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Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in recent issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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CHAD'S SHREWS

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Introduction

The distribution and abundance of small mammals in the Peak District was reviewed by Whiteley and Yalden (1976), but they commented that the altitudinal limits and relative abundance at high altitudes of the various species remained a mystery. Most of their records of small mammals came either from owl pellets or from remains in discarded bottles. The altitudinal provenance of owl pellet material is inherently uncertain, while that from bottles is biassed towards roadsides, where most bottles get discarded.

One solution to these problems would be to undertake deliberate trapping, or exploit accidental by-catches while pitfall-trapping for invertebrates. When Whiteley and Yalden (1976) wrote, no trapping had been done on moorland or at high altitudes, but they discussed owl-pellet material which suggested that Pigmy Shrews *Sorex minutus* might be more common than Common Shrews *S. araneus* on moorland. Pitfall trapping on Coldharbour Moor (SK0792, 1600 feet) subsequently confirmed that *S. minutus* was indeed about eight times more numerous than *S. araneus*, at least at that site (Yalden 1981). To establish the generality of this result requires samples from a wide range of altitudes and habitats. For thirteen years, my fieldwork in the Peak District was frequently enhanced (and occasionally hindered) by the company of our Black Labrador bitch Chad. She regularly investigated, and usually rolled on, any smelly corpse, and was particularly adept at drawing my attention to dead shrews.

Methods

Chad shared much of our fieldwork on Golden Plovers *Pluvialis apricaria* (eg Yalden & Yalden, 1990) and Mountain Hares *Lepus timidus* (Yalden, 1984), so that coverage of moorlands and higher altitudes was quite thorough, but she also accompanied me on surveys of the south western Peak District for Badgers *Meles meles* and other species. Any corpse she located was examined in the field, using a hand-lens to check the dentition if necessary. Records were assigned to habitat type (principally Heather *Calluna* moorland; Cotton-grass *Eriophorum vaginatum* blanket bog; or grassland, including acid *Nardus stricta* grasslands as well as limestone pasture) and altitude (to the nearest 50 foot contour, from the 1:63,360 tourist map). A smaller sample of Chad-derived records from elsewhere in the country (mostly obtained on holiday) provides a useful check on the validity of the results.

Results

In the Peak District, Chad found 91 shrews: 61 *S. araneus*, 28 *S. minutus* and 2 Water Shrews *Neomys fodiens*. Elsewhere in the country, a smaller sample of 23 shrews contained respectively 18, 4 and 1 of these three species. Thus in the Peak District, there were only 2.2 *S. araneus* per *S. minutus*, whereas the ratio was 4.5:1 elsewhere (Table 1).

TABLE 1
Shrews Soricidae found by Chad in the Peak District and elsewhere 1979-1992.

	Peak District	Elsewhere	
Sorex araneus	61	18	$x^2 = 1.5$, $p = 0.21$
Sorex minutus	28	4	
Neomys fodiens	2	1	
Total	91	23	

The distribution of the two *Sorex* sp. by habitat and altitude varied within the Peak District. In grasslands, *S. araneus* outnumbered *S. minutus* more than 6:1, but on blanket-bog, *S. minutus* outnumbered *S. araneus* by 2:1 (Table 2). Similarly, below 1,000 feet and from 1,000-1,500 feet, *S. araneus* outnumbered *S. minutus*, but the latter were more numerous above 1,500 feet. The median altitude for finding a *S. minutus* was 1,400 feet (range 350-1,750), whereas for *S. araneus* the median altitude was 1,150 feet (range 700-1,700). These results are, of course, correlated – most blanket-bog in the Peak District is above 1,500 feet.

TABLE 2

Habitat and altitudinal distribution of shrews found by Chad in the Peak District 1979-1992. "Other" includes woodland, forestry and path or roadsides that cannot be assigned to the other habitats.

	Sorex araneus	*Sorex minutus*	Ratio
Blanket Bog	8	16	1:2
Heather Moorland	16	6	2.7:1
Grassland	27	4	6.75:1
Other	10	2	5:1
Total	61	28	2.2:1
	$X^2_3 = 20.1$, $p = 0.0004$		
Above 1500ft	12	17	1:1.4
1000 - 1500 ft	33	7	4.7:1
Below 1000 ft	16	4	4:1
Total	61	28	2.2:1
	$X^2_2 = 14.7$, $p = 0.001$		

To complete the record, Chad also found, over the years, the corpses of 3 Wood Mice *Apodemus sylvaticus*, 2 Bank Voles *Clethrionomys glareolus* and 15 Field Voles *Microtus agrestis*. Many of these were dead inside nests, and would never have been recorded by a human observer alone. *Microtus agrestis* is the one species which also attracted her attention while alive; she killed three during moorland walks, and also drew my attention to two nests with young. One with 4 young was discovered on Shining Tor, SJ9973, at 1800 feet on 8 June 1980 and a nest with 3 young was found on Middle Edge Moss, SE0405, at 1,600 feet on 14 August 1987. These and a live *Apodemus sylvaticus* which she noticed as it foraged at dusk along the edge of the peat blanket on Holme Moss SE0903, at 1,700 feet on 18 August 1983, are among the highest altitude small mammal records from the Peak District (which only rises to 2,088 feet, on Kinder Scout).

Discussion

All the shrews which Chad found were corpses; presumably they were killed by Foxes *Vulpes vulpes* which attacked the rustling in the vegetation, but then discarded their prey on discovering it to be a relatively inedible shrew, rather than a rodent. In that case, the habitat, altitude and relative numbers of the different species are probably reliable indications of the distribution and relative numbers of shrews. This is not true for rodents, nor for comparisons between shrews and rodents.

The fact that *S. araneus* outnumbers *S. minutus* by 4.5:1 both in the lower altitude (below 1,500 feet) Peak District sample and in the shrews Chad found elsewhere is valuable confirmation of the validity of these results. This is, however, very different from the 9.3:1 ratio recorded from bottles in the Peak District, nearly all of which came from below 1,500 feet (Whiteley & Yalden, 1976). Neither does it match the 2.9:1 ratio of their

aggregate owl pellet sample, though that is a closer match. However, the most interesting result is the confirmation that at higher altitudes and/or on blanket-bog, *S. minutus* outnumbers *S. araneus*. This accords with the Coldharbour Moor pitfall trapping (8.7:1, Yalden, 1981) and also with samples subsequently caught accidentally while pitfall trapping for invertebrates. On Torside Clough, SK0696, at the site of a moorland fire at 1,500 feet, 4 *S. minutus* but 0 *S. araneus* were caught in 1981 (Mrs P. Anderson, det DWY) and on Kinder Estate, SK0786, at 1,500-1,750 feet, 51 *S. minutus* and 6 *S. araneus* were caught in 1984-88 (National Trust det DWY). Elsewhere in Britain the very large sample of shrews reported from moorland habitats across northern England by Butterfield *et al.* (1981) included 439 *S. minutus* and 53 *S. araneus* (ratio 8.3:1) from blanket-peat moorlands, as well as 52 *S. minutus* and 27 *S. araneus* from acid grasslands (ratio 1.9:1). During their experiments on moorlands limed to counteract acid rain, Shore and Mackenzie (1993) caught 249 *S. minutus* and 114 *S. araneus* in Wales, 153 *S. minutus* and 203 *S. araneus* in Scotland, but in both cases the numbers of *S. minutus* (but not *S. araneus*) were adversely affected by the liming, so altering the ratios of the two species. Even these changed ratios, however, like all the other figures from moorland, confirm that *S. minutus* is much more abundant there, relative to its congener, than in the lowlands.

Lastly, to return to Chad's contribution, Whiteley and Yalden (1976) had only 29 records (out of 1,195) of small mammals at or above 1,500 feet in the Peak District. She added another 32 to that total, and this paper was written to commemorate her valuable contribution to this and our other Peak District fieldwork. She died on 1 June 1993.

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YORKSHIRE CETACEANS: STRANDINGS AND SIGHTINGS 1985 TO 1992

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Traditionally, cetacean recording in Yorkshire waters has relied on the formalised reporting of strandings by H. M. Coastguard Service in accordance with responsibilities under the "Receiver of Wrecks" legislation. This source is supplemented by casual observations (sometimes supported by photographs) forwarded by members of the public, museum and bird observatory staff and by recorders of local natural history societies.

Data on strandings has routinely been collated by the Marine Mammals Section of The

Natural History Museum and listings of such records have been published periodically since 1913. The accumulated data relating to the coastline from the Tees to the Humber is presented in the series of Yorkshire cetacean reviews (Clarke & Roebuck 1881, Grabham 1907, Fraser 1956, Spalding 1966, Delany 1985, Howes 1991 a & b).

More recently, in fulfilment of various statutory requirements and international obligations regarding the marine environment, high priority has been given by government agencies to the monitoring and veterinary inspection of cetacean strandings in British waters; consequently, information on these matters has increased significantly. The current interest in cetaceans being shown by coastal bird-watchers has also produced an encouraging increase in reported sightings.

The following report forms the latest update in the series of Yorkshire cetacean reviews and is prepared with a view to encouraging further cooperative recording by naturalists and other observers who monitor the Yorkshire, North Humberside and Cleveland coastline.

Although records up to 1991 are given in Howes (1991b), the present study includes previously unavailable records dating back to 1985.

(BMNH) indicates records from the Natural History Museum files and (*) indicates that specimens or tissues have been examined by veterinary pathologists.

FIN WHALE *(Balaenoptera physalus)*

(*) 4. 2. 1992 Sewerby Rocks below Dane's Dyke (TA/1864). Immature females measuring 16.6m and estimated to weigh 30 tonnes, judged to be 3-4 years old, stranded alive during the high tide on the night of 3-4th February. Specimen examined by Thijs Kuiken of London Zoo, Dr John Baker of the University of Liverpool and Chris Spurrier of the British Museum (Nat. Hist.).

MINKE WHALE *(Balaenoptera acutorostrata)*

-.6.1990 Off Scarborough (TA/19). A baleen whale, probably this species surfaced adjacent to a small fishing boat off Scarborough (E. Horsley).

8-10.8.1990 British Gas Platform 47/8A 18 miles east of Easington, N. Humberside. A 30ft specimen in the vicinity of the platform for three days. Very close and impressive views of it surfacing and blowing were obtained during the very calm conditions (Johnson 1990).

1.9.1990 Kettleness (NZ/8316). From 9.00 to 9.15am a 20-25ft specimen was observed through a x20 telescope, some 1.5 to 2 miles offshore. In calm, clear conditions it appeared to be feeding, with its partly open mouth closing and its throat bulging as it lunged out of the water. This was repeated four or five times before moving positively northwards.

A second individual, swimming in the same direction, surfaced briefly somewhat closer to shore and it was just conceivable there was a third member of the group (A. Allport & B. K. Higham, in litt.).

15.7.1991 a 7.3m female which became entangled in the nets of two fishing boats was towed to Whitby harbour, where it escaped; later found stranded on the 'Undercliff' between Ravenscar and Hayburn Wyke (TA/9801) on 18th July, having died of its injuries (Ditchburn 1992, BMNH).

LONG-FINNED PILOT WHALE *(Globicephala melaena)*

26.11.1989 Low Skirlington (TA/1953). 4.57m specimen found in good condition dead on shore (BMNH).

21.5.1991 Redcar (NZ/6124). 6.1m male stranded alive on the beach, but died later (Ditchburn 1992, BMNH).

WHITE-SIDED DOLPHIN *(Lagenorhynchus acutus)*

12.9.1989 Long Nab (TA/02909380). 2.11m male in decayed condition (BMNH).

25.12.1989 Barton-on-Humber [South Humberside] (TA/03042188). 2.44m male stranded alive (BMNH).

24.6.1992 Flamborough Head (TA/2570) 2.21m specimen in decayed condition (D. Cutts, BMNH).

WHITE-BEACKED DOLPHIN *(Lagenorhynchus albirostris)*
--.--.1985 Whitby (NZ/81).1-1.5m specimen found dead on shore. Described in *Whitby Gazette* as a porpoise but identified from press photography by RD. (Ditchburn 1992).
5.2.1990 Bridlington (TA/1765). 2.26m male dead on shore (BMNH).
21.2.1990 Sandsend (NZ/8613). 2.30m female dead on shore (BMNH).
3.1.1991 Flamborough Head (NZ/2469). 2.95m male in good condition dead on shore (BMNH).
5.9.1991 Cayton Bay (TA/0684). 2.2m specimen dead on shore (BMNH).
29.5.1992 Low Skirlington (TA/1947). 2.44m specimen in decayed condition (BMNH).
(*) 1.6.1992 Hornsea (TA/2046). 2.5m specimen dead on shore (BMNH).
(*) 3.7.1992 Hornsea (TA/2147). Specimen dead on shore (BMNH).
26.8.1992 Flamborough Head (TA/2570). Identified from helicopter (BMNH).

DOLPHIN *(species unidentified)*
15.8.1986 Grimston (TA/2835). 1 seen offshore (SHCS).
17.8.1986 Grimston (TA/2835). 1 seen offshore (SHCS).
22.11.1986 Grimston (TA/2835). 2 seen offshore (SHCS).
22.11.1986 Grimston (TA/2835). 4 of a different species from the above seen offshore (SHCS).
18.1.1990 Withernsea (TA/3427). 1 seen offshore (SHCS).
31.7 to 14.8.1990 British Gas Platform 47/8A 18 miles east of Easington. Dolphins were frequently seen, the most interesting being a mother and calf which 'swam side by side, moving as one' and appearing to bask on the surface on calmer days (Johnson 1990).
1.8.1991 Scarborough (TA/0488). 1.38m specimen in decayed condition (BMNH).
14.9.1991 Easington (TA/3919) Specimen in decayed condition (BMNH).
1.10.1991 Saltburn (NZ/6621). Specimen in decayed condition (BMNH).
2.6.1992 Hartlepool (NZ/5231). Specimen in decayed condition (BMNH).
8.6.1992 Skipsea (TA/1654). 2.44m specimen in decayed condition (BMNH).
10.6.1992 South Gare, Redcar (NZ/5527). Two specimens in decayed condition, both with knotted ropes around their tails (BMNH).
12.6.1992 Barmston (TA/1758) Specimen in decayed condition (N. Cutts).
24.6.1992 Cayton Bay (TA/0749). 2.59m specimen in decayed condition (BMNH).

Unidentified Cetacean
1.10.1991 Withernsea (TA/3328). Dead on shore (BMNH).
8.6.1992 Marske (NZ/6423). Specimen in decayed condition (BMNH).
25.6.1992 Filey (TA/1682). 1.52m specimen in decayed condition (BMNH).
30.6.1992 Flamborough Head (TA/2670). 1.52m specimen in decayed condition (BMNH).

Records of harbour porpoise (*Phocoena phocaena*) are being incorporated in a separate study of their seasonality, herd size and status changes (Howes, in prep.).

Appendix 1, showing the monthly totals of cetacean strandings along the Yorkshire coastline between 1985 and 1992, indicates when specimens are most likely to be encountered.

ACKNOWLEDGMENTS
Thanks are due to The Natural History Museum (BMNH) for permission to reproduce data from their stranded cetacean files. Records were also forwarded to the YNU Mammal Recorder by C. I. Massey (Scarborough Field Naturalists Society); M. Mourby (South Holderness Countryside Society); A. Gowland (Hull Natural History Society); A. Allport, D. & N. Cutts, Dr. R. Ditchburn and L. Turner.

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APPENDIX 1. SEASONALITY OF STRANDINGS

Month	1	2	3	4	5	6	7	8	9	10	11	12
Cetacea (excluding harbour porpoise)	1	3	0	0	2	11	2	2	3	2	1	1
Harbour porpoise	1	3	2	3	1	4	6	4	10	4	0	0

FOOTNOTE

A programme of research, funded by the Department of the Environment, into the status and health of cetaceans in British waters is being carried out by the Institute of Zoology, London Zoo (Tel. 071 722 3333) in close collaboration with the British Museum (Nat. Hist.) (Tel. 071 938 8861 or 9431) and the Sea Mammal Research Unit, Cambridge (Tel. 0223 311354).

In order to assist with this study, naturalists are asked to notify the relevant local Coastguard Service or one of the above organisations on finding a stranded cetacean.

BOOK REVIEW

Gilbert White: Passages from *The Natural History of Selborne, Naturalist's Journal* and other writings selected by **Colin Cambell**. Wood engravings by **Thomas Bewick**. 1993 £9.95 softback.

This volume presents a selection from Gilbert White's writings as a composite journal with an entry for each day of the year. These vary in length from a terse comment on the weather (December 11 "Vast white frost") to a detailed and dramatic account of a landslide (March 8). Though beautifully designed and produced, anthologies of this nature tend to be unsatisfactory as the entries do not form a narrative, being connected only by the seasons. The Gilbert White enthusiast will want their own complete copy of *The Natural History*, the original of which has its own fine line engravings. One reason for publishing this book is that 1993 is the bicentenary of White's death.

OLG

HISTORY AND STATUS OF NORTH CLIFFE WOOD

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Introduction

North Cliffe Wood, which was acquired by the Yorkshire Wildlife Trust in 1982, occupies an area of about 34 ha. It lies on the eastern side of the Plain of York about 1 km west of the village of North Cliffe (GR 44/873.370). The soil is derived from aeolian sand and, in normal winters, the water table is close to the soil surface over much of the Wood. The pH of the upper layer of the mineral soil varies from about 3.2 at the dry sites where *Pteridium aquilinum** and/or *Dryopteris dilatata* and/or *Hyacinthoides non-scripta* predominate in the ground flora, to about 5.7 at the wettest sites under *Salix cinerea*.

Since the Wood became a nature reserve more than 150 flowering plant species have been recorded within its boundaries, of which 24 are trees or shrubs. There are also a few individuals of *Larix decidua*, *Pinus sylvestris* and *Picea abies* and a single individual of *Taxus baccata*. Twenty-seven species are commonly found on wetlands and 22 on grassy heaths. Over much of its present area the ground flora of the Wood is dominated by bracken, *Pteridium aquilinum*, which commonly reaches a height of 2m or more.

In an undated report on the Wood, written for Mr E. B. Burstall who owned it from 1955 until 1982, Miss E. Crackles expressed the view that, according to an assessment based on the number of ancient woodland indicator species present, *sensu* Peterken (1974), North Cliffe Wood was the second most important area of woodland in "Lower Derwentland". In 1984, however, Kirby, who visited the site on behalf of the Nature Conservancy Council, reported that since the site "could not be considered a good representative of what ancient semi-natural woodland in Humberside should be like" it could not be designated an SSSI. More recently Cook, who surveyed the site for English Nature, expressed the view that the area was not ancient woodland because there are no boundary ditches, coppiced shrubs or old trees. Indeed he considered it to be secondary woodland of recent origin.

As is commonly the case in secondary woodland on light, acid soils, the most common tree by far is birch, *Betula pubescens*. The variety of native trees and shrubs represented, however, suggests that the woodland might be old if not ancient in the stricter sense of having existed continuously since before 1600 A.D. In an attempt to clarify the status of the site a search for documentary and other evidence relating to its history has been undertaken and the results are reported here.

History Post-1772

The earliest cartographic evidence for the existence of woodland on the site of North Cliffe Wood is Jeffreys' map, published in 1772 to a scale of 1 mile inch^{-1}, where its presence is indicated by a small group of tree symbols. The Wood is not marked on either Bowen's or Speed's maps published in 1750 and 1610 respectively, but both of these are to a much smaller scale, about 5 miles inch^{-1} and 4 miles inch^{-1} respectively, so the Wood, if it existed, would probably have been too small to be shown.

The first map to show the boundaries of North Cliffe Wood is that of Bryant, dated 1828. On this map, to a scale of 1 mile inch^{-1}, the southern part of the Wood extends further eastwards than at present in the form of a wedge. By the time the first Ordnance Survey map had been published, however, in 1855, the eastern boundary had receded to its present position. On Bryant's map the area indicated as woodland is called Feather Wood, whereas on the O.S. map this name is applied to the northern part of North Cliffe Wood, the southern part being named Birk Wood. The two areas of woodland are separated by a trackway.

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* Nomenclature follows Clapham, Tutin and Moore 1987).

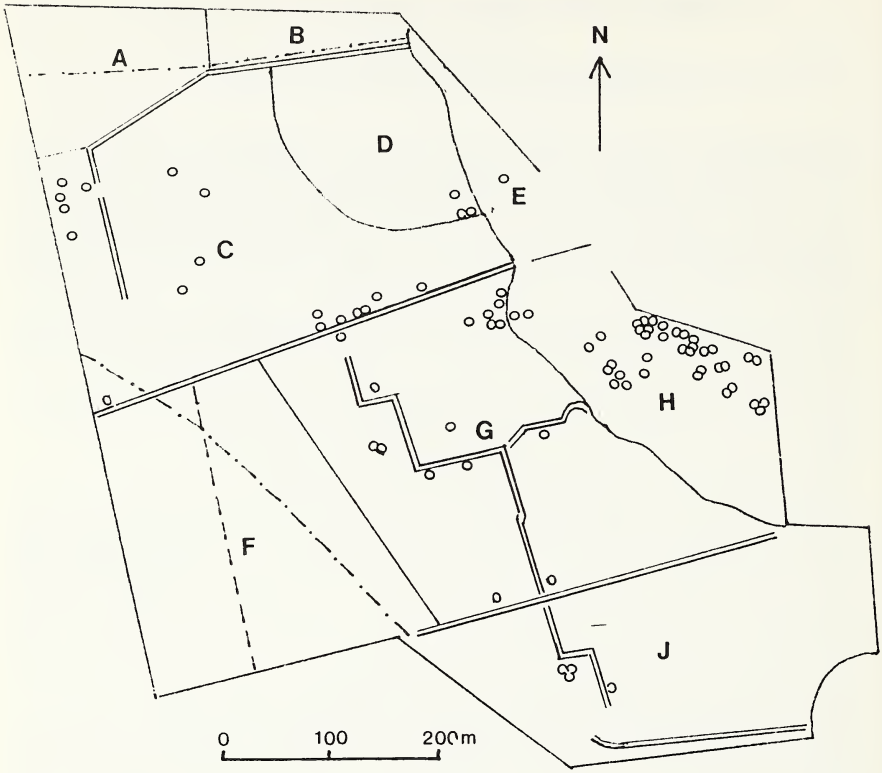

FIGURE 1

Fig. 1 Map of North Cliffe Wood showing the boundaries at earlier times, the main drains, the compartments and the distribution of multi-stemmed alders.

—•—	1855 boundaries	——	Compartment boundaries
– – –	1892 boundary	A-J	Compartments
═══	Main drains	O	Multi-stemmed alders

There is evidence to suggest that the southern boundary of North Cliffe Wood corresponded with its present position before the beginning of the nineteenth century. This boundary forms the northern boundary of South Cliffe parish which was enclosed in 1775. On the enclosure map the field boundaries correspond with those shown on the first O.S. map and the field immediately south of North Cliffe Wood is called "Wood Closes". This suggests that the adjacent area to the north was recognizable as woodland some 50 years before Bryant's map was prepared.

North Cliffe Common, which lies to the west of North Cliffe Wood, was enclosed in 1801 and again the field boundaries on the enclosure map correspond with those on the first O.S. map. In the description of the awards lying on the extreme eastern side of the Common, it is stated that they are "bounded eastward by ancient enclosures of the said Edward Worsley", though this does not, of course, necessarily mean that the land was woodland. The Worsleys had acquired a substantial estate at North Cliffe in 1695. It is to

be expected that more information about the state of the land currently forested would be found in the enclosure award for North Cliffe parish but unfortunately it seems that no copies of this award now exist.

In 1861 the Worsley estate, comprising about 1220 acres, was bought by Samuel Fox, an industrialist from west Yorkshire. Between then and his death in 1887 he built North Cliffe Lodge, which lies adjacent to the eastern side of the Wood and, according to Mott (*pers. comm.*), the gamekeeper for the Houghton Estate which owns the shooting rights, was also responsible for the draining of the Wood. This assertion is supported by the fact that no drains are shown on the first edition of the O.S. map and that the various footpaths shown on that map would have had to cross substantial drains had they existed as at present. The drains are shown on the 1892 edition and on this map the paths, which have been re-routed, cross the drains only where they are presently piped.

After Fox's death the estate was administered by trustees until 1921 when it was split up and sold. The Wood passed into the ownership of the Langdale family and in the year of its sale the oak trees, *Quercus robur,* were felled to make wedges for railway lines (Mott, *pers. comm.*). It is worth recording that, according to local information, at least one pit, location unknown, was dug to provide water for the engine that drove the saws but this was not, apparently, the largest pit near the NW corner of the Wood. This is marked on the 1910 edition of the O.S. map. It must be assumed, therefore, that this was one of a number of small meres which formerly existed in the general area.

From a comparison of the various editions of the O.S. maps it is clear that North Cliffe Wood has increased in size over the last 140 years. The 25-foot contour lies only a short distance to the west of the Wood so, by superimposing the contour lines on the various editions, the boundary changes can be determined with considerable precision. Thus it can be seen that between 1855 and 1892 Sands Lane, which bounds the Wood on the northern side, was realigned northwards with the result that a wedge-shaped piece of land had, as it were, been transferred from the northern to the southern side of the road and been incorporated into the Wood (see Fig. 1). Part of the old road is still discernible near the north-eastern corner. By 1892 this area had been planted with conifers as had another wedge-shaped area adjacent to the southern part of the western side of the Wood (the middle section of Compartment F - see Fig. 1). By comparing various 20th century revisions of the O.S. map, it appears that the conifers had been replaced by broad-leaved trees by 1948 and that another plot, adjacent to the second one mentioned above, had become afforested with broad-leaved trees between then and 1962. At the time the Wood was acquired by the Trust this plot supported a dense stand of *Betula pubescens.*

Mr. E. B. Burstall, a Hull solicitor, purchased North Cliffe Lodge in 1948 and the Wood in 1955. According to letters formerly held in the library of the Department of Botany at Hull University, he immediately came under considerable pressure from the Forestry Commission to plant up the site with conifers. Burstall wrote to Professor R. Good, head of the Botany Department, for advice and he, in turn, contacted the fledgling Nature Conservancy. Dr Edith Evans, representing the Nature Conservancy, visited the Wood, was apparently impressed by "the variety of communities in a comparatively small area" and elicited the confession from the Acquisitions Officer of the Forestry Commission that they could not force an owner to plant a wood against his will.

No doubt as a consequence of the draining of the Wood and the felling of the oaks in 1921, the spread of bracken was encouraged. According to Mott (*pers. comm.*), this spread accelerated considerably after 1946/7 when a deep drainage system was installed in the adjacent fields on the western side. It is estimated that today bracken dominates the ground flora over about 60% of the site. Since the Wood became a nature reserve, strenuous efforts have been made to prevent the further spread of bracken and also to encourage the spread of remnants of formerly more extensive types of vegetation such as heathland and reedswamp. In the north eastern part, where the vegetation consists largely of over-mature birch and tall bracken which appears to be preventing the regeneration of trees, a considerable number of oaks have been planted.

History Pre-1772

Before 1772 the area between North Cliffe and the present Market Weighton Canal was virtually uninhabited. The nearest farms, Manor House Farm and Avenue Farm, from which the land east and west of the Wood respectively are currently farmed, were established by Samuel Fox. Others further afield, such as Carr Farm to the west and Bielsbeck Farm to the north, were established early in the 19th century or very late in the 18th. Not surprisingly, therefore, there appear to be no historical records concerning land use other than those that refer to the area as a whole. These have been summarised by Sheppard (1966) from which the information given in the following paragraph has been taken.

Before the end of the 12th century the area under consideration formed part of a vast area of carr land, some 20 square miles (52 km^2) in area, known as Wallingfen. This extended from the Ouse to a line joining Holme-on-Spalding-Moor and Market Weighton, some 3 km north of North Cliffe. Naturally, it was the land adjacent to the Ouse which was drained first and since these drains extended northwards about 6 km to the River Foulney, which previously flooded across the carrs about 4 km south of North Cliffe Wood, it became possible to graze parts of the carrs for a few weeks each summer. In the early part of the 15th century another drain, then known as Langdike but called Black Dike on recent maps, was cut in an east-west direction to join those diverting the River Foulney. This drain had the effect of dividing the carrs into two, for cattle from the north were unable to cross into the southern carrs. Subsequently the carrs to the north of Langdike were divided, for administrative purposes, between the townships of Market Weighton, Holme, South Cliffe and Hotham. By 1660 another drain had been cut northwards from Langdike running just east of the line of the present Market Weighton Canal (about 1 km west of North Cliffe Wood). However, it was, apparently, the cutting of the canal itself between 1772 and 1782 which had the greatest effect on the northern carrs, for this made it possible to till large parts of it. Hence the pressure would have grown to enclose it.

About 1 km east of the Wood the village of North Cliffe lies at the foot of an escarpment formed from the Lower Lias which rises to a height of about 45m. According to Allison (1979), the medieval open fields of North Cliffe lay both above and below this Jurassic escarpment, and in 1311 land in North Field extended from the foot of the escarpment to "Mardik" on the lower ground. The location of Mardik is not known but Allison also states that "there was woodland beyond and below the hill and at least part of the escarpment itself was also wooded". There is, however, no way now of telling whether the woodland "below the hill" could have been or included the present North Cliffe Wood.

From Sheppard's account of the history of the carrs, it appears that the summer grazing of the northern carrs commenced before the mid-15th century, i.e. before the cutting of Langdike. If woodland did not exist on the present site of North Cliffe Wood at that time, it is to be expected that the site would have been grazed together with the rest of the carrs. If this were so, however, it is difficult to envisage why such a relatively small part of the total area should then or subsequently have been the subject of enclosure (see above). Had the enclosure been undertaken to separate grazings on the Worsley estate from the Common then it would have to be admitted that grazing was soon abandoned as woodland existed by 1772. If the Wood already existed, however, the reason for enclosing it might have been to prevent grazing animals from straying into it or for purposes of sport.

On the 1855 map the western boundary of the Wood is curved and the northern third extended somewhat further westwards than at present. South of this, and corresponding approximately with the 1855 boundary, is a shallow linear depression on the west side of which is a low ridge. This might be the relic of a ditch and bank which was created for the purpose of enclosure.

Botanical Features of Historical Interest

It has long been recognized that plants can be of value as "indicators" of specific environmental conditions but Peterken (1974) appears to have been amongst the first to

suggest that certain plants can be used as indicators of primary woodland, i.e. woodland which has existed continuously throughout the historical period. From a survey of 160 woodlands in Lincolnshire, Peterken drew up a list of 50 species which he considered were indicators of this type of vegetation. Of these thirteen occur in North Cliffe Wood or have been recorded there in the last four decades. Arranged according to the extent to which they are considered to be confined to primary woodland (the most confined first) they are *Milium effusum*, *Oxalis acetosella*, *Paris quadrifolia* (no longer present), *Scutellaria galericulata*, *Carex remota*, *Luzula pilosa*, *Anemone nemorosa*, *Lysimachia nemorum*, *Ranunculus auricomus* (probably no longer present), *Calamagrostis canescens*, *Conopodium majus*, *Geum rivale* and *Primula vulgaris*.

More recently, doubt has been cast on the reliability of the majority of Peterken's species as indicators of primary woodland but Spencer (1990), who uses the term "ancient woodland", defined as "long-established semi- natural woodland", rather than "primary woodland" considers that at least five of them have a close affinity with such vegetation. One of these, *Sorbus torminalis*, does not occur north of the Humber (Perring & Walters 1962), but of the remaining species *Anemone nemorosa* is present in North Cliffe Wood and *Paris quadrifolia* has been recorded there since 1950 (Crackles 1990).

Despite this evidence of antiquity, much of the Wood appears to be recent and secondary. There are, for example, no very old trees in the Wood and much of it is dominated by stands of *Betula pubescens* which appear to be fairly uniform in age. Nonetheless some of the trees in the Wood are of considerable size, as can be seen from Table 1 where the girths at breast height of the largest specimens of various species found in each of several compartments are presented.

TABLE 1

Girths at breast height in inches (and cm) of the largest trees of each of certain species in various compartments of North Cliffe Wood

Compartment	A	C	D	E	F	G	H	J
Quercus robur	81(206)	96(244)	105(267)	110(279)	64(163)	92(234)	78(198)	84(213)
Betula pubescens		63(160)	49(124)		48(122)	87(221)	68(173)	56(142)
Alnus glutinosa		64(163)	47(119)			76(193)	52(132)	53(135)
Fraxinus excelsior							76(193)	

According to Mitchell (1974) the girth at breast height provides a rough estimate of the age of many species of tree growing in Britain, those growing in the open increasing in girth by about 1 in. (2.4cm) annum^{-1} while those growing in competition with others increase by about 0.5 in. (1.2cm) annum^{-1}. The oaks growing in Compartments A, C, F, G and J all have spreading crowns as do others with somewhat smaller girths. This suggests that for much of their existence they have been growing in open conditions. The numbers given in Table 1, therefore, probably represent the approximate ages in years of the specimens recorded. If so, several of the trees appear to predate the 1921 felling, probably because they were too small to be worthy of harvesting.

Those oaks recorded in Compartments D (the extreme eastern side), E and H are components of small oak stands so the numbers probably underestimate their ages. Support for this view was obtained from a tree in Compartment E which was windthrown in the winter of 1992. This compartment is not part of the reserve and the owner quickly converted the tree into logs. One of these logs, from near the base of the trunk, extended from the periphery to the growth centre and was found to contain 134 growth rings. Assuming that each ring represents a year's growth, this tree originated just before Samuel Fox arrived at North Cliffe and was probably planted as a sapling by him along with the others in the compartment. In 1921 these trees must have been allowed to remain,

presumably for the benefit of the occupants of North Cliffe Lodge

In various parts of the Wood, where the ground is not covered with bracken litter, oak stumps have been found which are clearly the remains of trees that have been sawn off just above ground level. Most of the stumps are partially rotted but twelve of those found were sufficiently well preserved that their diameters could be measured. These varied between 12 in. (30cm) and 22 in. (55cm), eight of them falling within the range 16-20 in.(40-50cm). If it is assumed that these stumps are the remains of trees felled in 1921, the degree of uniformity suggests that the trees felled had been planted. The stumps, though widely distributed, are nonetheless of low and irregular density. This suggests that the existing tree cover was not cleared before the oaks were planted. It is worth recording that the radius of the 63rd ring in the log from Compartment E (corresponding, it is assumed, to the year 1921) was 7.5 in. (19cm), indicating a diameter of 15 in. (38cm). This is within the range of diameters recorded for the sawn stumps and suggests that the trees felled were planted at the same time as those presently growing in Compartment E.

Had there been any large oaks present at the time of the felling these would presumably have been felled together with the smaller ones but no large stumps have been seen by Mott (*pers. comm.*), who has been gamekeeper for the Wood since 1955. This, together with the scarcity of trees that survived the felling, suggests that before the Wood was drained there were few, if any, oaks present. Indeed, taking account of the probable ages of the largest trees and stumps, it seems likely that the Wood was drained in order that oaks could be grown, though the prime purpose of the enterprise might have been to provide local people with work; Fox is remembered as a man with a social conscience.

Like the isolated oaks, the large birches tend to have spreading crowns and to branch from low down on the trunks but they are probably not so old as their girths suggest. Large birches are very scarce in the Wood but a core taken from one in Compartment C, which fell in 1990 and had a girth of 52 in. (132cm), was found to contain only 43 growth rings. This tree had been growing beside a path which was created between 1955 and 1960 (Mott, *pers. comm.*) and was, therefore, probably able to grow rapidly in response to the high illumination. Indeed, according to Mott (*pers. comm.*), large parts of Compartments C, G and J were very open in 1955 but at about that time were invaded by birch which soon formed dense stands. This invasion was apparently a consequence of the large scale destruction of rabbits by myxomatosis. Until then the rabbits had prevented tree regeneration after the felling in 1921. This, therefore, explains the apparent secondary nature of much of the woodland in these compartments

Alder, *Alnus glutinosa*, is widely distributed in North Cliffe Wood and many of the trees are tall, up to 18m in height as measured with a Sunto hypsometer. Many of the trees are multi-stemmed, up to 11 stems apparently arising from a common stool, but there are also individuals and groups of single-stemmed trees, especially in the central southern part of Compartment G. These trees appear to be relatively young and one group, near the centre of Compartment G, appears to be invading an area of *Carex riparia* swamp.

Superficially the multi-stemmed trees appear to have been coppiced. Evidence that this is so was obtained by measuring the girth of each stem arising from each of 28 stools. On 21 of these the girths of up to three stems were within 10% of that of the largest on the stool, suggesting that these had started to grow at the same time as the largest stems. It is believed that such a structure could have arisen only as a consequence of coppicing.

To obtain an estimate of the time of coppicing, cores were taken from the largest stems of two stools, one in the NE corner of Compartment G and the other in Compartment H. The girth of each stem was 48 in. (122cm) and the lengths of the cores 7.2 (18.3) and 8.0 in. (20.3cm) respectively. The number of growth rings counted was 65 and 63 respectively. Bearing in mind that each core was taken at a height of about 1.5m in 1992 and slightly by-passed each growth centre, it seems likely that the trees were coppiced at the time the oaks were felled.

The location of each of the large, multi-stemmed alders is shown in Fig. 1. They are widely distributed across the older parts of the Wood but they also tend to occur in groups.

Some of the groups are close to areas where sallow, *Salix cinerea,* is common. The heights and girths of the largest stems of those alders growing close to ditches tend to be greater than those in more remote situations so it is unlikely that any alders were lost as a consequence of drainage. It is probable, therefore, that the distribution of this species has always been similar to that at present.

Fraxinus excelsior is very scarce in the Wood. Apart from two individuals in the middle of Compartment G, it has been recorded only from compartments on the eastern side. It is not a long-lived tree, maturing at about 60 years of age (Bolton & Jay 1944), so the existing trees are probably progeny of one or more which have since died and, because the wood is not very resistant to decay, rotted away. It is of interest that *Paris quadrifolia*, which often occurs in moist ashwoods, formerly grew in the general area where ash is now found.

Status of North Cliffe Wood

Three events, namely the draining and planting with oak, the felling of the oak and the arrival of myxomatosis, spread over the last 130 years or so, appear to have largely influenced the present appearance of North Cliffe Wood; yet on the first edition of the Ordnance Survey map, published in 1855, the area is shown as continuous forest. It is therefore of interest to speculate on the composition of this forest.

Even today there are about 1.5 ha. of vegetation, both herbaceous and woody, which are characteristic of wet conditions. The former include areas of *Phragmites australis* fen and *Carex riparia* fen, together with areas of mixed species such as *Lythrum salicaria* and *Iris pseudacorus*, while the latter contain sallow and alder. In 1855 such vegetation must have been much more widespread, as indicated by the present distribution of alder, but the presence of many woodland plants, for example those considered to be indicators of ancient woodland by Peterken (1974), suggests that parts of it were relatively dry. The areas occupied by these plants have no doubt been greatly reduced as a result of the spread of bracken and the grazing of rabbits but, taken as a group, they are still widely distributed.

Cook (*pers. comm.*), from a superficial survey undertaken on behalf of English Nature, considered the vegetation to be of the W10 type (*Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland – Rodwell 1991) but, as has been pointed out, there is no evidence that oak colonized the site naturally while bracken was formerly much more restricted than it is today. In the absence of oak, the only tree available which could have been widespread on the drier parts is birch. In this connection it is of interest that "birk" (cf. "Birk Wood" see above) is an East Yorkshire name for birch (Wright 1898).

Thus although the structure of the arboreal vegetation is, no doubt, currently very different from what it was in 1855, its composition is probably very similar. In the absence of timber of commercial value there are no grounds for suspecting that the structure and composition of the vegetation had been substantially modified by Man before 1855 so it is probable that the Wood marked by Jefferys in 1772 was of similar composition.

It is to be expected that, even before the early attempts to drain Wallingfen by diverting the River Foulney were undertaken, conditions would have existed in parts of the area where trees and shrubs, and hence woodland herbs, were able to compete successfully with wetland herbs. It is self-evident that such conditions would have occurred in the transition zone at the periphery of the wetlands, in which case woodland could have existed at the site of North Cliffe Wood for a considerable length of time. The survival of this woodland to the present day could then be attributed to its having been enclosed before the beginning of the nineteenth century, thus protecting it from later enclosure for agricultural purposes. It is believed that the documentary and biological evidence available supports this view and consequently that North Cliffe Wood must be regarded as an example of ancient woodland.

Acknowledgments

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BOOK REVIEW

Alien Plant Invasions in Native Ecosytems of Hawaii: Management and Research edited by **Charles P. Stone**, **Clifford W. Smith** and **J. Timothy Tunison**. Pp. xvi + 887, including numerous figures and tables. University of Hawaii Cooperative National Park Resources Studies Unit, Honolulu. 1992. $60.00 hardback.

Those, like myself, whose biological inquisitiveness was fired by Charles Elton's work, and more particularly his classic book *The Ecology of Invasions by Animals and Plants* (Methuen 1958), will find much of interest in this volume.

Much of our knowledge of animal and plant invasion is based on ecological and biogeographical studies of islands. Hawaii is of particular importance in such studies due to its very high percentage of endemic species resulting from its geographical isolation. From a conservation point of view, it is essential that the impact of alien species on such a unique fauna and flora is kept to a minimum, and that invasions are investigated in considerable detail and monitored on a continuous basis. To reduce the impact, tested and proven management and control practices are a prerequisite.

The 44 papers in this edited volume, most of which were presented at a Symposium in Hawaii in 1986, focus on these needs under the following main headings: 'Perspectives', 'Status and distribution of some important alien plants in Hawaii', 'Physical and chemical control', 'Biological control', 'Agency, organization, and landowner approaches', 'Introduced plants in the absence of Ungulates', 'Choosing which plants to introduce', 'Choosing which plants to control in native ecosytems' and 'Ecosystem approaches, education, and community involvement'.

In their conclusions, the editors draw attention to the fact that 90 of the 861 naturalized alien plant species pose significant threats to native ecosystems, and that new potentially invasive species continue to be introduced into Hawaii. These changes have resulted in replacement of native vegetation by alien-dominated communities in many areas. They also point out that '. . . the race between developing environmental consciousness and deterioration of the environment will be decided in the next human generation. Increased effectiveness in controlling introduced plants during that period will certainly be an essential determinant of Hawaii's future environmental quality'.

MRDS

POLLEN DIAGRAMS FROM ORIGINAL 17TH CENTURY TURF ROOF DURING RESTORATION OF COLLEGEHILL HOUSE, ROSSLYN CHAPEL, MIDLOTHIAN, SCOTLAND

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Introduction

Turf was once widely used as a material for roofing throughout Scotland and continued to be so in northern parts until recent times. The close knit nature of turf makes it an effective trap for airborne pollen, which, in due course, falls down under gravity or is washed down on to the turf during rainfall (= pollen rain). Thus analysis of the pollen spectrum at any one time will give a picture of the regional and local vegetation producing it. Search of the literature has failed to reveal any published accounts of similar investigations, though analyses of pollen occurring in moss polsters on roofs have appeared from time to time, e.g. Potzger *et al.* (1956), Turner (1964), Corbett and Lan (1974), Cundill (1985) and Bloomer (1985).

This paper is based on the pollen analysis of a turf roof constructed in the early 17th century on workmen's cottages, which subsequently came to be overlain with pantiles during a later conversion incorporating an inn adjacent to Rosslyn Chapel. As a consequence of earth tremors along a local fault line during 1986-87, a split occurred in the north-east wall of the inn. Repair and reconstruction work that ensued revealed a previous turf roof underlying the pan tiles of the present-day roof constructed in 1660. The turf roof, when exposed to the air prior to the construction of the later overlying pan tiles, would be the recipient of a descending rain of particles – organic and inorganic – extant in the mid-17th century. The pollen component of this rain would be efficiently trapped in the dense turf comprising the roof.

The original inn, now known as Collegehill House, is a private dwelling house for the Curators of the adjacent Rosslyn Chapel, long recognised as an important part of Scotland's heritage. Rosslyn Chapel and the adjacent Collegehill House are close to the village of Roslin (Grid Ref. NT 280632) and are between 140 and 150m. a.s.l. The area surrounding the site is farmland and mixed woodland. The Roslin area was visited by a number of naturalists and botanists during the last century, including Davies (1852) and Balfour (1874), but their interest centred exclusively on Roslin Glen, the wooded valley of the River North Esk in a deeply descending slope about 0.5km to the east of the Chapel site. Heather moor, with scattered clumps of *Quercus*, *Fraxinus*, *Alnus*, *Corylus* and/or *Myrica*, *Salix*, *Ulmus*, *Betula* and *Pinus* with some cultivated areas, is thought to have characterised the landscape in the late 17th century (McKean, pers. comm.). The area to the north of the River Esk, where Roslin village lies, was described in the First Statistical account of Scotland (1791) as 'covered partly with heath and partly with fine green pasture . . . About one sixth of the arable ground in the parish is kept in pasture . . . Gardening is carried on to a considerable extent, and south of the Esk there is 'extensive track of moor and wet moss . . . About 1,000 acres are planted with natural timber, oak, ash, elm, Scotch fir (i.e. pine), spruce and larch. The rest of the parish is arable land'.

Materials and Methods

Samples of Turf and underlying Hay and Cobweb-dust threads were collected on site and taken to the laboratory for analysis. Pollen analysis followed standard treatment (Faegri & Inversen 1975). Identification of less common pollens was achieved with the aid of Moore and Webb (1978). 1 gram of each of the samples was treated.

The turf itself which comprised the roof is predominantly fescue grass. Any other herbaceous plants present at the time the turf was cut have long since rotted away, leaving the dense wiry mat of *Festuca* with its underlying mineral soil.

Results

Table 1 details the three samples submitted to treatment and pollen analysis, and Figures 1-3 detail the taxa and percentages recorded within each sample: Turf, Cobweb-dust threads and Hay, respectively.

Twenty-nine taxa were recorded, six of which occurred at levels of over 10% of total pollens counted; ten taxa occurred at between 1 and 10%; nine taxa occurred at between 0.1 and 1% and four taxa occurred at less than 0.1% of the sample. In both Turf and Cobweb-dust threads a low percentage of pine was observed. The Hay sample yielded a smaller number of taxa (12) than either Turf or Cobweb dust threads (20 each), but nevertheless still a wide representative range. *Sinapis* (Cruciferae) was represented in this sample at a relatively higher percentage than in either of the other two samples.

The analyses were based on a total pollen count of 2,712 grains, the majority 2,342 (86%) of which occurred in the Turf sample (Fig. 1); 259 (9.5%) in the Cobweb-dust thread sample (Fig. 2) and 111 (4.5%) in the Hay sample (Fig. 3).

TABLE 1
Summary of pollen analyses of samples

Sample	Artifact	No. Pollen Grains Counted	No. Pollen Grains Per gm. Sample
01	Turf	2,342	243,635
02	Cobweb-Dust Threads	259	10,373
03	Hay	111	4,440
		2,712	258,448

Of the twenty-nine taxa recorded, 12 (60%) were arboreal pollens (AP) and 17 (40%) were non-arboreal (NP). *Betula* was represented with 35, the highest percentage for AP, whilst, as expected, Gramineae scored between 45-60%, the highest percentages for NAP. 406 grains (15%) overall were damaged or unidentifiable.

Only seven of the 29 taxa recorded overall, Ericoid, Gramineae, Compositae, *Quercus*, *Ulmus*, *Plantago* and *Pinus* occurred in all three samples (Figures 1-3). Four of the seven taxa's percentages were consistently low, whilst *Ulmus* had a markedly higher percentage in the Hay sample than in either of the two other samples. Ericoid pollen was significantly higher in the Turf than in either Cobweb-dust thread or Hay samples. Gramineae scored progressively higher percentages as recorded in Turf, Cobweb-dust thread and Hay samples respectively.

Nine taxa occurred in two of the three samples, *Betula*, *Alnus*, Coryloid, *Urtica*, Cruciferae, *Rumex*, *Salix*, *Tilia* and *Acer*. Of these only *Acer* was recorded from the Hay sample. *Betula* was the dominant taxon in the Turf sample.

The remaining thirteen taxa appeared only once in a given sample: *Fraxinus*, *Linum*, *Taxus*, Caryophyllaceae and *Castanea* type occurred in the Turf sample; Papilionaceae, *Ilex*, Umbelliferae and *Convallaria* occurred in the Cobweb-dust thread sample; *Sinapis*, *Hypericum* type, *Populus* and *Ulex* type occurred in the underlying Hay sample.

Discussion

The exposed roof Turf (Fig. 1) and the Cobweb-dust threads (Fig. 2) furnished the richest source of pollen in both number of taxa and pollen grains. The Turf yielded a pollen spectrum which numerically clearly divided into four sections. The integral pollen of the turf comprised the pollen pertaining to its original plant composition plus the

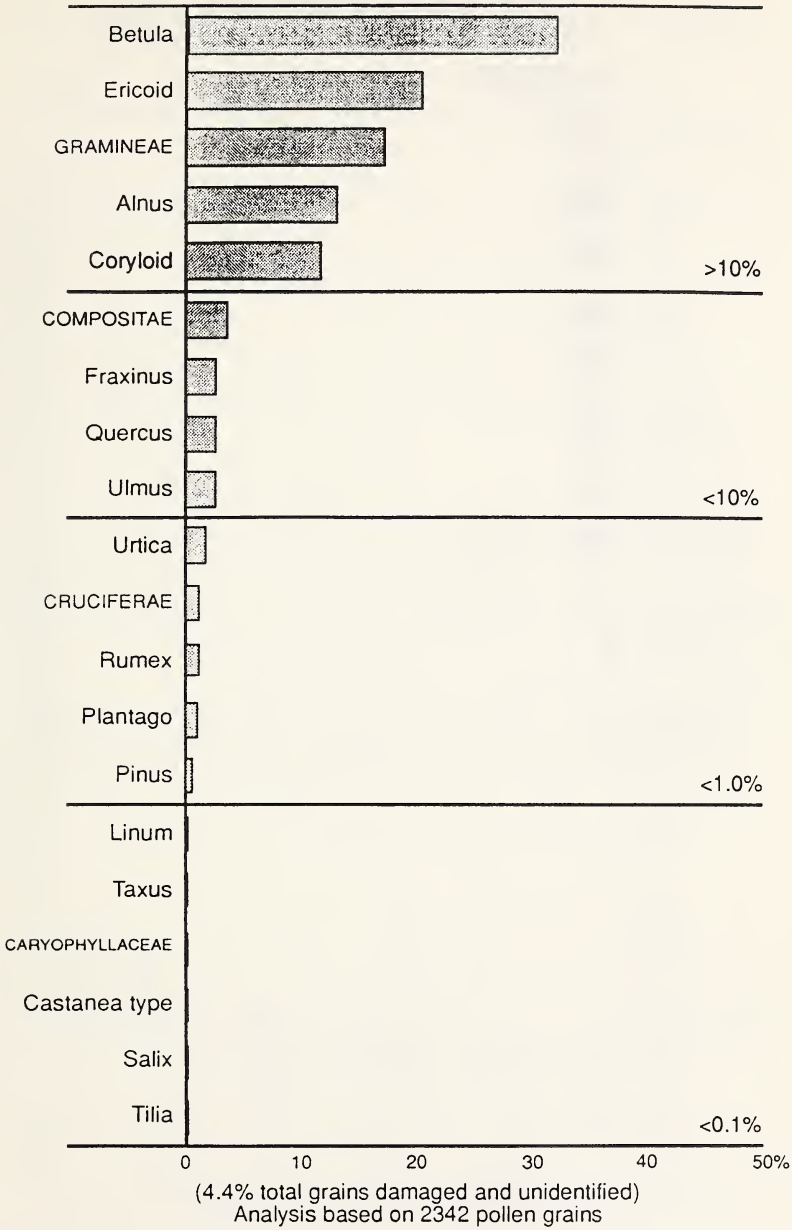

FIGURE 1
Pollen spectrum from exposed Mediaeval turf roof.

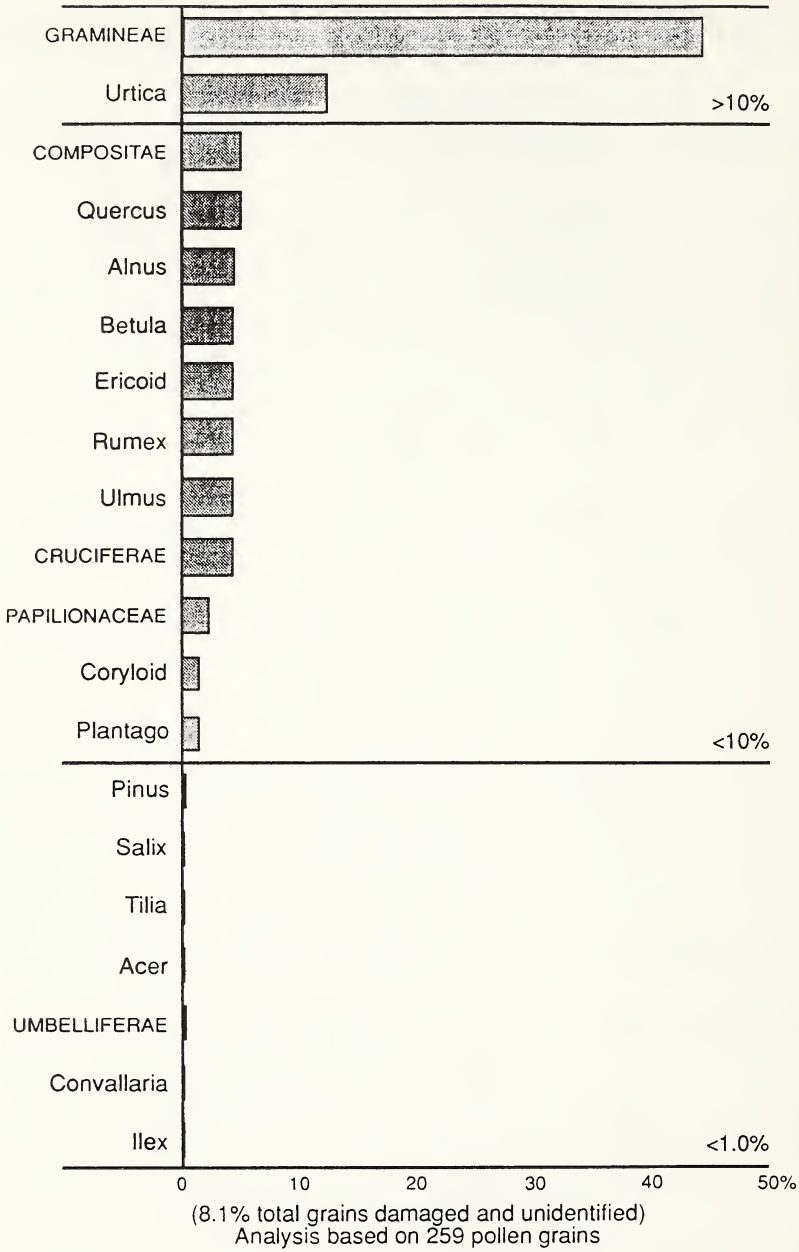

FIGURE 2
Pollen spectrum from cobweb/dust thread hanging from timber.

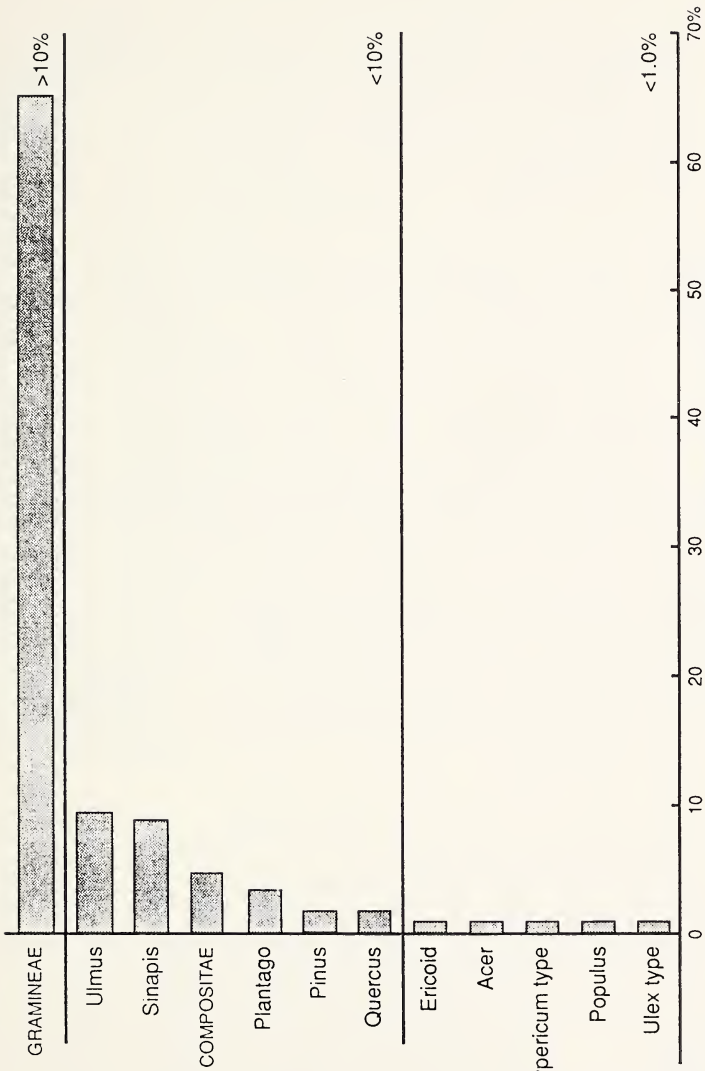

FIGURE 3
Pollen spectrum from hay on roof.

accumulated pollen rain to which the roof was exposed. The analysis indicated a landscape dominated by a moorland community with mixed heather scrub, moorland grasses and scattered clumps of *Betula*. Upland burns fringed with *Alnus glutinosa* and areas of boggy/marshy ground supported by *Myrica gale* would seem to be a reasonable interpretation of the five dominant pollen types present. It is possible that *Corylus avellana* may have comprised a significant component of the "coryloid" pollen type, occupying drier habitats in the locality. The remaining three percentage sections (10, 1.0 and 0.1) indicate a spectrum reflecting a range of habitats especially broad-leaved woodland of *Ulmus*, *Quercus* and *Fraxinus*. Grains of *Castanea*, *Tilia* and *Taxus* were also observed but in very low numbers suggesting few and scattered trees of these species in the area. A quotation in the Introduction refers to the existence of a market garden. The presence of *Plantago*, *Rumex*, Caryophyllaceae and Cruciferae pollen are all indicators of cultivation, the latter two families contributing to the weed flora with a number of species, e.g. *Stellaria*, *Sagina*, *Capsella*, and *Thlaspi*. *Urtica* (probably *U. dioica*) is a common weed of loose stony soil characteristic at the base of walls, which are not compacted by trampling. Chestnut, flax (*Linum*) and nettle were all plants of either culinary or economic value – flax and nettle providing fibres for weaving, chestnuts and young leaves of nettle as food. The presence of both *Acer* and *Convallaria* pollen (Figure 2) is interesting – the latter a woodland plant with fragrant flowers may have been grown in the garden nearby. Figure 2 (Cobweb-dust threads) yielded a pollen spectrum similar in range of taxa to that of Figure 1, but being internal did not reflect the pollen rain and therefore the external environment to quite the same degree. The dominance of graminaceous grains in this spectrum might well reflect the movement of fodder, straw, hay in or near the house. The relatively higher percentage of *Urtica* might well reflect the growth of this species around the house itself and adjacent walls. The presence of lily of the valley (*Convallaria*) suggests the plant may have been gathered locally or cultivated for its decorative qualities and perfume. *Acer* pollen occurred in both Cobweb-dust thread and Hay samples but not in the Turf. Sprigs of sycamore may have been gathered for decorative purposes around the house at the time of flowering.

Figure 3 (Hay) yielded twelve taxa, the most interesting of which were *Sinapis*, *Hypericum* and *Ulex*, none of which occurred in the Turf and Cobweb-dust thread samples. *Sinapis* is a common cruciferan weed of cultivation, *Hypericum*, probably St John's wort, is a frequent wild plant growing around wooded areas, and *Ulex* commonly occurs wild on heathland. It is likely that the hay used for the packing would be cut in fields around the house adjacent to woodland. Its most likely use as packing below the roof would be for insulation, but this would also have been a convenient storage place for fodder for customers' horses visiting the inn.

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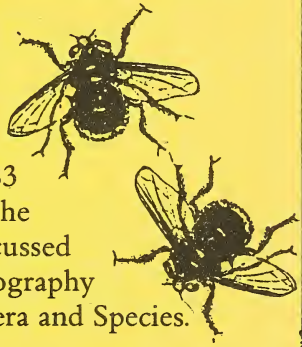

The Coleoptera booklet gives a brief life-history of Herbert Willoughby Ellis and the acquisition of his extensive Coleoptera collection. This is followed by an annotated checklist which encompasses the 12,383 Carabids to be found in this important collection. The provenance of the specimens in the collection is discussed alongside current distributional knowledge. A bibliography of Ellis's publications follows, as do indexes to Genera and Species.

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First Statistical Account of Scotland (1791-1799) – Parish of Lasswade.

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AQUATIC VEGETATION AND RESUMPTION OF FLOW AFTER DROUGHT IN A WOLDS WINTERBOURNE

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Four consecutive winters (1988-1992) of low rainfall in Southern and Eastern England, coupled with abstraction from aquifers, brought about exceptionally low flows or dry river beds in many chalk streams and led to loss or impoverishment of aquatic fauna and flora (Giles, Phillips & Barnard 1991; Hill & Langford 1992). This process was illustrated by Mill Beck, a calcareous stream near Market Weighton which is spring-fed from the Upper Cretaceous chalk of the Yorkshire Wolds at National Grid Reference SE 899 426 (Goulder 1992). Historically Mill Beck was a winterbourne, with maximum discharge in winter and flow persisting until about September. Aquatic vegetation in unshaded stretches was luxuriant, with water-cress, *Nasturtium officinale*, and fool's water-cress, *Apium nodiflorum*, as important species. During 1989-1992, however, flow was irregular, culminating in a dry stream bed from summer 1991 to beyond August 1992. Aquatic plants which persisted in two stretches of dry stream bed, 0-50m and 225-360 m downstream of the source, were recorded in May-August 1992. The 0-50m stretch was a grassy sward, although stands of some hydrophytes which usually occur as emergents at stream margins survived, notably reed sweet-grass, *Glyceria maxima*, yellow flag, *Iris pseudacorus*, and water-mint, *Mentha aquatica*. Seven of 13 aquatic plant species recorded in 1983 had, however, disappeared, including the formerly dominant *N. officinale*, *A. nodiflorum* and water-speedwell, *Veronica anagallis-aquatica*. The stretch from 225-360m downstream of the source was also a grassy sward, with abundant thistles, *Cirsium arvense*, and stinging nettles, *Urtica dioica*; five of 12 hydrophyte species present in 1984 were not recorded (Table 1).

The rains had returned by winter 1992-1993. However, although there is information on the recovery of aquatic wildlife on resumption of flow in normally permanent chalk streams which have become intermittent (Ladle & Bass, 1981), there is apparently less information on aquatic biota in streams where flow has resumed after long-term dryness. Thus, Drury (1993) commented on the absence of aquatic invertebrates following resumption of flow in the River Ver, a Hertfordshire chalk stream starved of water for a number of years and with its bed ploughed up in some reaches, and emphasized the lack of knowledge about biological recovery following the end of prolonged drought. A record of the response of aquatic vegetation in Mill Beck following resumption of flow after long-term dryness is, therefore, of interest.

There was a strong flow from the spring source of Mill Beck by February 1993 and substantial discharge has continued to the time of writing (July 1993). Aquatic plants were

recorded in May-June in the 0-50m and 225-360m stretches downstream of the source (Table 1). Hydrophyte species had increased to nine, from six in 1992, in the 0-50m length and to 12, from seven in 1992, in the 225-360m length. Many of the species lost between 1983-1984 and 1992 had reappeared, presumably from the seed bank or from propagules which survived in the stream bed. However, the overall composition of the vegetation in May-June 1993 remained very different from that in 1983-1984. The biomass of the earlier vegetation consisted virtually entirely of aquatic plants, especially *N. officinale* and *A. nodiflorum*. In 1993, however, very approximately 80% of the stream bed was occupied by non-flowering grasses, much entangled by filamentous algae. Many non-aquatic plants survived in the relatively recently flooded stream bed. For example, thistles, stinging nettles, meadowsweet, *Filipendula ulmaria*, creeping buttercup, *Ranunculus repens*, and a dock, *Rumex* sp., remained conspicuous in the 225-360m stretch. Many of the aquatic plants which had reappeared were inconspicuous, including *N. officinale* and *A. nodiflorum* in the 0-50m stretch. An exception, however, was towards the upstream end of the 225-360m stretch which was protected from cattle grazing. Here, about 20m of the stream had a complete cover of mainly *A. nodiflorum*, *N officinale* and water forget-me-not, *Myosotis scorpioides* emergent to 50-60cm height and with the latter two species flowering profusely.

TABLE 1
Aquatic plants recorded near to the source of Mill Beck; 1983-1984, 1992 and 1993.

	Distance from source					
	0 - 50m			225 - 360m		
Species	May-June 1983	May-August 1992	May-June 1993	January-June 1984	May-August 1992	May-June 1993
Agrostis stolonifera	+	+	+	+	+	+
Apium nodiflorum	+	-	+	+	+	+
Berula erecta	+	-	-	+	+	+
Callitriche sp.	-	-	-	-	-	+
Caltha palustris	+	+	-	+	+	+
Eleocharis palustris	-	-	-	-	-	+
Equisetum fluviatile	-	-	-	+	-	-
Glyceria fluitans	+	-	-	+	-	-
Glyceria maxima	+	+	+	-	-	-
Iris pseudacorus	+	+	+	-	-	-
Mentha aquatica	+	+	+	-	-	+
Myosotis scorpioides	+	+	+	+	+	+
Nasturtium officinale	+	-	+	+	+	+
Ranunculus aquatilis	-	-	-	+	-	+
Ranunculus flammula	+	-	-	+	-	-
Veronica anagallis-aquatica	+	-	+	+	-	+
Veronica beccabunga	+	-	+	+	+	+

Only species listed by Palmer & Newbold (1983) as aquatic plants found in England and Wales are included here; nomenclature here and elsewhere follows Clapham, Tutin & Moore (1987). (+) Indicates present, (-) indicates not recorded.

Seedlings of hawthorn, *Crataegus monogyna*, and dog rose, *Rosa canina*, which had become established in the dry stream bed in summer 1992 (Goulder 1992) were not found in 1993. Furthermore, the pastures adjacent to Mill Beck are being grazed in 1993, unlike in 1992, hence development of shrubs and excessive riparian shading should be

suppressed. Therefore, and since many hydrophyte species have reappeared following resumption of flow, it appears that Mill Beck has the potential to restore itself relatively quickly to its former status as a good example of an intermittent calcareous headstream, with luxuriant stands of amphibious aquatic plants able to withstand regular annual spells of dryness.

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THE SCIOMYZIDAE (DIPTERA) OF THE LOWER DERWENT VALLEY NATIONAL NATURE RESERVE, EAST RIDING OF YORKSHIRE

ROY CROSSLEY

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Sciomyzidae are small to medium-sized Acalypterate flies of a general brownish colour; some species have spotted or infuscated wings.

The majority occur in damp or marshy localities, and of the 64 species recorded from Britain, 22 have been found between 1987 and 1992 in the scattered complex of flood-meadows (known locally as 'ings') and drainage dykes which make up the Lower Derwent Valley National Nature Reserve in vice-county 61 (South-east York).

Since Berg (1953) published his observations that Sciomyzidae are amongst the insects that eat and kill snails, laboratory and field observations have established that the majority of known Sciomyzid larvae feed as aquatic predators on, or terrestrial parasitoids of, pulmonate snails or pea mussels, or more rarely feed on snail eggs (Rozkošný 1984).

Adrian Norris has kindly drawn to my attention an unpublished paper entitled 'Snails and Insects'. This was prepared some time ago by Dr B. Verdcourt, and copies are available from Mr Norris at The City Museum, Leeds. Two of the species recorded here are commented upon in Dr Verdcourt's paper as follows. *Tetanocera elata* feeds exclusively on slugs of two species, *Deroceras (D) laeve* (Muller 1774), and *Deroceras (Agriolimax) reliculatum* (Muller 1774). As Lundbeck showed, *Colobaea bifasciella* (Fall.) lives on the water-snail *Limnaea truncatula* (Mull).

It is reasonable to assume that in order for these flies to exist in both variety and in numbers of individuals in any locality there is need for a good cross-section of molluscan species to be available in some quantity for them to parasitise or prey upon; Mr Norris comments (*in litt.*) that in his experience Thornton Ellers and the other Ings have a very

wide range of molluscs from both fresh-water and marsh habitats and the range of species is very similar.

The recorded Sciomyzia species are listed in Table 1; six are ranked as nationally 'Notable' (Nb), which is a provisional classification allocated to flies that are estimated to occur in between sixteen and one hundred modern 10km squares (Falk 1991). Six species are new to vice-county 61, of which three are nationally 'Notable'; the new records are indicated by an asterisk in the table.

The apparent lack of diversity in some localities may partly be a reflection of collector bias or varying levels of collecting activity. Some sites, notably Wheldrake Ings, have been visited more often than others, and there has been no effort to undertake a systematic survey of these flies, most of which were collected incidentally during studies of other families of Diptera.

Nevertheless, it is interesting to note that the richest diversity, and the six nationally Notable species, are from either Wheldrake Ings or Thornton Ellers. In addition, there is a reasonably diverse list from East Cottingwith Ings which includes *Ilione lineata*. The

Table 1. Distribution of Sciomyzidae in the Lower Derwent Valley NNR 1987-1992

		Wheldrake Ings SE/706438	East Cottingwith Ings SE/697412	Aughton Ings SE/699388	Bubwith Ings SE/705370	North Duffield Ings SE/698370	Breighton Meadow SE/705328	Thornton Ellers SE/730455
Colobaea bifasciella (Fall.)	* Nb							+
C. distincta (Mg.)	Nb	+						
Pherbellia brunnipes Mg.	* Nb	+						
P. cinerella (Fall.)			+					
P. griseola (Fall.)	Nb	+						
P. ventralis (Fall.)	*						+	
Pteromicra angustipennis (Staeg.)			+	•				
Sciomyza simplex Fall.	Nb	+						
Elgiva cucularia (L.)	*	+	+	+		+		
E. solicita Harr.		+	+	+	+	+		+
Hydromya dorsalis (Fab.)		+						
Ilione albiseta (Scop.)		+	+	+			+	+
I. lineata (Fall.)		+	+					
Limnia unguicornis (Scop.)					+			+
Pherbina coryleti (Scop.)		+	+	+				+
Psacadina verbekei Roz.	* Nb							+
Renocera stroblii Hend.	*	+					+	+
Tetanocera arrogans (Mg.)		+	+	+				+
T. elata (Fab.)			+	+				+
T. ferruginea Fall.		+	+	+	+	+		+
T. hyalipennis Roser				+				+
T. robusta Lw.		+	+		+			+

Note: Grid references indicate approximate centres of the sites

species is also recorded from Wheldrake Ings; the only other Yorkshire records are North Cave (v.c.61); Pilmoor (v.c.62), and Thorne Moors (v.c.63).

The only previous Yorkshire record for *Colobaea bifasciella* is Blacktoft Sands (v.c.63), 1974. At Thornton Ellers a single specimen was taken on 16 June 1987. *C. distincta* has been recorded on two previous occasions in the County: Hotham Carrs (v.c.61), 1953, and Went Valley (v.c.63), 1971. Four specimens were taken at Wheldrake Ings on 28 July 1990. *Pherbellia brunnipes* has, in the past, been recorded from two localities in v.c.63 and at Otley (v.c.64). Two specimens were collected at Wheldrake Ings, along with the examples of *C. distincta*, on 28 July 1990. The site where they were taken was close to a narrow overgrown field drain in an extensive area of former meadow-land which is now dominated by fen vegetation.

A single specimen of *Pherbellia griseola* was also collected on 28 July 1990 at Wheldrake Ings. There are two previous Yorkshire records for this species:- Millington (v.c.61), 1936, and Thorne Moors (v.c.63). The discovery of three nationally Notable species in the same general area and on the same date was quite unexpected.

Apart from a record from Blacktoft Sands (v.c.63). 1980, *Sciomyza simplex* is only known in Yorkshire from the region of the Lower Derwent, as follows:- Bubwith (1921 and 1981), and Allerthorpe (1928). The species occurred at Wheldrake Ings on three occasions in 1992, the dates ranging from 28 August to 1 October. All the specimens were found in the general 'fen' area referred to earlier.

Psacadina verbekei is recorded from several localities in v.c.63 and also from single localities in v.c.64 and v.c.62. It is here recorded for the first time in v.c.61.

The remaining species are well distributed in Yorkshire, although *Elgiva cucularia* and *Renocera stroblii* are not known elsewhere in v.c.61.

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Thanks are due to English Nature for access to, and permission to collect in, the Lower Derwent Valley National Nature Reserve; in particular I thank the Site Manager, Tim Dixon for advice and guidance relating to land ownership and access arrangements. Thanks are also due to Peter Skidmore for making available to me the Y.N.U Diptera records which are in his keeping, and to Adrian Norris for drawing to my attention the paper by Dr Verdcourt, and for useful guidance in matters conchological.

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BOOK REVIEWS

The Last Panda by **George B. Schaller**. Pp. xx + 291, 27 colour plates and 4 maps. University of Chicago Press, 1993. $24.95.

Probably no animal evokes greater attraction and interest than the giant panda. Adopted as the emblem of the Worldwide Fund for Nature, the panda has come into considerable prominence as a symbol of the conservation movement. However, what do we know of this animal in the wild apart from the fact that it is exclusively a bamboo eater? Until 1980, very little. It was at this time that WWF made its first approaches to the Chinese government, to negotiate a joint research programme with a view to obtaining information on the ecology of the panda, which would lead to a management plan for its conservation.

This book is a narrative of George Schaller's association with the project from its inception up to the present. Schaller is one of the world's leading field biologists with a vast experience of large mammal studies in several continents. He is a keen observer of all facets of his environment and lucidly communicates his field observations not only on pandas but on all wildlife in the mountains of western China, where he spent considerable periods. He describes the observations made on pandas by his Chinese and Western colleagues at some length and highlights many features of their ecology that were previously unknown.

There is, however, another side to the panda story which Schaller relates. This concerns the biopolitics of the project. The difficulties of the negotiations between WWF and the Chinese, with errors and indiscretions on both sides, the difficulty in obtaining skilled and committed Chinese biologists, the ponderous bureaucracy, the fluctuating commitment of Chinese administration at all levels and differing perceptions on research priorities and approaches all hampered and frustrated progress. Add to these the persistent poaching and encroachment on panda habitat and you have the ingredients of a conservation nightmare. There are still more problems, some generated by overseas institutions, particularly in the United States. Rent-a-panda schemes operated by various western zoos, with pandas rented from China for limited periods, considerably enhanced the finances of the host zoo. This practice encouraged greater removal of wild pandas. Furthermore, with black market panda pelts fetching $10,000 in Taiwan, Hong Kong and Japan and live pandas realising as much as $112,000, one must ask what hope is there for the remaining 1,000 pandas in the wild.

The account is readable, stimulating and in many respects depressing. Although the Chinese government remains committed to research on and conservation of the panda, one must wonder whether it will survive in the wild much beyond the next century.

MJD

Ecology: Principles and Applications by **J. L. Chapman** and **M. J. Reiss**. Pp. ix +294, with numerous black and white plates and figures. Cambridge University Press, 1992. £15.95.

This introductory text, aimed at A-level and first-year undergraduate students, covers a very broad spectrum of ecological topics, starting with the ecology of individual organisms and progressing through populations, communities and ecosystems to biomes and biogeography, with various chapters along the way covering topics such as ecological genetics, behavioural ecology, sociobiology, nutrient cycling, co-evolution and conservation. There is plenty of interesting factual material here, with a good list of references for further reading, printed in a crisp and clear type. A useful glossary is also provided which should help students unfamiliar with the specialist words – although why terms such as 'homiotherm' or 'phylogeny' are not included, despite being used in the text, when words more likely to be familiar such as 'migration' are defined, eludes me.

The crispness of the sentences, and the breadth of the material covered, occasionally give the feeling of reading a catalogue, but generally the text maintains its interest. Not the least of the desirable features is the attempt to include controversies and indicate inadequacies of knowledge, so that students gain a better appreciation of the nature of scientific enquiry. There is extensive cross-referencing between sections and chapters, which emphasises the inter-related nature of many of the topics covered, but does sometimes lead to repetition. There are relatively few typographical errors. Some of the black and white photographs are not reproduced very well, but a more general criticism is that many (most?) of the photographs seem to be there solely to break up the text, rather than to support it, and could probably have been omitted. In contrast, the line diagrams are generally very clear and informative.

Overall, a useful book which could be used as the main text for students studying a course in introductory ecology and related topics at the target study level.

WHGH

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1992

C. S. V. YEATES
Tolson Museum, Wakefield Road, Huddersfield HD5 9DJ

Alamein Barracks and Eastburn Farm, Driffield (VC61) 4 July (S. Pashby)

Members met at the guardroom of Alamein Barracks, and after 'booking in' and receiving visitors' passes they were allowed on to the disused airfield used by the Army School of Mechanical Transport, where the morning was spent. The weather was the worst possible for natural history fieldwork, with continuous rain all day, heavy at times, and with a cold north-east wind. After lunch the party moved across the road to Eastburn Farm, where Eastburn Beck, a chalk stream, provided the most interest. During the day 22 members braved the bad weather conditions.

Later, members were grateful to be in the dry and have a hot drink, prepared by Jean Chicken in Kirkburn village hall. The meeting for the presentation of reports was held under the chairmanship of Adrian Norris; 17 members attended, with 17 affiliated societies being represented. Albert Henderson proposed a vote of thanks to Lt. Col. H. L. Dalwood for permission to visit the airfield, to Mr J. D. T. Megginson for permission to visit Eastburn Farm, to Trevor Malkin for making the arrangements for us to visit the farm and for guiding us round and to Shirley Pashby for organising the meeting.

Ornithology (S. Pashby)

On a day when the weather made it almost impossible to use binoculars it is not really surprising that only 29 species were recorded.

On the disused airfield Ringed Plovers had been found breeding in 1990 during fieldwork for the British Trust for Ornithology's *New Breeding Atlas*, and it was pleasing to find at least one pair still present. A number of Lapwings had also bred. A surprise was a Greenshank which flew off calling when disturbed – no doubt it had dropped in, attracted by the pools of rainwater. Both Red-legged and Grey Partridges and Turtle Dove were seen. Swifts were overhead, Skylark song was heard continuously and Meadow Pipits were calling. A Reed Bunting was carrying food alongside a ditch. Kestrel was the only raptor seen. Near the buildings on the edge of the airfield Swallow, House Martin, Pied Wagtail and Spotted Flycatcher were noted.

At Eastburn Farm we had hoped to see Kingfisher, which is known to occur along Eastburn Beck, but it did not oblige. Nothing of particular interest was found here.

Lepidoptera (J. Payne)

The morning site was potentially rich, with a multitude of plants suitable for the breeding of most of the butterfly families. Unfortunately, the weather only allowed us to record Meadow Brown and Ringlet, both grass feeders, and a male Common Blue. A Narrow-bordered Five-spot Burnet was seen near the roadway, and Cinnabar caterpillars were in low numbers on ragwort.

At Eastburn Farm, Ringlet was again seen by the beck, and Mullein caterpillars were on *Scrophularia auriculata* in the farmyard.

Flowering Plants and Ferns (E. Chicken)

The old airfield covers a large area, and under the wet and windy conditions it was not possible to make a full survey of the flowering plants. The area consists largely of calcareous gravel, and the previous drought has had its effect on the vegetation.

The northern part of the airfield was looked at by most members, and the first impression was of an extensive scattering of dwarfish *Crepis capillaris* and *Conium maculatum* that had only reached two to three feet in height. Round the concrete runways were patches of

Sedum acre in flower, and yet more yellow was provided by *Lotus corniculatus* and *Galium verum*. There was a good selection of plants requiring a calcareous or dry sandy soil, such as *Reseda lutea*, *R. luteola* and *Erodium cicutarium*, with occasional plants of *Knautia arvensis*, *Leucanthemum vulgare* and *Carduus nutans*. There was a good crop of *Fumaria officinalis* on the edges of raised earthworks. Of the taller-growing plants, stands of *Papaver somniferum* and *Dipsacus fullonum* were noted, but there were no non-planted trees or shrubs save the odd bush of *Sambucus nigra*. In all 53 species were listed and no doubt there were many more.

At Eastburn Farm one of the first observations was of a considerable amount of *Coronopus squamatus*, A walk by the Eastburn Beck afforded a contrast to the morning's botanising. Notable finds were *Mimulus guttatus* x *luteus*, *Salix purpurea* and *S.*x *mollissima* var. *undulata*. In other damp situations there were *Ranunculus trichophyllus*, *Stellaria graminea*, *Lotus uliginosus* and *Galium palustre*.

In the course of the day three sedges, *Carex flacca*, *C. hirta* and *C. viridula*; two rushes, *Juncus inflexus* and *J. subnodulosus*; and one horsetail, *Equisetum arvensis*, were noted.

The total number of species for the day was 103 which, all things considered, was very satisfying.

Lichenology (A. Henderson)

Clambering from the car into the heavy morning rain on the north-south length of the runway to the west of the old airfield, the first sight was of numerous colonies of the terrestrial blue-green cyano-bacterium *Nostoc commune*, its gelatinous thalli low and swollen among the grasses of the verge and in puddles on the runway. Some larger thalli were up to 15cm long and almost as wide, forming broad-lobate, folded expanses of olive-brown to pale translucent green, often lying unattached. Similarly scattered, but usually attached to the ground were small (up to 2cm diameter) dark brown-black cushions and patches of the gelatinous lichen *Collema tenax* (which has a *Nostoc* photobiont). Neither of the two varieties present, *C. tenax* var. *ceranoides* and *C. tenax* var. *vulgare*, was seen fruiting. Other dominant lower plants in this community were *Placynthiella icmalea* and *P. uliginosa* on damp soil and gravel, and the common cushion moss *Bryum argenteum*. Pebbles, flints and calcareous gravel hosted *Verrucaria muralis*, *V. nigrescens*, *V. viridula* and *Thelidium minutulum*. Although not at all a rich facies of this community, this gathering of a few species was prolific and showed to great advantage in the soaking conditions of the morning.

Concrete training ramps about the airfield bore *Aspicilia calcarea*-type communities reminiscent of the urban scene. Again, none of these were developed to any degree of richness. Such levels of development are not encouraged by the frequent habitat change and disturbance inevitable on a busy military training camp.

The afternoon visit to Eastburn Farm was spent mainly in exploring the lichens of the farmyard and of the stretch of beck to the south. Wooden fencing in the farmyard held liberally fruiting and densely pycnidiate *Micarea denigrata*, lavish crusts of *Trapeliopsis flexuosa*, *Lecanora saligna* and *Lepraria incana* on background *Lecanora conizaeoides*. On a stack of large corticate timber lengths the pale fruits of *Lecanora conizaeoides* were heavily infested by the black pycnidia of the lichenicolous fungus *Lichenoconium erodens*.

Trees, notably *Salix* and *Fraxinus* by the beck to the south, showed clear signs of lichen recolonisation, with incipient populations of *Evernia prunastri, Parmelia sulcata* and *Physcia tenella*. *Xanthoria polycarpa* and *Buellia punctata* were also quite frequent. If recolonisation proceeds successfully for the next decade or so, these plants could form the basis of a fine corticolous community.

Hovingham (VC62) 18 July (M. Atherden)

This meeting was held on the Hovingham Estate in the northern part of the Howardian Hills, by kind permission of the Worsley family. As the former home of the Union's patron, the Duchess of Kent, it was an appropriate venue. The estate manager, Mr Rupert

Drury, welcomed fifty people and gave them information about the estate. At the request of Mr William Worsley eight specific areas were studied, and in addition, with special permission from Sir Marcus Worsley, a small group examined the lichen flora of the hall and outbuildings. The higher parts of the estate are underlain by Upper Jurassic limestones and grits, whilst glacial and fluvio-glacial deposits obscure the Kimmeridge Clay of the lower ground. The weather was warm but changeable, with sunshine and showers.

The tea and meeting were held in the Worsley Arms hotel, and were attended by 32 people representing 23 affiliated societies.

Mammals and Amphibians (M. A. Atherden)
Evidence of Roe Deer, Brown Hare, Pipistrelle bat, Mole and Common Toad was observed.

Ornithology (A. J. Wallis)
July is not the best month for birdwatching, and during the day a list of only thirty-four species was recorded. It was not possible to obtain a separate list for each of the areas of the estate which we had been asked to survey; however, no area (with a single exception referred to later) had any birds which were not recorded elsewhere in one or another of the areas marked.

Considering the types of terrain visited there were no unexpected species. It was pleasing nevertheless to see Sparrowhawk, Great Spotted Woodpecker and Jay. Marsh Tit was recorded, but not Willow Tit. A Grasshopper Warbler near Hovingham was not surprising in view of the high numbers of this species recorded in the county this summer.

The most profitable area was a piece of damp waste ground bordering the Ebor Way just before Hovingham Spa is reached. Here Tree Pipit, Sedge Warbler, Whitethroat, Yellow-hammer and Reed Bunting were all numerous, with a family party of Whitethroats giving firm evidence of breeding. Nearby a Red-legged partridge with three chicks was also seen.

Fish (M. A. Atherden)
The stream through the parkland, which is rich in invertebrates, had Stone Loach, as did Wath Beck. Large shoals of fish were also seen in the Holbeck, which was choked with vegetation in places. Trampling by cattle has altered the stream habitats which used to be good for trout fishing in the past. The drains through the estate were highly polluted, but sticklebacks were observed in one of them.

Lepidoptera (J. Payne)
The writer walked from the village of Hovingham along the Ebor Way to Wath Beck and back. Ten species of butterfly were seen, mainly along the floriferous lane. These were Small Skipper, Small, Large and Green-veined White, Holly-Blue, Painted Lady, Small Tortoiseshell, Peacock, Meadow Brown and Ringlet. The last two were by far the commonest species. Dark Green Fritillary, Red Admiral and Comma were reported from other parts of the estate by other members, bringing the species total to thirteen. Particularly pleasing sightings were Holly Blue, Dark Green Fritillary and Comma.

At the village end of the Ebor Way, *Prunus spinosa* and *Crataegus* in the hedgerow bore some half a dozen rather solid looking web structures. On one these it was gratifying to see seventeen caterpillars of the Small Eggar moth sunning themselves prior to pupation, as other webs were already deserted. This moth has seriously declined in numbers and was known from only one site for many years. It was the first time that the writer had seen the species which is one of only five lepidopterans listed as nationally rare (RDB3) in the Invertebrate Site Register (1985). Other moths seen along this lane were Yellow-tail and Common Footman.

Wath Beck is lined almost exclusively with *Alnus glutinosa* and Single-dotted Wave, Riband Wave, Common White Wave, Common Wave, Dingy Shell and Light Emerald were flushed from the trees. Pebble Hook-tip and Yellow Shell were in Lower South

Wood. Dingy Shell is an uncommon moth, with only four published records for VC62, all from sites in the North York Moors. Moths reported from other parts of the estate were Spinach, Twin-spot Carpet, Narrow-bordered Five-spot Burnet, Garden Tiger, Smoky Wainscot, a 'Minor' and Silver Y.

The writer has visited the estate several times from 1983 onwards and has now recorded eighteen species of butterfly and forty 'macro' moths; no light trapping has been undertaken.

Flowering Plants and Ferns (D. R. Grant)

The area around Hovingham is situated on the Jurassic system of rocks, here represented by the Corallian Oolitic limestone, the Calcareous Grit (a sandstone) and Oxford Clay. The area has a mixture of arable farmland and woodland, a large part of the latter consisting of coniferous plantations. A small stream passes through the estate.

The roadside at Horse Coppice Wood had large colonies of *Rubus caesius,* growing with other calcicioles such as *Primula vulgaris, Origanum vulgare* and *Briza media.* Beneath light shading were *Carex sylvatica* and *Melica uniflora*, growing with a colony of *Calamgrostis epigejos*. The effect of glacial deposits and leaching of lime were evident in many places, and under the trees an acidic flora comprising *Deschampsia flexuosa*, *Luzula sylvatica* and *Teucrium scorodonia* was prominent. The stream was poor in species, the only ones of note being *Scrophularia auriculata* and *Sparganium erectum.*

The roadside verges around Hovingham High Wood held *Hypericum hirsutum*, *Pimpinella major*, *Centaurium erythraea*, *Leontodon hispidus* and *Dactylorhiza fuchsii*, growing almost side by side with acidophilous species such as *Hypericum pulchrum*, *Stachys officinalis, Solidago virgaurea* and *Agrostis canina.* The most interesting plant seen in the area was *Gnaphalium sylvaticum*; there is also a colony of *Trientalis europaea* in this wood. The hedgerows had *Ligustrum vulgare* and *Viburnum opulus*, together with *Campanula latifolia.*

In a green lane where garden rubbish had been deposited a colony of *Campanula rapunculoides* had established itself. A small area of pasture had an abundance of *Primula veris* and *Sanguisorba minor*, but, surprisingly, no other significant limestone species.

The best marshy area was in the valley near Wath Wood where *Scirpus sylvaticus*, *Carex acutiformis* and *C. paniculata* were found. Other damp areas held *Hydrocotyle vulgaris* and *Eupatorium cannabinum.* Additional plant species of note found in various other sites included *Rubus eboracensis*, *Scutellaria galericulata*, *Dipsacus fullonum*, *Crepis paludosa* and *Phragmites australis.*

Plant Galls (M. A. Atherden)

Several galls were noted by members of the party. As well as some common ones on *Quercus*, *Alnus* and *Rosa*, the mite gall *Aceria fraxinivora* on *Fraxinus*,the midge gall *Rondaniola bursaria* on *Glechoma* and the rust fungus *Puccinia lapsanae* on *Lapsana* were observed.

Lichenology (M. R. D. Seaward)

In all, 88 lichen taxa were recorded, 78 from the parkland and gardens surrounding Hovingham Hall, with additional records from the church and churchyard. The most rewarding habitats were old stonework, fencework and the occasional mature tree: lime, beech, willow, sycamore and field maple supported a limited epiphytric flora, but *Cliostomum griffithii*, *Hypogymnia tubulosa*, *Parmeliopsis ambigua*, *Phlyctis argena*, *Platismatia glauca*, *Pyrrhospora quernea* and *Xanthoria polycarpa* were found on ash, and *Chaenotheca ferruginea*, *Hypocenomyce scalaris*, and *Lecanactis abietina* on oak. An interesting lignicolous flora of *Candelariella vitellina*, *Lecanora varia*, *Parmelia glabratula*, *P. saxatilis*, *P. subaurifera*, *Physcia caesia*, *Placynthiella icmalea*, *Platismatia glauca*, *Porpidia tuberculosa* and *Pseudevernia furfuracea* was found on fence rails bordering the estate.

Haw Park (VC63) 16 August (R. Angus)

Ornithology (J. Cudworth)

Woodland in mid-August is usually very quiet for birds. On this occasion Haw Park was no exception; many parts of the area appeared birdless. Several Woodpigeons and Wrens were singing and a Willow Warbler also sang, briefly. The only other summer migrants recorded in Haw Park were Tree Pipit, Whitethroat and Spotted Flycatcher – all singles – with up to 14 Swifts and 3 Swallows hawking overhead.

To see birds in any numbers, it is necessary to find a feeding party of titmice; there was one party in the central area and another near Clay Royd Bridge. The birds in both groups were feeding in the tree-tops, so it was difficult to assess their numbers. A third party was found in a dense pine plantation on the south side, fortunately, the birds flew across a wide ride revealing that the party consisted of at least 64 birds, including 20+ Blue, 14+ Great, 2+ Coal, and 20+ Long-tailed Tits. Other species noted were Sparrowhawk, Robin, Mistle Thrust, Willow Tit, Treecreeper, Jay, Chaffinch and Bullfinch, making 20 species in all in and over Haw Park.

On the nearby Cold Hiendly Reservoir were Little and Great-Crested Grebes.

Mollusca (A. Norris)

The dramatic reduction in the number of species of mollusca found in the old, now disused Wakefield and Barnsley Canal at Haw Park was of great interest to our members. The canal at Haw Park was examined in detail by the Yorkshire Conchological Society on 8th April 1987, when it still contained a canal fauna. At that time the canal looked very similar, except that it was deeper and less overgrown. The canal had been partially filled in even then, creating the linear ponds present today. The transformation from a canal fauna to that of overgrown muddy ponds had started with several species showing signs of stress. A number of freaks were found, including specimens of *Valvata (Cincinna) piscinalis* (Müller, 1774) in which the body whorl had left its normal growth pattern and climbed over the apex of the shell.

In April 1987 we recorded 18 species of freshwater mollusca from the canal; on this occasion only 7 species were found. The loss of some of these was to be expected, but others such as *Bithynia tentaculata* (L. 1758) should have survived, as it is regularly found in overgrown ponds and lakes. The conditions in these linear ponds must be too anaerobic for the survival of this and several of the other species lost.

Odonata (J. Payne)

With the help of Dr Lloyd-Evans, 7 species were recorded during the day. These were the hawkers *Aeshna juncea* and *A. grandis*, the darters *Sympetrum striolatum* and the much rarer *S. sanguineum*. Three damselflies were seen: *Agrion splendens, Ischnura elegans* and *Enallagma cyathigerum*.

Coleoptera (M. L. Denton)

Some of the beetle species present in Haw Park bore witness to human disturbance of the environment. Had it not been for the planting of non-indigenous conifers, species such as the weevil *Pissodes pini*, the bark-beetle *Hylurgops palliatus*, the eyed ladybird *Anatis ocellata* and the pine ladybird *Exochomus quadripustulatus* would not have been present. Other more 'natural' species would have filled their niches.

On the native tree species was the oak leaf-roller weevil *Attelabus nitens* and the pollen beetle *Meligethes atratus* was found on bramble. The females of the weevil cut and roll part of an oak leaf without severing it; they then deposit eggs in the roll, which acts as a chamber for the developing larvae. Although several families of beetles were represented among those found under the bark of a variety of tree species, nothing of note was encountered.

In Woodpecker Wood the rather local Chrysomelid *Pyrrhalta viburni* was found on its food plant *Viburnum opulus*. The *Glyceria* beds along the disused Walton Canal held nothing of interest, and the water-net only revealed the presence of the generally common

water beetles *Hygrotus versicolor*, *Ilybius fuliginosus*, *Dytiscus marginalis*, *Gyrinus marinus* and *G. substriatus*.

Lepidoptera (J. Payne)
The writer walked from the Haw Park Lane car park along the reservoir to the disused canal, deviating into the woodland on the return journey.

Most of the butterflies seen were in the glades by the old canal as there were sun and shelter there.

Small Skipper was the commonest species noted, and all the specimens were very worn. The three common Whites were all present in low numbers. A Small Copper was seen, and there were several sightings of Holly Blue – some from ivy blossom on the boundary wall of Walton Hall.

Single specimens of Red Admiral, Peacock and Painted Lady were seen. It was pleasing to see Comma twice, so this was the commonest Nymphalid noted!

Wall was the most plentiful Satyrid, with Gatekeeper a close second; Meadow Brown brought the total to 13 species of butterfly – a good total for a late meeting in an "early" season.

Moths were not much in evidence, but a larva of Nut-tree Tussock was beaten from foliage, thus verifying the published 1977 record. A minute larva of Pale Tussock was also identified and Elephant Hawk larvae were reported. All three larvae represent different small families of macro-moths.

One of the larger micros, the Brown China-mark, was flying over the still water in good numbers, and evidence of the aquatic larvae was seen on the *Potamogeton* leaves.

Flowering Plants (D. R. Grant)
The area around Wakefield lies on the rocks of the Coal Measures series of the Carboniferous system. These are sandstones and shales which give rise mainly to heavy clay soils supporting a somewhat acidophilous flora. Much of the woodland in the area consists of planted conifers, but there are scattered pockets of the old *Quercus petraea-Betula* woodland. The dry edges of the woodland rides held *Carex pilulifera*, *Hypericum humifusum* and a little *Calluna*.

In one part of the older woodland there is a very small colony of *Sorbus torminalis*, whilst nearby, in a damper area, *Populus tremula* can be found.

At the southern end of the wood there is a section of the disused Barnsley Canal which still contains water. Along the margins of the canal *Glyceria maxima*, *Scutellaria galericulata*, *Lycopus europaeus* and *Berula erecta* were noted. In the water were large colonies of *Myriophyllum spicatum* and *Potamogeton natans*, together with a little *Lemna trisulca* and *Sagittaria sagittifolia*. The edges of the tow-path held *Centaurium erythraea* and *Hieracium vagum*, with some *Epipactis helleborine* under the trees.

A marshy area in the detached portion of the woods has small colonies of *Carex paniculata* and *C. riparia*. Waste ground near the railway bridge is the site for a colony of *Euphorbia esula*, growing with *Senecio erucifolius* and *S. viscosus*. The Chevet railway cutting nearby holds a clump of *Osmunda regalis*.

A track from the south-east corner of the wood follows the bank of Cold Hiendley Reservoir (the old canal feeder), where *Typha latifolia*, *Sparganium erectum* and *Stachys palustris* were found. In open areas alongside the track several brambles, *Rubus dasyphyllus*, *R. lindleianus*, *R. polyanthemus* and *R. eboracensis*, were noted.

Near the sailing club-house on Wintersett Reservoir a small stand of *Calamagrostis epigejos* was growing with *Salix viminalis*. The reservoir has a colony of *Ranunculus circinatus* but this was not seen on this visit, probably due to the large amounts of matted algae which were present in the area where it occurs.

Bryology (T. L. Blockeel)
Bryophytes were recorded along the canal in Haw Park, but were found to be surprisingly

poor in this area. Even the wooded parts failed to produce many of our commonest species. For example, none of the Mniaceae were found, although this is a characteristic family of woodland mosses. A few species were found on damp open soil in the vicinity of the canal; these included *Barbula tophacea* and some fine patches of *Riccardia chamedryfolia*. *Barbula rigidula* and *Rhynchostegium murale* were on damp stonework and *Orthotrichum diaphanum* was on a wall.

More interesting communities were found by the arable field between Wintersett Reservoir and Haw Park. The soil was clay, and there was a good growth of ruderal species in ruts at the field edge. They included *Dicranella staphylina* and a few stems of *Barbula tomaculosa*. This last-mentioned species was described in 1981 from arable fields in Yorkshire, and has been found in very few localities since. The new site is therefore a very pleasing discovery.

Also of some interest was the area of *Salix* by the north-western margin of Wintersett Reservoir. This produced *Amblystegium riparium*, *Drepanocladus aduncus* and a small quantity of the epiphyte *Ulota crispa* agg. A few years ago this would have been a very surprising discovery, since the genus was thought to have disappeared from southern Yorkshire as a result of atmospheric pollution. Recently, however, there have been several new records which suggest that the species may be recovering lost ground.

Mycology (M. Sykes)
The rather dry conditions meant that the fungal list was not a long one, but 8 species of agaric were encountered. Perhaps the most interesting records were of *Gymnopilus spectabilis* var. *junonius* on what appeared to be a species of *Salix*, and *Amanita citrina* (a species usually associated with *Fagus* or *Quercus* woodland) growing under the *Sorbus torminalis*.

Lichenology (M. R. D. Seaward)
A wide variety of habitats (gritstone walls, bridge parapets, sides of reservoir sluices, acidic grassland banks and trees) were thoroughly investigated, but proved to be lichenologically unproductive. Only 35 species were recorded, mainly from stonework, more particularly the wall bordering the Walton Hall estate. *Candelariella vitellina* was growing directly on ironwork, a favoured niche; trees were virtually devoid of epiphytes other than algae and the ubiquitous *Lecanora conizaeoides;* terricolous lichens were represented by five *Cladonia* species and a few patchy crusts of *Placynthiella icmalea*, *P. uliginosa*, *Trapeliopsis granulosa* and *T. pseudogranulosa*. The impoverished lichen flora is mainly a consequence of long-standing atmospheric pollution. Significant reductions in sulphur dioxide pollution throughout the British Isles in recent years has encouraged widespread re-establishment of epiphytic lichens, but sadly this has, as yet, not proved the case in this part of Yorkshire (cf. Bryology report above). Such sites should be critically monitored.

Bolton Abbey (VC64) 23 May (L. Magee)

A large group of members met in the car park at Bolton Abbey on a fine summer day and were welcomed by the President, Professor Leedale. The meeting was organised by the Freshwater Biological Section of the Union, and members were asked to pay special attention to the river, the ecology of which was suspected of being adversely affected by the intermittent discharges of water from Grimwith Reservoir. The meeting for the roll-call of societies and the presentation of reports was held in the Boyle Hall. The reports indicated that in spite of the large numbers of visitors to the estate throughout the year, the impact on the flora and fauna of the hanging woods and the river was slight. Votes of thanks were proposed to the Trustees of the Chatsworth Settlements for the facilities given for use of the car parks and access to the woodlands, and the Freshwater Biology section for organising the meeting at short notice.

Ornithology
27 species of bird were recorded in the early part of the day between the Priory and Pickles Beck – a somewhat lower total than might be expected for this time of the year. Dippers and Common Sandpipers were active on the river; both species bred successfully, despite the disturbance from visitors. The total number of species would doubtless have been larger had the open moorland and fellsides been visited. No reports were received of Pied Flycatcher and, surprisingly, none of Nuthatch, Garden Warbler Blackcap or Willow Warbler.

A few members visited the newly created lake at the trout farm at Barden, where a pair of Coot with five young were active. Oystercatcher, Mallard, Moorhen and two pairs of Tufted Duck had taken up residence since the lake was enlarged in 1991. Goosander breed on the river and visit the lake. Shoveller were present during April.

Coleoptera (M. Denton)
From a coleopterist's point of view it was very pleasing to see the copious amounts of dead wood which, if not in a detrimental position for public access, had been left *in situ*.

This management strategy will obviously have an advantageous effect on the insect species that are reliant on this kind of habitat. The only dead-wood beetles found on the day were the rhinoceros beetle *Sinodendron cylindricum*, the click beetle *Melanotus erythropus* and the longhorn *Rhagium mordax*.

By searching under the bark of dead trees a multitude of beetles was unearthed, several species belonging to the family Aleocharinae being included. Notable among these was *Crataraea suturalis*, a species which has only been recorded in Yorkshire on four previous occasions.

A single example of the cockchafer or may-bug *Melanotha melanotha* was found on an oak tree. This species, which takes between three and four years to develop to adulthood, is markedly less abundant now than formerly.

A dead oak in the Abbey grounds was festooned with the fungus *Daldinia concentrica*. By breaking open the fruit-bodies, three rather local species were encountered: *Dacne bipustulata*, *Litargus connexus* and *Biphyllus lunatus*. All these species are small (less than 3mm), but the last-mentioned species (which is confined to *Daldinia*), has a conspicuous velvety patch in the centre of the elytra.

The collecting conditions on the day were favourable. A complete list of the 71 species encountered has been lodged with the Trustees of the Chatsworth Settlements.

Lepidoptera (J. Payne)
On this beautiful sunny day six species of butterfly were recorded. Three members of the Pieridae were present: Green-veined White and Orange-tip were both numerous and both sexes were noted. The Large White was only seen once, and the Small White was not seen at all, no doubt due to the lack of brassica crops in the valley.

Small Copper was the only member of the Lycaenidae seen. As Holly Blue has occurred extensively in east and central Yorkshire this year, the species was searched for, but was not found. Of the Nymphalidae, the Red Admiral and Peacock were seen.

Two species of geometrid moths were flying, namely Common Carpet and Clouded Border. There was a great scarcity of larvae, but Winter Moth and a *Yponomeuta* species were present in webs on *Prunus padus*.

Freshwater Biology (D. T. Richardson & L. Magee)
The chemical analyses and pH values of water samples from the River Wharfe and its feeder streams showed a wide range of variation. This was reflected in the abundance of invertebrates in the individual streams. Collecting in the Wharfe itself proved to be disappointing, especially as larvae are usually plentiful during May. Posworth Gill and a small stream opposite the Cavendish Pavilion proved to be the most fruitful in terms of the numbers and relative abundance of species.

In all, five species of mayfly (as adults and/or larvae), seven species of stonefly (most as adults) and three species of caddis (all as larvae) were recorded. Comprehensive YNU biological record cards for each site surveyed are lodged with the recorders.

Botany (D. R. Grant)
The party started from the Priory Church, via the river to the Strid. The northern form of *Cochlearia officinalis* was growing in the rock crevices and *Chrysosplenium alternifolium* near the Seven Islands. The rare fern *Phegopteris connectilis* was found on a shady bank. Other interesting species seen were *Lathraea squamaria*, *Convallaria majalis* and a small colony of *Melica nutans*. Several trees of *Prunus padus* were in full flower, and *Geranium sylvaticum*, *Ononis repens* and *Rubus saxatilis* were in shady places nearby. Seven species of commmon sedges were seen as well as the more local *Carex caryophyllea*.

In all some 75 less common species were recorded, and it is pleasing to know that the plant communities, including many of the rarer species for which the estate has long been noted, continue to flourish.

Bryology (D. R. Grant)
The mosses *Fontinalis antipyretica* and *Eurhynchium riparioides* were on stones in the River Wharfe. Twenty other species were noted.

River Cover below Middleham (VC65) 6 June (D. Millward)

Ornithology
The respectable total of 38 species included Goosander, five waders including Common Sandpiper and Redshank, Kingfisher, Redstart, both Garden Warbler and Blackcap, Pied and Spotted Flycatchers, Nuthatch and Treecreeper.

Entomology (R. J. Marsh)
For the most part entomological activity involved the efforts of a small band of coleopterists, and the banks of the River Cover proved rather uneventful until the discovery of some decaying tree stumps which harboured some fine polypore bracket fungi.

M. L. Denton identified specimens of *Gyrophaena angustata* and *Oxypoda alternans*; both are common and widespread but these finds proved to be new vice-county records. Also new to VC65 was *Atheta ravilla*. Mr Denton also reported *A. castanoptera* (2nd vice-county record), *A. nigripes* (3rd vice-county record) and the scarce *A. liturata* (new to the vice-county and only the 5th Yorkshire locality).

Malthodes dispar was found on water mint by the edge of the river, whilst *Phloeonumus punctipennis* and *Dasytes aeratus* were taken from beneath some loose bark.

The writer collected a wide range of common species along with several noteworthy finds: *Ennearthron cornutum*, *Lathridius anthracinus* and *Pseudotryphyllus suturalis*, all from fungal growths beneath the loose bark of a decaying oak log; the first two provided further new vice county records.

Flowering Plants and Ferns (D. R. Grant)
55 species were noted in the Hullo Bridge/Cover Bridge area. Less common species included two colonies of *Equisetum telmateia*, *Moehringia trinervia*, *Veronica montana*, *Thymus praecox* ssp. *arcticus*, *Crepis paludosa* and *Solidago virgaurea*.

Carex caryophyllea was the pick of four sedges seen, and a good list of grasses was made; these included *Koeleria cristata*, *Avenula pratense*, *A. pubescens*, *Festuca arundinacea*, *Glyceria plicata* and, at Hullo Bridge, the unexpected *Aira praecox* and *Vulpia bromoides*.

Bryology (J. M. Blackburn)
Bryological recording took second place to work on the flowering plants, but a list was made of the more noticeable species.

Growing on rocks in the river were *Cinclidotus fontinaloides*, *Dichodontium pellucidum* and *Conocephalum conicum*; whilst *Pohlia carnea* was frequent on the banks. *Anomodon viticulosus* was found on a tree stump and nearby rocks held *Neckera complanata*. Tree branches had *Orthotrichum affine* and, as to be expected in a limestone area, cushions of *Tortella tortuosa* were growing on the walls. A total of 31 species was recorded.

Mycology (M. Sykes & L. Lloyd-Evans)
Around 20 species were recorded, most of them common and widespread species. The most noteworthy were the bolete *Xerocomus impolitus* and, on an old fire-site, the ascomycete *Pyronema opmphalodes*. Five species of rust were observed, the most interesting being *Trachyspora intrusa*.

BOOK REVIEWS

Richard Jefferies: a bibliographical study by **George Miller** and **Hugo Matthews.** Pp. xxviii + 787 (including 52 text figures), plus frontispiece & 12 plates. Scolar Press, Aldershot. 1993. £75.00 hardback.

Undoubtedly, *the* book for the serious student of the published output of one of Britain's most famous rural/nature writers, Richard Jefferies (1848-1887). Most of the volume (659.pp) contains detailed entries (and editorial comment) for his books, pamphlets and contributions to periodicals (newspapers and magazines) which analyse variants (often minutiae) of format, title-pages, etc. Smaller sections deal with: anthologies of selected passages, collected works, and separate editions of pieces previously collected in book form (66pp), manuscript material (22pp), chronological list of works about Jefferies in books, pamphlets and periodicals (29pp) and index (11pp). The text is complemented by figures and plates of magazine and book covers, title-pages, and facsimiles of handwriting.

Although a biography (other than a very brief chronology) of Jefferies is not provided, the detailed bibliography contains a significant amount of biographical information, including extracts from his correspondence. A scholarly and definitive work of reference.

MRDS

The Shaping of Environmentalism in America by **Victor B. Scheffer**. Pp.229, incl, 17 b/w illusrations. University of Washington Press, Seattle. 1991. $19.95 hardback.

This is a well produced 'popular' account of the growth of environmentalism in America during the period 1960-1980, with an epilogue covering the next decade prompted by the political changes of the Reagan years. The word 'environmentalism' is interpreted here in its truest sense, that of respect for nature. The author charts the development of this movement both as a force in environmental politics and as a form of social revolution.

The book is written in a clear and accessible style, well supported with relevant figures and quotations. Eleven 'Areas of Environmental Concern' (Croplands, Rangeland and Forests through to The Human Population) are explored in greater detail in the context of this period and country, though perhaps rather too succinctly. The second half of the book explores the social aspects of the environmental movement through consideration of education, law, politics and public participation. Again a very useful synthesis of material encompassing political, academic and popular commentary.

Many 'environmentalists' may find the material in this book very familiar; it is nevertheless a timely review. In addition it would be of interest to students of environmental science and studies, geography and perhaps even social history

AB

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