catch during their flight, there can be no doubt but in this respect they are extremely serviceable to mankind. They devour myriads of night flying moths, the caterpillars of which would otherwise prove injurious to our gardens, orchards and fields".

For his time Bingley, with quiet scepticism, showed surprisingly little subservience to earlier fantasy and wild hypothesis about bats, his writing generally being well-informed and usually based on unembellished observation. About a century later, eminent zoologists could find little more to add to the subject, Richard Lydekker (1896) recording cockchafers and large beetles as being the food of the noctule and Sir Harry Johnston (1903) noting "this bat would appear to feed largely on beetles. It prefers these and other insects that fly to those that crawl......". In many respects Bingley's remarks, though not referring to any one species, remain acceptable to modern authors, the current popular handbooks of Lyneborg (1971) and Lawrence and Brown (1967) venturing little further than did Bingley over a hundred and fifty years before.

At the turn of the century probably the first investigations into the life and habits of British bats were carried out, notably by T. A. Coward and Charles Oldham working in Cheshire and Arthur Whitaker and Jos. Armitage working around Barnsley, South Yorkshire. The wealth of data and illuminating anecdotes provided by these pioneers was drawn upon by Barrett-Hamilton (1910) in his compilation and review of knowledge on the Noctule, published as a section of the celebrated *History of British Mammals* 1910-1921.

Of the food of the Noctule Barrett-Hamilton notes that, "Besides beetles, this bat eats moths and lesser insects....", "....it is difficult however, to prepare a precise list of creatures upon which it preys, since digestion is very rapid and the contents of the stomachs of shot specimens are usually in a highly disintegrated condition". Barrett-Hamilton also records Coward's observations of Noctules taking the winged stages of black ants and Mr. Stee-Elliot's account of them hawking for mayflies.

Although aware of the shortcomings of his experiment, Charles Oldham (Barrett-Hamilton 1910) investigated the prey preference of Noctules by feeding his captive specimens on an assortment of food including mealworms, cockroaches, a cricket, raw meat and the following species of moth: *Melanchra persicariae* (L.), *Hyphilare pallens* (L.), *Hepialus humili* (L.), *H. sylvina* (L.), *Hepiolopsis hecta* (L.), *Rumia crataegata* (L.), *Ourapteryx sambucaria* (L.), *Gonodontis bidentata* (cl), *Ematurga atomaria* (L.), *Bupalus piparia* (L.), *Syma polyodon* (L.) and *Eubyja betularia* (L.). All were taken readily though *Tyria jacobaea* (L.), *Calospilos grossularia* (Bos.) and to a lesser extent *Spilosoma menthastri* (Denis and Sçh.) and *S. luteum* (Huf.) proved unpalatable. Whitaker also fed his captive Noctules on various insects adding *Laothoe populi* (L.) to the list of moths.

Oldham noted that "All food was thoroughly masticated by an extremely rapid movement of the jaws before it was swallowed. The wings of moths were generally consumed but the horny elytra of large beetles were bitten off and allowed to fall". This feeding feature of the bat was later exploited by John Hooper (1962) in his studies of Horseshoe Bats *(Rhinolophus)* when he collected and identified the discarded prey fragments in order to compile a prey list.

Since the days of Whitaker and Armitage, probably the most important observations on the feeding of Noctules have been made by the Earl of Cranbrook (Blackmore 1964) who studied the composition of hunting parties coming to feed on crickets on a refuse tip in East Anglia. David Herringshaw (1968 and 1971) also reports this habit at a refuse tip at Ecclesfield.

During the summer of 1973 the author made observations on a small colony of Noctules (about 10) in Sandall Beat Wood Local Nature Reserve, Doncaster, (map ref. S.E. 61-03-). The colony occupied a disused Great Spotted Woodpecker nesting hole about 30ft. up in a limb of a large and venerable beech tree on the southern perimeter of the wood facing open sports fields, Cantley housing estate and Cantley wood beyond. According to Mr. George Coville, the woodman in charge of the reserve, the roosting hole had been excavated and occupied by the Woodpeckers some three years earlier. In its second year a pair of Starlings had nested in it and in 1973 the Noctules utilised it as a summer roost after being ousted from a large rot hole in the main trunk by children attempting to set fire to the tree.

It was evident from the behaviour of the bats when leaving the roost that, initially at least, feeding did not take place in the immediate vicinity. The bats generally departed singly at short intervals and flew at speed in a more or less straight line out across the playing fields, disappearing over Cantley Wood several hundred yards distant. (Flying some distance to feeding grounds is known in the Noctule through the work of the Earl of Cranbrook *loc. cit*.). On emerging from the roost, droppings, old and new, were scattered from the entrance hole. This provided an opportunity, through the analysis of the dung, to determine the bat's prey and consequently ascertain how the bats fed.

Fresh dung was damp, having a glistening mucilaginous coat, presumably to aid evacuation from the bat. Wood chippings from the roost cavity and soil particles from beneath the roost adhered to the faecal pellets but were removed before examination. Generally the pellets consisted of a dark brown matrix of finely masticated chitinous invertebrate remains in which were lodged a few larger but well disintegrated fragments of exoskeleton. The larger sheets of chitin showed the puncture and fracture marks where the bat's high crowned teeth had smashed through. Pellets comprised predominantly of lepidopteran remains were a characteristic horn colour, the matrix consisting of fur-like body scales in which were enclosed neat bundles of wing nerves and leg segments enfurled in sheets of wing membranes largely denuded of scales, and sheets of abdominal wall. The entire structure was suggestive of a miniature Barn Owl pellet containing mammalian skeletal material neatly set into a fur matrix.

Under a low-power binocular microscope each faecal pellet was dissected dry, using mounted needles. Larger fragments of chitin exhibiting features of sculpturing, texture or structures which could aid identification were separated out, the insect remains being passed to Mr. Peter Skidmore for determination and the arachnid remains being worked by the author. Confirmation of the identity of the fragments was checked by comparison with the ranges of whole specimens in Doncaster Museum's invertebrate collections.

From the fragments separated out the following organisms were classified:—

Diptera

Bibio pomonae L.

One of the St. Mark's flies identified from two front tibiae and two wing fragments. The species breeds in humus soils and swarms from July to September.

Lyciella sp.

A basal half of a wing of this small acalypterate fly which breeds in humus and decaying plant matter.

Scatophaga stercoraria L.

A yellow dung-fly identified from a hind leg and a complete wing. This is a predaceous species which breeds in dung — especially cow dung.

A nematoceran fly — a small crane-fly identified from a fragment of wing.

Hymenoptera

A sawfly sp. identified from a hind wing.

Coleoptera

Serica brunnea (L.)

A common chafer identified from a complete hind tarsus and the apex of a hind tibia. It is an active nocturnal flyer.

Rhizophagus politus Hell

An uncommon beetle which breeds beneath the bark of dead trees. This record (from a pronotum with attached fore-leg) represents only the second record for V.C. 63 and the third for Yorkshire.

Liophloeus tessulatus (Mv.)

A large flightless (probably mainly nocturnal) weevil identified from a fragment of pronotum. The species is associated with ivy-covered walls and tree trunks.
pronotum. The species is associated with ivy-covered walls and tree trunks.

A small carabid (ground beetle) determined from an elytra fragment.

Arachnida remains were as follows:—

ACARINA

A mite of the family *Uropodidae*, probably from a *Geotrupes* beetle to which they are frequently attached.

ARANEA

Amaurobius (probably *atropos* (Walck)).

A large terrestrial spider 7-12 mm. long. The species was determined from two chelicera.

Lycosa sp.

One of the familiar wolf spiders; determination was from two chelicerae with fangs.

A further item of particular note was a bundle of well-chewed grass fibres. The fibrous bundle which comprised the bulk of one faecal pellet was coated with well-masticated insect — predominantly beetle-remains.

DISCUSSION

The significant proportion of terrestrial or non-flying organisms in this small sample of droppings (about 200 faecal pellets collected 3/9/73) infers that alighting to feed could be an important feature of the Noctule's repertoire of hunting methods. Blackmore (1964) lists Whiskered Bat (*Myotis mystacinus* (Kuhl.)), Natterer's Bat (*Myotis nattereri* (Kuhl.)), Bechstein's Bat (*Myotis bechsteini* (Kuhl.)), Long-eared Bat (*Plecotus auritus* (L.)) and the Serotine (*Eptesicus serotinus* (Sch.)) as species known to take prey, such as moths and beetles, from foliage, the Serotine landing heavily on branches with wings 'spread eagled' to snatch prey. In addition the Whiskered Bat is known to take prey from fence posts and the Long-eared Bat to hover and take prey from tree trunks. Blackmore also records an instance where a Greater Horseshoe Bat (*Rhinolophus ferrum-equinum* (Schr.)) was observed to "settle on grass and seize dor-beetles feeding on cow dung".

Although the beetle *Rhizophagus* could have been picked up from a tree trunk and the flightless weevil *Liophloeus* from an ivy-covered wall in the manner described for the Serotine, and the land-and-grab tactics as observed by Blackmore *(loc. cit.)* for the Greater Horseshoe Bat might be effective in capturing the free-roving *Lycosid* and perhaps the carabid (ground beetle), these methods would be inappropriate for the *Amarobius* spider. These large spiders occupy silken tubes several inches in length, often having bifurcated retreats, spun under stones, in hedgebanks or embedded amongst the lower stems of herbage. The capture of this, almost subterranean, type of prey would almost certainly necessitate active foraging on the ground.

Spiders have frequently been listed amongst the prey items of bats (e.g. Bristowe (1941) and Blackmore (1964)), though apart from Newstead (1897) and Coward (1907) who recorded the cave spider *Meta menardi* (Lat.) as being taken in nature by both the Greater and Lesser Horseshoe Bats (*R. ferrum-equinum* (Schr.) and *R. hipposideris* (Bech.)), no other species taken in the wild has been identified. Crocker (1969) has, however, experimented with a captive Pipistrelle (*Pipistrellus pipistrellus* (Schr.)) on the palatability of a range of terrestrial and orb web-spinning spiders but this, like Oldham's work on moths taken by noctules, unfortunately does not indicate how bats locate and catch the prey in the wild.

It would seem that with *Amaurobius* and to an extent *Lycosa, Liophloeus* and the carabid occurring in the prey of the Sandall Beat Wood Noctules, a shrew-like foraging technique may be employed, though whether the attendant olfactory and tactile facilities are available to the Noctule would require experimentation to prove. Even Arthur Whitaker's insistence that eye-sight can be used in the location of terrestrial prey cannot be ruled out.

Although unrecorded in British bats, habitual terrestrial feeding is a possibility. Certain British species in captivity are known to be reasonably mobile on the ground but could be even more adept than has been suspected, since studies on the molossid bats of the Americas and the short-winged *Mimitillus* bats of west and central Africa have shown these forms to be highly competent quadrupeds (Harrison-Matthews 1971).

ACKNOWLEDGEMENTS

This study was carried out in connection with Doncaster Museum's investigations into the mammalian fauna of South Yorkshire and I would like to thank the Chairman and members of Doncaster Metropolitan Borough Council Education Committee for making resources available for carrying out this work.

Special thanks are due to Mr. George Coville who first located the Sandall Beat Noctule colony and to my colleague Mr. Peter Skidmore for performing the remarkably skilled job of identifying the insect remains and for useful comments on the species discovered.

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A Dictionary of Useful and Everyday Plants and their Common Names by **F. N. Howes.** Pp. 290. Cambridge University Press. £4.

When Airy-Shaw revised Willis's *Dictionary of the Flowering Plants and Ferns* the additions and amendments required were so numerous that generic and family names only were included. The two recent editions therefore depart substantially from their predecessors through the omission of various categories of information such as common and vernacular names, ornamental plants, economic and commercial products, which had been incorporated in earlier editions. The exclusion of such information, whilst an enforced consequence of the very great increase in space devoted to purely taxonomic and nomenclatural matters, was generally regretted by most users of the work. The present volume will therefore be assured of a welcome since it supplies — also in an extended and up-to-date form — the information which had to be jettisoned from the larger work. The total number of entries has been more than doubled and some new features have been added. Everyone interested in plants, whether professionally or casually, will find the answers to a host of questions in this very useful book. W.A.S.

PHYTOPLANKTON BIOMASS IN TWO EAST YORKSHIRE GRAVEL-PIT PONDS (1967 AND 1973)

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Phytoplankton biomass, in terms of chlorophyll *a* concentration, was measured in a flooded East Yorkshire gravel pit (Scales pond) at regular intervals throughout 1966 and 1967, and also in a second pond (Sangwin No. 2 pond) throughout 1967 (Goulder 1969). Since then changes in the phytoplankton may have taken place as a result of both gradual vegetation succession and of sudden changes in the environment, for example (1) the road adjacent to Scales pond has been realigned and (2) a dense summer crop of the aquatic macrophyte *Ceratophyllum demersum* L. which was present in Sangwin No. 2 pond in 1967 was absent in later years. It was considered, therefore, that further investigation might be interesting and so in 1973 phytoplankton biomass was again measured at regular intervals in both ponds.

DESCRIPTION OF SITES

Scales pond

The ponds are at Brandesburton on the Plain of Holderness about 17 km north of Hull. They are both on the Brandesburton gravel ridge (described by Phemister 1922) which is about 4 — 5 km long, is of fluvio-glacial origin, and is deposited on top of glacial till.

Scales pond (Grid Ref. TA 098485) which was excavated 1940-45 is 127 m long, 43 m wide and has a maximum depth of about 5 m. It is filled by ground water and also receives run off water from its banks. During 1967 and 1973 the pond was thermally stratified in summer and there was some oxygen depletion in the deeper water. The major summer vegetation in 1966, 1967 and 1973 consisted of a reed margin of mainly *Typha latifolia* L. and beyond this areas of the floating leaved *Potamogeton natans* L. Most of the pond, however, remained as open water. In 1967 the metalled road along the gravel ridge ran to the west of the pond but by 1973 the alignment of this road had been altered so that it passed to the east of the pond along what had been a rough track. It is possible that this change affected local drainage patterns and hence the nature of the water entering the pond.

Sangwin No. 2 pond

Sangwin No. 2 pond (Grid Ref. TA 104472) is about 1.5 km south-east of Scales pond and was excavated 1934-1957. It is 183 m long, 53 m wide and has a maximum depth of about 5 m. The pond is filled by ground water and run off water from its banks but it also receives the discharge of a land drain which drains heavily fertilised arable land. It is, therefore, richer in inorganic nutrients than Scales pond. For example, high nitrate concentrations (up to 1.7 mg NO_3-N/1) were found in Sangwin No. 2 pond in the winters of 1965-66, 1966-67 and 1967-68 while in Scales pond nitrate was not detected (<0.1 mg NO_3-N/1); see Goulder and Boatman (1971). During 1967 and 1973 summer stratification took place and the hypolimnion became anaerobic. The marginal vegetation in the summers of both 1967 and 1973 consisted of a reed fringe of mainly *Sparganium erectum* L. beyond which were small areas of *Potamogeton* cover. During 1967 (and also 1965 and 1966) *Ceratophyllum* was very obvious in Sangwin No. 2 pond. This plant overwintered in a dormant state at the bottom of the pond and in 1967 it began to rise to the surface in April until by June about 80% of the surface was covered by an extremely dense mat of *Ceratophyllum*. Later in the summer the extent of cover decreased and *Ceratophyllum* had sunk completely by the end of October. In contrast, in summer 1968 no dense mat of *Ceratophyllum* appeared and the plant was observed only as a few loose shoots at the margin. In summer 1969 *Ceratophyllum* could not be seen from the bank and 30 minutes work with a grapnel on 5 July produced only two stunted and dormant shoots a few centimetres in length. Since then *Ceratophyllum* has not been found in Sangwin No. 2 pond. For a discussion of factors which might be responsible for such sudden decreases in freshwater macrophytes see Morgan (1972).

METHODS

Water samples for chlorophyll analysis were collected at sites about 4.5 m deep, at intervals of one or two weeks, from Scales pond in 1966, 1967 and 1973 and from Sangwin No. 2 pond in 1967 and 1973. Integrated samples, representative of a column of water, were taken using a flexible tube sampler as described by Lund (1949). In Scales pond a column of water from 0 — 4.0 m deep was sampled on all occasions. In Sangwin No. 2 pond only the top 0 — 2.0 m was sampled in 1967 because fragments of decomposing *Ceratophyllum* were caught at depths greater than 2.0 m; also on five days in May-June only surface samples could be taken because floating *Ceratophyllum* made the use of the tube sampler impossible. In 1973, however, the tube sampler was always used to a depth of 4.0 m.

The concentrations of chlorophyll *a* were measured using a spectrophotometer, after filtration (Whatman GF/C glass-fibre filters) and extraction in 90% methanol, as described

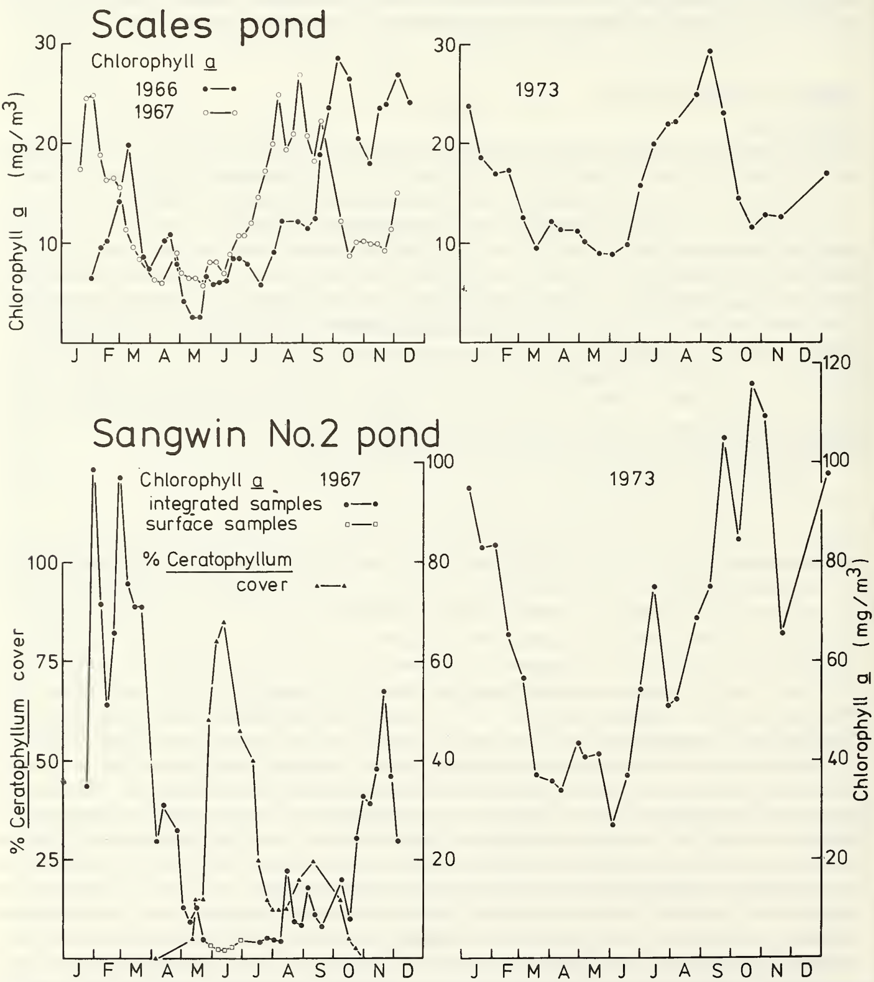

Fig. 1. (Top) Phytoplankton chlorophyll in Scales pond 1966, 1967 and 1973. (Bottom) Phytoplankton chlorophyll in Sangwin No. 2 pond 1967 and 1973 (note change in vertical scale) and percentage surface cover of *Ceratophyllum* in 1967.

by Talling (1969). An exception to this however was that, because of a misunderstanding, ethanol was used as the extractant from January to 4 June 1973. A number of water samples was therefore taken from the ponds, in January 1974, and each was divided into halves and parallel chlorophyll extractions were carried out in ethanol and methanol. The ratio, absorbance at 665 nm in ethanol/absorbance at 665nm in methanol = 1.083 (mean of 15 pairs of extractions, variance = 0.012). It is unlikely, therefore, that the use of ethanol instead of methanol had any great effect on the results.

The percentage surface cover of *Ceratophyllum* in Sangwin No. 2 pond in 1967 was roughly estimated by eye from the top of a high bank. Oxygen and temperature profiles were made using a Mackereth probe (Mackereth 1964) and underwater light intensities were measured with a submersible selenium photocell.

RESULTS AND DISCUSSION

Scales pond

Concentrations of phytoplankton chlorophyll *a* in Scales pond are given in Fig. 1 (top). It may be noted that seasonal fluctuations in phytoplankton biomass were similar in all the three years studied. In each instance highest crops occurred very early in the year (maximum levels 19.8 mg chlorophyll a/m^3 on 10 March in 1966, 24.8 mg/m^3 on 2 February in 1967, and 23.8 mg/m^3 on 10 January in 1973) and again in late summer (maximum levels 28.5 mg/m^3 on 7 October in 1966, 26.8 mg/m^3 on 30 August in 1967, and 29.4 mg/m^3 on 10 September in 1973) while the lowest crops were found in early summer (minimum levels 2.5 mg/m^3 on 14 May in 1966, 5.7 mg/m^3 on 24 May in 1967, and 8.9 mg/m^3 on 4 June in 1973).

It appears, therefore, that there was no marked change in phytoplankton biomass between 1966-67 and 1973. The maximum crops were very similar in all years and although the minimum early summer crop in 1973 was somewhat higher than in the earlier years it is quite likely that this reflected minor fluctuations from year to year rather than a permanent change. We have no evidence to explain these annual fluctuations but it is possible that the high phytoplankton crops found early in each year decreased because relatively high winter inorganic nutrient levels decreased, and that the late summer increase was related to increases in nutrients as summer stratification started to break down (see Fogg 1965 for a general discussion of the factors which influence phytoplankton periodicity).

Sangwin No. 2 pond

Concentrations of phytoplankton chlorophyll *a* in Sangwin No. 2 pond are given in Fig. 1 (bottom). In 1967, high crops were found early in the year (maximum 98.6 mg/m^3 on 2 February), very low levels were present in the summer (minimum 1.7 mg/m^3 on 7 and 14 June), and high crops occurred again late in the year (maximum 53.9 mg/m^3 on 22 November). Estimates of surface cover of *Ceratophyllum* in 1967 are also shown in Fig. 1 (bottom left). It may be seen that the decrease in phytoplankton biomass in spring coincided with the increase in *Ceratophyllum* cover, and that the autumn resurgence in phytoplankton followed the decline in *Ceratophyllum*.

It is probable that the factors which produced low summer phytoplankton crops included shading by *Ceratophyllum* and low inorganic nutrient levels brought about by (1) a massive nutrient demand by *Ceratophyllum,* (2) lack of water, and therefore nutrient, circulation following the establishment of stratification, and (3) low summer flows from the land drain. In contrast the high phytoplankton crops early and late in the year might have been promoted by (1) lack of competition from *Ceratophyllum,* (2) the partial or complete breakdown of stratification, and (3) increased flow from the land drain (details of fluctuations in nitrate concentration and rate of nitrate inflow from the land drain in 1967 are included in Goulder and Boatman 1971).

In 1973, high phytoplankton crops were again recorded early in the year (maximum 94.8 mg/m^3 on 10 January) and towards the end of the year (maximum 115.8 mg/m^3 on 23 October). Lower levels were found in spring and early summer (March-June) but these were notably higher than the summer crops of 1967 (minimum 26.9 mg/m^3 on 4 June 1973).

In Sangwin No. 2 pond, therefore, it seems that there has been a significant increase in summer phytoplankton biomass between 1967 and 1973 and it is probable that this is related to reduction in competition following the disappearance of *Ceratophyllum*. It must, however, be mentioned that some caution needs to be applied when comparing data from 1967 and 1973 because 1967 data were based on 0 — 2.0 m integrated (or surface) samples while those of 1973 were based on 0 — 4.0 m integrated samples. It was noticed, however, that in summer 1967 the top 2 m or so of water was crystal clear in areas free of *Ceratophyllum*, while throughout 1973 the surface water remained green and opaque. This is supported by the observation that underwater light intensity at 1.0 m was 75% of surface intensity on 14 June 1967 but only 31% on 29 August 1973. It is likely, therefore, that there was a real increase in phytoplankton biomass, at least in the epilimnion, between 1967 and 1973.

The data in Fig. 1 also show that maximum phytoplankton crops in Sangwin No. 2 pond were considerably higher than in Scales pond. This was probably a result of Sangwin No. 2 pond being generally richer in inorganic nutrients.

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What is Ecology? by **D. F. Owen.** Pp. xii + 188 with 26 monochrome photographs and 26 figures. Oxford University Press, 1974. £2.75.

This is not a text-book nor is it directed at biology students in particular. It explains simply how wild populations are regulated in nature; the inter-relationships of species in communities and how food chains, or food webs and organic diversity function harmoniously in nature; or how stability is readjusted when harmony is upset. Many familiar and some less familiar examples are explained to illustrate the formation and operation of ecosystems.

But a disinterested exposition of ecological principles in operation is only part of the book's intention. It is also concerned with man's place in the ecological framework. A world dominated by people who are systematically destroying natural environments which have taken millenia to develop seems an inescapable legacy of the agricultural and industrial revolutions. Agricultural techniques cannot keep pace with an exponential rate of population growth; "every time you give money to a charitable organization to relieve famine in India you are making a small contribution to postponing what is inevitable". The accelerating rate of depletion of oil, coal and other non-renewable raw materials and the consequences of exponential consumption of finite resources and other trends in man's destructive activities are also discussed. They are familiar topics in newspapers and magazines, on the radio and on television programmes, usually discussed against an economic or political background. The ecological background against which they are here discussed is no less relevant, nor are the lessons and conclusions to be drawn more reassuring.

W.A.S.

BRYOLOGICAL MEETING AT HIGH HOYLAND 27th APRIL 1974

F. E. BRANSON

The area investigated at Hoyland Bank, V.C.63, was the replanted site of opencast coal-mining and it proved a most interesting bit of country. The area had a very open westward aspect, covering 100 acres. It is not known exactly when the area was out-cropped, but presumably from 1952 onwards. It is thought to have been planted in 1955/56, and is used chiefly for forestry, but game reserves are being built up. From the road opposite High Hoyland church there is a rather steep bank, covered with older deciduous woodland and the flat, marshy area at the bottom (the opencast site) has been replanted with trees of various species, chiefly Japanese Larch. From the afforestation point of view the trees have done well in the short time they have been growing, especially so on "opencasted" land.

In the older woodland on the actual bank where there were fallen branches and trunks in places, there was some excellent *Tetraphis pellucida*, known easily by the gemmae in the terminal cups and strikingly beautiful when growing in large masses on some fallen trunk. In the same habitat was *Orthodontium lineare* and the hepatic *Lophocolea heterophylla.* On the ground was also a considerable amount of *Isopterygium elegans.* At the bottom of the bank and along the edge of the replanted area is a broad track and here *Pohlia nutans* was very conspicuous with myriads of capsules, making a very striking spectacle. This ride was carpeted with the rather dull-looking, brownish-green, foliose hepatic *Nardia scalaris.* The bottom of the area consisted of a series of marshes and although here the number of species seen was not great, some interesting species were present. Some *Pellia neesiana* with perianths was present and Miss Dalby detected a patch of the moss *Campylopus introflexus.* The first Yorkshire record of this was from Reynard Crag near Birstwith V.C.64 found by me in 1967 in similar ground replanted with conifers. A small patch of *Dicranella cerviculata* was seen and a little *Plagiothecium undulatum* was noticed in a clump of other species. The ground is being recolonised and some species have made a definite stand, one of these being *Aulacomnium palustre,* a moss of marsny places which was particularly abundant. In some of the material of this plant frequent flagelliform pseudopodia were noted bearing clusters of leaf gemmae at the apex. A very good description of these is given by F. O. Bower in the *Journal of the Linnean Society* for 1884. Another moss of the same genus which invariably produces gemmae, grouped on the end of a stalk resembling a miniature drumstick, is *A. androgynum* which was also seen on this occasion. It was from these marshy areas that Miss Dalby collected the seven species of *Sphagnum* enumerated below. To finish the meeting we paid a visit to Margery Wood, not very far distant, but found it rather disappointing and very dry.

Nomenclature for hepatics follows *Census Catalogue of British Hepatics* (4th edition) by J. A. Paton and for mosses *Census Catalogue of British Mosses* (3rd edition) by E. F. Warburg.

My thanks go to J. H. Field for confirming the *Philonotis,* to E. Thompson and S. Jagger for information regarding the area and to G. A. Shaw for looking up early references to leaf gemmae in *Aulacomnium palustre.*

Hoyland Bank

Musci:

Sphagnum palustre
S. squarrosum
S. recurvum
S. cuspidatum
S. fimbriatum
S. capillaceum
S. plumulosum
Polytrichum piliferum
P. formosum
Polytrichum commune
Fissidens bryoides
F. taxifolius
Dicranella heteromalla
Dicranum bonjeanii
D. scoparium
Campylopus pyriformis
C. flexuosus
Bryum pallens

Bryum pseudotriquetrum
Mnium hornum
M. punctatum
Philonotis calcarea
Thuidium tamariscinum
Cratoneuron filicinum
Drepanocladus uncinatus
Acrocladium cuspidatum
Brachythecium rutabulum
B. rivulare
Eurhynchium praelongum
Plagiothecium succulentum
P. denticulatum
Hypnum cupressiforme
H. cupressiforme var. *ericetorum*

Hepaticae:
Riccardia pinguis
Pellia epiphylla
Lepidozia reptans
Calypogeia muelleriana
C. fissa
Gymnocolea inflata
Lophocolea cuspidata
Chiloscyphus polyanthos
Cephalozia bicuspidata
Scapania irrigua
S. undulata

Margery Wood

Species found in Margery Wood not found on Hoyland Bank:

Musci:
Ceratodon purpureus var. *purpureus*
Eurhynchium riparioides

Hepaticae:
Conocephalum conicum
Lophocolea bidentata
Calypogeia arguta

BOOK REVIEWS

The Geography of the Flowering Plants by **Ronald Good.** Fourth edition. Pp. xvi + 557 with 86 line-drawings, 9 maps and 18 plates. Longman, 1974. £9.00.

Professor Good's comprehensive account of plant geography, designed primarily for professional botanists, first appeared 27 years ago. Two new editions have since been issued and now, ten years after the publication of the last one, a fourth edition replaces the earlier ones. The book is divided like its predecessors into two parts, the first largely factual, the second more theoretical and the chapter headings are as in previous editions. With each edition corrections and extensive revisions have been incorporated such that the present volume exceeds the original issue by more than 150 pages, has more line-drawings and plates, and has a bibliography which covers more than three times the number of references. No aspect of the subject has seen such a radically changed outlook since the work first appeared as that concerned with Continental drift and no chapter has called for a more thorough overhauling and up-dating. Full advantage has also been taken of Airy-Shaw's new edition of Willis's *Dictionary of the Flowering Plants and Ferns* which has made it possible to give a considerably more accurate presentation of the content and distribution of families and genera than was previously possible. The range of information covered is so wide that the most meticulous of authors could scarcely hope to avoid incorporating some errors, but the opportunity afforded of further revising his book whilst bringing it fully up to date justifies the author's claim for this standard work that it now has a greater finality than its predecessors.

W.A.S.

The Wild Flowers of Britain and Northern Europe by **Richard** and **Alastair Fitter,** illustrated by **Marjorie Blamey.** Pp. 336 with 257 full page colour plates and numerous other illustrations. Collins, 1974. £1.60.

This book is a guide to flower identification designed for amateurs with no botanical training. There will inevitably be some unsolved problems for its users; but does any beginner ever reach the right answers with all his Umbellifers and yellow-flowered Composites? The identification struggle is part of the enjoyment and within its limits this book does what it sets out to do about as well as it possibly could.

Northern Europe covers Iceland and Scandinavia from the Arctic southwards to the Loire valley and eastwards to Munich and most of West Germany and thence northwards to the Baltic. About 2250 species are included, over 1200 of which are beautifully illustrated in colour. There is a main key to herbaceous plants based on easily observed characters and subsidiary keys to trees and shrubs, several of the larger families and to water weeds. The descriptions are terse and non-technical, about nine to each page with closely related or non-illustrated species briefly mentioned in the same paragraph as the depicted species and the illustrations are invariably on the pages facing the relevant descriptions. In addition to the explanatory introduction there are appendices on additional species, introduced shrubs, species aggregates, ecology and soil type species lists, a glossary and indexes to popular and scientific names. English names are used throughout but with Latin names appended and the plants are grouped in families and not arranged according to flower colour or other artificial system. Grasses, sedges and rushes are omitted, and wisely so in a work of this kind and the book is of a size which makes it easily carried in the pocket.

The merits of this book so far outweigh its limitations that to carp would be churlish. It combines careful compilation and skilful compression with the maximum of convenience in the arrangement of its contents. The paintings by Marjorie Blamey are outstanding. They were all done specially for this work from fresh specimens and the highest praise must be given both for the life-like appearance and exact colour rendering of all her paintings and the near-perfection with which their reproduction has been achieved. In general the reproduction of a good painting of a plant is better value to a botanist than the best colour photograph which can rarely take in all parts of the plant — radical and cauline leaves, flowers and fruits; and though the reproduction of coloured flower illustrations has made great advances in recent years one rarely finds a collection in which some at least do not fall below the high standard of the others. But not so with this collection: for the illustrations alone the price is positively derisory. Only because the publishers have been able to print for eight other countries has the low price been possible.

This is a book which will sell like "hot cakes", so get a copy before the plates have to be used too many times for the issue of the reprints which will surely be required.

W.A.S.

A Field Guide to the Trees of Britain and Northern Europe by **Alan Mitchell.** Pp. 416 with 40 colour plates and 640 line drawings. Collins, 1974. £2.95.

This new handbook to trees — wild and cultivated — is comparable in its scholarship with the standard manuals of Rehder, Hillier or Dallimore and Jackson. It is authoritative, packed with information and replete with neat and clear drawings in addition to the generous supply of good colour plates all done from paintings specially prepared for the book.

The keys for hardwood trees are largely based on foliage characters. In the Gymnosperms, to which more than a third of the book is devoted, cone characters are freely used and drawings are often included. About 800 species are described, the information for each being arranged under the headings bark, crown, foliage, flowers and fruit, often with supplementary paragraphs on similar species, recognition characters and cultivars or hybrids. Dates of introduction into this country, country of origin, frequency in cultivation and the dimensions and locations of notable examples are also cited for most species. Nearly all the commonly cultivated trees and many rare ones are illustrated in the colour plates often with outline drawings showing growth habit. Those not included in colour are almost all accompanied by line drawings of leaves and often habit sketches. There is a concise introduction (which includes a useful tip on how to estimate simply and correctly the height of any tree), a glossary and a county guide to gardens, parks and estates open to the public where notable trees or collections of trees may be seen and there is an index to English and to scientific names.

This book occupies an intermediate position between smaller works comprising not very wide selections of species and the standard, comprehensive and bulky manuals. It is comprehensive enough to include all trees save those which are very rare in cultivation and only to be seen in exceptionally favoured localities; it is not bulky, not very expensive and is beautifully illustrated. Mr. Mitchell attaches importance to looking at the whole tree and observing its growth habit and crown as well as the details of its foliage. His devotion to his subject is likely to rub off on his readers and generate a cult of tree-spotters with an urge to go to the nearest park in search of examples on which to try out this book. The author, illustrators and all who have had a hand in its production deserve unqualified congratulations.

W.A.S.

Identification of the Larger Fungi by **R. Watling.** Pp. 281 with 81 text figures. Hulton Education Publications, Amersham, 1973. £1.20.

This book has a different aim from those small guides that invite the learner to identify his finds by comparing them with a set of coloured illustrations. Here the only illustrations are careful line drawings (85 pages of them) describing the points which taxonomists use in determining specimens. The amateur with a microscope will find the book indispensable, since the many microscopic characters are not given in other reasonably-priced books. Particularly valuable are the introductory pages on techniques of examination. The serious amateur might expect here advice on preservation, but this is lacking. There follow keys and 100 full descriptions (plus some 50 shorter ones), arranged in an ecological order and covering commoner species in all groups of larger Basidiomycetes and 15 larger Ascomycetes. Minor points which may confuse the reader at first are the lack of explicit cross reference bytween adjoining text and illustration, and the obscure location (on p.264) of the key explaining the very useful citations of colour illustrations in other books. The omission of any taste characters, even in such groups as *Lactarius,* might be thought eccentric. But, all in all, this is one of the most helpful small books ever produced in this field and its low price makes it particularly attractive.

T.F.H.

The Ciliates by **A. R. Jones.** Pp. 207 with 4 plates and 37 text figures. Hutchinson University Library, 1974. Paperback £2.00; Hardback £3.50.

The ciliate Protozoa are a fascinating group of microscopic organisms, both for their intricate structure and their complex behaviour. In recent years there has been renewed research interest in these highly-organised unicells, involving detailed ultrastructural and experimental studies on the pellicle and other cell components; on ciliary activity, coordination and physiology; on feeding, nutrition and symbiosis; on osmotic and ionic regulation; on binary fission and sexual processes; on growth, morphogenesis and regenerative capacity; and, in relation to these studies, on classification and evolution. The present book provides a useful elementary text summarising these various aspects of ciliate structure and function, together with a brief account of ciliates of economic importance, a glossary and a bibliography of research articles and monographs. It will be welcomed by teachers with a special interest in protozoology who require a survey of recent work on *Paramecium* and its relatives and by those who enjoy looking at the ciliates and would like to know more about their biology. Unfortunately, even though the book contains concise accounts of topics such as structure and function of cilia and conjugation in *Paramecium,* it is likely to be too specialised for most teaching below university and polytechnic level.

G.F.L.

Collins Guide to Animal Tracks and Signs by **Preben Bang** and **Breben Dahlstrom.** Translated and adapted by Gwynne Vevers. Pp. 240 with over 600 paintings, drawings and photographs. Collins, 1974. £2.95.

The second generation of naturalists to cut their teeth on Collins Field Guides are already in the field. It is twenty years since the first edition of the guide to the birds of Britain and Europe first appeared and in the interval between then and now guides to almost every natural history subject area have appeared.

With the modern emphasis on ecological studies and field observations those branches of field craft which were formerly the domain of the few, and those mainly white hunters or aborigine trackers, are now needed as skills by many more people. This is a most excellent book for putting over the tell-tale signs of animal activities which are so difficult to render in words or even to demonstrate by any other means. Foot prints, runs and routes, feeding signs, prey remains, and pellets, wallows and so on are covered in the most comprehensive coverage yet of animal signs.

The scope of the book includes birds and mammals on a European scale and in the case of the former there are inevitably gaps. However, do not be put off by this — there is every stimulus offered for the ornithologist to try and remedy this situation. Trees killed by the droppings of nesting Cormorants and the environmental wear and tear induced by displaying Ruffs are not subjects which are uppermost in most birdwatchers' minds but they are points to ponder and in these days of all-embracing consideration of the environment they are valid.

It is in areas of interest such as the contents of owl and raptore pellets that the book is weakest and there is little to assist those who have an urge to dissect pellets and identify the contents. Trying the book out under actual combat conditions on some rodent-chewed hazel nuts from a post-glacial peat bed proved interesting. Starting off with a list of possibles which included Wood Mouse, Dormouse or Bank Vole, I soon eliminated the second. This sample which I have had for quite a long time I could not ascribe to either mouse or vole with any degree of conviction using existing guides. This Field Guide offered another possibility in Water Vole and after studying the text and plates and knowing that the nuts came from a *Phragmites* bed preserved in a raised river deposit in Perthshire, I now feel happier about the possible identity of the chewer.

I have no hesitation about recommending this book to the widest possible readership; carry it in the car, take it on picnics and perhaps even on your journeys round safari parks and zoos. At least you will be able to practice Beaver, Elk and Bear signs there. Then, when the next edition appears we may look forward to an enlarged version or, possibly in time, separate bird and mammal guides.

The gallery of illustrations is excellent, the text most readable and the production is well up to the standard we expect of Collins.

T.M.C.

The Living Seashore by **Joan N. Clayton.** Pp. xiv + 204 with 32 photographic plates, 16 in colour and numerous diagrams and line drawings. Frederick Warne, 1974. £6.00.

Within the intertidal zone on rocks, shingle, sand or mud are to be found representatives from nearly all the invertebrate groups of animals; indeed the diversity of animal life to be found concentrated within the zone between high and low-water marks exceeds that of any other comparable area. The present account of seashore life is divided into two parts; the first part deals with the different types of habitat from an ecological standpoint, the second covers the morphology and biology of the different groups of animals from planktonic larvae and porifera to fishes. Seaweeds and higher plants associated with marine environments are also, more briefly, covered.

The book is well written, free from technicalities and intelligible to the general reader as well as to the marine biology student. It is a guide not only to the recognition of the species encountered but to their way of life, their inter-relationships, adaptations, food-chains, population balance and survival problems. The line drawings and diagrams supplement the text usefully and the quality of the photographic illustrations ensures their helpfulness for purposes of identification.

The Seabirds of Britain and Ireland by **Stanley Cramp, W. R. P. Bourne** and **David Saunders**. Pp. 287 with 4 colour plates, 9 black and white photographic plates and numerous sketches and maps. Collins, 1974. £3.50.

This book is based on the results of 'Operation Seafarer', a national enquiry organised by The Seabird Group to survey all the coastal seabird colonies in the British Isles. There is a chapter on seabird biology by W.R.P.B. and on threats to seabirds by S.C. who also contributes a chapter on present numbers and changing fortunes. The main body of the work is a detailed account of each of the 24 species which breed regularly on our coasts. For each there are paragraphs on identification, food and feeding habits, breeding, movements, world distribution, census methods, status in Britain and Ireland in 1969-70 and past history. There is a short chapter on the scarcer species and vagrants. The 24 maps showing the main breeding colonies with numbers of breeding pairs indicated by variable sized dots are particularly valuable and well presented as are the appendices giving the past histories, population changes and the 1969-70 numbers of breeding pairs.

The four colour plates by Robert Gillmor are pleasant but not particularly well done, the one depicting the gulls being the least accurate. Why most artists depict the Lesser Black-backed Gull and the Herring Gull as replicas of each other except for the mantle colour I do not know. The latter is a much more heavily built bird with broader wings. The line drawings by the same artist at the start of each species section are excellent. These are relatively unimportant aspects however; the main text and the mass of good solid data presented in a clear concise way make this a very valuable contribution to our knowledge of seabirds and show well what can be achieved by well organised amateur field workers. For those who have an interest in aspects of ornithology other than simply seeing birds, this book is a mine of interesting information and certainly an outstanding scientific document which will be used as the baseline reference for monitoring any future changes in distribution and breeding numbers.

J.R.M.

Seal Song by **Michael Clegg.** Pp. 130. Standard Press, Montrose, Angus, 1974. £3.00.

Some years ago I wrote "Seals are, indeed, fascinating creatures" and anyone who reads *Seal Song* will endorse this statement. This is the story of the first nine months in the life of a common seal, born on a sandbank in the Tay in late June. Interwoven with this is another story: that of an old man in nearby Dundee whose view of the new-born pup led to an interest in seals that soon spread to others members of his family.

After some weeks, the pup leaves his birth area, journeying north to Orkney, but finally returning again to the Tay and the book is enlivened by descriptions of his encounters with other creatures, including man. There are the thousands of terns diving over swarming sand-eels, migrants crossing the North Sea in darkness, the first pink-feet flying in to winter in Perthshire and the great grey shrike, newly arrived from Norway. Mixed with these are other, less usual incidents; the dying gannet entangled in courlene fishing net and the seal's successful skirmish with a dive-bombing bonxie. Mr. Clegg also deals with some of the hazards facing wildlife today and he writes feelingly of the oil that menaces many thousands of sea birds. He describes, too, the quite unnecessary suffering that can be caused when people "rescue" what they believe to be an abandoned seal pup.

All this adds up to a book which will give great pleasure to anyone interested in natural history. But it must not be regarded as a text book on seals, at least in so far as grey seals are concerned. Mr. Clegg has certainly done some careful homework — for example, he gives the not generally known visual method of distinguishing a grey from a common seal — but he is less well informed on other aspects of grey seals and his book contains some unfortunate errors.

G.H.

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THE NATURALISTS' YORKSHIRE

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POPULATION GROWTH AND BREEDING SUCCESS IN A SALTMARSH COMMON TERN COLONY

M. E. GREENHALGH
Dept. of Biology, Liverpool Polytechnic

This paper describes the establishment and growth, together with breeding output (in terms of clutch size, hatching and fledging success) of the Common Tern *Sterna hirundo* colony on the saltmarshes of the Ribble estuary, Lancashire (figure 1). Such a colony is of special interest for a recent survey (Cramp *et al.* 1974) has suggested that in general this species is probably currently decreasing in England.

Methods

Censuses up to 1969 and from 1970-73 are given by Greenhalgh (1971 and in press a, respectively). A further census was made in 1974 using the methods previously described (Greenhalgh 1971).

In the years 1971-3 a sample of nests towards the middle of the colony close to Hundred End was marked with pegs and visited at intervals of 4-7 days. From these visits data on clutch size and hatching success were obtained whilst in 1971-2 efforts were made to calculate fledging success. This was not too difficult in that nests were generally well-dispersed in the colony (see later) and for at least the first fortnight after hatching the young remained within a few metres of the nest-site. Only in the few areas where nest density was very high or vegetation very thick (*Halimione portulacoides* was worst in this respect) was there great difficulty in finding and counting chicks.

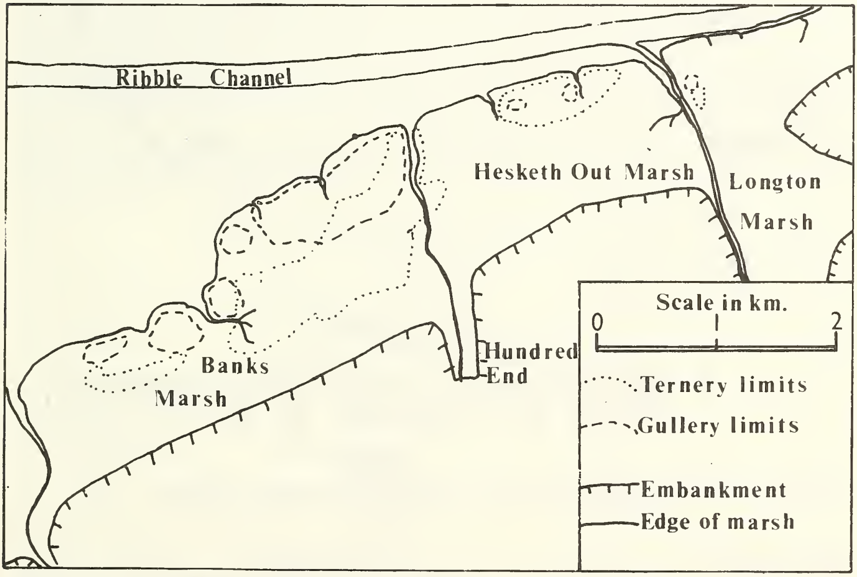

Figure 1. The distribution of the gullery and ternery on the Ribble saltmarshes, 1972-3.

Population Growth

Figure 2 shows the population of the Ribble Common Tern population since its discovery in 1954 to 1974. Overall the rate of increase has averaged 19.3% *per annum*, though in the earliest years (1954-64) the rate was lower at 15% and since 1964 has averaged 24% *per annum*. This increase has closely paralleled the increase of Black-headed Gulls *Larus ridibundus* which breed alongside the terns (Greenhalgh in press b).

The greatest local increase in Common Terns noted by Cramp *et al.* (1974) was from Coquet Island, Northumberland, two pairs in 1958 increasing to 1,500 pairs in 1965 (a rate of 157% *per annum*), which was certainly due to continued movement from other colonies. In the Ribble colony, however, there is no evidence of influxes over several years of Common Terns from nearby decreasing colonies. In fact, the nearer terneries on Walney/Foulney, the Lune estuary marshes and Shotton Pools appear to be fairly stable or increasing (D. O'Kill, personal observations). Certainly, the original settling of the Ribble ternery was by birds forced by disturbance from the nearby sand-dunes at Ainsdale and Southport. This ternery, which used to hold up to 900 pairs (Oakes 1953) became extinct as the Ribble colony was founded.

In 1971 a single pair of Arctic Terns *S. paradisaea* was recorded breeding in the Ribble ternery. In 1972 there were five pairs, in 1973 seven pairs and in 1974 ten pairs.

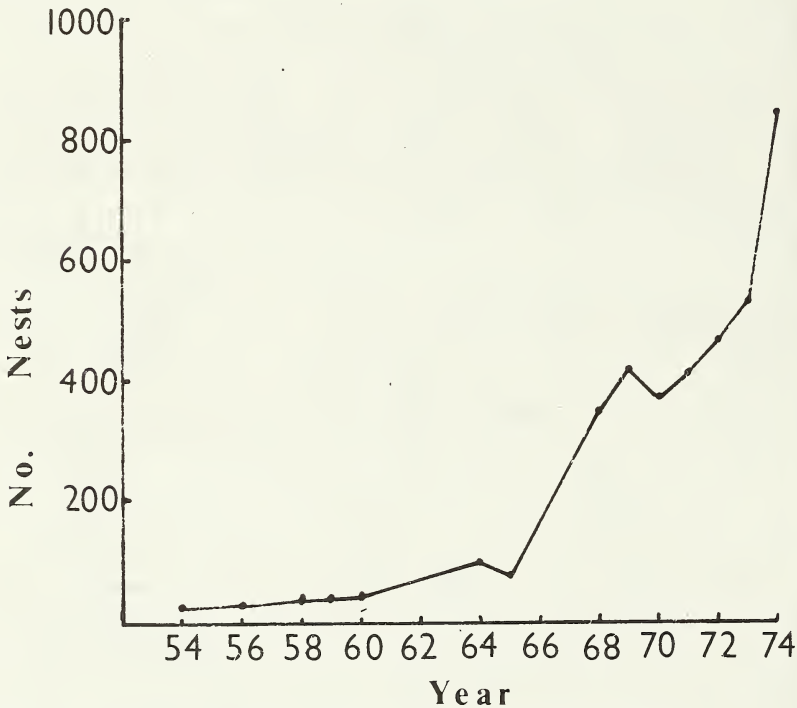

Figure 2. The population of Common Terns on the Ribble marshes, 1954-74.

Nest Dispersion

The ternery covers about 115 hectares of Banks and Hesketh Out Marsh with an average density (in 1974, when the population was 850 pairs) of 7.4 pairs per hectare. Most nests were in a strip across the marsh running along the edge of the Black-headed Gull colony of Banks Marsh, the largest concentrations occurring just out of the gullery, then along the outer edge of Hesketh Out Marsh (figure 1).

Within this zone nest distribution was irregular, in that small distinct groups of nests or subcolonies were scattered over the marsh with often over 100 metres separating one subcolony from the next. In 1972 and 1973 the number of nests in each subcolony was noted and the data are given in table 1.

In 1972 the area enclosing eight subcolonies, having a total of 142 nests, was calculated and the density within this area estimated as one nest per 28.7 m^2 (0.035 nests per m^2). In the same year a similar estimate on the shingle Foulney Island (Cumbria) Common Tern colony gave a mean of one nest per 3.4 m^2 (0.30 nests per m^2).

TABLE 1. Subcolony sizes of Common Terns on the Ribble marshes.

Subcolony size	1972	1973
1 nest	11	14
2-5 nests	19	26
6-10 nests	16	13
11-20 nests	9	11
21-30 nests	2	5
31 or more nests	0	1
TOTAL SUBCOLONIES COUNTED	57	70
mean subcolony size	6.7 nests	7.4 nests

Two factors possibly contribute to the greater scatter of nests on the saltmarsh ternery compared with the shingle beach ternery:

1. The large are of the saltmarsh habitat compared with the narrow shingle split and beach of Foulney where the terns were restricted to the zone above the high water mark;

2. The saltmarsh ternery has been, and still is to some extent, subject to egg-collecting by humans and trampling by cattle. Furthermore, they are largely excluded from the somewhat safer outer marsh (on Banks) by the large gullery. By maintaining scattered small groups over a larger area there would possibly be less likelihood of a predator destroying most or all nests as could happen if they were concentrated in a small area, whilst by having some grouping the tern 'predator-reaction' (Lack 1968) could still be applied.

TABLE 2. Nest composition of Common Terns on the Ribble marshes.

No real nest made (see text)	197
Number of nests containing:	
Grass (*Festuca* or *Puccinellia*)	217
Leaves of *Spartina*	2
Cochlearia	52
Leaves of *Aster*	17
Halimione	22
Atriplex	31
Suaeda	9
Flowers of *Glaux*	5
Cochlearia	11
Aster	1
Armeria	8
Fruits of *Cochlearia*	5
Total nests analysed	426

Personal observations showed similar scatter in the Lune estuary saltmarsh ternery in 1966-68 and Taverner (1965) reported it from the *Spartina* marsh at Needs Oar Point, Hampshire, whilst beach and island terneries in Norfolk, Northumberland, Western Scotland and North Wales showed characteristic high density over just one part of the habitat. Beach and island terns seem to congregate in one small area of the apparently suitable habitat, possibly areas less liable to disturbance than the remainder.

NEST AND NEST-SITE

Table 2 presents data on the composition of 426 Common Tern nests on Banks Marsh. Of the 197 lacking any material, in 23 the eggs were laid on dried cow-pat, 41 on bare mud or sand, and the remainder on flattened vegetation. In the cases where nest material was added, it usually took the form of a shallow cup or ring of freshly-picked vegetation (sixty such nests had a diameter of 113.0 ± 12.9 mm) though a small number had more substantial nests up to 24 mm deep and 204 mm diameter.

Nest-site was related to three factors:

1. Raised areas of the marsh. On Hesketh Out Marsh the nests were concentrated on small raised 'islands' at the river-edge of the marsh. Such islands were up to seven metres higher than the surrounding marsh. Concentrations also occurred on the raised edges of the marsh channels (a characteristic of the distribution of most wader and gull nests on saltmarshes cf. Greenhalgh 1969 and in press b, Taverner 1965). This is presumed to be a reaction to avoid flooding of nests by spring tides which usually left these areas exposed. Such positions are also better vantage points so that potential predators can be seen from a distance as they approach.

2. Vegetation. In general largest tern subcolonies occupied areas of thicker vegetation, mainly *Atriplex littoralis, A. hastata, Suaeda maritima* and *Cochlearia anglica.* This vegetation generally tends to occur on the marsh 'islands' and channel ridges.

3. Gullery distribution. In the areas occupied by the large Black-headed Gull colony (and also Lesser Black-backed and Herring Gulls *L. fuscus* and *argentatus*) the gulls nest in the areas described above (Greenhalgh in press b), excluding the terns or forcing them to nest on the lower *Festuca* marsh, often closer to the marsh embankments. In such areas

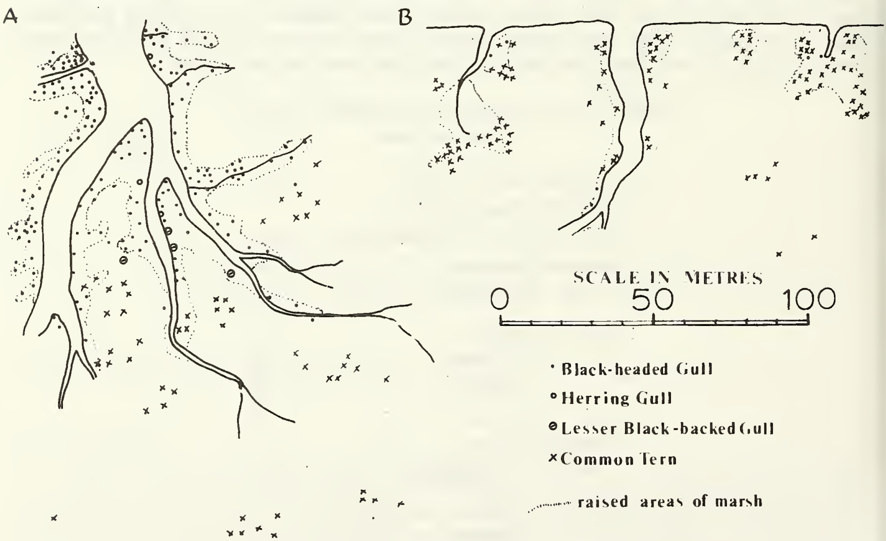

Figure 3. Nest distribution of gulls and terns on parts of A. Banks Marsh and B. Hesketh Out Marsh, 1973.

the terns' nests are more vulnerable to flooding by spring tides, trampling by grazing cattle and collection by humans who venture less onto the outer marsh with its maze of channels.

Figure 3 shows nest distribution on two different areas which illustrates these points, on Banks Marsh where it can be seen that the terns are generally excluded from the channel edges and associated rich vegetation by the gullery, and from Hesketh Out Marsh where there were few gulls and the terns occupied the raised areas.

Clutch Size and Hatching Success

Table 3 presents clutch size and hatching success during the years 1971-3 from a sample of Common Tern nests from the centre of the Ribble ternery close to Hundred End channel. Mean clutch size here was 2.42 eggs and hatching success 1.80 young per pairs (74%). Losses were probably entirely due to flooding of lower nests by spring tides in early June 1973 and robbery by gulls, particularly Herring and Lesser Black-backed Gulls.

TABLE 3. Clutch size and hatching success of Common Terns on the Ribble Marshes.

	C/1				C/2			
Year	No. Nests	No. Eggs	No. Hatch	% Hatch	No. Nests	No. Eggs	No. Hatch	% Hatch
1971	11	11	2	18	47	94	68	72
1972	19	19	5	26	67	134	101	76
1973	9	9	2	22	32	64	47	74
Totals	39	39	9	23	146	292	216	74

	C/3				Totals		
Year	No. Nests	No. Eggs	No. Hatch	% Hatch	No. Eggs	No. Hatch	% Hatch
1971	89	267	211	79	372	281	76
1972	79	237	198	84	390	304	78
1973	28	84	52	62	157	101	64
Totals	196	588	461	78	921	686	74

Clutch-one nests were markedly less successful than two- and three-clutch nests, the hatching successes of which were fairly similar. Coulson and White (1961) showed that in the Kittiwake *Rissa tridactyla* younger females tend to lay smaller clutches whilst Horobin (1969) found that in the Arctic Tern young breeders had a very low success rate. It may be therefore that the Common Terns laying clutches of one were predominantly young breeders.

TABLE 4. Clutch size and hatching success of Common Terns on the Ribble Marshes in relation to the date of laying

Approx. date of 1st egg	–5 June	6–15 June	16–25 June	25 June onwards
Mean clutch	2.62	2.22	1.88	1.74
No. of eggs laid	508	211	28	14
No. eggs hatched	418	153	12	2
% eggs hatched	82.3	72.3	42.8	14.3

Clutch size and hatching success tend to decrease through the breeding season (table 4), though in areas where many eggs are robbed by humans, lost to the tides or smashed by cattle this is confused due to replacement clutches. In one such area on Banks Marsh in 1971 the mean size of 43 first-clutches was 2.77 eggs and of 37 replacements 2.56. Furthermore, it appeared from general observations that hatching success amongst replacements was similar to that amongst first-clutches where heavy losses did not occur (tables 3 and 4). For example in 1973 at least 61 young hatched from 37 nests (1.65 per nest) laid after 10 June on one area of Hesketh Out Marsh where previous nests had been mostly lost to spring tides. In general therefore, losses made earlier in the season can be made up by replacements which may be laid up to mid-July (in 1974,14 replacements were laid in the period 22-27 July following flooding).

Fledging Success

Without ringing the young whilst still in the nest it is very difficult to calculate the fledging success of each particular brood as there is likely to be some mixing of broods, particularly as they near fledging. However, in a colony such as the Ribble where terns nest in distinct small groups it is possible to calculate fledging success by working out the number of young terns fledged within the separate groups, knowing already the number of nests and young hatched within the groups. Some young may be overlooked, as is the case with following-up most semi-nidifugous species so that any estimate of fledging should be considered minimal. In the Ribble ternery however, young are easy to find, especially when fairly large. Possible errors due to birds fledging which may have been considered dead and due to birds recorded as fledging but which have in fact died probably balance each other out.

By thorough searching in 1971 and 1972 estimates were made of fledging success of the birds hatched and recorded in table 3. The results are given in table 5.

TABLE 5. Fledging success of Common Terns on the Ribble Marshes, 1971-2

	No. hatched	No. fledged	% young fledged
1971	281	96	34.1
1972	304	171	55.3
Totals	585	267	45.6

The low fledging success of 1971 was mainly due to a high proportion of small young dying as a result of heavy rainfall which probably resulted in chilling. For instance, on 28 June 1971, 17 out of 23 young in two subcolonies were found dead following heavy rain the previous day.

In the last two years (1973-4) very heavy mortality in some areas has been due to predation by the increased Herring and Lesser Black-backed Gulls which have obtained a high proportion of their food from the Black-headed Gull and Common Tern colonies (personal observations). The possible effects of further increases of these large gulls on the smaller saltmarsh species is causing some concern, for in many areas such increases have caused directly by predation, or indirectly by alteration of the habitat, the extinction or gross reduction of terns and other vulnerable seabirds (see Cramp *et al.* 1974).

Conclusion

After much persecution on the beaches of northwest England Common Terns have established a large colony on the Ribble saltmarshes. At present breeding success, which has probably been high enough to result in a steady increase of the colony, is reduced by two types of factor:

1. Environmental in the form of tidal flooding of the lower nests and chilling of young by heavy rain.

2. Biotic in the form of trampling of nests by cattle (this affects nests on the inner marsh), collection by humans (this has been reduced by wardening), predation of eggs and young by gulls and exclusion of tern nests from the better nesting sites by the gulls. This causes them to nest on lower areas, where flooding is more likely, or the inner marsh, where trampling by cattle or human collection is more likely.

At present these are not sufficient to result in a decline of the ternery; in fact, it continues to increase. However, should the gulls' increase continue to the point at which they cause direct or indirect reduction of the ternery then a control programme will be necessary. Terns are such vulnerable species when it comes to disturbance and predation by gulls that it would appear good policy to conserve such large and growing colonies.

ACKNOWLEDGEMENTS

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RED AND GREY SQUIRRELS IN THE SHEFFIELD AREA: 1970-73

D. HERRINGSHAW and D. GOSNEY

The introduction of the American grey squirrel *(Sciurus carolinensis)* in the early years of the twentieth century and its subsequent rapid spread throughout the British Isles, followed by a parallel decline of the British red squirrel *(Sciurus vulgaris)* has already been extensively documented. A series of studies of the changing pattern of distribution on a national scale have been published in *Journal of Animal Ecology* and elsewhere. These results were summarised in the *New Naturalist* monograph 'Squirrels' (Shorten 1954).

The Sheffield region has been in the transitional zone between the two species for some twenty years now and their patterns of distribution have undergone a number of changes during the course of this period. A survey was carried out by The Sorby Natural History Society in 1955 and the results were published in the British Association Handbood *Sheffield and its Region* (Linton 1956). This survey showed that red squirrel was still present in eight of the nine ten-kilometre grid squares immediately surrounding Sheffield, whilst the grey squirrel was already established in six squares. Three of these squares were thus apparently completely free of grey squirrel at this time.

This survey was repeated by D. A. E. Spalding in 1965 and the results published the following year in *The Naturalist* (Spalding 1966). This paper summarised much of our knowledge of the distribution of the two species within the Sheffield region and also outlined the history of the introduction and and subsequent spread of the grey squirrel within South Yorkshire. The survey received a large amount of publicity both in the local press and within the Sorby Natural History Society and its results can thus be judged to be reasonably accurate. The grey squirrel was found to have continued its increase and had now moved into one additional ten-kilometre square, whilst increasing in density in certain of the other squares. The red squirrel had dwindled in numbers and was confined to very few localities within six ten-kilometre squares. This change in distribution of both red and grey squirrels within the same nine squares surveyed in both 1954-5 and 1965 is shown in Figure 1.

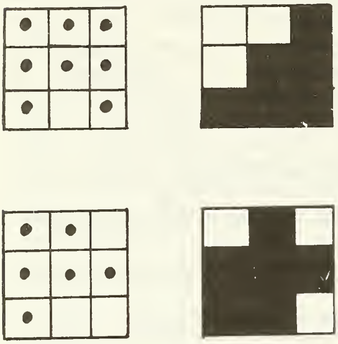

Figure 1 Change in the Distribution of the Red and Grey Squirrel (left and right) in the Sheffield Area, 1954-5 (above) and 1965 (below). (After Spalding 1966).

There thus seemed little hope for the survival of the red squirrel within the region, indeed, so pessimistic was David Spalding regarding the future of this species that he expected it to "barely maintain a foothold in the area in another ten years" (Spalding 1966). In the late 1960's a number of reports were received of sightings of the red squirrel within areas where this species had been formerly common at the time of the 1954-5 survey, but had subsequently disappeared. In view of this apparent recolonisation of former breeding areas a request for information on both squirrel species was placed in the Sorby Natural History Society's monthly Newsletter of May 1970. A further request for information was given at the beginning of 1971 and additional publicity was provided by an article on the subject in the local press and a short programme on Radio Sheffield. Within a very short time a large number of sightings were received both from members of the local natural history society and from the general public. Such was the response that the writer decided to extend the survey into 1972 in an effort to ensure an even more complete coverage of the twelve ten-kilometre squares which make up the Sheffield region. Further red and grey squirrel sightings within 1973 have been incorporated into the results in order that this account will be fully up-to-date.

Great care was taken to ensure accuracy in the acceptance of records of the red squirrel. Wherever possible the informant was questioned on the method of identification, the distance from the specimen and its general behaviour. Visits to the actual locality of the sighting took place wherever there was doubt about the reliability of identification. All such

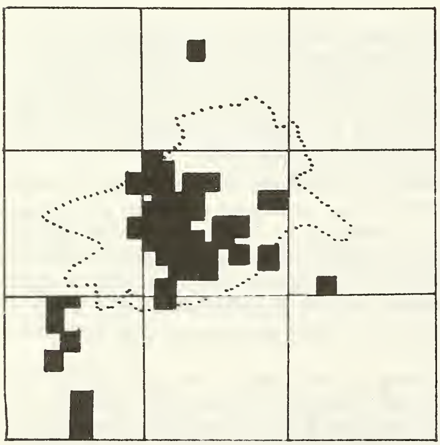

Figure 2a Distribution of the Grey Squirrel in the Sheffield Area, 1965. (Based on Spalding 1966.)

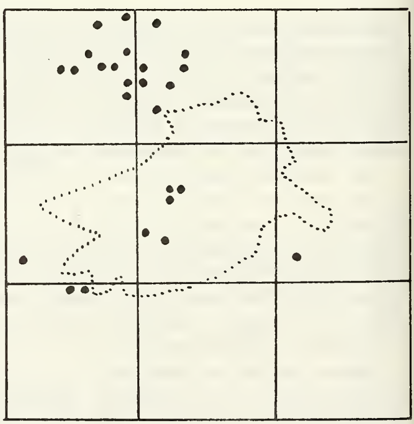

Figure 2b Distribution of the Red Squirrel in the Sheffield Area, 1965. (Based on Spalding 1966.)

doubtful records which cold not be substantiated either by the writer or the informant were rejected.

By the end of 1973 results were sufficiently detailed to justify presentation of the data in the form of a written paper. The many individual records were incorporated on a card index and accuracy was usually sufficient to enable the localities to be mapped to the nearest one-kilometre square. The results are presented on the accompanying maps (Figures 3 and 4) which represent the twelve ten-kilometre squares containing one or other of the two species are blocked in on the maps. All records are for the period beginning January 1970 and terminating in December 1973. The major rivers and the city boundary are also shown.

A comparison of the grey squirrel records obtained in the present survey (Figure 3) with those received in the 1965 survey (Figure 2a) shows that this species is now present in all of the twelve ten-kilometre squares surveyed. It would seem to have consolidated its hold on the city square (43/38) occupying every suitable woodland, and has been recorded on occasion in small gardens with only one or two small trees or shrubs. Elsewhere it has populated most areas of woodland and has moved into those ten-kilometre squares in which it had not been reported in 1965. In these latter squares it would still seem to be thinly scattered and it has not yet consolidated its hold. So dense in places is this local population that there are now several small communities living on the moorland fringe and not a few instances of specimens being sighted on open moorland considerable distances from suitable trees.

With regard to the distribution of the red squirrel a surprising picture emerges. From a mere scattering of records obtained from six ten-kilometre squares in the years 1960-65 (Figure 2b) there have been in the period 1970-73 a greater number of sightings from eight ten-kilometre squares (Figure 4). There would seem to be little doubt that the nucleus of the population concentrated in 43/29 in 1965 has increased and perhaps formed a valuable reservoir for the repopulation of other areas. There are now, within the twelve ten-kilometre squares surveyed, three main population nuclei: one concentrated in the Upper Derwent valley (43/19) in conifer plantations, one in the Bradfield-Ewden are (43/29) again largely in conifer plantations and another in both coniferous and deciduous woodland at Wharncliffe and Grenoside (43/39). The Upper Derwent valley was not included in the 1965 survey but this colony has probably been in existence since the maturation of the plantations surrrounding the Ladybower-Derwent-Howden reservoirs. The Wharncliffe-Grenoside area formerly held a very high red squirrel population which had almost completely disappeared by the time of Spalding's survey. There seems little doubt that a gradual repopulation of this area has taken place within the last six or seven years, possibly as a result of movement from the Ewden valley. It is of course also possible that one or two specimens remained and through subsequent reproduction have helped in the gradual build-up of a local breeding stock once more.

There has also been within recent years a gradually increasing number of reports of red squirrel from within Sheffield City boundary. Such reports were very carefully checked,

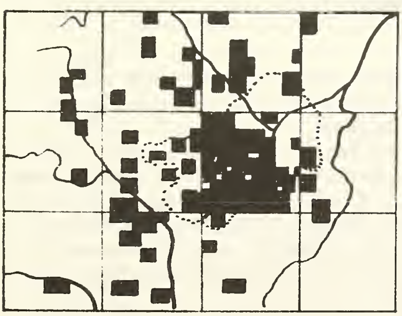

Figure 3 The Distribution of the Grey Squirrel in the Sheffield Area in 1970-73

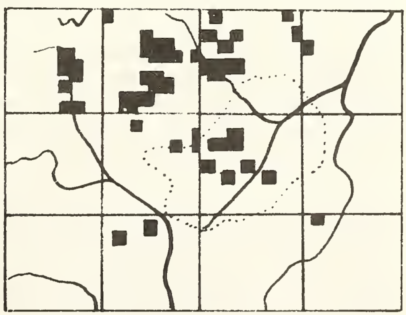

Figure 4 The Distribution of the Red Squirrel in the Sheffield Area in 1970-73

many were undoubtedly oddly coloured or mis-identified grey squirrels but after careful analysis there is left a scattering of red squirrel sightings from within the city boundary as shown in Figure 4. Such reports may be of individual strays from the main areas of population to the north-west.

Elsewhere, away from the major breeding areas cited above, there have been additional records of both individual red squirrels and very small populations within mixed woodland south of Sheffield. Many of these reports may simply be of individual squirrels wandering from the colonies further north.

In conclusion, the future for the red squirrel within the Sheffield area would seem to be somewhat brighter than it appeared to Spalding in 1965. There appears to be little doubt that the main factor largely responsible for this increase within the region is the maturation of conifer plantations around many of the local reservoirs to the north-west of the city. These woodlands, on the Pennine fringe, now hold the main population of red squirrel within North Derbyshire and South Yorkshire and may be ultimately responsible for a gradual recolonisation of deciduous woodlands elsewhere in the region. The proposed use of Warfarin by the Ministry of Agriculture, Fisheries and Food to control the grey squirrel in areas where it is a pest would have a severe effect upon the red squirrel population in this area. This would be especially true in those localities where the red and grey squirrel coexist.

An additional feature of interest is the increasing proportion of melanistic specimens of the red squirrel. Spalding (1965) noted only one instance of the melanistic form, this being seen in Greno Woods in 1955. Within the last two or three years black specimens have been noted with some frequency in the Ewden and Wharncliffe areas although, as yet, none have been reported from the Upper Derwent valley.

The future of our native red squirrel should be of interest to all naturalists, and the present population within North Derbyshire and South Yorkshire still requires much further investigation, in order to ascertain more fully the factors affecting the status and distribution of the species within the area.

ACKNOWLEDGEMENTS

This paper could not have been written without the assistance of many people including members of the Sorby Natural History Society, other local naturalists and many citizens of Sheffield. To all of them we are deeply grateful for their interest and help.

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FIELD NOTE

Little Gull ***(Larus minutus)*** **at Swillington**

While birdwatching at Swillington on April 15th, 1974, I saw three Little Gulls flying around over the main ing, in company with Black-headed Gulls *(Larus ridibundus),* the smaller size of the former species attracting my attention.

Two of the Little Gulls were adults and it was easy to see the contrast between the dark underwing and the pale grey upper wing. Also the black heads of the adult Little Gulls were noted and were compared with the chocolate-brown head of the Black-headed Gulls, and was seen to be more extensive, reaching well down the back of the neck. The third was an immature bird. It had a black spot behind the eye and a black diagonal bar across the upper wings. All three had a more buoyant flight than the Black-headed Gulls and fed regularly by picking insects off the surface of the water in flight.

Inland occurrences of Little Gulls in spring are infrequent and the appearance of these birds may be associated with easterly winds which prevailed at this time. C. E. Andrassy and R. L. Brook also saw the birds and agreed with the diagnostic details given above. G. Carr

NOTES ON THE FOOD OF FOXES ON SPURN PENINSULA

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Museum and Art Gallery, Doncaster

Foxes have long been a component of the vertebrate fauna of Spurn, co-existing with the cherished species which have, over the years, made the Peninsula famous.

The work of de Boer (7 and 8) has shown that a succession of promontories emanating from the northern shore of the Humber mouth have been built up, under certain conditions of tide and wind, from materials eroded from the receding Holderness coast. In the past, the promontories, of which Spurn point is the latest of this series, have alternately been built up and destroyed by regular cycles of events. During the build-up phase of each cycle the area becomes a natural deposition zone for debris washed down the Holderness coast. Debris which no doubt would have included periodic harvests of dead birds and other carrion accumulated by appropriate storm and tide conditions would certainly have attracted scavenging foxes and focussed the attention of these gastronomic opportunists on the promontories whenever they developed. Partly on account of this it is reasonable to assume that breeding or scavenging populations of foxes would have been included in the faunas of the earliest known Humber mouth promontories. Another feature which probably acted as an additional magnet for foxes during the early days of the existing peninsula was the presence of a rabbit warren at Kilnsea. Kilnsea warren was the earliest known commercial rabbit warren in the East Riding of Yorkshire, being fully active as early as 1412 and operating up to the mid-18th century (12).

Although the fox is such an obtrusive member of Spurn's resident vertebrate fauna, very little information is available on its history, present status and role there as a predator and scavenger. Michael Clegg's paper on the mammals of Spurn (2) provides the only available summary. In it he states that the area has been a stronghold for the fox for many years, that it was well established on the peninsula during the period 1960-64 and that occupied earths were found in bushy areas and at least three families were in residence during 1964.

In view of the scarcity of direct evidence on the impact of foxes on the ecology of Spurn, the following brief notes are provided to form the basis of a prey list and possibly, if further work is carried out, help to construct a competent evaluation of the role and importance of foxes as predators and scavengers.

During November 1973, 41 batches of fox dung were collected from Spurn Nature Reserve. Droppings or "scats" were sparsely distributed over most parts of the reserve though definite concentrations, providing the majority of the specimens, were evident around rabbit workings particularly on the Humber side of the road and from beneath the line of overhead electricity cables which run down the peninsula to the life-boat cottages.

Each batch of pre-soaked "scats" was individually broken up by hand under running water. The separated contents were washed into an eighth inch mesh sieve which collected most of the fur, feathers and large skeletal fragments and run-off water containing finer particles (e.g. rodent teeth and fine feather remains) was led off into a settling tank. By using the keys in Day (6) and Harris (12) it was possible to classify most of the food taken by examining the fine structure of the feathers and fur and from skeletal and dental remains.

The food types identified from each batch of "scats" were noted thus providing the basis of a food list and an index of frequency was achieved by noting the number of batches in which each food type occurred. Although this indicated which organisms are eaten and throws light on the diet of the foxes, little account was taken of the relative volume of each food type, consequently no accurate comment can be made on the relative importance to the foxes of the various foods listed. It seems likely, however, that the composition of the diet depends largely on abundance and availability rather than selectivity.

Food type	*Number of dung batches containing food type*	
Lagomorpha	24	
Microtus agrestis	8	36 batches containing
Rattus norvegicus	2	mammal remains
Apodermus sylvaticus	2	
Small Passerines (2 Alaudidae and 2 Motacillidae)	8	
Turdidae	2	
Sturnidae (probably *Sturnus vulgaris)*	2	22 batches containing
Charadriidae	4	bird remains
Laridae	4	
Colombidae	2	

Supporting the popular belief, lagomorphs were the most frequent prey taken and judging from the large amounts of lagomorph fur, bones and teeth — the fur forming the matrix of the majority of "scats" — they formed the most important food in terms of volume. Although no attempt was made to distinguish between the remains of rabbit and hare, from the relative frequency of these species on the peninsula (2) it is likely that most, if not all, the remains were of rabbit. Surprisingly, the Short-tailed Vole *(Microtus agrestis)* was the most frequently taken small mammal. This feature perhaps indicates a population swing since Clegg's survey which recorded it as less common than the Bank Vole *(Clethrionomys glareolus)*, a species habitually taken by foxes elsewhere but which was not represented in these samples.

It was interesting to note that all "scats" containing the remains of medium and large-sized birds (pigeons, waders and gulls) were collected from sites along the Humberside of the peninsula, particularly near the overhead power cables. As several partly-eaten bird carcasses were found beneath the power cables it seemed reasonable to assume that foxes habitually patrolled the area, birds which had fallen foul of the cables giving added bonus to the strand-line corpses. The territorial feature of defecating on or near to food (1) was also particularly noticeable in areas beneath the power cables, thus providing further indication that foxes are particularly attracted to this evidently food-rich zone. From evidence of foot-prints foxes also patrolled the seaward strand-line, but analysis of the few "scats" from this side of the peninsula did not indicate the same success in dead-bird scavenging, neither were remains of bird corpses as frequent as on the Humber shore. No doubt the productivity of the eastern shore depends upon there having been appropriate bad weather conditions.

The presence of small and medium sized passerines (larks, pipits, starlings and thrushes) in the diet could well be a feature of migratory periods. Particularly during adverse weather conditions, numbers of birds weakened by their migratory ordeal die from exhaustion on reaching Spurn. Being, as Fairley (10) puts it, "gastronomic opportunists", foxes will utilize this crop of corpses as well as 'weeding out' specimens rendered vulnerable through excessive fatigue.

Conflict of opinion exists over the toleration of foxes on managed nature reserves, particularly where the popular interest is focussed on ornithology. During the bird breeding season foxes are regarded with hostility, having been blamed at Spurn and Gibraltar Point Nature Reserves for jeopardising the future of the colonies of little terns *(Sterna albifrons)* (3 and 4). Actual evidence of a hostile policy being exercised is the shooting of foxes at Spurn (4 and 11). On the other hand some natural history factions tolerate foxes for their effect in controlling rabbit populations, thus reducing the danger of overgrazing the herbage. This again seems to be the case at Gibraltar Point and Spurn (2 and 3). Generalisations about the food and feeding of foxes published in reviews of British predatory mammals (e.g. 5, 14, 15 and 17) are very limited, being based on surprisingly little data. A balanced evaluation of the fox's true role as a predator and scavenger cannot therefore be accurately arrived at without gathering further local information. Southern and Watson (16) were rather more outspoken about the lack of precise information, stating that "hearsay forms the basis of most statements and it is by now most desirable that such statements should be checked......by scientifically collected data". Certainly the data available in the above works is insufficient to allow the formulation of a valid predator control policy, indeed recent researches (9, 10 and 13) are showing that the popular traditional notions on the predatory propensities of foxes are having to be dispensed with.

Like owl pellet work, mammal dung analysis is both fascinating and revealing if carried out in a systematic manner. It is invaluable in providing a more exact understanding of the predator's feeding habits and diet, information of this nature being useful if reviewing predator-prey relationships in terms of nature reserve management policies.

ACKNOWLEDGMENTS

I would like to thank Mr. J. Hartley of the Spurn Bird Observatory Committee who made available information on the control of foxes on Spurn and without whose help the study could not have been carried out. Thanks are also due to Doncaster Metropolitan Borough Council Education Committee who made available facilities for the analysis of the specimens.

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Calendar of the Countryside for 1975.

As a useful, decorative and inexpensive Christmas gift, we commend this attractive calendar with its coloured reproductions of specially commissioned paintings depicting Old Country Crafts. The crafts illustrated are hand sowing, reaping, ploughing and milking, sheep shearing, hedge laying, hay stacking, besom and wattle hurdle making and thatchers, blacksmiths and wheelwrights at work. The calendar is $8\frac{1}{4} \times 5\frac{7}{8}$, is designed to stand or hang and is published by and obtainable from Christian Action Publications Ltd., 104-5 Newgate Street, London EC1A 7AP, price 85p. post paid.

A RECORD OF PRESERVED HUMAN REMAINS FROM BLANKET PEAT IN WEST YORKSHIRE

HEATHER M. TINSLEY
The Department of Geography,
University of Keele

Recent examination of the Ripon Millenary Record published in 1886 drew the author's attention to the discovery of a peat-embedded human body on Grewelthorpe Moor, near Kirkby Malzeard (Grid. Ref. SE 170758). The find was made in 1850 by two brothers while peat cutting:—

> "they came upon the body of a man, in an almost complete state of preservation, and from his dress evidently a Roman, which the peat had tanned and dried, in a remarkable manner, somewhat like an Egyptian mummy. The robes were quite perfect when found, the toga of a green colour, while some portions of the dress were of a scarlet hue; the stockings were of yellow cloth, and the sandals of a finely artistic shape, one of which was preserved, and we believe is now in the museum of the Yorkshire Philosophical Society. The flesh was tanned into a kind of white fatty substance and had a very offensive smell. (Grainge, 1886).

This find appears to have been largely ignored and yet it is certainly very rare for human remains to be so well preserved in upland blanket peat. Although Glob (1969) notes that 41 preserved bodies have been recorded from bogs in England and Wales, most of these must have come from lowland mires similar to those in Denmark where over 150 bodies have been discovered. The Danish discoveries are the best documented in Europe and most have been attributed to the Roman Iron Age (Glob, 1969). For a body to be preserved, the environment must be completely anaerobic, and the Danish examples appear to have been deposited in pools on the mire surface.

The 1886 description of the body notes a good state of preservation, and yet the description of the flesh as "tanned into a kind of white fatty substance" somewhat belies this. The well-preserved bog bodies described by Glob *(loc.cit.)* from Denmark all have the skin tanned to a uniform dark brown. In addition, inhabitants of the Kirkby Malzeard area who have heard accounts of the incident from their grandfathers, recall that the body disintegrated soon after discovery. It was finally buried in an unmarked grave at Kirkby Malzeard parish church. However, the sandal and a portion of one of the stockings are still held in the Yorkshire Museum and are considered to belong to the Roman period (Hartley, 1974).

The presence of the Romans in this part of the Yorkshire Dales is well known; to the west across Nidderdale lie important Roman lead mines at Greenhow Hill, and on the lowlands to the east of Grewelthorpe Moor the Roman villa site of Castle Dikes has been excavated at North Stainley. There are, however, no known Roman routes across the intervening moors. Palynological investigations of peat deposits from this area (Tinsley, 1974) have shown that the heathland was already established by the Roman period; therefore the reasons for a burial at such a remote spot must remain a matter for conjecture.

ACKNOWLEDGEMENTS
Mr. H. Gillies of Harper Hill, Grantley, kindly helped me to gather information for this article.

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OSTEOLOGY OF DEFORMED VERTEBRAL COLUMNS IN THE CYPRINID FISH *PHOXINUS PHOXINUS* L. OF LAKE WINDERMERE

BRIAN W. COAD
Department of Biology, University of Ottawa

The minnow, *Phoxinus phoxinus,* is commonly found schooling in littoral areas of Lake Windermere (Frost, 1943). Individuals with a deformed vertebral column (Figure 1) were first observed around the Ferry House, Far Sawrey in 1969. The Supply Department of the Freshwater Biological Association, Far Sawrey has collected samples of the minnow, containing some deformed individuals, for several years and kindly supplied the specimens for the present study from their June 1973 collections. Additional specimens collected in the years 1970-1972 proved to be similar to the 1973 sample.

The structural changes in the vertebral column associated with the deformation are illustrated in Figure 2. Table 1 lists the data on the specimens and the position of the modified vertebrae. The Weberian apparatus was counted as four vertebrae. The nature of the deformities was determined by examination of radiographs and by dissection of alizarin stained specimens. Curvatures of the vertebral column were found in both the sagittal and horizontal planes. Vertebral centra were dorsally, ventrally or laterally shortened. There was some shortening of neural and haemal arches and spines where curvature was marked and particularly where curvature occurred adjacent to a median fin. Within individual fish the deformed vertebral column varied from a slight flexure in one plane only to complex, repeated flexures in both planes.

No estimate of the frequency of deformed individuals was undertaken but they were readily visible in the field. Their swimming ability was less than that of normal individuals; nevertheless some fish survive to adulthood since females carrying eggs and males bearing breeding tubercles were found in the sample under study.

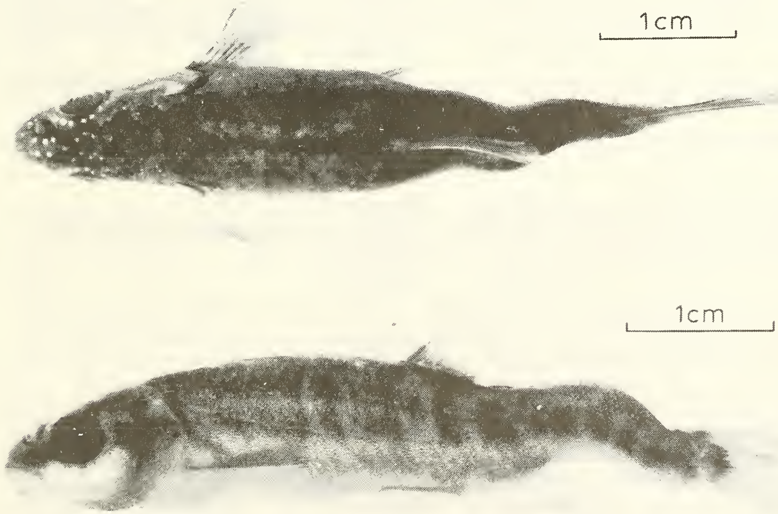

Figure 1. Dorsal view of 48 mm. S. L. adult male *Phoxinus phoxinus* (above) and lateral view of 51 mm. S. L. adult female *P. phoxinus* (below) with deformed vertebral columns.

Table 1. Typical positions of deformed vertebrae in minnows taken from Lake Windermere, June 1973.
(A = abdominal vertebrae; C = caudal vertebrae.)

Standard length, mm.	Sex	Vertebrae deformed	Position of shortened centra
55	♀	11—16 A	Ventral and left lateral followed by dorsal and right lateral
		23—30 C	Ventral
		33—34 C	Right lateral
51	♀	30—34 C	Ventral
		38—40 C	Dorsal
48	♀	14—16 A	Dorsal and left lateral
		23—28 C	Dorsal and left lateral, neural and haemal spines depressed
48	♂	12—14 A	Dorsal
		15—18 A	Left lateral and ventral
		21—24 C	Dorsal
		26—27C	Ventral
		32 C	Dorsal
39	♀	31—33 C	Left lateral
38	♀	28—31 C	Right lateral
		33—34 C	Ventral
35	♀	12 A	Dorsal
		15—24 A, C	Ventral followed by dorsal, neural spines shortened
		28—29 C	Left lateral
35	♂	31 C	Ventral
		32—33 C	Right lateral
		34—35 C	Dorsal and right lateral
32	♂	14—15 A	Ventral
		17—18 A	Dorsal
		33—34 C	Ventral
30	♀	12—13 A	Ventral
		17—18 A	Ventral
		20—22 C	Dorsal

The causative factors for the deformed condition are probably environmental variables such as adverse temperature conditions acting during ontogeny (Schaperclaus, 1954). There may be an inherited component but this was not investigated.

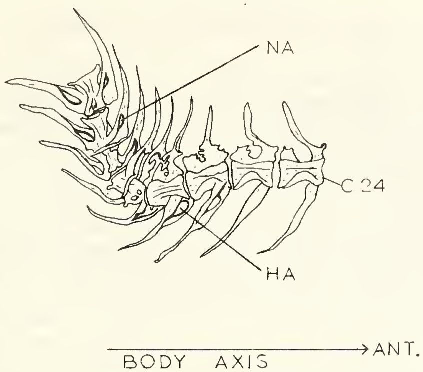

Figure 2. Right lateral view of deformed caudal vertebrae in a 48 mm. S. L., female *Phoxinus phoxinus*. Vertebral centra are dorsally and left laterally shortened.
(C24 = 24th centrum; HA = haemal arch and spine; NA = neural arch and spine.)

ACKNOWLEDGEMENTS

The author would like to thank Dr. D. E. McAllister, Curator of Fishes, National Museum of Natural Science, Ottawa, Canada, for the use of X-ray facilities. Mr. J. D. Allonby, Supply Department, Freshwater Biological Association, Far Sawrey, Westmorland, kindly supplied specimens of *P. phoxinus*. The photographs comprising Figure 1 were taken by Mr. G. Ben-Tchavtchavadze, University of Ottawa.

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Fish Charts of the British Isles and Northern Europe. *Sea Fishes (1)* and *(2), Freshwater Fishes (3)*: *Shellfish (4)*. Titles 1, 2 and 4 illustrated by Anthony Morris; title 3 illustrated by Baz East. Frederick Warne & Co., Ltd., 1974. 54p. each or, in individual plastic containers, 75p.

The illustration of fishes in colour and to a reasonable likeness, is never an easy task and so the artists of these new charts (size 504 × 768mm) must be complimented on the results of their apparently simple but effective techniques. A total of 20 species of freshwater fishes and 46 marine fishes are illustrated on three of the charts which are printed on a matt-finished, medium weight paper and which unfortunately give no indication of the dimensions of the species depicted. The marine species shown are all common types to be found between tide marks, or those usually caught by rod and line or commercial fishing craft, and thus while these charts will no doubt command a ready sale because of their aesthetic qualities, they should also prove useful in schools and field centres when talks and visits to the fish-market, the shore and fish hatcheries are being contemplated. The fourth chart, *Shellfish*, including as it does such a variety of marine life would be better entitled *Marine Invertebrates*. The paintings here are less well executed, there is again no indication of natural size and on the whole a better presentation and selection of species could have been attained.

D.E.W.

A COMMENT ON THE IDENTITY OF *MEGASELIA* FLIES REARED FROM DEAD SHREWS

R. H. L. DISNEY
Malham Tarn Field Centre, Yorkshire

In my note on insects reared from dead shrews (Disney, 1974) I recorded some Phoridae which I had identified as *Megaselia (= Aphiochaeta) errata* Wood. The specimens were identified by means of Lundbeck (1922). The complex genus *Megaselia* had been only partly revised by Schmitz (1956, 1957, 1958) before his death in 1960. The completion of his work on this genus is continuing (Schmitz and Beyer, 1965a, 1965b, 1974, Schmitz and Delage, 1974) but has not yet dealt with the group that includes *Megaselia errata*. Having been able to examine more specimens of *Megaselia* (of various species) I now conclude that the specimens I reared from dead shrews are nearer to Lundbeck's species *Megaselia rata* Wood.

On page 215 of Lundbeck the cluster of species that includes *M. errata* is separated (at couplet 27) from the group including *M. rata* by the presence of "long bristles" on the sides of the second abdominal segment. *M. rata* is arrived at by observing a lack of such "long bristles". However in his description of *M. rata* Lundbeck notes that the marginal hairs of the abdominal segments are very short but goes on to comment that "at the side margins of second abdominal segment they are a little longer, sometimes rather conspicuous". In the specimens under consideration they are certainly conspicuous. The general galaxy of characters, however, seems to place these specimens nearer to *M. rata* than to *M. errata*. My specimens are, however, a little larger than the length given by Lundbeck for these species.

Kloet and Hincks (1945) list *M. rata* as a synonym of *M. giraudii* (Egger).

Until the revisionary work of Schmitz and Delage is completed there must remain problems with the identity of species of *Megaselia* related to *M. errata*.

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Birds of the Yorkshire Coast by **Richard Vaughan.** Pp. 94 with 80 plates. Hendon Publishing Co., Nelson, Lancs. £1.20 paperback: £1.70 hardback.

Professor Richard Vaughan has provided a lavishly illustrated guide to the birds of the Yorkshire coast. The plates are of excellent quality and portraits of the birds most frequently seen are supplemented by habitat shots. The text is brief but adequate, although for the stranger to Yorkshire a little more detailed information about access to the various sites would have been helpful. The coast is surveyed from Teesmouth to the Humber estuary. The author is to be congratulated on providing an interesting and pleasing pictorial record of his detailed observations of Yorkshire coastal ornithology.

J.D.P.

A LIST OF CRANEFLIES FOR LINCOLNSHIRE

ALAN E. STUBBS

Lincolnshire is a much neglected county for Diptera and there would appear to be very little information on the craneflies. This paper sets out the results of collecting between the 12th and 17th June 1972, plus a small supplement on 3rd August 1972, and offers a provisional list of 89 species in the vice-counties of Kesteven and Lindsey.

The time of year was ideal, but in view of the seasonal pattern of emergence of craneflies it is clear that a substantial number of species could be added by collecting at other times of the year. Despite the fact that craneflies are particularly wetland insects and much of the county is barren of suitable habitats, it proved relatively simple to locate satisfactory scattered collecting spots whilst travelling through the county. A fairly good range of habitats was sampled, but many useful localities were probably missed. The records cover the western part of Kesteven and the northern half of Lindsey: a broad belt around the Wash, including Holland, was not sampled. A total of 41 localities are situated in 30 ten kilometre squares.

Localities

Localities are arranged in 10 km. grid squares order, with letters for localities where several lie in the same square.

43/83		Harlaxton, 886312, dry wood, August
43/89		Scotton Common, 863997, cotton grass marsh
43/91	A	Castle Bytham, 986183, scrub
	B	Clipsham, 988158, overgrown parts of quarry
43/92	A	Bitchfield, 986290, wood and ditch
	B	Stoke Rochford, 911285, wood by pond, August
43/93		Boothby Pagnall, 974306, wood by stream
43/94		Wilsford Heath Quarry, 985413, partly wooded quarry
43/95		Wellingore, 976553, wood with ponds
43/97		Skellingthorpe, 945701, open dyke, shaded stream, wooded swamp
43/99		Redbourne, 964986, ash wood with stream
44/71		Crowle Waste, 7614, shaded ditches and old peat diggings
44/80		Scunthorpe, 875082, wood
44/81	A	Flixborough, 865152, wood with stream
	B	Normansbury, 896162, sallow copse with pools
44/90	A	Manton Warren, 934046, scrub with ditch
	B	Twigmore Woods, 942064, *Juncus* marsh, sallow scrub, woodland
	C	West Wood, Broughton, woodland with wet spots
44/91		Winterton, 908186, willow copse
44/92		Winteringham, 960213, high salt marsh
53/01	A	Holywell, 006161, marsh and wood
	B	Newell Wood, 004143, wood
53/02	A	Irnham, 006263, pond in meadow
	B	Irnham, 013265, wood and ditch
53/07		Greetwell, 001721, marshy field
53/17		Horsington, 195701, wet woodland
53/18		Hainton, 178853, wood with streams
53/19		Tealby, 167917, wood by stream
53/27		West Ashby, 2772, wood by stream, marsh and lake
53/28	A	Market Stainton, 240805, shaded riverside fen
	B	Welton-le-Wold, 293867, alder wood by stream
53/38	A	Legbourne, 348854, wood with damp hollows
	B	Louth, 320873, shaded stream
53/39	A	Fotherby, 307907, wood with ditch
	B	North Thoresby, 317992, wood on humic soil, with pools and ditches

53/49 Saltfleetby, high salt marsh
54/00 Howsham, 035066, ash wood with ditch
54/01 A Elsham Cross, 020116, ash wood with stream
B Nettleton, 000113, marshy field
54/11 Ulceby, 125152, ash wood with ditches
54/30 Humberston, 347058, saltmarsh

CHECK LIST

TIPULIDAE (300 + British species)

Tipulinae

Dolichopeza albipes Stroem. 44/90B
Nephrotoma appendiculata Pierre. 43/94; 44/81A
N. flavescens L. 43/91B
N. flavipalpis Mg. 43/83
N. quadrifarea Mg. 43/83; 44/80, 90B & C, 91; 54/11
Prionocera turcica Fab. 44/71
Tipula fulvipennis Deg. 53/39B
T. lateralis Mg. 43/91B, 93, 97; 53/02B, 27; 54/30
T. livida v.d. Wulp. 44/90B
T. lunata L. 43/91B; 44/90B; 53/02B, 28B, 39; 54100, 01A.
T. maxima Poda 43/97
T. oleracea L. 44/81B; 53/07, 49; 54/01B
T. pabulina Mg. 53/02B
T. rufina Mg. 44/91
T. scripta Mg. 43/83; 44/90B & C; 53/01B, 02B, 18, 38A; 54/01A
T. solstitialis Westh. 43/97
T. unca Wied. 44/71; 53/18, 38B, 39A
T. variicornis Schum. 53/18
T. varipennis Mg. 44/91

Limoniinae

Limoniini

Helius longirostris Mg. 44/90B
Limonia chorea Mg. 43/83, 94; 44/71, 91; 53/01A, 02B, 17, 18, 19, 39A; 54/11
L. decemmaculata Loew 53/18
L. didyma Mg. 53/38B
L. dumetorum Mg. 43/94, 97; 44/71; 53/17, 18; 54/11
L duplicata Doane 43/83, 91A; 44/91; 53/02B, 07, 17, 18, 28B, 39B; 54/00, 01A
L. flavipes Fab. 43/92A, 93, 94, 99; 44/71, 90C; 53/01A & B, 17, 27, 28B, 38A; 53/39A; 54/00, 11
L. mitis Mg. 53/17
form *lutea* Mg. 43/94
L. modesta Mg. 43/95; 44/81B, 91; 53/01A, 28B, 39A & B; 54/01A, B
L. nubeculosa Mg. 43/83, 91A, 92A & B, 93, 94, 99; 44/71, 81A & B, 90A & C; 53/01A & B, 02B, 17, 18, 19, 27, 28B, 38A, 39A & B; 54/00, 01A, 11
L. ornata Mg. 54/01A
L. sera Walk. 53/49; 54/30
L. tripunctata Fab. 43/91A & B, 92A, 94, 95, 99; 44/71, 81A & B, 90A, B & C, 91; 53/01A & B, 02A & B, 17, 18, 19, 27, 28B, 38A & B, 39A & B; 54/00, 01A, 11

Pediciinii

Dicranota bimaculata Schum. 53/18, 27, 28B, 38B
D. pavida Hal. 44/81A; 53/18, 28B
Pedicia immaculata Mg. 43/99; 44/71, 81B, 90B; 53/02A, 07, 18, 27, 49

Hexatominii

Austrolimnophila ochracea Mg. 43/83, 92A & B, 94, 95, 99; 44/80, 81A, 90B & C, 91; 53/01A, 02B, 17, 18, 19, 28B, 38A, 39A & B; 54/00, 11
Epiphragma ocellaris L. 43/99; 53/02B, 17, 18
Limnophila adjuncta Walk. 53/07, 27
L. dispar Mg. 44/71; 53/02A, 17, 27, 38A; 54/00
L. ferruginea Mg. 43/89, 97; 44/71, 81B, 90B
L. fulvonervosa Schum. 43/97; 44/71, 81B, 90B
L. lineola Mg. 53/07
L. maculata Mg. 43/97, 99; 44/81A; 53/18, 39B
L. meigeni Ver. 44/71
L. nemoralis Mg. 53/02B, 27, 38B
Paradelphomyia senilis Hal. 43/92B; 44/81A & B; 53/18, 27, 39A & B
Pilaria batava Edw. 53/18
P. discicollis Mg. 43/92B, 97; 53/02B, 18, 27, 38B, 39B
Pseudolimnophila lucorum Mg. 43/91B; 53/39B

Eriopterinii

Cheilotrichia cinerascens Mg. 43/99; 44/71, 80, 81A, 90B, 91, 92; 53/18, 27, 28A & B, 38B, 39A & B; 54/00, 01A, 11
C. imbuta Mg. 43/97
C. flava Schum. £?¿»;A, 93, 99; 44/80, 81A; 53/02B, 17, 18, 28B, 38B, 39A & B; 54/00, 01A
Erioptera fuscipennis Mg. 53/07, 17, 39B; 54/01B
E. griseipennis Mg. 53/01A, 02A, 18, 39B
E. hybrida Mg. 44/81B; 53/27
E. lutea Mg. taenionota Mg. 44/80, 90C; 52/02B; 53/07, 17, 18, 27, 28B, 39A & B; 54/01B, 11
E. maculata Mg. 44/90C; 53/07, 18, 28B, 39A; 54/00
E. occoecata Edw. 53/01B
E. stictica Mg. 44/71, 81B, 91, 92; 53/27, 39B, 49; 54/30
E. trivialis Mg. 43/97; 44/71, 90B; 53/02A & B, 07; 54/01B
E. vicina Ton. 53/18, 27
Gonomyia conoviensis Barn. 44/91
G. lucidula de Meij. 43/97
G. recta Ton. 44/81A, 90C; 53/17; 28A, 39B.
G. tenella Mg. 53/02B
Lipsothrix remota Walk. 43/99; 44/81A; 53/18
Ormosia depilata Edw. 44/71, 90C
O. hederae Curt. 53/28A
O. nodulosa Macq. 43/83, 92A, 94, 99; 44/71, 90B & C, 91; 53/01B, 02B, 17, 19, 27; 53/28A & B, 38A, 39A & B; 54/00, 01A, 11
Molophilus appendiculata Staeg. 43/99; 44/81B; 53/18, 38B
M. bifidus Goet. 44/90C; 53/01A, 07
M. cinereifrons de Meij. 53/17
M. curvatus Ton. 53/28B
M. griseus Mg. 43/97; 53/02B, 27
M. medius de Meij. 53/18
M. obscurus Mg. 53/02A, 07, 28A
M. ochraceus Mg. 53/17, 38B
M. pleuralis de Meij. 54/30
M. propinquus Egg. 43/97
M. serpentiger Edw. 43/97; 44/90C; 53/19, 27; 54/00, 11
Tasiocera murina Mg. 44/90A; 53/02B, 17, 18, 19, 28B; 54/11

TRICHOCERIDAE (4 British species)
Trichocera regelationis L. 53/27

ANISOPODIDAE (7 British species)
Sylvicola punctata Fab. 53/28B, 38A

PTYCHOPTERIDAE (7 British species)
Ptychoptera albimana Fab. 53/07, 39B
P. contaminata L. 53/39B
P. lacustris Mg. 53/39B
P. minuta Ton. 53/02B
P. paludosa Mg. 53/18

DISCUSSION

The list is remarkable for the number of local species. The most outstanding record is that for *Tipula livida*, of which a male and female were taken at Twigmore Woods; this species was first listed as British in 1953 and no previous records occur north of the Thames Valley — Bristol axis. *Gonomyia conoviensis* is very little known as a British insect and previous records have been from streams in upland areas or on southern sea cliffs — at Winterton it was very abundant among nettles in a small willow copse, a most unexpected habitat.

The representation of streamside species is interesting, especially as the county would seem to be sparse in ideal habitats. *Limnophila*, subgenus *Eloeophila*, is only locally represented by *maculata* and the other common species, *submarmorata*, was not found. By comparison, it was surprising to find *Dicranota* almost as frequent, but only the two most widespread species occurred and there was no sign of *subtilis* which is a less southern species. However, of the pair of species *Erioptera vicina* and *areloata*, it was the former which was found, this being the northern rather than the southern species.

Acid peat is of very restricted distribution in Lincolnshire, and it was only at Crowle Waste that *Prionocera turcica* and *Limnophila meigeni* were found. There may be a few further localities which would be suitable such as Scotton Common, where, however, only one species of cranefly could be found.

Limonia sera and *Molophilus pleuralis* are typical coastal species found at the edge of saltings. The latter is the more local of the two.

A few local fenland species were found — *Limonia ornata*, which is confined to butterbur (*Petasites hybridus* (L.) Gaertn., Mey. & Scherb.), *Tipula solstitialis,* among *Glyceria* in a dyke and *Cheilotrichia imbuta.*

Among the further uncommon species are *Pilaria batava, Molophilus propinquus* and *M. curvatus.* Little is known about the habitat requirements of these species.

As one who has not collected insects in Lincolnshire before, I was pleasantly surprised to find the county more productive than anticipated. Some of the best localities were as good as one could hope for in any county, even if they were small and isolated.

British Moths, Books 1 & 2. Text and photographs by **Geo. E. Hyde**. Jarrold Publications, Norwich, 1974. 30p. each.

These are the natural successors to *British Butterflies* by the same author published last year in the same series. Our remarks on the butterfly booklets could very well be repeated here as these bear the same hall-marks of expert photography with accurate brief text.

In spite of the scope offered by the vast array of British moths, a tendency has always existed in books of this kind to portray the spectacular, often resulting in a series of mere pretty pictures. The present author, a field worker of first rank, is to be congratulated on balancing the scene by the inclusion of many of our commonest moths, frequently of most sombre hue as the Yellow Horned. Who previously has treated us to such a wonderful portrait of the Green Arches or the Figure of Eight?

The colour reproduction is, if anything, superior to that of the butterflies and the printing is without flaw. Wonderful value. May we now look forward to Books 3 & 4? C.R.H.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1974

WENTWORTH WOODHOUSE, WHARNCLIFFE WOOD AND UPPER DON VALLEY V.C. 63 - MAY 25th - 27th

This first meeting of the year was held on the Spring Bank Holiday week-end in excellent weather. Saturday was spent in parkland at Wentworth Woodhouse, where old established deciduous woodland, ornamental lakes and farmland offered a variety of habitats. On the Sunday we visited Wharncliffe Wood and climbed through young coniferous plantations and some mixed birch scrub, from the valley to the moorland above. Conditions were very dry except about the moortop ponds. Monday was spent in old-established, deciduous woodland, carpeted with sheets of Bluebells, and in nearby wetlands in the Upper Don Valley between Wortley and Deepcar. At the end of the day we adjourned to the Community Centre at Oughtibridge, for tea. Mr. John Flint took the Chair at the meeting afterwards and conveyed apologies from the President, who was in the U.S.A. Mr. Grant expressed thanks to Mrs Freda Kemsley who had made all the arrangements and led the excursions, to the landowners who had given us access to their properties and to members of their staffs who had been particularly helpful.

Flowering Plants and Ferns (D.R. GRANT and JOAN E. DUNCAN)

In Wentworth village *Senecio squalidus* (Oxford Ragwort) and *Arabidopsis thaliana* (Thale Cress) were growing on the tops of walls. The party then passed through a wood which had a ground flora of Bluebell, Yellow Archangel and Wood Millet Grass, together with isolated patches of *Veronica montana* (Wood Speedwell). Emerging from the woods the members then passed through arable farm land to the three large artificial lakes which were then examined. A feature of these lakes was the large amount of *Juncus inflexus* (Hard Rush) present, indicating a neutral of slightly alkaline soil. The shores of Morley Pond had *Typha latifolia* (Reedmace), *Alisma plantago-aquatica* (Water Plantain) and *Scrophularia aquatica* (Water Figwort) growing around the margin. A small marsh near the old boathouse yielded *Carex hirta* (Hairy Sedge) and *Pulicaria dysenterica* (Fleabane). Along the southern shore *Quercus cerris* (Turkey Oak) was becoming naturalised; many small seedling trees were noted.

Lunch was taken by the shore of Dog Kennel pond where there was a fine show of *Nuphar lutea* (Yellow Water-lily). This no doubt has been planted for we were informed that both pink and white water-lilies were also here. Other plants in the pond were *Polygonum amphibium* (Amphibious Bistort), *Sparganium simplex* (Unbranched Burreed), and the sedges *Carex riparia* and *C. acutiformis.* In a marshy patch of ground the Flote-grasses *Glyceria plicata* and *G. declinata* were found. Near the dam wall there was a colony of Hornbeam, possibly native here as the trees were young compared to the size of the other tree species nearby. The last pond had the Yellow Water-lily again and *Eleocharis palustris* (Common Spike-rush) growing on the southern shore line. Two other aquatics here, were *Potamogeton natans* (Broad-leaved Pondweed) and *Myriophyllum spicatum* (Water-milfoil).

The route on Sunday was through Wharncliffe Wood (SK/39) and out on to the acid moorland by Wharncliffe Chase. In the woodland, of mainly larch, pine and silver birch, the older parts with marshy areas were much more productive of species than the newly planted parts. Plants seen included: *Equisetum sylvaticum* (Wood Horsetail), *Castanea sativa* (Sweet Chestnut), *Lamiastrum galeobdolon* (Yellow Archangel), *Scrophularia auriculata* (Water Figwort), *Luzula pilosa* and *L. sylvatica* (Hairy and Great Woodrushes).

Three ponds were visited on the moor, each having its own particular association of plants, although the species were those to be expected in such habitats. The most northerly pond was charecterised by a full growth of *Equisetum fluviatile* (Water Horestail) and *Eleocharis palustris* (Common Spike-rush). Patches of *Ranunculus* *omiophyllus* (Round-leaved Crowfoot), in good flower, were in shallow water and on mud, and there was some *Potamogeton polygonifolius* (Bog Pondweed).

The vegetation of the second pond nearby, on slightly lower ground, was more varied, Round-leaved Crowfoot was again present and in addition, *Stellaria alsine* (Bog Stitchwort), *Hydrocotyle vulgaris* (Marsh Pennywort) and *Eriophorum angustifolium* (Common Cottongrass). In the third pond Water Horsetail was less widespread and there were clumps of *Juncus effusus* (Soft Rush) round the edge, and some *Thelypteris limbosperma* (Lemon-scented Fern). Bog Stitchwort was present and in the water *Sparganium erectum* (Branched Bur-reed). Other species observed were the sedges *Carex flacca, C. nigra, C. ovalis, C. pilulifera; Ranunculus flammula* (Lesser Spearwort), *Viola palustris* (Marsh Violet), *Galium palustre* (Common Marsh-bedstraw), *Lemna minor* (Common Duckweed) and *Glyceria declinata* (Small Sweet-grass).

The interest of examining and comparing the plant associations of the moorland ponds compensated for the rather low total of 130 species recorded during the day.

The district around Wortley and Deepcar was explored on Monday. The River Don flows through a picturesque wooded valley, the rocks of the Coal Measures series here being laminar sandstones and soft shales. There are old mill dams used as fishing ponds adjacent to the river and there is an extensive area of tipping at the Deepcar end of the the valley. The party was rewarded with a fine show of *Montia sibirica* (Pink Purslane) along the banks of the river. On the journey to the old mill dam a small colony of *Prunus padus* (Bird Cherry) were seen together with *Prunus avium* (Gean). The dam was covered with the floating leaves of *Potamogeton natans* (Broad-leaved Pondweed), whilst the shore line produced *Scutellaria galericulata* (Skullcap). The marshy area on the north side of the dam was filled with *Phalaris arundinacea* (Reed Grass), *Salix fragilis* (Crack Willow) and *Rorippa amphibia* (Great Yellow-cress).

A few members walked down the valley to the tips at Deepcar where *Centranthus ruber* (Red Valerian) was seen. This, according to one member, had decreased in numbers when compared with previous years, but there were still vigorous plants growing on the loose parts of the tips. Other plants seen here were *Verbascum thapsus* (Great Mullein), *Reseda luteola* (Weld) and *Genista tinctoria* (Dyer's Greenweed). Along the B. 6088 road back to Wortley Station *Populus tremula* (Aspen) was still in catkin, and *Chelidonium majus* (Greater Celandine) was just breaking bud.

After lunch the party examined the woods upstream from Wortley station and soon the fern *Dryopteris borreri* was located, this being rare on the Coal Measures as it seems to prefer the wooded cloughs of the Millstone Grit of the Pennines. A small rough grazing pasture near Wortley Station had a large colony of *Ulex gallii* (Western Gorse) which still had seed pods on its branches. Part of this pasture must have been tipped on at one time, as a corner by the road yielded a few lime-loving species viz. *Carex caryophyllea* (Spring Sedge), *Linum catharticum* (Purging Flax), *Briza media* (Quaking Grass) and *Ranunculus bulbosus* (Bulbous Buttercup), *Aegopodium podagraria* (Goutweed) and *Chrysanthemum parthenium* (Feverfew) were noted by the disused houses.

Ornithology (A.C.M. DUNCAN)

The area visited on Saturday was the Wentworth estate, an area of parkland with three large ponds, giving some variety of habitat. On the Sunday Wharncliffe Wood, a conifer plantation covering a sandstone escarpment running along the side of the valley, was investigated. On Monday we were down in the valley of the Upper Don which gave us a riverside habitat. A Mallard on the river Don had five ducklings. Twenty-two species were heard in song (marked * in list) out of a total of 70.

List of birds noted:– Little Grebe, Great Crested Grebe, Grey Heron, Canada Goose, Mute Swan, Mallard, Tufted Duck, Kestrel, Pheasant, Moorhen, Coot, Lapwig, Curlew, Black-headed Gull, Lesser Black-backed Gull, Herring Gull, Wood Pigeon, Stock Dove, Collared Dove, Turtle Dove*, Cuckoo*, Little Owl, Swift, Kingfisher, Great Spotted

Woodpecker, Skylark*, Sand Martin, Swallow, House Martin, Tree Pipit*, Meadow Pipit, Pied Wagtail, Wren*, Dunnock*, Sedge Warbler, Garden Warbler*, Blackcap*, Whitethroat*, Willow Warbler*, Chiffchaff*, Wood Warbler*, Goldcrest*, Spotted Flycatcher, Redstart*, Robin*, Blackbird, Song Thrush, Mistle Thrush*, Long-tailed Tit, Willow Tit, Coal Tit*, Blue Tit, Great Tit*, Tree Creeper, Yellowhammer*, Reed Bunting*, Chaffinch*, Greenfinch, Goldfinch*, Linnet, Redpoll, Bullfinch, House Sparrow, Tree Sparrow, Jay, Magpie, Jackdaw, Rook, Carrion Crow.

Mammals and other Vertebrates

Red Deer tracks were seen at Wharncliffe wood, Water Vole and Grey Squirrel at Wentworth Woodhouse and Bank Vole and Water Shrew in the Don Valley, near Wortley. Of the Amphibia, Smooth Newt and many tadpoles were found in the woodland ponds in the Upper Don Valley.

LOWTHORPE AND HARPHAM, V.6. 61, JUNE 8th

Seventeen members assembled near Lowthorpe for this one-day meeting near Driffield. The route taken was from Bracey Bridge to Lowthorpe Station and the rather wet start was succeeded by a sunny afternoon. Tea was served at the St. Quinton Arms, Harpham, followed by the meeting for Reports, at which the Chair was taken by the President: Dr. Lloyd-Evans. Mrs. Joan Duncan proposed a vote of thanks to Miss Myra Taylor who had organised the programme and to the landowner who had so kindly granted access to his property.

Flowering Plants and Ferns (MYRA TAYLOR)

Chalk streams arising from springs four miles north pass through the Bracey Bridge area providing a boggy wood to the north with two main streams passing down the valley, dykes and a pond associated with these. Although the water level was low the wood was almost impassible being full of large leaves of *Petasites hybridus* (Butterbur), the boggy areas containing large beds of *Glyceria maxima* (Reed-grass). An open area of marsh contained a few tufts of *Carex paniculata* amongst small areas of *Juncus subnodulosus.* On the south side of the road was a pond on the edge of which were beds of the sedges *Carex acutiformis, C. rostrata* and *C. disticha,* with *Hippuris vulgaris* (Mare's-tail) frequent.

At the next area to be visited, West End Farm, a wet meadow yielded some *Dactylorchis fuchsii* (Spotted Orchid), *Menyanthes trifoliata* (Bogbean), some *Senecio aquaticus* (Marsh Ragwort), *Galium uliginosum* (Fen Bedstraw), *Lychnis flos-cuculi* (Ragged Robin), *Betonica officinalis* (Betony) and *Luzula multiflora* (Heath Wood-rush). Along the farm road near the stream we encounted tufts of *Carex paniculata* again, but a *Phragmites* marsh proved to be too dense for much of interest apart from a few bushes of *Salix purpurea* (Purple Osier). The stream itself had a fair amount of *Groenlandia densa* (Opposite-leaved Pondweed) and *Hippuris vulgaris* (Mare's-tail). Another small patch of marsh was found to have some *Carex echinata* (Star Sedge), *C. lepidocarpa* (Yellow Sedge). *C. paniculata* (Tussock Sedge), with *Triglochin palustris* (Marsh Arrowgrass) and in the stream *Veronica catenata* (Water Speedwell).

The station at Lowthorpe yielded *Filago germanica* (Common Cudweed) and *Sedum acre* (Stonecrop) and in a small wood a few plants of *Lithospermum officinale* (Gromwell) and *Ophioglossum vulgatum* (Adders Tongue) were seen. Black Mullein was common, especially near the station platform, with *Hypericum perforatum* (Perforate St. Johnswort) and *Hypericum hirsutum* (Hairy St. Johns-wort). Other plants included a mixture of chalk and marsh species - *Eupatorium cannabinum* (Hemp Agrimony), *Salix caprea* (Goat Willow), *Valeriana officinalis* (Marsh Valerian), *Fragaria vesca* (Strawberry), *Listera ovata* (Twayblade), *Centaurium erythraea* (Centaury) and *Moehringia trinervia* (Three-nerved Sandwort).

This was an interesting mixture of plant communities and my thanks are offered to Miss E. Crackles and Mrs. D.E. Haythornthwaite for their help with the records.

Ornithology (D.E. MURRAY)

Ten minutes before the beginning of the meeting, a female Marsh Harrier was observed leaving a marshy, woodland area beside the road. It was seen subsequently on several occasions as it quartered the roadside fields. In addition, fifty two other species of birds were noted during the day, and evidence of breeding was collected for many of these.

The following birds were seen with fledged young: Heron, Mute Swan, Mallard, Moorhen, Coot, Lapwing, Robin. Those heard in song were: Wood Pigeon, Collared Dove, Cuckoo, Skylark, Wren, Dunnock, Sedge Warbler, Garden Warbler, Blackcap, Willow Warbler, Robin, Blackbird, Song Thrush, Great Tit, Yellow-hammer, Reed Bunting, Chaffinch, Greenfinch, Goldfinch and Redpoll. Nesting birds included: Woodcock, Swallow, Willow Warbler, Song Thrush and Goldfinch. Those carrying food included: Yellow Wagtail and Yellow-hammer. Other species present were: Harrier, Kestrel, Common Partridge, Pheasant, Feral Pigeon, Turtle Dove, Swift, Sand Martin, House Martin, Pied Wagtail, Whitethroat, Spotted Flycatcher, Whinchat, Long-tailed Tit, Bluetit, Linnet, Bullfinch, House and Tree Sparrows, Starling, Magpie, Jackdaw, Rook and Carrion Crow.

It was interesting to compare this list with the one made by the Y.N.U. at Lowthorpe in 1890. Mr. C. I. Massey brought along an 1890 volume of *The Naturalist* containing this information. Tree Pipit and Meadow Pipit were recorded then. Obvious omissions were the Collared Dove and the Redpoll, which have undergone population explosions only in recent years.

Other Vertebrates (C.I. MASSEY)

Marshy pools and the old mill stream south of the Bracey Bridge lay - by contained many Common Frog and Common Toad tadpoles. No adults were seen. A single Hedgehog casualy was seen on the A166, near to the Bracey Bridge meeting place. The Rabbit was common on farm land at Wold Farm, Harpham, with the burrows in hedgerows or at the edge of woods. An extensive warren existed in the wooded bank south of the Bracey Bridge lay-by. Two Brown Hares were seen in fields near Wold Farm. Three Water Voles were seen, and from the well used tracks and bolt holes, appear to be common in Kelk Beck.

Conchology (A. NORRIS)

The discovery of *Vertigo substriata* Jeff. in a rich marshy meadow near Harpham (NGR 54/086615) establishes this species for the first time in VC 61. Although this was the only new V.C. record taken a number of other interesting and local species were found. The most outstanding of these was *Lauria anglica* Wood. This species was known in East Yorkshire only from the cliffs near Speeton. Some of the other species found in association included *Acanthinula aculeata* (Mull.), *Columella edentula* (Drap.) and *Punctum pygmaeum* (Drap.).

STAPE NEAR PICKERING, V.C. 62 - JUNE 22nd

We were fortunate to have another glorious day for this meeting. Thirty members, representing twelve Affiliated Societies, spent their time exploring the Forestry Commission's woodlands, marshes and streams in Raindale and Newton Dale, immediatley to the east of Stape.

The meeting for tea and reports was held at the Joseph Rowntree School Field Centre, when the President, Dr. Lloyd-Evans, took the Chair. Thanks were expressed to Mr. Ian Lawrence who had organised and led the activities, and to the School for the use of its Field Centre.

Flowering Plants and Ferns (EVA CRACKLES)

The main party of botanists worked the forest area of the south and east of Raindale Head. On a well-grazed hillock the following species were noted: *Polygala vulgaris* (Milkwort), *Lathyrus montanus* (Bitter Vetch), *Veronica officinalis* (Common Speedwell), *Hypochoeris radicata* (Common Cat's Ear), *Hieracium pilosella* (Mouse-ear Hawkweed), *Carex caryophyllea* (Spring Sedge), *Sieglingia decumbens* (Heath Grass), *Cynosurus cristatus* (Crested Dog's-tail), and *Briza media* (Quaking Grass). Species recorded along the woodland rides included: *Blechnum spicant* (Hard Fern), *Hypericum pulchrum* (Slender St. John's-wort), *Linum catharticum* (Purging Flax), *Epilobium obscurum* (Short-fruited Willowherb), *Lysimachia nemorum* (Yellow Pimpernel), *Centaurium erythraea* (Common Centaury), *Veronica serpyllifolia* (Thyme-leaved Speedwell), *Luzula multiflora* (Heath Woodrush), *Carex sylvatica* (Wood Sedge), *C. pilulifera* (Pill-headed Sedge), *C. flacca* (Glaucous Sedge), *C. muricata* (Prickly Sedge) and *C. ovalis* (Oval Sedge). In the wetter parts of the rides occured: *Epilobium palustre* (Marsh Willowherb), *E. parviflorum* (Hoary Willowherb), *Eupatorium cannabinum* (Hemp Agrimony), *Cirsium palustre* (Marsh Thistle), *Carex nigra* (Common Sedge), and *Glyceria fluitans* (Flote Grass). Along woodland rides lower down the valley sides *Carex laevigata* (Smooth Sedge), *C. pallescens* (Pale Sedge) and *C. remota* (Remote Sedge) were locally frequent. Woodland species occurring in quantity in suitable areas included: *Equisetum sylvaticum* (Wood Horsetail), *Oxalis acetosella* (Wood Sorrel), *Sanicula europaea* (Wood Sanicle), *Teucrium scorodonia* (Wood Sage) and *Lonicera periclymenum* (Honeysuckle).

During the afternoon marshy areas with markedly different plant associations were visited. Species noted in a marsh by the forest road included: *Ranunculus flammula* (Lesser Spearwort), *Caltha palustris* (Marsh Marigold), *Lychnis flos-cuculi* (Ragged Robin), *Stellaria alsine* (Bog Stitchwort), *Veronica beccabunga* (Brooklime), *Sparganium erectum* (Bur-reed) and *Eleocharis palustris* (Common Spike-rush). In small flushes on the hillside the following acid-loving species were at least locally frequent: *Hydrocotyle vulgaris* (Pennywort), *Juncus bulbosus* (Bulbous Rush), *Dactylorhiza maculata* (Heath Spotted Orchid), *Carex binervis* (Ribbed Sedge), *C. demissa* (Yellow Sedge), *C. echinata* (Star-headed Sedge) and *C. pulicaris* (Flea Sedge). In one of these flushes *Dactylorhiza fuchsii* x *D. maculata* was noted.

The most interesting marshy areas occurred in the bottom of the valley by the side of the railway. In the first marsh examined *Carex paniculata* (Tussock Sedge) was present in quantity and other species noted included: *Equisetum fluviatile* (Water Horsetail), *E. palustre* (Marsh Horsetail), *Lotus uliginosus* (Large Bird's-foot-trefoil), *Potentilla palustris* (Marsh Cinquefoil), *Sanguisorba officinalis* (Great Burnet), *Succisa pratensis* (Devil's-bit Scabious) and *Carex rostrata* (Bottle Sedge). Scattered bushes of *Salix aurita* (Eared Sallow) also occurred here and there was a large bed of *Carex acutiformis* (Lesser Pond-sedge). The second of the valley bottom marshes examined was of a very different nature. Here the dominant plant was *Juncus effususs* (Soft Rush) with *Viola palustris* (Marsh Violet) and *Carex curta* (White Sedge) occurring in quantity between the rushes. Other species were confined to the periphery of the area and included: *Carex laevigata* (Smooth Sedge), *Carex vesicaria* (Bladder Sedge), *C. nigra* (Common Sedge) and *C. echinata* (Star-headed Sedge).

At Stape members were able to see *Coeloglossum viride* (Frog Orchid) and *Listera ovata* (Twayblade) by the roadside and *Botrychium lunaria* (Moonwort) not far from the school. During the afternoon Mr. G. Simpson, who knows the area well took some members of the party to localities where particular species were known to occur, the most notable of these species being: *Thelypteris phegopteris* (Beech Fern), *Genista* *anglica* (Petty Whin), *Pyrola media* (Intermediate Wintergreen), *Trientalis europaea* (Chickweed Wintergreen) and *Schoenus nigricans* (Bog-rush).

Mycology (W.G. BRAMLEY)

In view of the dry and cold conditions, little was expected, and this was fulfilled. Most of the finds were species of common occurrence, but it was a surprise when Mrs. Hollis presented me with a Stinkhorn 'egg'.

The only other fungi of note were *Taphrina tosquinetii* (West.) Mang., on leaves of Alder, and *T. padi* (Jacz.) Mix, on young fruits of Bird Cherry. The former is not uncommon in the area, especially on young sucker growth, but the latter has not, to my knowledge, been reported from the county in the last forty years and I last saw it in the Dent area before then, with the late F.A. Mason.

Ornithology (G. SIMPSON)

The small total of thirty-nine species seen or heard was in the main due to two factors, the dearth of ornithologists and the limitation of the visit to areas in or near Forestry Commission woods, rather than a wide variety of habitats. Many species one would expect to encounter were not in evidence.

Those we did see, or hear, included Curlew, Black-headed Gull, Wood Pigeon, Swift, Green Woodpecker, Great Spotted Woodpecker, Swallow, House Martin, Carrion Crow, Rook, Jackdaw, Magpie, Jay, Blue Tit, Coal Tit, Marsh Tit, Long tailed Tit, Wren, Mistle and Song Thrush, Blackbird, Robin, Blackcap, Garden Warbler, Whitethroat, Willow Warbler, Chiffchaff, Goldcrest, Dunnock, Pied and Grey Wagtails, Starling, Greenfinch, Linnet, Redpoll, Bullfinch, Chaffinch, Yellowhammer, and House Sparrow.

Other Vertebrates (G. SIMPSON)

Dead Common Shrews and a dead Mole were seen at Raindale. Signs of Rabbits were plentiful. A few Roe Deer frays were located near innumerable Badger dung pits, towards the head of Raindale. Fox droppings and a Brown Hare were seen near Raindale Mill. Several Brown Trout, including one estimated to be 23 cm. long lazed in sun-drenched pools along Raindale and Pickering Becks.

Conchology (A. NORRIS)

The area of Newtondale examined had been extensively worked for molluscs only a few months previously and therefore no systematic collecting took place on the day of the meeting. The discovery however of a fine adult specimen of *Limax cinereoniger* Wolf added at least one species to the known list for the area. This slug is now almost confined in Yorkshire to areas of old mixed woodland. It is only known from 16 of the 180 plus 10 kilometre squares which make up the county even though it does seem well established in some areas.

BOROUGHBRIDGE, V.C. 64 – JUNE 29th–30th

Thirty-five members met in very pleasant weather again, for the weekend of June 29th and 30th at Minskip, to explore nearby Roecliffe, Westwick and Bishop Monkton Ings. Although much of the area is under arable farming, we were taken to a very interesting range of semi-wild habitats; these included a disused brickyard, the Ure banks near Roecliffe, Westwick Lock and Cut, part of the Newby Hall Estate, rough pasture and scrub woodland at Upper Dunsforth and the marshland on Bishop Monkton Ings.

An excellent tea at the White Swan Hotel, Minskip, on the Sunday, was followed by the customary meeting for reports, chaired by the President, Dr. Lloyd-Evans. A vote of thanks to the numerous landowners who had so kindly given us permission to visit their land was given by Miss Eva Crackles, who also expressed the members' appreciation to Mr. John Hickson who had organised and led the excursions.

Flowering Plants and Ferns (DOROTHY HAYTHORNTHWAITE)

On the Saturday morning the party visited the old brickyards near Roecliffe. This is a very interesting area; it has been worked for clay in a small part at the south-west end up to 12 or 13 years ago. It is now disused except for rearing duck for shooting, in some seasons. The area has reverted and there is a good selection of wild plants. These include *Ophrys apifera* (Bee Orchid) six plants of which were seen near to the original area for these, but unfortunately the eastern part has been sold, filled in, and built upon. *Dactylorchis fuchsii* (Common Spotted Orchis) occurs in every shade from pale pink to a rich purple. *Melilotus altissima* (Tall Melilot) has seeded profusely near to the entrance at the west end. At Westwick Cut and Lock, which is part of the Newby Hall Estate, and the island, 171 species were recorded in a comparatively small area. Apart from the native plants of field and riverside, many plants were found which have been brought down by flood water and deposited on the banks of the river and cut and on the island as well. There is a beautiful stand of *Saponaria officinalis* (Soapwort), also *Allium scorodoprasum* (Sand Leek) and *A. oleraceum* (Field Garlic), *Lycopus europaeus* (Gipsywort), *Epilobium nerterioides* (New Zealand Willowherb) and *E. adenocaulon* (American Willowherb), also *Festuca arundinacea* and *F. gigantea.*

In the marshy field before the Lock itself, there were very large plants of *Rorippa sylvestris* (Creeping Yellow-cress), a few fine plants of *Scirpus sylvaticus* (Wood Club-rush) and *Heracleum mantegazzianum* (Giant Hogweed).

On the Sunday morning a short visit was made to a piece of boggy woodland at Upper Dunsforth but partly owing to the very dry season this was not very profitable. After lunch we went to Bishop Monkton Ings, due east of Bishop Monkton. This is normally a *very* wet marshy pasture containing a drain running north and south. One hundred and fourteen species were found, including at least thirteen species of *Carex.*

A list of the more interesting plants for each area is given below.

ROECLIFFE BRICKYARDS

Scirpus lacustris (Bulrush), *Typha angustifolia* (Reedmace), *Hippuris vulgaris* (Mare's-tail) five species of *Carex* including *C. spicata, Melilotus altissima* (Tall Melilot), *Potamogeton natans* and *P. berchtoldii* (Pond-weeds), *Alisma plantago-aquatica* (Water Plantain), *Festuca arundinacea* (Tall Fescue), *Lemna minor* and *L. trisulca* (Common and Ivy-leaved Duckweed), *Dactylorchis fuchsii* (Common Spotted Orchis), *Ophrys apifera* (Bee Orchid), *Phalaris arundinacea* (Reed Canary Grass).

WESTWICK LOCK AND CUT

Rorippa sylvestris (Creeping Yellow-cress), *Hesperis matronalis* (Dame's Violet), *Barbarea vulgaris* (Winter Cress), *Festuca gigantea* (Giant Fescue), *Myrrhis odorata* (Sweet Cicely), *Scirpus sylvaticus* (Wood Club-rush), *Potamogeton perfoliatus, P.pectinatus* and *P.compressus* (Pondweeds), *Berula erecta* (Narrow-leaved Water Parsnip), *Mimulus guttatus* (Monkey Flower), *Eupatorium cannabinum* (Hemp Agrimony), *Carduus acanthoides* (Welted Thistle), *Allium oleraceum* (Field Garlic), *A. scorodoprasum* (Sand Leek), *Origanum vulgare* (Wild Marjoram), *Lysimachia vulgaris* (Yellow Loosestrife), *Lycopus europaeus* (Gipsywort), *Conium maculatum* (Hemlock), *Saponaria officinalis* (Soapwort), **Epilobium nerterioides* (New Zealand Willow-herb), *Poterium sanguisorba, Carex acutiformis, Geranium pratense* (Meadow Cranesbill), *Helictotrichon pubescens* (Hairy Oat), *H. pratense* (Meadow Oat), *Lythrum salicaria* (Purple Loosestrife) and **Heracleum mantegazzianum* (Giant Hogweed).

BISHOP MONKTON INGS

Equisetum fluviatile (Water Horsetail), *Ranunculus trichophyllus* (Thread-leaved Water Crowfoot), *Thalictrum flavum* (Common Meadow-rue), *Silaum silaus* (Pepper Saxifrage), *Hottonia palustris* (Water-Violet), *Rhamnus catharticus* (Buckthorn), *Carex acutiformis* and *C. acuta, Alchemilla glabra* (Ladies Mantle), *Lysimachia vulgaris* and *L. nummularia* (Yellow Loosestrife and Creeping Jenny), *Calamagrostis canescens* (Purple Smallread), *Dactylorchis fuchsii* (Common Spotted Orchid and Hybrid), *Veronica catenata* (Pink Water-speedwell), *Oenanthe lachenalii* (Parsley Water-dropwort).

Six of the species recorded were additions to this well-worked 10 km square.

Ornithology (R.F. DICKENS)

On Saturday, June 29th, a total of 64 species was recorded. Of these, twenty different species were in song, including a Blackcap at Roecliffe which had a peculiar beginning to each series of phrases, with notes reminiscent of a Nuthatch. Lesser Whitethroat was singing persistently throughout the morning. Eighteen species had young, including a nice breeding record of Tufted Duck. A female accompanied three small young. Additional species were certainly nesting.

At Westwick, Kingfishers were feeding young out of the nest and Common Sandpiper apparently had young. There was a colony of Sand Martins in the river bank here, just above the ferry. Pochard and Great Crested Grebe on the river were somewhat unusual. A Little Owl was seen perched on hay bales south of Minskip, but no other birds of prey were reported during the day.

On Sunday, June 30th, the Dunsforth and Ouseburn area was rather disappointing for birds, though Lesser Whitethroat was again heard in song. Whitethroat was more in evidence than in Saturday's areas and Goldfinches were plentiful.

The Ings near Bishop Monkton proved more interesting, with Curlew present and Snipe drumming. Reed Bunting was nesting, as were other species no doubt, and Grasshopper Warbler had young out of the nest. A brood of four young Kestrels just out of the fledgeling stage was located. A cock Redstart was seen and this was one of the forty-seven species recorded on the Sunday. Seven of these were not on Saturday's list and the grand total for the two days was seventy-one.

A full list of species for the two days, with areas and other notes, has been lodged with the V.C. Recorder who was away on holiday and whose apologies were received by the meeting.

Mammals and other Vertebrates

Hare and Rabbit were seen on both days; some of the Rabbits were black. Bank Vole occurred on Saturday, Frogs and Toads on both days and Water Voles were also seen in the Ure. Bullheads and Stone Loaches were the only fish recorded.

Conchology (A. NORRIS)

A large number of molluscs were noted over the two days period by Dr. and Mrs. L.Lloyd Evans and Dr. B. Colville but nothing of any outstanding interest was discovered. Twenty-six new records were noted for the squares 44/36 and 44/46, but this is mainly due to the freedom of access to property and habitats which would be unavailable but for field meetings such as those organized by the Y.N.U.

Roecliffe, Westwick, Bishop Monkton. Square 44/36

Theodoxus fluvialitis	*Ancylus fluviatilis*	*Monacha granulata*
Potamopyrgus jenkinsi	*Succinia putris*	*M. cantiana*
Bithynia tentaculata	*S. pfeifferi*	*Discus rotundatus*
B. leachii	*Cochlicopa lubrica*	*Arion intermedius*
Carychium minimum	*Vertigo antivertigo*	*A. fasciatus*
L. peregra	*Vallonia excentrica*	*A. ater* agg.
Planorbis planorbis	*Clausilia bidentata*	*Vitrea crystallina*
P. leucostoma	*Helix hortensis*	*Oxychilus cellarius*
P. albus	*Hygromia striolata*	*O. alliarius*
Acroloxus lacustris	*H. hispida*	*Retinella radiatula*

Retinella pura
R. nitidus
Zonitoides nitidus
Agriolimax reticulatus
A. laevis
Anodonta anatina
Sphaerium corneum
S. lacustre
Pisidium amnicum
Pisidium milium
P. subtruncatum
P. henslowanum
P. nitidum

Upper Dunsforth. Square 44/46
Carychium minimum
Lymnaea truncatula
Succinea putris
S. pfeifferi
Cochlicopa lubrica
Columella edentula
Vertigo antivertigo
V. pygmaea
Helix hortensis
Helix nemoralis
Hygromia hispida
Punctum pygmaeum
Discus rotundatus
Arion intermedius
A. ater agg.
Euconulus fulvus
Vitrea crystallina
Oxychilus cellarius
O. alliarius
Retinella pura
R. nitidula
Zonitoides nitidus
Vitrina pellucida
Agriolimax reticulatus
A. laevis

WEST SCRAFTON, COVERDALE, V.C. 65 – JULY 20th

Fifteen members met at Middleham on July 20th and drove into the delightful scenery of nearby Coverdale for yet another gloriously sunny excursion.

Some time was spent exploring the picturesque stream in the viscinity of the village, and the nearby woodland. In the afternoon members climbed to the moorlands on the millstone grits above the village.

A picnic tea was held in the Scouts' Hall. The President, Dr. Lloyd-Evans, took the Chair at the meeting afterwards. Miss Helen Lefevre expressed a vote of thanks to Mrs. Jean Holloway for planning and leading the day, and to Miss Buckley who had supervised the tea arrangements.

Flowering Plants and Ferns (W.A. SLEDGE)

Baker's *Flora* mentions few noteworthy species for Coverdale and nearly all those which are given occur in the lowermost part of the dale where the influence of the limestone is most apparent. In the area investigated the vegetation was that of siliceous soils and only in the river bed itself was any limestone exposed. The fields and tree-lined course of the river which were visited in the morning yielded few plants other than common and widespread species. *Ranunculus auricomus* (Goldilocks), *Cirsium heterophyllum* (Melancholy Thistle), *Crepis paludosa* (Marsh Hawk's-beard), *Adoxa moschatellina* (Moschatel) and *Triglochim palustre* (Marsh Arrowgrass) were observed in the valley bottom where in one place a forest of *Equisetum telmateia* (Great Horsetail) clothed a wet slope above the river. Nearby *Allium oleraceum* (Field Garlic) was seen and this was perhaps the most uncommon plant seen throughout the excursion.

In the afternoon most members ascended the right, west-facing slope of the valley above West Scrafton. Two of us succeeded in reaching the derelict mine on the summit of the moor at 1500 ft. but this proved to have been a coal mine and the tips surrounding it were barren and sterile. Outcrops of dry, grit rocks fringing the edge of the valley were similarly devoid of floristic interest, yielding only *Calluna* (Heather), *Vaccinium myrtillus* (Bilberry) and *Empetrum nigrum* (Crowberry). *Sagina nodosa* (Knotted Spurrey), *Drosera rotundifolia* (Sundew) and *Myosotis secunda* (Creeping Forget-me-not) were the only species seen by me other than common moorland plants though those who worked Lead Up Gill found a few additional species such as Harts-tongue Fern and *Asplenium trichomanes* (Maidenhair Spleenwort) indicative of more basic rock.

Ornithology (A.C.M. DUNCAN)

The ground rises steeply to the east up to East Scrafton Moor. In the morning a sweep was made round the lower ground and streams of the valley. In the afternoon we went up

to the high ground of East Scrafton Moor. A total of 37 species were noted and five were heard singing (marked * in list).
List of birds noted:–

Grey Heron, Kestrel, Partridge, Curlew, Snipe, Black-headed Gull, Lesser Black-backed Gull, Wood Pigeon, Cuckoo*, Swift, Skylark*, Swallow, House Martin, Meadow Pipit, Yellow Wagtail, Grey Wagtail, Pied Wagtail, Dipper, Wren*, Willow Warbler*, Spotted Flycatcher, Wheatear, Robin, Blackbird, Song Thrush, Coal Tit, Blue Tit, Great Tit, Chaffinch, Greenfinch, Goldfinch*, Redpoll, House Sparrow, Starling, Jackdaw, Rook, Carrion Crow.

Mammals and other Vertebrates

Hare and Moles were present. Dr. Sledge reported seeing an Adder on the moors above West Scrafton.

Conchology (DR. & MRS. LLOYD-EVANS)

The following species were noted:–

Lymnaea truncatula	*Arianta arbustorum*	*Arion ater* agg.
Ancylus fluviatilis	*Hygromia striolata*	*Euconulus fulvus*
Azeca goodalli	*H. hispida*	*Oxychilus cellarius*
Cochlicopa lubrica	*Monacha granulata*	*Retinella pura*
C. lubricella	*Discus rotundatus*	*R. nitida*
Pyramidula rupestris	*Arion intermedius*	*Vitrina pellucida*
Lauria cylindracea	*A. circumscriptus*	*Limax maximus*
Clausilia bidentata	*A. fasciatus*	*Agriolimax reticulatus*
Balea perversa	*A. hortensis*	*A. laevis*

All the species found are common and widespread in Yorkshire, with the exception of *Azeca goodalli*, which is rather local, although known over a wide area of west and north-west Yorkshire.

The Macro-lepidoptera of Spurn Head, E. Yorkshire
Additions to the list, July-September 1974

S. L. SUTTON and B. R. SPENCE

Perizoma flavofasciata (Thunberg) Sandy Carpet. 2. viii. 74.
Eupithecia valerianata (Hübner) Valerian Pug. R; 2. vi.-5.vii. (genitalia checked).
Eupithecia subfuscata (Haworth) = *castigata* (Hübner) Grey Pug. R; 5. vii. (genitalia checked).
Harpyia furcula (Clerck) Sallow Kitten. 18. vii. 74.
Mythimna pudorina (D. and S.) Striped Wainscot. 13. viii. 74. Another interesting addition to the fauna of the *Phragmites* marsh. There appear to be no more than 4 or 5 other Yorkshire localities.

Confirmed by genitalia (already on the list).
Eupithecia absinthiata (Clerck) Wormwood Pug. 1 on 9. vii. 73.
Eupithecia vulgata (Haworth) Common Pug. 44 specimens 2. vi.-5.vii.74.
Eupithecia tripunctaria (Herrich-Schäffer) White-spotted Pug. 2 on 2.vi.74.
Eupithecia simpliciata (Haworth) = *subnotata* (Hübner) Plain Pug.

Our grateful thanks to Mr. T. Ford for confirming the Pug identifications.

SPRING FORAY, LEEDS

W. G. BRAMLEY

Once again our meeting was favoured by good weather. Fewston on the Friday was rather dry until the party of some dozen got into the valley bottom which was not as damp as in a normal spring and the list of species was light. Saw Woods, in contrast to our visit in 1970, provided good hunting and lived up to its general reputation and also attracted a field of some twenty.

Early arrivals at Bretton Park found a damp bonfire site within a few yards of the car park and the later visitors were presented with a rear view of mycologists on their hands and knees as the debris was moved and the area searched thoroughly. Later a lot of time was spent in the same recumbent position amongst the damp vegetation at the top end of the lake despite the large red warning boards with 'Deep Mud Keep Out' on them. Many of these areas have more vegetation on them than on our last visit two years ago.

The final day at Meanwood saw the party much diminished but two or three new visitors turned up. This was the wettest ground visited and a number of marsh-loving species were collected. Skirting the golf course a clutch of eight golf balls were also collected, going as remuneration to our guide Dr. C. J. La Touche.

My thanks are due to those who helped in collecting and naming, especially to Mrs. Sheila Wells for a very full list.

B = Bretton Park
F = Fewston
M= Meanwood
S = Saw Woods

Discomycetes (W. G. B. & S. W.)

Anthracobia melaloma, B.
Belonopsis pullum, on *Pinus* needles, F.
Dasyscypha acuum, on *Filipendula*, M.
Mitrula paludosa, M. Known here for half a century.
Peziza violacea, B.
Pyrenopeziza urticola, M.
Pyronema domesticum, B., on burnt ground.
Taphrina turgidus, F., on *Betula pubescens*, in fruiting condition. No recent records though the galls are fairly frequent but not often examined.
Trichobelonium obscurum, F., on dead *Calluna*. Only two published records, but not uncommon.
Trichoscyphella subtillissima, F., on *Pinus* bark and twigs.

Pyrenomycetes (W. G. B. & S. W.)

Acanthophiobolus helminthosporus, M., on *Phalaris* stem. Apparently first Yorkshire record.

Agaricales (S. W.)

Coprinus acuminatus, S.
C. domesticus, B.
C. truncorum, B.
Crepidotus amygdalosporus, S.
Galerina sphagnorum, S.
G. triscopa, F. (det. T. Hering)
Marasmius epiphyllus, S.
Mycena pudica (=*quisquiliaris*), M.
Panaeolus rickenii, B.

Other Basidiomycetes (S. W.)

Fomes fomentarius, M., on *Betula.*
Phellinus igniarius, M. Frequent on old willows.
Calocera pallido-spathulata, Reid, F. M. S.

REPORT ON HERBICIDES APPLIED TO FOUNTAINS ABBEY

R. M. HENSON
Harrogate College of Further Education

The flora of the Fountains Abbey area has been studied for many years and the plant communities on the walls of the Abbey buildings have been visited by many naturalists both individually and as societies; consequently there are many records of this interesting flora both published and unpublished. However, as many people know, the walls of the Abbey are now almost bare of all plant life. I consider that it is worth placing on record the chemicals used in its destruction so that anyone studying its flora in the future will know what substances may be present. A study of the surviving plants and any recolonisation of the walls will be of interest, as "weed killers" have their activities described in terms of conventional "weeds" and their activity on lichens, bryophytes and plants not usually regarded as weeds, are not often reported.

When the Department of the Environment took over the management of Fountains Abbey they found that many of the walls were in a seriously weakened state and a programme of strengthening and repointing was drawn up with a time scale of several years. The early work was to be concentrated on the main tower which was in imminent danger. The Yorkshire Naturalists' Trust contacted the local office of the Department of the Environment and it was agreed that the repair work was essential and that deep-rooted plants on the wall tops were causing the walls to break up, but it was agreed that there would be no deliberate eradication of the other plants. However, the local superintendent retired and a new area architect was appointed in London. After visiting the Abbey he instructed the local office to arrange for a contractor (Chipman Chemical Co. Ltd.) to spray the wall tops. The wall tops were sprayed in the autumn of 1973 with Dextrone (registered trade mark of Chipman Chemical Co. Ltd.) and Tordon 22K (registered trade mark of Dow Chemical Co. (U.K.) Ltd.). There was no deliberate spraying of the wall surfaces but there appears to have been significant run off and the walls are now virtually bare of plant life.

Dextrone X is a bipyridyl herbicide containing 2 lbs. of paraquat per gallon plus wetter. Paraquat is manufactured by I.C.I. Plant Protection Ltd. and the action is mainly contact but some translocation can occur in higher plants. Paraquat kills all green tissue but does not harm mature bark. It is used to control many grasses and annual, broad-leaved weeds but deep-rooted perennials will regrow. A plant treated with paraquat dies rapidly in light but not in the dark. Interference with photosynthesis alone would result in the slow death of the plant, but as death occurs rapidly the action of paraquat must involve some other process within the plant. Paraquat is destroyed by bacterial action and ultra violet light and is rendered largely inactive on contact with soil as it is held by the clay particles until degraded.

Tordon 22K is a persistent weed killer used for tough, deep-rooted, perennial weeds or brush; it is based on picloram. Picloram is a relatively new weed killer, its activity first being described in 1963. It is a chlorinated compound (4-amino-3,5,6, trichloropicolinic acid) which is very stable (e.g. stable to above 200°C.) and is known to persist in active concentrations in the soil for up to two years.

Giant Hogweed *(Heracleum mantegazzianum)* which grew behind the museum was destroyed on instructions from the County Medical Officer of Health as it is known that it can cause serious ulcerations on contact with the skin of children.

Since the spraying of the wall tops the only chemicals used in the Abbey grounds have been the conventional selective weed killers on the mown lawn areas.

Anyone not familiar with the once rich flora of the Abbey walls should visit the outhouses to the S.W. of the Abbey which have not been sprayed.

BOOK REVIEWS

The Geology and Mineral Resources of Yorkshire edited by **D. H. Rayner** and **J. E. Hemingway** and published by the Yorkshire Geological Society. Pp. 405 with 7 plates, 79 text figures and 24 tables. £4.50.

It is now fifty years since Kendall and Wroot's *Geology of Yorkshire* was published. It combined authenticity with readability and its usefulness extended well beyond a purely geological public. Since its publication many research papers have appeared and the present work, to which twenty-one specialists have contributed and which is in no sense intended as a revised version of its predecessor, gives a new and up-to-date account of the geology and geological resources of the county.

The book is divided into two parts. The first eleven chapters deal with the geological succession from Lower Palaeozoic rocks to the Quaternary period, with an opening chapter on the history of geological investigations throughout the county and concluding with one on physiographic evolution. These chapters are authoritative, well documented and admirably illustrated. They record the facts for each geological horizon, the advances in knowledge made in recent decades and they indicate the scope for further work on problematical structures and interpretations.

The second part deals with economic aspects. Mineral resources include in addition to coal, ironstone, limestone and chalk, lead, zinc, barytes, gypsum, rock salt, potash, building stone and constructional materials also water resources and supplies, oil and gas fields. The distribution of these and the constitution of the more variable deposits is detailed together with briefer accounts of the history of extraction and assessment of reserves. Statistics relating to the enormous quantities of chalk, limestone, sands and gravels annually removed, often from places of great natural history interest, make depressing reading for the conservationist.

The editors deserve high praise for the skilful way in which they have surmounted the problems involved in moulding contributions from so many authors into a harmonious sequence. This is a book which will remain — probably for the next fifty years — the standard account of the geology of the county and the Yorkshire Geological Society in general and the editors in particular deserve congratulations on a work in which the expertise of the contributors is matched by the handsomeness of production.

W.A.S.

Eagle Days by **Peter Steyn.** Pp. xvii + 158, with 144 photographic illustrations, 22 in colour. Purnell & Sons, South Africa 1973, reprinted by Macdonald & Jane's, London 1974. £4.25

Although pictures figure as largely as the text, the author has accomplished the task of commenting significantly on the breeding cycles of nearly all of Southern Africa's resident Eagle species, He has presented his material, which is first-hand, in a way that is factual and concise and yet conveys vividly to the reader the many sights and sounds picked up by so acute an observer. The amount of watching devoted to his field studies can be appreciated.

The book has one chapter devoted to each of nine main species (or groups thereof); migratory Eagles are touched on but briefly. There is also an "intruder" in the list, for the Golden Eagle was watched in Scotland where the author learned some useful lessons in nest-spotting. From his studies in Rhodesia he has become an expert on Snake Eagles and the chapter on these four species is outstanding. The photography is an integral part of this work, emphasis being throughout on that area of bird life, nesting, where photography from hides has most to contribute to ornithology. The colour plates round off a splendid collection; altogether this is a book to be recommended to the naturalist in general as well as to the keen ornithologist. G.E.P.

Highland Animals by **David Stephen.** Pp. 110, with 23 black and white photographs and 46 colour photographs. Collins, 1974. £1.50.

The Highlands and Islands Development Board is a body which promotes in the widest possible terms the well-being of the group of seven counties which are nearest the top of the map of Britain. This is their second natural history book, the first having appeared in 1971, and it continues the treatment given to highland birds by covering the mammals, reptiles and amphibians of the region. David Stephen proves himself more than equal to the task and with his vast knowledge of the highlands and their wildlife he offers the visitor an ideal introduction to the subject and the resident an excellent compendium of his country's assets in the field of mammals, reptiles and amphibians.

If I were to quibble with the coverage it would be at the omission of the Black Rat for which the Orkney Island of Westray has something of a reputation, if indeed it does not occur in Iverness, and at the sketchy treatment given to the Orkney Vole and the northern Water Vole. Since the last two are by way of being personal favourites of mine, and since small rodents do not perhaps inspire many people to visit the crofting counties, I might be airing my own prejudices here. With almost a monopoly on Wild Cats (Perthshire and Angus apart), and with majority holdings on Pine Martens, Otters, Grey Seals, and the native race of the Red Squirrel, the highlands have so much to offer. The author makes a strong case for Polecats on Mull, but to me they still have a powerful smell of ferret. Better to leave them as the mammalian pride of Wales and point instead to the herds of Red Deer, the Roe that make road journeys a pleasure, and the companionable Mountain Hares.

The highlands and islands include a great deal of wild country and natural history in the area still offers the thrill of discovery. Only three bats are in David Stephen's book but Natterer's Bat has recently been discovered just outside the area covered. He suggests that there may still be wild Polecats in Caithness or Sutherland and the invitation which he extends to come and see is mighty persuasive. All I can do is endorse it.

Most of the photographs in the book were taken by the author and are of as high a standard as one would expect from David Stephen. Among those from other sources, the Blue Hare in snow, by Alexander Tewnion is a gem. T.M.C.

Thorburn's Mammals edited by **David Attenborough** with an appendix by Ian Bishop. Pp. 128 with 50 colour plates. Ebury Press & Michael Joseph, 1974. £3.95.

For many years Archibald Thorburn's (1860 - 1935) brilliant mammal illustrations, first published in 1920 - 1921, have only been available to fine-book collectors. This splendid reprint enables the present generation of wild-life art appreciators to enjoy his masterpieces. Virtually everything about this production deserves praise. David Attenborough's introduction complements James Fisher's mainly biographical appraisal of Thorburn in the reprint of *Thorburn's Birds* issued in 1969. Attenborough concentrates on the man as an artist and provides a guide to the appreciation of the artist's style and peculiar skill. Unlike the reissue of his *British Birds* the text to *Thorburn's Mammals* appears in its original form and being a competent precis of the works of such contemporaries as Barrett Hamilton and Hinton, it forms a highly useable reference work. Despite additions to the British fauna and revisions of nomenclature since the 1920's the editor has wisely left Thorburn's text unchanged but an appraisal of these changes together with new information on status and distribution is provided by Ian Bishop in an appendix.

As anatomical studies Thorburn's mammal portraits combine the highest artistic and scientific standards, and his technique of depicting his subject anables us to interpret their intimate nature and character. Demonstrating this feature is the startled stance of a mountain hare which almost compels one to turn the page quietly in case it should be frightened off. The weasel is given a look of eager determination so well typifying this indefatigable little hunter while the otter's stance demonstrates beautifully its sleek, liquid line. The book is a sumptious feast of mellow colour, fine draughtsmanship and intuitive interpretation. C.A.H.

Wild Dogs of the World by **Lois E. Bueler.** Pp. 274 with 35 black and white photographs and 29 distribution maps. Constable and Company Ltd., 1974. £3.50.

In the days when I attended meetings in London with some regularity I quite often was the first customer of the day at the London Zoo. Here, before the crowds came, I was able to visit my old favourites and even chat to them. The South American Bush Dog, a low-slung terrier type with a rough coat, was particularly responsive and would wag its tail and even roll over on occasion with all the affability of a domestic dog.

It was with particular pleasure that I turned to the section devoted to *Speothos venaticus* in this book and found that my observations were comparable to the experiences of others. Lois Bueler's book is the first review of wild canids for a number of decades and gives summarised life histories, details of taxonomy, field observations and the conservation status of the extant species. They are all here, the Grey Wolf, the Coyote, the Jackals and the Dingo. With them the problem of the origin of the domestic dog is discussed once more, but without a workable solution emerging. How about a dash of Dhole, *Cuon alpinus*, to leaven the straight mixture of *Canis* species?

Familiar foxes like our own Red Fox are covered along with their desert-adapted relatives of both hemispheres, the odd Semyen Fox of Ethiopia and the attractive South American species. The other odd species such as the Raccoon Dog of Asia, now spreading in Europe as a result of introduction, the African Hunting Dog and the Maned Wolf all get the full treatment and the result is a book which is readable and at the same time a valuable reference work on the subject. It should have considerable appeal too to the dog owner, for it provides a lot of points to ponder in conncetion with the domestic hearth-sharer and its place in the animal kingdom. My own hearth is shared at present by a highly specialised spaniel to whom the be-all and end-all of existence is sniffing out potential "game", and a 57-varieties type whose ancestral specialities have long since disappeared into a melting pot of dog. The result is, I feel, something akin to the animal which first took up residence on the mesolithic fire-side. Incidentally, her greeting ritual contains all the elements of that of the Bush Dog — but there the resemblance ends.

The gallery of photographs which illustrate the book includes a number of animals which are very rarely photographed, though some of them have of necessity had to be of captive animals. It is a pity that the Wolf's scientific name is mis-spelled in its section heading because otherwise the book is free of small but irritating errors.

T.M.C.

All About Photographing Birds and Animals by **David Hodgson.** Pp. 190 with 100 plates. Pelham Books Limited. £4.50.

An Introduction to Bird and Wildlife Photography by **John Marchington** and **Anthony Clay.** Pp. 149 with 24 plates. Faber & Faber. £2.95.

The first of these two books is a guide for those who's aim in life is to photograph dressed up dogs and take "humorous" animal pictures. Seventeen pages are devoted to wildlife photography — the author includes a zoo photograph of a weaver bird in this category — and his writing in this section gives the impression of lack of personal experience in the field.

An Introduction to Bird and Wildlife Photography is the work of two authors and contains a great deal of information on their very different types of photography. John Marchington has written a beginner's guide to shooting and one can appreciate his preference for using the camera like a gun and his ability to do so. What he writes is for the snapshotter and although many exciting nature pictures have been produced by this technique, some of the pictures in this book would have been better if a tripod and a smaller stop had been used.

Anthony Clay's movies cannot be illustrated in the book, but he is well known for his R.S.P.B. films and no one can doubt his ability. Well written, with great clarity, his section of the book will be an invaluable aid to anyone wishing to enter the world of wildlife movie making.

A.G.

The changing Flora and Fauna of Britain edited by **D. L. Hawksworth** Pp. xiv + 462 with one plate, 72 figures and 41 tables. Systematics Association Special Volume No. 6. Academic Press. £9.20.

This volume records the proceedings of a symposium of the Systematics Association held at Leicester in April 1973. In its 22 chapters specialists in all the principal groups of plants and animals set out the available information on increases and decreases in the occurrences of species in each group and discuss the factors responsible for these changes. Tables and maps illustrate notable instances of distributional alterations and the effects of various factors such as air and water pollution, agricultural sprays, woodland clearance and management, climatic fluctuations and public pressures on different groups of plants and animals, are examined as probable or possible agents responsible for the gains and losses recorded. That changes will continue is certain, for the environment in Britain is constantly changing and the ever more intensive agricultural exploitation of the land and spread of conifer plantations probably constitute the greatest danger to our flora and fauna. By bringing the facts together for each group this book provides a highly informative reference work on a subject which is of concern to all naturalists, ecologists and conservationists. Unfortunately its high price will largely limit its sales to libraries.

W.A.S.

A Dictionary of Plants used by Man by **George Usher.** Pp. 619. Constable 1974. £6.

More than 25,000 alphabetically arranged entries are included in this comprehensive dictionary of trees, shrubs, herbs, fungi and other plants which are grown or made use of by man all over the world. Vernacular names are cross-referenced with Latin names throughout which facilitates the identification of obscure items such as quamo, kanjere, duffin bean or zarza. Having thus arrived at the correct scientific name, the family to which it belongs, the country in which it grows and the use to which it is put are duly recorded, often, in the case of the more important products, with information about methods employed in extraction or preparation. Collective names are listed under the different species; thus there are 60 entries under mahogany, 40 ebonys, 56 resins etc. English names for British plants are sometimes misleading e.g. club-rush for *Scirpus lacustris* and oyster plant for *Tragopogon porrifolius*: there is no mention of the latter name under *Mertensia* where we learn that the rhizomes are eaten by eskimos in Alaska. Silver beech is included but not silver birch. The book is rather liberally sprinkled throughout with misspellings of Latin names and authors' names frequently have a full stop after them when not contracted. These are minor blemishes however in a book which contains a great deal of useful information and which is likely to be consulted frequently by its owner.

W.A.S.

Botany — A Functional Approach by **W. H. Muller**. Third Edition. Pp. 601 with 292 text figures. Collier-Macmillan Publishers, London. 1974. £5.95.

The first illustration in this book depicts the sub-atomic structure of helium and the last reveals details about changes in a deer population over a 50 year period! With several "college" text books with an interpretation of botany as wide as this being produced and revised in the U.S.A., the best a reviewer can do is to indicate the strongpoints of this particular one. It is exceptionally well illustrated. It has a strong anatomical background. Strong doses of biochemistry and physiology are well integrated with structure. The sections on microbiology and plant pathology are unusually good. New chapters in this edition are concerned with the environment generally, human population problems, pollution and the origin of life. Good further reading lists are given at the end of each chapter. With these and the thought-provoking questions next to them, any naturalist of any age will find interesting information. It is a stimulating American book.

T.F.P.

A Modern Herbal by **Mrs. M. Grieve,** edited and introduced by **Mrs. C. F. Leyel.** Pp. xvi + 916 with 96 plates. Jonathan Cape. £12.

Those reared on Gerard and Culpeper, not yet having discovered *A Modern Herbal,* have a feast in store. In a handsomely produced and illustrated volume of over nine hundred pages the author describes the history, constituents, therapeutic action, domestic uses and folklore of more than a thousand plants, including herbs, grasses, fungi, shrubs and trees.

To many people, not necessarily botanists, interested in the plants of the countryside this book will be a boon. It may be picked up for purposes of reference but it will be read also for pleasure. One may learn how to dye with alder bark, trace the therapeutic history of the foxglove from the treatment of scabby heads and dropsy to its present use in the treatment of congestive heart failure, or learn the culinary uses of sage as practised in the eighteenth and nineteenth centuries. Older doctors and pharmacists browsing through this book will be interested to see how many official preparations of the British Pharmacopoeia and the British Pharmaceutical Codex are no longer in use e.g. Tincture and Infusion of Digitalis which have been almost completely superseded by Digoxin Tablets B.P.. Tablets of Digitalis Leaf, whose therapeutic properties were discovered by the immortal Doctor William Withering in the eighteenth century, are still in use. By experiment he found out that the leaf blade only gave the foxglove its properties as a medicine. Another preparation of nostalgic memory is Cherry-Laurel Water, often used in eye lotions forty years ago.

The illustrations are superb and its language being readable and not too technical, the layman will not be robbed of enjoyment. Readers with any regard for nature, from the beginner to the experienced naturalist, doctor, pharmacist or herbalist, will all find something of interest in this fascinating volume. R.H.M.

Biological Control by Natural Enemies by **Paul DeBach.** Pp. 323. Cambridge University Press. £5.50 (Hardback) £2.25 (Paperback).

This book is aimed at the general public and seeks to assess not only the past achievements in the control of pest populations by natural enemies, primarily parasitoids and predators, but its potentialities for the future. Although Dr. DeBach avoids any detailed treatment of pesticide use, the relative merits of control by natural enemies and by chemical pesticides inevitably and quite rightly forms an important theme for the simple reason that biological control cannot operate effectively where chemical control is practised.

The author attacks the dogma that has developed in both scientific and non-scientific circles in the past that the world's teeming millions can be fed only by the extended use of pesticides and strongly urges that our ultimate goal should in fact be the complete elimination of them. In developing this thesis he reviews in considerable detail the history of biological control and some outstanding control projects of recent years. From this series of data he estimates that the chances of obtaining significant success against any given pest species by the importation of foreign enemies are about 54 in 100. This, and the fact that of the 5,000 species of insect pests recorded in the world only about 223 species have been subjected to natural enemy importation, point to the great potentialities of biological control in the future.

One interesting chapter deals with the upsets in ecological balance produced by applications of the broad spectrum insecticides leading to increases in, rather than the control of, the pest species and creating new species of pests that were previously rare. Chemical control is failing due mainly to the adverse effects on natural enemies combined with increasing development of genetic resistance to pesticides. Immediate application of current knowledge could rapidly lead to general reductions of 50% in the use of pesticides — often with increased yields and with reduced environmental pollution. Thereafter the main concern should be with the conservation, importation and encouragement of natural enemies combined with refinement in cultural control and the development of resistant host plants.

The book is well written and adequately illustrated although the printing of some of the photographic illustrations could be improved. E.B.

Freshwater Life by **John Clegg.** 4th edition. Pp. x + 283 with 64 plates. Frederick Warne, 1974. £6.

That a fourth edition of this well known work — originally published more than 20 years ago as *Freshwater Life of the British Isles* — has been called for is sufficient proof of its continuing usefulness and popularity, but as its writer says the composition of its readership has changed during this period. There are now fewer amateur pond-hunters, but more people are introduced to the life of our inland waters at school and university. Does this mean that bad teaching dampens enthusiasm? There is no lack of enthusiasm on the part of the author who, while striving to present his facts accurately, is not afraid to express delight or to marvel at the beauty of the organisms about which he writes. "The beautiful green globes" of *Volvox*, as seen under dark-ground illumination, for instance are described as presenting "a singularly beautiful spectacle as they move along, rotating as they go". There is no dichotomy here between scientific and aesthetic appreciation.

After a useful introduction to the freshwater environment, the plants and animals to be found there, especially in Britain, are presented. At the chosen level this is a fine *tour-de-force* of the field, for while each organism mentioned could have been treated at much greater length and every knowledgeable reader will think that some particular group is neglected, the newcomer will find sufficient to whet his appetite yet not be overburdened with detail. One of the great attractions of freshwater life is the diversity of animal forms that it embraces and this will quickly be brought home to the reader as he passes from protozoans, via worms, rotifers, molluscs, crustaceans and insects to the briefly mentioned vertebrates. This is not, however, an identification manual but a book about living animals, and the numerous plates, in colour and black and white, have the potential to demonstrate this admirably. Unfortunately neither these nor the line-drawings are sufficiently exploited by cross references in the text and some of the animals illustrated are not even mentioned there. References to plates are often added almost as an afterthought at the very end — instead of the beginning — of a description, sometimes with unfortunate or odd results. Thus one turns to the plate of *Theodoxus* expecting to see a reddish operculum but the shell illustrated lacks this structure, and on p. 101 when reference is made to plate 17 one half expects to see a picture of Alexander the Great severing the Gordian knot! Some parsimony has also been shown in the provision of line drawings: for example no text can convey the appearance of the larva of *Simulium* or its food-collecting apparatus so well as a good figure, and one wonders just how the reader is expected to visualise this creature. Many of the arrows in the food web shown in fig. 7 are going in the wrong direction. Otherwise criticisms are of small points — the occasional generalisation that is too sweeping and a few typographic errors. Such quibbles apart, the text is sound and easy to read, and can be thoroughly recommended as a first-rate introduction to the plants and animals of freshwater. Armed with this book and some simple equipment anyone interested in the world about him can look forward to many hours — or years — of instructive enjoyment. Hints to such would-be investigators are given and there is a chapter on freshwater biology in the service of mankind, very relevant in this conservation-conscious era, which highlights the importance of a resource too often taken for granted and reveals some of the ways in which the animals and plants living in it work for the good, or evil, of man. We look forward to the fifth edition.

G.F.

Birds of the Woodlands by **Reg Jones.** Jarrold Bird Series, Book 3. Pp. 32. Jarrold Colour Publications, Norwich. 30p.

This booklet is beautifully illustrated and maintains the very high standard set by its predecessors in the Jarrold Nature Series. The text is brief and accurate, a great amount of information being packed into a small space. This is an excellent gift for the beginner providing a useful guide to the birds found in woodland.

J.D.P.

CONTRIBUTORS

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