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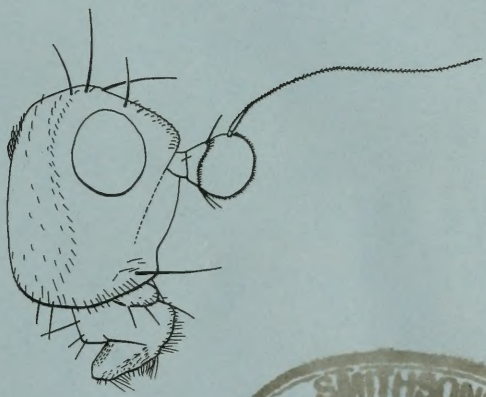

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OF PHEASANTS AND FRITILLARIES: IS PREDATION BY PHEASANTS (*PHASIANUS COLCHICUS*) A CAUSE OF THE DECLINE IN SOME BRITISH BUTTERFLY SPECIES?

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SUMMARY

Published evidence concerning the hypothesis that pheasant predation is implicated in the decline of the heath fritillary (*Mellicta athalia*) is discussed.

Nineteen species of British butterfly which have declined in range since 1969 are assigned to 'risk of predation by pheasant' categories based on features of the butterflies' ecology.

Seven of these species are shown to have a statistically significant negative correlation between 10 km map squares from which the species has been lost and the density of pheasants in these squares. These are seven of the 11 species here assigned 'high-risk' scores on life-cycle information.

None of the eight species assigned low-risk scores showed a significant negative correlation with pheasant density.

The hypothesis of a causal relationship between pheasant density and the decline of 'high-risk' butterfly species is discussed. Further experiments which test the hypothesis are suggested.

THE HEATH FRITILLARY AND PHEASANTS

The heath fritillary at Abbots Wood near Eastbourne 'suffered greatly in the larval stage from the depredations of pheasants now more extensively preserved': so said a Mr Carpenter in a discussion on the protection of insects in danger of extinction at a meeting of the South London Entomological and Natural History Society in 1897 (Turner, 1897). This seems to be one of the earliest suggestions that artificially increasing the density of pheasants could be detrimental to butterflies. It was made at a time of great increase in the game preservation industry, when gamekeepers were being blamed for the disappearance of many predatory mammals and birds. The charges against the gamekeepers were comprehensively proven in the famous paper by Langley & Yalden (1977). The charges against the pheasants appear to have been dropped without trial. My purpose in this paper is to argue that the circumstantial evidence is sufficient to demand that the trial be re-opened.

It is following the paper by Warren, Thomas & Thomas (1984) that recent authors have tended to dismiss the possible significance of pheasant predation on endangered butterflies. They quoted three authors who suggested pheasants as possible culprits in the case of the heath fritillary (Frohawk, 1924; Stokoe, 1944; Ford, 1945) and dismissed these claims as follows: 'Stokoe (1944) and Ford (1945) . . . are probably only quoting Frohawk. None of these authors gives any direct evidence and their comments seem based purely on the general fact that the birds are known to eat ground-living insects. . . .'. Warren *et al.* (1984) and Warren (1987) provide convincing proof that habitat structure is a major influence on heath fritillary

This paper is based upon a talk to be given to the Society on 14 December 1989.

populations. This seems to have been taken as an adequate justification for dismissing the possibility that pheasants are also part of the story. Their comments on Frohawk and Stokoe seem less than fair.

Frohawk quotes as evidence the rapid decline of the heath fritillary in Chattendon Woods, Kent in the final quarter of the 19th century coincident with the increase in pheasant rearing in the area. Stokoe quotes not Frohawk but a report from Dr G.H.T. Stovin concerning a colony of heath fritillaries in Essex: 'the last colony in Essex died out owing to the woods in question being used for game preservation'. We thus have three separate cases, in three counties, of a rapid decline in heath fritillaries following an intensification of game preservation: hardly a case of many authors copying the (mis)information contained in a single publication as Warren *et al.* (1984) imply. Ford (1945) boldly stated that 'pheasants are even more deadly enemies to it than unscrupulous collectors' but gives no reference or evidence. He may well have been repeating Frohawk as Warren *et al.* suggest.

Warren (1987) reports a most detailed study of the ecology of the heath fritillary including an attempt to measure the mortality rates and causes. Larval mortality could not be measured—so the results are obviously incomplete, but none-the-less extremely interesting. Egg batches contained between 60 and 100 eggs. Females may lay more than one batch but, even if few females live long enough to do so, an average of 80 eggs per reproducing female seems a minimal estimate. Just under 6% of eggs failed to hatch in the field (mostly disappeared, assumed predated, predator unknown). The mortality in the pupal stage was higher—around 50%. Some of this was due to parasitoid insects but most from predators assumed to be small mammals and beetles. Most pupae assumed to be predated by small mammals simply disappeared and could possibly have been bird predated. Others left clear remains similar to those left when beetles or mammals consume the pupae in captivity.

From Warren's estimates of egg and pupal mortality, and my assumption of a minimum of 80 eggs per female and assuming that mortality of adult butterflies before egg-laying is not massive, it follows that larval mortality must be about 90% if heath fritillary populations are not to increase dramatically each year. This is hardly surprising since the larval stage is the overwintering stage and has by far the longest duration of the four life-cycle stages. It is thus particularly sad that Warren was unable to measure the causes of larval mortality. It is noticeable that most heath fritillary colonies survive (or have been successfully introduced) in nature reserves—areas where both the habitat management can be adjusted to the needs of the butterfly and where pheasant rearing and release does not take place. It thus seems wrong to assume, in the absence of any evidence, that pheasant predation is quite unimportant and that habitat structure is the only thing that matters.

Bird predation and butterflies

That many species of British butterflies have declined in range during the present century (especially during the last 30 years) is well known. The cause(s) of these declines has been the subject of much discussion usually concerned with establishing the relative importance of habitat change, habitat fragmentation, pesticides and pollution, climatic variation and butterfly collecting. Thomas (1984) gives a particularly valuable review of these topics but it is noticeable that the possible significance of bird predation is scarcely mentioned in this and some other papers concerned with butterfly declines. A review by Dempster (1984) indicates that, in those few species that have been studied, predation by birds is a significant cause of mortality especially in the later larval instars and the pupal stage. Pollard (1979) has

suggested that the association between cool spring and summer temperatures and declines in the range of the white admiral (*Ladoga camilla*) may be the result of low temperatures slowing development and thus lengthening the time during which larvae and pupae are exposed to bird predation. Pratt (1983) concluded that increased predation by birds may well have been an important cause of the decline to extinction of the black-veined white (*Aporia crataegi*).

For predators to cause significant declines in their prey it is necessary that the predators have increased in abundance and that the predator population is not limited by prey availability. Pheasants (*Phasianus colchicus*) fulfil both these conditions.

Why pheasants?

Pheasants are not native to the British Isles. Probably introduced to England in the 11th century they did not become widespread throughout the British Isles until the late 19th century. Although the species can survive in the feral state without assistance by man, game preservation and release of captive reared birds substantially increases the population density (Sharrock, 1976). Game preservation directed at increasing pheasant density became widespread in lowland Britain during Victorian times. There were declines in the amount of pheasant rearing and game preservation activities during the two war periods during this century and corresponding declines in the abundance of pheasants were noticed (Sharrock, 1976). In recent decades there has been a substantial increase in the numbers of captive bred pheasants released; now about 15 million birds are released annually (Lack, 1986): these exceed the total biomass of native insect-eating and mixed-diet terrestrial-feeding birds in Britain. Table 1 shows that, in biomass terms, the pheasant is the dominant species of potential butterfly-predating birds in the British Isles. It should be pointed out that biomass is a rather crude indication of likely impact on insects: larger birds may well have a smaller proportion of insect prey in their diet. Also, small birds have a higher heat loss rate than large ones and in consequence eat more per gram of body weight than large ones. Even so, if any bird has an effect on butterfly populations, it is likely that the pheasant does.

Methodology

The butterfly species included in this analysis were all the 18 species listed by Heath, Pollard & Thomas (1984) as showing a major contraction of range. In addition, *L. camilla* was included as their map indicates a considerable contraction in range although they put it in their 'contraction and equal of greater re-expansion' category.

Pheasants feed only at ground level and are not such a major part of the bird community in short downland turf habitats as they are in wood, scrub and rough grassland habitats (Fuller, 1982). It is thus a reasonable *a priori* assumption that butterflies whose larvae and pupae live entirely in the tree or shrub canopy will be immune to predation by pheasants. Of those whose larvae are sometimes within reach of pheasants it seems reasonable to suggest that woodland species will be at greater risk than downland ones. That camouflaged larvae and pupae will be at lesser risk than gregarious or non-camouflaged forms is debatable: the gregarious larvae may be distasteful to birds and have some protection. On the basis that birds need to learn to avoid distasteful prey, and that pheasants are released as inexperienced young birds likely to peck at anything moving at ground level, I have assumed that

Table 1. Biomass of insect-eating birds in the British Isles.

Species	Percentage total biomass		Total biomass (tonnes)	
	Winter	Summer	Winter	Summer
Pheasant *Phasianus colchicus* L.	39	12	8800	1100
Starling *Sturnus vulgaris* L.	14	13	3034	1148
Blackbird *Turdus merula* L.	8	15	1710	1330
Crow *Corvus corone* L.	9	12	1995	1140
Rook *Corvus frugilegus* L.	9	11	1960	980
Song thrush *Turdus philomelos* L.	3	6	656	574
Skylark *Alauda arvenis* L.	4	3	975	234
House sparrow *Passer domesticus* (L.)	2	3	351	319
Dunnock *Prunella modularis* (L.)	2	2	420	210
Robin *Erithacus rubecula* (L.)	1	1	190	133
Great Tit *Parus major* L.	1	1	180	108
Magpie *Pica pica* (L.)	1	1	157	135
Blue Tit *Parus caeruleus* L.	1	1	150	100
Wren *Troglodytes troglodytes* (L.)	1	1	150	100
Chaffinch *Fringilla coelebs* L.	0	2	0	210
Grey Partridge *Perdix perdix* (L.)	0	2	0	160
Red Partridge *Alectoris rufa* (L.)	0	2	0	146

This table is derived from: (a) The estimates of total British & Irish populations (breeding and wintering) given in Lack (1986) and Sharrock (1976). Where a range of figures is given the mid-point of the range was used. (b) The typical weights given in Perrins (1987). Where a range of weights is given the mid-point was used. Where male and female weights are different a mean figure was used. (c) The indications of diet given in Perrins (1987). All species noted as including insects as a normal part of their diet were included except those that feed in aquatic habitats or on the wing only. Those (e.g. partridge and many finches) which are herbivorous in winter but feed on insects in summer were included in the summer figures only. (d) The data for all 100 species were used in the calculations but the table includes only those species with an average of 1% or more of the total biomass.

Notes to Table 2.

1. *L. sinapis* larvae prefer the taller specimens of their foodplants. Mean height of pupation is 20–40 cm (Heath & Emmet, 1989). Thus the true risk score may be lower.
2. It is the ground level pupa of *T. betulae* which is most at risk, but most larvae feed low on bushes oviposition being in range 20–100 cm (Heath & Emmet, 1989).
3. *H. lucina* now survives almost exclusively in non-woodland habitats but was originally a woodland species (Heath & Emmet, 1989).
4. *A. aglaja* does colonize woodlands but its main habitats are windswept downlands and coastal sites (Heath & Emmet, 1989).
5. The young larva hibernates on tree trunks where it may be out of reach to pheasants. It descends to feed early in the spring (Heath & Emmet, 1989): hence the high risk score.
6. *E. aurinia* also inhabits woodland rides and scrubby areas so a higher score than given here could be justified.
7. Most strong *M. galathea* colonies are on downland and coastal habitats — hence the score given here despite the existence of some woodland ride populations.

Table 2. Degree of risk from pheasant predation for those British butterflies which have declined in range.

Species	Column a	Column b	Column c	Column d	Overall score
Chequered skipper *Carterocephalus palaemon* Pall.	1	1	1	0	3
Silver-spotted skipper *Hesperia comma* (L.)	1	1	0	0	2
Wood white *Leptidea sinapis* (L.)	1	1	1	0	3 (note 1)
Brown hairstreak *Thecla betulae* (L.)	1	1	1	0	3 (note 2)
Small blue *Cupido minimus* (Fuess.)	1	1	0	0	2
Silver-studded blue *Plebejus argus* (L.)	1	0	0	0	1
Adonis blue *Lysandra bellargus* (Rott.)	1	1	0	0	2
Duke of Burgundy *Hamearis lucina* (L.)	1	1	1	0	3 (note 3)
White admiral *Ladoga camilla* (L.)	0	na	na	na	0
Purple emperor *Apatura iris* (L.)	0	na	na	na	0
Large tortoiseshell *Nymphalis polychloros* (L.)	0	na	na	na	0
Sm. Pearl-brd fritillary *Boloria selene* (D. & S.)	1	1	1	1	4
Pearl-brd fritillary *Boloria euphrosyne* (L.)	1	1	1	1	4
High Brown fritillary *Argynnis adippe* (D. & S.)	1	0	1	1	3
Dark-green fritillary *Argynnis aglaja* (L.)	1	1	0	1	3 (note 4)
Silver-washed fritillary *Argynnis paphia* (L.)	1	1	1	1	4 (note 5)
Marsh fritillary *Eurodryas aurinia* (Rott.)	1	1	0	1	3 (note 6)
Heath fritillary *Mellicta athalia* (Rott.)	1	1	1	1	4
Marbled white *Melanargia galathea* (L.)	1	1	0	0	2 (note 7)

This table shows a "risk-score" based on four aspects of the biology of the species as recorded by Thomas (1986). The arbitrary scoring system is: (a) Larva and/or pupa occurs near enough to ground to be accessible by pheasants, (yes: score 1 plus scores in other columns; no, score 0 overall). (b) Larva and/or pupa accessible to pheasants during July–March, time of high pheasant abundance, (yes, score 1; no, score 0). (c) Woodland habitat normally (score 1), downland/heathland habitat normally (score 0). (d) Larva gregarious and/or not well camouflaged (score 1), larva camouflaged (score 0).

the non-camouflaged larvae will be at greater risk than those which are more difficult to see (but which are probably more palatable). Finally, since pheasant populations are substantially higher during autumn and winter than during late spring and summer (Lack, 1986) it seems reasonable to assume a greater risk for those species which overwinter in the larval or pupal stage.

Based on the above *a priori* assumptions, each of the 19 butterfly species was given a 'risk-score' between zero and four (Table 2).

The data used for the analyses in Table 3 came from the published distribution maps for pheasants (Lack, 1986) and butterflies (Heath, Pollard & Thomas, 1984). Both surveys use the 10 km squares of the national grid to plot distribution surveys. The pheasant map was based on the BTO winter birds survey conducted in the winters 1981/2 and 1982/3. Squares with pheasants were assigned to one of three density categories based on the number of pheasants seen during a standardized period of search. The butterfly maps indicate, for each square with any known occurrence of the species, the date class of the most recent record.

The data from each map was entered into a micro-computer and a contingency table calculated showing the date of the most recent butterfly record against the pheasant density for all 10 km squares for which the butterfly species had ever been recorded. An index indicating the size and direction of any correlation between pheasant density and date-class of most recent record was calculated — see Table 3.

Results

Table 3 shows the results of a standard chi-square test with the MICROTAB program (Higginbotham, 1985); the null hypothesis being no association between pheasant density and presence of the butterfly in recent times. Eight of the 19 species show a significant deviation from expectation ($P < 0.05$) and in all but one of these (*Hamearis lucina*) the direction of the deviation was a negative correlation (i.e. squares with high pheasant densities are less likely to have a recent record of the butterfly than would be expected by chance).

In every one of the eight species in the low-risk categories 0 to 2 there was no significant deviation from the null hypothesis expected values. In other words, it is reasonable to accept that whether or not a butterfly has survived in a given square is quite unrelated to the density of pheasants in that square. (Although there is some indication of a weak positive correlation in *Apatura iris*). Seven of the 11 species in high-risk categories 3 and 4 show significant negative correlation with pheasants. An additional two species in these 'high-risk' categories show some negative correlation but not strongly enough to give a P value below 0.05. For these species, there was less than average chance that each would survive to the time of the recent survey in squares with a high pheasant density.

Discussion

Interpretation of dot-distribution maps is easy to criticize: the maps reflect the distribution of recorders, the butterfly maps do not distinguish between a single wandering individual and a strong resident population, the bird and butterfly surveys were conducted at different times and quite probably in different parts of each surveyed 10 km square. It is worth pointing out that every one of these criticisms is valid and that the effect of each would be to hide any real relationship between two maps with 'random-noise'. That a strong negative correlation between survival of the butterfly to recent times and high pheasant density is demonstrable, despite these sources of random effects, is added reason to be convinced that the link is genuine.

Table 3. Butterfly survival and pheasant density.

For each species a 3 × 4 contingency table was constructed showing the numbers of 10 km squares (n) in each of three butterfly record-date classes (the dates of the most recent record: pre-1940; 1940–1969; 1970–1982) against the density of pheasants in those squares. The data sources for the butterflies are the maps in Heath, Pollard & Thomas (1984) and Lack (1986) for the pheasants.

Using the Microtab program (Higginbotham, 1985) each contingency table was tested for departure from the numbers expected in each cell of the table (null hypothesis: no correlation between pheasant density and survival of butterflies to recent times). Where the expected numbers in a cell fell below five, it was necessary to amalgamate the "no-pheasant" and "low-pheasant" rows to permit the statistical testing. The numbers of degrees of freedom (df) indicates when this has been necessary. A 3 × 4 table has df=6; a 3 × 3 table df=4. In the case of the heath fritillary all pre-1970 records had to be amalgamated leaving a 2 × 3 table (df=2). The chi-squared value and its associated P value indicate whether departure from the null hypothesis is indicated. If $P<0.05$ the null hypothesis was rejected.

A single index of association is given for each species. This was obtained by grouping the results into a 2 × 2 table (no + low pheasants or medium + high pheasants against old records only or post-1969 records). The chi (as opposed to chi-squared) value is used as the index as it carries a sign indicating whether the association is negative (butterflies are less likely to survive to recent times in squares where pheasant density is high than the laws of chance would suggest) or positive.

Full contingency tables are available from the author. Here, the results are summarized with the species presented in sequence based on the degree of negative association detected. Species asterisked show a statistically significant departure from a random association.

	n	Chi-sq	d.f.	P	Index
*Silver-washed fritillary	886	64.53	6	$P<0.001$	−6.12
*Dark green fritillary	1192	39.65	6	$P<0.001$	−5.07
*Chequered skipper	88	32.61	4	$P<0.001$	−4.91
*Marsh fritillary	628	30.88	6	$P<0.001$	−4.17
*Brown hairstreak	364	32.61	6	$P<0.001$	−3.42
*Small pearl-bordered	959	47.11	6	$P<0.001$	−3.17
Wood white	533	9.59	6	$0.95>P>0.1$	−2.07
High brown fritillary	415	9.20	6	$0.1>P>0.05$	−1.62
*Pearl-bordered fritillary	716	12.73	6	$0.05>P>0.025$	−1.50
Silver-spotted skipper	118	8.13	4	$0.1>P>0.05$	−0.93
Adonis Blue	174	8.33	4	$0.1>P>0.05$	−0.70
Large tortoiseshell	379	3.74	4	$0.95>P>0.1$	−0.54
Heath fritillary	73	3.81	2	$0.95>P>0.1$	0
Silver-studded blue	312	2.84	6	$0.95>P>0.1$	0
Marbled white	575	7.48	4	$0.95>P>0.1$	+0.36
Small blue	486	6.21	6	$0.95>P>0.1$	+0.98
White admiral	382	3.56	4	$0.95>P>0.1$	+1.27
Purple emperor	225	8.48	4	$0.1>P>0.05$	+1.46
*Duke of Burgundy	259	10.44	4	$0.01>P>0.025$	+2.12

The programs used for this and the other analyses reported here are available (Corke, 1988) and can be used for investigating these correlations further and also for more general biological mapping.

It is also worth noting that the combined picture of distribution and decline for the 'high-risk' species is very different from that of the 'low-risk' species. This is illustrated by the distribution maps (Figs 1–6). The low-risk species are concentrated in southern-central England and have contracted further into that area. This is entirely consistent with the widely accepted explanations of the combined influence of deteriorating climate and loss of rich (mainly downland) habitats. The 'high-risk'

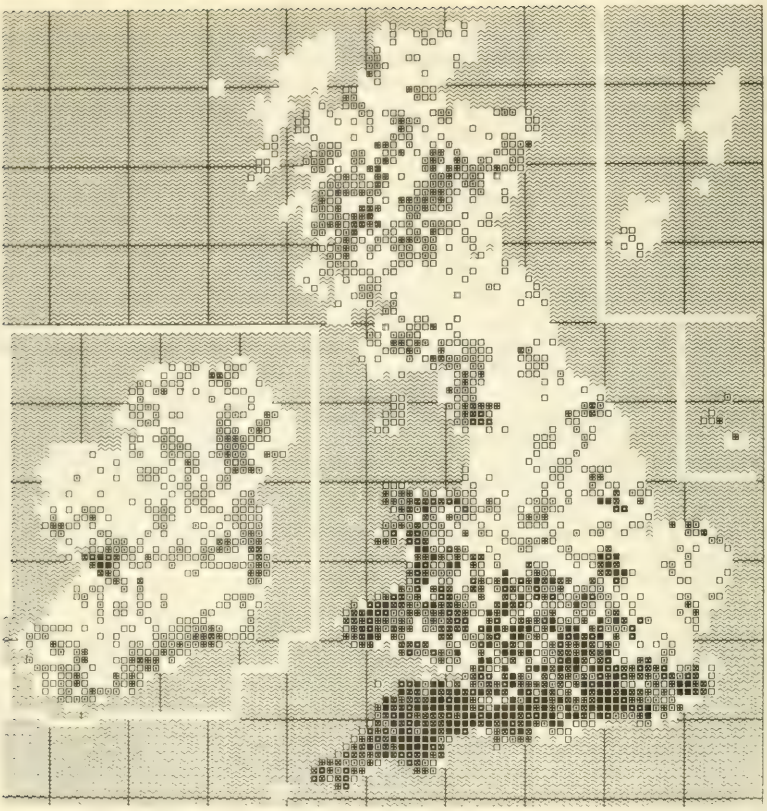

Fig. 1. 10 km sq map showing the total number of the 11 butterfly species in "risk" categories 3 and 4. □=1, ▯=2, ⊞=3, ⊠=4, ◪=5, ■=6.

species, in contrast, have a westerly bias to their distribution with no indication that they avoid the wet and cold areas of Britain. Their contraction has been mainly noticeable in the east of their range. This cannot be explained in climatic terms but parallels very closely what happened to many predatory birds and mammals in consequence of game-preservation (Langley & Yalden, 1977).

The negative correlations detected for the high-risk species are most unlikely to result from chance. That does not, of course, prove that the relationship is one of cause and effect. It could reasonably be argued that the decline of some butterfly species has resulted from habitat fragmentation, habitat change due to agricultural practices or pesticides associated with agriculture. Since pheasant shooting (and therefore rearing) is a favoured pastime of the richer members of the agricultural community, one would expect that a high pheasant density be associated with the intensive agriculture of eastern England. These areas may have become unfavourable to butterflies because of the agricultural changes and associated loss of actively coppiced woodland. This is the most generally acccepted reason for the decline of this group of species. If this is the main explanation of the correlation between

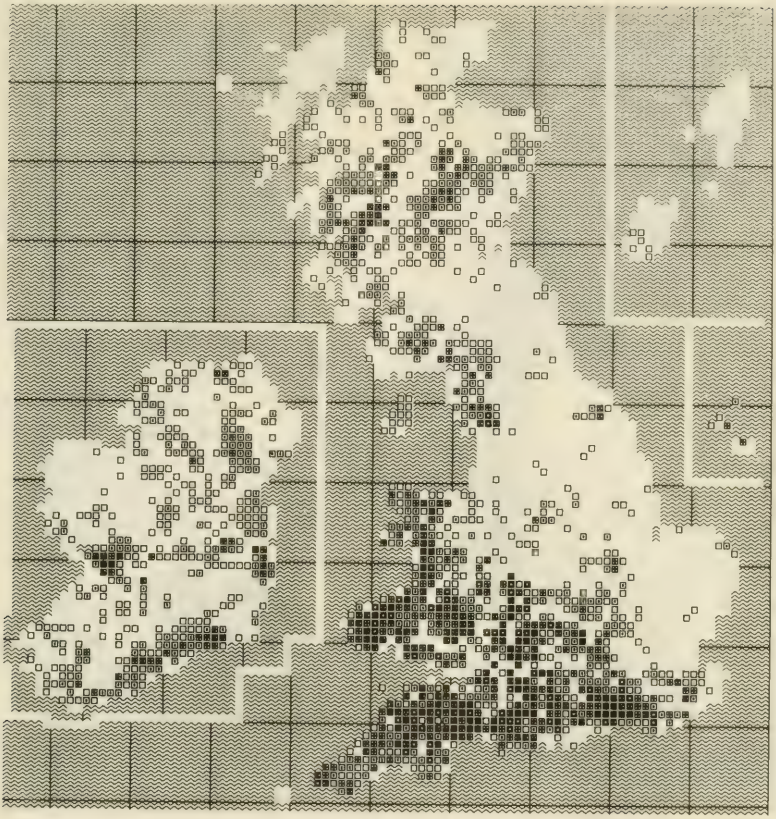

Fig. 2. 10 km sq map showing the number of the 11 butterfly species in "risk" categories 3 and 4 for which there is a post-1969 record. For symbols see Fig. 1.

pheasant density and butterfly decline reported here, then it is remarkable that the correlation is found only in those species whose biology exposes them to the risk of direct predation by pheasants and not those which pheasants cannot attack (but which would be susceptible to agricultural changes presumably).

On the basis of the information presented here, it seems reasonable to conclude that, for at least five species of fritillary butterfly (asterisked in Table 3) and perhaps two other woodland species (*Thecla betulae* and *Carterocephalus palaemon*) pheasant predation may be a significant cause of their decline (in combination, no doubt, with changes in woodland habitats associated with reduced coppicing and increased separation of suitable woodlands). For the declining species of downland habitats and the high woodland canopy pheasants are clearly not responsible and one would not expect them to be. The well-established habitat changes on downlands and heathlands (related to agricultural changes and reduction of rabbit grazing) are sufficient explanation for five species. The decline of three tree/shrub feeding species may, perhaps, be related to climatic change.

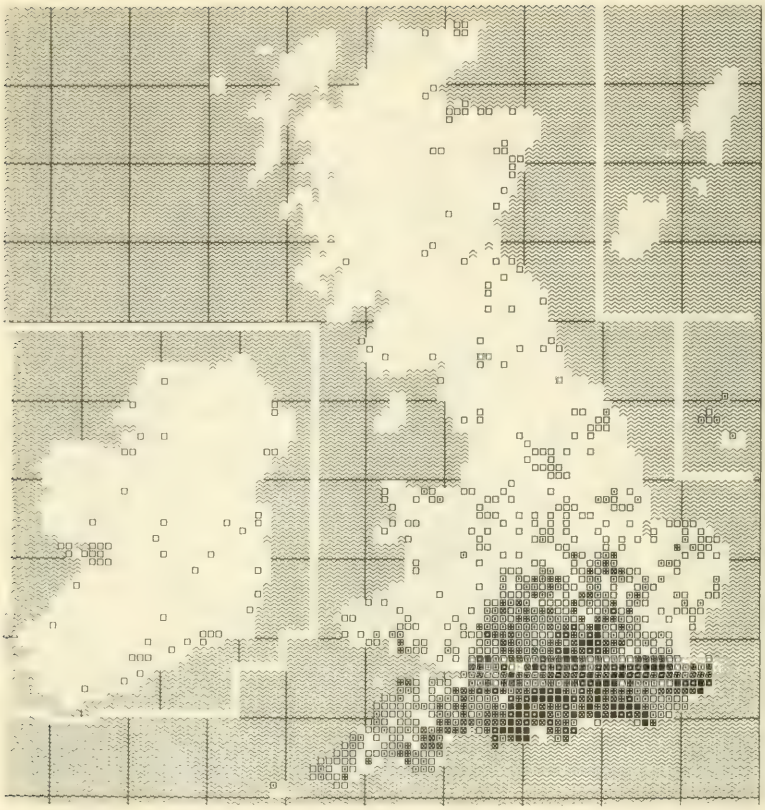

Fig. 3. 10 km sq map showing the total number of the eight butterfly species in "risk" categories 0 to 2. For symbols see Fig. 1

The heath fritillary does not show any correlation (positive or negative) in this analysis. The total number of squares involved in the analysis is very low for this species — probably too low for this crude form of analysis to be of any use. The evidence discussed in the first section of this paper does, though, suggest that pheasant predation could be important.

The Duke of Burgundy (*Hamearis lucina*) is one species which does not fit this hypothesis. Its biology suggests that it should be susceptible to pheasant predation in wood and wood-edge habitats and yet it shows some positive correlation between high pheasant density and survival. It is a rapidly declining species and survives best in non-woodland habitats. Recent surveys show that it has disappeared from virtually all its woodland haunts and survives mainly on 'poorly grazed calcareous grassland' (Heath & Emmet, 1989) which may explain this anomaly. I predict that, in studies at a more local level than 10 km squares, this species will be shown to survive better in low pheasant density woodlands. If this prediction is shown to be false it will be an excellent argument against my hypothesis.

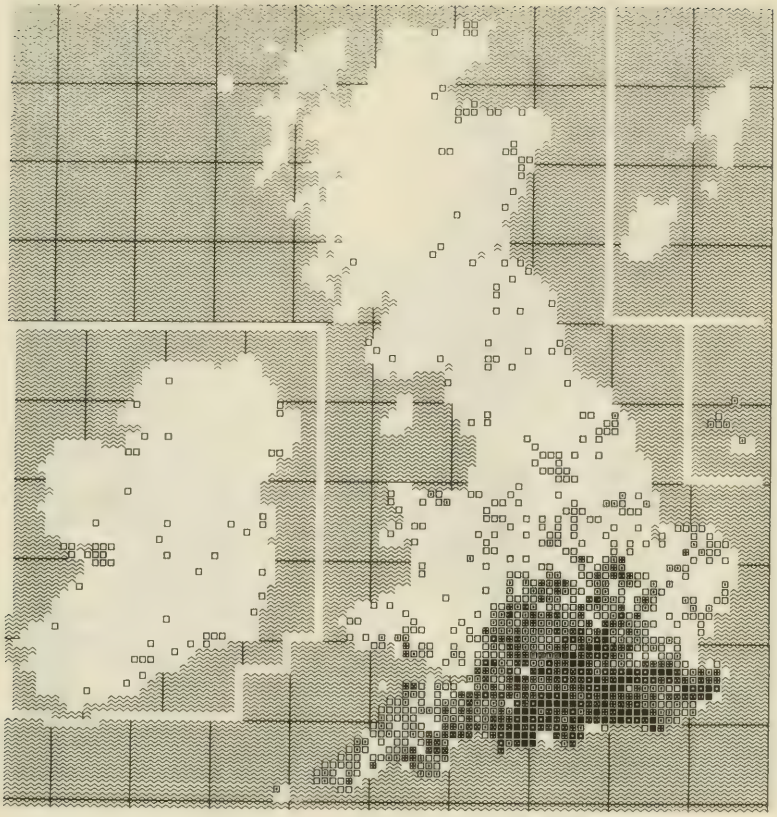

Fig. 4. 10 km sq map showing the number of the eight butterfly species in "risk" categories 0 to 2 for which there is a post-1969 record. For symbols see Fig. 1

A number of other predictions follow from the hypothesis of a causal link between the decline of woodland and scrub-habitat butterflies whose immature stages exist at ground level and predation by pheasants. The following three predictions could be tested quite simply and would serve to confirm or reject the hypothesis presented here.

1. The density of 'at risk' species should be significantly lower in otherwise equivalent habitats which have a high pheasant density than in low pheasant density woods. The standard monitoring techniques (Pollard, Hall & Bibby, 1986) could be used to test this prediction if the monitored sites can be surveyed for pheasant density.

2. The density (and number of species) of butterflies will decline in existing 'good' woodland habitats if pheasant release is started or intensified in these woodlands.

3. Attempted re-introduction of species to woods from which they have been lost will succeed more often in woods with low pheasant density during the re-introduction experiments.

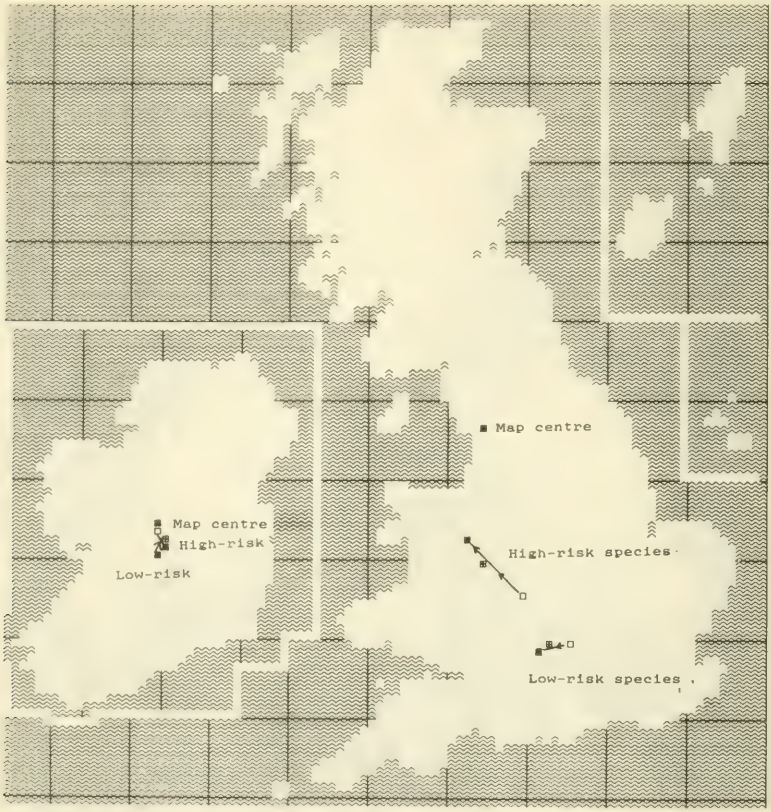

Fig. 5. Map showing shifts in the range centres of "high-risk" and "low-risk" species. The map centres are calculated separately for Ireland and for Britain (including its offshore islands except Orkneys, Shetlands and Channel Isles). The results for Ireland indicate a random scatter of records for both groups, no real shift in range centres and range centres close to the geographic centre of Ireland. The results for Britain indicate a distinct shift to the north and west in the ranges of the "high-risk" species and a lesser shift to the west (and south?) for the low risk groups. Both groups still have range centres to the south of the geographic centre of Britain and this is very pronounced in the "low-risk" species. ■ = recent research, ✚ = total records, □ = last species.

Implications for butterfly conservation

Recent research by the Game Conservancy Trust (Robertson, Woodburn & Hill, 1988) has shown convincingly that the management of woodlands for pheasants has a positive effect on the numbers of adult butterflies seen in the wood. The authors do not, of course, make any claim that the pheasants themselves are beneficial to butterflies. It is because the requirement of pheasants are best met by an open woodland structure and wide rides that 'pheasant woods' are better than uncoppiced woods or conifer plantations. The published work does not compare the density of

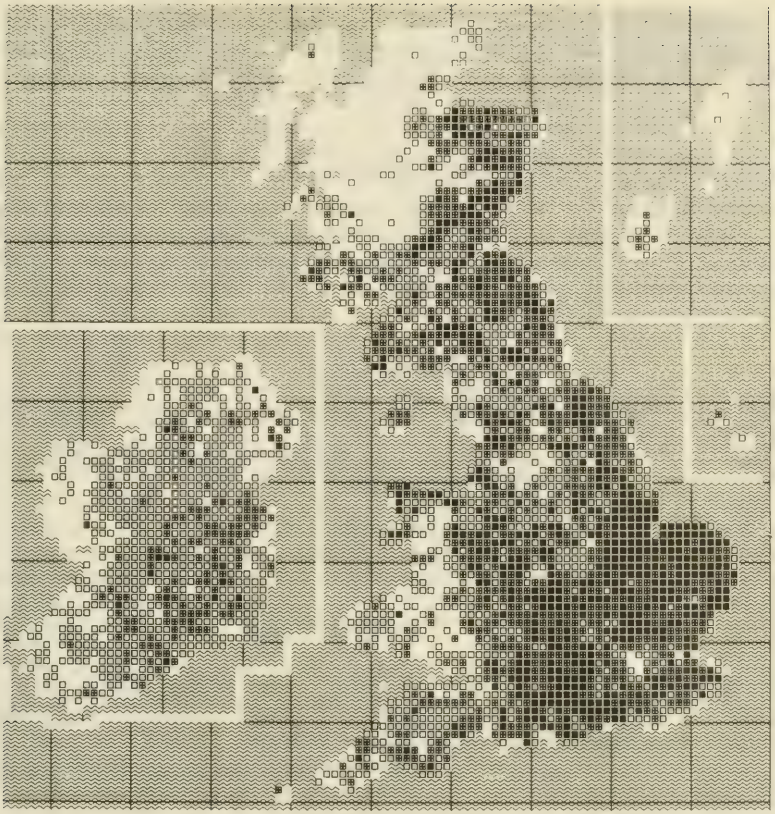

Fig. 6. The 10 km square map of pheasant density (from Lack, 1986) used for the analyses in Table 3. ■ = high, ⊞ = medium, □ = low.

butterflies in open coppiced woods managed as nature reserves with structurally similar woods managed for pheasants. Such a comparison would be most valuable. The butterfly species recorded by Robertson *et al.* contained only two species in my 'high risk of pheasant predation' category in their study woodland.

Meanwhile, the positive links between woodland management for pheasants and butterfly conservation are being widely publicized. I feel there is some risk that the managers of nature reserve woods (especially when these are poorly funded County Wildlife Trusts with strong influence from the field sports lobby) may be tempted to permit the use of nature reserves for pheasant rearing as a way of increasing income. It is my view that such action would be most unwise. While it is true that a wood managed for pheasants is better than no wood or a derelict and overgrown wood, there is no evidence that it is better than a properly coppiced wood with a low pheasant density. The evidence presented here suggests that the reverse applies.

In conclusion, I regard it as important that the case of the pheasant and the fritillary be re-opened by the funding of suitable study along the lines suggested in this paper. Only then will the accusation made over 90 years ago be confirmed or rejected.

Acknowledgements

I wish to thank Lt. Col. A.M. Emmet for helpful comments on the draft of this paper and for permission to read and quote from the butterfly volume of *Moths and Butterflies of Great Britain and Ireland* (Heath & Emmet, 1989) in advance of its publication. My colleagues M.E. Jakobson and J. Rostron gave valuable comments on my use of statistics.

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THE 1987 PRESIDENTIAL ADDRESS—PART 1 REPORT

J.A. Owen

8 Kingsdown Road, Epsom, Surrey KT17 3PU.

You have heard, Ladies and Gentlemen, reports from your Council, the Treasurer and other Officers of the Society. There is no doubt that, after going strong for 115 years, the Society continues to flourish with currently 718 members. Alas, we cannot have a year in a society like this without losing a few old friends and I would like to start my address by mentioning briefly those members whose deaths have been brought to our attention during the past 12 months.

Mr H.M. Biley of Boothville, Northampton, was a lepidopterist who died sadly in November 1987 after only one year's membership of the Society.

Mr P.N. Crow, latterly of Blenau-Ffestiniog in North Wales had a life-long interest in entomology, first in Lepidoptera and then in Diptera. He was a member of the society for 55 years, joining in 1932, and was made a Special Life Member in 1982. He had some notable finds among the Diptera in North Wales including *Didea alneti* (Fall.), the first capture of this species for 30 years, and also of *Erizona syrphoides, Cheilosia semimaculata* and *Asilus crabriformis* L.

Mr J. Heath of St Ives, Huntingdonshire joined the Society in 1954 and became President in 1982. He had a life-long interest in Lepidoptera, first as a hobby and later in a professional capacity. He will be particularly remembered for two things: firstly as the initiator of the 11 volume series *The moths and butterflies of Great Britain and Ireland* which he sadly did not live to see completed and, secondly, for setting up the insect distribution mapping scheme of the Biological Records Centre at Monks Wood.

Mr G.E. Hyde of Doncaster, joined the Society in 1950. His entomological interests lay in Lepidoptera and in dragonflies and, also, in insect photography of which he was a notable exponent and pioneer. His collection and many of his photographs are to be found in the Doncaster Museum.

Mr F.G. Ranson of Bury St Edmunds joined the Society in 1974. He collected Lepidoptera and Coleoptera, mainly as far as I can determine around his home town.

Mr D.G. Sevastopoulos of Mombassa, in Kenya joined the Society as long ago as 1923, becoming a Special Life Member in 1974. He was an enthusiastic lepidopterist who published many papers on East African butterflies. The major part of his collection was donated to the British Museum a few years ago.

Mr D.W. Thorpe-Young, was a member of the Society for 37 years, serving on Council from 1952 to 1953 and holding office as Treasurer from 1963 to 1967. He was living, at the time in Carshalton but, on retirement in 1971, he moved to Broadstone in Dorset where he was able to continue pursuing his interests in various aspects of entomology.

Finally, Mr R.D. Weal of North London, who joined the Society in 1952. Mr Weal held office in the Society for some time during the seventies as Assistant Curator under Mr Eric Bradford and was responsible for setting out the Massee collection of Coleoptera. Bob Weal was a contemporary of the late F.D. Buck and of the late H.W. Forster, sharing their interests in the beetles of the Epping Forest area.

We have stood as a tribute in memory of our lost friends and I will not ask you to stand again.

In terms of weather, the year 1987 will be remembered as a rather cold spell between a gale in March and another in October. On questioning my entomological friends, however, there have been more who have told me that they found it a 'good'

year than have found it a 'bad' year. It appears from the grapevine that the number of additions to the British insect list has been maintained for most groups at its annual average level and we look forward to their formal introduction in due course.

A highlight of the year, as usual, was the Society's Annual Exhibition, staged in greatly improved surroundings with, unbelievable in Central London, no parking problems. Perhaps the number attending the Exhibition did not quite come up to that recorded for the Annual Exhibition of 1887, of which a contemporary report stated that 'despite the dense fog that prevailed, was attended by about 1000 visitors'. The Exhibition will be held in the same venue in 1988, a little later in the year which will give you more time to set this year's captures for display. As I said at the time, things like an Annual Exhibition and Dinner do not just happen. They are a success because a lot of people put in a lot of work. I thank them on your behalf for their unstinted efforts and look forward to seeing you all at our Exhibition and Dinner this year.

Before I come to the end of the first part of my address, I ought to say that being President for the year has really been quite easy—the other officers and members of Council do all the work! I would like to thank them all sincerely for their unfailing support—the Secretary, the Treasurer, the Minutes Secretary, the Membership Secretary, the Editor, the Publications Committee, the Curator, the Librarian and his Committee, the Sales Secretary, the Distribution Secretary, the officers who arrange the indoors and field meetings, the Lanternist and the members without portfolio who help keep our Council meetings to the point. I would thank also the members who participate in the affairs of the Society by attending our indoor and field meetings, by showing exhibits and making comments thereon, by attending open days, by supporting the Annual Exhibition and Dinner and by contributing to our *Proceedings*, in the past, and to our *Journal*, in the future. These are the things which make a Society worthwhile—and I would thank also the various speakers from inside and outside the Society for the many entertaining and enjoyable evenings they have provided during the past year.

That, I think brings me to the end of all I wish to say about the Society and I will now move on to the second part of my address.

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5	6	7
8	9	10
	12	13
11		
	14	15

Plate I. ANNUAL EXHIBITION 24 October 1987

1: *Boloria euphrosyne* L., Cotswolds, vi.87, K.E.J. Bailey. 2: *Argynnis aglaja* L., near ab. *altha* Thiery-Meig, Wilts., 1987, D. Trew. 3: *Maniola jurtina* L., ab.nov., Lewes, East Sussex, 21.vii.85, R. Dennis. 4: *Tetheela fluctuosa* Hb., Haslemere, Surrey, 7.vii.87, J.T. Scanes. 5: *Lysandra bellargus* Rott., ab. nov., Corfe, Dorset, 29.viii.87, A.S. Harmer. 6: *Celastrina argiolus* L., halved gynandromorph, Chessington, Surrey, 23.ix.87, A.M. Jones. 7: *Polyommatus icarus* Rott., ab. *discoelongata* plus *basielongata,* bred, 24.viii.87, L.D. Young. 8: *Polymixis gemmea* (Treitschke), Cockpole Green, Berks., 1.ix.79, P. Waite. 9: *Drepana falcataria* L., Shabbington, Oxon., 27.v.87, A. Jenkins. 10: *Melanthia procellata* D. & S., Chilgrove, Sussex, 5.vii.87, B. Skinner. 11: *Angerona prunaria* L., Hamstreet, Kent, 29.vi.87, D. O'Keefe. 12: *Colostygia pectinataria* Knoch, Blair Atholl, Perths., 2.vii.87, D.J.L. Agassiz. 13: *Hypena rostralis* L., Marlow, Bucks., 15.ix.73, D.J. Wedd. 14: *Xanrhorhoe designata* Hufn., Tavistock, Devon, 28.viii.64, D.J. Wedd. 15:*Mesoligea furuncula*, Petts Wood, Kent, 2.ix.86, D. O'Keefe.

Photo: D.E. Wilson.

THE 1987 PRESIDENTIAL ADDRESS—PART 2
A PRELIMINARY ACCOUNT OF THE BEETLES OF THE RSPB LOCH GARTEN RESERVE

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Most of what you heard this evening so far has been about happenings of the past 12 months. I have chosen for the second part of my address to tell you about something which has been going on for the past 10 years — a survey of the beetles of the Loch Garten RSPB Reserve. The work is still going on but I thought it would be of interest at this stage to provide an interim report.

The Loch Garten Reserve

The Loch Garten RSPB Reserve lies at the western edge of the Abernethy Forest — the largest semi-natural woodland area in Britain and one of the major remaining areas of Caledonian pine forest. It is on the Spey Valley, a little to the east of Aviemore. About 80% of the Reserve is pine forest. Besides this, there are Loch Garten and Loch Mallachie, formed as 'kettle-holes' at the end of the last ice-age some 10 000 years ago. There is also an expanse of moorland with some open birch woodland and a very small hill farm. Much of the pine forest has been planted at one time or another but the greater part of the planted area is on the site of earlier pine woods so that the area has probably been the site of pine forest for the last 8000 years. The Reserve lies at an altitude of 200–350 m (600–1000 ft) and is, for Scotland, a relatively dry area with a rainfall of 30–35 inches a year. The air temperature can reach 25°C in summer and −20°C in winter. Frosts have been recorded every month of the year.

The original part of the Reserve, amounting to about 1500 acres, was bought by the RSPB in 1957 to offer protection to the osprey which had returned to breed in Scotland after a lapse of some 50 years. Since then, two major additions have been made — firstly the area to the north west, known as Garten Wood and more recently, an area to the south east known as Tore Hill. These purchases gave the Reserve a total area of nearly 3000 acres.

Besides the osprey, many bird species occur in the area. About 150 species have been recorded of which some 75 species have bred, though not all every year. The birds include Scottish crossbill, our only endemic bird, the crested tit, black grouse and capercaillie. Golden eye nest near the lochs. Red squirrels, roe deer and wood mice are relatively plentiful, otters have bred on the islands in the lochs and wild cat and badger visit the reserve occasionally. There are common frogs, toads and lizards but no snakes have been recorded, as far as I am aware. Besides pine and birch, there are small stands of aspen and juniper and most of the plants characteristic of northern pine-woods and moorland, such as the common wintergreen (*Pyrola minor* L.), chickweed wintergreen (*Trientalis europae* L.), bitter vetchling (*Lathyrus montanus* Bernhauer), cowberry (*Vaccinium vitis-idaea* L.) and stag-horn clubmoss (*Lycopodium clavatum* L.).

The area is rich in insects. I will be telling you something about the beetles shortly. Many local and rare flies are known from around Loch Garten and Loch Mallachie, including at least 25 'Red Data Book' (RDB) species, such as *Blera fallax* (L.) and *Callicera rufa* Schummel. A previously undescribed phorid — *Megaselia gartensis* Disney — turned up during the survey among insects collected by a Malaise trap.

There are records from the Reserve for 19 species of butterfly including dark green, pearl-bordered and small pearl-bordered fritillaries, which are maintaining their numbers, and about 240 moths — some relatively common, some much more local. There are a number of rare aculeate Hymenoptera including *Osmia uncinata* Gerstaecker and its parasitoid *Chrysura hirsuta* (Gerstaecker), both RDB grade 2. Another rare aculeate, *Pemphredon wesmaeli* (Morawitz) makes its nests in the thick bark of standing pine trees. The reserve is home to 12 species of dragonfly including the local *Somatochlora arctica* (Zett.).

Methods employed in the survey

How do you set about recording the beetles of an area? There are many traditional procedures available to the coleopterist — looking under stones, looking under bark and in rotten wood, sweeping vegetation, beating foliage, using a water net and so on.

Searching blossom such as hawthorn is a very profitable way of finding beetles in the south, especially for beetles associated with dead wood but blossom (apart from pine blossom) is rare in pine woods. I have been unable to find hawthorn at Loch Garten but scrutiny of the blossom of rowan (*Sorbus aucuparia* L.) has produced a number of species not encountered elsewhere on the Reserve. Thistles and umbels attract the bee beetle *Trichius fasciatus* (L.) and the rare longhorns, *Leptura sanguinolenta* L. and *Judolia sexguttata* (L.).

Nests of the wood ant (*Formica lugubris* Zett.) have produced 14 species more or less confined to this specialized habitat. The nests also provide a cosy home for the larvae of the northern rose chafer (*Cetonia cuprea* F.) — vegetable debris in the nest provides food, metabolic heat from the ants provides warmth and the aggressiveness of the ants provides security. Another beetle associated with wood ants is *Clytra quadripunctata* (L). The female hangs on to a suitable twig or grass stem immediately above the ants nest and drops her eggs directly into the nest. There, the larvae build a case for themselves like a coleophorid larva, to give protection from the ants.

Nesting boxes for smaller birds have to be cleaned out each winter, in part to get rid of the fleas lying in wait for the birds to return to them next spring. I have had several parcels of old bird's nests sent south by post, with each nest initially securely wrapped in a polythene bag. Unfortunately, lepidopterous larvae in the nests eat holes in the bags allowing fleas to escape. When one parcel arrived by post at the door, it had dozens of fleas crawling and hopping all over the outside. Periodically the ospreys' nest at Loch Garten gets top heavy and has to be pruned in the 'off' season. I have been able to examine portions of it on several occasions and have found a variety of beetles. One these, the staphylinid *Haploglossa picipennis* (Gyll.) has been present in every sample of the nest examined. Sometimes over a hundred have been present in a small portion of nest. Away from nests of birds of prey, the beetle is very rarely encountered. Disused dreys of the red squirrel have provided other species.

The use of beetle traps

It will be obvious that most of the techniques I have mentioned for surveying a beetle fauna require the coleopterist to be on site. I have tried over the past 10 years to spend as much time as I could at Loch Garten but I have found that I rarely could manage more than 7 days all told there in any one year. This led me to think of using trapping techniques which would work unattended or with a minimum of attention from someone on site.

Some of the traps used have been baited using, as bait, anything suitable which came to mind — carrion, fermenting fruit, horse and deer dung and cut grass. Pails with chicken dung have been hung from trees to simulate birds nests. Setting out bunches of flowers such as rowan or umbels produced further species.

Other traps were not baited. Pitfall traps were set out in the pine woods and on the moor. With preservative such as 10% aqueous ethylene glycol, they work unattended for months especially in the winter. Malaise traps and an interception trap have caught flying beetles though it seems that beetles fly much less readily in Scottish pine forests than in southern areas, perhaps because it is simply not often warm enough for this activity. One trapping method which came about accidentally arose from the practice of setting out in the forest white plastic funnels to catch pine seed to monitor the annual seed production. Each funnel has a mesh bag tied to the spout allowing rain water to escape but keeping back pine seeds and beetles! A number of interesting species were caught in this way.

The effectiveness of different types of beetle traps as used out at Loch Garten is shown in Table 1. The carrion traps came out top catching almost one-quarter of the species recorded from the area. There is a predominance of predatory beetle species at Loch Garten compared with Britain as a whole and carrion is a good source of prey for these beetles. The exclusiveness of different traps is illustrated by the data in Table 2. About one-eighth of the total species were caught in one or other type of trap and by no other means throughout the survey.

I should perhaps mention that the rate of capture of beetles in traps is not as great as you might think. In summer, pitfall trapping caught only one or two beetles per cup per week, with the catch falling to under one per week in the winter months. The catch in the Malaise trap at Loch Garten never exceeded a rate of 50 beetles a month

Table 1. Yield of beetle species from different sorts of traps. The total number of species recorded in the survey was 807.

Type of trap	No. of species
Carrion	186
Pitfall	179
Malaise	116
Interception	109
Seed fall	76
Fruit	67

Table 2. Species found only by one collection mode.

Collection mode	No. of species
Carrion trap	36
Pitfall trap	26
Interception trap	5
Malaise trap	11
Seed fall trap	11
	89

Table 3. Beetle species taken in a pitfall survey at Loch Garten, April 1983 – March 1984. The 72 traps remained in the same position throughout.

No. of species	Specimens trapped
49	1
18	2
9	3
8	4
.....	.....
1	169
1	172
1	197
1	319
Total species 117	Total specimens 1944

(under two a day) whereas weekly collections from favourable areas in southern England can be up to twenty times this.

One of the features of insect faunas illustrated by trapping is the relative incidence of different species. Table 3 shows data from pitfall trapping; there were a few really common species but more than 66% of the species caught were represented by no more than three specimens.

I know that some entomologists express abhorrence at the idea of catching insects in traps but there seems to me little difference, at least in principle, between catching moving insects with a stationary device such as a Malaise trap and catching stationary insects with a moving device such as a sweep net. Trapping, indeed, has an important advantage over many methods of surveying insect fauna for, to borrow a term from physiologists, it is 'non-invasive' — the environment is essentially unharmed. Prising a portion of bark off a log permanently destroys that piece of microhabitat for, once it has been removed, you cannot get a piece of bark to go back on again as it was no matter how hard you try, even with hammer and nails. Even lifting a stone puts you in a quandary. If you don't put it back, you leave a micro-habitat exposed. If you do put it back even with care, you invariably squash a wood louse or a spider or destroy a system of micro-tunnels in the soil. Using traps avoids such problems. I would like to see the day when conservation bodies who commission surveys of insects faunas on selected sites encouraged the use of non-invasive collecting methods by supplying investigators with the necessary traps and discouraging the removal of bark and the destruction of rotten timber.

Species diversity

The total number of beetles species recorded from the Reserve was on the last count 807 — about one-fifth of the total for Britain. Of these, all but about 20 were recorded for the first time during the current survey. I suspect, however, that there are still many additions to be made to the list. Firstly, as shown in Table 4, the rate at which species have been recorded over the past 10 years has not yet tailed off. I have sat down and listed all the beetles not yet found at Loch Garten but recorded from nearby sites in Speyside or from similar pine wood areas further away. My 'yet-to-be-found at Loch Garten' list currently exceeds 300 species. Actually, we know so little about so many British beetles that predicting what species will turn up in a particular area is fraught with difficulties. For example, this year (1987) 24 species turned up at Loch Garten for the first time but one-third of these were not on the 'expected' list at the start of the year. Several of the species encountered in this

Table 4. Rate of recording of beetle species at Loch Garten.

Year	Accumulated no. of species
1978	95
1979	334
1980	372
1981	434
1982	517
1983	591
1984	650
1985	712
1986	780
1987	807

Table 5. Frequency of recording different species during 10 year period. A record means the occurence of a species in a Reserve compartment on an occasion. Several examples of a species, occuring in the same compartment at the same time, constitute one record of that species.

No. of records	No. of species
1	292
2	123
3	105
4	51
5	49
6	40
7	31
8	17
9	21
10	18
11 or more	59

The maximum no. of records for a species was 33.

survey do not appear previously to have been found in Highland Scotland and one (*Corticaria abietorum* Motschulsky) is new to Britain.

Secondly, as shown in Table 5, 35% of species were recorded on one occasion only. This, too, suggests that there are many species present on the Reserve but not yet recorded.

My estimate is that the final total of beetle species at Loch Garten will reach 1200, though not necessarilly all will be present simultaneously. The Reserve is a relatively small place and many beetles come and go. They may breed in an area for a year or two and then move on. Nevertheless, I suspect that there are many more resident species to uncover.

The beetle fauna of Loch Garten compared with elsewhere

To provide an overall view of the sort of beetles which occur at Loch Garten and to enable comparisons to be made with beetle faunas elsewhere, I have provided in Table 6 a breakdown of various beetle faunas into major groups. The largest group in Britain are the staphylinids (rove beetles); next come the curculionids (weevils), then the carabids (ground beetles) and then the chrysomelids. Together, these four

Table 6. Major groups of beetles at Loch Garten compared with those elsewhere. Data represent the percentage of species in each family.

Family	Britain	Loch Garten	Richmond Park	Box Hill	Outer Hebrides	Shetlan
Carabidae	9.0	7.8	7.8	7.8	12.9	16.1
Dytiscidae	3.2	4.2	3.1	0.0	8.2	8.3
Staphylinidae	25.3	37.8	33.7	22.4	37.2	37.5
'Heteromera'	4.4	1.9	5.3	5.4	0.2	0.0
Chrysomelidae	6.5	3.2	3.7	13.0	3.9	2.1
Curculionidae	13.0	6.7	6.4	17.6	8.4	9.2
Scolytidae	1.6	1.7	1.3	1.0	0.0	0.0
Total species (approx.)	4000	800	1000	650	600	350
Source of data	1	2	3	4	5	6

Sources: 1 Pope (1977); 2, this survey; 3, Hammond, P.M. & Owen, J.A. (unpubl.); 4, Owen, J.A. (unpublished compilation from published and published records); 5, Waterston *et al.* (1981); 6, Bacchus (1980).

families account for more than 50% of the British beetle fauna. The staphylinids, the carabids and the dytiscids are mainly predatory — the weevils, the chrysomelids and scolytids are almost exclusively phytophagous.

Comparing the Loch Garten data with that for Britain as a whole, there is at Loch Garten an excess of staphylinids and water beetles and deficits of weevils, chrysomelids and 'Heteromera'. Almost certainly the reason for these differences is the relatively small number of flowering plants on the reserve, with consequently a diminished proportion of the phytophagous groups, and automatically an increased proportion of the predatory groups. The detritus associated with carrion and with the nests of birds and mammals provides a ready home for the smaller invertebrates, including insect larvae, on which the predators live. The British carabids are also mainly predatory but they are essentially an insect group of open country and this probably is the reason why they fail to show at Loch Garten the excess shown by staphylinids. The 'Heteromera' also are down, for while they are chiefly insects of dead wood, they are associated mainly with deciduous trees rather than pine trees.

Comparing the Loch Garten beetle fauna with that of other parts of Britain we find (Table 6) that the Hebrides and Shetland similarly show excesses of staphylinids and water beetles but in these two areas, carabid species are relatively more numerous, probably because there is more open country and, in particular, coastal habitats. Box Hill, in contrast, has more phytophagous species and fewer staphylinids. Richmond Park is somewhat anomalous as a southern area in that it has relatively few flowering plants and, consequently, relatively few phytophagous species.

Now I don't want to give you the impression that Caledonian pine wood beetles are all aggressive predators. There is the mainly phytophagous group of native pine-wood species, beetles which are — or perhaps more correctly were — mainly confined to long-established native pine woods. I say 'were' because many beetles originally found only in native Scottish pine-woods are progressively taking to plantations, including those in the south of England. Scots pine grows relatively quickly, rots relatively quickly when it falls or is felled and most plantations have a fair amount of dead wood. Native pine-woods are a romantic idea to naturalists but they appear to be nothing very special to most pine wood beetles, many of which take quite readily to plantations. This makes compilation of a list of native pine-wood

beetles a matter for debate. Most people would agree, however, that less than 50 species warrant the term 'native pine-wood' beetle. I have a working list of 44 species of which 33 are recorded from Loch Garten, moreover, more than half of these are to be found in the section known as Garten Wood which is essentially a plantation, though in part planted on the site of an older natural pine wood. Another six pine-wood beetles are recorded from other nearby sections of Abernethy Forest and almost certainly wait to be discovered in the Reserve, leaving only five native pine-wood beetles with no suggestion that they may be present in the Reserve.

I should make the point that not all native pine wood beetles are actually phytophagous. There are pine associated lady-birds which eat aphids, pine associated Cryptophagidae living on moulds and, as I have mentioned, beetles which live in nests of creatures such as birds or wood ants living in pine woods.

Loch Garten as a site for nationally important beetles

It is fashionable, these days, to compute the entomological value of an area in terms of the number of rarities present, especially now that the *British Red Data Book No. 2 Insects* has been published. How does Loch Garten score? Not, I may say, all that well, as is indicated by the data in Table 7. Out of nearly 500 beetle species awarded RDB status, only 15 have been recorded for Loch Garten. The reason for the relative deficit of RDB beetles at Loch Garten lies, perhaps, in the fact that there are relatively few RDB species dependent on conifers of any type. Only 16, i.e. 3.7% qualify. Ironically, there are more conifer-dependent RDB species in the Windsor area than have yet been recorded at Loch Garten.

Another classification of beetles used for scoring areas is their ability to act as indicators of ancient pasture-woodland. Here again, Loch Garten does not score highly, as is shown in Table 8.

I should like to finish by referring to a few pine-wood beetles, their associates and something of their biology. One of the most spectacular, is the longhorn, the timberman (*Acanthocinus aedilis* L.) (Fig. 1). The larvae develop immediately beneath the bark of pine logs, burrowing deeper into the wood when they come to pupate and plugging the hole behind them with thin strips of wood obtained while excavating the pupal chamber. The longhorn, *Rhagium inquisitor* (L.) (Fig. 2) has

Table 7. Nationally rare beetles at Loch Garten compared with those elsewhere. Data represent the no. of 'Red Data Book' species at each locality.

Grade	Britain	Loch Garten	Windsor	Richmond Park	Box Hill	Outer Hebrides	Shetland
RDB 1	146	0	28	3	9	1	0
RBD 2	83	5	19	9	2	0	0
RBD 3	262	10	37	15	22	5	3
Totals	491	15	84	27	33	6	3
Source of data	1	2	3	4	5	6	7

Sources: 1, Shirt (1987); 2, this survey; 3, Owen, J.A. (unpublished compilation from published and unpublished records); 4, Hammond, P.M. & Owen, J.A. (unpubl.); 5, Owen, J.A. (unpublished compilation from published and unpublished records); 6, Waterson *et al.* (1981); 7, Bacchus (1980).

Table 8. Ancient pasture-woodland species at Loch Garten compared with those elsewhere. Data represent the no. of indicator species (Harding & Rose, 1987) at each locality. Sources of data as in Table 7.

APW category	Britain	Loch Garten	Windsor	Richmond Park	Box Hill	Outer Hebrides	Shetland
1	69	0	52	23	4	0	0
2	34	3	24	10	7	0	0
3	90	16	47	64	29	1	0
Totals	193	19	123	97	40	1	1

larvae following the same life style but instead of burrowing into the wood to pupate, the larvae surround themselves for protection with a kind of corral also made from thin strips of wood. Subcortical beetle pupae need protection because of the presence in northern pine woods of the fly *Xylophagus cinctus* (Degeer) whose larvae (Fig. 3) do not live up to its name but rather live under bark of fallen pine trees or their branches preying on the pupae and larvae of longhorn and other beetles.

Another beetle developing immediately under bark is *Pytho depressus* (L.), a peculiarly flattened beetle with flattened larvae as an adaptation to living under bark. Before pupating, the *Pytho* larva makes a really stout 'fence' around itself (Fig. 4), presumably also as protection against the dreaded *Xylophagus* larva.

Longhorn larvae play an important role in the natural recycling of timber. Larvae of *Rhagium bifasciatum* (F.) are content to live in dead heart wood — not so nutritious as the subcortical layers, but perhaps a safer environment against the predations of *Xylophagus*. Holes made by emerging adults allow fungal spores to gain access to stumps facilitating recycling of the timber.

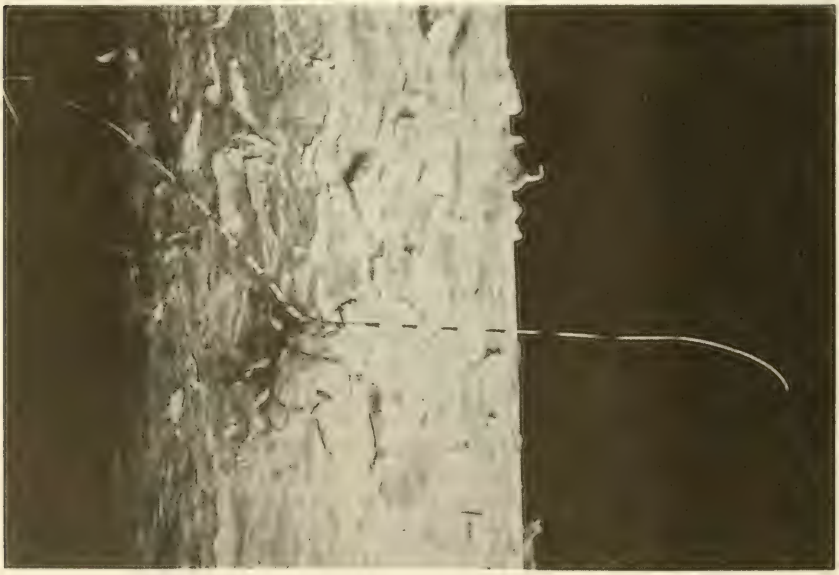

Fig. 1. The timberman *Acanthocinus aedilis* (L.), showing antennae extended.

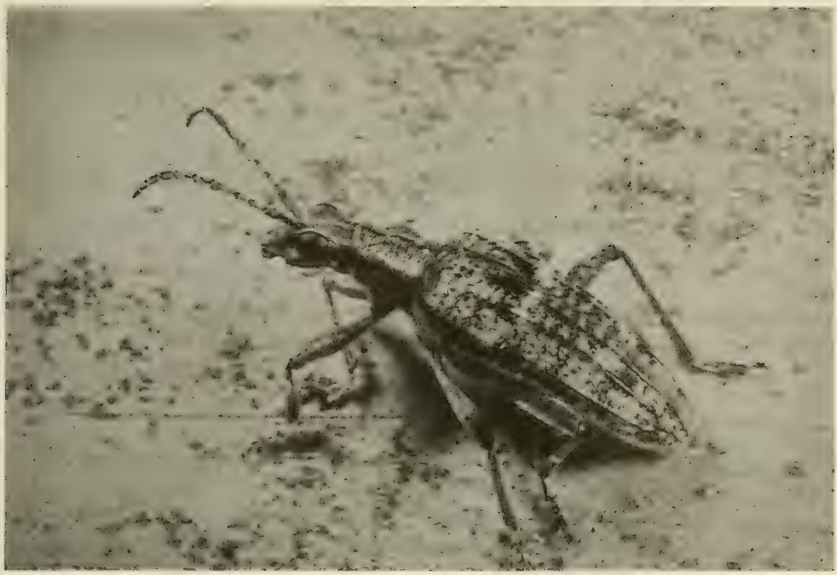

Fig. 2. *Rhagium inquisitor* (L) on pine log.

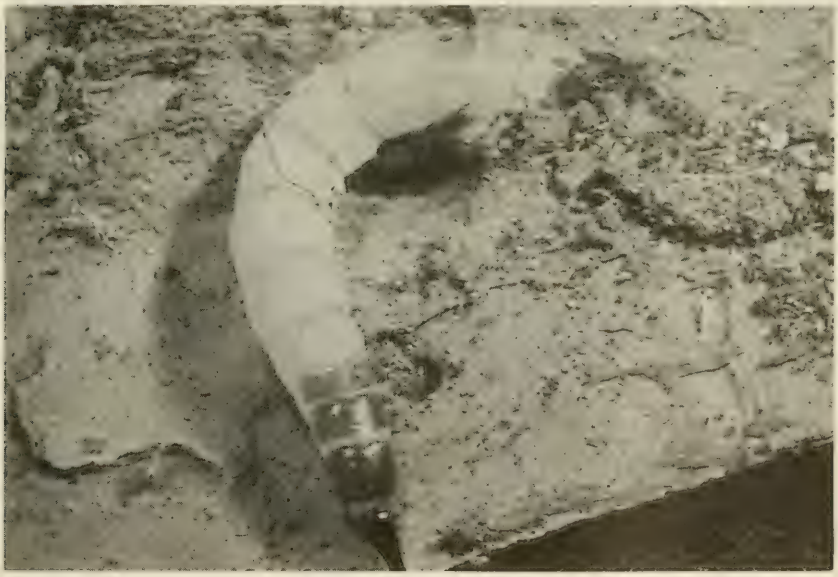

Fig. 3. Larva of *Xylophagus cinctus* Deg. showing the 'beak' which it inserts into the soft skinned larvae of longhorn and other subcortical species.

Fig. 4. Pupal chamber with adult of *Pytho depressus* (L.) revealed by removing bark from a pine log; the protective 'corral' was made by the larva.

Fig. 5. The lycid, *Dictyoptera aurora* (Herbst).

Fig. 6. The clerid *Thanisimus formicarius* (L.) looking for scolytids.

In case you come to think that pine wood beetles lack colour, the bright red lycid *Dictyoptera aurora* (Herbst) (Fig. 5) may be seen sometimes flying among the pine trees in the evening sunshine. It is a close relative of the glow-worm as can be seen from the appearance of its larvae, which live in rotten pine. Also brightly coloured are the pine lady birds, such as *Neomysia oblongoguttata* (L.), living on pine aphids, the wood ant associate *Clytra quadripunctata* (L) and the clerids *Thanisimus formicarius* (L) (Fig. 6) and *T. rufipes* (Brahm) which mimic wood ants while they run over pine bark in the sunshine looking for lunch in the form of the bark beetles. More sombre is the elaterid *Selatosomus impressus* (F.) whose immature stages have not yet been discovered — a challenge for pine wood entomologists. I suspect it may live in the soil at the roots of pine stumps.

Now if I have counted properly, I still have 792 beetles to deal with. I think, however, that I have said enough at this point to give you some idea of the RSPB Loch Garten Reserve and its flora and fauna and in particular its beetles. I will tell you, if you wish, about the rest of the beetles on some other occasion.

As the retiring President, there remains one more thing for me to do. As the Chinese might say, we have tonight come to the end of the 'Year of the Beetle' and are about to enter the 'Year of the Fly'. It is my most pleasant duty to welcome into office your new President. I wish him, his Office bearers and all the Society's members every good wish for the forthcoming season.

Acknowledgements

You cannot carry out a survey such as I have described on your own. No one has helped more in this work than the warden of the Reserve, Mr Stewart Taylor who has

never failed to provide information and guidance for my explorations of the Reserve. He has looked after many of the traps, collected material from nests of birds and mammals and, not infrequently, caught the beetles themselves. I should express thanks also to the many others who have helped me, including my wife, who many times has trudged round the forest in the snow helping me set various traps and to those many colleagues who have helped me look for beetles on the Reserve or have provided me with lists of their own captures. I had much help too from my son David with the production of the photographs. Last but not least Mr A.A. Allen, Dr M. Cox, Mr P.M. Hammond, Mr C. Johnson and Dr M. Luff have each helped me more than once in the identification of some of the beetles discovered and I thank them for their assistance.

Appendix: *Material and methods*

The Malaise trap was of standard design as supplied by Marris House Nets, Richmond Park Avenue, Bournemouth BH8 9DR.

The interception trap comprised a piece of black nylon net 2 m long by 1 m high, held vertically between two poles, with its lower edge just touching the rims of flat plastic trays holding water to which had been added a little household detergent.

The carrion trap was home built, comprising an open wooden box 65 × 45 × 15 cm, with a hole 6 cm in diameter in the floor at one end below which was fitted a plastic jar containing some 70% ethyl alcohol. The trap was charged from time to time with whatever carcases were available, mostly of rabbits or hares which had been victims of road traffic.

The fruit trap comprised a plastic net bag holding about 1 litre of fruit residues suspended over a plastic funnel 20 cm in diameter, to which was attached a plastic jar containing some 70% ethyl alcohol. The fruit residues were from domestic jelly making, mainly of plum and apple, fortified prior to use with cane sugar and baker's yeast.

Pitfall traps comprised slightly tapering plastic drinking cups 8 cm deep which were charged with different materials at different times but mainly with 10% aqueous ethylene glycol.

The seed fall traps were semi-translucent white plastic funnels 25 cm in diameter to the stem of which was attached a small net bag to catch falling pine seed. They were set out just above ground level beneath mature pine trees.

Beetle records were kept and analysed on a home computer. Each record comprised the beetle species (in the form of species number), the date, the Reserve compartment, the number of individuals taken or observed on that occasion, the mode of capture, the recorder and a comment up to 64 characters long.

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1988 ANNUAL EXHIBITION
Imperial College, London SW7 — 19 November 1988

After the success of last year, any 'teething troubles' had been overcome, and the second year at Imperial College was an even greater success. This year 285 people signed the attendance book (compared to 207 last year) and 170 exhibits are detailed below (compared to 164 last year). Worries over the lighting were ill-founded and despite being later in the year than normal, everything was adequately lit, bright and clear.

Those specimens selected for photography are reproduced here on two colour plates, along with the plates taken at the 1987 Exhibition.

At the Annual Dinner in the evening, 66 members and guests had a very congenial time.

The following account of exhibits has been compiled by R.S. Tubbs (British Butterflies), B.F. Skinner and B.K. West (British Macrolepidoptera), J.M. Chalmers-Hunt (British Microlepidoptera), B. Goater (foreign Lepidoptera). P.J. Chandler (Diptera), R.A. Jones (Coleoptera and Hemiptera), A.J. Halstead (Hymenoptera and other orders) and E.S. Bradford (illustrations). The colour plates are taken from photographs by D.E. Wilson. The exhibit of the Nature Conservancy Council, covering all orders, is reported separately on page 58 for convenience.

British Butterflies

There were rather fewer exhibits of British butterflies in 1988 than there had been in recent years. This was undoubtedly due to the very poor weather conditions in the summer. There had been very little sunshine and it had rained nearly every day from May 21st to July 1st. The month of July was the wettest in England and Wales since 1936 and there was some rainfall in London on every day but one. These conditions made it very difficult for those who were trying to get their F_1 and F_2 generations to lay eggs. Frequently, if no eggs are laid within 4 or 5 days after pairing, the females are reluctant to start laying. Even more than usual credit is therefore due to those who brought exhibits showing the results of breeding from aberrations and there are now many members who work very hard in this form of research.

Bailey, K.E.J. — An impressive exhibit illustrating a further year's work showing the results of temperature shock experiments during the early pupal life. This part of the exhibit included:- (1) *Ladoga camilla* L. An unusual result, all from one group of cold-shocked pupae. A male ab. *latealba*, showing an increase in the white pattern dimension and also two ab. *nigrina* Weymer, which is the more usual result of cold shock. (2) *Polygonia c-album* L. A similar case to the above, with one specimen showing a reduction of the black pattern while the second specimen was heavily suffused with black of the form ab. *reichstettensis* Fettig. (3) *Nymphalis polychloros* L. ab. *testudo*, a form which is heavily suffused with black. (4) *Vanessa cardui* L. A curious modification of the rare ab. *elymi* Rambur. This was indeed an extreme aberration.

The second part of the exhibit included:- (1) *Pararge aegeria* L. showing the results of crossing the British subspecies *tircis* Butler (=*egerides* Staudinger) with Spanish *aegeria* L. Three specimens from the F_2 generation showed segregation of the original characters. The *tircis* form alone appears to be linked with seasonal

melanisation. (2) *Aphantopus hyperantus* L. A wild caught homoeotic specimen showing a linear distribution of eye spot colour.

Barrington, R.D.G. — Specimens taken or bred from Dorset, Avon, Wiltshire and Somerset during 1988. An especially interesting part of the exhibit included a range of five aberrations of *Maniola jurtina* L. all taken in one North Dorset hay meadow on two dull mornings in July. Aberrations included:- (1) An extreme female ab. *fracta* Zweigelt with a strip of the dark colour going right across the pale band. (2) A female ab. *postfulvosa* Leeds, with a dark suffusion covering the hindwings. This is a scarce form in the English race, but occurs more frequently in the Irish (ssp. *iernes*) Scillonian (ssp. *cassiteridum*) and western Scottish (ssp. *splendida*) races. (3) A female ab. *crassipuncta* Leeds, with very large eye spots in the fore wings. (4) ab. *anti-excessa* Leeds with two additional small spots in the fore wing. (5) A female showing homoeosis with orange splashes on the underside of the left hindwing.

Also exhibited was a bred male *Quercusia quercus* L. (ex. North Dorset) with extra white scaling outside the white band, transitional to ab. *latefasciata* Courv. A fine male *Coenonympha pamphilus* L. ab. *albescens* Rob taken in Somerset was shown, which had the tawny ground colour replaced by white. What a pity it was not a female, as I am not aware of the genetics of this form having been fully studied. Also exhibited was a delightful painting of *Apatura iris*. Barrington's paintings are now adding a new pleasure to our exhibitions.

Beccaloni, G.W. — British butterfly aberrations taken in 1987/88 which included two *Aphantopus hyperantus* L.ab. *lanceolata* (not very extreme) taken in Surrey. This aberration is very variable and the recessive gene which causes it seems to be subject to much modification. Also exhibited were four female *Lysandra coridon* Poda with varying degrees of blue scaling but not *semi-syngrapha* Tutt. This occurrence of limited blue scaling in the female is not uncommon.

Farwell, Mr and Mrs P.G. — *Aglais urticae* L. An extreme melanic aberration bred in classroom conditions at Uphall Primary School, Ilford, Essex by Mrs Carol Farwell. This was the only aberration from a brood of 80 larvae found at Custom House, E15. This would suggest that it was the result of environmental conditions.

Fry, R.A. — A male *Colias crocea* Geoffroy taken at Brightlingsea, Essex in August 1983, the colour of the yellow being similar to that of *Colias australis* Verity. The ground colour of this species is subject to considerable variation in the female (from a stock of ab. *helice* I have bred two in which the ground colour is half-way between *helice* and the normal type colour) but colour variation in the male is very rare.

Harmer, A.S. — *Plebejus argus* L. ab. *flavuslunulatus* Tutt, with very pale spots on the underside and *anticoradiata* Tutt with extended black spots on the underside forewing. *Lysandra coridon*, one ab. *tithonus* Meig. and one ab. *fowleri* South bred by the exhibitor from original R. Tubbs/R. Revels/A.S. Harmer stock. *Boloria euphrosyne* L. An extreme melanic female—ab. *edna* Lobb with almost totally black hindwings. *Hipparchia semele* L. a small specimen of a female ab. *monocellata* Lempke taken in Portland, Dorset. This aberration is caused by a simple recessive gene which suppresses the eye spot, but it is only seldom that this spot is totally missing. *Lasiommata megera* L. ab. *quadriocellata* Oberthur with double spots in the forewing. It is noteworthy that breeding from specimens with large eye spots produce an F_1 generation with large eye spots and an F_2 generation with even larger spots. *Coenonympha pamphilus* L.—a male specimen with a small *homoeosis* on the left hindwing underside, consisting of of a small spot of orange.

Herbert Art Gallery and Museum—As a single item in a large exhibit, a specimen of *Pieris rapae* L. was shown which had a ground colour with a blue tinge

resembling that of ab. *coerulea* Gardiner of *Pieris brassicae* L., taken Bishop's Hill, 3.viii.1988, coll. R.J. Barnett and D.J. Mann.

JONES, A.M.—aberrations of British butterflies captured and bred in 1988.

(1) A whole drawer of *Pararge aegeria* L., the results of breeding to four generations from a male ab. *antico-excessa* Lempke. This aberration has increased pale spots. The original male aberration was captured on 20.vi.87 and was paired with a fresh wild caught female on 22.vi.87. The F_1 generation emerged in August and consisted of 17 specimens—12 aberrations and five type. Pairings were obtained but most of the ova were infertile, so that only 10 specimens were reared in the F_2 generation. Of these eight were aberrations and two type. The F_3 generation consisted of 32 specimens—23 aberrations and nine type, all emerging January 1988. Of the 114 specimens reared in the F_4 generation in April/May 1988, 74 were aberrations and 40 were type. Many pairings were taken but fertility was poor and the larvae which hatched were very weak and died during the first and second instar. Although some of the best aberrations were used for pairing in each generation, the resulting specimens did not get much more extreme than the original male.

(2) The second drawer shown by this exhibitor included the following aberrations. *Celastrina argiolus* L. three very fine females with dark suffusion on the hindwings, bred ex wild larvae September and October 1988. *Polygonia c-album* L. ab. *obscura* Closs captured 30.vii.88. This specimen very much resembled those produced by K.E.J. Bailey by temperature shock treatment. *Argynnis paphia* L. a most unusual bred female aberration with pinkish brown replacing the normal green on the underside. It apparently emerged in March so one wonders whether it was subject to unusual conditions. *Maniola jurtina* L. three wild caught females captured in the same Surrey locality during July. (a) ab. *antiparvipuncta* Leeds underside with very tiny slightly streaked eye spots, with the pupils missing 21.vii.88. (b) ab. *postexcessa* Leeds. An upperside with two additional spots on each hindwing. This rather insignificant aberration is very rare. (c) ab *fracta* Zweigelt captured 30.viii.88. A strongly marked female, one of several taken. Larvae from the other females captured are currently overwintering.

KNILL-JONES, S.A.—*Pararge aegeria* L. taken at the very late date of 11.xi.88.

MCNAMARA, D.S.K.—*Lycaena dispar batava* Oberth. Although not a British butterfly, it is perhaps relevant here to mention this very striking exhibit. A quite spectacular extreme ab. *striata* underside was shown. The upper side was normal. It occurred in the second brood in September 1986. The stock, which has been bred in captivity for about 6 years, originally came from West Germany.

NATIONAL COLLECTION OF BRITISH LEPIDOPTERA—This incorporates the Rothschild–Cockayne–Kettlewell collection. Two drawers of *Nymphalis io* L. were exhibited illustrating a wide range of variation in the extent and nature of the spots. Specimens included *exoculata* Weymer, *belisaria* Oberth, *semi-ocellata* Frohawk and *nigriocellata* Reuss. In one very extreme specimen the hindwing ocelli were entirely replaced with black suffusion while in the forewings the ocelli were almost covered with a similar suffusion. No indication is given as to the cause of these aberrations, although in some cases temperature during the pupal stage would appear likely.

NASH, S.—A dark specimen of *Pieris napi* L. taken at Inverloch, Ross. 4.vii.88. This somewhat resembled *P.napi* fm *bryoniae* Oberth which inhabits the Alps and other mountainous regions of Europe. *Coenonympha tullia* L. a series from Inverpolly, Ross.

PAYNE, J.—*Aglais urticae* L. ab. *semiichnusoides* Pronin. This emerged 7–8 days after the rest of the brood had emerged. In his book *Aberrations of British butterflies*, A.D.A. Russwurm (p. 41), speaking of the late emergence of a specimen of the same

aberration suggests that "this late emergence can be explained by the fact that extreme aberrations are often weak and do not always succeed in breaking open the pupa casing".

RUSSWURM, A.D.A.and MIDDLETON, H.G.M.—An exhibit which included the following two butterflies whose pupae had been subjected to heat treatment similar to that used by K.E.J. Bailey. *Vanessa atalanta* L. transitional to ab. *klemensiewiczi* Schille, bred Brockenhurst 10.x.88 (A.D.A.R) and *Nymphalis polychloros* L. ab. *testudo* Esp., a very large specimen with extreme black suffusions, bred Brockenhurst 6.vii.88 (A.D.A.R.) *Melitaea cinxia* L. two underside aberrations, one *transformis* all wings, the other with reduced markings on hindwings, bred H.G.M.M. Boldre ex I.o.W June 1988.

SALMON, Dr M.—An exhibit of butterflies selected from various collections which included the following very remarkable specimens. *Anthocharis cardamines* L. halved gynandromorph taken by P. Bond near Aylesbury, 13.v.88. *Argynnis paphia* L. three halved gynandromorphs one of which taken in the New Forest 9.vii.61 was fm *valezina* on one side, *Quercusia quercus* L., a gynandromorph taken in Monks Wood 10.vii.1916 (ex. L.W. Newman collection).

STANDING, P.A.—*Nymphalis polychloros* L. Three male specimens bred July 1988. Original stock from K.E.J. Bailey via R.E. Stockley. The strain has been inbred for at least 3 years, possibly longer. One showed slight variation in forewing markings, the second greater forewing variation plus large radiating dark bands on the hindwings while the third extreme and very fine specimen suffused with black approached ab. *testudo* Esp.

STOKES, D.—*Plebejus argus* L. ssp. *caernensis* Thompson, a small series taken from the Great Orme in North Wales. Although this is generally considered a dwarf race, there was considerable variation in the size of the specimens.

WEDD, D.—Butterflies from the Island of Lundy, Bristol Channel. *Lycaena phlaeas* L. showing the range of shading and ground colour in the island race, *Maniola jurtina* L. a form very similar to ssp. *cassiteridum* (Isles of Scilly) and *Hipparchia semele* L. illustrating a considerable reduction in the size of this species on the island over the last 30 years, possibly due to food plant scarcity due to overgrazing by sheep.

YOUNG, L.D.—*Polyommatus icarus* Rott. ab. *basielongata* B. & L., Hants 13.viii.84 and ab. *discoelongata* B. & L., Surrey 12.vi.85 and a selection from their crossbred offspring obtained in 1988. For the third year in succession this exhibitor has produced an outstanding exhibit based on these aberrations, the results of skill and hard work. The gene for ab. *basielongata* is a definite dominant, but that for ab. *discoelongata* is a recessive with variable expression. The bred specimens included a halved gynandromorph with the right upperside female, in which the black from the margins spread across the blue. On the underside these wings were both *discoelongata* and *basielongata*. Another drawer showed a spectacular female *P. icarus* underside aberration taken in Hampshire 13.viii.76 and a similar aberration bred 20.vii.88 from a typical female captured on the North Downs 1.vi.88. Both these specimens had very extended black markings. There is no accounting for this, but the stock is being maintained for research.

BRITISH MACROLEPIDOPTERA

AGASSIZ, Rev. D. — *Alcis repandata* L., an extreme form of ab. *conversaria* Hübn. from Churchill, Som., 27.vi.88.

BAKER, P.J. — Specimens included *Drymonia ruficornis* Hufn. ab. *delineata*

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

Plate II. ANNUAL EXHIBITION, 24 October 1987

1: *Aplota palpella* Haw., Savernake Forest, Wilts., bred, vii.87, P.H. Sterling. 2: *Lobesia botrana* D. & S., West Wood, Knotting, Beds., 21.viii.87, D.V. Manning. 3: *Cydia corollana* Hb., Burnt Oak, Hamstreet, Kent, 26.v.82, P.J. Jewess. 4: *Monochroa* undescribed species, East Mersea, Essex, bred 6.vi.87, E.C. Pelham-Clinton. 5: *Cydia pactolana* Zell., Worley's Wood, Melchbourne, Beds., 22.vi.86, D.V. Manning. 6: *Hemerobius fenestratus* (Tjeder), Etchden Wood, Kent, 9.ix.86, C. Plant. 7: *Xestia triangulum* Hufn., Hoads Wood, Charing, Kent, 28.vi.87, J. Clarke. 8: *Orthosia gothica* D. & S., Faringdon, Oxon., 16.iv.87, M. Corley. 9: *Pseudoips fagana* F., Friston Forest, East Sussex, 12.vii.86, C. Pratt. 10: *Dolichovespula media* Retz., RHS Garden, Wisley, Surrey, 27.vii.87, A.J. Halstead. 11: *Luperina nickerlii* Frey., Tillingham, Essex, 21.viii.87, B.F. Skinner. 12: *Agrotis clavis* Hufn., Addington, Surrey, 1.vii.87, B.F. Skinner. 13: *Nephrotoma crocata* (L.) Chobham Common, Surrey, 15.vi.84, S.R. Miles. 14: *Stratiomys chamaeleon* (L.) Cors Erddreiniog, Anglesey, 11.vii.87, I. Perry. 15: *Philanthus triangulum* (F.), Nacton Heath, Suffolk, 15.viii.76, M.E. Archer.

Photo: D.E. Wilson.

1	2	3	4
5	6	7	
8	9	10	
11	12	13	
14	15		

Plate III. ANNUAL EXHIBITION, 19 November 1988

1: *Hylaea fasciaria* L., Moulin Huet, Guernsey, 9.x.88. G. Higgs. 2: *Gymnoscelis rufifasciata* Haw., Wyre Forest, Salop., 18.vi.84, C. Plant. 3: *Chrysotoxum vernale* Loew, Oaker's Wood, Dorset, 17.v.88, M.J. Parker. 4: *Chrysotoxum octomaculatum* Curt., Hankley Common, 28.v.88, S. Miles. 5: *Epirrita dilutata* D. & S., Bedford Purlieus, Northants., 20.x.87, M. Parsons. 6: *Acronicta euphorbiae* D. & S., Aude, France, N. Hall. 7: Unnamed new genus of tineid, Brunei, G.S. Robinson & D.J. Carter. 8: *Tyria jacobaeae* L., Strood, Essex, vi.87, B. Goody & J. Young. 9: *Ematurga atomaria* L., Beeley Moor, Derbyshire, 26.v.88, A. Jenkins. 10: *Orthosia incerta* Hufn., Uffington, Oxon., 16.iv.88, E.W. Classey. 11: *Apamea sordens* Hufn., Erdington, 19/20.v.84, N.M. Hall. 12: *Semiothisa notata* Hb., Glen Strath Farrar, Inverness-shire, 19.vi.88, M. Young. 13: *Agrotis exclamationis* L., Addington, Surrey, 19.vi.88, B. Skinner. 14: *Arctia caja* L., Northumberland, 8.vii.88, R. McCormick. 15: *Biston betularia* L., Colchester, Essex, vii.88, B. Goody & J. Young.

Photo: D.E. Wilson.

Lempke from Thorpe, 3.v.70, two unusual forms each of *Alcis repandata* L. from Balmoral and Finzean, and *Thera britannica* Turner from the New Forest and Swanage, and a series of bred *Anticollix sparsata* Treits. from larvae found in Windsor Forest, 15.ix.87.

BARRINGTON, R. — *Malacosoma neustria* L. ab. with reduced and darkened central band of forewing, and dark basal area of hindwing, bred from Dorset larva, 1988, and *Plusia iota* L. ab. *percostationis* Treits. (gold spots joined to form a Y mark).

BECCALONI, G.W. — Hybrid hawk moths comprising *Smerinthus ocellata* L. × *Laothoe populi* L. (including an intersex), two specimens of the difficult *Mimas tiliae* L. × *S. ocellata* L. and two males of *Hyles gallii* Rott. × *H. euphorbiae* L.

BLAND, K.P. — two species new to the Isle of Coll: *Epirrhoe galiata* D.&S. and *Chloroclystis rectangulata* L., both taken at light at Arinagour, 15/16.vii.88.

BRETHERTON, R.F. — *Chrysodeixis chalcites* Esp. (or perhaps *C. acuta* Walker) from Bramley, Surrey, 10/11.xi.88 and a specimen of *Orthonama obstipata* F., also from Bramley, 16/17.x.88.

BRITTON, M. — Bred specimens of *Xestia agathina* Dup. (with notes on breeding) and *Photedes elymi* Treits. from a new Yorkshire locality.

BRITISH MUSEUM (NATURAL HISTORY) — Four drawers from the RCK Collection showing variation in *Xestia xanthographa* D.&S. and *Autographa gamma* L. including a banded form of the former from Hoy, Orkney.

CLASSEY, E.W. — Specimens from Uffington, Oxon. including an albino *Orthosia incerta* Hufn. 16.iv.88, two colour forms of *Laothoe populi* L., a very rare and apparently un-named form of *Autographa gamma* L. in which the upper part of the Y mark is missing, and *Agrotis exclamationis* L. ab. *plage* Steph. 2.ix.87.

COOK, R.R. — Various species taken or bred recently, including *Photedes morrisii* Dale and *Cosymbia pendularia* Clerck from Dorset, *C. linearia* Hübn. ab. *cingulata* Lempke from Buckinghamshire and *Hypena tarsicrinalis* Knoch from Suffolk.

CORLEY, M.F. — From South Harris, Outer Hebrides, August 1988 the following: *Aporophyla lueneburgensis* Freyer, *Amphipoea crinanensis* Burr., *A. fucosa* Freyer and *Epirrhoe alternata obscurata* South.

CRONIN, A.R. — Both living and set specimens of *Panaxia dominula* L. and an intersex of *Lasiocampa quercus* L.

DOBSON, A.H. — *Mythimna favicolor* Barr. taken at Sparsholt College, Hants, 14 miles inland, 9.vii.88 and an aberration of *Xanthorhoe fluctuata* L.

DYKE, R. — *Enargia paleacea* Esp. from the Forest of Wyre, *Sesia apiformis* Clerck from Barton Mills and a number of species from Scotland including *Orthonama vittata* Borkh. and *Perizoma blandiata* D.&S.

FOSTER, A.P. — Moths from Norfolk in 1988 included *Pelosia obtusa* H.-S. from Haw Hill Nature Reserve, 16.vii.88 (a new locality), *Senta flammea* Curt. from Woodbastwick, 2.vii.88 and the migrants *Chrysodeixis chalcites*. Esp. and *Orthonama obstipata* F. from Winterton, 23.x.88.

FRY, R.A. — A series of yellow forms of *Arctia caja* L. originating from Great Bromley, Essex.

GOODY, B. AND YOUNG, J. — A number of species from Colchester and elsewhere along the Essex coast; a gynandromorph of *Angerona prunaria* L. f. *corylaria* Thunb. from Colchester, 15.vii.87, a whitish *Pseudoips fagana* F. from Colchester, 17.vi.85, *Orthosia opima* Hübn., often common in neighbouring coastal areas, *Tyria jacobaeae* L. with extensive dark shading from Mersea Island, *Meganola albula* D.&S. which is now seen more often, an unusually marked *Biston betularia* L. with a greyish ground colour, *Mythimna favicolor* Barr. from Mersea Island and *Agrotis ripae* Hübn. taken at St. Osyth.

HALL, N. — An exhibit included two rare migrants, *Agrotis crassa* Hufn., from Portland, 18/19.viii.87 and *Macdunnoughia confusa* Steph., Wyke Regis, 22/23.ix.88. Among the other species exhibited were *Hydriomena ruberata* Frey. and *Eilema sororcula* Hufn. from Holt Forest, Dorset, 21.v.88; *Cleora cinctaria* D.&S. from Great Ovens Hill, Dorset, 7.v.88 and a dark form of *Acronicta leporina* L. from Birmingham.

HENWOOD, B. — Larvae and cocoons of *Lycophotia porphyrea* D.&S. with a note to state that the final instar larvae did not feed.

HERBERT ART GALLERY AND MUSEUM — Some rare and very local species from Warwickshire comprising *Euxoa obelisca* D.&S., Hillmorton, 3.ix.86, *Photedes fluxa* Hübn., Ryton Wood, 10.viii.88, *Archanara dissoluta* Treits., Coombe Abbey, 8.viii.88, *Scotopteryx bipunctaria* D.&S., Bishop's Hill, 3.viii.88, *Adscita statices* L., Hillmorton, 2.vii.88, *Bembecia scopigera* Scop., Stockton, 19.vii.88 and two species new for the county — *Synanthedon myopaeformis* Borkh. taken at Shipton-on-Stour, 2.vii.88 and *S. formiciaeformis* Esp. from Brandon Marsh, 7.vii.86.

HIGGS, G.E. — A selection of moths from Guernsey which included *Ennomos quercinaria* Hufn., *Thera cupressata* Geyer, *Leucochlaena oditis* Hübn., *Trigonophora flammea* Esp. and *Hypena obsitalis* Hübn.

HORTON, G.A.N. — Bred specimens of *Chrysodeixis chalcites* Esp. from Crowbridge, Glam., 1979. A comprehensive exhibit of scarce and local species in Monmouthshire included the following species taken in the county for the first time: *Epirrita filigrammaria* H.-S., *Euxoa tritici* L. from Llansoy, 4.ix.86, *Lithophane leautieri* Boisd. from Usk, 17.x.79, *Eumichtis lichenea* Hübn. from Usk, 30.ix.83, *Photedes fluxa* Hübn. from an established colony, *Earis clorana* L. from Usk, 26.vi.83, *Schrankia taenialis* Hübn. from S. Gwent 2.viii.82, *S. turfosalis* Wocke from Trelech, 24.vii.86. Other rare and interesting species included *Eriogaster lanestris* L. from Usk, *Eupithecia intricata arceuthata* Frey., *Furcula bicuspis* Borkh. which is common in the county and the rare *F. bifida* Brahm, *Eremobia ochroleuca* D.&S. from Magor, 1.vii.88, *Eustrotia uncula* Clerck from Blackwood, 20.vi.87 and *Mythimna pudorina* D.&S. from the only two known locations in which it occurs in the country.

JENKINS, A. — aberrations included *Zygaena filipendulae stephensi* Dup. ab. *unitella* Crombrugghe, from Somerset, some yellowish and orange coloured *Xestia castanea* Esp. from Surrey and a gynandromorph *Ematurga atomaria* L. from Derbyshire.

KIRBY, P. and LAMBERT, S.J. — A series of *Minoa murinata* Scop. from Herefordshire.

KNILL-JONES, S.A. — From Freshwater, Isle of Wight, both resident species and rare migrants, the most outstanding of which were: *Ctenoplusia limbirena* Guen. 18.viii.88, *Chrysodeixis acuta* Walk. 19.x.88, four *Heliothis armigera* Hübn. taken in October and November, 1988, three *Mythimna loreyi* Dup. 29.x., 8.xi. and 12.xi.88, two *M. albipuncta* D.&S. 25.viii. and 3.ix.88 *Cyclophora pupillaria* Hübn. 25.x.88, *Rhodometra sacraria* L. 21.x.88, *Orthonama obstipata* F. 24.x.88, two *Spodoptera exigua* Hübn. 20.x.88, a series of *Eumichtis lichenea* Hübn. showing local variation, *Amphipoea fucosa paludis* Tutt, *Cyclophora annulata* Schulze and a varied series of *Espirrita dilutata* D.&S.

LANGMAID, Dr J.R. — New to mainland Hampshire a specimen of *Aporophyla australis* Boisd. Southsea, 20.ix.88.

MCCORMICK, R.F. — *Autographa bractea* D.&S. bred from a probable migrant taken at Cranwich Heath 23.vii.88, a depleted brown aberration of *Arctia caja* L. from Northumberland, a brick red *Mimas tiliae* L. and *Heliothis peltigera* D.&S. both from Cheam, Surrey.

NASH, S. — Immigrant species from Fernham, Oxon. comprised: *Ctenoplusia limbirena* Guen. 7.ix.88, *Heliothis peltigera* D.&S. 10.ix.88, *Agrius convolvuli* L. 22.ix.88, *Spodoptera exigua* Hübn. and *Rhodometra sacraria* L. A further three *S. exigua* were exhibited from Portland, 10.ix.88. Aberrations included *Autographa iota* L. with the Y marking absent.

PARSONS, M. — An interesting exhibit of which the following were especially noteworthy: *Epirrita dilutata* D.&S. with very few markings, Bedford Purlieus, 20.x.87, a female *Lasiocampa trifolii flava* C-Hunt, ab. *obsoleta* Tutt, *Thalera fimbrialis* Scop., Dungeness, 26.vii.88, *Pelosia obtusa* H.-S. from How Hill N.R., Norfolk, 17.vii.88, and *Phragmataecia castanea* Hübn. and *Celaena haworthii* Curt. from the same locality, *Photedes elymi* Treits. from Winterton Dunes, Norf., a bred series of *Bembecia muscaeformis* Esp. from larvae found at Porthleven, Corn. 1.iv.88, *Perizoma sagittata* F. bred from larvae found at Holme Fen, 1.viii.87 and specimens of *Heliothis armigera* Hübn. taken at Ninfield, Sussex in 1988.

PELHAM-CLINTON, E.C. — A melanic *Axylia putris* L. from Axminster, small specimens of *Mythimna favicolor* Barr. caught in September 1988, presumably being members of a second brood, and *Heliothis armigera* Hübn. from Axminster.

PICKLES, A.J. and C.T. — A series of *Orthosia gothica* L. abs. *gothicina* H.-S. and *obsoleta-rufescens* Tutt from Kinloch Rannoch, *Trichopteryx carpinata* Borkh. ab. *fasciata* Prout from the same area and several *Heliothis armigera* Hübn. caught during October at Lymington and Highcliffe.

PITTIS, Rev. S.C. — An exhibit of aberrant and local forms which included specimens of *Gortyna borelii lunata* Freyer bred from a female taken at Hamford Water, Essex in 1987, examples of *Rhyacia simulans* Hufn. from Portland, from Druridge Bay, Northumb. and Faringdon, Oxon., *Spaelotis ravida* D.&S. from Faringdon, an almost bilateral sexual mosaic of *Agrotis puta* Hübn. from Woking and *Biston strataria* Hufn.

PLANT, C.W. — An un-named aberration of *Gymnoscelis rufifasciata* Haw. taken in the Forest of Wyre, 18.vii.84.

PRATT, C.R. — A dark specimen of *Spilosoma lubricipeda* L. from Peacehaven, Sussex and a heavily suffused *Agrotis exclamationis* L. from the same area.

RUSSWORM, A.D. — From Brockenhurst two banded forms of *Biston betularia* L., a melanic *Peribatodes rhomboidaria* D.&S. and three aberrations of *Agrotis exclamationis* L., all obtained in 1988.

SIMPSON, Brig. E.C. — Series of *Dysstroma truncata* Hufn. and *D. concinnata* Steph., *Lampropteryx suffumata* D.&S. and *Thera juniperata* L. comparing northern and southern forms, and some aberrations of *Ennomos erosaria* D.&S.

SKINNER, B. — A halved gynandromorph of *Agrotis exclamationis* L. from Addington, Surrey, 19.vi.88, *Standfussiana lucernea* L. from Eastbourne, 17.vii.88, melanistic specimens of *Paradarisa extersaria* Hübn. from Dartford, 8.vi.88, a melanistic *Eupithecia nanata* Hübn., Eastbourne, 17,vi.88 and *Tetheella fluctuosa* Hübn. from Merionethshire, 17.vi.88 with the dark central fascia bisected by a pale grey band. Also larvae of *Heliothis armigera* Hübn. were shown.

SOKOLOFF, P. — From Orpington, Kent, an aberration of *Spilosoma luteum* Hufn. and a specimen of *Mythimna loreyi* Dup. 26.x.88, plus a live, perhaps hibernating, *Macroglossum stellatarum* L.

SPALDING, A. — Specimens of *Cleorodes lichenaria* Hufn. from Cornwall and Brittany illustrating colour difference perhaps related to their woodland and rocky habitats respectively, and migrant Pyralidae from Cusgarne, Cornwall in October 1988. *Diasemiopsis ramburalis* Dup. and *Hellula undalis* F., the latter probably not before encountered in Cornwall.

STERLING, Col. D.H. and P.H. — *Eriogaster lanestris* L. bred from larvae found at Oxford in 1987, indicating a revival of this species. *Diachrysia orichalcea* F. from Micheldelver, Hants, 4/5.ix.88 and *Conistra rubiginea* D.&S. bred from a female taken at Winchester, 9.v.88, a species rarely found on the Chalk.

WARING, P. and THE NATURE CONSERVANCY COUNCIL — A display of photographs concerning protected species. They comprised *Siona lineata* Scop. larvae feeding on marjoram (*Origanum vulgare*), *Ascometia caliginosa* Hübn., *Thetidia smaragdaria* F. and *Pareulype berberata* D.&S.

WEDD, D. — Moths from Lundy Island: *Noctua comes* Hübn. in a form resembling ab. *sagittifer* Cockayne, females obtained in July did not begin laying eggs until mid-October. Other species included very dark *Hadena confusa* Hufn., *H. perplexa* D.&S., greyish *Lycophotia porphyrea* D.&S., *Earis clorana* L. *Archanara dissoluta* Treits. and *Syngrapha interrogationis* L. Another exhibit comprised specimens of *Phragmatobia fuliginosa* L., one of which was taken at light 2.v.88 (very unusual in the first brood) and hybrids of *Smerinthus ocellata* L. × *Laothoe populi* L. showing considerable variation.

YOUNG, D. — A number of moths caught or bred in 1987 and 1988 which included a streaked form of *Rhizedra lutosa* Hübn. from Burghfield Common, Berks. and *Archanara dissoluta* Treits. from Woolhampton, Berks.

YOUNG, Dr M. — A most remarkable extreme aberration of *Semiothisa notata* obtained at Glen Strath Farrar NNR 19.iv.88.

BRITISH MICROLEPIDOPTERA

Despite what has generally been regarded as a rather poor season entomologically, 1988 will nonetheless be remembered as having produced a number of exceptionally interesting Microlepidoptera. Among which may be noted the following, all new to Britain: *Cydia medicaginis* Kuznetsov (Rev. D. Agassiz); *Gelechia senticetella* Staud. (Rev. D. Agassiz); *Sciota adelphella* F.R. (D.J. Brotheridge); *Endotricha consobrinalis* Zell. (B. Goodey); *Batia internella* Jäckh. (Dr M. Harper); *Eulamprotes phaeella* H.&L. (Heckford & Langmaid); *Sclerocona acutellus* Evers. (D.H., M.J. & P.H. Sterling).

AGASSIZ, Rev. D. — *Cydia medicaginis* Kuznetsov, series from Grays, S. Essex, vii.1988; *new* to the British list. *Gelechia senticetella*, one, Grays, S. Essex, 6.viii.1988; *new* to Britain. *Blastodacna atra* Haw., Grays, S. Essex, 21.v.88, form with a very white head, and an exceptionally early date for this species. *Pyrausta cespitalis* D.&S., Walton Down, Somerset, an unusual form with purplish coloration.

The following species new to Somerset: *Nemophora metallica* Poda, Wellow, 16.vii.88; *Argyresthia laevigatella* H.-S., Churchill, 28.vi.88; *Stephensia brunnichiella* L., Walton Down, 26.vii.88; *Eulamprotes wilkella* L., Berrow Dunes, 27.vi.88; *Sorhagenia lophyrella* Dougl., Churchill, 21.vii.88.

BAKER B.R. — Some Microlepidoptera taken or bred from Berkshire VC22 in 1988:- *Eriocrania chrysolepidella* (Zell.) Unhill Wood, 13.v.88, larval mines in *Corylus* and extracted larvae; new VC22 record. *Phyllonorycter scopariella* (Zell.) Impstone Plantation, 23.vi.88, new VC22 record. *Coleophora alnifoliae* Bar. Padworth, 4.v.88, an old case from *Alnus*, new VC22 record. *C. genistae* Stt. Burghfield Common, cases found 4.vi.88; new VC22 record. *Stephensia brunnichella* (L.) North Unhill Bank, 4.vi.88. *Teleoides paripunctella* (Thunb.) Wishmoor Bottom, 17.vi.88. *Pancalia leuwenhoekella* (L.) North Unhill Bank, 4.vi.88. *Falseuncaria ruficiliana* (Haw.) Moulsford Downs, 6.v.88. *Clepsis senecionana*

(Hübn.) Broadmoor Bottom, 23.v.88; new VC22 record. *Acleris schalleriana* (L.) Fairmile, bred from *Viburnum lantana*, 16.vi.88. *Endothenia ericetana* (H.&W.) Wishmoor Bottom, 17.vi.88. *Rhopobota myrtillana* (H.&W.) Impstone Plantation, adults on the leaves of *Vaccinium myrtillus*, 20.v.88; new VC22 record. *Sitochroa verticalis* (L.) Ham Island, 24.vi.88. *Microthrix similella* (Zinck.) Wasing Wood, 9.vii.88. *Hypochalcia ahenella* (D.&S.) Ham Island, 24.vi.88.

Baker P.J. — *Myrmecozela ochraceella* Tengst. Adults ex nests of wood ants near Ballater, Aberdeenshire, 20.vi.88. These moths were found in quite large numbers in every nest checked along a 1 km stretch of road but were not found elsewhere in the vicinity.

Beaumont, H.E. — *Nemophora cupriacella* (Hübn.) West Burton, Notts (VC56), 12.vii.1987; about 12 moths, all females, found at rest on heads and stems of *Dipsacus*; the usual foodplants (*Knautia, Scabiosa* & *Succisa*) were not seen on the site, the number of moths present suggested that they were utilizing the teasel as an alternative foodplant (*Dipsacus* is listed as a foodplant in France by Lhomme); first Notts. record. *Lampronia morosa* (Zell.) Denaby Ings, South Yorks (VC63), 11.vi.1988; surprisingly scarce (or overlooked) in the county for this is the first record since 1979. *Morophaga choragella* (D.&S.) Sherwood Forest, Notts (VC56); a few at mv light 24.vi.1988; confirmed records of this species are all from southern England (MBGBI 2) but there are old Notts records from the same general area dating from the beginning of the century. *Phyllonorycter trifasciella* (Haw.) Edlington Wood, South Yorks (VC63), 28.v.1988, swept from *Lonicera*; a moth which appears to be very local in Yorkshire, this is only the third record in over fifty years. *Coleophora frischella* (L.) Wykehan Forest, North Yorks (VC62), from Rothamsted trap sample taken in late May 1982, the first Yorkshire record and considerably further north than any other British locality. *Pseudotelphusa scalella* (Scop.) West Haigh Wood, South Yorks (VC63), several at rest on oak trunks, 30.v.1987, a local moth in the county with few records. *Endothenia marginana* (Haw.) Denaby Ings, South Yorks (VC63), moths reared on several occasions from larvae feeding in seed heads of *Dipsacus*; the females have pale hindwings with a fuscous border, usually only males have conspicuously pale hindwings. *Ancylis uncella* (D.&S.) Hatfield Moor, South Yorks (VC63), two disturbed from small birches, 17.v.1987; the first confirmed Yorkshire record. *Epinotia demarniana* (F.R.) Sherwood Forest, Notts (VC56), one at MV light, 24.vi.1988; the first Notts record.

Bland, Dr K.P. — *Elachista triseriatella* Staint. St Abbs, Berwickshire (NT9167;VC81); *new* to Scotland. *E. triatomea* Haw., Luffness, E. Lothian, 12.vi.88 (NT4781;VC82), shown for comparison. *Coleophora sylvaticella* Wood, W., ex *Luzula sylvaticella*, Comrie Woods, Perthshire (NN7623;VC88), coll.30.iv.88, em.19.v.88. *C.lithargyrinella* Zell. ex *Stellaria*, Drummondreach Wood, Black Isle (NH5857;VC106), coll.18.vi.88, em.7.vii.88. *Roeslerstammia erxlebella* F. ex *Tilia cordata*, Dall, Rannoch, Perthshire (NN5956;VC88), coll.21.ix.87, em.15.v.88; an unusual foodplant for Scotland. *Ancylis laetana* F., ex Aspen, Carie, Rannoch, Perthshire (NN6156,VC88), coll.21.ix.87, em.9.v.88. *Mirificarma mulinella* Zell., Ballard, 17.vii.88; new to Isle of Coll (Inner Hebrides).

Bradford, E. — The following taken in 1988 at Pean Hill, Whitstable, Kent. *Rhynchopacha mouffetella* L., *Eurrhypara perlucidalis* Hübn., *Bisigna procerella* D.&S., *Monochroa palustrella* Dougl., *Oncocera formosa* Haw. The following from Hythe, Kent. *Infurcitinea argentimaculella* Stt., ex larva on the lichen *Lepraria incana*, in 1988.

Brotheridge, D.J. — *Sciota adelphella* F.R., Wroughton, Wilts., (VC7), 15.vii.87. *New* to Britain.

CHALMERS-HUNT, J.M. — *Prays fraxinella* Bjerk., six examples showing different forms, including one with pale costal patch, taken Folkestone, Kent, 4.viii.88, a form not previously known to the exhibitor. Also, one small example from West Wickham, Kent, with unicolorous dark forewings, thought to be biologically distinct. *Pempeliella ornatella* D.&S. 'A local and ill-known species of chalk downs in southern England, chiefly coastal. Burren of Clare, widespread and locally common' (Goater, *British Pyralid Moths*, 1986). This species may have increased of late, and the specimens shown are the first *ornatella* to have been noted by the exhibitor for over 30 years. They were taken at Capel-le-Ferne, East Kent, 19.vii.88.

CORLEY, M.F.V. — (1) From S.Harris, Outer Hebrides, August 1988. *Agonopterix ciliella* Stt., bred from *Angelica*, Northton; *A. nervosa* Haw., Rodel, 24. viii. (new to VC110); *Eana penziana colquhounana* Barr., Strond, 19.viii; *Crambus perlellus* Scop., Luskentyre, 23.viii; *Acleris aspersana* Hübn, Strond, 19.viii; *A. hastiana* L., bred from *Salix repens*, Strond; *Rhigognostis senilella* Zett., Strond, 19.viii; *Elachista kilmunella* Stt., Northton, 21.viii; *Caryocolum marmoreum* Haw., Luskentyre, 23.viii.

(2) Interesting species caught or reared in 1987–88. *Cydia illutana* H.-S., Tubney Wood, Oxon. VC22, 28.vi.87; *Swammerdamia compunctella* H.-S., Savernake Forest, Wilts., VC7, 13.vi.88; *Uresiphita polygonalis* D.&S., Wallasey, Cheshire, 16.ix.88; *Anthophila fabriciana* L., ab. without dark pigment, Faringdon, Oxon, VC22, 23.vi.88; *Scrobipalpa clintoni* Pov., Kilmelfort, Argyll, VC98, bred from *Rumex crispus; Blastobasis decolorella* Woll., Cumnor Hurst, Oxon. VC22., 11.vii.88.

DOBSON, A.H. — *Eurrhypara perlucidalis* Hübn, Sparsholt College, 20.vi.88, at m.v. light, the second Hampshire specimen. *Nascia cilialis* Hübn., 2.vii.88, Chippenham Fen, Cambs., jarred out of a sallow bush amongst reed beds, during field meeting.

EMMET, Lt.Col. A.M. — *Mompha subdivisella* Bradley, three adults reared from pupae in stems of *Epilobium hirsutum*, 29.ix.88 from Newport, north Essex; *new* to Essex. *Cydia medicaginis* Kuznetzov, adults captured on 26.vi.79 and 31.vii.80 at Grays Chalk Quarry, south Essex. This species was first recognized as British in 1988. The Coleophoridae: summary maps and statistics together with 107 species maps showing progress in recording the distribution of the British Coleophoridae for inclusion in *The Moths and Butterflies of Great Britain and Ireland, Volume 3*.

FOSTER, A.P. — *Palpita unionalis* Hübn., Winterton, Norfolk, 2♂♂ at m.v.l., 21.x.88 and 1♂ at m.v.l., 22.x.88.

GOODEY, B. and YOUNG, J. — *Endotricha consobrinalis* Zell., the example was taken by B. Goodey 'in my kitchen in Colchester, Essex, on 24 December 1987, and originated from a batch of Israeli celery. The specimen was taken by A.M. Emmet to the BM(NH) where M. Shaffer suggested *E. consobrinalis* as being likely, though it was not possible to be conclusive. The specimen passed to D.J.L.Agassiz for dissection and he agreed with Emmet's and Shaffer's diagnosis. On the basis of this the species was admitted to the British list in *A field guide to the small British Lepidoptera* (2nd Edition) and given a log number of 1424a.' *E. flammealis* is shown for comparison. *New* to Britain. *Adela croesella* Scop. Specimens taken 21.vii.87 as they flew around garden privet, form the first Essex records for 83 years. The precise locality was destroyed in 1988, but a search revealed another specimen in a nearby wood, Friday Wood, Colchester. *Yponomeuta rorrella* Hübn., Fingringhoe Wick, Colchester, three at m.v.l., 3.viii.88; *new* to Essex. *Assara terebrella* Zinck., Birch Lake, Colchester, 11.vii.87, at m.v.l.; new to Essex. *Apomyelois bistriata neophanes* Durr., Berechurch Dyke, Colchester, viii.83, fairly common at m.v.l. around an area

of burnt gorse; second record for Essex. *Semioscopis steinkellneriana* D.&S., fairly common in woodland south of Colchester at m.v.l., 24.x.84. *Agonopterix ocellana* F., fairly common at sugar but not at m.v.l. in woodland south of Colchester, October 1984–88.

HALL, N. — *Nomophila noctuella* D.&S., one caught at Wyke Regis, Dorset by Paul Baker, 22.ix.88, on same night as a *Macdunnoughia confusa* Steph. P.B. noted that the *Nomophila* answered well to the description of *N.nearctica* Munr. in Goater (1986) and welcomed comments. *Amblyptilia punctidactyla* Haw., Wasing Estate, Berks., 9.vii.88; the only VC22 record of this species for Berks. since the *Victoria County History* was published (1906). *Acrocercops brongniardella* F., Bulmershe, Berks., bred. *Spatalistis bifasciana* Hübn., The Slade, Berks, 12.vii.86; first record of this species for VC22 since 1920. *Phycitodes maritima* Tengst., Knowle Hill, Berks., 29.v.84. *Tinagma ocnerostomella* Stt., Bowdown Wood, Berks., one bred from an isolated clump of *Echium*, vi.88; new to Berks (VC22). *Endothenia ustulana* Haw., 20.vi.86; the only recent Berks record. Phyllonorycters off *Salix* sp. bred in the hunt for *P. dubitella* H.-S., including some large well marked *P. spinolella* Dup. Phyllonorycters from birch in Berks., all emerged 1988: *P. ulmifoliella* Hübn., *P. cavella* Zell., *P. anderidae* Fletch.; the latter is new to VC22 and occurred at Longmoor Bottom and Bowdown Wood. Phyllonorycters yet to be determined: two from Spencer's Wood, Berks on *Sorbus torminalis*; many from *Sorbus aria*, Fritham, Hants; *P. mespiella* Hübn., which often occurs on *S. torminalis* has yet to be recorded from Berks.

HARPER, Dr M. — *Batia internella* Jäckh: of this species which is new to Britain, two specimens from the same locality in Herefordshire occurred one in August 1985, and one in August 1988; *B. lunaris* Haw. and *B. lambdella* Don. were shown for comparison. Note the small differences macroscopically viz:- *B. internella* is intermediate in size, and there are distinct differences in the colouration of the forewing margin, which separate *B. lunaris*, and also in the shape of the black *lambdella* mark of the forewing which is slightly different in all three species. There are also genitalic differences. I do not know of any other British specimens so far.

HECKFORD, R.J. — *Argyresthia glaucinella* Zell., Uphams Plantation, Yettington, Devon, ex 1. 25.v.88, *Castanea sativa. Schiffermuelleria tinctella* Hübn. nr Canonteign, Barton, Devon, ex 1. 16.iv.88, dead elm. *Eulamprotes atrella* D.&S., nr Washington, Sussex; for comparison with *E. phaeella*; also three larval cases. *E. phaeella* Heckford & Langmaid, Berry Head, Brixham, Devon, 9.vi.84(1), 15.vi.86(1), 10.ix.86(2), all paratypes; Gwithian, Cornwall, 7–12.viii.88; described as new to science in 1988 by Dr J.R. Langmaid and the exhibitor. *Aproerema anthyllidella* Hübn., from various localities, for comparison with *Eulamprotes phaeella. Scrobipalpa tussilaginis* Frey., Wear Cliffs, Seatown, Dorset, ex 11. 5–17.v.88 & ex.1. 9.viii–11.viii.88, on *Tussilago farfara*. Eype Mouth, Dorset, ex 1. 18.v–26.v.88, on *T. farfara*; new to Dorset and 2nd and 3rd British localities. *Glyphipteryx linneella* Clerck, nr. Northernhay Gardens, Exeter, Devon, 2.viii.88. *Acleris caledoniana* Steph., Goss Moor, Cornwall, ex 1. on *Myrica gale*, 20–24.vii.88. *Oligostigma polydectalis Walk.*, Escot, Devon, found dead, 9.iv.88; 5th recorded British specimen. *Epischnia bankesiella* Rich., Dinas Head, Trevose Head, Cornwall ex 1. 20.vi. & 30.vi.88 on *Inula crithmoides*; Boscastle, Cornwall ex 1. 5.vii.88 on *I. crithmoides*; new to VC2. *Platyptilia calodactyla* D.&S., Beacon Point, Devon, ex 1. 24.v–1.vi.88 on *Solidago virgaurea*.

HIGGS, G.E. — The following taken in 1988 at St. Peters in the Wood, Guernsey. *Nomophila noctuella* D.&S., 3.x. and also noted frequently at light 1–15.x in different parts of the island; *Udea ferrugalis* Hübn., 4.x; *Eudonia angustea* Curt., 3.x

& 10.x.; *Alucita hexadactyla* L., 4.x.; *Epiphyas postvittana* Walk., 1 & 14.x. and also noted frequently at light between 1.x & 15.x in different parts of the island.

KNILL-JONES, S.A. — The following all taken at m.v.l. at Freshwater, I.o.W. in 1988. *Nomophila noctuella* D.&S., a series showing variation in form and size; *Euchromius ocellea* Haw., 21.ix(1), 20.x(1), 12.xi(1); *Palpita unionalis* Hübn., 23.x(2), 12.xi(2); *Galleria mellonella* L., 28.viii; *Tortricoides alternella* D.&S., 9.iii.(♂); *Hypsopygia costalis* F., 27.viii; *Agriphila geniculea* Haw., 9.viii., *Cydia pomonella* Hübn., 25.vi.; *Udea ferrugalis* Hübn., 25.x.(2).

LANGMAID, Dr J.R. — *Lampronia fuscatella* Tengst., Bramshott Chase, Hants, one bred 1988. *Leucoptera lathyrifoliella* Stt., Branscombe, Devon, series bred from *Lathyrus pratensis* 1988. *Prays fraxinella* Bjerk., an aberrant specimen, Kishorn, Wester Ross, 20.vi.88. *Elachista apicipunctella* Stt., Earles Colne, Essex, series bred from pupae found inside old stems of *Heracleum*, 1988. *E. bisulcella* Dup., Seaton, Devon, series bred from larvae found in February 1988 on *Festuca arundinacea*. *Denisia albimaculea* Haw., Southsea, Hants, one at m.v.l., 5.vi.88. *Eulamprotes phaeella* Heck. & Lang., Kynance Cove, Cornwall, 22.ix.83(1); Rinnamona, Co. Clare, 9.viii.77; *E. atrella* D.&S. and *Aproaereme anthyllidella* Hübn. shown for comparison. *Scrobipalpula tussilaginis* Frey, Milford on Sea, Hants, series bred from larvae found on 7.xi.87 on *Tussilago farfara*; new to Hants. *Mompha lacteella* Steph., Savernake Forest, Wilts., two bred from *Epilobium montanum*, 1988. *Cosmopterix orichalcea* Stt., Leckford, Hants., one bred from *Phalaris arundinacea*; new to Hants. *Piercea minimana* Caradja, one taken Mochrum, Wigtownshire, 29.vi.88.

NASH, S. — *Palpita unionalis* Hübn., Fernham, Oxon, 22.x.88. *Pyralis lienigialis* Zell., Fernham, Oxon, 8.ix.88. *Hypsopygia costalis* F., ab. having 'the second costal spot united with the fringe', Fernham, Oxon. *Eriocrania salopiella* Stt., Sommelford Common, Wilts, 15.v.88. *Swammerdamia compunctella* H.-S., Savernake Forest, 12.vi.88 (new to Wilts.?) *Blastobasis lignea* Wals., Inchmore Common, Berks., 12.vi.88 (new to Berks.?) *Epiblema aspidiscana* Hübn., Inchmore, 12.vi.88 (new to Berks.?). *Cydia caecana* Schlag., Ashbury, Oxon, very common. Scottish microlepidoptera taken, including: *Crambus ericella* Hübn., Beinn Eighe, common, 9.vii.88. *Acrolepiopsis betulella* Curt., Allum, Inverpolly, Ross, larvae 13. vii.88, reared. *Schiffermuelleria similella* Hübn., Amat Forest, W. Ross, 6.vii.88. *Eana incana* Steph., Inverpolly, 5.vii.88 (new to Ross?). *Olethreutes metallicana* Hübn., Amat Forest, W. Ross (new county record?).

PARSONS, M. — *Cynaeda dentalis* Hübn., Dungeness, Kent, Rye Harbour, Camber Sands and The Crumbles, nr. Eastbourne, all in East Sussex, all reared from pupae found in 1988. *Ethmia terminella* Fletch., Dungeness, Kent, 16.vii.88 and The Crumbles, E. Sussex, 16.vii.88. *Ethmia bipunctella* F., Dungeness, 12.v. & 25.v.88. *Agonopterix nanatella* Stt., found as a larva, Dungeness, 1988. *Aethes margaritana* Haw., *Pempelia genistella* Dup., *Oncocera semirubella* Scop., *Pediasia contaminella* Hübn., *Oxyptilus parvidactylus* Haw., *Capperia britanniodactyla* Greg., *Platytes alpinella* Hübn., all from Dungeness, Kent in 1988. *P. alpinella* Hübn., Camber Sands, E. Sussex, 3.viii.88. *Acleris lorquiniana* Dup., Woodbastwick NNR and How Hill NR, Norfolk, 16.viii & 17.vii.88 respectively. *Pediasia fascelinella* Hübn., Winterton, Norfolk, 15.viii.88. *Batia lambdella* Don., The Crumbles, larvae collected from dead gorse wood, 31.v.88, moths bred. *Olindia schumacherana* F., Fore Wood, nr Catfield, E. Sussex.

PELHAM-CLINTON E.C. — Mostly collected in 1988. *Argyresthia abdominalis* Zell., Beinn Eighe, Ross, one bred from prostrate juniper; new to Scotland. *Yponomeuta rorrella* Hübn., Axminster, Devon; new to Devon. *Elachista bisulcella* Dup., Beer, Devon, unusually early moths of large size, bred in March and April from larvae on

Festuca arundinacea in February. *Eulamprotes phaeella* Heckford & Langmaid, five paratypes from Ireland and Scotland of this recently described species. *Phalonidia minimana* Caradja, Mochrum, Wigtownshire, a specimen netted amongst *Pedicularis palustris*; new to the west of Scotland. *Apomyelois bistriatella neophanes* Durr., Axminster, Devon.

PICKLES, A.J. and C.T. — A series of unidentified microlepidoptera bred from larvae found in dried mushrooms: the mushrooms had been sent by post from Poland where they are a delicacy.

SATTLER, Dr K. — The only British specimens of *Ethmia pyrausta* Pall. and *Roeslerstammia pronubella* D.&S., collected by E.C. Buxton in Sutherlandshire in May 1853 and May 1854 respectively, were considered lost but were recently traced in the Doubleday collection (BMNH). The authenticity of both specimens can be demonstrated by reference to correspondence between Buxton and Stainton, which is now preserved in the Entomology Library, BMNH. Copies of relevant letters are exhibited together with the original specimens.

SIMPSON, Dr A.N.B. — *Dichomeris ustalella* F., probably the first bred British specimens, from larvae collected from *Tilia cordata,* Worcester district; with photo of larva on underside of *Tilia cordata* leaf (photo by Dr M.W. Harper). *Elachista subnigrella* Dougl., Bredon Hill, Worcs., 6.vi.88; 1st county record.

SOKOLOFF, P. — *Tinagma balteolella* F.R., bred series from *Echium* stems, Dungeness, Kent. *Hofmannophila pseudospretella* Stt., bred from slug pellets (containing the poison metaldehyde), Orpington, Kent.

STERLING, M.J., P.H. and Col. D.H. — *Lampronia fuscatella* Tengst. bred from birch gall collected from Wixall Moss, Salop. VC40 on 30.iii.88. The gall, with empty pupa projecting was shown in separate case. *Morophaga choragella* D.&S. taken at MV light at Edwinstowe, Notts. VC56 on 25.vi.88. This is the first Midlands record for many years. *Coleophora orbitella* Zell. and case, found in Bernwood Forest, Bucks. VC24 on birch in September 1987. *Phyllonorycter muelleriella* Zell. from a number of *Phyllonorycter* mines in fallen oak leaves collected 30.xii.87 at Kempley, Gloucs. a single *P. muelleriella* emerged amongst other species. *Coleophora therinella* Tengst. a male and female specimen of this elusive species taken at mv in Winchester, VC11 on 20.vii & 17.vii.86 respectively. The life history and foodplant are still unknown. *Mompha lacteella* Stt. bred specimens from larval mines collected from *Epilobium montanum* in Savernake Forest, Wilts. VC7. See details in *Br. J. Ent. nat. Hist* 1988; **1**: 126. *Cosmopterix orichalcea* Stt. bred specimens from mines in *Phalaris arundinacea* collected at Leckford, Hants. VC12 between 13.ix. & 22.ix.87. A new vice-county record. *Glyphipteryx linneella* Clerck. found resting on lime tree bark at Colwick, Carlton Notts. VC56 on 4 and 5.viii.1988. A new county record. *Eupoecilia ambiguella* Hübn. bred from *Frangula alnus* berries collected 16.viii.87 at Newtown Common Hants VC12. A new vice-county record. *Choristoneura diversana* Hübn. disturbed by day on 30.vi.88 at Newtown Common Hants. VC12. This is only the second record for Hants. (previous one in 1973). *Olethreutes arcuella* Clerck. taken at Bernwood Forest Bucks. VC24 by day on 12.vi.88. *Cydia caecana* Schläg. bred from stems of *Onobrychis* collected from Pewsey Downs, Wiltshire, VC8 on 13.iii.88. *Sclerocona acutellus* Evers. taken at MV trap sited beside River Test marshes at Leckford, Hants. VC12 on the night 8/9.viii.1988. Previously unknown in Britain and very rare in a few marshes in Europe. The life history and foodplant are unknown. *Phlyctaenia perlucidalis* Hübn. taken at Leckford, Hants. VC12 at MV trap on night 24/25.vi.1988. One of three specimens taken by different people at different places in Hants between 20.vi and 6.vii.1988. This species has been colonizing new areas in Britain and the Continent, and the spread of dates

seems to indicate that there is now a colony in Hants. A new record for VC12. *Mecyna flavalis* D.&S. taken at Leckford, Hants. VC12 at MV 9.viii.88 (identity checked by genitalia). Although stated by Fassnidge in 1931 to be common on some Hampshire downland localities, this is the first subsequent record for the county.

STERLING, P.H. and LANGMAID, Dr. J.R. — The biology of *Mompha subdivisella* Bradley. This species was previously only known from 11 specimens taken last century in Norfolk. In August 1988, the larvae were found commonly in the Oxford district, feeding in the stems of *Epilobium hirsutum*. The exhibit showed larval galleries, pupal cocoons and exit caps in the stems, as well as reared imagines.

FOREIGN MACROLEPIDOPTERA

BALDOCK D.W. — *Cynthia cardui* L. ab. *pallens* Noel, Pantocrator, Corfu, Greece, July 1988: a similar example of this rare colour aberration, from Pistoria, north Italy, is figured in Verity, *Farfalle diurna d'Italia*, Pl.52, Fig. 3. *Hipparchia semele* group, a short series from Pantokrator and St Stephanos, Corfu, 27/28.vii.1988: these large specimens are probably attributable to *H. algirica senthes* Fruhstorfer.

BROOME, G. — Lepidopteran mimics from Costa Rica: Pericopinae (Arctiidae) and Melitaeinae (Nymphalidae), with photographs of living Lepidoptera. Examples were shown of spectacular diurnal Arctiidae which enter into mimicry complexes with known toxic butterfly taxa, including Danaidae, Ithomiidae, Heliconidae and Triodinae (Papilionidae).

DOBSON, A.H. — Heterocera from Mallorca taken at Font de sa Cala, on the east coast, between 25 and 31.vii.1988, mostly at hotel lights and at an actinic trap on a scrubby and heathy limestone scree slope with pine trees 800 m inland. The captures included species which have been found in Britain: *Scopula marginepunctata* Goeze, a paler and smaller form, common; *Rhodometra sacraria* L. fairly common; *Menophra abruptaria* Thunb., one of a darker, smaller second brood; *Pachycnemia hippocastanaria* Hübn., a few; *Macroglossum stellatarum* L., one hovering at a 7th floor window, and at hotel lights; *Acronicta rumicis* L., fairly common, specimens exhibited were bred from eggs laid in a pill box; *Eublemma parva* Hübn., one; *Spodoptera exigua* Hübn., very common, and *Palpita unionalis* Hübn., frequent.

EVANS, L.J. — (i) *Mellicta deione berisalii* Ruhn from Martigny, Switzerland (See Evans, 1983, *Entomologist's Rec.J.Var.* **95**: 124).

(ii) A specimen of *Lycaeides idas* L. with missing chevron marks over the blue and orange eye spots; a normal specimen shown for comparison.

(iii) Two short series of *Ladoga camilla* L. showing measurable differences between British and Continental specimens; the exhibitor suggested that the British race might merit subspecific status.

GOATER, B. — Some interesting Noctuidae from Western Europe, including series of the three species of *Trigonophora* Hübn. *viz. T. flammea* Esp. (S. France and northern Spain), and *T. jodea* H.-S. and *T. crassicornis* Oberth. (different localities in northern Spain); *Allophyes alfaroi* Agenjo, which appears to replace *A. oxyacanthae* L. in Spain: the two can only be separated with certainty by examination of the genitalia, but *A. alfaroi* appears to be quite invariable and of a slightly greyer tone than its congener; *Heliophobus reticulata* Goeze (England), *H. reticulata* subsp. *hibernica* Cock. (S. Ireland) and the very similar *H. kitti* Schawerda from Switzerland, which differs in being darker in colour and with the crosslines single, not double; two variable species, *Polymixis argillaceago* Hübn. and *Episema grueneri* Boisd., the latter only separable from the equally variable *E. glaucina* Esp. by

examination of genitalia; finally, a small selection of species rarely recorded in Britain, including *Mesogona acetosellae* D.&S., *Rhyacia lucipeta* D.&S. and *Meganephria bimaculosa* L., all from northern Spain.

HALL, N. — Macrolepidoptera taken in France and Spain in 1988.

(i) *Acronicta euphorbiae* D.&S., a bilateral gynandromorph, right side female, taken in the Aude, France.

(ii) Species on the British list, some very rare or of dubious provenance: *Eustroma reticulatum* D.&S. (Cantal, France); *Aspitates gilvaria* D.&S. (Barcelona & Lerida, Spain); *Euxoa tritici* L. (Charente-Maritime, France); *Ochropleura flammatra* D.&S. (Zaragoza, Spain); *O. leucogaster* Frey. (Zaragoza, & Aude, France); *Noctua orbona* Hufn. (Zaragoza & Ardèche, France); *Pachetra sagittigera* Hufn., the dark subsp. *pyrenaica* Oberth. (Zaragoza); *Lacanobia blenna* Hübn. (Aude); *Mythimna ferrago* F. (Zaragoza); *M. obsoleta* Hübn. (Aude);*Oligia versicolor* Borkh. (Barcelona); *Hoplodrina superstes* Ochs. (Zaragoza); *Protoschinia scutosa* D. & S. (Gard, France); *Eublemma ostrina* Hübn. (Zaragoza & Gard); *E. parva* Hübn. (Gard); *Acontia lucida* Hufn. (Zaragoza); *Trichoplusia ni* Hübn. (Gard); *Clytie illunaris* Hübn. (Aude); *Catephia alchymista* D.&S. (Barcelona & Ardéche); *Herminia tarsicrinalis* Knoch (Gerona, Spain).

(iii) Other interesting species, including the following. Zygaenidae: *Zygaena lavandulae* Esp. and *Z. rhadamanathus* Esp. taken flying together in several localities near the Huesca/Zaragoza boundary, Spain. Attacidae: *Graellsia isabellae* Graells, one of five seen in one night in a pinewood near Barcelona, Spain. Lasiocampidae: *Malacosoma castrensis* L., Aveyron, France; *Pachypasa limosa* Vill., Gard, France; *Phyllodesma suberifolia* Dup., Zaragoza, Spain. Lymantriidae: *Arctornis L-nigrum* Müll., bred 2nd generation from female captured in Charente-Maritime, France; *Albarracina warionis* Oberth., Peñalba, Huesca, Spain. Notodontidae: *Phalera bucephaloides* Ochs., *Cerura iberica* Templado & Ortiz, a 'genitalia species' that replaces *C. vinula* L. in Spain, *Furcula bifida* Brahm, the pale S.W. European subsp. *urocera* Boisd., *Spatalia argentina* D.&S. and *Rhegmatophila alpina* Bellier, all from Zaragoza Province; *Drymonia velitaris* Hufn., one of the least frequent European notodontids, from Vic., Barcelona Province; *Tritophia tritophus* D.&S.., bred 2nd generation from female captured in Spain. Sphingidae: *Marumba quercus* D.&S., the oak hawkmoth, seen in numbers in early June in the Ardèche, France. Arctiidae: a number of interesting species, including *Eilema uniola* Rambur, *E. lutarella* L., *E.pygmaeola* Doubl., *E. palliatella* Scop. and *E. complana* L. from Zaragoza Province, and *E. deplana* from two localities in France.

HARMAN, T.W. — Lepidoptera from Thailand, August 1987 and April 1988, comprising one drawer of Sphingidae and another of large and gaudy species of other families.

LUCKENS, C.J. — A selection of butterflies collected in Greece, 18.vi–1.vii.88. Local and comparatively rare species were shown and included *Colias balcanica* Rebel, *Elphinstonia charlonia* Donz., *Agrodiaetus coelestinus* Evers., *Melitaea arduinna* Esp., *Kirinia climene* Esp. and *Pseudochazara orestes* de Prinse van der Pootlen. He also showed a female *Gonepteryx cleopatra* L. with a splash of male colouring, which was taken by Mr J.M. Chalmers-Hunt, and an extraordinary melanistic aberration of *Colias libanotica* Led. with the forewings brownish mauve.

PAINTER, S. and R. — An exhibit of insects of various orders, including some Lepidoptera, collected during August 1988 in Southern California, Arizona, Nevada and Utah in the United States of America. The collection was made in a variety of habitats ranging from the dry, arid Mojave Desert, with rocky outcrops and mountains, to canyons with evidence of seepage from springs; the whole area was

very hot. Three local butterfly specialities were shown, namely *Limenitis bredowii* (California sister), *Coenonympha californica* (California ringlet) and *Colias eurydice* (California dogface).

Robinson, G.S. and Carter, D.J. — Two female examples of a new genus and species of vespiform tineid moth reared from a bracket-fungus (*Ganoderma* — Polyporaceae) collected in lowland rain-forest in Brunei (north Borneo). This striking wasp-like moth is a Batesian mimic of species of Vespidae and Pompilidae (Hymenoptera) and the first example of this mimicry type recorded in the Tineoidea. Abdominal, eye and wing-coupling modifications suggest the species is diurnal and a behavioural mimic. It is a member of the Scardiinae and closely related to *Morophaga*.

Simmons, M.J. — A dark female specimen of the geometrid moth *Arichanna melanaria* L. taken in a peat bog near Janòw Lubelski, Poland, on 23.vii.1988, by Mr P. Bucior. It is said to be uncommon in Poland.

Spalding. A. — *Cleorodes lichenaria* Hufn., showing differences in size and colour between specimens in woods at Lerryn, Cornwall, and on the cliffs at Cap Sizun, Brittany. In the latter locality, the larvae feed on lichen growing on rocks, and the moths are paler, probably because they rest on rocks rather than on trees.

Waite, P. — An aberration of *Mellicta parthenoides* Kef., taken flying with typical specimens in the Valle de Remuñe, 1700 m, Huesca Province, in the Spanish Pyrenees, 17.vii.1988.

Waring, P. — Some Lepidoptera from the Yugoslavian island of Mljet.

Wiltshire E.P. — Two interesting species of Lycaenidae taken on the same day, 7.vii.1988, near Geneva, Switzerland: *Maculinea alcon* D.&S., Marais de Bidonnes, Vaud, Switzerland, foodplant *Gentiana pneumonanthe* L., and *M. rebeli* Hirschke, Carrière de Riamont, Ain, France, ova seen on *Gentiana cruciata* L.

Diptera

There were 14 exhibits, mostly of uncommon species collected during 1988, a few from preceding years, but also including two notable biological exhibits: John Dobson's painstaking observations on the life history of the syrphid *Paragus haemorrhous* Meig. and the President's summary of his long-term researches into the biology of the Chamaemyiidae.

The new records of *Chrysotoxum octomaculatum* Curt. and *C. vernale* Loew are particularly important and it was pleasing to see *Ferdinandea ruficornis* (F.), which is generally associated with sap runs from trees attacked by *Cossus*, from two new localities. Some other uncommon syrphids such as *Psilota anthracina* Meig., *Brachyopa pilosa* Collin and *Xanthandrus comtus* (Harris) seem to have had a good year with extensions to their known ranges being recorded. Notable records from other families include *Chrysopilus laetus* (Zett.) (Rhagionidae) (Ivan Perry) and *Leopoldius brevirostris* (Germ.) (Conopidae) (Andrew Godfrey) from new localities.

In addition to those cited below a range of typical marshland Diptera were included in the Nature Conservancy Council exhibit on the recording of Welsh wetland sites, which was illustrated by photographs of the habitats involved.

Chandler, P. J. — (a) *Macrocera fastuosa* Loew (Keroplatidae), Shelf Held Coppice, Wyre Forest, Worcs., x, 88, ♂ by stream in coppice woodland: the second British record, the first being from Clovelly, N. Devon, viii. 1927. Four other banded-winged *Macrocera* species were exhibited for comparison.

(b) Three species of Milichiidae new to the British list, all found in 1988, running

on sunlit oak foliage in Windsor Forest, Berks. There are only 11 species of Milichiidae on the British list but about 17 are present in Museum collections and the British species are under revision by the exhibitor, for which any material requiring identification is welcome.

COLLINS, G. A. — Twelve species of rare and local Syrphidae taken in Surrey and Kent in 1988. These included: *Microdon devius* (L.), Pebblecombe Hill, Surrey, 7.vi.; *Pelecocera tricincta* Meig., Chobham Common, Surrey, 17.ix., the most easterly record of this little known southern heathland species; *Psilota anthracina* Meig., Woodham, Surrey, 7.v., at *Crataegus* blossom; *Myolepta luteola* (Gmel.), Bookham Common, Surrey, 22.vi.; *Epistrophella euchroma* (Kowarz), Olddean Common, Surrey 7.v.; *Xylota tarda* Meig., Orlestone Forest, Kent, 12. vi.

DOBSON J. — A series of photographs depicting the life history of *Paragus haemorrhous* Meig.: (a) the female ovipositing on *Rubus idaeus* in the wild; (b) an egg laid among a colony of the aphid *Aphis idaei* van der Goot; (c) first instar larvae, preying on aphids; (d) apparent crypsis of first and third instar larvae; (e) third instar larva; (f) puparium. Notes were provided on behavioural observations, both of the adult and larva; these will be the subject of a future publication.

GODFREY, A. — Twenty-three species of uncommon and local Diptera found during 1987 and 1988, including the following: *Gnophomyia viridipennis* (Gimmerthal) (Tipulidae), One Tree Hill, Forest Hill, S. London, 5.vi.88, ♂ on cut logs in woodland; *Solva marginata* Meig. (Xylomyiidae), Sydenham Hill Wood, S. London, 10.viii.88, ♀ in malaise trap (both the above develop in decaying poplar wood); *Cheilosia grossa* (Fall.) (Syrphidae), not uncommon in iv.88 at Sydenham Hill Wood; *Brachyopa pilosa* Collin (Syrphidae), common around beech logs in Whippendell Wood, Herts., late v.88; *Parhelophilus consimilis* (Malm) (Syrphidae), Gordon Moss, Berwickshire, 10. viii.88 swept in bog; *Leopoldius brevirostris* (Germ.) (Conopidae), Sydenham Hill Wood, S. London, 24.viii.88, in yellow water trap; *Paraclusia tigrina* (Fall.) (Clusiidae), Ashenbank Wood, Cobham, Kent, 24. viii.88, ♂ swept from rotten beech log.

HALSTEAD A. — Fourteen species of local Diptera, taken in 1988, including the following: *Psilota anthracina* Meig. (Syrphidae), RHS Garden, Wisley, Surrey, 16.v.88, ♀; *Ferdinandea ruficornis* (F.) (Syrphidae), RHS Garden, Wisley, Surrey, 16/17.viii.88, ♂♀ on oak bark near sap run; *Chrysotoxum elegans* Loew (Syrphidae), Bolt Head, S. Devon, 10. viii.88, ♀ on *Centaurea nigra* L. flower; *Caliprobola speciosa* (Rossi) (Syrphidae), on beech stump and *Brachypalpus laphriformis* (Fall.), on moribund oak, both from Frame Heath, New Forest, Hants., 14.v.88; *Oxycera pardalina* Meig. (Stratiomyidae), Bilsdean Cliffs, Berwickshire, 13. vii.88, ♂♀ at cliff seepage; *O. dives* Loew (Stratiomyidae), Whitlaw Bank, Hawick, Roxburghshire, 10. vii.88, ♂.

HERBERT ART GALLERY AND MUSEUM, COVENTRY. — Thirteen species of Syrphidae and eight species of larger Brachycera from Warwickshire, including several new county records, the following among them: *Vanoyia tenuicornis* (Macquart) (Stratiomyidae), Coventry, 25.vi.88 (A. Wright); *Chrysops viduatus* F. (Tabanidae), Stockton Quarry, 14.vi.87 (D. J. Mann); *Platycheirus discimanus* Loew, Brandon Wood, 5.v.88; *P. perpallidus* Verrall, Sutton Park, 1988 (A. Wright, D. J. Mann & J. Piekarczyk); *Ferdinandea ruficornis* (F.), Ryton Wood, 1985 (also found 1987) (C. J. Palmer & A. Wright); *Brachyopa pilosa* Collin, Brandon Wood, 14.v.88 (D. J. Mann); *Neoascia interrupta* (Meig.), Coventry, 1987 (S. A. Lane). The rediscovery of the rare bog species *Orthonevra geniculata* Meig. at Sutton Park, 26.iv.88, was another highlight of this exhibit.

KIRBY, P. and LAMBERT, S. J. J. — Seven species of Diptera from Herefordshire

woodlands, v.1987 and one species from the Essex Coast, vii.87, were included in an exhibit encompassing several orders from four areas surveyed by the collectors. The latter was *Haematopota bigoti* Gobert (Tabanidae), Colne Estuary NNR.

McLean I. F. G. — A selection of 26 British species of Chamaemyiidae, with notes on their biology, behaviour and life cycles. These included three undescribed species, for two of which the collector has worked out their life histories, one predatory on the aphid *Laingia psammae* Theobald on marram grass, *Ammophila arenaria*, and the other on the gall forming psyllid *Trichochermes walkeri* (Först.) on *Rhamnus*.

There are 28 species in four genera of Chamaemyiidae ('silverflies') on the British list although a further 10 have been identified by Dr McLean during his studies of the family, easily recognized as a group by their silvery appearance and characteristic 'trundling gait'. All species are predators of Homoptera as larvae, including scale insects, aphids, woolly aphids in addition to the psyllid mentioned above and some have been used for biological control. The uniform appearance within each genus and need to check genital characters for identification, especially in *Leucopis*, was stressed. Mimicry of ants in milking aphids for honeydew was mentioned as an adult feeding strategy in *Leucopis*. Larvae are slow moving and secretive, hiding in crevices; they attack aphids from beneath, generally being ignored both by aphids and ants.

The life cycle of *Leucopis silesiaca* Eggers was displayed; this has two generations per year, with different scale insect hosts occupying different habitats, grassland and woodland. A possible decline of *Leucopis griseola* (Fall.), which is a predator of *Schizoneura ulmi* (L.), due to Dutch elm disease, was suggested.

Miles, S. — A female of *Chrysotoxum octomaculatum* Curt. (Syrphidae), Hankley Common, Surrey, 28.v.88, on *Ranunculus* flowers isolated in a heathland area; the identity of a second *Chrysotoxum* seen at these flowers was not confirmed — no others of the genus were seen on the Common.

Moore, D. — Eleven species of uncommon Diptera: *Thyridanthrax fenestratus* (Fall.) (Bombyliidae), Chobham Common, Surrey, 13.vii.87, on bare sand; *Xanthandrus comtus* (Harris) (Syrphidae), Chobham Common, 8.vii.87, many seen on heather; seven species of local Syrphidae from Windsor Forest and Great Park, also *Xylota coeruleiventris* Zett., Cragside, Rothbury, Northumberland, 30.vi.88 (shown on behalf of N. Smith).

Painter, S. and R. — Some exotic Diptera were included in an exhibit of insects from the south-western United States.

Parker, M. J. — Seventeen species of Syrphidae, mainly from Dorset, including: *Xanthandrus comtus* (Harris), Yellowham Wood, 4.ix.88, ♀ near umbels; *Dasysyrphus lunulatus* (Meig.), Oakers Wood, 8.vii.88, ♀; *Brachyopa pilosa* Collin, Mark Ash Wood, New Forest, Hants., 5.v.88, ♂♀ near sap runs; *Caliprobola speciosa* (Rossi), Denny Wood, New Forest, 12.vi.88; *Chrysotoxum vernale* Loew, Oakers Wood, 16.vi. and 17.v.88, ♂ on *Euphorbia amygdaloides* flower, ♀ on foliage; *Microdon eggeri* Mik, Perrywood, Haseley, New Forest. Hants., 12. vi.88, ♀ on spruce sapling.

Perry I. — A selection of 16 uncommon Diptera found during 1988: *Oxycera dives* Loew (Stratiomyidae), Northhouse Burn, Roxburghshire, 15. vii. and Branxholm Wester Loch, Roxburghshire, 15.vii.; *Chrysopilus laetus* (Zett.) (Rhagionidae), Bottisham Park, Cambs., two ♀ emerged vi.88 from beech rot hole material collected 14.xi.87, the first record outside Windsor Forest and Great Park; *Syndyas nigripes* (Zett.) (Hybotidae), Stoney Moors, New Forest, Hants.; *Oedalea apicalis* Loew (Hybotidae), Hayley Wood, Cambs., 16.v., in oak/ash woodland with some

dead elm — this species is normally associated with ancient beeches; *Systenus bipartitus* (Loew) (Dolichopodidae), emerged 6. vi. from beech rot hole, larval medium collected at Bottisham Park, Cambs., 14.xi.87; *Nematoproctus distendens* (Meig.) (Dolichopodidae), Matley Bog, New Forest, Hants., 23.vi., resting on *Alnus* leaves in sunshine; *Cephalops perspicuus* (de Meijere) (Pipunculidae), Chippenham Fen, Cambs., 29.viii., previously known from two localities in Norfolk; *Eudorylas terminalis* (Thom.) (Pipunculidae), Loch Garten, Inverness, 17.vii., sweeping *Vaccinium* under Scots Pine; *Chamaesyrphus caledonicus* Collin (Syrphidae), Rothiemurchus, Inverness, 19.vii., certainly distinct from the commoner *C. scaevoides* (Fall.), although there is some doubt about the status of this species.

Stubbs, A. E. — (a) A newly recognized species near *Platycheirus peltatus* (Meig.) (Syrphidae).

(b) Six species of Diptera from coastal cliffs: *Cheilosia griseiventris* Loew (Syrphidae), Specton Yorks., on *Senecio* flowers; *Trichopsomyia flavitarsis* (Meig.), Cayton Bay, Yorks., 5.vii.88, ♀ lacking the usual pale spots on tergite 2; *Erioptera scotica* Edw. (Tipulidae), Specton, Yorks., 17.viii.88, 2 ♂ on cliff seepage, the only previous British record apparently being the type female from Dingwall; *Arctoconopa melampodia* (Loew) (Tipulidae), the Spittals, Lyme Regis, Dorset, 1. viii.88, ♂ by silted up pools with *Phragmites; Platycephala umbraculata* (F.) (Chloropidae), The Spittals, Yorks., 1.viii.88, ♂ on *Phragmites; Myopites eximia* Séguy (Tephritidae), Worbarrow Bay, Dorset, 4.viii.88, 2 ♂ on the food-plant *Inula crithmoides*.

(c) *Hybomitra expollicata* (Pand.) (Tabanidae), Thornham Marsh, West Sussex, 8.vii.85, ♂♀, a scarce brackish marsh and ditch species.

Coleoptera

There were 15 exhibits of Coleoptera this year. These ranged from a single *Ptinus* bred from poison (Sokoloff), to extensive arrays from Horton and Owen, both of which included many fascinating and interesting species. Two leaf-mining species (usually the province of the microlepidopterists) were shown by Alexander. Several exhibits concentrated on particular habitats (e.g. dunes and salt marshes by Henderson and ancient woodlands by Moore) or particular localities (e.g. Hertfordshire woodlands by Kirby and Lambert and the Crumbles of Eastbourne by Parsons). In my own exhibit I tried to concentrate on an evolutionary approach to understanding sculpture and puncturation in beetles. Other interesting finds were: *Agrypnus murinus* (McClenaghan), *Hydrochus megaphallus* (Foster), *Colydium elongatum* (both Halstead and Porter) and *Zeugophora flavicollis* (Herbert Art Gallery and Museum). Messrs Painter exhibited some American beetles and included a very unusual item — some 25,000-year-old semi-fossilized beetles!

Alexander, K.N.A. — A display of the larval signs of two Buprestidae, *Agrilus sinuatus* (Ol.) and *Trachys troglodytes* Gyll., in their respective host plants hawthorn (*Crataegus*) and devils bit scabious (*Scabiosa pratensis* Moench). Searching for signs of larval activity in the Cotsworlds has demonstrated that these two species are more widespread there than was previously thought. Maps of their British distribution were also displayed.

Foster, A.P. — *Dromis longiceps* Deg., a teneral example that emerged from a stem of reed (*Phragmites communis* Trin.), galled by the fly *Lipara lucens* Meig., collected by D.A. Proctor, 16.vi.88, Brancaster, Norfolk. *Quedius brevicornis* (Thom.) and *Trox scaber* (L.) from an old bird's nest in the bowl of an old beech

pollard, 7.xi.87, High Beech, Epping Forest, Essex. *Conopalpus testaceus* (Ol.), reared from a larva collected 7.xi.87, Markshall Wood, Epping Forest, Essex. *Bagous lutulentus* (Gyll.), swept from *Equisetum*, 1.viii.88, Great Cressingham Fen, Norfolk. Three scarce species of *Hydrochus* from Catfield Fen, Norfolk, 28.iii.88: *H. brevis* (Herbst), *H. ignicollis* (Mots.) and *H. megaphallus* Berge. The last of these was first described in 1988.

Halstead, A. — Some local Coleoptera taken in 1988. *Oodes helopioides* (F.), in rotten *Salix* log, Mayford, Surrey, 13.ii.88. *Melasis buprestoides* (L.), *in cop* on dead oak branch, Frame Heath, New Forest, 14.v. *Megatoma undata* (L.), on old hawthorn trunk, Box Hill, 21.v. *Ctesias serra* (F.), on dead oak trunk, RHS Garden, Wisley, Surrey, 20.vi. *Ptinomorphus imperialis* (L.), on fallen beech trunk, Sheepleas Woods, Surrey, 15.v. *Tillus elongatus* (L.), on dead oak trunk, RHS Gardens, Wisley, 3.viii. *Anthocomus rufus* (Herbst), swept, Fowlmere RSPB Reserve, Cambs. 1.viii. *Omosita depressa* (L.), under dead badger, RHS Garden Wisley, 10.v. *Cryptarcha strigata* (F.), at oak sap run, RHS Garden, Wisley, 29.vi. *Triplax aenea* (Schall.), on oak fungus, Gritnam Wood, New Forest, 5.vi. *Dacne bipustulata* (Thunb.), on *Laetiporus sulphureus* fungus on dead oak, RHS Garden, Wisley, 13.vi. *Anisosticta 19-punctata* (L.), swept near pond, Chobham Common, Surrey, 8.v. *Litargus connexus* (Fourc.), on bark of dead oak, RHS Garden, Wisley, 30.vi. *Mycetophagus atomarius* (F.), on beech stump, Mickleham Down Woods, Surrey,21.v. *Colydium elongatum* (F.), on fallen beech tree, Frame Heath, New Forest, 14.v. *Eledona agricola* (Herbst), in *Laetiporus sulphureus* fungus on dead oak, RHS Garden, Wisley, 14.vi. *Prionychus ater* (F.), bred from larva found in rotten oak, RHS Garden, Wisley, emerged 4.v. *Mycetochara humeralis* (F.), under beech? bark, Great Huntley Bank, New Forest, 5.vi. *Tomoxia biguttata* (Gyll.), on dead holly trunk, Great Huntley Bank, New Forest, 5.vi. *Notoxus monocerus* (L.), swept, Sandy Point, Hayling Island, 23.vii. *Molorchus umbellatarum* (von Schr.), *in cop* on dogwood flowers, Box Hill, 19.vi. *Agapanthia villosoviridescens* (Deg.), swept, Chippenham Fen, Cambs., 2.vii. *Cryptocephalus moraei* (L.), swept, Box Hill, 19.vi. *Cassida vibex* (L.), on leaf of creeping thistle, Fowlmere RSPB Reserve, Cambs., 27.viii. *Mesites tardii* (Curtis), under dead sycamore bark, Widdicombe House, Dartmoor, Devon, 7.viii. *Tapinotus sellatus* (F.), on *Lysimachia vulgaris* L. shoot, Basingstoke Canal, Woking, Surrey, 23.iv. *Ernoporus fagi* (F.), under beech bark, Sheepleas Woods, Surrey, 11.vi. *Platypus cylindrus* (F.), on bark of dead oak, RHS Garden, Wisley, 30.vi.

Henderson, M.K. — Some typical beetles of sand dunes and salt marshes. These included several scavengers like *Aegelia arenaria* (F.), *Onthophagus similis* (Scriba), *Phylan gibbus* (F.) and *Melanimon tibialis* (F.). Some predators like *Pogonus chalceus* (Marsh.), were also shown and it was commented that there is a paucity of ecological information on such insects. The nature of the maritime association is clearer for phytophagous species like the local weevil *Sibinia sodalis* Germ., found by M.G. Morris on the recent (June, 1988) Coleopterists' weekend in Devon.

Herbert Art Gallery and Museum— Rare and local beetles recorded in Warwickshire during the Coventry Ecological Surveys 1986–1988. These were mainly collected and determined by: R.J. Barnett, S.A. Lane, D.J. Mann, J. Piekarczyk, A. Salisbury, D.F. Warren, A. Wright. *Zeugophora flavicollis* (Marsh.) 1st British record for about 10 years and 2nd War. record, 20.vi.1988. *Donacia obscura* Gyll., 1st War. record, Sutton Park, 1988. *Chalcoides nitidula* (L.) local in War., four sites in 1988. *Donacia thalassina* Germ. 2nd War. record, Sutton Park, 1988, (one other site found since). *Polydrusus flavipes* (Deg.), 1st War. record, CAD Kineton (MOD), 1988. *Asaphidion stierlini* Heyden, 1st War. record, Coventry,

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Plate IV. ANNUAL EXHIBITION, 19 November 1988

1: *Polyommatus icarus* Rott., bred, 20.vii.88, L.D. Young. 2: *Polyommatus icarus* Rott., halved gynandromorph, bred, 1988, L.D. Young. 3: *Boloria euphrosyne* L., ab. *edna* Lobb, Isle of Wight, 21.v.88, A.S. Harmer. 4: *Gonepteryx cleopatra* L., intersex, Kalavryta, Achaia, Greece, 18.vi.88, C.J. Luckens. 5: *Colias libanotica,* Led., Mt Chelmos, Achaia, Greece, C.J. Luckens. 6: *Nymphalis polychloros* L., ab. *testudo* Esp., bred, vii.88, A.D.A. Russworm & H.G.M. Middleton. 7: *Maniola jurtina* L., ab. *fracta* Zweigelt, North Dorset, vii.88, R. Barrington.

Photo: D.E. Wilson.

The cost of reproducing colour plates I to IV has been met by a grant from the Hammond and Crow Memorial Fund.

1986. Coll. J. Piekarczyk, det. M. Luff. *Pterostichus oblongopunctatus* (F.), 1st War. record, Wappenbury Wood, 1987, (three other sites found since). *Laemostenus terricola* (Herbst), 1st War. record, Coventry, 1986. *Platydracus latebricola* (Grav.), 1st War. record, CAD Kineton (MOD), 1988. *Ctenicera pectinicornis* (L.), local in War., two sites in Coventry, 1988. *Cantharis figurata* Mann., fairly common in War., nine sites in 1987/1988. *Adonia variegata* (Goeze), (Nb) local in War., Coventry 1986 and 1987. *Chrysolina oricalcia* (Mull.), local in War., Coventry, 1986. *Cryptocephalus aureolus* Suff., local in War., three sites in 1987/1988. *Chrysomela aenea* L., 1st War. record, Close Wood, 1987, (one other site found since). *Grypus equiseti* (F.), 1st War. record, Coventry, 1987, (four other sites found since).

Jones, R.A.—An exhibit entitled 'Dots and Dashes—Lumps and Bumps. Puncturation, striation and sculpture in the Coleoptera— some conjectures on the evolution of form and function'.

Sixty-four species of beetle were selected to illustrate the wide variety of elytral patterns and structures formed by punctures, striae, tubercles and the like. These varied from extremely smooth and shining species like *Gyrinus* to extremely granular and sculptured species like *Opatrum*. On a different spectrum of classification, elytral pattern varied from simple (ancient?) netted forms like *Dictyoptera aurora* to simple modern forms like *Cetonia* (smooth and shining) and complex modern forms like *Elaphrus* (highly sculptured) and *Molorchus* (greatly reduced).

Species were examined with respect to their habitat (flower beetles, ground beetles, water beetles, dung beetles, bark and timber beetles, carrion and detritus beetles, leaf beetles), but by examining the precise habit (rather than habitat) of various species, tentative suggestions were made to account for the different strial formations found in relatively closely related species. For example *Carabus* (sculptured corrugations giving massive strength to push through undergrowth) and *Cicindela* (smooth unpunctured surfaces giving aerodynamic finish).

The specimens were accompanied by line illustrations from various published sources.

As a postscript, three carabids were exhibited which showed faults in their elytral striation. These were: *Agonum dorsale*, with greatly altered fused and abbreviated striae; *Harpalus rufibarbis* with third and fourth striae fused either side of a space about one-third from base on both elytra; *Dromius linearis* with a similar fault affecting its second and third striae, but on the right elytron only. It was noted that the *Harpalus* and the *Dromius* were collected in the same locality and on the same date (Nunhead Cemetery, London SE15, 28.v.88) and a local factor like insecticide use may have been responsible for the effect.

Kirby, P. and Lambert, S.J.J.—(i) A few interesting beetles collected in Hereforshire Woodlands, May 1987. These included from Hall Wood: *Chalcoides nitidula* (L.), *Ischnomera sanguinicollis* (F.), *Orsodacne cerasi* (L.), *Rhynchites cavifrons* Gyll. (also from Wellington Wood) and *Zeugophora subspinosa* (F.); from Haugh Wood: *Clytra quadripunctata* (L.); and from Wellington Wood: *Orsodacne lineola* (Panz.), *Phytodecta decemnotata* (Marsh.), *Pyrrhochroa coccinea* (L.) and *Stenostola dubia* (F.).

(ii) Beetles from the Colne Estuary NNR, Essex, July 1987 and August 1988: *Apion limonii* Kirby, *Dolichosoma lineare* (Rossi) and *Helops caeruleus* (L.) on a dead elm trunk on the shore.

(iii) Beetles collected in West Norfolk, September 1987, including from Syderstone Common: *Agabus labiatus* (Brahm), *Enochrus isotae* Hebaur and *Helochares punctatus* Sharp; from Holme Dunes NNR: *Apion limonii* Kirby, *Bembidion ephippium* (Marsh.), *Crypticus quisquilius* (L.) and *Pogonus littoralis* (Dufts.);

Demetrias monostigma Sam. from Holkham Dunes NNR and *Rhantus frontalis* (Marsh.) from Snettisham.

McLenaghan, I.—Some Irish and English beetles of interest. *Coccinella hieroglyphica* L., Castleroch, Co. Londonderry, August 1983. *Grypus equiseti* (F.), swept from *Equisetum*, Ballycastle, Co. Antrim, 5.vi.88. *Otiorhynchus atroapterus* Deg., 22.vi.88, *Philepedon plagiatus* (Schall.), June 1988. *Agrypnus murinus* (L.), 22.vi.88. The last three species were swept in sand dune foliage. *Agrypnus* has few (five) former site records in Ireland, and none from Co. Atrim. *Triplax aenea* Schall., Napton, War., 3.iv.88. *Agrilus laticornis* Ill., Ryton Wood, War., 30.vi.88. *Fleutiauxellus quadripustulatus* (F.) Ryton Pond, Coventry, 30.vi.88. *Anatis ocellata* (L.), Ingrave, Essex, at m.v. light, 9.ix.84. *Scymnus frontalis* (F.), Asheldham, Essex, at roots of grass on sand, 24.viii.87. *Quedius lateralis* (Grav.), Tregynon, Pemb., amongst leaf litter in small wood, 16.x.88.

Moore, D.—*Ampedus cinnabarinus* (Esch.), Denny Wood, New Forest, 22.v.88. *A. rufipennis* (Steph.), High Standing Hill, Windsor, 29.v.88. *Selatosomus bipustulatus* (L.), South Forest, Windsor, 7.vi.88, 2nd Windsor record. *Stenagostus villosus* (Fourc.), Radlett, Herts., at m.v. light, 2.vii.87. *Leptura rubra* L., Grimes Graves, Norfolk, 14.viii.88, in numbers in *cop* on a pine log. *Agapanthia villosoviridescens* (Deg.), common on umbels, Grimes Graves, Norfolk, 5.viii.87. *Anaglyptus mysticus* (L..), Aldbury Towers, Herts., 13.vi.86. *Molorchus minor* (L.), South Forest, Windsor, 7.vi.88. *Hoplia philanthus* (Fuess.), swarming, Chobham Common, Surrey, 14.vii.88. *Pyrochroa coccinea* (L.), South Forest, Windsor, 7.vi.88. *Tomoxia biguttata* (Gyll.), High Standing Hill, Windsor, 6.vii.87. *Melandrya caraboides* (L.), crawling at base of beech stump, Denny Wood, New Forest, 22.v.88.

Horton, G.A.N.—Some selected Monmouthshire Coleoptera comprising mainly woodland and riparian species taken between 1975 and 1980. Those marked with * are thought to be new VC 35 records. *Carabus monilis* F., Usk, 29.iv.85. *Cychrus caraboides* (L.), Whitebrook, 26.vi.79. In riverside shingle, Usk: *Bembidion litorale* (Ol.), 19.iv.76. *B. punctulatum* Drap., 17.v.77 and *B. fluviatile* Deg., 19.iv.76. *Pyrochroa coccinea* (L.), in ash stumps, Monmouth, 31.v.79. *Lagria hirta* (L.), on *Malva sylvestris* L., Usk, 23.vi.76. *Oncomera femorata* (F.), at m.v. lights, Usk, 14.viii.77 and Whitebrook, 28.v.78. *Tenebrio obscurus* F., indoors, Usk, 3.ix.79. *Prionychus ater* (F.), at m.v. light, Usk, 28.vii.79. *Gonodera ceramboides* L., Magor Marsh, 9.vii.78. *Orchesia undulata* Kraatz, under willow bark, Usk, 21.ix.76. *Tetratoma fungorum* F., under elm bark, Usk, 11.iii.82. *Melandrya caraboides* (L.), under ash stumps, Monmouth, 9.vi.79. *Sinodendron cylindricum* (L.), in ash stumps, Monmouth, 9.vi.79. *Dorcus paralellipipedus* (L.), round rotten beech stump, Usk, 1971. *Trox scaber* (L.), at m.v. light, Llansoy, 12.vii.86. *Trichius fasciatus* (L.), on bluebell flower, Monmouth, 16.vi.79. *Platycis minuta* (F.), on wall, Usk, 30.ix.79. *Dasytes plumbeus* (Mull.), Usk, 19.vi.77. *Xestobium rufovillosum* (Deg.), Usk, iv.79. *Ptilinus pectinicornis* (L.), on dead willow trunk, Magor Marsh, 10.vi.75. *Necrodes littoralis* (L.), a large (25 mm) male to m.v. light, Angiddy Valley, 30.ix.79. *Hister unicolor* L., under horse dung, Monmouth, 13.v.82 together with *Paralister carbonarius* (Hoffman), and *Grammostethus marginatus* (Er.). *Scaphidium quadrimaculatum* Ol., under willow bark, Usk, 16.x.76. *Psammoecus bipunctatus* (F.), in reed litter, Magor Marsh, 2.x.76. *Pediacus dermestoides* (F.), under beech and oak bark, Redding's Inclosure, Forest of Dean, 19.iv.77. *Endomychus coccineus* (L.), under elm bark, Usk, 16.xi.77. *Bitoma crenata* (F.), under willow bark, Usk, 16.xi.76. *Cerylon fagi* Bris., under beech bark, Redding's Inclosure, 19.iv.77. **Aulonium trisulcum* (Fourc.), at m.v. light, Usk, 11.viii.77. *Rhizophagus nitidulus* (F.), under beech and oak bark, 19.iv.77. *Carpophilus sexpustulatus* (F.), under

sappy oak bark, Redding's Inclosure, 19.iv.77, 15.iv.78. *Kateretes bipustulatus* (Payk.), Monmouth 24.v.77. *Glistrochilus quadriguttatus* (F.), under oak bark, Redding's Inclosure, 19.iv.77, 15.iv.78. *G. olivieri* Bed., under birch fungus, Monmouth, 17.iv.76 and under oak bark, Redding's Inclosure, 26.iv.77. *Dacne bipustulata* (Thunb.), under bark, Monmouth, 2.vi.79. *Triplax aenea* (Schall.), in fungal mycelia under elm bark, Usk, 11.iii.82. *Mycetophagus multipunctatus* F., under willow bark, Usk, 16.xi.76. *Stenochorus meridianus* (L.), Monmouth, 6.vi.78. *Judolia cerambyciformis* (Schr.), Monmouth, 26.vi.79. *Strangalia maculata* (Poda), three examples of this variable insect from Monmouth and Chepstow, 1978 and 1979. *S. quadrifasciata* (L.), Magor Marsh, 9.vii.78. *S. melanura* (L.), Angiddy Valley, 3.vii.79. *Anaglyptus mysticus* (L.), Usk, 29.v.77. **Pyrrhidium sanguineum* (L.), on herbage, Monmouth, 26.vi.79. **Arhopalus rusticus* (L.), at m.v. light, Usk, 27.vii.79 and 27.viii.80. *Pogonochaerus hispidulus* (Pill.), Pont-y-saeson, 12.iv.77. *P. hispidus* (L.), Usk, 3.iv.79. *Stenostola dubia* (Laich.), at m.v. light, Tintern, 23.vi.86. *Denticollis linearis* (L.), at m.v. light, Monmouth, 27.vi.78. *Ampedus cinnabarinus* (Esch.), plentiful under birch bark, Monmouth, 31.v.79. *Ctenicera cuprea* (F.), on grassy mountainside, Cwmfelinfach, 20.vi.87. *Cryptocephalus moraei* (L.), sweeping *Hypericum*, Usk, vi.77. *C.pusillus* F., Magor Marsh, 4.ix.78. *Clytra quadripunctata* (L.), on herbage near wood ants' nest, southern Monmouthshire, 26.v.79. *Lamprosoma concolor* (Sturm), beaten from ivy on old stump, Usk, 24.v.77. *Plagiodera versicolora* (Laich), under willow bark, Usk, 25.iv.77. *Chrysolina violacea* (Mull.), Usk, 22.vi.77. *C. fastuosa* (Scop.), on *Lycopus europaeus* L., Blackwood, 17.vi.88. *C. brunsvicensis* (Grav.), on *Hypericum hirsutum* L. and *H. perforatum* L., Monmouth, vi and vii.78. *C. varians* (Schall.), on *H. tetrapterum* Fr., Pont-y-saeson, 5.vi.78. *Luperus longicornis* (F.), swept, Trelech Bog, 1.vii.75. *Phyllobrotica quadrimaculata* (L.), abundant on *Scutellaria galericula* L., Magor Marsh, 12.viii.75. *Altica lythri* Aubé, on *Epilobium hirsutum* L., Usk, 15.iv.79. *Lasiorhynchites sericeus* Herbst, at m.v. light, Whitebrook, 28.v.78, 26.vi.86. *Strophosomus faber* (Herbst), Newchurch West, 11.v.77 etc. *Sitona ononidis* Sharp, Undy, 26.viii.75. *Sciaphilus asperatus* (Bons.), Usk, iv.77. *Polydrusus confluens* Steph., on aspen, Monmouth, 24.v.77. *P. mollis* (Ström), Wye Valley, 15.v.86. *Phyllobius calcaratus* (F.), St Pierre's Great Woods, 1.vi.85. *Hylobius abietis* (L.),, Llansoy, 21.vi.86. *Alophus triguttatus* (F.), Newchurch West, 8.v.77. *Curculio venosus* (Grav.), at m.v. light, 11.viii.72, Llansoy, 21.vi.86. *C. glandium* Marsh, at m.v. light, Whitebrook, 31.vii.82, Llansoy, vi.86. *C. nucum* L., Wye Valley, 4.ix.78. *Nanophyes marmoratus* (Goeze), on *Lythrum salicaria* L., Magor Marsh, 12.viii.75. **Stenopelmus rufinasus* Gyll., on *Azolla filiculoides* Cam., Magor Marsh, 2.x.76. *Rhinoncus perpedicularis* (Reich), on *Polygonum*, Magor Marsh, 9.ix.75. *R. inconspectus* (Herbst), sweeping *Polygonum*, Magor Marsh, 25.viii.75. *Coeliodes erythroleucus* (Gmel.), Tintern, 12.iv.77. *Cionus scrophulariae* (L.), on *Scrophularia aquatica* L., Magor Marsh, 9.vii.78. *C. hortulanus* (Fourc.), on *S. nodosa* L., Monmouth, 6.vi.78. *Magdalis armigera* (Fourc.), beaten from *Ulmus glabra* Huds., Usk, 16.vi.75. *Dorytomus tortrix* (L.), on aspen, Monmouth, 24.v.77. *Grypus equeseti* (F.), sweeping, Magor Marsh, 25.viii.75. *Platystomos albinus* (L.), on ash stump, Monmouth, 31.v.79.

Owen, J.A.—*Pterostichus rhaeticus* Heer, Mull, July 1971, under stone and *Pterostichus nigrita* (Payk.), Dungeness, Kent 1988, in gravel. These two species (together with a non-British species *P. mukdenensis* Breit.) have recently been extracted from the *P. nigrita* complex. The three species will not interbreed and have different numbers of chromosomes. There are also differences in the genitalia. In Britain, both species are widespread and relatively common. They probably have

habitat preferences but these have yet to be clearly defined. *Hydrochus megaphallus* van Henegouwen, Catfield Fen, Norfolk, March 1978, and *H. brevis* (Herbst), Loch Vaa, Inverness-shire, July 1980. These are two recently separated species. They can be distinguished most clearly on the size and shape of the male genitalia and, less obviously, on the sculpture of the pronotum which is more closely punctured in *megaphallus*. *Leiodes oblonga* (Er.), Richmond Park, Surrey, August 1988, in Flight Interception trap. Three males of varying size. Thus, in large males, the crenulations on the hind tibia are very obvious whereas in small males they are often completely absent. *L. triepkii* (Schmidt, W.L.E), Thetford, Norfolk, August 1988, by evening sweeping. *Lesteva hanseni* Lohse, Start Point, Devon, April 1988, in very wet moss. *Stenus assequens* Rey, Stedham Common, Sussex, July 1987, running on dried mud. *Thinobius brevipennis* Kisenw., Totland Bay, Isle of Wight, April 1988, at edge of small pool in clay (mainly from fen districts). *Heterothops dissimilis* Grav. Santon Downham, Norfolk, June 1983 in Malaise trap (J. Field) and *H. minutus* Woll., Woodbastwick, Norfolk, September 1988, reed debris. The distinctness of these two species has only recently been realized. On the average, *dissimilis* is smaller with a narrower head and more diffuse punctuation on the elytra and abdominal tergites. In Britain, *minutus* appears to be much commoner than *dissimilis*. *Aloconota eichoffi* (Scriba), Llandinam, Montgomeryshire, August 1988, in riverside gravel. A rare riverside (shingle?) species though widely distributed. Can be distinguished from its closest ally *A. planifrons* by the small eyes and the triangular shape of the head. *Meotica anglica* Benick, Llandinam, Montgomeryshire, August 1988, in riverside gravel. This appears to be the first record for Wales. *Zyras haworthi* Steph. Aldermaston, Berkshire (S. Grove), June 1988 in oak stump, found in the absence of ants. *Euplectus punctatus* Muls. Cannitch, Inverness-shire, July 1988, under bark of birch stump. *Gnorimus nobilis* L. Reared from eggs laid by a female taken on an umbel flower head in the New Forest, Hampshire, July 1986. *Cryptophagus confusus* Bruce, Richmond Park, Surrey, October 1987 in frass from old beech tree infested with *Lasius brunneus*. The occurrence of this species in Britain was first realized when the exhibitor sent to Mr Colin Johnson for identification a specimen taken in an old beech stump at Windsor in September 1988. Subsequently it turned out that other specimens had been taken at Windsor earlier in 1988 in company with *Crytophagus labilis* which it closely resembles. *Atomaria lohsei* Johnson & Strand, Thetford, Norfolk, August 1988 beaten from fallen pine branch. A quite distinctive species first noted in Britain in 1972 in Hampshire. Subsequently a number of specimens have occurred in the Brecklands. The beetle appears to be associated with conifers. *Mordellistena nanuloides* Ermisch, Isle of Grain, Kent, August 1988, tapped from its food plant—*Artemisia maritima* L. This species, the smallest member of the genus known to occur in Britain, appears to be confined to the north Kent salt marshes. *Hypera diversipunctata* (Schr.), Southern Ness, Dumfries, July 1982 swept in marshy area. This rare weevil was regarded by Fowler as 'perhaps doubtfully indigenous'. The species was ignored by Joy but a number of authentic British specimens are now known. *Ceutorhyncus urticae* Boh., Cirencester, Gloucestershire, July 1987 on *Stachys arvensis* L. There are records for this species from many areas in southern England but few are recent. In the field, the beetle closely resembles the very common *Cidnorhinus quadrimaculatus*.*C. euphorbiae* Bris., Box Hill, Surrey, April 1987 in moss on chalky slope. This species is thought to breed in forget-me-not (*Myosotis*) species though such plants were not present at the site of capture. The two examples taken in moss were probably hibernating.

PAINTER, S. and R.—A selection of insects from California, Arizona, Nevada and Utah, USA including several beetles. These comprised scarabaeids, longhorns,

chafers, an Opilo and a blue Blaps-like tenebrionid. Also exhibited was a lump of tar containing the bodies of water beetles trapped about 25 000 years ago.

Parsons, M.—Four species noted from The Crumbles near Eastbourne, East Sussex during 1988: *Helops caeruleus* (L.), 16.vi., *Brachinus crepitans* (L.), 10.viii, *Malachius marginellus* Ol., 31.v and *Ceutorhyncus geographicus* (Goeze), 7.vii. This site is destined to become a marina and shopping centre.

Porter, D.A.—*Mesosa nebulosa* (F.), sweeping!, Windsor, 7.vi.86. *Metoecus paradoxus* (L.), in nest of *Vespula* sp., built in soil and leaf litter at base of old beech/hornbeam hedge, Hailsham, East Sussex, 11.viii.86. *Ampedus ruficeps* (Muls. & Guil.), in red rotten oak, Old Windsor, 2.v.88, apparently the 2nd British specimen captured as an adult. *Colydium elongatum* (F.), under sound bark of fallen oak bough, Windsor Great Park, 8.vi.86, new to the Windsor list.

Sokoloff, P.—*Ptinus fur* (L.), bred from slug pellets containing the poison metaldehyde, Orpington, Kent.

Hemiptera

Only four exhibits of Hemiptera graced the tables of Imperial College this year, although these were all very interesting. A corporate member of the Society — the Herbert Art Gallery and Museum — showed several species new to Warwickshire including the peculiar *Chorosoma schillingi*. Mr Porter showed only a single species, Britain's largest flatbug *Aradus betulae* and Messrs Painter showed some US shieldbugs. Messrs Kirby and Lambert had a wide selection of species, the smallest being *Chlorita dumosa*, a hopping plant bug new to Britain.

Herbert Art Gallery and Museum — Rare and local bugs recorded during the Coventry Ecological Surveys 1986–1988. *Aphanus rolandri* (L.), 1st War. record, Coombe Abbey 1987. *Agnocoris reclairei* (Wagner), 1st War. record, Brandon Marsh 4.ix.1986, recorded at same site in 1987, 1988. *Chorosoma schillingi* (Schummel), 1st War. record, usually coastal, Coventry, 1986, recorded at same site in 1987 and 1988. *Alloeotomus gothicus* (Fall.), 1st War. record, Close Wood, 1986, (one other site found since). *Brachyarthrum limitatum* Fieb., 1st War. record, Wappenbury Wood, 1987, (two other sites found since). *Rhacognathus punctatus* (L.), 1st War. record, Sutton Park, 1988. *Zicrona caerulea* (L.), nationally decreasing, but recorded at several sites during 1986, 1987 and 1988.

Kirby, P. and Lambert, S.J.J. — Some bugs from the Isles of Scilly and West Cornwall, June 1987: *Emblethis verbasci* (F.), St Agne's, St Martin's, IoS, a nationally rare species at the edge of its range. *Geotomus punctulatus* (Costa), Sennen Cove, currently its only known locality. *Henestaris laticeps* (Curt.), Sennen Cove. *Myrmedobia inconspicua* (D.&S.), St Mary's, IoS. *Piesma quadratum spergulariae* Woodroffe, St Mary's, St Martin's, IoS, apparently endemic to the Scillies. *Pterometus staphyliniformis* (Schilling), Sennen Cove.

Some bugs from the Essex Coast, July 1987 and August 1988. *Chartoscirta elegantula* (Fall.), Colne Estauary NNR. *Miridius quadrivirgatus* (Costa), Paglesham Creek. *Stalia boops* (Schiodte), Colne Estuary NNR. *Aphrodes aesuarinus* (Edw.), Paglesham Creek. *Aphrodes limicola* (Edw.), Paglesham Creek, taken in numbers clinging to vegetation at the water surface at high tide. *Athysanus argentarius* (Metc.), Colne Estauary NNR. *Chlorita viridula* (Fall.), Paglesham Creek, on sea wormwood. *Macropsis mendax* (Fieb.), Paglesham Creek. *Neophilaenus longiceps* (Puton), Paglesham Creek. *Craspedolepta piolsa* (Oshanin), Colne Estauary NNR.

Some bugs from the River Cam, north of Cambridge, August 1987 including:

Agnocoris reclairei (Wagner), *Idiocerus herrichi* Kirsch. From Suffolk Breckland, August 1987: *Ortholomus punctipennis* (H.-S.), Icklingham Plain, rediscovered close to the site where it was first recorded in Britain in 1937, and *Chlamydatus pulicarius* (Fall.), Icklingham Plain.

Chlorita dumosa (Ribaut), new to Britain from Scout Scar, Cumbria, July 1987.

Some of the more interesting species collected on a meeting of the Heteroptera Study Group, West Norfolk, September 1987. *Chartoscirta cocksi* (Curtis), Roydon Common; *C.elegantula* (Fall.), Holme Dunes NNR; *Nabis ericetorum* Scholtz, Holkham Dunes NNS, found in the absence of heath and heather and without the usual reddish colour; *Rhopalus parumpunctatus* Scill., Holkham Dunes NNR; *Aphrodes aestuarinus* (Edw.), Warham Saltmarsh, Holkham NNR; *Aphrophora alpina* Melichar, Roydon Common; *Paralimnus phragmitis* (Boh.), Holme Dunes.

Painter, S. and R. — Some insects from central southern USA including several shield bugs.

Porter, D.A. — *Aradus betulae* (L.), found in some numbers in the fungus *Piptoporus betulinus* on an old birch trunk and under the bark close by, Boat of Garten, Inverness, 5.viii.87, Britain's largest flatbug and apparently new to the Inverness list.

Hymenoptera

Despite being Britain's largest order of insects the Hymenoptera have few enthusiasts — at least that is the impression given by the sparse selection of exhibits shown in recent years. At the 1988 exhibition bees and parasitic hymenoptera were notable by their almost complete absence. This may in part be due to the poor summer weather but with insects as badly under recorded as are many of the Hymenoptera, there must be something of interest to report. Perhaps now is the time for some of those jaded lepidopterists who have seen all the moths and butterflies to turn their attentions to some real insects!

Halstead, A. J. — Some local woodwasps and sawflies taken in 1988, mostly in Surrey. Woodwasps of the Xiphydriidae family were a female *Xiphydria prolongata* (Geoff. in Fourc.) taken 2.vii.88 on a dead birch trunk at Chippenham Fen, Cambs., and a male *X. camelus* (L.), bred by Prof. J. A. Owen from a pupa found in a birch log at Happy Valley, Box Hill, Surrey, on 21.v.88, the adult emerged 23.vi.88. A male of the very local *Aprosthema melanura* (Klug), swept 1.vi.88 from the edge of former watercress beds at the RSPB Reserve, Fowlmere, Cambs. This rare member of the family Argidae is apparently previously known only from sites in Hants. and Berks. The other sawflies shown were of the family Tenthredinidae. A female *Eutomostethus gagathinus* (Klug.) swept from salt marsh vegetation, 16.vii.88, in Aberlady Bay, E. Lothian; a female *Perineura rubi* (Panz.), swept 21.v.88 from the leaves of wild raspberry, Happy Valley, Box Hill, Surrey; a male *Pachyprotasis simulans* (Klug), swept from meadow vegetation, 21.v.88, Mickleham Downs, Surrey; a male *Pachynematus apicalis* (Hartig) swept in a boggy meadow, 7.v.88, at Mayford, Woking, Surrey; a pair *in cop.* of *Amauronematus fallax* (Lep.) on *Salix cinerea* L., 19.iv.88; a female *A. crispus* Benson on *Salix cinarea*, 19.iv.88; a female *A. longiserra* (Thomson) ovipositing into the opening buds of *Salix cinerea* L., 11.iv.88. The three *Amauronematus* spp. were all taken on Wisley Common, Surrey.

Herbert Art Gallery and Museum, Coventry. — Some local symphyta and aculeate Hymenoptera taken in Warwickshire, many of them being first records for the county. Most of the determinations were made by Mr A. Wright, Senior Keeper of Natural History at the museum. The symphyta were of various families as follows:

Pamphiliidae — *Pamphilius gyllenhali* (Dahlbom) a provisional Red Data Book (pRDB) 3 species taken at Ryton Wood on 12 and 21.vi.87 by D.J. Mann. Xiphydriidae — *Xiphydria camelus* (L.), collected by D.J. Mann 19.vi.88 at Brandon Wood; *X. prolongata* (Geoff. in Fourc.), several taken by D.J. Mann at Coventry, 20.vii.86. Both *Xiphydria* records are firsts for War. Cephidae — *Hartigia xanthostoma* (Evers.), pRDB 3 species, second War. record, taken by J. Piekarczyk, 13.vi.86 at Brandon Marsh. Cimbicidae — *Trichiosoma vitellinae* (L.), a pRDB 1 species new to War. at Ryton Wood, 26.vi.86 and collected by R.J. Barnett when it landed in his beard! Diprionidae — *Microdiprion pallipes* (Fall.) taken by A. Wright 7.v.87 in Brandon Wood. This is the first British record for over 30 years and the first for England of this normally Scottish sawfly (pRDB 3). Tenthredinidae —*Dolerus bimaculatus* (Geoff. in Fourc.), first War. record of this pRDB 3 species made at Coombe Pool, 20.vi.87 by D.J. Mann, also a thriving colony found by A. Wright at Sutton Park, 1988; *Periclista pubescens* (Zaddach) (pRDB 3) a new War. record and a considerable northwards extension to its known range, collected by A. Wright, Brandon Wood 6.v.87, and taken again at the same site in 1988 by D. J. Mann; *Pontania tuberculata* (Benson), a pRDB 3 species new to War. and possibly only its second site in England, taken by D. J. Mann at Herald Way Tip, Coventry, 19.v.88; *Pachynematus imperfectus* (Zaddach and Brischte), a first War. record and pRDB 3 species taken by S.A. Lane at Brandon Wood, 6.v.87. The aculeate Hymenoptera consisted of Chrysididae — *Spinolia neglecta* (Shuck.), first War. record, taken 22.vi.88 by A. Wright. Sapygidae — *Sapyga clavicornis* (L.), only recent War. record taken at CAD Kineton (MOD), 23.vi.88 by A. Wright. Andrenidae —*Andrena tibialis* (Kirby), a pRDB 3 species new to War. and rarely seen outside the London area, taken by J. Piekarczyk at Herald Way Tip, Coventry, 1987.

PAINTER, S. and R. — A drawer of insects collected in southern California, Utah, Arizona and Nevada during August 1988. These included a large spider-hunting wasp.

PORTER, D.A. — A specimen of *Ibalia leucospoides* (Hocken.) (Ibaliidae) found in some numbers on a roadside stack of recently felled pine at Windsor, Berks., on 21.ix.86. This local insect is a parasitoid of siricid larvae.

ORTHOPTERA

HARMAN, T.W. — A specimen of the migratory locust, *Locusta migratoria* (L.) found 10.xi.88 by J. Morris on the outside of her house in Herne Bay, Kent. This is believed to be the first genuine migrant specimen recorded in Kent. [Other specimens were being recorded in the south west of England at about this time.]

PHASMIDA

MUGGLETON, J. — Two live female specimens and eggs of the little known stick insect *Leptynia hispanica* (Bolivar) of the family Phasmatidae. This rare species has been found by the exhibitor in dry, open habitat known as garrigue in the Hérault, Vaucluse and Ardèche departéments of France. The adults resemble some other European species but the grey-brown sausage-shaped eggs readily distinguish it from the more common *Bacillus* and *Clonopsis* spp. It is difficult to breed in captivity but can be fed on the leaves of *Rosa* and *Helianthus* spp. The specimens shown were pale green but brown forms also occur and males are reported to be not uncommon.

Arachnida

Danahar, G.W. — Some spiders recorded during a visit to the Burren, near Fanore, Co. Clare, Ireland, on 10.viii.88. The Burren is famous for its limestone pavements and unusual flora. It has little tree cover and most of the specimens collected were found under stones or in webs spun between the rocks. The species shown were *Xysticus cristatus* (Clerck), *Heliophanus cupreus* (Walckenaer) *Segestria senoculata* C.L. Koch, *Zelotes apricorum* (L. Koch), *Harpactea hombergi*(Scop.), *Drassodes cupreus* (Blackwall), *Trochosa terricola* Thorell, *Tetrix denticulata* (Ol.) and *Monocephalus fuscipes*. These are mostly common species of widespread distribution in the British Isles.

Illustrations

Alexander, K. — A drawer containing distribution maps and photographs of the habitats of two of the buprestid beetles. The display pointed out that experience in the Costswold suggested that the two species may be more widespread than is generally believed.

Barrington, R. — Water colour studies of *Apatura iris* (purple emperor butterfly) and colour photographs of *Aglais urticae* (small tortoiseshell) feeding on fallen apples; resting larva of *Antheraea roylei* (royal oak silkmoth), *Acherontia atropos* (death's-head hawk-moth) resting on a wall.

Collins, G.A. — Two cases of Syrphidae, together with eighteen distribution maps of some rare and local species. The display was all part of the Hoverfly Recording Scheme.

Copestake, D. — Twelve large magnification colour photographs of Coleoptera species, some scarce, from various localities in Britain.

Green, E. — A chart consisting of a number of coloured photographs, plus text and tables of wood rotting ecosystems and their importance in the natural environment. The tabulation showed the species, age, height, diameter, health, locality etc of various species of tree.

Henderson, M. and Gschmeissner, S. — Fourteen black and white scanning electron microscope photographs of various insects. Some magnifications were of intermediate and others of highly magnified aspects of the same species. The photographs showed the beauty of this technique and the surface structure of the insects shown, which included Hymenoptera, Coleoptera, Odonata and Lepidoptera.

Jones, R. — Two large format charts containing numerous illustrations and text. The purpose of the display was to show and explain the often intricate structure and surface of the beetles, especially the sculpturing of the elytra.

McLean, I.F.G. — Illustrations and text explaining the biology and structure of the British Chamaemyiidae, a small family of acalyptrate Diptera. Two drawers of various species were also shown.

Nature Conservancy Council — A stand comprising colour photographs, illustrations, maps, lists, tables and graphs etc covering the Invertebrate Site Register and the management of diverse habitats in the British Isles. A second stand containing colour photographs and information about the conservation of the rarer macro moths.

Owen, J.A. — Photographs and accompanying text in two drawers of beetles. The object was to show some of the habitats and methods of rearing particular species.

Revels, R. — Four panels of colour photographs depicting various insects and other aspects of the flora and fauna of the British Isles.

Colour transparencies

Ashby, C.B. — Transparencies of the landscape and various species of the flora and fauna taken in Norway and Sweden. Apart from Lepidoptera there were pictures of birds, dragonflies, flowers and elk.

Callow, N.A. — Twelve transparencies. Two, of a Celandine-like flower and a primula growing at 11,000 and 13,000 ft in the Nepalese Himalaya. The rest showed various species of insect, birds, flies, fungi, slugs and dragonfly of the British Isles.

Ferguson, I.D. — Six transparencies. One, of the less common spider *Micrommata virescens* taken in Denge Wood, Kent; three of the bug *Troilus luridus* and one each of *Thera juniperata* (juniper carpet) and *Dichonia aprilina* (merveille du jour).

Jones, R.A. — Transparencies of some wildlife from Queensland, Australia, including spiders, aggressive green ants, a weird spiny beetle and several others of the flora and fauna.

Meredith, S.L. — Six transparencies of butterflies including one each of *Mesoacidalia aglaja* (dark green fritillary), *Hamearis lucina* (Duke of Burgundy fritillary) and *Mellicta athalia* (heath fritillary) in one of its Kent localities.

Murphy, F.M. — Transparencies taken during a visit to Hong Kong. Four showed the countryside and islands of that region. The remaining eight depicted some of the interesting spiders found in the Aberdeen Park area of Hong Kong.

Parker, W. — Six transparencies of various species of Odonata taken in Balaton-Füred, Hungary and Zivohost, Czechoslovakia.

Softly, R.A. — Twelve transparencies. Ten of particular interest were recorded at Hampstead Heath, a very interesting locality, so near to central London.

Sokoloff, P. — Transparencies of insects and habitat in Kent. Two of uncommon and local species — *Apomyelois bistriatella neophanes* and *Lampronia fuscatella*.

Uffen, R.W.J. — Twelve transparencies; five being of interesting species of the Coleophoridae. The remainder were taken in France and showed species of orchid and other plants. One picture revealed a number of pools and lakes now thought to have been left by melting blocks of ice during the last glaciation.

Yendall, D. — Twelve transparencies of various insects and spiders taken in Australia, Tasmania, France and the UK.

Nature Conservancy Council — Welsh Peatland Invertebrate Survey

A 3-man team started a project in March 1987 to investigate the invertebrate communities found on Welsh peatlands, and to study the effect of management on their composition. An exhibition of results from the 1987 field season in Dyfed was presented. This consisted of a series of boxes illustrating the typical components of various peatland habitats, each with an accompanying board illustrating study sites and describing the vegetation present. The habitats covered were tall fen, poor fen, wet heath and rough grassland, flushes, basin mires and raised and blanket bogs. A further box showed species which, whilst not true peatland species, might be present where damage such as draining or burning had occurred, or where there was edge effect. A number of uncommon species were exhibited, including the hoverfly *Parhelophilus consimilis* (Malm), the soldier fly *Stratiomys chamaeleon* (L.), the rove beetles *Stenus opticus* Grav., *S. oscillator* Rye and *Philonthus corvinus* Er., and the ground beetle *Elaphrus uliginosus* F. Invertebrate groups exhibited other than Coleoptera and Diptera included Lepidoptera, Orthoptera, Odonata and Mollusca.

FIELD MEETINGS

Mount Farley Country Park, Crab Wood & West Wood, Sparsholt, Hampshire, 16–17 July 1988

Leader: **David Young.** This was a combined afternoon and evening field meeting to a fine area of mixed woodland and open areas, on chalk, at the glorious height of a British summer. Our more cynical members would conclude that the weather, which started poor and got steadily worse, was much as one might expect in the circumstances. Little daytime field work was possible, or desirable, once the vegetation had become thoroughly wet. Only six common species of butterflies, together with a few burnet moths, were seen in areas where they normally abound.

Strangely, and contrary to the weather forecast, the rain did largely cease at dusk and six MV traps, plus two Heath traps, were operated in the West Wood area, a total of 72 species of Macrolepidoptera being recorded, a modest total indeed for such an area. The only species worthy of note were five specimens of *Ptilodontella cucullina* D.&S. (maple prominent); five specimens of *Deileptenia ribeata* f. *sericearia* Curt. (satin beauty); and two specimens of *Craniophora ligustri* D.&S. (coronet) one of which approach ab. *coronula* Haw. Few Microlepidoptera were seen and, from those recorded, only *Microstega hyalinalis* Hübn. was noteworthy.

Fourteen members and friends attended the meeting. No records of orders other than the Lepidoptera were received.

Nunhead Cemetery, London SE15, 28 May 1988

Leader: **R. A. Jones.** The day dawned bright and clear, and by 10.30 it was obvious that this would be the warmest day of the year so far. Andrew Godray was the only other member to appear, but with enthusiasm to make up for low numbers we set off amidst a flurry of nets. An avenue of old limes thick with chervil was attracting a lot of insects. It was here that the local leaf beetle *Chrysolina oricalcia* (Müller, O.F.) turned up. Also swept here was a snake fly—*Rhaphidia maculicollis* Steph. Walking up past a ruined chapel, brought us to a large open clearing now deep in cat's-tail grass. At the edge of the clearing stood a large cherry-laurel *Prunus laurocerasus* L. aand its extra-floral nectaries (four at the base of each leaf midrub) were attracting honey and bumble bees. Among the flies taken, *Parhelophilus versicolor* (F.) was unusual, as it is normally associated with marshes.

In the evening, at 8.30, Bernard Skinner and Michael Chalmers-Hunt arrived laden with four lights and yards of cable. As dusk settled, we carried various black canvas bags up into the cemetery, looking for all the world like grave robbers. The four traps were sited some distance apart, in clearings and along a track. Darkness came down at 9.45 and shortly after, the first moth arrived—the brimstone moth *Opisthograptis luteolata* L. Among others were the peppered moth *Biston betularia* L. (a melanic) and the waved umber *Menophra abruptaria* Thunb. one of which was the melanic form often found in the London area. By half past midnight, 33 species had appeared, but only in low numbers. It was decided to clear away and leave, and the gates were locked shut as we left at 1.30 a.m. Walking back home, it started to rain very lightly; a change in the weather which the moths had probably detected hours before and which had discouraged them from flying.

INDOOR MEETINGS

22 September 1988

Exhibits

Dr I.F.G. McLean showed a specimen of the sciomyzid fly *Pherbellia knutsoni* Verbeke taken on 9.ix.88 at Weeting Heath NNR, West Norfolk. Three males and a female were swept from sparse grasses in the rabbit enclosure part of the site. This is a nationally scarce fly with most records from Breckland heaths with a significant calcareous influence, although it has also been recorded from coastal dunes and calcareous grassland. At Weeting Heath this fly was not found in the area immediately to the north of the road, possibly because the sandy soil there supports fewer host snails. The larvae of *P. knutsoni* are parasitoids or predators of snails such as *Cochlicella acuta, Helicella caperata, H. itala* and *H. virgata*.

Mr I. Ferguson asked Dr McLean if there was a sciomyzid fly that would deal with the large black slugs in his garden. He was told that there was a widespread species, *Tetanocera elata* F. which might feed as larvae on this type of slug.

Mr A.J. Halstead showed an aggregation of empty cocoons attached to a stem of *Lonicera nitida* L. from Stockwood, near Bristol. The 98 cocoons were arranged at right angles to the stem and were piled four or five deep. They were believed to have been spun by larvae of a braconid wasp, *Protomicroplitis* sp., which is a parasitoid of moth larvae.

Dr J. Muggleton said he had seen in France a mass of cocoons similar to that shown by Mr Halstead.

Rev. D. Agassiz showed a series of the tortrix moth, *Cydia medicaginis* (Kuznetsov), which has recently been recognized as occurring in Britain. The larvae feed on lucerne and most of the specimens shown had been collected from Grays Chalk Quarry, Essex, with some from Southampton. The adults emerged in late June–July.

Prof. J.A. Owen showed a specimen of a scarce fly *Thereva lunulata* Zett. (Diptera: Therevidae). This was bred from a larva found in sand by the River Allen in Tyne and Wear on 11.vi.88. Also shown was a live larva of an unidentified therevid fly found at Thetford, Norfolk.

Dr McLean said that the therevid larva shown by Prof. Owen might be *Thereva nobiliata* but in would be necessary to rear out the adult.

Communications

Mr C. Plant reported that about 500 *Autographa gamma* L. had been taken at light on 10th September at Sizewell, Suffolk, together with some *Agrotis ipsilon* Hufn., *Phlogophora meticulosa* L. and *Nomophila noctuella* D. & S.

Mr R. Softly said that on the same night *Rhodometrea sacraria* L. had been seen at Ashburton, Devon, while Mr R. Morris said that *Agrius convolvuli* L. and *Spodoptera exigua* Hübn. were taken at Dungeness.

Dr I.F.G. McLean gave details of a meeting jointly organized by the NCC and the RES Eastern Region on 'Invertebrate Conservation' to be held on 30.ix.88. He also gave details of the dipterists' autumn meeting which is being held at Bideford, Devon, on 12–16.x.1988.

Lecture

Mr P.A. Sokoloff gave an account of the various strategies adopted by British moths and their larvae to avoid being eaten. These can be summarized under the

headings of mimicry, flash coloration, warning colours, hairiness, disappearing in flight, disruptive coloration, camouflage or various combinations of these. The speaker made the point that the protection provided by camouflage markings may be less real than is suggested by photographs taken of moths posing on suitable backgrounds in the studio. Little is known of the daytime resting places of moths but some species which apparently have camouflage markings are known to hide in places where they would not benefit from such markings.

13 October 1988

The Vice President, Prof. J.A. Owen, announced the death of Dr Gregory Houghton of Oxford.

Announcements

The Secretary, Dr J. Muggleton, announced that the Journal and details of the Annual Exhibition and Dinner were ready for imminent distribution. Members were urged to book early for the Dinner. A copy of this year's Christmas card depicting two red admirals was displayed.

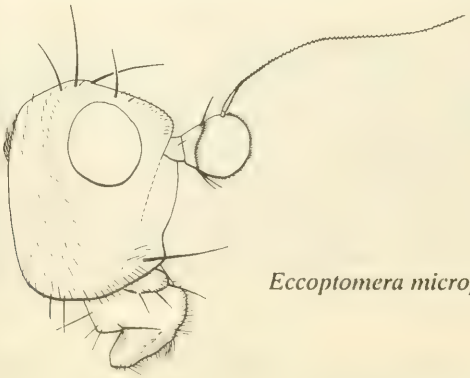
Lecture

Dr R. Angus gave an account of how chromosome studies can help in the recognition of species and the degree of variation within a species. His talk was based on his studies of mud beetles, *Helophorus* spp. There are a number of European species of very similar appearance which cannot always be separated. This is because the genitalia, which are of considerable taxonomic importance in this genus, can show variations in form across the geographical range of a species. By collecting specimens from various parts of Europe, Dr Angus has been able to separate some of these difficult species on the basis of their chromosome patterns.

27 October 1988

Exhibits

Dr I.F.G. McLean exhibited a female specimen of *Eccoptomera microps* Meig. (Diptera: Helomyzidae) taken in Hele Wood, Devon (SS 674 205) on 15.x.88 during the Diptera Recording Schemes' Autumn Field Meeting. The fly was taken by sweeping in this ancient wood which has some planted beech. It is normally found in



Eccoptomera microps Meig.

the nests of moles (*Talpa europea* L.) and, as far as the exhibitor was aware, this is the first occasion that this species has been taken by sweeping. This small yellow and grey fly has distinctive tiny eyes and deep jowls; these are features which have evolved independently in several families of flies where the species live in caves or the burrows of small animals. *E. microps* presumably has to come above ground level in order to colonize other mole nests but its fidelity to an underground existence is indicated by its eyes, which are smaller than in other *Eccoptomera* spp.

In response to questions, Dr McLean said that *Eccoptomera microps* probably mates underground rather than in the open air, and that the larvae feed on the nesting material of moles.

Dr McLean also displayed a copy of the Society's newly revised publication *A field guide to the smaller British Lepidoptera*.

Mr R.A. Jones showed some leaf bugs of the family Coreidae, found in Cairns, Queensland, Australia, in August 1988. Although superficially similar (if larger) to British coreids they, like many tropical species, have broad foliated hind legs. These appear to be used as rudders when flying, trailing behind the insect and giving good manoeuvrability (in comparison to some species with normal legs which have a rather clumsy direct flight).

Mr R. Softly showed a live specimen of the dark sword-grass moth, *Agrotis ipsilon* Hufn., taken in an actinic light on 26.x.88 at Hampstead. This was presumed to be an immigrant but was the only specimen taken this year by the exhibitor.

Announcements

Some copies of a leaflet giving guidance to importers of invertebrates, published by MAFF, were put on show by the Secretary.

Mr P. Baker displayed a copy of a report he had received from the Royal Entomological Society on the 1985 Project Wallace Expedition to Sulawesi.

Communications

Mr R.A. Jones reported seeing the hoverfly *Volucella zonaria* Poda on lavender at Basingstoke, Hants., on 27.vii.88. Mr S. Falk noted that females of this species are often migrants from the continent.

Mr R. Softly said that recent S/SE winds had brought specimens of the rush veneer moth, *Nomophila noctuella* D.&S. and the diamond back moth, *Plutella xylostella* L., to light in his garden at Hampstead. Mr I. Ferguson said that he had been taking *N. noctuella* for about a week.

Dr I.F.G. McLean reported seeing a specimen of the wall butterfly, *Lasiommata megera* L., on 18.x.88 at the Isle of Grain, Kent.

Lecture

The scheduled speaker was unable to give his talk but his place was admirably filled by Mr S. Falk who spoke on 'Flies in British woodlands'. He showed slides and gave details of many uncommon species associated with various habitats within deciduous and coniferous woods.

SHORT COMMUNICATIONS

Amateur Entomologists' Society Annual Exhibition, Kempton Park, 22 October 1988.—This year saw a change of venue for this entomological beano. After several years of problems with the previous site (Hounslow Civic Centre), over catering, cost and crowd control, Kempton Park Racecourse was finally chosen. A racecourse might seem an odd choice for an exhibition of any sort, but the halls under the grandstand, normally thronging with eager punters set on placing a bet, are quite extensive and it was here that the tables and placards were set out. On the day, the queues of punters at the Tote were replaced by queues of punters for the stands and the only jostling for position at the start was a very gentle shuffling in the queue as the doors opened at 11.00 to let in the crowds.

There was a little confusion on the faces of some people attending as they turned into the car park; for here they were met with large signs advertising the motorcycle parts and spares sale taking place in one of the other enclosures. The leather-clad bikers also looked somewhat askance at the obviously non-leather-clad characters clutching wooden store boxes, butterfly nets and piles of old books.

As ever, the main attraction was the trade fair of nearly 75 stalls selling equipment, books, livestock, set specimens, tee-shirts and mugs decorated with butterfly pictures, and other assorted fare. The usual display of exotic animals was put on by the enthusiastic St Ivo schoolchildren and members' exhibits were there even if slightly crowded out by fat toads and loose snakes.

According to those at the door, there were 1260 receipts; together with the exhibitors and stall-holders there were probably about 1400 people all together.

The BENHS had a stand, to attract new members and to promote and sell its publications. It was an exciting day for those manning the stand, as the Society's most recent publication—the second edition of Emmet's *Field guide to the smaller British Lepidoptera*—made its first public appearance. There had however been a slight dampening of enthusiasm when it was discovered that the printers had erroneously printed the cover in the same green as the first edition instead of the specified blue. Despite different illustrations on the front covers, this now made the two different books look rather too similar, especially the spine. There was even more anxiety when the first copy was examined, several of the pages were bound out of order! A hasty check of the others luckily proved this to be the only case of such a binding error; the rest were fine.

During the day the Society did a brisk trade in the new book, together with some sales of the last few reduced copies of the previous edition. Stubbs' and Falk's '*Hoverflies*' still proved popular and the Society's new Christmas card sold steadily.

Several new members were encouraged to join, and the stand played an invaluable role as a quiet meeting place amidst the general hubbub of the rest of the hall.—Richard A. Jones.

Postscript—Next year's AES Annual Exhibition is scheduled for 7 October 1989.

***Norellia spinipes* R.-D. (Diptera: Scathophagidae) in London**. — This species was added to the British fauna by Chandler and Stubbs (1969) on specimens taken from Surrey and Buckinghamshire. It has subsequently been recorded from new localities in Surrey, from Sussex (Chandler, 1970; Stubbs, 1973); Windsor Forest, Berks (Allen, 1983) and Middlesex (Smith & Vardy, 1988). I can now add records for London South of the Thames from specimens taken in Forest Hill, SE27 in 1987.

The records are as follows. One male was taken in a water trap containing detergent and formalin placed in secondary deciduous woodland on the Horniman Nature Trail adjoining the Horniman Gardens, Forest Hill on 5.viii.87. A second male was swept from low vegetation alongside the path on the trail on 25.ix.87. The ground flora by the side of the path at this site includes yarrow, stinging nettle, white deadnettle, coltsfoot, goosegrass and creeping buttercup whilst in the wood, ivy and bramble are dominant with a few daffodils also being present. The nature trail itself has been created on the railway embankment that formerly carried the line between Crystal Palace and Peckham.

A third male of *N. spinipes* was found amongst the dead insects in a fluorescent light holder in the nearby Horniman Museum. This was emptied and examined on 5.ix.87 and although the specimen was in very good condition, I understand that the fitting had not been disturbed for several months, so that no precise date can be attached to this specimen.

The species has larvae that mine the leaves of daffodils and pupate near the base of the plant. The daffodils on the nature trail have been planted by Lewisham Parks Department annually since the early 1970s and were purchased from a Dutch firm, J. Bonkenberg & Son based at Heemstadte. It is of particular interest to note therefore that of the few Dutch (and Continental) records, one is from Heemstadte—a female on 9.v.53 (de Jong, 1985). It has not been possible however to discover whether the daffodils on the nature trail were initially grown in the Netherlands or originally imported from elsewhere. It is difficult to resist suggesting however that the *Norellia* may have been introduced from here in the daffodils—the similar non-British *N. tipularia* was probably so introduced into the Netherlands in imported daffodil bulbs from Hungary (de Jong, 1985). Chandler and Stubbs (1969) considered that *N. spinipes* may have been introduced into this country in imported daffodil bulbs. It would seem unusual that such a distinctive species could remain undetected in this country for such a long time were it to be native.

My thanks to Peter Chandler for determining a specimen submitted to him and to Mr Chandler and Alan Stubbs for their comments. My thanks also to Denis Cousins (Lewisham Parks Department) and J. Bonkenberg & Son for information on the daffodils.—A. Godfrey, Nature Conservancy Council, Northminster House, Peterborough PE1 1UA.

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Chandler, P.J. 1970. A supplementary note on *Norellia* R.-D. (Dipt., Scatophagidae). *Proc. Trans. Br. ent. nat. Hist. Soc.* **3:** 12.

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Smith, K.G.V. & Vardy, C.R. 1988. A further British record of *Norellia spinipes* (Meigen) (Scathophagidae), from daffodils in Middlesex. *Entomologist's mon. Mag.* **124:** 242.

Stubbs, A.E. 1973. Exhibit. Meeting of 24 May 1973. *Proc. Trans. Br. ent. nat. Hist. Soc.* **6:** 89.

BOOK REVIEW

Pseudoscorpions by Gerald Legg and Richard E. Jones. 159 pp, Linnean Society of London/E. J. Brill, Leidin, £21.

Pseudoscorpions are fascinating little (in Britain no more than 4 mm) creatures. They resemble tiny tailless scorpions but although they are arachnids they are not closely related to scorpions. Their large pedipalps are chelate and in many species are furnished with poison glands. With these they capture and subdue their prey. Their chelicerae are also chelate and furnished with silk glands. Silk is used to build cells for protection during moulting and when caring for their young.

Pseudoscorpions are found in litter, under the bark of trees, in birds nests, under stones etc. and are by no means rare. They are found, for example, in the reviewer's Middlesex garden and have been seen on the bathroom wall making threatening gestures while she was cleaning her teeth.

This book gives a complete description of all 25 species found in the British Isles together with maps of the known distribution in Britain and lists of the other countries where the species in question has been found. As pseudoscorpions have been rather neglected the distribution maps probably map the students of pseudoscorpions rather than the actual species. First class drawings of the whole animal are given for all species, together with various other illustrations. These are much needed as reproduction in the pseudoscorpion is achieved with the aid of spermatophores and the genitalia are not as helpful in determining species as is the case with spiders, for example. The descriptions follow a set pattern, an admirable arrangement making it much easier to check particular details.

A key is provided about which I am not in a position to make any useful comments. It does look rather heavy going and one has to refer to illustrations which are part of the systematic descriptions. Thus to understand a couplet one frequently needs to consult two other pages, a tiresome process.

The early chapters name the main parts of the pseudoscorpion's body and describe the biology and typical life history. The chapter on collection, preservation and preparation gives sensible advice on collection and preservation, though here I might remark that many people store their spiders in ordinary household 'bottling jars' rather than 'museum jars', coffee or jam jars. No advice is given on examining or manipulating these tiny creatures under the microscope. However, this is a difficult thing to describe and those who wish to start a study of pseudoscorpions would no doubt be well advised to attend a field week (or weekend) on the subject.

There could be arguments about some of the species but that is to be expected in a subject like this! There are quite a few typos eg on p. 52 couplet 22, reference is made the lack of trichobothrium on tarsus VI!

£21 does seem very expensive for a short paperback book and the cost is likely to deter a number of people who would benefit from buying it. All the same, there is no comparable work and it is well worth having.

F.M. Murphy

ANNOUNCEMENTS

The Professor Hering Memorial Research Fund.—The British Entomological and Natural History Society announces that awards may be made from this fund for the promotion of entomological research with particular emphasis on: (a) leaf-miners; (b) Diptera, particularly Tephritidae and Agromyzidae; (c) Lepidoptera, particularly Microlepidoptera; (d) general entomology, in the above order of preference having regard to the suitability of candidates and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary to fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £350 in 1989/90.

Applicants should send a statement, if possible six copies, of their qualifications, of their plan of work, and of the precise objects and amount for which an award is sought, to Dr M.J. Scoble, Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD, as soon as possible and not later than 30 September, 1989.

Chequered skipper research.—We are currently undertaking a 3-year project to investigate the ecology and status of this rare and localized species in Scotland with a view to designing conservation measures for it. Consequently, all site records and observations of the behaviour of the species would be gratefully received. We would like to appeal to visitors to NW and central west Scotland in the May–June period to contact us for a standard site recording form. Information on dates and locations from specimens in collections would also be extremely valuable. All data will be acknowledged and used responsibly.—N.O.M. Ravenscroft and M.R. Young, University of Aberdeen, Department of Zoology, Tillydrone Avenue, Aberdeen AB9 2TN.

Errata

The Editor would like to apologize for a typographical error in the report of the meeting held on 28 July 1988, published *Br. J. Ent. nat. Hist.* 1988; **1:** 184. Lines 18 and 22, *frindolini* **should** read *fridolini*.

Br. J. Ent. nat. Hist. 1988; **1:** 23. Line 16, St Ives, Hunts, *should* read Ringwood, Hants.

Addendum

Chandler, P. 1988. Thirteen species of *Mycetophila* Meigen (Diptera: Mycetophilidae) new to the British list. *Br. J. Ent. nat. Hist.* **1:** 139–145.

The following references were accidentally omitted:

Kidd, L.N. & Ackland, D.M. 1970. *Mycetophila bohemica* Laštovka and *Dynatosoma nigromaculatum* Lundst new to Britain, and notes on other little known fungus gnats (Diptera, Mycetophilidae). *Entomologist* **103:** 10–17.

Dziedzicki, H. 1915. Atlas des organes genitaux (hypopygium) des types de Winnertz et des genres de sa collection de Mycetophiles. *Pub. Soc. Sci. Varsovie* **3:** 1–16, pls 1–21.

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Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

Authors of original papers of more than one page qualify for 25 free reprints. Extra copies (prices on application) must be ordered when proofs are returned.

MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 28th October 1989 at Imperial College, London SW7.

Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings.

The current Programme Card can be had on application to the Secretary at 32 Penton Road, Staines, Mdx. TW18 2LD.

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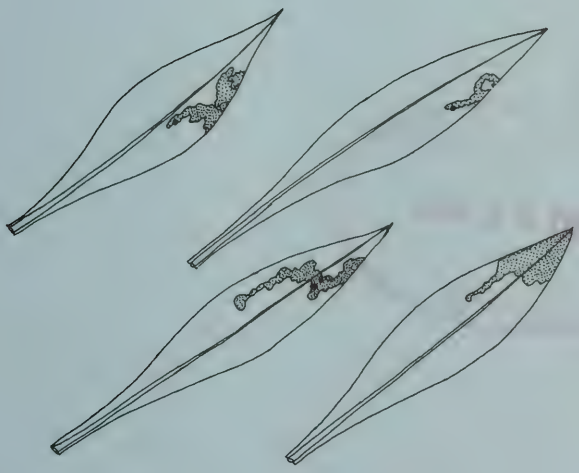

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1914–5 B. H. Smith, B.A., F.E.S. (dec.)
1916–7 Hy. J. Turner, F.E.S. (dec.)
1918–9 Stanley Edwards, F.L.S. etc. (dec.)
1920–1 K. G. Blair, B.SC., F.E.S. (dec.)
1922 E. J. Bunnett, M.A. (dec.)
1923–4 N.D. Riley, F.Z.S., F.E.S. (dec.)
1925–6 T. H. L. Grosvenor, F.E.S. (dec.)
1927–8 E. A. Cockayne, D.M., F.R.C.P., F.E.S. (dec.)
1929 H. W. Andrews, F.E.S. (dec.)
1930 F. B. Carr. (dec.)
1930 C. N. Hawkins, F.E.S. (dec.)
1931 K. G. Blair, B.SC., F.Z.S. F.E.S. (dec.)
1932 T. H. L. Grosvenor, F.E.S. (dec.)
1933 C. G. M. de Worms, M.A., PH.D., A.I.C., F.R.E.S., M.B.O.U. (dec.)
1934 T. R. Eagles (dec.)
1935 E. E. Syms, F.R.E.S. (dec.)
1936 M. Niblett (dec.)
1937 F. J. Coulson (dec.)
1938 F. Stanley-Smith, F.R.E.S. (dec.)
1939 H. B. Williams, LL.D., F.R.E.S. (dec.)
1940 E. A. Cockayne, D.M., F.R.C.P., F.R.E.S. (dec.)
1941 F. D. Coote, F.R.E.S. (dec.)
1942 S. Wakely (dec.)
1943 R. J. Burton, L.D.S. R.C.S.ENG. (dec.)
1944 Stanley N. A. Jacobs, F.R.E.S.
1945–6 Capt. R. A. Jackson, R.N. F.R.E.S. (dec.)
1947 L. T. Ford, B.A. (dec.)
1948 Col. P. A. Cardew (dec.)
1949 J. O. T. Howard, M.A. (dec.)
1950 Air-Marshal Sir Robert Saundby, K.B.E., C.B., M.C., D.F.C., A.F.C., F.R.E.S. (dec.)
1951 T. G. Howarth, B.E.M., F.R.E.S., F.Z.S.
1952 E. W. Classey, F.R.E.S.
1953 F. Stanley-Smith, F.R.E.S. (dec.)
1954 Stanley N. A. Jacobs, S.B.ST.J., F.R.E.S.
1955 F. D. Buck, A.M.I.PTG.M., F.R.E.S. (dec.)
1956 Lt-Col. W. B. L. Manley, F.R.E.S. (dec.)
1957 B. P. Moore, B.SC., D.PHIL., F.R.E.S.
1958 N. E. Hickin, PH.D., B.SC., F.R.E.S.
1959 F. T. Vallins, A.C.I.I., F.R.E.S. (dec.)
1960 R. M. Mere, F.R.E.S. (dec.)
1961 A. M. Massee, O.B.E., D.SC., F.R.E.S. (dec.)
1962 A. E. Gardner, F.R.E.S. (dec.)
1963 J. L. Messenger, B.A., F.R.E.S. (dec.)
1964 C. G. Roche, F.C.A., F.R.E.S.
1965 R. W. J. Uffen, F.R.E.S.
1966 J. A. C. Greenwood, O.B.E., F.R.E.S.
1967 R. F. Bretherton, C.B., M.A., F.R.E.S.
1968 B. Goater, B.SC., F.R.E.S.
1969 Capt. J. Ellerton, D.S.C., R.N. (dec.)
1970 B. J. Macnulty, B.SC., PH.D., F.R.I.C.S., F.R.E.S.
1971 Col. A. M. Emmet, M.B.E., T.D. M.A.
1972 Prof. H. E. Hinton, PH.D., B.SC., F.R.S., F.R.E.S. (dec.)
1973 J. M. Chalmers-Hunt, F.R.E.S.
1974 C. MacKechnie Jarvis, F.L.S., F.R.E.S.
1975 M. G. Morris, M.A., PH.D., F.R.E.S.
1976 W. G. Tremewan, M.I.BIOL.
1977 R. Tubbs, O.B.E., F.R.I.B.A., F.R.E.S.
1978 G. Prior, F.L.S., F.R.E.S.
1979 Rev. D. J. L. Agassiz, M.A.
1980 R. Fairclough, F.R.E.S.
1981 A. E. Stubbs, B.SC., F.R.E.S.
1982 J. Heath, F.R.E.S. (dec.)
1983 B. R. Baker, B.SC., A.M.A., F.R.E.S.
1984 P. A. Sokoloff, M.SC., M.I.BIOL., F.R.E.S.
1985 P. J. Baker, C.ENG., F.R.H.S.
1986 J. M. Chalmers-Hunt, F.R.E.S.
1987 Prof. J. A. Owen, M.D., PH.D., F.R.E.S
1988 I. F. G. McLean, PH.D., F.R.E.S.

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AN EMERGENCE TRAP FOR INSECTS BREEDING IN DEAD WOOD

By J. A. Owen

8 Kingsdown Road, Epsom, Surrey KT17 3PU.

The association of many insects with dead wood is well recognized. In many cases, however, details of the association are incompletely known or even quite lacking. One difficulty in studying the biology of dead wood insects is the problem of examining a piece of fallen timber without destroying what is being studied. Removing bark from a log or tearing the log apart may reveal whatever adult insects happen to be present at that time but the early stages of insects which are uncovered often cannot readily be identified and rearing them for identification can present great problems. The log, moreover, has now been destroyed.

One means of overcoming some of these problems is to keep the dead wood as it is found under as natural conditions as possible but to have it enclosed in such a way that any insects emerging are trapped. This note describes a prototype device for this purpose. Two such prototypes have been constructed and tested over a period of 12 months.

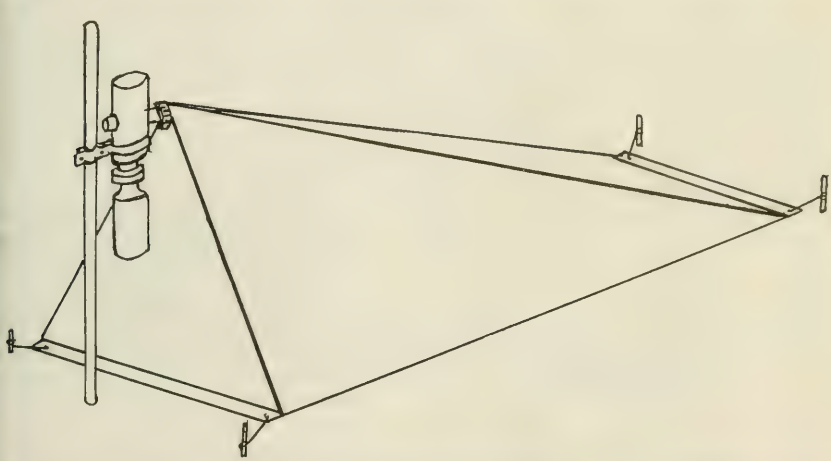

Fig. 1. The emergence trap, showing the base pegged out and the collecting head fixed to a pole and, in turn, supporting the apex of the 'tent'. For clarity, the guy ropes holding up the pole are not shown.

The device consists of a pyramidal netting 'tent' on a porous base with a collecting head fitted to the apex of the 'tent' (Fig. 1). The two prototypes are approximately 500 mm long by 900 mm high by 900 mm wide, but the dimensions of a trap to be used in a particular context will obviously depend on the amount of the dead wood being studied. The 'tent' is made from nylon netting with a mesh size appropriate to the size of the insects to be retained. The prototypes use netting supplied by Marris House Nets (54 Richmond Park Avenue, Bournemouth BH8 9DR). The four pieces which make up the 'tent' are joined appropriately together using 20 mm wide cotton tape to strengthen the seams. There is a hole at the apex of the 'tent' leading to the collecting head.

The material used in the prototypes for the base of the enclosure is closely woven polyethylene mesh such as forms the sheets ('Donkeys') used by gardeners for collecting garden debris (but see below). Similar material is used by carpet suppliers to parcel up rolls of carpeting. The lower edge of the 'tent' is sewn to the polyethylene mesh on two adjacent sides and, in use, fastened to the other two sides by means of 'Sew'n Stick' Velcro fastener. The self-adhesive strip of the Velcro is fastened to the base and the other strip is sewn to the two remaining lower edges of the 'tent'. The ends of the base are 50 mm longer than the tent to allow metal eyelets to be let into each corner. Short loops of cord are threaded through the eyelets to allow the base to be 'pegged out' and kept flat. The two prototypes have been in use for 12 months. The condition of the base after a year's exposure of the trap to the elements suggests that a more robust material will probably be necessary for long term use. The porous material 'Terram' (Imperial Chemical Industries) looks as if it may prove more suitable.

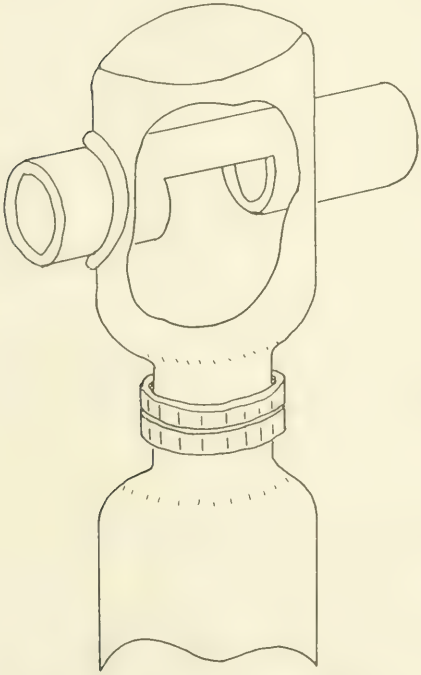

Fig. 2. The collecting head. In the figure, part of the wall of the upper container has been cut away to show the incised section of the perspex tube. The rubber bung sealing one end of the tubing and the Jubilee clip which holds the netting onto the other are not shown.

The collecting head is of the type widely used in Malaise traps. It is made from two screw-cap, wide-mouthed plastic containers (capacity 250 ml — from any camping shop) which are fastened together, one upside down above the other (Fig. 2). The two plastic caps are held together (top-to-top) by two small bolts with nuts and with plastic sealant (from a DIY shop) filling the dead space between them. A round hole (dia. 20 mm) is cut through the centre of the joined caps. When the containers are screwed onto the joined caps, they are held together and communicate via the hole in the joined caps. The upper container has a hole on each side diametrically opposite

to take a short length of clear perspex tubing (dia. 30 mm). The tubing is fixed into the container with a ring of plastic sealant against the outer wall of the container. One end of the tubing connects the apex of the net to the collecting head. The other is blocked off with a rubber bung. The connection to the 'tent' is made by sleeving the edges of the netting around the hole over the tubing and holding them in place by a 'Jubilee' clip.

Within the container, the lower wall of the perspex tubing is cut away over the centre portion (Fig. 2) so that an insect passing along the tube from the 'tent' falls into the collecting head when it reaches the cut away part of the tubing. The lower container holds an appropriate preservative, such as 50% alcohol. The collecting head is fastened to a short pole by an encircling alloy strip (Fig. 1), clamped to the pole by a nut and bolt on either side. The height at which the collecting head is fixed to the pole is adjusted to keep the 'tent' extended but not too taut. The pole is kept upright by three guy ropes.

The dead wood being studied is introduced into the trap with the free lower edges of the 'tent' held back and these edges then fastened down to the base by pressing together the Velcro strips. If the dead wood is heavy, pieces of dressed wood should be placed sideways across the base to even the pressure on it.

Obviously there are many ways in which the device described can be used to study dead wood insects. Thus the wood can have been dead and exposed to insects for a few months or for several years, before it is loaded into the trap. Alternatively, the attractiveness of dead wood to insects at different stages of decay could be examined by cutting timber live, keeping it protected from insects for a year or two and then exposing it for a period before putting it into the trap.

Choice of position for the emergence trap depends on the nature of the material being examined. A dead branch of a tree may get all the sun that shines whereas a dead branch lying on the ground in a wood with close canopy will get little or no sunshine. If material in the trap appears to be getting dry, it can be sprinkled through the net with water from a can or hose.

As an indication of the potential of this device, one trap loaded with pieces of fallen oak from Windsor Great Park in 9 months produced *inter alia* 130 beetles comprising 31 species whilst another trap loaded with Scots pine logs from the Loch Garten RSPB Reserve in 4 months produced 643 beetles comprising 12 species.

I should like to thank my wife for her usual patience and skill in constructing much of the device. Mr Ted Green procured the oak logs used in testing one prototype and Mr Stewart Taylor supplied the pine logs used in testing the other prototype and serviced the collecting head. Mr R. Locock very kindly supplied a sample of Terram.

BOOK REVIEW

The dragonflies of Europe by R. R. Askew, Colchester, Harley Books, 1988, 292 pages, 29 colour plates, £50, and **The dragonflies of Essex** by E. Benton, Essex Field Club, 1988, 138 pages, 3 colour plates, paperback, £5.95 (copies available from: M.W. Hanson, 28 Sylvan Road, London E7 8BN, p&p 55p).

Dragonflies have enjoyed a glut of books lately (see the reviews in *Proc. Trans. Br. ent. nat. Hist. Soc.* 1987; **20**: 118). This glut is both the cause and result of increased interest in the group. But for the most ancient of flying animals, it comes late; too late perhaps? The very near future will tell. Almost universally, dragonflies are associated with water in the larval stage, whether lakes, rivers, ponds or puddles, and are amongst the most vulnerable to the effects of pollution. Here are two books, both

furthering the one aim: to increase the interest in these beautiful and fascinating insects before it is too late.

Askew's work continues the splendid series of books from the House of Harley; it is well produced, authoritative, difinitive, has excellent colour plates from the author's paintings and is fully illustrated with figures of diagnostic characters and maps. After the introductory chapters on biology, morphology and distribution, 114 species are keyed out; most are illustrated in colour and all have a distribution map. These maps provide tantalizing detail and speculation. Surely *Lestes viridis* and *Sympecma fusca* could establish themselves in the relatively recent gravel pits at Rye? Keys to the larvae are also provided, and 11 pages of exhaustive references.

The text for each species gives details of description, biology, flight period and distribution and is by necessity concise. Nevertheless, I would have liked to have read and understood a little more about why such and such species occurs here and yet not there. Sometimes brevity is taken to extreme. The biology of *Gomphus simillimus* is dismissed in three words: "Restricted to rivers". Is this all there is to say about it?

With its profusion of paintings, drawings, keys, tables and descriptions, the book certainly succeeds as an excellent identification guide. But its rather flat style coupled with its abrupt content make it slightly less appealling.

Benton's book is completely different. It is only of local content (28 species), it is not particularly well printed (the text is faint in some places and the colour has been badly out of register in the several copies I have seen) and it is more concerned with local appearance than international identification. But it is brimming over with information, comment and anecdote, after the wonderful tradition of local lists.

Each species is discussed in depth, with distribution maps, tables and charts. Introductory chapters cover the general natural history of dragonflies and their habitats and occurrence in Essex. Concluding chapters cover old records, a history of dragonfly recording in Essex and an identification key to the 28 Essex species. The author's enthusiastic style is enjoyable and infectious, and being small, the book fits snugly into the pocket to read on the train.

It is useless to compare two such different books. They both set out with one aim—furtherance of the study of Odonata—which they both achieve admirably, if from different ends of the spectrum, and different ends of the bank account.

R.A. JONES

SPHINGIDAE OF THE CÉVENNES

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INTRODUCTION

Nineteen species of hawk-moth (Sphingidae) are recorded from the Cévennes (Central Massif). Most are recorded from the southern part, the Basse-Cévennes, particularly in the region of St Martial and the hamlet of Cabanevieille. The geology of the southern region comprises limestone pavement, granite, conglomerate and micaschist rising to 1567 m on Mt Aigoual. It lies within the *Parc National des Cévennes*. Most of the following observations have been made over the last 15 years.

FAMILY: SPHINGIDAE
SUBFAMILY: SPHINGINAE

1. *Agrius convolvuli* (Linnaeus, 1758)

Convolvulus hawk-moth; le sphinx du liseron, le sphinx à cornes de boeuf.

The species was numerous at light traps in August 1977, infrequent at same time in 1978 and never seen since. Professor H. Harant recalls that on the coast (about 50 km from the Cévennes) the adult frequents the strongly aromatic flowers of sea daffodil (*Pancratium maritimum*). In the Cévennes one of us (P.D.) has seen this crepuscular moth feeding at petunias in the evening during the end of August and beginning of September. Jacques Lhonoré has observed hundreds of full fed larvae swarming on sea bindweed (*Convolvulus soldanella*) on the dunes at Grau du Roi (some way from the Cévennes). This was about 15th September 1971. Larvae collected here, pupated on about the 22nd September and hatched on 3–5th October. There were no parasites. This provides some evidence that there are at least two generations of this moth in the region.

When disturbed the full-fed larvae stays still and curls up showing off its 'horn' and rear segments (Fig. 1). The effect is striking mimicry of a vertebrate face, possibly that of a snake.

2. *Acherontia atropos* (Linnaeus, 1758)

Deaths-head hawk-moth; le sphinx à tête de mort.

Known to us from only a handful of specimens to light, (e.g. 2nd September 1978) and twice since, according to local farmers the large larvae of this species used to be a familiar sight in potato fields at harvest time. However, extensive use of rotary cultivators and insecticides has probably been partially responsible for their decline. There have been few recent records of this magnificent moth: one larva was seen on the 28th August 1987; two pupae were found 10 cm deep in a potato field, during manual harvesting at the end of July 1987, and one adult hatched on the 5th August of that year.

The moth is associated with the honeybee; it has a short proboscis for penetrating honey cells and mimics the sound of queen bees' piping. Bee-keeping is a traditional industry in the Cévennes and there are hundreds of tree trunk hives as well as modern hives likely to sustain this requirement of the moth (see various articles in the *Revue du Parc National des Cévennes*).

Fig. 1. Larva of *Agrius convolvuli* curled up and showing off its 'horn'.

3. *Sphinx ligustri* Linnaeus, 1758

Privet hawk moth; le sphinx du troène.

Known from only two specimens; one at Sumene during August 1986, the other at Cabanevieille in 1987. Privet (*Ligustrum*) is mostly restricted to residential areas in the Cévennes and one would expect this moth in urban areas. A record of this moth in Le Vigan by M. Warnotte in 1977 confirms this.

4. *Marumba quercus* Denis & Schiffermüller, 1775

Oak hawk-moth; le sphinx du chêne.

Known from only three specimens; the first recorded by M. Warnotte at Le Vigan in 1977, the second by J.F. as a dead specimen found on 17th June 1987 at the roadside at the tiny village of Pegairolles-de-Bueges (just outside the Cévennes to the south in Herault). The area is at 397 m in fairly undisturbed holm oak (*Quercus ilex*) shrubby countryside, which, of course is typical habitat for this species. The third specimen arrived, surprisingly, at 02.30 hours on the morning of 11th June 1988 (P.D.) — a rare occurrence since it has never before been recorded at light here. This is the only *Marumba* species known in Southern Europe.

5. *Sphinx pinastri* (Linnaeus, 1758)

Pine hawk-moth; le sphinx du pin.

Known from only two specimens; one at Cabanevieille in 1983 by P.D., the other at Le Vigan by M. Warnotte in 1977.

6. *Mimas tiliae* (Linnaeus, 1758)

Lime hawk-moth; le sphinx du tilleul.

The lime hawk is widespread and common in the Cévennes, where it is a frequent

visitor to the m.v. light during early August. The earliest record of a moth was on the 5th April 1988, when one was seen drying its wings, some 20 metres from a lime (*Tilia × europaea*). This early record suggests that there are at least two generations of the lime hawk-moth, and perhaps three at lower altitudes (e.g. Sumene, Ganges, Le Vigan). The larvae probably also eat the leaves of alder (*Alnus glutinosa*) and nettle tree (*Celtis australis*) which are commoner than lime trees, but we have not seen any larvae on them.

The attractive silver lime (*Tilia tomentosa*) is a frequent shade tree used as avenues in towns and villages. It is doubtful that larvae feed on the leaves of this species as the plant probably does not have the necessary nutrients for active larval growth, or it has poisonous secondary plant substances. The light coloured leaves are due to a lack of chlorophyll and magnesium. The Cevenol people do not make tisanes from the flowers of the silver lime, as it is said to contain distasteful properties.

7. *Laothoe populi* (Linnaeus, 1758)

Poplar hawk-moth; le sphinx du peuplier.

Probably widespread, but apparently rare, it has been recorded at light during its second generation on the 17th and 22nd August 1978 and once again during 1983 by P.D. It probably has two generations, one in May, the other in the second half of August. The polymorphic form *rose* has never been recorded. Lhomme records the larvae eating *Paulownia*, *Catalpa* and *Spiraea* which are now increasingly found as ornamental species in town and village gardens.

Subfamily: Macroglossinae

8. *Hemaris tityus* (Linnaeus, 1758)

Narrow-bordered bee hawk-moth; le sphinx gazé; le sphinx bombyliforme.

The larva has been photographed in June feeding on *Galium* at Monoblet to the south east of the Cévennes. Its broad pink bars are highly characteristic. Jacques Lhonoré has recorded this species as more abundant during the first generation at the end of May, than the second. Specimens are sometimes seen at the end of April. Patrick Ducros has seen the moth flying in the Vallée du Bonheur at Camprieu on 11th July 1988. One fine specimen was seen at Sannisac (near Sumene) on 28th August 1983 nectar-feeding on scabious (*Knautia* sp.).

9. *Hemaris fuciformis* (Linnaeus, 1758)

Broad-bordered bee hawk-moth; le sphinx gazé, le sphinx fuciforme.

An infrequent moth whose larvae are said to feed on *Scabiosa* and *Knautia*. Like the previous species it is, according to Jacques Lhonoré, more abundant during the first generation. Several adults were seen by one of us (J.F.) near Alzon (800 m) on 21st June 1988 feeding repeatedly at viper's bugloss (*Echium vulgare*). In the Bouches de Rhone (Provence) 100 km away from the Cévennes, Hanson noted that this moth was very local.

10. *Macroglossum stellatarum* (Linnaeus, 1758)

Humming-bird hawk-moth; le moro-sphinx, le sphinx du caille-lait.

An abundant diurnal moth of the Cévennes. It is also crepuscular and flies on warm evenings after sunset and early in the morning. Larvae have been recorded (by J.L.) feeding on cleavers (*Galium aparine*) in La Vallée de la Jonte, near Le Rozier, on 8th May 1985.

Flower-feeding is its speciality. It seems to have a preference for purple-coloured

flowers though this is not that clear cut. For instance, in August 1983 we recorded it feeding at the following purple flowers: mallow (*Malva* spp.), thistles (*Cirsium* spp.), buddleia (*Buddleja* sp.) and aubergine (*Solanum melongena*) even as late as 21.00 hours. It also went to red–purple valerian (*Valeriana officinalis*), red willowherbs (*Epilobium* spp.) soapwort (*Saponaria officinalis*) and marjoram (*Origanum vulgare*). But it was also recorded at the white flowers of basil (*Ocimon sp.*), calamint (*Calaminta* spp.) and blue hydrangea (*Hydrangea*) as well as the white and pink flowers of bramble (*Rubus* spp.). Jacques Lhonoré has observed the species often feeding on viper's bugloss — the viperine — (*Echium vulgare*).

The humming-bird hawk-moth is an extremely active feeder coming back frequently to the same flower or doing a round of flowers, then darting off at high speed. Periods of flower-feeding are often followed by periods of quiescence. It spends much time searching for a place to rest, usually on the vertical face of a stone wall. But it does not spend much time here and it is soon off again seeking nectar.

The moth hibernates in the dry stone walls of which the Cévennes has thousands of miles on the terraced hillsides, in corners of windows in houses and in factories. Moths are on the wing from the beginning of March when they reappear from hibernation. From then on there are probably two or three generations since the moths may be seen continuously until November. In the warmer lowlands of Provence, Hanson (1946) noted it as on the wing 'all year'. It comes to light too.

Miriam Rothschild (1980) notes that the humming-bird moth is a very palatable species. This is presumably why it is has cryptic coloration and flies fast and in a darting manner, to avoid predators. At night it is said to be eaten by bats. In the Cévennes bats are, fortunately, still very common and most houses have them in roofs, granaries, outhouses and cellars.

11. *Proserpinus proserpina* Pallas, 1772

Willowherb moth; le pterogon, le sphinx de l'epilobe, le sphinx de l'oenothere.

We know this moth from only one specimen — a caterpillar collected during Easter 1982 at Cabanevieille subsequently gave rise to a crippled adult in May–June 1983. This species is noted as a rare moth in central and southern Europe. The larvae feed on evening primrose (*Oenothera* spp.) (Stanek, 1977) and willowherb (*Epilobium rosemarinfolium*). It is typically a species of limestone regions.

12. *Hyles euphorbiae* (Linnaeus, 1758)

Spurge hawk-moth; le sphinx de l'euphorbe.

This is one of the commonest hawk-moths of the Cévennes, and a pretty one, which may be seen at dusk along roadside verges and on the *garrigue* hovering beside flowers and sipping nectar. This latter behaviour we have only observed in September, presumably for adults of the second, or third generation. Such crepuscular behaviour has never been seen in July and August.

The aposematic larvae are often very common on spurges, most frequently on the tall and impressive *Euphorbia characias* their red, black and white warning colours defying predators. In the spring, larvae are often seen on the cypress spurge (*E. cyparissias*), whilst later in June they have been observed on wood spurge (*E. amygdaloides.*).

Freshly emerged larvae are often seen as groups on spurge leaves, but as they become larger they disperse. When one finds one large larva, other single larvae are frequently found nearby. The bright warning colours of the fully fed larva permit it to feed on its foodplant in the face of potential predators such as lizards especially the green lizard (*Lacerta viridis*) and the common wall lizard (*Podarcis muralis*).

No doubt the poisonous alkaloids of the food plant are stored in the larval skin as chemical defence. In 1922 Lhomme recorded plenty of larvae at La Molene along the Tarn in the North of the Cévennes during July. Larvae have been found by J.F. in July and again in September and adults are frequent visitors to light in August.

13. *Hyles nicaea* (de Prunner) 1798

Le Sphinx nicea.

This species is only known to us from two specimens we caught on 14th July 1984 at Cabanevieille. It is very similar in colour and pattern to the spurge hawk-moth, but it is very much larger. One specimen had a wingspan of 99 mm, compared to two examples of *E. euphorbiae* at 58 mm and 77 mm. It is a fine-looking and powerful species which originates from North Africa and the Iberian Peninsula. It is likely that there is also a small resident population of this species in the warmer coastal regions of the Gulf du Lion.

The moth is cited from the following Cévennes localities by Lhomme; Ales, Le Vigan, Anduze and Uzes. Larvae feed on a variety of spurges like *E. esula, E. characias*, and *E. nicaenois*.

14. *Hyles gallii* (Rottemburg, 1775)

Bedstraw hawk-moth, le sphinx de la garance.

Known only from one larva photographed in June 1986, the adults had never been recorded at light. It is said to feed on *Rubia tinctorum, Galium verna* and *Epilobium* spp., all of which are common in the Cévennes. Jacques Lhonoré notes that the larvae much prefer *Rubia peregrina* and *R. tinctorum* than *Epilobium* spp.

15. *Hyles livornica livornica* (Esper, 1780)

Striped hawk-moth; le livournien, le sphinx orangé.

Known from only three specimens, all to light; the first on 19th August 1977 at Cabanevielle, the others at Sannisac (1980) and at Cabanevieille. A strong migrant from Africa, this species hardly ever penetrates the mountainous Cévennes. It is noted as being very common in certain years in the Midi of France (which is a warmer area to the south-east) and may be seen either in May–June or August—September (Harant & Jary, 1983). The French name for the moth is taken from the region of Italy called Livourne.

16. *Hyles vespertilio* Esper, 1779

Mouse hawk-moth; le sphinx chauve-souris, le cendré, le sphinx vespertilio.

Known only from only two specimens to light on 14th July, 1979 and 14th July 1984, both at Cabanevieille. The species is probably under-recorded since it is very similar in size, colour and pattern to the spurge hawk-moth.

17. *Deilephila elpenor* (Linnaeus, 1758)

Elephant hawk-moth; le grand sphinx de la vigne.

This is not a common moth in the Cévennes. It has been recorded only as two specimens, both at light, the first on 22nd August 1978, the second in 1985; both at Cabanevieille. Surprisingly it is not often encountered as larvae in the vineyards, but transparencies of a larva eating grape leaves have been made during June. Persistent use of insecticides and copper sulphate in the cevenol vineyards has probably dramatically reduced the numbers of this species. Larvae also feed on *Epilobium, Fuchsia* and *Galium*.

When molested by predators the fully-fed larva puffs up its anterior end when

disturbed showing off vertebrate-like false eyes. This is interpreted by Miriam Rothschild (1980) as mimicking a small snake. In the Cévennes there are always numerous Grass snakes (*Natrix natrix*) and rarely there are Montpellier snakes (*Malpolon monspessulanus*) (one small dead one, 12 cm long, has been brought in by the cat).

18. *Deilephila porcellus* (Linnaeus, 1758)

Small elephant hawk-moth; le petit sphinx de la vigne, le petit pourceau.

This is common in comparison to the previous species. Sometimes during June to August there may be two or three resting on the white sheet illuminated by the moth light every night. It is on the wing until September. The species is also recorded on Mt Aigoual by M. Warnotte during 1977.

19. *Smerinthus ocellata* (Linnaeus, 1758)

Eyed hawk-moth; le sphinx demi-paon.

This species is known to us from only one specimen at Cabanevieille caught during 1985.

Discussion

Nineteen species have been recorded for the Cévennes over the last 15 years or so. Most have been recorded from the Basse-Cévennes which represents only a small part of the mountainous Cévennes. No previous records of sphingids exist at the Park headquarters in Florac. Due to the relative lack of recorders in the Cévennes, it is likely that one or two more species and new localities will be identified in the future. Tony Pittaway, author of the forthcoming book on hawk-moths of the Western Palaearctic, believes that two further species should be found in the Cévennes (they are recorded for the region in general). These are *Hyles hippophaes* and *Daphnis nerii*. *H. hippophaes* is a rather local and elusive moth confined to areas where its larval food plant, *Hippophae rhamnoides* grows. However, the food plant is not noted from the Cévennes.

A rare migrant to the Cévennes may well be the oleander hawk-moth (le sphinx du laurier-rose *Daphnis nerii* (Linnaeus, 1758)). It has been recorded in Provence by Hanson in 1946. The larvae feed on oleander (*Nerium oleander*), which with white, red and pink flower forms is a popular plant for sheltered patios and as a pot plant. It survives well in the lowlands around the Cévennes, but is subject to frost in the mountainous Cévennes, anywhere above about 300 m. It does not grow wild, and this therefore limits any breeding potential of the larva. Larvae have been recorded from small periwinkle (*Vinca minor*) which does however, occur widely in the Cévennes. The moth is recorded from only eight stations in Spain.

Nineteen species represents a very high percentage (83%) of the total of 23 species listed in France by Leraut (1980). Lhomme (1923–35) lists 22 species for France. The 'extra' species mentioned by Leraut is the Corsican subspecies of *Hyles euphorbiae*, now regarded as a true species, endemic as well. it also represents a very high proportion (70%) of the 27 sphingids recorded from Europe by Pittaway (1989). Biogeographical Europe in this context includes the Urals, Black Sea, Bosphorus and Caucasus.

The Basse-Cévennes contains five species more than recorded from the Dordogne (400 km to the north) by Dufay (1955). Only 21 sphingids are listed for the Iberian Peninsula by Gomez Bustillo and Fernandez Rubio (1976).

The commonest sphingids in the Basse-Cévennes are the humming-bird hawk-

moth and the spurge hawk-moth. It is perhaps surprising that so many sphingids are recorded from the Basse-Cévennes, since much of it is wild countryside dominated by *Quercus ilex, Castanea sativa* and open areas of limestone pavement. *M. quercus* is notable in being scarce, though this may be because it is shy of lights or simply under-recorded. One would expect it to be common.

It is significant that *D. elpenor* and *S. ligustri* are not common, since they often prosper in urban areas (at least in England). It is also surprising that *H. pinastri* is only recorded from two specimens since so much forestry has been creeping into the Cévennes over the last decade, both on Mt Aigoual to the south and Mt Lozère to the north. Perhaps this species will increase in the future at the expense of the other species.

At least half of the sphingids recorded are known from only a handful of specimens. Some of these can be explained because they are migrants a little off their main areas (e.g. *H. l. livornica* or *H. nicaea*). The latter species has a marked coastal distribution around the Mediterranean coast of Spain. Increased mechanization of agriculture in the Cévennes is probably responsible for the decline of *A. atropos*. Turning the soil with a hand pick has so often now been replaced by the rotivators, with dramatic consequences for the larvae and pupae.

There has been a general decline in sphingids in the Basse-Cévennes and some of this has been attributed to habitat loss (e.g. forestry), increased mechanization on farms and the use of agrochemicals. Although sphingids are not mentioned, it is perhaps worth drawing attention to the review of the declining fortunes of invertebrates as discussed by Bernardi (1986), since much of it is relevant to sphingids.

Much of the Basse-Cévennes are now encompassed in the Parc National des Cévennes (PNC) where restrictions on collecting are in effect for the 'inner' park, rather than the periphery. This list of sphingids has been passed on to the Park headquarters at Florac for their records. Conservation of any habitat relies upon first knowing which plant and animal species are there in the first place. The PNC would be happy to receive other lists on any group.

Acknowledgements

We would like to thank Dr Jacques Lhonoré of the University of Paris, for kindly reading and commenting on earlier versions of this manuscript and advising on dates and species, and to Claude Warnotte of Oupeye, Belgium for permission to cite from his personal lists of the area. We would also like to thank Ralph Hobbs of Hastings for rearing the willowherb hawk-moth from a larva brought back from the Cévennes. Finally, we would like to thank Tony Pittaway of the Commonwealth Agricultural Bureau Internal Institute of Entomology, Didcot for his comments.

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GYPSIES ATTACK FOREST – OR IS IT ACID RAIN?

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Driving through the semi-natural forest, or *garrigue* of southern France in June 1988 I was astonished to find huge tracts of land apparently suffering from a very severe attack of acid rain. This seemed mysterious since the Languedoc is not noted as being a recipient of pollutants from the east or north, even if the Mistral, and the other 50 named winds are blowing. But yet, hectare upon hectare was completely defoliated.

The area observed was from Ganges (Gard) to the outskirts of Montpellier (Hérault), a distance of 35 km (22 miles) and was at least 9 km (5 miles) wide. Much of this land is rugged and wild and I was not able to ascertain whether the damage was more extensive than I saw. The effects of acid rain, I thought, had suddenly come to the Languedoc, and taken us all by surprise. After all, some suspected effects of acid rain have been recorded not far away on Mt Aigoual.

However, on closer inspection the culprits were found to be larvae. The trees were covered from top to bottom with larvae, fine webbing, yellow egg masses on the trunks and limbs, and pupae dangling in groups, or singly, festooning the leafless trees by the thousand, as if deliberately decorated as Christmas trees. There were large pupae and little ones, which would turn out to be respectively the large-abdomened females and the smaller males. They were, of course, all of the gypsy moth (*Lymantria dispar*) a perennial scourge along the seminatural forests of the Mediterranean.

The gypsy moth larvae were effectively defoliating quite a number of tree species, but they clearly had their likes and dislikes. They were not completely catholic in their choice. The dominant trees of the area are the evergreen or holm oak (*Quercus ilex*) and these had been thoroughly defoliated, creating an eerie landscape. It looked like a deciduous woodland in winter but it was summer, and the trees were meant to be evergreen!

Other trees defoliated included the deciduous white or downy oak (*Quercus pubescens*), elm (*Ulmus* sp.), wild pear (*Pyrus pyraster*) and Mediterranean buckthorn (*Rhamnus alaternus*). Surprisingly the hairy larvae had defoliated the turpentine tree (*Pistacia terebinthus*), and were apparently immune to its turpentine oils. Possibly they were sequestering the oils for their own defensive advantage. The turpentine tree is a typical species of the south, and breaking any leaf, fruit or stem, releases aromatic and disagreable odours.

In this wilderness of apparently dead oaks, there were other trees and shrubs left completely untouched, presumably those unpalatable or which the larvae could not exploit, perhaps thwarted by their toxins. These included common box (*Buxus sempervirens*) — which contains alkaloids, white mulberry (*Morus alba*) and strawberry tree (*Arbutus unedo*). Spurges, especially the metre-high *Euphorbia characias* which contains milky white alkaloids were also left completely untouched.

Larvae were everywhere, swarms of them, not just in the woods. Roads were gathering a veritable paté of larvae as they wandered in ceaseless numbers from the countryside. I suspect that the larvae were also eating the tall 'London' planes (*Platanus* × *hybrida*) (though not completely defoliating them), since in village squares the caterpillars were swarming over tree trunks, dusty paths and seeking refuge on walls, under arches, doors and windows, anywhere to lie up, spinning

flimsy transparent covers in which to pupate. Old men were out with broom handles, killing all larvae on sight, especially around door frames. One man told me of the perennial menace of these annoying insects — every 3 or 5 years.

With such a concentration of larvae, ideal opportunities exist for parasites and hyperparasites. A selection of mature larvae brought back to England resulted in a number of parasitic Hymenoptera and Diptera. These were kindly analysed by Dr Mark Shaw of the Royal Museum of Scotland. One very large ichneumonid turned out to be *Theronia atalantae* (Poda) — a male. This species is incredibly rare, if not extinct in Britain. However, it is commoner in Europe, but still scarce. Of interest was the presence of a large chalcid, a male *Brachymeria intermedia* (Nees) which was obviously making its own successful depredations on *dispar* pupae in the wild. In America this same species has been used to control *L. dispar*. There were various tachinids present too.

Seeing the 100% defoliation on the holm oaks, one assumes that it might be fatal to the trees. However, by August the trees had flushed out another set of leaves, albeit, not a thorough covering but enough to photosynthesize and survive. If the gypsy moth occurs like this two or three times every decade, there is no evidence that the trees are dying from repeated defoliation. They seem to be as healthy as ever. The holm oak, in any case, is a thoroughly drought-tolerant species and has, therefore, adaptations to restricted growth in its physiology.

The effectiveness of the larvae to colonize new blocks of semi-natural forest is perhaps aided by their powers of dispersal, for gypsy moth larvae have been sampled at 600 m when upper levels of the air have been trawled. There are other features which help to make the gypsy moth a very successful insect. Adult females attract mates on emergence using their powerful pheromones. The gregariousness of the larvae makes up for the adults which do not have mouthparts and cannot feed. Mating and egg-laying done, the perfunctory role of the adults is completed. In captivity adults do not fly but sit around, sometimes vibrating their wings, like a *Bombyx* silkmoth, but going nowhere.

Defoliating larvae of various species have always been a nuisance in the South of France. The Michelin guide to the Côte d'Azur (1985) describes a problem with larvae in the 16th century at the Roman village of Contes (north of Nice, Alpes-Maritimes). This prealpine village was so overrun with larvae (species undisclosed) that the tribunal issued an order banning them to exile. Apparently the larvae obeyed and never returned. Staying in the village last year, I imagined that it may have been the work of the pine processionary moth, *Thaumetopoea pityocampa* since there are still many native pines in the region (Aleppo, stone and maritime). Professor H. Harant (1983) is a little more helpful in that it was apparently the Bishop of Nice who damned the larvae to hell in 1508. He also mentions that plagues of grasshoppers were legislated against by the Parliament of Aix in 1545 and 1596.

On a similar note on the rapaciousness of insects Lady Hanbury (1938) recounted a legend of the pine processionary moth. With her husband, Sir Thomas and his brother Sir Cecil, they gardened just over the French border at Ventimiglia at the famous La Mortola gardens. She had over 500 larval nests removed from her own arboretum which included Aleppo and Canary Island pines. But of the legend she says that larvae used to devour the crops on Cimiez hill (just outside Nice) and the local farmers sought the help of a very pious monk at the Monastery. The jolly friar attracted the caterpillars with a bell, book and candle. He cursed and excommunicated them and finally drove them across the valley of the Paillon to Grammondo. He also compelled them to change their diet, and to eat pine needles. From the monk the larvae retained the habit of walking in procession.

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BOOK REVIEW

Grasshoppers and Allied Insects of Great Britain and Ireland. Judith A. Marshall and E.C.M. Haes. Harley Books, 1988, 252 pages incl. 12 colour plates. £25.

A Sound Guide to the Grasshoppers and Allied Insects of Great Britain and Ireland. J. F. Burton and D. R. Ragge. Harley Books, 1988, cassette tape, 30 minutes. £5.75.

The trickle of fine entomological works from Harley Books is threatening to become a flood, with dragonflies in hot pursuit of spiders and caterpillars, and grasshoppers leaping along behind. It is rumoured that even the long-awaited volume on butterflies will appear shortly.

The present volume is a comprehensive treatment of the grasshoppers, crickets and bush-crickets of the order Orthoptera (or Saltatoria) in its narrow sense, together with stick-insects, cockroaches, mantids and earwigs, all formerly included within the Orthoptera.

All native species and established aliens are covered in depth. The Channel Islands are included, and contribute two additional species of grasshoppers. One chapter is devoted to discussing the exotic species that may be imported with plants or fruit, or escape from captivity, while four probable migrant species are also illustrated. Readers may be surprised to find stick-insects and mantids included in a book of British insects, but the praying mantis is represented by one specimen that may have migrated here, and the stick-insects by three species from New Zealand established in the West Country and the Scilly Isles, together with the familiar laboratory stick-insect, occasionally escaping but unable to establish itself permanently.

The book fills the gap left when D. R. Ragge's excellent *Grasshoppers, crickets and cockroaches* went out of print. The authors state that they have set out to update and supplement Ragge, and in this task they have succeeded magnificently. The last twenty-odd years of research and recording have been incorporated, and coverage is extended to include the earwigs. Study of these insects has been largely neglected owing to their very meagre representation in the British Isles, and it is good to see them here.

Some chapters are by specialist authors: J. F. Burton on recording the sounds of Orthoptera, and R. & C. Foord on their photography. Dr Ragge has contributed the interesting and lucid account of the distribution and history of the British Orthoptera from his earlier work, with slight alterations. A beginner to the group might have a problem here, since in this chapter the insects are referred to predominantly by their English names, but by their scientific names in the rest of the book. The problem is solved neatly by the provision of a bilingual bookmark that lists English and scientific names side by side. In any case the authors recommend that both sets of names be used, no difficult task in so small a group.

In the scientific names, a conservative classification is followed, and the few departures from the currently standard Continental works of Harz are argued carefully and logically. One of the English names has been changed — on Dr Ragge's

advice. The common field grasshopper has been renamed the field grasshopper, since it is now known to be not a particularly common insect in Europe. It seems questionable that the Continental distribution should affect the English name, and also, to quote Ragge's own words from his earlier work justifying the use of English names, '. . . they are readily understood by the layman and are not subject to the periodic changes that affect so many Latin names'. However when a change is made in such an authoritative work, it must of course be accepted.

Only a small part of the book, but worthy of special mention, is the advice given for the pronunciation of the scientific names. Instead of the heavily anglicized pronunciation previously in vogue, it is suggested that we use elements of the classical Latin pronunciation in order to be understood by the rest of the world, and this advice is followed on the companion tape of orthopteran sounds. The idea that we should meet the Continentals halfway in establishing a common pronunciation of these names that is universally understood, is both praiseworthy and novel.

There is a great wealth of information in this book, so it is all the more surprising that no song diagrams have been included. Instead we are referred to the companion cassette for the songs of the insects. The Orthoptera Recording Scheme has been in existence for over 12 years, and the number of records arising can be seen in the distribution maps, which are given in both 10km square and vice-county versions. Further data from the recording scheme is incorporated into chapters on typical habitats for Orthoptera throughout the British Isles, and outstandingly rich sites which are concentrated in the climatically favoured south of England. Photographs of a dozen rich habitats are included.

The plates by D. W. Ovenden are superb in their meticulous attention to detail. Each plate consists chiefly of related insects in a similar posture, but slight variations in the positions of antennae and legs render the insects most life-like and one forms the distinct impression that they are about to leap or crawl off the page.

The study of this numerically small but important and interesting group of insects can be recommended to all entomologists, and all who take up this study will find this work an essential handbook for many years to come.

R.D. Hawkins

PLATYPALPUS BIAPICALIS WEBER (DIPTERA, HYBOTIDAE) NEW TO BRITAIN

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Among numerous specimens of the common *Platypalpus pallidiventris* (Meig.) and *P. longiseta* (Zett.) collected during a survey for the Nature Conservancy Council was a single female of the very similar *P. biapicalis*. Weber (1972) described this species from Hungary, and Kovalev & Chvala (1985) have since recorded it from several localities in Czechoslovakia.

Platypalpus biapicalis ongs to the *pallidiventris–cursitans* groups (Collin's (1961) group 8, Chvala's (1975) group IX). It shares with *P.pallidiventrus* and *P.longiseta* the unique combination of three notopleural setae and black dorsal setae on the anterior and posterior tibiae. The males are easily separable using genitalia characteristics which are illustrated by Collin (1961) and Weber (1972). The specific epithet *biapicalis* presumably refers to the two broad, shallow excisions on the distal margin of the left lamella. The anal papillae of *biapicalis* are both broadly rounded lamellae lacking the pronounced asymmetry found in those of *pallidiventris* and *longiseta*. The front tarsi of male *biapicalis* are indistinctly annulate.

Dry pinned females of the trio are less easily separated. In my experience, a reliable but indistinct character used by Collin (1961) to separate the two well known species is the colour of the third anetennal segment. In *pallidiventris* it is entirely black whereas in *longiseta* it has a yellowish base. Identifications based on this character have been confirmed by examining differences in the genitalia. The antenna of *P.biapicalis* may have either colour pattern though in my specimen it is entirely black. However, female *biapicalis* may be separated from the other species by the conspicuous hairs towards the lateral margin of the abdomen. These are almost as long as the tergites and on the postero-lateral margin of the eighth tergite they form a pronounced fan-like cluster. The equivalent hairs in the other species are inconspicuous. Also, the seventh tergite is shiny with two broad dust bars that do not meet medially; in the other species, this tergite is entirely dull.

Conspicuous differences between the females of all these species are visible in the last two abdominal segments of specimens that are preserved in alcohol or in slide mounts of these segments. The features are also discernable in dry specimens in which these segments have been extended while still fresh, though some care is needed in interpreting the differences between *P.pallidiventris* and *P.longiseta* because dry dusting obscures the distinction between sclerites and membranes. The differences are summarized below and are figured.

	biapicalis	*pallidiventris*	*longiseta*
Tergite VII	completely sclerotized	partially membranous	medially membranous
Tergite VII	mostly membranous dorsally	entirely sclerotized	entirely sclerotized
Sternite VII	quadrangular	elongate	elongate

Kovalev & Chvala (1985) describe *P.biapicalis* as a lowland species with some captures from poplar and willow foliage along a large river and from bushes by a forest margin. My specimen was swept at Aunt Mary's Bottom, near Rampisham in Dorset (NGR ST546023) on 10 July 1987. The habitat was seepage fen with a slight calcareous influence near wet woodland and sallow carr. The dominant plants were

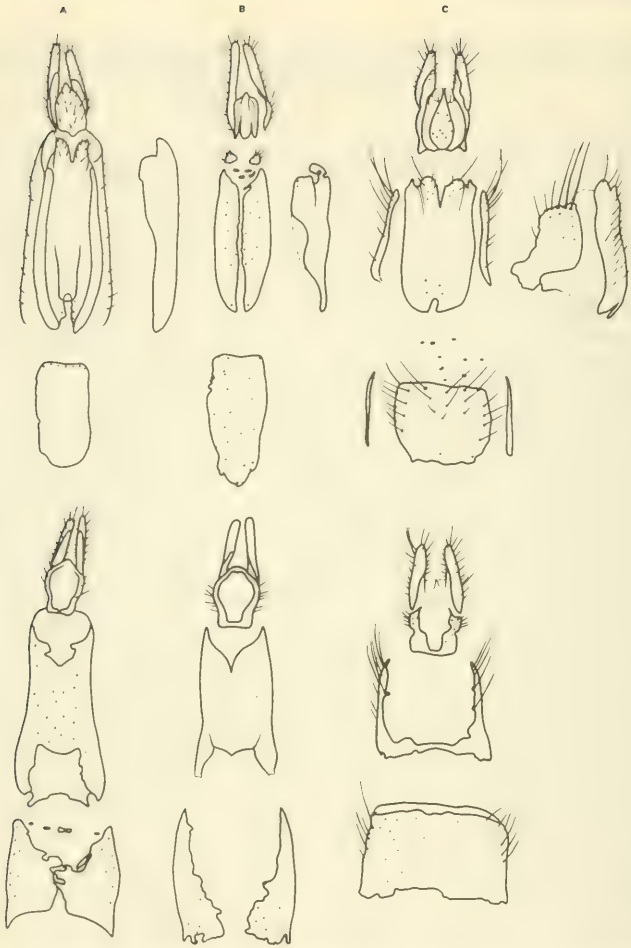

Fig. 1. Terminal abdominal segments of *Platypalpus* females. Sternites 7–9 and segment 8 in lateral view (above) and tergites 7–9 (below). (A) *P.pallidiventris*; (B) *P.longiseta; (C) P.biapicalis*.

Carex and *Juncus* spp forming tussocks interspersed with bare peat. Other frequent plants were *Equisetum* sp, *Angelica sylvestris* L., *Pulicaria dysenterica* (L.) and *Galium uliginosum* L. *Platypalpus fasciatus* (Meigen) was also recorded here.

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OBITUARY

Peter Noel Crow

Peter Crow was a lepidopterist of the old school. He had a wealth of field experience and was always willing to draw upon this in helping others. Despite promptings to put pen to paper, he published very little, preferring open discussion in which to state his often forthright views. For many years he held the view that the professional entomologist lacked the field expertise of the amateur, but in later years one sensed an easing of this stance.

Of stocky build and broad of shoulder, he was a fine sportsman and played hockey at county level; yet there were times when illness belied his apparent good health and he retired from the banking world in his middle years. His keen business sense was however still put to good purpose and for many years he served as treasurer to the *Entomologist's Record*, Lancashire and Cheshire Entomological Society, and the joint committee set up expressly for the protection of the large blue butterfly.

Born in Leicestershire he later lived in Berkshire and then Hertfordshire where he received much help from the late Dr C. B. Williams at Rothamsted. Having lived mainly in digs during his professional life Peter was much appreciative of the offer of temporary storage space for his cabinets at Rothamsted and, later, at Reading Museum where he also gave valuable help on the collections. Certain notable Diptera and Lepidoptera collected in Berkshire and now in the collections at Reading bear witness to Peter's industry for he had set up home in the town in 1967 before finally moving to North Wales to spend his last 19 years.

Those early Welsh years were possibly his happiest — a time when he walked the hills finding many new localities for *tullia* and *aurinea* and discovering *Eriozona syrphoides* a syrphid new to Britain.

The final years at Dolafon were clouded by ill health when chronic osteoarthritis caused him much distress. However, even at these times he would still enjoy talking of days in the field — his delight at finding *plumigera* eggs in mid-winter — of nights down the Smugglers Cliffs for larvae of *craccae* — and of a particularly heavy night at Dungeness following which he nodded off and drove into the Royal Military Canal. Heedless of other items in the car he gave eternal thanks that his set of Buckler's 'Larvae', high on the back seat, were undamaged. "Remarkable" he would say with a twinkle, "because the car was full of fish!"

His wide ranging collections of Lepidoptera, Diptera and Hymenoptera have gone to Glasgow and Liverpool and bear witness of a dedicated, knowledgeable and friendly companion of the field.

B.R. Baker

The later years

During the sixties Peter Crow acquired a small chalet-type bungalow, Dolafon, in the extensive grounds of what was later to become the Plas Tan-y-Bwlch study centre. Set back amongst the trees on a hillside overlooking Maentwrog, the river below, a small lake just over the hill behind, this proved an idyllic holiday home with an under-recorded insect fauna in the surrounding countryside to be investigated. He was very proud of his discovery of the handsome hoverfly *Eriozona syrphoides* in August 1968 and published several notes on the species, but, regrettably, very little on his other captures locally.

After taking early retirement he moved permanently to Dolafon and made many

collecting trips to North Wales localities such as Harlech dunes, Cader Idris, or, further afield, to Newborough Warren. However, as the years went by the isolation of Tan-y-Bwlch proved to have its disadvantages. Most of the nearby bungalows were not occupied continuously and it must have been quite a lonely existence at times during the long winter months. Increasing ill-health and several operations on a painful knee joint were perhaps the cause of an irascibility which at times proved a strain on social relations.

I first knew Peter Crow as a member of the North Wales Naturalists' Trust and our common interest in insects was a point of contact during his time in North Wales. Some years before his death I spent an afternoon with him while he showed me his treasured specimens. Every beautifully set butterfly had a history and he remembered clearly the exact place and circumstance of its acquisition, who was with him and how long it took to capture. One of his worries as the years went by was what was to happen to his beloved collections and the topic was raised with several of us. Sadly, he never made a final decision and a nephew who works abroad and spends limited time in Britain was left with the problem of disposal. Fortunately he realized the importance of the main cabinets and the Diptera and Lepidoptera are now safely installed at the Liverpool and Glasgow Museums respectively. A small number of store boxes was put on one side locally but everything else ended up in two skips at the roadside! Inquisitive neighbours later raided these and, as a result, 66 boxes are now in my possession. An interesting sidelight on Peter's character then came to view — he was an enthusiastic frequenter of auction sales. As well as a variety of domestic bric-a-brac from crockery to bird-cages and small items of furniture, numerous boxes of Lepidoptera, British and foreign, had thus originated and still bear the lot numbers. Amongst the specimens can be seen the labels of A.E. Gardner, Tait, F. Smith, F.W. Sherman and others. But alas, many insects are without data of any kind and suffering from long neglect.

Entomologists are a rare species in North Wales and it is sad to see the number of this small group diminished. Peter Crow died in November 1987. He never married.

M. Joan Morgan

INDOOR MEETINGS

10 November 1988

Exhibits

Dr I.F.G. McLean showed specimens of the sucker *Trioza chenopodii* Reuter (Homoptera: Triozidae) found on 18.x.88 at Stoke Saltings, Isle of Grain, Kent. They were noticed alighting on the exhibitor's clothing and yellow lunch box. They were the short-winged form *autumnalis* and none of the long-winged summer form *aestivalis* were found. *Trioza chenopodii* is associated with the plants *Chenopodium, Atriplex* and *Haliomione* and, according to the Royal Entomological Society key to the psyllids, it is uncommon in England north to Northumbria.

Mr A.J. Halstead showed a male specimen of the sawfly *Aprosthema melanura* Klug (Hymenoptera: Argidae). It was swept from low growing vegetation along former watercress beds at the RSPB reserve at Fowlmere, Cambs., on 1.vi.88. It is a very scarce species, apparently only previously known from a few sites in Berks. and Hants. The larvae feed on *Lathyrus* spp. such as *L. pratensis* and *L. tuberosus*. Males of this sawfly and the two other British representatives of the sub-family Stericti-phorinae have very distinctive bifurcated antennae, giving them the appearance of having four antennae.

Mr R.A. Jones showed a male and female of the woodwasp *Xiphydria camelus* L. (Hymenoptera: Xiphydriidae) taken on 27.vii.77 at Heathfield, East Sussex. They were found in the company of about 50 others in a fallen birch trunk from which they were on the point of emerging. The larvae of this local species bore in the wood of birch and alder.

Mr R.D. Hawkins exhibited a live specimen of a ladybird, provisionally identified as *Sospita 20-guttata* L., collected at Meissendorf in north Germany. It was found resting between bound up aspen leaves near a lake on 26 September and had been kept in cool conditions without food since then.

Prof. J.A. Owen showed a pair of the elaterid *Ampedus ruficeps* (Muls. & Guil.) (Coleoptera: Elateridae) reared from larvae found in the red rotten wood of an old oak in Windsor Great Park in August, 1986. The larvae, like those of other *Ampedus* species, pupated in July and the adults eclosed in September, 1988. Surprisingly, adults were found to be active nocturnally at this time, unlike other *Ampedus* species which remain dormant in their pupal chambers until the following summer. Whether this unusual behaviour is due to rearing in captivity remains to be determined.

This species was added to the British list in 1937 by A.A. Allen who found a single adult at Windsor. Nothing further was seen of the species until April 1984 when the exhibitor found what is now known to be a larva in a tree not far from the original site. Unfortunately, the ability of the larvae to hide inside extremely small pieces of wood was not realized at the time and the larva was lost. However, in August, 1986, clearly recognizable fragments of this species were found by the exhibitor in a nearby tree and eventually live larvae were found. At exactly the same time, Mr Howard Mendel found two pupae in another nearby tree from which he reared an adult. Subsequently larvae were found to be present in a number of large pieces of old oaks brought down by the storm in October, 1987. Unfortunately, the species appears to be restricted to the open parkland at Windsor and most of the fallen timber found or likely to have held larvae of this species has by now been cleared away. The practice of clearing fallen timber in this part of the Great Park continues. A photograph was shown taken at the site on 5.vii.88 showing the usual fate of a fallen oak bough—a heap of logs and a smouldering fire [see comment below].

Windsor Great Park, 5.vii.88, showing the usual fate of a fallen oak bough—a heap of logs and a smouldering fire. Photo: J. A. Owen

Mr P. Waring showed some larvae of the dingy footman, *Eilema griseola* Hübn. found amongst piles of cut fen vegetation at Woodwalton Fen during an unsuccessful search for larvae of the marsh moth, *Athetis pallustris* Hübn. He also showed a series of colour transparencies on the conservation of the Essex emerald, *Thetidia smaragdaria* F., a species protected under the Wildlife and Countryside Act. During 1987 and 1988 the NCC has surveyed likely places on the Kent and Essex coast looking for larvae. Eleven larvae were found in October 1987 at only one site and these were taken into captivity and reared individually on southernwood (*Artemisia abrotanum*). The larvae adorn their bodies with hairs and other fragments taken from the food plant. It was noted that at ecdysis the caterpillars would pick these fragments off their old skins and transfer them onto the new skin. The larvae eventually produced seven adults from which two pairings were achieved. One hundred and thirty-three small larvae are now overwintering and it is hoped that the experience gained from this project will enable the Essex emerald to be reintroduced into its former sites [see comment below].

Comments on the exhibits

The President referred to the continuing difficulty in getting the estate workers at Windsor Great Park to allow at least some of the fallen timber to remain. The NCC have had discussions on this point with the Crown Estates but it remained an unresolved problem. He welcomed the encouraging results of the Essex emerald breeding project and said that there would be a display on this work at the Annual Exhibition. Larvae of the Essex emerald were being raised on *Artemisia abrotanum* rather than the usual host plant, sea wormwood (*A. maritima*), since the former is easier to grow as a pot plant. Mr Waring was asked if released stock might have difficulty transferring to or laying eggs on sea wormwood. He replied that this did not appear to be a problem, although there was a possibility that bred stock might have a lower fecundity compared with moths reared on the natural food plant.

Communications

Although it had generally been a quiet autumn for migrants, Mr P. Waring said that small marbled, *Eublemma parva* Hübn., the delicate *Mythimna vitellina* Hübn., the white-speck *M. unipuncta* How., and the scarce bordered straw, *Heliothis armigera* Hübn. had been seen in Devon. About four specimens of the very infrequent migrant, the Scar Bank gem, *Ctenoplusia limbirena* Guen., had been seen in September near Faringdon, Oxon.

Mr R.D. Hawkins said that about 40 specimens of the desert locust had been reported in the Scillies and south-west England.

Mr S.L. Meredith described the larvae he was finding in sweet chestnuts which he presumed were imported. They were possibly beetle larvae and it was suggested that he should attempt to rear out the adult stage.

Lecture

Dr D.A. Sheppard gave an account of British sawflies. This group of nearly 500 species has been much neglected by most entomologists and as a consequence some widespread species are still undescribed as larvae. The larvae are similar in appearance and habits to those of the much more popular Lepidoptera, but are more difficult to rear due to their habit of overwintering as prepupal larvae rather than pupae. Dr Sheppard described the history of sawfly study in Britain and highlighted the work of Peter Cameron in the late 19th century and Robert Benson in more recent times. The newly formed Sawfly Study Group hopes to launch a recording scheme shortly and there is the prospect of an Aidgap key to sawfly genera being available soon in test form. Anyone interested in sawflies was urged to join the Study Group, c/o Dr D.A. Sheppard, 10 Stainfield Road, Hanthorpe, Bourne, Lincs, PE10 0RE.

24 November 1988

Exhibits

The President, Dr I.F.G. McLean showed a female specimen of the window fly, *Scenopinus fenestralis* L. (Diptera: Scenopinidae), taken 14.vii.85 in his house at Brampton, Cambs. It has long thin larvae that prey on the larvae of clothes moths and carpet beetles. In the wild it is likely to be found in the nests of birds and small mammals, but is more usually taken on windows, as implied by the fly's common and specific names. Linnaeus, when describing the species, wrote 'Habitat in Europe, frequens in fenestris'.

Mr R.A. Jones showed the exuvium of a large Cicada found on the base of a large 'tree-grass' trunk at Cairns, Queensland, Australia, on 17.viii.88. The adult insect had emerged through a long slit from the base of the abdomen, up across the thorax and head, and down either side of the frons. The minute details of the vertex and frons and of the enlarged front legs were perfectly preserved in the dried skin, although of course, the wings were represented only by small buds.

Mr R.D. Hawkins showed specimens of two European chrysomelid beetles. *Cryptocephalus octopunctatus* Scop. was taken on brambles on 30.vi.88 at Arrens in the French Pyrenees. Its colour and markings resemble those of some ladybirds and it may benefit from this mimicry. The other species was *Agelastica alni* L., taken at Meissendorf, north Germany, on 27.ix.88, where it was common on alder leaves. Although *A. alni* is on the British list, it has not been seen this century and is now presumed to be extinct in Britain.

Announcements

Mr C.B. Ashby announced that a transcript of the lecture given by Mr P. Sterling on 'Coppicing for conservation' at the joint meeting with the London Natural History Society, had now been published in the November 1988 edition of *The London Atalanta*. Copies of this newsletter of the Ecology and Entomology section of the LNHS were made available at the meeting.

Report and discussion on the Annual Exhibition and Dinner

The attendance book at the Annual Exhibition was signed by 195 members and 90 visitors. This was an increase on the 1987 hurricane-affected exhibition and was similar to the attendance recorded in 1986 at the Old Town Hall, Chelsea. One hundred and eighteen exhibits were staged, some of which consisted of several display boxes. The Diptera was particularly well represented this year, with a number of scarce species being recorded. The dull summer had adversely affected the collecting of British Lepidoptera but a good migration late in the season produced some interesting records. Coleopterists seemed to have had an average season while the Hymenoptera and other orders, with a few exceptions, were not well represented. The Dinner was enjoyed by 66 members and guests.

In the discussion on the Exhibition, the general consensus was that everything had gone smoothly and that the Sherfield Hall at Imperial College had again proved to be an excellent venue. Useful suggestions were made concerning the seating arrangements, the nature of the food provided during the day, and means of promoting the event to entomologists and other naturalists who are not members of the society. Exhibitors of small insects were urged to mount them high up in the display case so that they would be within range of a hand lens when viewed through a glass lid. Next year's Exhibition and Dinner will be held on 28th October 1989 at Imperial College.

Slide evening

The lanternist, Mr M. Simmons, opened the session by showing a slide depicting the name of the society. This had been prepared by Catrina Ure and she was thanked for providing this.

Enoplognatha ovata on small web built in trumpet of *Sarracenia alata* in a Middlesex garden. Photo: F. M. Murphy.

Mr R.A. JONES showed a series of slides of the cuckoo wasp, *Notozus panzeri* F., described in his article in the Society's Journal (1988; **1:** 189). He also showed slides of the tortoise beetle, *Cassida viridis* L. as larvae, pupae and adults.

Mrs F.M. MURPHY showed slides of two species of parasitoid flies, one confirmed and one believed to be *Ogcodes* spp., bred from spiders in Arizona and Kenya. She also showed slides of spiders taken at home and abroad, including some British spiders that had spun their webs inside the funnel-like leaves of the insectivorous plant, *Sarracenia*.

Mr D. WILSON showed a series of slides of some plume moths and their larvae. Also shown were the larva of the silky wainscot, a male adult reed leopard moth, storm damage in Orlestone Forest and some potential migrant moths and butterflies photographed in Majorca in late October 1988. Two transparencies taken by Mr Wilson of the more notable Lepidoptera and other insects at the Annual Exhibition were shown. These will be printed as plates in a future edition of the Society's Journal.

Dr I.F.G. MCLEAN showed slides of a number of flies in their natural habitats, some of which were taken during a visit to the Spey Valley in July. Also featured was Lurcher's Gulley on Cairn Gorm, which is threatened by a proposed ski-lift development.

FIELD MEETINGS

Fowlmere RSPB Reserve, Cambs., 27 August 1988

Leader: **A. J. Halstead.** The reserve, which was purchased by the RSPB in 1977, consists of former watercress beds which now have extensive reed beds with hawthorn scrub and some woodland and chalk grassland. During the day the leader was joined by two members, with three others attending in the evening. Two local Microlepidoptera were noted, *Coleophora siccifolia* Staint. and *Stigmella paradox* (Frey). The latter was first recorded as British in 1969 at Wicken Fen. The beetle *Anthocomus rufus* (Herbst) was swept from low vegetation. After a good start the evening became rather cool when the clouds disappeared at about 11 p.m. This limited the catch at lights but reed bed moths such as *Archanara geminipuncta* (Haw.), *A. dissoluta* (Treits.), *Photedes pygmina* (Haw.) and *Arenostola phragmitidis* (Hubn.) were present in good numbers.

Chobham Common, Surrey, 17 September 1988

Leader: **P.J. Baker.** A small but select gathering enjoyed a few hours on the Albury Bottom area of the common. Possibly due to the inclement season *Heliothis maritima* (Gras.) seemed to be restricted to its most regularly favoured haunts, where a number of larvae were located. Other larvae were found, some quite commonly, as indicated below.

The only butterflies seen were a couple of aged specimens of *Hipparchia semele* (L.) and *Orgia antiqua* (Ochs.) was also seen in flight. One hardy member ran lights on the Longcross segment of the common, recording *Xestia castanea* (Esp.), *X. xanthographa* (D.&S.) and *Photedes pygmina* (Haw.).

Larvae recorded were as follows. Birch: *Notodonta dromedarius* (L.), *Pheosia gnoma* (F.), *Ptilodon capucina* (Hübn.); *Salix* spp: *Phalera bucephala* (L.), *Harpyia furcula* (Clerck); *Ulex minima*?—certainly fed up on the flowers—*Chlorissa viridata* (L.); *Erica tetralix*: *H. maritima* (Gras.), *Pyrrhia umbra* (Hufn.); *Erica/Calluna* complex: *Ceramica pisi* (L.), *Macrothylacia rubi* (L.), *Eupithecia nanata* (Prout), *E. goossensiata* (Mab.), *Semiothisa clathrata* (L.), *Pachycnemia hippocastanaria* (Hübn.), *Lycophotia porphyrea* (D.&S.), *Anarta myrtilli* (L.), *Xestia castanea* (Esp.), *Dasychira fascelina* (L.) and *Alcis repandata* (L.).

SHORT COMMUNICATIONS

***Hofmannophila pseudospretella* (Stainton) breeding in commercial slug killer.**—Sokoloff (1989) briefly recorded breeding this species from slug pellets. We report here a similar occurrence. Early in 1988 J.L. opened up a biscuit tin in which he had stored a quantity of a commercial slug killer (trade name Draza). This had not been disturbed for about 5 years. Inside were found a large quantity of larvae and some adult moths. These were identified for us as *H. pseudospretella* by Dr Adrian Riley of Rothamsted Experimental Station.

The original label on the slug killer described it as 'metaldehyde with an animal repellant'. We are not sure if the moths were completing their development on the metaldehyde, or whether there was bran or similar mixed with the slug pellets to act as a slug attractant. The colony had died out by January 1989.

The larvae of *H. pseudospretella* are known to feed on seeds, dried plants, wool, skins, dead insects, frass, books etc (Emmet, 1979). It is an unusual turn to have a pest species living entirely on a pesticide!—P.R. Holmes, Nature Conservancy Council, Plas Gogerddan, Penrhyncoch, Aberystwyth, Dyfed SY23 3EE, and J. Lewis, Hafod-y-Bryn, Bryn Road, Aberystwyth, Dyfed SY23 2 EJ.

References

Emmet, A.M. (ed.) 1979. *A field guide to the smaller British Lepidoptera*. BENHS, London.
Sokoloff, P. 1989. Exhibit at BENHS Annual Exhibition. *Br. J. Ent. nat. Hist.* **2**, 41.

***Trachys troglodytes* Gyllenhal (Coleoptera: Buprestidae) widespread in the Cotswold limestone grasslands of Gloucestershire.** — This beetle has always been regarded as something of a rarity despite the general frequency of its larval foodplant devil's-bit scabious throughout Britain. Recent investigation of its distribution in the unimproved limestone grasslands of the Cotswold Hills however suggests that here at least it is widespread and occurs largely wherever its foodplant is plentiful in the sward.

It was first discovered in Gloucestershire by E.G. Neal, who found two adults at Marsden (SP 010120), 20.vi.1943, where also I.S. Menzies found "4 or 5 on leaves regularly on summer afternoon, 1944–45" (Atty, 1983). These remained the only records for the county until P.J. Hodge (pers. comm.) found it while sieving moss and dry grass in an area of scrubby grassland on the Bathurst Estate near Cirencester (SO 973045), 22.v.1983, and it has been found there subsequently by I.S. Carter (pers. comm.), 31.vii.1984.

I visited the latter site, 24.viii.1988, to look for the larval leaf-mines on the foodplant and successfully found a number which were occupied by buprestid larvae. Spurred on by this success, I subsequently visited a number of Cotswold grasslands where devil's-bit flourishes, and again readily found buprestid larvae in leaf-mines at each. The sites are: Rodborough Common (SO 856038), 29.viii, St Chloe's Green (SO 848019), 7.ix, Oakridge Lynch (SO 911032), 8.ix, Oakridge (SO 916031), 16.ix, and Ravensgate Hill (SO 982185), also 16.ix. The relative ease with which these additional localities were found strongly suggests that the species is widespread on the Cotswolds, and that searching for the larval leaf-mines in late summer and early autumn—when the devil's-bit is in flower and easily spotted—is much the most productive way of discovering whether or not the species is present on a particular site.

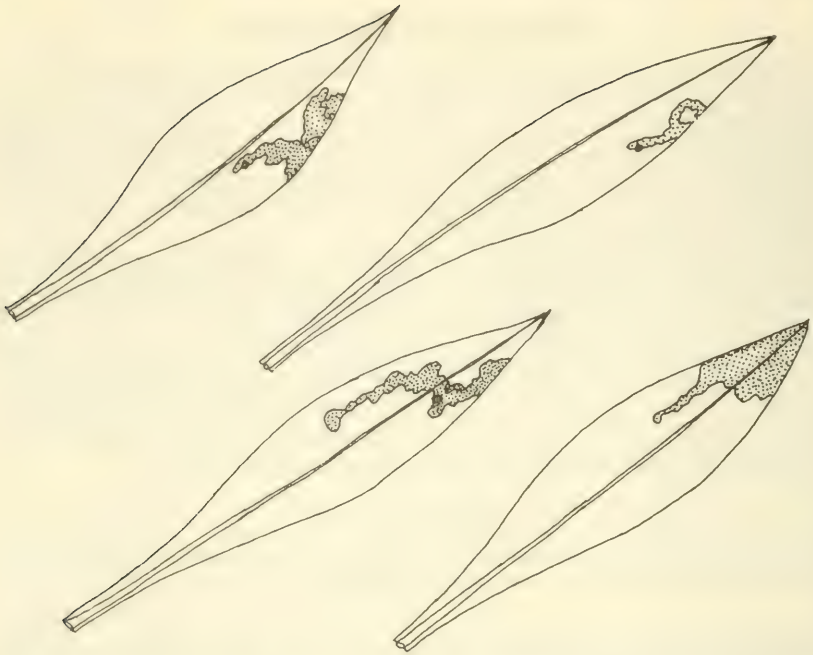

Fig. 1. Various leaf-mines of *Trachys troglodytes* found on devil's-bit scabious in Cotswold grasslands.

The leaf-mine is of a generally characteristic form, being a full depth blotch, occasionally elongated, and generally with a shiny black spot at the start of the mine (J. Robbins, pers. comm.)—see Fig. 1. As other insect species produce leaf mines on devil's-bit scabious, the identification should be confirmed by checking that the larva inside the mine is a *Trachys* sp.—one is illustrated in Bily (1982).

My thanks to D.K. Clements for his illustration of various *Trachys troglodytes* leaf-mines, to J. Robbins for the use of his *Provisional keys to the identification of the British leaf-miners*, and to P.J. Hodge and I.S. Carter for the details of their unpublished records.—K.N.A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

References

Atty, D.B. 1983. *Coleoptera of Gloucestershire*. Published privately, Cheltenham.

Bily, S. 1982. The buprestidae (Coleoptera) of Fennoscandia and Denmark. *Fauna Ent. Scand.* **10.**

A second Gloucestershire locality for *Macroplax preyssleri* (Fieber) (Heteroptera: Lygaeidae). — A single *Macroplax preyssleri* was taken on Daneway Banks (SO 941038) in the Cotswold Hills, 28.iv. 1989, by sieving moss and grass litter on a steep south-east facing slope. The turf was open, with patches of bare ground amongst the tufty sward. Common rock-rose was plentiful — the bug is believed to be associated with this plant. The only other known locality in the country is Rodborough

Common, where Askew (1985) found it in 1983, and where I have also taken it — one swept on a steep south-west facing slope, 30.v. 1985.

The species is listed as 'endangered' in the Red Data Book (Shirt, 1987) on the basis that it was only known from two localities on the Mendip Limestone: Brean Down and Dolebury Warren. The subsequent discovery of the bug on the Gower Limestone and at Rodborough Common (Askew, 1985), together with the present record, suggest that it may be widespread in suitable situations on the Limestone of South-west Britain.

Daneway Banks, like all the other sites, is an SSSI, and is managed as a nature reserve by the Gloucestershire Trust for Nature Conservation. — K.N.A. Alexander, 22 Cecily Hill, Cirencester, Glos GL7 2EF.

References

Askew, R.R. 1985. *Macroplax preyssleri* (Fieber) (Hem.,Lygaeidae) in Gloucestershire and South Wales. *Entomologist's mon.Mag.* **121:** 8.

Shirt, D.B.(ed.) 1987. *British Red Data Books: 2.Insects.* Nature Conservancy Council, Peterborough.

BOOK REVIEW

Tephritid Flies (Diptera: Tephritidae) by I.M. White. Royal Entomological Society of London, Handbooks for the Identification of British Insects vol. 10, part 5a. 1988. British Museum (Natural History), London. £12.00 (£8.40 to Fellows of the RESL).

The Tephritidae are a family of flies whose varied larval associations with plants, combined with the attractive appearance of the adults (typically with patterned wings—a scarce feature among British Diptera) have made them popular with entomologists. However, until the publication of this Handbook there have been great difficulties for the British student aspiring to identify our species accurately. Most dipterists have struggled with a combination of the generic key by Collin (1947) which is not illustrated, supplemented by the wing plates and keys to species by Séguy (1934), now somewhat outdated taxonomically speaking. It is therefore very pleasing to be able to recommend this new RESL Handbook, which in 134 pages and with the aid of 286 figures (including 64 wing plates) sets out clear identification keys and presents detailed biological information on our fauna. A total of 73 British species are treated, together with a few other species which have emerged from imported fruit but have not become established here.

A brief introduction places the British fauna in a European and world context, and this is followed by a useful discussion of the biology of the family. Sections on parasitoids, pest species, biological control of weeds, and collecting and rearing, all provide interesting background information, as well as references for further reading on these aspects of the family. The 'Methods of study' section is comprehensive and self-contained, and this will be of considerable help to those dipterists taking up studies of Tephritidae for the first time, or indeed to entomologists commencing work on flies with the aid of this handbook.

Few misprints were noted: on p. 19 line 4 'main' should read 'male', p. 20 line 4 the figure number should read 176 not 175, p. 28 line 2 the figure number should read 223 not 22, p. 31 line 12 an extra 'g' has slipped into 'oranges', and on p. 92 figure 63 the hind femur of *Rhagoletis alternata* is shown in anterior (not posterior) view to illustrate the strong anteroventral subapical seta.

I found the keys work well with a variety of species, and special mention should be

made of the line drawings which are very clear and well-executed, showing the dignostic features with just the right amount of detail. The wing plates are sensibly arranged by the type of pattern, rather than in taxonomic sequence, and because of this beginners will be encouraged to try to match their specimens with the appropriate photograph. I found that annotating the plates with the species name under each individual wing photograph, and adding the page number for the main reference to the species in the keys, speeds up use of wing patterns to home in on a tentative determination. As is general with this series, the illustrations are grouped together towards the rear of the book, and although this works well for the block of wing plates, facilitating rapid comparison of patterns, many of the line drawings would be easier to refer to if they were set out alongisde the keys. In my opinion it would have been helpful to have included the months of adult occurence within the brief descriptive section for each species in the keys.

In addition to the excellent keys to adults, there are keys to puparia in selected hostplants, and a table of pupal characters, which will be of particular interest to those conducting biological investigations of our species. A comprehensive appendix lists known hostplants of British Tephritidae, sensibly distinguishing British from foreign rearing records. A second appendix gives the tephritids associated with different plants, briefly indicating the larval biology, and this is followed by a third appendix summerizing the life history data for the British fauna.

Altogether this is an excellent handbook which should do much to stimulate further studies of the biology and distribution of our Tephritidae, and it is strongly recommended both to experienced dipterists and to those new to flies, or considering starting with this order, for whom it will be a reliable and stimulating guide.

References

Collin, J.E. 1947. The British genera of Trypetidae (Diptera) with notes on a few species. *Entomologists Rec. J. Var.* (supplement) **59:** 1–14, 39.

Séguy, E. 1934. Diptères (Brachycères) (Muscidae Acalypterae et Scatophagidae). *Faune de France.* **28.** 832 pp. Paris.

I.F.G. McLean

BOOK NOTICES

Fauna Entomologica Scandinavica, Leiden, E.J. Brill.

Volume 18. **The Hydrophilidae (Coleoptera) of Fennoscandia and Denmark** by Michael Hansen. 254 pages, 4 colour plates, £27.00, 1987.

Covering the families Hydraenidae, Sperchidae, Hydrochidae, Georissidae and Hydrophilidae, this book fills an important gap in the recent literature. The larger and more difficult genera *Ochthebius, Hydraena, Helophorus* and *Cercyon* are dealt with carefully and expertly. Most of the keys use external characters with genetalia figures for confirmation. The book contains 136 species, including (sadly) only 109 of the 122 British species, nevertheless it succeeds in being an excellent and useful addition to any library.

Volume 19. **The Sarcophagidae (Diptera) of Fennoscandia and Denmark** by Thomas Pape. 204 pages, 2 colour plates, £23.50, 1987.

It is ironic that such large and obvious flies have caused so many problems in identification. This difficult group of flies has been handled admirably here. Where "external" characters can be used they have been, but genetalia are the only definite distinguishing characters for many species. Luckily, the extension of the terminal

segments is often enough, and the author's delicate drawings facilitate identification of at least the males. The 87 species covered include 47 of the 54 British species.

Volume 20. **The aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark** by Mogens Holmen. 168 pages, 1 colour plate, £23.00, 1987.

This volume covers the Gyrinidae, Haliplidae, Hydrobiidae and Noteridae. All 35 of the British species are included in the 41 species covered. On the whole, upperside characters are used, but in *Haliplus* when the pro- and meta-sternal aophyses are used, some aspects can be seen from the side of these incredibly convex beetles. An unusual departure is the use of scanning electron microscope pictures of the elytral microsculpture of *Gyrinus* and *Aulonogyrus*. No magnifications are given, but at about ×60 under light microscopy, the microsculpture can be seen and compared.

Volume 21. **Stoneflies (Plecoptera) of Fennoscandia and Denmark** by A. Lillehammer, 166 pages, £17.50, 1988.

These peculiar and delightful creatures may now achieve more widespread interest. The insects themselves are widespread, as shown in the interesting circumpopular distribution maps. Both nymphs and adults can be identified to species. Although we are told that dry pinned specimens are of little value, they can be softened up by warming for a few minutes in lactic acid. The terminal segments of the abdomen are useful characters and with the 262 line figures, most species are readily identifiable. Unfortunately, although the book covers 87 species, these include only 47 of the 54 British species.

Volume 22. **Longhorn beetles (Coleoptera, Cerambycidae) of Fennoscandia and Denmark** by S.Bílý and O.Mehl, 203 pages, 9 colour plates, £28.00, 1989.

Although the Cerambycidae are a moderately 'easy' group, E.A.J. Duffy's Royal Entomological Society 'Handbook' is too concise and now out of print. Such spectacular beetles need colour illustrations and the plates in this book are indeed spectacular, quite the best in the series so far. An indication of how 'easy' the group is, is shown by the very few line figures necessary in the text (61). As usual, description and distribution details are followed by notes on the biology and foodplants. British readers will find the nomenclature a little strange, following various international changes, many of our well known genera have changed: with the reversion of *Strangalia quadrifasciata* to the genus *Leptura,* various *Leptura* species are given almost a genus each; *L.livida* becomes *Pseudoalosterna, L.melanura* becomes *Stenurella,* and so on. Even the old favourite *Strangalia maculata* does not survive the jump to *Leptura,* it becomes *Rutpela maculata*. How long it takes for these changes to trickle through to this country remains to be seen.

The book contains 123 species, including 61 of the 66 British species. The colour plates show 83 species.

Handbooks for the Identification of British Insects, London, Royal Entomological Society of London/BM(NH).

Volume 6, part 4. **Spider wasps, Hymenoptera: Pompilidae** by M. C. Day, 60 pages, £5.00, 1988.

These large and distinctive wasps are a common feature of sandy heaths, their flittering flight is attractive and characteristic, but they have been traditionally regarded as a difficult group. The format of this part is slightly different to previous ones. Forty-four species are keyed out in two keys—males and females. Each species is then described and commented upon. A fascinating essay on functional morph-

ology and terminology is attended by a long table listing the different names of veins and cells used by various recent authors. The figures are grouped together at the end of the book.

Volume 7, part 1. **Pimpline ichneumon-flies, Hymenoptera, Ichneumonidae (Pimplinae)** by M. G. Fitton, M. R. Shaw and I. D. Gauld, 110 pages, £9.00, 1988.

At last, a readily available work on some of the largest and most distinctive of the ichneumons. There are still some problems, and in certain genera only the females are keyed. A key to genera is followed by keys to each genus. Each species is then discussed individually. Venation is not very much used, but the shape of the tip of the female ovipositor is frequently one of the most important characters. The figures are interspersed throughout the text, a welcome departure from the usual current style of many of the handbooks.

Volume 10, part 5e. **Lesser dung flies, Diptera: Sphaeroceridae** by Brian R. Pitkin, 176 pages, £14.50, 1988.

These diminutive rather drab flies are very common and widespread. The 114 British species are constantly overlooked and ignored despite O. W. Richards' excellent paper (*Proc. Zool. Soc. Lond.* **18:** 261–345) in 1930. A large number of species have been added since then. The book is copiously illustrated, with 115 pages of figures compared to only 61 pages of text. As usual, genetalia figures are the best means of identification, but venation and chaetotaxy are used throughout, including electron microscope pictures of the latter.

Killing, setting and storing butterflies and moths, London, The Amateur Entomologists' Society, Leaflet 28, 20 pages, £2.25, revised, 1988.

This is the third edition of the leaflet by L. W. Siggs first published in 1956. It has been updated and added to, and provides an excellent introduction to materials, equipment and methods.

A supplement to The hymenopterist's handbook (2nd edn, 1986), by Clive Betts, London, Amateur Entomologists' Society, 24 pages, £1.75, 1989.

This supplement contains a flight table for the aculeate Hymenoptera, giving the months when the insects are on the wing, and comments on their habitats and distributions.

ANNOUNCEMENTS

The Professor Hering Memorial Research Fund.—The British Entomological and Natural History Society announces that awards may be made from this fund for the promotion of entomological research with particular emphasis on: (a) leaf-miners; (b) Diptera, particularly Tephritidae and Agromyzidae; (c) Lepidoptera, particularly Microlepidoptera; (d) general entomology, in the above order of preference having regard to the suitability of candidates and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary to fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £350 in 1989/90.

Applicants should send a statement, if possible six copies, of their qualifications, of their plan of work, and of the precise objects and amount for which an award is sought, to Dr M.J. Scoble, Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD, as soon as possible and not later than 30 September, 1989.

Bees, wasps and ants recording scheme (BWARS).—BWARS is currently being revitalized and now produces a bi-annual newsletter and a starter pack sent to all new participants. BWARS also organizes field meetings, and two annual indoor meetings. One of the indoor meetings consists of a few short informal talks and a workshop identification/recording/slides session (Sept. 23rd, 1989). The other is for identification and recording (Jan. 6th, 1990). Expert help with identification is available at both. Anyone interested in collecting, recording and studying aculeate Hymenoptera (bees, wasps and ants) is encouraged to join; beginners particularly welcome! Send your name and address to: Dr J. P. Field, Dept. of Pure & Applied Biology, Imperial College at Silwood Park, Ascot, Berks, SL5 7PY.

Nature Conservancy Council Invertebrate Survey of the New Forest. The following changes and additions should be noted to the list given in *Br. J. Ent. nat. Hist.* 1988; **1:** 104.

Butterflies: Mr M. Oates, 'Tabanids', 5 William Way, Alton, GU34 2UW.

Ants and Spiders: Mr K. H. Halstead, 'Mistletoe Cottage', Masseys Lane, East Boldre, Brockenhurst, Hants.

Hoverflies: Mr I. R. Hudson, 'Eaglehurst', 7 Ladram Road, Alverstoke, Gosport, Hants., PO12 2RH.

There are a few offprint copies of the colour plates from the 1987 and 1988 Annual Exhibition. Exhibitors who had specimens photographed, who require copies, should apply to the Editor.

BRITISH JOURNAL OF ENTOMOLOGY AND NATURAL HISTORY

Volume 2, Part 2, July 1989

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Contributions must be double-spaced with 3cm margins either side to facilitate marking up. They should be typed if possible, on one side only of A4 paper. Layout should follow that of the journal, but apart from underlining scientific names, no marks should be made to define typeface.

Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

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MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 28th October 1989 at Imperial College, London SW7.

Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings.

The current Programme Card can be had on application to the Secretary at 32 Penton Road, Staines, Mdx. TW18 2LD.

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The Society has learned, with regret, of the death of Mr Stanley N. A. Jacobs, on 14 September 1989. Stanley Jacobs joined the Society in 1923, and was elected an honorary member in 1973. An obituary will be published in a future issue of the journal.

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COCCINELLA MAGNIFICA (REDTENBACHER): A MYRMECOPHILOUS LADYBIRD

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Coccinella magnifica Redtenbacher (the scarce 7 spot ladybird) (syn. *C. distincta* Faldermann, *C. divaricata* Oliver) is rarely recorded in Britain. This is because it is very similar in appearance to *Coccinella 7-punctata* (L.) (the 7 spot ladybird). Both species are of a similar size, and are red, usually with three spots on each elytron and a shared scutellary spot flanked anteriorly by two small white or off-white triangular markings. At first glance they are difficult to distinguish even if both species are held together for comparison. *Coccinella magnifica* has a more domed appearance (Fig. 1), the elytra dropping to the sides and back more sharply than those of *C. 7-punctata* (Fig. 2). The spot at the centre of the elytron of *C. magnifica* is usually larger and more obviously wider than long than that of *C. 7-punctata* (compare Figs 1 and 2). The front lateral spot of the *C. magnifica* is usually very small (Fig. 1). Both species may have one or occasionally more additional spots on each elytron, usually near the front outer angle, but additional spots are more common in *C. magnifica* (e.g. Fig. 3). The pale triangular marks flanking the scutellary spot tend to be less distinct and more dingy in *C. magnifica* than in *C. 7-punctata*. The front angle of the pronotum is more rounded in *C. magnifica* than in *C. 7-punctata* (see Figs 4 and 5). However, all these distinguishing characteristics are variable in both species making identification somewhat subjective and unsatisfactory. The only definitive deterministic feature which does not depend upon dissection is to be found on the underside of the thorax. *Coccinella magnifica* has the epimerae of the meso- and meta-thorax white, while *C. 7-punctata* has the epimerae on the meta-thorax white but those on the meso-thorax black (see Figs 6 and 7).

The scarcity with which *C. magnifica* is recorded may be gauged from the results of the Cambridge Ladybird Survey. Between October 1984 and December 1988, *C. magnifica* was the second least recorded of the 24 British ladybirds, the only species being found less often being the 13 spot ladybird (*Hippodamia 13-punctata*) which is probably extinct in Britain. Apart from those which the author has found himself, and a record of 'abundant in Hamsterley Forest (where there are stacks of *Formica rufa* nests)', records of only ten individuals from seven sites, have been sent to us since the instigation of the Cambridge Ladybird Survey, and this despite over three and a half million records of other species of ladybird from all over the British Isles. The distribution of *C. magnifica* is given in Fig. 8.

The paucity of records of *C. magnifica* can only partly be attributed to the difficulty in distinguishing it from *C. 7-punctata*. Undoubtedly it is rare, and its rarity appears to be a consequence of an unusual specialization. It is adapted to living close to the nests of ants, particularly those of the wood ant *Formica rufa* L. Of over 1400 *C. magnifica* found in the wild by the author since the summer of 1984, only one was not found in the sphere of influence of a nest of *F. rufa*. This was a single specimen netted in flight in a meadow in North Hampshire. The other records came from ten sites, three in Surrey and one each in Kent, Sussex, Hampshire, Dorset, Bedfordshire, Cambridgeshire and Suffolk. Studies of four colonies of *C. magnifica* and rearing the species in the laboratory, have shed some light on the general biology of the *C. magnifica* and the reasons for the association between this species and *F. rufa*.


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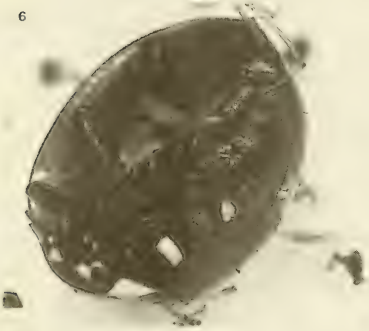
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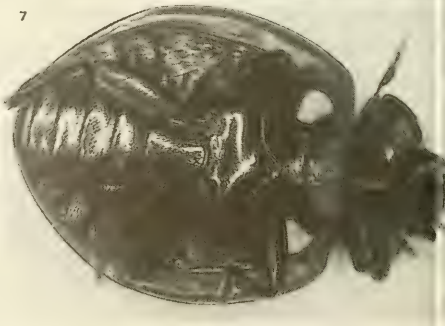
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Fig. 8. The distribution of *Coccinella magnifica* in Britain. (From Cambridge Ladybird Survey records 1984–1988.)

Fig. 1. *Coccinella magnifica*, lateral view; note strongly domed appearance at posterior and transverse shape of central spot.
Fig. 2. *Coccinella 7-punctata*, lateral view; note generally shallower appearance, and less obviously transverse shape of central spot.
Fig. 3. *Coccinella magnifica*, lateral view; note additional spot close to front-angle of elytron.
Fig. 4. *Coccinella magnifica*, anterior view; note rather curved front-angle of pronotum.
Fig. 5. *Coccinella 7-punctata*, anterior view; note rather pointed front-angle of pronotum.
Fig. 6. *Coccinella magnifica*, ventral view; both meso- and meta-thoracic epimerae are white.
Fig. 7. *Coccinella 7-punctata*, ventral view; note meso- thoracic epimerae are white, meta-thoracic epimerae are black.

A colony on Chobham Common, close to a large nest of *F. rufa* has been situated on the same spot since before 1973. This colony has been visited on numerous occasions since the summer of 1984.

A colony in Bedfordshire, centred on a rather small *F. rufa* nest has been visited 13 times since it was discovered in 1985. The third study colony, was found in the New Forest, in 1986. The colony is the largest of the four in area, being perhaps a composite of two colonies centred on two nests of *F. rufa* which are situated about 80 metres apart. The only colony larger in area which I have seen is on Esher Common. Here *F. rufa* nests are situated at intervals all along the edge of a mixed coniferous and deciduous wood, and *C. magnifica* is to be found quite commonly along a stretch extending for almost half a mile.

These three study colonies are all situated on *Erica* and *Calluna* heathland with associated Scots pine (*Pinus sylvestris* L.) and some deciduous trees, particularly birch (*Betula* sp.) and oak (*Quercus* sp.). At two of the sites gorse bushes (*Ulex europaeus* L.) grow within 15 metres of the nests of *F. rufa* and these bushes appear to be favoured as overwintering refuges for *C. magnifica* at these sites.

The fourth study colony was discovered in East Dorset in July 1988. It is numerically the largest colony, over 300 individuals being counted on the afternoon that the colony was first discovered. This region of Dorset is characterized by areas of *Erica* and *Calluna* heathland on sandy soils. However, the colony was in a development area, situated along the verge between a residential estate and a busy dual carriageway. A nest of *F. rufa* was situated below a single mature Corsican pine (*Pinus nigra* L.). Most of the ladybirds when first discovered were feeding on black aphids on ragwort (*Senecio jacobaea* L.) with a few on evening primrose (*Oenothera biennis* L.). All the ladybirds were of a light orange–red colour characteristic of ladybirds that have recently emerged.

To test whether the association between *C. magnifica* and *F. rufa* is necessary for the successful reproduction of the ladybird, four attempts have been made to breed the species in the laboratory. In 1984, a single female ladybird from Surrey was brought to the laboratory. She was housed in a petri dish and fed on live pea aphids (*Acyrthosiphon pisum* Harris). Two days after her capture she laid a batch of eight eggs. A further nine batches of eggs, totalling 51 in all, were laid over the next 3 weeks. Most of the eggs hatched, the young larvae being fed on pea aphids. There was some early mortality and later some cannibalism among the larvae, but 15 larvae pupated successfully, and of these 12 hatched into apparently healthy and full-sized adults. The successful rearing of *C. magnifica* from oviposition to adult emergence in the complete absence of ants of any kind, suggests that the wood ants are not essential to the reproduction of *C. magnifica*. However, this contention would carry more weight if it could be shown that mating took place in the absence of the ants.

In 1985, two males and a female *C. magnifica* were sent to us from Scotland. One of the males mated with the female, she subsequently laid eggs and the larvae were reared to the adult state, again on pea aphids. While it is not possible to be sure that the mating observed was successful and responsible for the fertility of the eggs that were subsequently laid, the observation of mating suggests that close proximity to ants or an ants' nest is not necessary for mating.

This was confirmed in 1986 when seven *C. magnifica* larvae were found in Hampshire. These were reared and the resulting adults, which were obviously known to be virgin, mated and laid fertile eggs in the laboratory in the complete absence of ants. These were reared to the adult stage. The majority of the progeny were retained in the laboratory, at around 21°C, and were fed on pea aphids. Although these appeared to thrive and some survived for more than 7 months they

were not seen to mate and the very few eggs that were laid were infertile. A small sample of 17 of the progeny had been split off in October and placed in a perspex cage 46 × 46 × 46 cm. The floor of the cage was covered in peat, and bark, pine twigs, needles and cones, egg boxes, and corrugated cardboard were placed inside. The cage, was placed in an unheated insectary on October 17. During mild weather over the next six months, six 1-cm cubes of an artificial ladybird food (for details of this food see Majerus & Kearns, 1989) were placed in the cage on a petri dish lid. The food was replaced a week later if the mild weather persisted.

The cage was brought back into the laboratory on 11 April and the ladybirds were fed on pea aphids. Eleven *C. magnifica* had survived. These began feeding almost immediately, and within 48 hours three pairs were seen mating. Eggs were laid the following day and on many subsequent days. Nearly all the eggs were fertile and the first resulting adults emerged on 29 May. This result showed conclusively that contact with ants is not essential for reproduction in this species, for neither these second generation adults, nor their parents, were ever in contact with any ants. It also suggested that a period of dormancy is essential to reproduction. However, this latter conclusion has subsequently been put in doubt. A sample of 12 *C. magnifica* taken from the Dorset colony on the day it was discovered (6 July 1988) were taken back to Cambridge. All appeared from their ground colour which was pale orange, to be newly emerged adults, and quite different from the much deeper red of adults which have overwintered. These 12 were fed on pea aphids in the laboratory for several weeks, being kept at approximately 21°C the whole time. On 25th August a batch of eggs was laid. Although no mating was observed, these were fertile producing adults by the third week of September. Subsequently, matings were observed and further eggs were laid throughout September. In November the progeny began to mate and oviposit, producing a third generation in January 1989.

Coccinella magnifica is comparatively easy to rear in the laboratory, given a good supply of live aphids of a suitable species. The duration of the early stages is very similar to that of the *C. 7-punctata.* When kept at 21°C, ova hatch within 6 days, the larvae feed up in 3 to 4 weeks and the adults emerge from the pupae about 10 days later. If anything, larval cannibalism and larval mortality is less than in *C. 7-punctata* and matings seem more easy to obtain.

One suggested reason for the association between *C. magnifica* and *F. rufa* was that the ladybirds overwinter in the ants' nests. This was investigated by obtaining a series of population size estimates using mark–release–recapture techniques on the New Forest colony. During a series of visits between September 1987 and May 1988, all *C. magnifica* that could be found were collected for a radius of 50 metres around the two nests upon which this colony is centred. The majority of *C. magnifica* throughout this period, except in May 1988, were found on gorse bushes with small numbers on pines and heather. In May 1988 most of the ladybirds were on the

Table 1. Population size estimates for a *C. magnifica* colony in the New Forest 1987/88.

Date	Total previously marked	Number in sample	Number marked	Population estimate
September 1987	69	53	9	406
December 1987	113	47	14	379
January 1988	146	61	22	405
February 1988	185	50	29	319
March 1988	207	39	24	336
May 1988	223	58	41	315

heather. No ladybirds were found on or in the nests. All were marked with tippex and released, different mark positions being used each visit. Population size estimates were obtained for September 1987, December 1987, January 1988, February 1988, March 1988 and May 1988. The population size estimates are given in Table 1.

Comparison of these estimates shows that the number of ladybirds remained relatively consistent throughout the winter. There appears to have been a gradual decrease in population size throughout the period. This decrease is probably

Table 2. Numbers of coccinellids of different species found at specific distances away from nests of *F. rufa*, at three sites.

Distance from nest (metres):	0–10	10–20	20–30	30–40	40–50
Chobham Common					
Coccinella magnifica	26	22	4	1	0
Coccinella 7-punctata	1	1	11	28	26
Coccinella hieroglyphica	2	0	3	6	8
Chilocorus 2-pustulatus	0	0	1	4	3
Exochomus 4-pustulatus	0	0	0	2	4
Adalia 10-punctata	0	1	0	2	0
Propylea 14-punctata	1	0	2	2	1
Calvia 14-guttata	1	0	1	0	1
Anatis ocellata	0	0	0	1	3
Bedfordshire					
C. magnifica	31	42	17	3	0
C. 7-punctata	4	3	18	38	91
C. 2-pustulatus	0	0	0	4	5
Adalia 2-punctata	0	0	1	2	6
A. 10-punctata	1	0	1	2	0
P. 14-punctata	0	2	2	7	6
Myrrha 18-guttata	1	0	0	0	0
Harmonia 4-punctata	0	0	0	1	0
*New Forest (nest a)**					
C. magnifica	16	13	5	4	2
C. 7-punctata	2	3	10	17	20
C. hieroglyphica	0	0	0	1	1
E. 4-pustulatus	0	0	2	0	2
A. 10-punctata	0	1	0	0	1
C. 14-guttata	0	1	0	0	1
M. 18-guttata	0	0	3	0	1
*New Forest (nest b)**					
C. magnifica	27	31	12	7	4
C. 7-punctata	4	2	9	28	29
C. 2-pustulatus	1	0	1	0	1
E. 4-pustulatus	0	0	2	3	6
P. 14-punctata	1	0	0	2	0
M. 18-guttata	0	2	0	3	3
Mysia oblongoguttata	0	0	1	0	0
Totals (all sites)					
C. magnifica	100	108	38	15	6
C. 7-punctata	11	9	48	111	166
All other species	8	7	19	42	53

* The New Forest site was centred on two *F. rufa* nests, a and b, approximately 80 metres from one another. As a was situated north-west of b, none of the 50 metre transects encroached within 50 metres of the other nest.

attributable to natural mortality, a likelihood reinforced by a detailed analysis of the dates that recaptured individuals were marked. There was no substantial decrease between September and December 1987, nor any increase between March and May 1988, both of which would have been expected if a substantial portion of the population had overwintered in the *F. rufa* nests.

The question remains as to why the species in the wild appears to be so closely associated with the ant *F. rufa*. At one time I thought it possible that the association might be more apparent than real. The association between *C. magnifica* and *F. rufa* was first noted by Donisthorpe (1939) and was affirmed by Pontin (1960). In 1984 when I asked Dr John Muggleton for information on where and how to find the species, he mentioned the association, and told me of the location of the Chobham Common colony. It subsequently occurred to me in the winter of 1985/86 that I only really sought *C. magnifica* when I was aware of a nest of *F. rufa* in the area I was working. Otherwise I generally ignored *C. 7-punctata*, and did not scrutinize them carefully to confirm their identity. Consequently, during 1986, while collecting at a total of 26 sites in Dorset, Hampshire, Sussex, Surrey, Cambridgeshire and Suffolk, I checked the identity of 5971 seven spotted ladybirds. These were collected without consideration of the presence or absence of *F. rufa* nests in the vicinity. Apart from 38 ladybirds found at the New Forest site mentioned previously and 11 ladybirds found at the Chobham Common site, all were *C. 7-punctata*. So, despite an exhaustive search, mainly in counties where I knew *C. magnifica* could be found, none were found except in the proximity of *F. rufa* nests. The association is real, not apparent.

Two possible causes for the association between *C. magnifica* and *F. rufa* may result from the aggressive behaviour of the ants towards intruders in general, and to aphid predators in particular.

While recording *C. magnifica* I gained the impression that generally very few species of ladybird apart from *C. magnifica* were to be found within the main sphere of influence of an ants' nest.

Consequently, during 1985 the colonies at Chobham Common, and in Bedfordshire, and during 1986 the colony in the New Forest, were surveyed for all ladybirds. In each case, 1-metre wide transects, one running north/south, and a second running east/west, each centred on the ants' nest (at the New Forest site the colony was associated with two nests) and extending straight out 50 metres on either side of the nests, were carefully searched for any coccinellids. All were recorded with the distance away from the ants' nest being noted. The results are given in Table 2.

At all sites, within 20 metres of the nest, a substantial majority of all ladybirds found were *C. magnifica*. Thereafter, the proportion of *C. magnifica* declines rapidly as distance from the ants' nest increases. Conversely *C. 7-punctata* which is rarely found close to the ants' nest begins to increase from a distance of 20 metres from the nests. It seems possible that *C. magnifica* does not compete successfully with *C. 7-punctata* for food or for some other major requirement of life when the two species are present together. However, if *C. magnifica* is immune to ant attacks, while *C. 7-punctata* is not, then in the sphere of influence of a *F. rufa* nest, *C. magnifica* will not be in competition with its close relative.

The reaction of *F. rufa* to a variety of species of ladybird was studied during 1988. Ten adult ladybirds of each of eight species were placed on foliage between 5 and 10 metres from an ants' nest. The ladybirds were placed approximately 15 cm from a colony of aphids being tended by ants. In addition ten second instar and ten final instar larvae of both *C. 7-punctata* and *Adalia 2-punctata* (L.) were used in the same way. Finally, 30 adult, ten second instar, and ten final instar *C. magnifica* were placed

Table 3. Outcome of introducing coccinellids into close proximity of aphid colonies being tended by *F. rufa*.

Species	Not attacked by ants	Dropped off foliage	Carried away on foliage	Carried away on ground after dropping	Carried towards nest after dropping	Killed and left	Killed and carried towards nest	Ran away	Flew away
Coccinella 7-punctata	—	8	—	1	—	—	—	1	1
Adalia 2-punctata	—	7	1	2	—	—	—	—	2
Calvia 14-guttata	—	10	—	1	—	—	—	—	—
Propylea 14-punctata	2	3	—	—	—	1	—	2	5
Anatis ocellata	—	6	—	—	—	—	—	3	1
Myrrha 18-guttata	—	6	—	1	—	—	—	—	4
Exochomus 4-pustulatus	—	8	—	—	1	—	1	1	1
Aphidecta obliterata	1	—	—	—	—	—	7	—	3
Coccinella magnifica	30	—	—	—	—	—	—	1	1
Coccinella 7-punctata (final instar larvae)	4	10	—	3	—	—	—	—	—
Coccinella 7-punctata (second instar larvae)	—	4	—	—	—	4	1	1	—
Adalia 2-punctata (final instar larvae)	—	10	—	4	—	—	—	—	—
Adalia 2-punctata (second instar larvae)	—	3	—	—	—	7	—	—	—
Coccinella magnifica (final instar larvae)	10	—	—	—	—	—	—	—	—
Coccinella magnifica (second instar larvae)	10	—	—	—	—	—	—	—	—

in similar situations. The reaction of the ants to all these coccinellids was recorded, the results being summarized in Table 3.

In general, at least one ladybird–ant encounter occurred within a minute of a ladybird being introduced onto the foliage (except when the ladybird immediately took flight). On encountering a ladybird the ants initially tap it with their antennae and palps. For all species except *C. magnifica*, the ants then attacked the ladybird. The ladybirds' reaction was either to fly away, or to clamp down, withdrawing the legs under the body and 'reflex bleed'. Clamping down and reflex bleeding never caused the ants to break-off the attack, and usually more ants joined the attack. The ants attempt to gain a grip on the edge of the ladybird with their mandibles, or to push it up on one side to gain access to the underside where a grip would be easier to find. This pushing often resulted in the ladybird being toppled from, or knocked off, the vegetation. If a firm grip on the ladybird was gained by the ant, the ladybird was usually carried to the edge of the leaf and dropped off. Some of the ladybirds which were dropped off the vegetation took flight while they were falling. If they landed on vegetation close to ants they were often attacked again. A number of the ladybirds which fell to the ground were also attacked again, and if ants gained a grip on them, the ladybirds were usually carried or ant-handled away from the nest, some being carried up to 15 metres. Only very rarely were adult ladybirds killed or carried back to the ants' nest, except in the case of *Aphidecta obliterata* (L.). This is an exceptional coccinellid because it is cryptically, rather than warningly, coloured, and cannot reflex bleed (Brakefield, 1985). Seven out of ten of this species were killed and transported back to the ants' nest. The three which did not suffer this fate escaped by the simple expedient of taking flight.

Larger larvae of *C. 7-punctata* and *A. 2-punctata* were treated by the ants in much

the same way as the adults were treated. They were tapped, attacked, and because they are not able to clamp down, were generally picked up quickly and dumped off the vegetation. The larvae, when attacked, often attempted to escape by running or simply by falling from the vegetation themselves. The smaller larvae were usually killed by the ants, but were then generally left rather than being carried either back to or away from the nest.

The ants' treatment of both adult and larval *C. magnifica* was very different from that between ants and any other species of ladybird. After encountering *C. magnifica*, and touching it with antennae and palps, the ants would pass on, subsequently ignoring the ladybird (see also Pontin, 1960). In several instances ladybirds then found the aphid colonies and began feeding apparently with complete immunity from the ants attending the aphids.

But why do the ants not attack *C. magnifica*? One possibility is that the more rounded shape of *C. magnifica* affords some protection, making it difficult for ants to gain a grip on the ladybird. This seems unlikely to be the case because larvae of *C. magnifica*, which are also immune to ant attacks, would be afforded no such protection. A much more probable explanation is that *C. magnifica* secretes a pheromone of some kind which placates the ants. The nature of any protective secretion produced by *C. magnifica* is not known. It may be that, if there is one, it acts as a warning to advertise distastefulness or toxicity, although it is doubtful that this would deter the ants who appear to attack and remove other warningly coloured ladybirds primarily to protect aphid colonies which the ants attend to obtain honeydew. It is more probable that the secretion acts as a deceptive scent, either by mimicking the ants own scent, or by making the ladybird smell like an object that is apparently of no threat to the ants or aphids.

Whatever the reason for their immunity from ant attacks, it appears that areas close to the nests of *F. rufa* nests provide *C. magnifica* with a situation in which to live that is relatively free from other competing aphid predators.

Why then does *C. magnifica* not live away from *F. rufa* nests? It may be that they simply cannot compete successfully with other aphid predators. Yet during all my observations I have seen nothing to indicate that they are less able to find and secure food than other species of predatory ladybird. Nor have I gained the impression that they are less well adapted than other species. Although no resource necessary to the basic biological systems of *C. magnifica*, and provided by *F. rufa*, has been found, such may exist. Yet the ease with which the species can be bred and reared in captivity argues against this.

However, there may be benefits, other than avoidance of competition with other aphid predators, that may accrue from living near an aggressive predator, such as *F. rufa*. For example, predators and parasites of coccinellids may be kept away by the ants.

I have only once found the parasitic wasp *Perilitus coccinellae* (Schrank), which attacks a number of species of coccinellid, including *C. 7-punctata*, in *C. magnifica*, from a total of 119 individuals obtained and kept in conditions under which the presence of the parasite would have been determined. This compares with a parasitization rate of 4.38% in *C. 7-punctata* (from all appropriate observations, Majerus unpublished data). No other parasites have been recorded from *C. magnifica*.

One of the main groups of predators of ladybirds are spiders. A simple experiment on spider population density around nests of *F. rufa*, at two sites, was carried out in September 1988. Two 5 × 5 m areas of vegetation (mainly *Calluna* and *Erica* heathers) situated from 5 to 10 metres from *F. rufa* nests were surveyed using a sweep

Table 4. Relative abundance of spiders on heathland close to, or away from, *F. rufa* nests. (Sites a and b were between 5 and 10 metres from different *F. rufa* nests. Sites c–h were all between 100 and 150 metres from the nearest nest.)

Location/site	No. of spiders
New Forest a	29
Bedfordshire b	17
New Forest c	182
New Forest d	167
New Forest e	243
Bedfordshire f	171
Bedfordshire g	190
Bedfordshire h	140

net. The sweeping was carefully conducted, 50 sweeps being made on the 25 square metre plot. The process was repeated on six other similar plots (three at each site) each at least 100 metres from any *F. rufa* nest. The number of spiders on each plot is given in Table 4.

The number of spiders from the plots away from the ants' nests are between 5 and 11 times as great as the number from the appropriate plot close to a nest. The relative dearth of spiders near the nest may be a direct consequence of the aggressive behaviour of the ants, or could result from a low density level of potential prey for the spiders because of the ants. Either way, a low density of spiders; which are known to eat ladybirds that become entangled in their webs, would undoubtedly be beneficial to *C. magnifica*. A similar situation may exist in respect of other predators of *C. magnifica*.

It may be worth mentioning that at no time during my observations of *C. magnifica* and *F. rufa*, have I obtained any evidence that the ants gain a benefit from the presence of the ladybird.

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BEETLES FROM PITFALL-TRAPPING IN A CALEDONIAN PINEWOOD AT LOCH GARTEN, INVERNESS-SHIRE

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As part of a survey of the beetles of the Loch Garten RSPB. Reserve undertaken during the period 1978–1987 (Owen, 1989), a pitfall-trapping exercise was carried out between April 1983 and March 1984. This paper presents the results of this trapping, in part as an exercise helping to define the beetle fauna of the area and in part as a study in its own right.

Methods

The RSPB Reserve at Loch Garten is geographically part of Abernethy Forest, one of the largest remaining tracts of the Caledonian Forest. The trapping was carried out in a part of the Reserve which had probably had Scots pine (*Pinus sylvestris* L.) cover more or less continuously since pre-historic times.

Trapping was carried out in four different pine-wood habitats, all within a circle of about 1000 m diameter. The first site (grid ref. NH 979175) comprised fairly close canopy mature pine forest on a poorly drained site with good ground cover mostly of thick mosses with some *Vaccinium* spp. The second site (NH 976186) comprised more open mature pine forest with juniper and ground cover likewise mainly of moss and *Vaccinium* spp. The third site (NH 968178) was an area with about 20-year-old Scots pine, well spaced out with various grasses between the trees and the fourth (NH 965176) was an area which had been clear felled some years previously, with patches of vegetation between old pine stumps and a few self-sown young pine trees.

The traps were slightly tapered, plastic drinking cups (diameter at mouth 7 cm, capacity 200 ml) set into the ground with their rims flush with the ground level. Each cup had a cut 2–3 cm long vertically in the wall just below the rim to allow excess fluid from rain to escape without loss of beetles. The cups were charged initially and on emptying with about 80 ml of 10% (v/v) aqueous ethylene glycol as a preservative and each was loosely covered with a piece of pine bark set 1–2 cm above the rim to make them less obvious and to reduce entry of rain. The ground immediately around the sunken cups was not cleared.

Initially 18 traps were set out at each site in three circles (diameter about 3 m) of six traps but, during the study period, some traps were found to have been damaged or disturbed (probably by deer) and these were not replaced. By the end of the survey, about one trap in six had been put out of action. The traps were set out at the beginning of April 1983. Because of the distance of Loch Garten from Epsom, it was only possible to service the traps at 3 months (end of June), 6 months (end of September) and 12 months (end of March 1984). In presenting the results, the collecting periods are described as 'early summer', 'late summer' and 'winter'.

All species trapped were identified and counted. The relation between numbers of species and their relative abundances was expressed by plotting species *count* (number of species with a particular abundance i.e. 1, 2, 3 . . . examples) against their *abundance*. Details of the procedure are given in the legend to the figure.

In many studies on samples of trapped insects, the numbers of species with a particular abundance has been found to conform more or less to a log-series (Williams, 1964). In such a series, the numbers of species of which there are respectively 1, 2, 3, 4 . . . examples are given by the terms:

$$\alpha x,\ \alpha x^2/2,\ \alpha x^3/3,\ \alpha x^4/4\ \ldots \text{ and so on.}$$

α is a parameter related to the population from which the sample is obtained and has the characteristic of a diversity index; the greater the diversity of insects (in terms of number of species and their relative abundances), the higher the value of α. An estimate of α can be obtained from the number of species and number of beetles in the sample (Williams, 1964). x is a parameter related to the size of the sample and can be calculated similarly from the total number of species and the total number of beetles.

To see how well the observed data conformed to a log-series, the parameters α and x were first determined for the beetles trapped and the expected number of species with 1, 2, 3, . . . examples (assuming a log-series) then calculated. To allow comparison between observed and expected species counts, the latter were plotted in the same way as was the observed data.

Finally, Simpson's index of diversity (Simpson, 1949) was calculated in the form of its reciprocal (Hill, 1973) and Brillouin's index as described by Morris & Lakhani (1979). The latter indices are likewise higher in instances of greater species diversity. They have the attraction that they make no assumption about the relation between numbers of species and their respective abundances.

Results

A summary of the results of this exercise is presented in Table 1 and a list of the species caught is given in the appendix. The open canopy pine forest produced the most beetles and the most species; the young pine forest produced the least beetles and the least species. There were more beetles and species in late summer and, as might be expected, least numbers of both in the winter. There were 17 species (see appendix) each represented by two or more examples (in one case 32 examples) which were trapped in only one habitat and 18 species represented by two or more examples which were restricted to one season.

Table 1. Summarized results of pitfall-trapping at Loch Garten

	Total beetles	Trap-days (approx.)	Beetles per 100 trap-days	Total species	Exclusive* species
By habitat					
Closed canopy pine forest	393	5400	7	48	4
Open canopy pine forest	778	5400	14	67	4
Young pine forest	280	5400	5	36	1
Cleared area	490	5400	9	52	7
By season					
April–June	800	5400	15	57	5
July–September	938	5400	17	68	8
October–March	203	10 800	2	37	5
All data	1941	21 600	9	117	

*Species represented by at least two examples but restricted to one habitat or one season.

At the time, 20 of the species taken were not among the 600 species already recorded from the Reserve. Some of these 20 species were found by other means later in the survey but, by the end of 1987, there were still 12 species (see appendix) recorded in this exercise which were not found by any means other than pitfall-trapping.

As indicated in the appendix, the numbers of examples of individual species

(species-abundance) varied widely. The number of species with one example was greatest, with a progressive diminution in the numbers of species with more examples. As an expression of this, a plot of species-abundance (the *number of examples* of a species caught) against the species count (the *number of species* with that particular abundance) is given in Fig. 1 for which a full explanation is provided in the legend. The plot of data appears to comprise two approximately linear sections, one covering abundances from 1 to 5, the other covering higher abundances but this apparent discontinuity may simply represent an effect of sampling. Similar plots for data from each habitat have not been included in the figure for the sake of clarity but all four were similar in shape to that for all the data combined.

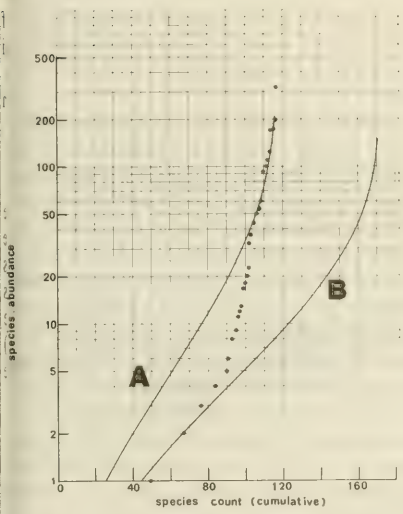

Fig. 1. Species-abundance plotted against species count. Species abundance (no. of examples of a species) is expressed as usual (Southwood, 1978) on a log-scale. Species counts (numbers of species with a particular abundance) have been plotted cumulatively to allow comparison with theoretical log-series plots, with rarer species (low species-abundance) on the left to give a positive slope. Dots represent observed data. Thus, there were 49 species of which only single examples were trapped (species-abundance = 1). There were *further* 18 species of which two examples each were trapped, giving a cumulative species count of 67 against a species abundance of 2. The cumulative plot continues up to the 117th species, of which 319 specimens were collected. Curve A is a theoretical curve derived from a log-series with diversity index α = 27.3, as calculated from the observed data; total beetles = 1941. Curve B is a theoretical curve derived from a log-series with an arbitrary diversity index α = 45; total beetles = 1941.

The theoretical curve which would have been obtained had the species-abundances conformed exactly to a log-series is also plotted (curve A). The α index for this curve (27.3) is that calculated from the number of beetles and number of species obtained as described by Williams (1964). The curve approximates to the plot of observed data only in the region covering common species (high species-abundance).

A curve (B) represents the theoretical curve conforming to a higher α value selected to give a curve fitting better the region of rarer beetles (low species-abundance). This curve, however, deviates considerably from the plot of observed data in the region of common species.

Table 2 presents indices of species-diversity. There is obvious correlation between the different diversity indices for a particular habitat or season and very little evidence of superiority of one over another. All measures of species-diversity indicated that this was highest in the open canopy pine forest and lowest in the young forest. Overall, more than a third of the 117 species recorded were represented by single examples and this relatively high number of singleton species occurred in all habitats and at all seasons.

Table 2. Analysis of species-diversity by habitat and by season

	Total species	William's α index	Simpson's index	Brillouin's index	No. of singleton species predicted*	observed
By habitat						
Closed canopy pine forest	48	14.3	8.3	3.6	14	25
Open canopy pine forest	67	17.6	13.8	4.2	17	33
Young pine forest	36	11.0	6.7	3.4	11	28
Cleared area	52	14.7	11.5	3.9	14	28
By season						
April–June	57	14.0	11.7	4.0	14	24
July–September	68	16.8	11.6	4.0	17	26
October–March	37	13.2	5.4	3.2	12	18
All results	117	27.3	14.4	4.5	27	49

*From the α index and the number of beetles.

Discussion

By the end of 1987, approximately 12 000 beetles comprising 820 species had been recorded from the Reserve. Only 12 of the 117 species caught by pitfall-trapping were not found by any other means but they included several relatively rare species such as *Acidota cruentata*, *Quedius fulvicollis* and *Neohilara subterranea*. The single specimen of *Atomaria ornata* (= *contaminata* Erichson) trapped in close canopy forest was only the second example of this species to be discovered in Britain. Its capture drew attention to the presence of the species at Loch Garten and led to the discovery of many more examples in ground litter of the pine woods, especially that accumulating beneath fallen or cut pine branches on the ground.

Most of the species trapped were those which normally inhabit ground vegetation or soil and which had presumably fallen into the traps accidentally but there were five species (four silphids and a *Geotrupes*—see appendix), which were probably attracted to the traps by the odour of dead beetles. Twelve other species were trapped, e.g. *Cetonia cuprea*, *Triplax russica*, *Cis lineatocribratus* which do not ordinarily spend much time in the ground layer but which could presumably have been accidentally trapped without necessarily being attracted to the traps.

The rate of capture of species (Table 1) was surprisingly low, with an overall average of about nine beetles per 100 trap-days. Even in the warmest season—late summer—the capture-rate reached an average of only 17 beetles per 100 trap-days, i.e. just over one beetle per trap per week. This rate of capture was approximately the same as that achieved (Owen, unpublished observations) by pitfall-trapping during the same time of year on two very exposed sites on the summit of Beinn Macdhui (altitude ca 1300 m).

At the start of this exercise, it was thought that the findings might reveal differences in the beetle faunas of the four habitats examined. A few species were only trapped in one of the habitats (see appendix). Thus *Cicindela campestris* was trapped only in the open area (habitat 4), which is in keeping with the habits of this species. Overall, however, the number of species showing apparent habitat preferences was small. Much larger samples would have been required to be sure that the differences were significant. Identification of seasonal difference presented a similar problem. The trapping of some species such as *Acidota crenata* and *A. cruentata* only in the winter is in keeping with the known habits of this group but again the number of species showing apparent seasonal trends was small. Species-diversity, however measured, was highest in the open canopy pine forest probably

because this site held the greatest number of different microhabitats. It was lowest among the young pine trees, perhaps because the young trees with grass between them formed the most uniform area.

Dobson (1978) has presented the results of a similar pitfall-trapping exercise carried out in the Black Wood, Rannoch, another area of old Caledonian forest. He used 74 traps continuously over a period of 14 months and caught approximately 5900 beetles of 126 species. This gives an average capture-rate of about 24 beetles per 100 trap-days which is appreciably higher than the average rate at Loch Garten. The difference could have been due to there being a higher density of beetles in the Black Wood than at Loch Garten or it may have been due to differences, such as have been described by Greenslade (1964) and Luff (1968, 1975), in the efficiency of the trapping techniques used at the two sites. For example, formalin was used in the traps at Rannoch as a preservative and Luff (1968) has shown that this attracts some species.

Comparing species lists, there were 69 species trapped at Loch Rannoch but not at Loch Garten and 56 species trapped at Loch Garten but not at Loch Rannoch. Though there may be real differences in the beetle faunas of these two areas of Caledonian pine forest, the numbers of species trapped at the two site were relatively small in proportion to the numbers of species known respectively from the areas and it would seem likely that most of the differences in species lists obtained in these two pitfall-trapping exercises were due to sampling.

From the number of beetles trapped and the number of species found, a Williams α index of 22.5 is obtained for Dobson's Black Wood data. This is less than that calculated overall for the Loch Garten data (27.3) which suggests that beetles liable to be caught in pitfall-traps in the Black Wood at Rannoch are less diverse than those at Loch Garten. There is, however, also the possibility that the formalin in the traps in the Black Wood attracted selectively some species which would have increased beetle numbers but reduced the diversity 'score' of the species trapped.

As indicated in Fig. 1, the observed species-abundances for all data did not fit well a log-series distribution of the type described by Williams. Plots of data for individual habitats or seasons have not been presented but they were similarly shaped and likewise did not conform to curves derived from a log-series distribution. The shape of the plot relating species-abundance to species count (Fig. 1) is perhaps more suggestive of a log-normal relationship (Whittaker, 1972).

The lack of close conformity of species abundance to a log-series is further illustrated (Table 2) by the numbers of singleton species observed being in every case higher than those predicted respectively from the calculated α index and the number of beetles. The same was true for the findings at Rannoch reported by Dobson—observed number of singleton species 27, predicted 22. A similar under-estimate of singleton species expected was noted by Williams (1964) in analysing data obtained by Easton (1947) relating to a sample of beetles in flood refuse. Whether these discrepancies reflect the underlying distribution of species-abundances in the population sampled or are an effect of sampling procedures remains to be determined.

Acknowledgements

I am indebted to Mr Stewart Taylor, Warden, RSPB Loch Garten Reserve for permission to carry out this survey and for help in various ways. Mr Colin Johnson and Mr Peter Hammond kindly confirmed some of my determinations and Mr Hammond and Dr Martin Luff provided valuable discussion pertaining to the expression of species diversity.

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Appendix

List of species caught by pitfall trapping at Loch Garten 1983–1984

Cicindela campestris Linnaeus	32 H4 **
Cychrus caraboides (Linneaus)	44
Carabus arvensis Herbst*	1
C. glabratus Paykull	172
C. problematicus Herbst	169
C. violaceus Linnaeus	60 S2
Leistus rufescens (Fabricius)	5
Notiophilus aquaticus (Linnaeus)	1
N. biguttatus (Fabricius)	6
Trechus obtusus Erichson	11
Pterostichus melanarius (Illiger)	108
P. nigrita aggr.	1
P. oblongopunctatus (Fabricius)	123
P. versicolor (Sturm)*	5 H4
Calathus erratus (Sahlberg, C. R.)	1
C. micropterus (Duftschmid)	50
C. piceus (Marsham)	2
Harpalus latus (Linnaeus)	2 H4
Bradycellus harpalinus (Serville)	1
B. ruficollis (Stephens)	1
Megasternum obscurum (Marsham)	17
Sphaerites glabratus (Fabricius)	2
Leiodes obesa (Schmidt, W.L.E.)	1
Agathidium convexum Sharp	4
A. laevigatum Erichson	3
A. rotundatum Gyllenhal	4
Nargus wilkini (Spence)	4 H2 S2
Choleva glauca Britten*	1
Sciodrepoides watsoni (Spence)	4 S2
Catops fuliginosus Erichson	2
C. nigrita Erichson	1
C. tristis (Panzer)	1
Nicrophorus investigator Zetterstedt	101
N. vespilloides Herbst	1
Thanatophilus rugosus (Linnaeus)	2 H4
Oiceoptoma thoracicum (Linnaeus)	8 H4
Silpha atrata Linnaeus	55
Stenichnus collaris (Muller & Kunze)	1
Proteinus brachypterus (Fabricius)	20 S3
P. crenulatus Pandelle	2 H1
P. ovalis Stephens	2
Anthobium unicolor (Marsham)	319
Olophrum fuscum (Gravenhorst)*	2
O. piceum (Gyllenhal)	12
Acidota crenata (Fabricius)	1 S3
A. cruentata Mannerheim	5 S3
Omalium rugatum Mulsant & Rey	3
Stenus impressus Germar	2
Lathrobium brunnipes (Fabricius)	2 H1 S3
Othius laeviusculus Stephens	1
O. myrmecophilus Kiensenwetter	3 H2
O. punctulatus (Goeze)	23
Xantholinus laevigatus Jacobsen*	9
X. linearis (Oliver)	2 S3
Philonthus decorus (Gravenhorst)	18
P. fimetarius (Gravenhorst)	1
P. marginatus (Strom)	1

P. puella von Nordmann	5 S2
P. splendens (Fabricius)	1
Platydracus stercorarius (Oliver)*	1
Staphylinus brunnipes Fabricius	13
S. erythropterus Linnaeus	34
Quedius curtipennis Bernhauer	1
Q. fuliginosus (Gravenhorst)	1
Q. fulvicollis (Stephens)*	1
Q. mesomelinus (Marsham)	1
Q. molochinus (Gravenhorst)	9 S2
Q. nigriceps Kraatz	1
Q. tristis (Gravenhorst)	2
Mycetoporus rufescens (Stephens)	2
M. splendidus (Gravenhorst)	1
Lordithon thoracicus (Fabricius)	1
Tachinus elongatus Gyllenhal	1
T. marginellus (Fabricius)	2
T. pallipes (Gravenhorst)	1
T. proximus Kraatz	1
T. signatus Gravenhorst	94
Autalia impressa (Olivier)	4 S2
Neohilara subterranea (Mulsant & Rey)*	2 H2
Geostiba circellaris (Gravenhorst)	1
Atheta harwoodi Williams	1
A. aquatica (Thomson, C. G.)	1
A. oblita (Erichson)	1
A. repanda (Mulsant & Rey)	1
Drusilla canaliculata (Fabricius)	1
Zyras humeralis (Gravenhorst)	1
Oxypoda spectabilis Markel*	1
Geotrupes stercorosus (Scriba)	198
Aphodius ater (Degeer)	1
Cetonia cuprea Fabricius	1
Byrrhus fasciatus (Forster)*	4
B. pilula (Linnaeus)	2 H3 S1
Melanotus erythropus (Gmelin)	4
Selatosomus impressus (Fabricius)	1
Dalopius marginatus (Linnaeus)	3
Epuraea pusilla (Illiger)	1
E. thoracica Tournier	1
Rhizophagus depressus (Fabricius)	4
R. dispar (Paykull)	5
Cryptophagus scanicus (Linnaeus)	2
C. setulosus Sturm	54
Antherophagus nigricornis (Fabricius)*	1
Atomaria contaminata Erichson	1
A. bella Reitter	1
Triplax russica (Linnaeus)	3 H2 S2
Coccinella hieroglyphica Linnaeus	1
Dienerella elongata (Curtis)	3 H2
Corticaria linearis (Paykull)	1
Cis lineatocribratus Mellie*	1
Lochmaea suturalis (Thomson, C. G.)	5 H4 S1
Otiorhynchus nodosus (Muller, O. F.)	1
O. scaber (Linnaeus)	2 H2 S1
Strophosomus melanogrammus (Forster)	1
Hylobius abietis (Linnaeus)	3 S1
Pissodes pini (Linnaeus)	1
Hylurgops palliatus (Gyllenhal)	8 H1 S1
Hylastes brunneus (Erichson)	3 H1 S1

*Species not found at Loch Garten except by pitfall trapping; **no. of examples trapped. Hn species trapped more than once but only in habitat n; Sn species trapped more than once but only in season n.

Errata

Br. J. Ent. Nat. Hist. **2:** 53

The Editor would like to apologize for the accidental omission of the following report of an exhibit at the Society's 1988 Annual Exhibition. It should have been the first item of the Hemiptera report.

HAWKINS, R. D.—Some Heteroptera from a Pyrenean vallet. *Prostemma guttula* (F.), Gaillagos, 840 m. This boldly marked red and black species was taken running fast over stones. It is widespread in Europe, occurs in the Channel Isles and was found in England several times in the last century. *Pirates stridulus* (F.), Gaillagos, 840 m. *Tropidothorax leucopterus* (Goeze), Lac d'Estaing, 1400 m. Although Stichel gives this as found on *Vincetoxicum* and rosemary, this one and several pairs were seen on nettles near the Arriousec Cabine, where scrubby woods give way to mountain pasture. *Corizus hyoscyami* (L.), Lac du Tech, 1350 m. A mating pair was taken from mountain pasture just above a wood. The species is found in England, but restricted to the coast. Several similar *Carpocoris* sp. Gaillagos, 840 m, Arrens, 950 m. *Eurydema oleraceum* (L.), Arrens, 925 m. *E. cyaneum* (Fieb.), Col d'Aubisque. Three specimens taken along a mountain ridge. This metallic blue species with white-edged abdomen is found only in Spain and southern France. Since the red colour of the abdominal dorsum is an important character in the determination, the wings were removed from one side of one specimen. *Graphosoma italicum* (Müll.), Gaillagos, 840 m. *Capsodes flavomarginatus* (Don.), Arrens, 925 m. *Horvathia hieroglyphica* (Muls. & Rey), Arrens, 925 m. Almost an endemic species, being found outside the French Pyrenees only in the Carpathian mountains of Poland and western Russia. *Pyrrhocoris apterus* (L.), Arrens, 925 m. The well-known firebug is found in the Channel Isles and just extends to southern England. In Britain it occurs only in association with a rare plant, the tree mallow, but is by no means so restricted on the Continent.

Br. J. Ent. Nat. Hist. **2:** 93.

The correction of a misprint in the book review by I. F. G. McLean was itself subject to a misprint! In his third paragraph, the erroneous figure number on page 28, line 2 was 222 not 22. The intended figure number—223—however is correct.

TWO SPECIES OF *MEDETERA* FISCHER (DIPTERA, DOLICHOPODIDAE) NEW TO BRITAIN

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Medetera parenti Stackelberg 1925

In June 1986 Ivan Perry bred out some *Medetera* which did not appear to be a known British species and he sent me a pair to examine. I identified them as *M. parenti* from Negrobov (1972–77) and confirmed the male from the genitalia description and figures. A particular feature of the aedeagus is a large dorsal bifid thorn-like process just distad from where it emerges from the epandrium (Plate XCI fig. 735). Neither specimen keyed directly to *parenti* because of the variable number of propleural bristles, a feature which appears not to have been noted before in *Medetera*. The original description (Stackelberg, 1925) did not give the number of propleurals, only that they were white. In Negrobov (1972–77) *parenti* is described as having four propleurals, the upper two clearly smaller than the lower two, and this is used in his key, but in the specimens examined the male and female respectively had five and six on each side, the upper two or three tending to be weaker, but not markedly so. Thuneberg (1955) gives the number as four or five (only females were known to him) but in the same paper he describes a new species, *collini* having two propleurals, which was synonymized with *parenti* by Negrobov (1972–77). Ivan Perry examined the other specimens from the same source and found the propleurals variable in number and size *viz*:

	Left side	Right side
Male	4 subequal	obscured by leg and not counted
Female 1	6 (3 upper shorter)	4 (lowest very strong and 3 upper very small)
Female 2	5 (2 upper shorter)	5 subequal
Female 3	5 subequal	7 (3 upper shorter)

Thus the propleural bristles in *M. parenti* are unusually variable, from four (or two if *collini* is indeed conspecific) to seven, with the upper ones usually weaker.

The two specimens I examined otherwise agree with the description in Negrobov (1972–77) except that some parts are somewhat darker. The arista is black, not yellowish-brown, the tibiae almost black, not brown, and the squamal border brown, not light yellow. This agrees with Bickel's (1985) observation referred to below under *M. veles*.

Ivan Perry has supplied the following information. Bark and sappy material, containing numerous *Neopachygaster meromelaena* (Dufour) larvae, were collected on 10.vi.86 from two fallen grey poplars (*Populus canescens* (Aiton) Sm.) at Lode, Cambridgeshire. The trees had fallen in a severe gale earlier in the year and showed signs of 'die back'. Between 13 and 17.vi. two male and four female *M. parenti* emerged. Unfortunately the logs were removed by mid-July and no further material was collected.

M. parenti extends across north and central Europe to the Caucasus and south-east Siberia.

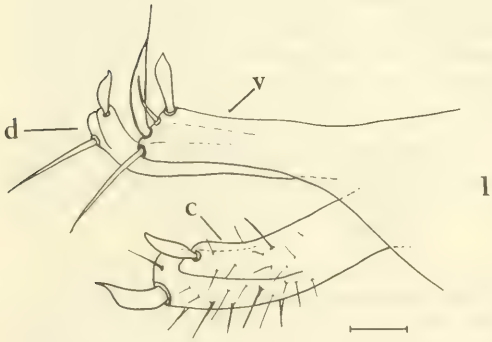
Medetera veles Loew 1861 sensu Bickel (= *bilineata* Frey 1915)

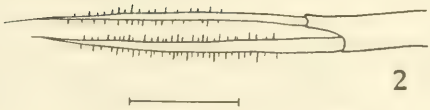
A dark, medium-sized species related to *infumata* Loew, among which one male was found, but distinguished by having pale halteres and distinct mesonotal stripes. The

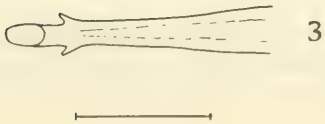
British males agree well with the external characters described (as *bilineata*) in Negrobov (1972–77) and run without difficulty in his key to the last couplet containing *bilineata* and *jakuta* Negrobov, but genitalia characters differ from both in some details. A female which is almost certainly *veles* agrees with the description except that the third antennal segment is slightly longer than deep and the arista is slightly less distinctly apical.

Three British specimens are known, all from Scotland. One male was taken on the shore of Loch Garten, Inverness-shire (grid ref. 28/9616) 4.vii.82. (J. H. Cole). It was 'pooted' from a large barkless Scots pine log (*Pinus sylvestris* L.) together with several *infumata*. I returned to this log 2 years later on 15.vii.84 with Peter Chandler and Peter Dyte, but a patient search of it and adjacent logs and pine stumps failed to reveal any more specimens although *infumata* was still present.

One male is known from Loch Minard, Argyllshire (grid ref. 17/8124) 17.vi.78 and one female from Braelangwell Wood (birch and pine with calcareous flushes), East Ross (grid ref. 28/6963) 16.vi.76 (Dr A. G. Irwin).







Figs. 1–3. *Medetera veles scotica* var. nov., male genitalia. 1. Surstyli and cerci, lateral view, c = cercus, d = dorsal lobe of surstylus, v = ventral lobe of surstylus. 2. Left epandrial lobe, ventral view. 3. Tip of aedeagus. Scale lines = 0.05 mm.

Details of the Loch Garten male are shown in Figs 1–3. An apparently unique feature among Holarctic *Medetera* are the fine hairs standing at right angles on the setae of the epandrial lobe (surstylus of Negrobov). They are somewhat irregular in length and spacing but give an almost pectinate appearance (Fig. 2). The Minard Point male had been previously labelled *bilineata* by Peter Dyte without examining the genitalia, and I found that it agrees with the Loch Garten male in all respects except that the epandrial lobe setae are not pectinate although very minute points are visible under high magnification. More specimens need to be found to establish whether one form is aberrant or there is continuous variation between them. I have not been able to examine a continental *bilineata* but a comparison of the surstyli (gonopods of Negrobov) of the Scottish flies (Fig. 1) with Negrobov's (1972–77 Plate LIV Fig. 426) shows obvious differences. In the latter the surstylus appears to be undivided, but to have a club-shaped terminal process. However Negrobov describes the surstylus as being divided into dorsal and ventral lobes, so the apparent apical process in his figure is misleading and must represent the ventral lobe. The cerci and their large terminal setae are differently shaped but within the range of variation figured by Bickel (1985) for *veles*. These variations were found in long series of specimens from certain localities and are not geographical varieties. The cerci of *bilineata* are both figured and described by Negrobov (1972–77) as having two ventral processes, a leaf-shaped spine and a lobe, which latter is absent from the Scottish flies. The hypandrium and aedeagus are not described or figured by Negrobov, but they are rather simple and uniform in this species group and are probably of little diagnostic value.

Bickel (1985) has revised the Nearctic *Medetera* and was able to visit several European museums to examine types. He concluded from the male holotype of *bilineata* that it was a junior synonym of *veles*. I have examined two North American *veles* males and the hypopygia agree with Bickel's figure. They differ from the Scottish specimens principally in the weaker surstylus spines, the absence of the longer flattened spine on the tip of the ventral lobe, and the branched tips of the epandrial lobe setae which arise closer together on the common base.

M. veles is a common species over most of North America and follows a general tendency in *Medetera* noted by Bickel (1985) for species to vary in colour over a wide geographical range where '. . . the most consistent pattern is a pale coloration . . . correlated with drier, sunnier habitats'. This also applies to the Palaearctic fauna as noted under *parenti* above, and another example seems to be *sphaeropyga* Negrobov which Bickel has also sunk under *veles*. It has pale legs and some pale hairs and setae and is therefore well separated from *bilineata* in Negrobov's (1972–77) key, but their hypopygia are closely similar according to his figures. From its description *jakuta* Negrobov must be another synonym of *veles* because it cannot be separated from *bilineata* on external characters, and the only differences are the branched epandrial lobe setae which arise closer together from the common base, and this is the North American *veles* form.

The *veles* group of *Medetera* appears to be highly successful and at present undergoing speciation in which the detailed genitalic morphology is particularly plastic. Bickel (1985) has taken the conservative view in 'regarding as intraspecific much of the variation found among members of a single genitalic type'. Our knowledge of the range of variation in the Palaearctic members of this species group is poor compared with the Nearctic fauna and there do not appear to be sufficient grounds for describing the Scottish specimens as new, but they are sufficiently distinct from continental *veles* (= *bilineata*) with no at present known intermediate forms, to require a distinguishing name, and I propose *scotica* **var. nov.**

The following modification of the Dolichopodid Handbook (Fonseca, 1978) key will accommodate both *parenti* and *veles*. Genitalia characters have not been used but confirmation from these structures should be obtained where there is any doubt.

27	Unchanged.	28
—	Two or more strong propleural bristles, sometimes with additional weaker ones in *parenti*.	29
28	Unchanged.	
—	Unchanged.	
29	Clypeus dull black or dusted grey or brown.	29a
—	Clypeus strongly shining green, blue or purple, only narrowly dulled or dusted at sides.	29b
29a	Thorax not striped. Arista not more than 1.5 times length of antenna. Apical section of discal vein strongly curved. Larger sp. 3–3.5 mm.	*melancholica* Lundbeck
—	Thorax with distinct stripes. Arista more than 4 times length of antenna. Apical section of discal vein almost straight. Smaller sp. 2.5 mm.	*veles* Loew
29b	Clypeus brilliantly shining green.	30
—	Clypeus brilliantly shining blue-purple.	31
30	Thorax conspicuously and broadly striped. Acrostichals very small and numerous. Larger sp. 4.25–4.5 mm.	*diadema* L.
—	Thorax unstriped. Acrs normal. Smaller sp. 3.75–4.25 mm.	*parenti* Stackelberg
31	Unchanged.	
—	Unchanged.	

ACKNOWLEDGEMENTS

I am very grateful to C. E. Dyte, A. G. Irwin, and I. Perry for permission to examine their specimens and use their records. Also to C. E. Dyte for his helpful knowledge of the foreign literature and useful comments.

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SOME RARE DIPTERA FROM THE BLACKDOWN HILLS IN SOMERSET AND DEVON

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The Blackdown Hills lie on the border between Somerset and Devon, forming a plateau rising to a little over 250 m. They are composed of upper greensand overlying lower lias and keuper marl with almost horizontal bedding. Numerous streams have dissected the plateau and exposed the junction of the porous sandstone over the impermeable clay in the steep valley sides. Seepages arise at and above this junction, forming an extensive series of bogs which are rapidly being drained in the course of agricultural improvement. Some of the remaining bogs are of considerable botanical interest and, as a rapid survey in poor weather demonstrated, also for Diptera.

The survey took place in the first two weeks of July 1988. Sweep netting, pitfall traps and yellow water traps set for 8–10 days were used, but, with two exceptions, the species mentioned here were caught by sweeping. Field work was undertaken by C.M.D. and the specimens were identified by both C.M.D. and A.G. Five species are included in the 'Red Data Book' (Shirt, 1987) and the others are nationally notable, ie occurring, or thought to occur, in 100 or fewer 10 km squares (Ball, 1986). However, some of these ratings are now thought to overstate the rarities of some species (Falk, in prep.). Seven sites are discussed here. Except when stated otherwise, they are in Somerset.

Beacon Lane Meadows (ST 1417), owned by the Somerset Trust for Nature Conservation (STNC), are small, grazed, acid meadows with poorly developed seepages and no true bog, on the north-facing scarp of the Blackdown Hills. They are surrounded by tall hedges and woodland.

Blackdown Common SSSI, Devon (ST 1116) is one of the largest areas of heathland and bog in the Blackdowns. *Molinia caerulea* (L), *Erica tetralix* L. and *Sphagnum* spp. are abundant. It is an exposed site.

Deadman SSSI (ST 2315), near Holman Clavel, is also owned by the STNC. The vegetation is mostly grazed, marshy grassland interspersed with true bog around the wettest seepages. Part of the hillside has been extensively disturbed during the removal of soil drains, producing areas of bare peat and small pools.

Longlye Common (ST 2612) is a small, traditionally managed farm that includes a few closely grazed acid meadows with floristically rich bog.

Munty (ST 1912) is a small valley head flanked by neglected, dry, acid pasture with alder and sallow carr forming a strip over a stream. There are very small areas of true bog, mostly dominated by tall *Molinia*.

Ringdown Common (ST 1715 to 1816) is an extensive hillside of long-neglected bog dominated by dense tussocky *Molinia* which is being invaded by birch and gorse. *Erica tetralix* and *Calluna vulgaris* (L.) are rarely codominant with the *Molinia*. Extensive carr woodland lines a stream at the valley bottom. One small area that is still grazed is floristically rich bog.

Southey and Gotleigh Moors SSSI (ST 1910 to 1911) form one of the richest mosaics of bog and carr in the Blackdowns. It spans the county boundaries: Southey is in Somerset, Gotleigh in Devon. A wide range of structures is present in the bogs, ranging from short grazed and poached vegetation to dense, species-poor *Molinia* swards. Alder and sallow carr lines the streams and one area has an extensive understorey of *Carex paniculata* L.

Tipula marginata Meigen, Tipulidae, RDB3. 2♂, Southey Moor, 9.vii.88, at the margin of floristically rich bog and alder and sallow carr with small streams and numerous seepages. New to Somerset, though known from Hampshire and Dorset (A. E. Stubbs, pers. comm.).

Tipula yerburyi Edwards, Tipulidae. 1♂, Munty, 7.vii.88; 1♂, Blackdown (Devon) 12.vii.88; 3♂, Ringdown 11.vii and 14.vii.88. Two of the specimens were swept from sallow, alder and birch foliage, one from open, wet heathland and two in wet woodland, one being caught in a pitfall trap within carr woodland very close to a stream. This species is most frequently found in south west England (Falk, in prep.).

Limonia inusta (Meigen), Tipulidae. 1♂, Ringdown, 15.vii.88; 1♂, Southey Moor, 14.vii.88. The Ringdown specimen was swept from damp secondary woodland. The other was swept from an alder and sallow carr adjacent to a stream where *Melica uniflora* Retz. was the dominant grass.

Orimarga juvenilis (Zetterstedt), Tipulidae, RDB3. 1♀, Gotleigh Moor (Devon) 14.vii.88, swept from floristically rich boggy seepages adjacent to a stream about 100 m from the spring from which it arose. The stream was shaded by sallows. This species is mainly found in Scotland but it has already been recorded from Devon (Edwards, 1938).

Beris fuscipes Meigen, Stratiomyidae. 1♂, Munty, 12.vii.88, from dense *Molinia* close to sallows over a stream. Although nationally this species is restricted to the west of England and Wales, it is probably not uncommon in the West Country (Drake, in prep.). It has been recorded in both counties.

Syndyas nigripes Loew, Hybotidae, RDB1. 1♀, Longlye Common, 7.vii.88; 4♀, Ringdown Common, 11.vii.88; 4♂ 2♀, Gotleigh Moor (Devon), 14.vii.88. Apart from the specimen from Longlye Common, whose exact habitat was not recorded, this species was found on open bog. One specimen from Ringdown Common came from the grazed area, the others from dense *Molinia* interspersed with small seepages dominated by *Sphagnum* and abundant *Narthecium ossifragum* (L.) and *Erica tetralix*. The specimens from Gotleigh Moor were collected from seepages at four stations dispersed over a wide area of the open bog and marshy hillside in the most exposed part of the site. This area was grazed by cattle so the vegetation was mostly short.

There are published records for only two localities: a bog in the New Forest, Hants, in 1954 (Collin, 1961) and at Shapwick Heath, a peat bog on the Somerset Levels, in 1985 (McLean, 1986). Falk (in prep.) quotes unpublished records for Berks and Surrey. On the continent it is known from central and northern Europe and European USSR where it is locally common in marshy biotopes, particularly bogs (Chvála, 1983).

Empis volucris Meigen, Empididae, RDB2. 1♂, Beacon Lane Meadows, 7.vii.88. Collin (1961) quotes only two records, the New Forest and Waterperry Wood, Oxon. Drake (1988*a*) found it frequently on the Gwent Levels beside drainage ditches and at an *Iris* fen near Toller Porcorum, Dorset, 1987 (Drake, 1988*b*). Falk gives a wide distribution in southern England.

Campsicnemus pusillus (Meigen), Dolichopodidae. 1♂, Gotleigh Moor (Devon), 14.vii.88, swept from grazed vegetation over seepages where the common plants were *Erica tetralix*, *Narthecium ossifragum*, *Eriophorum angustifolium* Honck., *Juncus* sp. and *Potamogeton polygonifolius*. There was very little bare peat here. Fonseca (1978) quotes several localities with wet heath and bog.

Hercostomus chetifer (Walker), Dolichopodidae. 1♂, Munty, 12.vii.88, swept from the stream banks under light shade.

Tachytrechus consobrinus (Haliday), Dolichopodidae. 1♂, Blackdown Common,

12.vii.88; ♂♀, Deadman, 8.vii.88; 1♀, Southey Moor, 9.vii.88; 7♂ 2♀ Gotleigh Moor, 14.vii.88. This fly was invariably swept from short vegetation or bare peat at very wet seepages and small pools, often where *Potamogeton polygonifolius* Pourr was frequent. *Syndyas nigripes* and *Ochthera mantis* (De Geer) were frequently found in the same localities. Fonseca (1978) quotes inland sandy areas as its habitat, and records it from both Devon and Somerset.

Rhaphium auctum (Loew), Dolichopodidae. 1♀, Deadman, 8.vii.88; 1♂ Munty, 12.vii.88. Both specimens were swept from moderately tall bog vegetation. The Munty site was close to birch and sallow scrub near a stream. Fonseca (1978) records it for north east Somerset. It was a very frequent species at seven sites surveyed in west Dorset in 1987 (Drake, 1988*b*).

Syntormon tarsatus (Fallén), Dolichopodidae. 3♂, Ringdown, 11.vii.88; 4♂ 2♀, Southey Moor, 9 and 14.vii.88; Gotleigh Moor (Devon) 14.vii.88. The specimens were swept from a range of habitats that included wet woodland, carr woodland, grazed open bog, scrubby bog with acid pasture and a well vegetated spring. All sites had seepages. This species may be widespread in the west and north of Britain.

Sapromyza albiceps Fallen, Lauxanidae. 1♂, Ringdown Common, 15.vii.88. Swept from very dense, tussocky *Molinia* with abundant birch scrub on damp peat.

Lyciella illota (Loew), Lauxanidae. 1♀, Deadman, 8.vii.88. Swept from open grazed and marshy ground.

Eccoptomera microps (Meigen), Heleomyzidae. 1♂, Blackdown Common, 14.vii.88, caught in a pitfall trap set in deep litter under dense tussocks of *Molinia* with remnants of wet heath vegetation. Earthworms were found in the peat here, so moles, with which it is known to be associated (Collin, 1943) may be present here.

Psacadina verbeckei Rozkošný, Sciomyzidae. 1♂, Deadman, 8.vii.88, swept from a marshy field with boggy seepages though more precise details were not recorded. Ball & McLean (1986) show this species to be widely distributed in southern Britain and state that adults are found in fens and sometimes in mesotrophic wetlands. The Deadman site falls into the latter category. There is a pre-1960 record from Somerset.

Opomyza lineatopunctata von Roser, Opomyzidae. Ringdown Common, 15.vii.88. Numerous specimens were swept from a very small area of dense tussocky *Molinia* under birch woodland at the margin of an old deciduous plantation. The ground was partially, and probably permanently, flooded. Although dense *Molinia* covers most of this 150 ha common, and shaded wet areas similar to that described above were frequent, *Opomyza lineatopunctata* was found nowhere else. An association with *Molinia* is emerging from collected records but it has yet to be shown that this grass is the host plant.

Aphanotrigonum nigripes (Zetterstedt), Chloropidae. 1♂1♀, Ringdown Common, 14.vii.88. Caught in a water trap placed among dense tussocks of *Molinia* close to birch scrub. This species may be widespread in southern Britain. There are published records for the New Forest (Hants) (Ismay, 1980), Dorset and Suffolk (Collin, 1946). Falk (pers. comm.) has received records from Norfolk, Kent and Gwynedd. Ismay (1980) suggested that its habitat may be heathland and the present capture would certainly support the notion of an acid habitat.

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THE VALUE OF IMMATURE STAGES IN EVOLUTIONARY STUDIES

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The value of immature stage characters in evolutionary studies has long been a matter of dispute (Hennig, 1966), and many workers still believe that such characters should not be taken into consideration in taxonomic research. There appear to be two reasons for this point of view. First, it is argued that, because insect larvae (especially among the Holometabola) are caenogenetic, i.e. secondary forms not resembling the ancestral condition, the characters of these early ontogenetic stages cannot be seen to recapitulate phylogeny (van Emden, 1957). Therefore, it is concluded that 'larval characters cannot be regarded as a general rule to be of overriding importance for the taxonomy' (van Emden, 1957). This view has persisted for a long time, perhaps because of the partial truth it contains. Certainly, the larvae of the Holometabola are caenogenetic; no one, as far as I know, has seriously suggested that the ancestral blowfly resembled a maggot. But this is missing the point. The point is that comparative studies of modern blowfly larvae should give us a good idea of what the ancestral maggot looked like, and thus will tell us a good deal about the evolution of the group.

The second reason put forward for ignoring immature characters is that the immature stages do not reproduce. This is a rather startling idea, since it seems to imply that immature stages are separate organisms having a gene-flow of their own, which is clearly not the case. All animals, to a greater or lesser extent, change in appearance during their ontogenetic development; in Holometabolous insects this change happens to be great and sudden, but this is hardly a reason for ignoring the pre-adult characters. In any case, immature stages do reproduce eventually and are themselves reproduced by the adult. These well-known facts seem to have caused confusion in the past. For example, van Emden (1957) states that the structure of the egg chorion reflects the shape of the follicular cells in the ovariole and that, therefore, chorionic structure is, in reality, an adult character. He distinguishes such characters from what he calls 'truly embryological egg characters'. In my opinion, this is a meaningless distinction, since both sets of characters are ultimately derived from the adult.

In principle, therefore, the characters of immature stages are equal to those of adults in value. In practice, however, it is usually found that either the adults or the larvae of a group better characterize that group. For example, Crowson (1970) states that, of the two Coleoptera families Elateridae and Carabidae, the subdivisions of the former are more clearly expressed in the larval stages, whereas the reverse is true of the latter family.

Much is often made of the fact that a classification based on larval characters will almost always be different from one based on adult characters. However, as Hennig (1966) points out, 'In many cases the asserted incongruence between larval and imaginal systems is based on the fact that only degree of similarity is considered, without raising the question of whether the similarity rests on symplesiomorphy or synapomorphy'. One may add that convergence is another question that ought to be raised. Of course, many entomologists do recognize the value of immature stages in evolutionary studies. Nevertheless, the use of these stages in such studies remains a minority activity.

Finally, it is possible that the longevity of a particular stage may be related to its taxonomic use. In the Coleoptera examples cited above, Crowson (1970) states that it may not be accidental that the larvae are long-lived and the adults short-lived in the Elateridae, whereas the reverse is true of the Carabidae. In my own limited studies on the Oestridae, which have very long-lived larvae, Crowson's point finds strong support.

The same may be true of Tachinidae, many of which overwinter as larvae (Clausen, 1940). It is well-known that the identification of tachinids is not easy, but it has hardly ever been thought worthwhile to question whether this is because the species features may be more clearly expressed in the larval stages. In a largely overlooked paper, Thompson (1922) makes the following remarks: 'It sometimes happens that species belonging to this group [i.e. Tachinidae], though easily separated by constant and well marked characters in the larval stage, are in the adult stage so similar that it is only possible to separate them by characters whose value in the group as a whole is so open to question, that to admit their validity in general would be to plunge the taxonomy of the family into inextricable disorder'. He goes on to describe three larval species parasitizing *Pyrausta nubilalis* (Lepidoptera: Pyralidae). Each of these three species consistently developed into one adult 'species', *Paraphorocera senilis* Rondani. In spite of these observations, Tachinidae specialists have continued to ignore the larvae in their definitions of species. In a group where selective pressures on the larvae would be expected to be strong, larval studies would undoubtedly be of great use in evolutionary and taxonomic studies.

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THE ORIGIN OF PARASITISM IN BLOWFLIES

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As far as their larval feeding habits are concerned, the species of the family Calliphoridae (blowflies) can be divided into three groups: (1) obligate parasites, feeding on the tissues of living mammals and birds, and causing a condition known as myiasis in the host, (2) obligate saprophages, feeding on decomposing vertebrate carcases, and (3) a vast array of normally saprophagous species that can also act as facultative parasites. The question is whether parasitism or saprophagy is the primitive, ancestral habit. The question may be applied to the whole of the Cyclorrhapha.

Keilin (1915) noted that Cyclorrhapha larvae are very uniform in structure, but exhibit a very great diversity in life-habit, whereas Orthorrhapha larvae exhibit great structural diversity which is not accompanied by great biological diversity. Keilin asks how, then, can one explain the great diversity of Cyclorrhaphous larval habits coupled with such uniformity of structure? He concluded that the ancestral Cyclorrhaphan must have followed a life-habit from which the later great diversity was derived. He further concluded that this ancestral habit must have been parasitism. His reasons for holding this view are as follows:

1. A very large number of parasitic species are known among Diptera, but they are almost all Cyclorrhapha, not Orthorrhapha. Parasitism among the Orthorrhapha is extremely rare.
2. Larviparity and pupiparity, both adaptations to the parasitic habit, are again limited exclusively to the Cyclorrhapha and are absent from the Orthorrhapha.
3. Only in the Cyclorrhapha is there an enormous fauna of sarcophagous and myiasis-causing species. The latter may be considered to be a sort of transition between parasitic larvae with a long terminal saprophagous period, and truly saprophagous larvae.

Therefore, so Keilin argued, all free-living Cyclorrhaphous larvae are secondarily so, and the peculiar form of the free-living Cyclorrhaphous maggot is an example of the irreversibility of evolution.

Zumpt (1965) held the opposite view, believing that the parasitic habit in myiasis-causing species is derived from the free-living saprophagous habit. He saw the ancestral species of myiasis-causing flies as being very unspecialized feeders like the modern *Muscina stabulans* (Muscidae), which is saprophagous on dead vertebrates and insects, a scavenger in wasps' nests, a predator on other maggots and, occasionally, a myiasis agent.

He hypothesized that myiasis may have had two roots: a saprophagous and a sanguinivorous root. He saw the saprophagous root as beginning with species that bred in carcasses, which later became facultative parasites of suppurating wounds. This was then followed by a facultative parasitic habit on unwounded tissues, which eventually became an obligate parasitic habit. Zumpt saw intestinal parasites as arising from larvae accidentally swallowed in food.

The sanguinivorous root arose from larvae that preyed upon other maggots. Such larvae may have accidentally pierced the skin of a bird or mammal in its nest or burrow, thus obtaining a blood meal; these larvae would have evolved into obligate bloodsuckers. Zumpt, however, offered no evidence to support his hypotheses.

My own view, like Zumpt's, is that saprophagy was the ancestral habit, both among the Calliphoridae and the Cyclorrhapha as a whole. In response to Keilin's three points cited above, the following answers can be made.

1. While it is true that an enormous number of Cyclorrhapha are parasitic, it is also true that at least an equal, if not greater number are saprophagous. Parasitism, while not as common in the Orthorrhapha, is certainly not rare in that sub-order; the very large family Bombyliidae, and also the Nemestrinidae, Acroceridae and many Asilidae are parasitic as larvae.
2. The occurrence of larviparity and pupiparity in the Cyclorrhapha does not, in itself, indicate that the ancestral habit was parasitic.
3. Keilin's third point may be argued both ways; in other words the myiasis habit can easily be derived from the saprophagous habit, as shown by Zumpt.

Points in support of Zumpt's view are:

1. The parasitic habit among Cyclorrhapha is often linked with features that are obviously derived, e.g. the reduction of adult mouthparts and the absence of adult feeding in the Oestridae.
2. The widespread saprophagous habit among the Cyclorrhapha, even in many families that contain parasitic species, would indicate that this habit is primitive.
3. Parasitism is an all-embracing term that covers many different phenomena. For example, the parasitoid habit of Tachinidae is a very different phenomenon from the myiasis-causing habits of blowflies, and it is difficult to see how one habit could have arisen from the other. It is, however, easy to see how a generalized feeder like *Muscina stabulans* (see above) could have developed any one of the life-habits covered by the term 'parasitism'. It is very likely, therefore, that parasitism arose independently many times in the evolution of the Cyclorrhapha as a whole, and probably the Calliphoridae as well.

Regarding the peculiar form of the cyclorrhaphous larva, this appears to have evolved in response to the saprophagous habit, and does not indicate that the ancestral habit was parasitic. It simply shows that the 'maggot-form' is so successful that it enabled the Cyclorrhapha to invade a wide variety of habitats. In this paper, therefore, the hypothesis is that saprophagy is the plesiomorphic habit and parasitism the apomorphic.

The second question to answer is: What can the actual hosts of the Calliphoridae tell us about the evolution of the group? Although the Calliphoridae are known to parasitize many vertebrate and invertebrate groups, our concern in this paper will be restricted to the myiasis–parasitic habit in vertebrates. The vertebrates most commonly parasitized are without doubt the mammals, although birds and amphibians have a small number of highly specialized calliphorid parasites (Zumpt, 1965). It is interesting that there are very few records indeed of blowflies parasitizing reptiles, which seem to be the only class of land vertebrates that are effectively immune from attack. Zumpt (1965) cites a case of a gecko (*Naultinus elegans*) as a host of *Calliphora stygia* in Australia. Larval specimens sent to me from parasitized tortoises (*Testudo hermanni*) kept in captivity in Vienna, Austria, proved to be *Calliphora vicina* and *Lucilia ampullacea*.

Since the mammals are the main host group, what can blowfly parasitization patterns tell us about the evolution of blowfly parasitism? One of the most interesting points to emerge is that there are very few records of species of *Calliphora*, *Lucilia*, or *Chrysomya* parasitizing wild mammals in the wild state. All records known to me are either from zoo animals or animals in an urban situation. On the other hand, domestic mammals are frequently parasitized by these species. Even the obligate parasite *Chrysomya bezziana* has hardly ever been recorded from a wild mammal in

the wild state, while it is recorded from 21 zoo mammal species from kangaroos (*Macropus rufa*) to Polar bears (*Thalarctos maritimus*) by Spradbery & Vanniasingham (1980). During many years of collecting, Zumpt (1965) never recorded *Ch. bezziana* from a wild African mammal, in spite of the abundance of this species in Africa.

What does this indicate? I suggest that these species may have evolved the parasitic habit in association with man. Further evidence in support of this view is that, of the six British species of *Calliphora*, the only two known to cause myiasis in any animal are the two synanthropic species *C. vicina* and *C. vomitoria*.

The endemic species of *Calliphora* in Australia include some, e.g. *C. augur* and *C. stygia*, that are known to be important agents of sheep myiasis (as well as breeding in carcases) yet none of these species has ever been recorded as a parasite of any indigenous marsupial, bat or dingo. This would suggest that the parasitic habit evolved after the arrival of man with his flocks of sheep to Australia, and that prior to this these flies must have bred exclusively in animal carcases. This seems to support strongly the view that parasitism in these species arose in association with man, and in response to the attraction of the unhygienic conditions prevailing in human dwellings and barns. It is possible that most blowflies do not parasitize wild mammals both because of their generally cleaner condition (in the wild) and because that niche has already been filled by the Oestridae and Gasterophilidae. It is also possible that domesticated breeds of livestock are genetically prone to blowfly attack, e.g. many varieties possess loose folds of skin or long, easily-soiled fleeces—features that are known to be attractive to blowflies.

If the above proposal is true it would probably follow that the parasitic habit evolved after man became settled in communities. It is quite possible, therefore, that archaeological evidence may shed light on this idea. It would be very interesting to make comparative studies of the insect faunas of archaeological sites that are known to have been heavily populated (by humans), and other sites that are known to have been only sparsely inhabited. This is a field in which both the entomologist and the archaeologist could make useful contributions.

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TIMES PAST

Extracts from the Society's Journals

100 years ago

At a meeting on 28 March 1889 Mr W. H. Tigwell exhibited examples of *Deilephila galii* Schiff., and read the following notes:—

The usual number of *Deilephila galii* that occurred all over England last year, extending even to Ireland and Scotland, naturally re-opens the oft-repeated query as to their origin. The idea that has perhaps found the most favour is the so-called 'blown over' theory, although there has never been any conclusive evidence given to prove it; but merely that it appeared the most feasible solution of the origin of this sudden and wonderful abundance of a large and showy species like *galii*. It my be remembered that in February last I exhibited a bred series of *D. galii*, three males and three females, as fine and large as any British-born specimens I had ever seen: when, to my surprise, after the meeting, one of our members, Mr F. Oswald, came to me, and whilst admitting the beauty of my specimens, asked if they were not unusually small. On thinking this matter over afterwards, I too recollected that Mr J. T. Williams had also told me how large the specimens were that he and Mr Oswald had taken in St Margaret's Bay, so much so that Mr Oswald had supposed them to be *S. ligustri* L. This gave me the key to what I am now fully convinced is a positive fact, viz., that in nearly every case of captured moths of *D. galli* they are immigrants from the Continent, as I found on writing to all the captors of imagines in 1888 for measurement of their insects, they all agreed in being the large type that is found in France, but which type is never reared here in England from British-fed larvae. The cause of this is, I am fully convinced, the want of sunshine with us, our cold and wet weather, which weakens and dwarfs them, as the following table of figures will show pretty conclusively:—

Bred specimens from English larvae, i.e. found at large in this country. Liverpool—Out of a large number bred one female only reached 3½ inches whilst the largest male was only 2 10/12 inches. From 106 bred by myself from Deal larvae, the largest female measured 3 1/16 inches, the largest male measured 2⅝ inches; average males, 2½ inches; average female, 2¾ inches. From a number bred by Mr J. A. Cooper from Essex larvae, largest females, 2⅝ inches; largest males, 2⅜ inches.

Contrast these measurements with the following from caught imagines, the largest female caught by Mr J. T. Williams measured 3⅜ inches, and the smallest 3⅛ inches; whilst the males measured 3⅛ inches. From Kingsdown, Kent, female, 3¼ inches; from Aberdeen, female, 3¼ inches; from Plymouth, female 3 7/16 inches; Dartford, Kent, female 3 inches; Dublin, female 2 7/10 inches.

All these caught examples agree with French types in my possession, viz., females, 3⅜ inches full; and males, 3⅛ inches, and point most conclusively to their probable French origin, as not a single case of known bred English specimens ever reach the size of the caught moths, an average English female being 2¾ inches; an average English male, 2½ inches only.

FIRST BRITISH RECORD OF *POLYMIXIS GEMMEA* (TREITSCHKE, 1825) (LEPIDOPTERA: NOCTUIDAE)

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At the 1987 BENHS Annual Exhibition, I exhibited a specimen of *Polymixis gemmea* (Waite, 1988). The moth was taken at light in my garden in East Berkshire on the night of 1.ix.79.

In spite of the late date and being something like 40 miles from the nearest coast as the crow flies, the only noctuid I could find on the British list which resembled my specimen, was *Hadena albimacula* (Borkh.) and this I assumed it to be.

It was not until 7 years later, as a result of a casual conversation with Brian Baker, that I examined the moth more closely. It was then apparent that the similarity to *H. albimacula* was superficial and I began to believe I might have something that had not been previously recorded.

Shortly afterwards, I received the first volume of the facsimile publication of Culot's *Noctuelles et géomètres d'Europe* and found what I believed to be an illustration of my noctuid, referred to by Culot as *Hadena gemmea*. It was at this point I took it to the BMNH where Martin Honey confirmed its determination as *Polymixis gemmea*.

This species is, apparently, widespread in the northern part of Continental Europe, occurring as far north as Finland and reaching northern France in the south. Two specimens in the BMNH are recorded as having been taken in Corsica, although these records are thought to be suspect. Martin Honey believes that Seitz's reference

Fig. 1. *Polymixis gemmea.*

to Corsica as a locality probably stems from his having had sight of the BMNH specimens at some time.

Various authors give the grasses *Deschampsia cespitosa* and *Phleum pratense* as the larval food plants.

As this species did not seem to be known for its migratory habits, it seemed to me likely that my specimen was an accidental import. I have, however, recently received a letter from Mr R. F. Bretherton who has been kind enough to draw my attention to the fact that the period which bracketed the date on which the moth was taken, was one of unsettled weather with south and south-westerly winds prevailing. Bretherton & Chalmers Hunt (1980) refer to a large number of immigrants entering the British Isles in late August and early September. As a consequence, Mr Bretherton believes conditions were such that my *P. gemmea* was more likely to be a natural immigrant than an import, as I had originally supposed.

The specimen is a male with a wingspan of 34 mm and is in very good condition. The coloration is very similar to that of *H. albimacula* although, as Fig. 1 shows, the ornamentation on the forewings is more elaborate. It does seem possible that the similarity between these two species is such, that other specimens of *P. gemmea* could be overlooked as a result of their being mistaken for *H. albimacula*, particularly if they were to be taken in the latter's coastal haunts.

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LEPIDOPTERA FOODPLANT RECORDING FOR CONSERVATION

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INTRODUCTION

Have you been asked to assist in a survey on a reserve or habitat to be conserved, or to produce a list of Lepidoptera when you have operated a light trap? How can one best assist the conservation management of a reserve or habitat? Perhaps like myself, you have either made a short list of species meriting conservation, or listed the species found and added details about their relative abundance. The reserve managing body or land owner is primarily involved with the terrain, soil maintenance, plants and trees. Information is important so that the person wielding the billhook or driving heavy machinery does not rip out trees or plants, host to many or rare Lepidoptera. There is a need to record larval foodplants. In this paper, written by one primarily interested in Macrolepidoptera, data and methods of collecting and presenting this information are described and examples given: one for a reserve and the other for an agricultural and horticultural area that is being conserved. However this approach is fraught with problems and parallels will be found with Lena Ward's paper on insect foodplant records (Ward, 1988).

METHODS

Lepidoptera records for a well-known site can often be obtained from the literature, but one is often asked to assist at a new or relatively unknown site. Records can either be based on field-work by oneself and others and/or light-trapping. For the former, observing oviposition, searching or beating for larvae by day and night, produces evidence of plant hosts. However other methods such as searching for adults on flowers, on wine ropes draped on branches and bushes (sash cord steeped in wine and sugar to avoid blemishing tree trunks with a sugar mix), at rest or in flight can be used; the wider the range of methods the more data can be obtained. However, if time is at a premium for the amateur, light-trapping is necessary and, if possible, using both actinic and mercury vapour light-traps will produce a wider range of species. During the winter months, a list of larval foodplants can be compiled from one's own field notes and also from literature sources.

A list as complete as possible of plants should be compiled. This can be obtained from either the reserve management body or from one's own observations when carrying out field-work. When records are obtained only from light-trapping, this list can be compiled from literature sources. Against this a list of Lepidoptera should be attached to the relevant foodplant.

By making use of a standard reference checklist of Lepidoptera (such as Bradley & Fletcher, 1979) much time and energy may be saved. To avoid making long lists of species' names, the numbers to be found in the log book can be listed after each foodplant. The reader can then readily see how many Lepidoptera species there are for each plant, and to discover the names of the insects can check back to the full list using the numbers. The occurrence of a species can be qualified in abbreviated form. For where the foodplant is established by either finding the larvae on it or beating, the moth species number can be followed by a dagger symbol (†). This symbol can also be used for an insect when it is known that the foodplant is possibly the only one

within the area being studied. If imagines with known foodplant(s) not to be found in the area occur, they can be labelled 'vagrants' and listed separately. An example of this is *Lithophane leautieri hesperica* Bours. (foodplants *Cupressus macrocarpa* and *C. lawnsoniana*) at a light trap in open deciduous woodland. They should be included for interest's sake. If a species has more than one foodplant, e.g. several species of *Salix* and *Populus*, it can be accounted for under the relevant foodplants, unless it is a species regarded as polyphagous. To avoid a time-consuming task and possible errors such species can be listed separately. To aid the reader of the report, the plant list can be divided into three sections: tree and shrub layer; ground cover herbaceous plants, and ground cover grasses, rushes and sedges. A part of the report can include comments on the area, its habitats, a few ideas on improvement if necessary, highlighting Lepidoptera at risk and the need for certain plant/tree species to be increased or discouraged.

Foodplant data and some problems involved

With lists of Lepidoptera numbers attached to each plant, a false impression might be given that plant species with fewer Lepidoptera attached are of little importance. To counter this, numbers marked with a dagger symbol (†) indicate the importance of the foodplant. For scarce Lepidoptera an asterisk (*) can be put by the number to indicate its greater importance.

There are inevitable problems with recording foodplant data. The ideal situation is for one to base foodplant records on one's own experience. Even then, should one include all foodplants? For example, a nearly full grown larva of *Amphipyra pyramidea* L. was found at Sparsholt on a *Cotoneaster* plant growing in an open situation in one of the beds and was feeding on the plant. It was given *Quercus robur* foliage but refused to eat it, being quite contented with its *Cotoneaster*! It was bred through, but the record has to be ignored as deviant to normal behaviour for this arboreal species. If one has found a species on one foodplant but other foodplants recorded in literature are also to be found in the area being worked, should one record these? Through fear of having overlooked the larvae (in particular with arboreal foodplants the larvae may well have been unseen or the foliage out of reach of the beating stick) one should record them.

For the examples which follow, the bulk of the foodplant data were extracted from the literature, but as will be shown accuracy can be difficult to obtain. In my earlier years, data was largely from Scorer's (1913) entomologist's log book, which I found useful for annotating with my field notes. Later I used Allan's (1949) *Larval foodplants*, which I still use as my working book annotating with my own notes, updating with Heath and Emmet (1983 & 1984). One problem with older data is that of all the foodplants included the most popular pabulum or even the natural foodplants are not always indicated. The main emphasis has been to rear the perfect insects from ova using easily accessible plants. With Allan, one is led to believe that all possible foodplants have been recorded including some which appear rather unusual, e.g. for *Stauropus fagi* L.: '*Fagus sylvatica*, *Quercus robur*, *Betula alba*, *Corylus avellana*, *Pyrus malus*, *Alnus glutinosa*, *Crataegus oxyacantha*, *Prunus spinosa*, *Tilia europaea*, *Rosa canina*, has also been found on *Salix* spp.' The occasional larvae I have found were only on *Quercus* and imagines have often visited the light trap operated in oak woods where *Fagus* was absent. So in my experience *Quercus* is the moth's most popular pabulum though others have found it to be *Fagus*. All the rest of the foodplants listed for *fagi* in my copy of Allan's book have been crossed out except *Betula* and *Corylus*, as they have been mentioned in recent literature (Heath and Emmet, 1979). In recent years I have tried to include as many

Microlepidoptera as possible and for their foodplants, have depended on the Society's field guide, recently updated (Emmet, 1988).

With literature covering the whole country, geographical variation is not well covered; more useful information could possibly be obtained by studying and recording foodplants at a county level. Foodplant data could be compiled for or by Naturalists' Trusts on databases, so that geographical comparisons can be made by the recorder. Over a period of years one problem with listing checklist numbers against the foodplant is that the classification and nomenclature is never static; the log book numbers will have to be altered whenever the updated lists are published.

Foodplant data should not only include those foodplant species which in the locality have been proven; those foodplants, which if found in the locality could be possible hosts to insects, should also be noted. Nature reserves are becoming oases in terrain that has been agriculturalized, afforested or developed for housing, roads and industry. It is important to list *possible* foodplants for the survival of both static and nomadic populations of insects.

Appendix 1

A wet heath and woodland area has recently been acquired for a reserve. Plants lists were not to hand, and it was a case of visiting the new reserve to discover the insect life. As the reserve comprises some 200 acres and includes a variety of habitats, the reserve was divided into numbered areas. Below are extracts from the report produced at the end of 1987. First, the Lepidoptera species are listed. The numbers before the name refer to the checklist number of Bradley & Fletcher. Second, the foodplants are listed for one area. † by the insect species number indicates that the foodplant is proven or is the only possible foodplant for that species. Relative abundance key: ab abundant, vc very common, c common, fc fairly common, sc scarce, occ occasional, r rare, loc local. Finally, some suggestions are made for conservation.

Lepidoptera species list

1627 *Coenonympha pamphilus* L. small heath 6
1629 *Aphantopus hyperantus* L. the ringlet 5, 6, 8, 11, 18
1632 *Trichiura crataegi* L. pale eggar 6, 11, 12, 20
1634 *Malacosoma neustria* L. the lackey 6
1638 *Macrothylacia rubi* L. fox moth 6
1640 *Philudoria potatoria* L. the drinker 6
1645 *Falcaria lacertinaria* L. scalloped hook-tip 5, 7, 11
1648 *Drepana falcataria* L. pebble hook-tip 7
1652 *Thyatira batis* L. peach blossom 5
1653 *Habrosyne pyritoides* Hufn. buff arches 5, 7
1654 *Tethea ocularis* L. figure of eighty 7
1658 *Cymatophorima diluta* D. & S. oak lutestring 7
1661 *Archiearis parthenias* L. orange underwing 5, 6, 8, 12
1665 *Pseudoterpna pruinata* Hufn. grass emerald 6
1666 *Geometra papilionaria* L. large emerald 5, 6, 7
1667 *Comibaena bajularia* D. & S. blotched emerald 5
1669 *Hemithea aestivaria* Hb. common emerald 6, 7, 12
1674 *Jodis lactearia* L. little emerald 7
1677 *Cyclophora albipunctata* Hufn. birch mocha 6, 7
1680 *C. punctaria* L. maiden's blush 5, 7, 10, 19, 20
1682 *Timandra griseata* Peters. blood-vein 6, 8, 19, 20
1693 *Scopula floslactata* Haw. cream wave 7, 13, 18, 19, 20
1711 *Idaea trigeminata* Haw. treble brown spot 7
1713 *I. aversata* L. riband wave 5, 6, 8
1722 *Xanthorhoe designata* Hufn. flame carpet 6
1724 *X. spadicearia* D. & S. red twin-spot carpet 7, 8, 19, 20

1725 *X. ferrugata* Cl. dark-barred twin-spot carpet 17
1727 *X. montanata* D. & S. silver-ground carpet 5, 7, 13, 17, 18, 20
1728 *X. fluctuata* L. garden carpet 7
1732 *Scotopteryx chenopodiata* L. 8, 12, 13, 18
1734 *S. luridata plumbaria* F. July belle 6

Foodplant list

Area 6
Shrubs
Betula 375 † sc & loc, 381 fc, 410 sc, 1092 † fc, 1093 † fc, 1134 † fc, 1156 † sc, 1632 † occ, 1661 † fc, 1666 † sc, 1755 occ, 1773 occ, 1796 † r, 1799 † occ, 1837 occ, 1904 r, 1926 † r, 1931 fc, 1935 † c, 1944 sc, 1955 fc, 1994 r, 2000 sc, 2030 sc, 2128 r, 2130 sc, 2150r, 2156 fc, 2268 fc, 2280 † r, 2421 occ
Lichen on trees 2040 c
Mosses on trees 1334 fc, 1344 fc
Quercus 1033 vc, 1634 † r, 1669 † r, 1773 occ, 1779 † occ, 1837 occ, 1904 r, 1931 fc, 1944 sc, 1994 r, 2030 sc, 2150 r, 2183 † sc
Salix spp. 701 † occ, 1755 fc, 1777 † c, 1811 † r, 1828 occ, 1837 occ, 1887 † fc, 1904 r, 1931 fc, 1955 † fc, 1981 † r, 2017 † sc, 2030 sc, 2109 occ, 2128 r, 2130 sc, 2156 fc, 2158 r, 2182 † occ, 2225 sc, 2268 fc, 2273 † loc c, 2274 † loc fc, 2318 † fc, 2421 loc c
Vagrant 1898 r (*Pinus sylvestris* and *Larix decidua*)
Ground Cover Herbaceous Plants
Angelica sylvestris wild angelica 1835 sc
Calluna vulgaris ling 1638 r, 1734 sc, 1755 fc, 1828 occ, 1941 † r, 1952 sc, 2109 occ, 2118 c, 2484 fc
Cirsium spp. thistles 945 r, 1108 occ, 1458 r
Crepis taraxacifolia hawk's-beard 1840 sc
Cruciferae 1722 r
Erica cinerea bell heather 1451 sc, 1952 sc, 2118 c
E. tetralix cross-leaved heath 1451 sc, 1638 r, 1828 occ, 1941 occ, 1952 sc
Genista anglica needle furze 1255 fc, 1665 r, 1734 sc
Leontodon hispidus greater hawkbit 1840 sc
Lichens on ground & on heather 2040 c, 2047 sc
Mosses 1334 fc
Plantago spp. 2089 occ, 2361 occ, 2381 r
Polyphagous on herbaceous plants 1076 occ, 1524 r (usually *Calystegia* or *Convolvulus* but occasionally on other herbaceous plants), 1828 occ (on flowers), 1837 occ (on flowers), 2102 c, 2107 fc, 2334 occ
Rumex spp. docks & sorrels 1561 r, 1682 occ, 1713 sc, 1742 occ, 2059 occ, 2089 occ, 2126 r, 2130 sc, 2134 sc, 2150 r, 2156 fc, 2158 r, 2161 occ, 2381 r, 2421 occ
Salix repens creeping willow 1638 r, 2017 ? (searched for but larvae not found), 2126 r
Serratula tinctoris saw-wort 699 † fc, 2299 occ
Succisa pratensis devil's bit scabious 1828 occ, 2059 fc
Taraxacum officinale dandelion 1713 sc, 1742 occ, 2059 fc
Trifolium pratense & *repens* 2462 occ (1 larva found resting on grass)
Ulex gorse 911 † r, 1255 † fc, 1665 r, 1734 sc, 1862 r
Vagrants 1807 (*Rhinanthus minor* yellow rattle), 1894 r (*Trifolium* spp but usually in drier habitats)
Ground Cover Grasses, rushes & sedges
Agropyron repens 1531 fc, 1625 sc, 1626 fc, 1629 r, 1640 fc, 2321 r, 2330 occ

Suggestions for conservation

Please keep and encourage further growth of *Calluna vulgaris* (ling) and *Erica tetralix* (cross-leaved heath). Though only a few Lepidoptera use these as foodplants, there is potential for other species to move in. Perhaps these plants could be extended by felling of woodland in neighbouring areas. A lush herbage should be encouraged in places, particularly as *Metrioptera brachyptera* L. (marsh bush cricket), was found here. In the literature it is stated that cross-

leaved heath is necessary for this species. *Ulex* (gorse) needs to be restricted to its present extent, which is enough to support species attached to it. The grassy area with few birches supports strong colonies of 2156 *contigua* (*Salix* spp and *Betula* in damp heaths) and 2196 *pudorina* (graminae). Please leave the isolated stands of *Salix* (sallow), *Quercus* (oak) and *Betula* (birch) as they support so many species, some of which favour isolated bushes on heathland.

Appendix 2

A Robinson mercury vapour light trap has been operated at Sparsholt College, Hampshire on 15 nights in 1986 and 30 nights in 1987 and 1988. The nights selected were either for optimum weather conditions or for educational use with visiting school parties the following morning. In 1988 the Rothamsted survey insect light trap was operated every night except for 7 nights when bulb failure occurred. The traps are being operated for two purposes: one is for educational use, the second is for recording both qualitatively and quantitatively the Lepidoptera as an environmental indicator to changes taking place in the landscape. The aim is to record the foodplants of the Lepidoptera to reflect the quality of plant and tree life in the area. This will relate to the 10-year college farm conservation plan which is now in its second year, and hopefully a richer fauna will be recorded with the improvements to the farm such as new hedges and shelterbelts and reduced spraying on headlands and lane-verges. The data produced has already influenced some decisions made on clearance and planting.

Sparsholt College is approximately 4 miles west-north west of Winchester. It occupies 177 hectares of which the College farm covers 144 hectares. This area is farmed commercially and at the same time is used intensively for education and training purposes. The traps are operated outside the schools' unit and close to the parkscape and ponds of the horticultural department.

Below are extracts from the various reports. First, the Lepidoptera species are listed for 1987 mercury vapour light trapping. The numbers before the names refer to the checklist numbers of Bradley and Fletcher and the numbers after the names refer to the total number of specimens. Second, the foodplants are listed for 1987 Lepidoptera species. This was an academic exercise as at present there is little field-work data and many of the trees have foliage out of reach for using a beating tray. † by the moth species number indicates that the foodplant is the only recorded foodplant in the literature for that species or is the only known foodplant present on the College land. N indicates that the foodplant was not found on College land. Third, the foodplants and the numbers of Lepidoptera for each foodplant from 1986 to 1988. The development of the light trapping has produced results which are difficult to compare because of differences in the number of nights the traps were operated. In future years the operating frequency pattern will follow the 1988 pattern, so that changes can be monitored more clearly. Operating traps in reserves annually could provide data for foodplants to reflect success or failure of conservation work. Light trapping by Lepidopterists living near reserves, farm land or parks could, by using the methods described to produce foodplant lists, reflect the present situation. Data could be produced to support the case for improvements. However recording over a period of years will probably show variation in numbers due to weather conditions. At Sparsholt 1988 was comparatively a poor year. The full lists of moth species reveal that the autumn of 1987 was poor compared with the autumns of 1986 and 1988. Fourth, some comments and suggestions are made.

Lepidoptera species list

2155	*Melanchra persicariae* L.	34	2187	*O. stabilis* D. & S.	31
2157	*Lacanobia w-latinum* Hufn.	4	2188	*O. incerta* Hufn.	1
2158	*L. thalassina* Hufn.	2	2190	*O. gothica* L.	37
2160	*L. oleracea* L.	76	2192	*Mythimna conigera* D. & S.	1
2164	*Hecatera bicolorata* Hufn.	1	2193	*M. ferrago* F.	12
2166	*Hadena rivularis* F.	2	2198	*M. impura* Hb.	160
2177	*Tholera cespitis* D. & S.	1	2199	*M. pallens* L.	1022
2182	*Orthosia cruda* D. & S.	6	2232	*Aporophyla nigra* Haw.	6
2186	*O. gracilis* D. & S.	1			

Foodplant list

Tree and shrub layer
Acer campestre (field maple) 290, 462, 970, 1032, 1876, 2009 †, 2279, 2425
A. platanoides (Norway maple) 1032
A. pseudoplatanus (sycamore) 161, 290, 462, 1032, 1036, 2110, 2279
Aesculus hippocastanum (horse chestnut) 161, 2279
Alnus glutinosa (alder) 970, 1648, 1657, 1666, 1876, 1913, 1956, 1979, 2000, 2187, 2280, 2425
Betula spp. (birch) 161, 410 †, 663, 970, 1093 †, 1632, 1648, 1657, 1666, 1762, 1764, 1773, 1904, 1912, 1913, 1915, 1940, 1956, 1958, 1979, 1999, 2000, 2006 †, 2008, 2030, 2033, 2109, 2110, 2114, 2120, 2128, 2138, 2150, 2187, 2279, 2280, 2283, 2284, 2322, 2425
Carpinus betulus (hornbeam) 161, 994, 1032, 2325
Chamaecyparus lawsoniana (Lawson's cypress) 1827
Clematis vitalba (traveller's joy) 1781 †, 1813 †, 1825, 1862
Corylus avellana (hazel) 969, 970, 1632, 1657, 1666, 1777, 1906, 1999, 2000, 2008, 2110, 2111, 2128, 2182, 2422, 2425
Crataegus monogyna (hawthorn) 161, 441 †, 450, 455, 994, 1037, 1048, 1083, 1632, 1669, 1764, 1834, 1837, 1853, 1860, 1862, 1884, 1906, 1912, 1958, 2020, 2030, 2077, 2109, 2110, 2111, 2114, 2120, 2128, 2158, 2182, 2283, 2284, 2299, 2425
Dead wood and fungus 224 †, 642 †
Euonymus europaeus (spindle) 451 †, 1465 †, 1888 †
Fagus sylvatica (beech) 161, 663, 1647 †, 1666, 1681 †, 1904, 1915, 1999, 2008, 2014, 2187, 2422, 2425
Fraxinus excelsior (ash) 969, 1011, 1914 †, 1976, 2269 †, 2291 †
Ilex aquifolium (holly) 1862
Juniperus spp (junipers) 1827, 1854 †
Larix decidua (larch) 1002, 1856 †, 1893, 1940, 1962
Lichens on trees 2040 †, 2043 †, 2044 †, 2050 †, 2473 †
Ligustrum spp. (wild & garden privet) 161, 994, 1002, 1011, 1378, 1936, 1976
Lonicera periclymenum (wild honeysuckle) N 161, 453 †, 1002, 1747, 2120, 2158, 2442, 2443
Malus spp. (crab apple & cultivars) 161, 455, 970, 994, 1037, 1048, 1452, 1632, 1860, 1906, 2020, 2030, 2033, 2077, 2158, 2188, 2283, 2284, 2425

Foodplants and numbers of Lepidoptera for each foodplant, 1986–1988

	1986	1987	1988
No. of nights operated m.v.	15	30	30
Roth.			350
Tree and shrub layer			
Acer campestre (field maple)	4	8	8
A. platanoides (Norway maple)	1	1	1
A. pseudoplatanus (sycamore)	5	7	5
Aesculus hippocastanum (horse chestnut)	1	2	1
Alnus glutinosa (alder)	13	12	7
Betula spp (birch)	26	40	33
Carpinus betulus (hornbeam)	6	4	3
Chamaecyparis lawsoniana (Lawson's cypress)	2	1	2
Clematis vitalba (traveller's joy)	4	4	6
Corylus avellana (hazel)	12	16	12
Crataegus monogyna (hawthorn)	32	35	41
Dead wood and fungus	0	2	0
Euonymus europaeus (spindle)	1	3	2
Fagus sylvatica (beech)	10	13	12
Frangula alnus (alder buckthorn) N	1	0	2
Fraxinus excelsior (ash)	8	6	4
Ilex aquifolium (holly)	1	1	4
Juniperus (garden spp.)	1	2	1
Larix decidua (larch)	1	5	2

	1986	1987	1988
ligustrum spp (wild & garden privet)	4	7	5
Lonicera periclymenum (wild honeysuckle) N	8	8	10
Malus spp (apple including cultivars)	16	19	17
Picea abies (Norway spruce)	1	0	0
Pinus spp. (pine)	5	6	3
Populus spp. (poplars)	17	16	17
Prunus domestica (plum)	12	9	9
P. padus (bird cherry) N	4	5	5
P. spinosa (blackthorn)	21	22	26
Pyrus communis (pear)	8	10	9
Quercus robor (oak)	26	44	38
Q. ilex (evergreen oak)	1	1	1
Rhamnus catharticus (buckthorn)	1	1	2
Ribes spp. (currant)	1	2	2
Rosa spp. (wild roses)	4	9	10
Rubus fruticosus agg. (bramble)	10	12	12
Salix alba (white willow)	26	27	27
S. caprea (pussy or goat willow)	38	45	44
S. cinerea (common sallow)	31	35	24
Sambucus nigra (elder)	0	2	1
Swida sanguinea (dogwood)	0	0	1
Syringa vulgaris (lilac)	4	4	3
Tilia spp. (lime)	8	8	6
Viburnum lantana (wayfaring tree)	1	1	1
V. opulus (guelder rose)	1	0	0
Polyphagous on native deciduous trees and shrubs	14	22	22
Birds' nests	0	1	1
Ground Cover Herbaceous Plants			
Anthriscus sylvestris (cow parsley)	0	3	4
Achillea millefolium (yarrow)	2	3	6
Aquatic plants	1	1	1
Arctium minus (lesser burdock)	4	2	2
Artemisia vulgaris (mugwort)	1	3	3
Arum maculatum (lords & ladies)	1	0	0
Astragalus glycyphyllos (wild liquorice) N	1	1	0
Brassica spp	2	3	3
Bryonia dioica (white bryony)	1	1	0

Comments and suggestions on conservation

Tree/shrub hosts with the largest number of species (average for the 3-year period) are *Salix caprea* 42.3, *Crataegus* and *Quercus* 36 each, *Betula* 33, *Salix cinerea* 30, *S. alba* 26.6 *Prunus spinosa* 23, *Malus* 17.3, and *Populus* 16.6. These figures are not cumulative, e.g. some species occurred in 1987 but not in 1988 and vice versa. The cumulative total for *Betula* is 50 species. An average of 20 polyphagous species can be added onto these numbers. You will note that there has been a fall in numbers for *Alnus*, *Betula*, *Quercus* and *S. cinerea*. *Quercus* numbers could have been partly influenced by the hurricane felling oak trees. There has been a decline in moth species with *Fraxinus* as their only foodplant. The hurricane brought down a nearby tree and another was lost previously by disease. It is hoped that the planting of ash under the 10-year conservation plan will improve the situation. It is hoped that some *Salix caprea* will be planted, as at present there is only one small bush. For the ground cover plants there has been little change, except for *Achillea millefolium* which is increasing.

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A STUDY OF THE BEHAVIOURAL PATTERNS OF SIX SPECIES OF BRITISH BUTTERFLIES WHILST IN COPULA

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During the fine summers of 1983 and 1984 I was fortunate to come across six species of butterflies in copula and now will describe their behavioural patterns which varied considerably between each species. I have not come across any literature on this subject and think that few people have been mad enough to study this behaviour which can take several hours in the heat of a mid-day sun.

The grizzled skipper (*Pyrgus malvae* L.)

On 13.v.84 I left for Tennyson Down, Freshwater and at 12.28 p.m. noticed a pair of *Pyrgus malvae* L. in copula which had settled on a dandelion flower at the foot of the down. The male was facing due east and the female due west in hazy sunshine. Their wings were both open to the sun and there was little bodily movement except that the male used its proboscis to feed from the flower on which they had settled. I marked their place and returned 15 minutes later to find that they were still in exactly the same position. Shortly after I returned for the second time, they separated with the male leaving first departing into the distance. The female which was still facing west remained still for a period of 10 minutes before finally departing at 1.10 p.m.

The small white (*Pieris rapae* L.)

At 4.30 p.m. on 12.ix.84 I came across a pair of *Pieris rapae* L. in copula on a holm oak tree at about 15 feet above the ground in the garden. The sun was fully out. The female had its wings open at an angle of 45 degrees whereas the wings of the male were held at 35 degrees. The female faced upwards in an easterly direction and the male to the west towards the ground. There was little wing movement and the only change in the position of the wings was made when the sun went behind the clouds at 4.53 p.m. It was then that the wings became fully closed with the sun completely obscured by clouds and only the wings of the male were at a slight angle of 5 degrees.

It was not until 6.15 p.m. that separation took place when the male flew off leaving the female static and at rest on the stem. After 5 minutes the female flew off and out into the garden on the now overcast evening. This may explain why the Pieridae may be seen flying late in the evening and sometimes at dusk.

The small copper (*Lycaena phlaeas* L.)

At 11.35 a.m. on 26.ix.83 I came across a pair of *Lycaena phlaeas* L. at Spinfish, Freshwater which had just mated and had settled on a dock leaf in the sunshine. Their wings were mostly closed and their abdomens gently pulsated in a rhythmical way. This appeared to be the most lyrical part of their mating experience because after 20 minutes this movement stopped and the insects became more static. They basked in the sun with their wings open for nearly an hour and only moved to a different part of the leaf when disturbed by a cricket which happened to pass close to them.

At 1.15 p.m. they left this leaf and flew several yards over the spinney where they settled on a much larger dock plant growing on the bank. There was more cloud now which did not prevent them from opening their wings. Shortly after 2 p.m. they moved to the underside of the leaf only to reappear on the surface 10 minutes later. Their abdomens were static all this time and they concentrated on sunning themselves.

At 2.40 p.m. mating ceased. They parted and the male flew south leaving its mate with its wings open and quite motionless. After 2 minutes the female left the leaf and flew around the riverside vegetation. They had been in copula for 3 hours 5 minutes.

The chalk hill blue (*Lysandra coridon* Poda)

On 27.vii.84 I noticed a pair of *Lysandra coridon* Poda flying together in the sunshine on Tennyson Down shortly after 10.30 a.m. They displayed a similar courtship behaviour to *Lycaenea phlaeas* L. and it was not long before they mated and came to rest on a short blade of grass. The male faced due south and the female due north. Whilst in copula the male held its wings open intermittently during the first 15 minutes whereas the female only opened its wings once. This was the only occasion when their wings were open to the sun after which time their wings were always closed.

Shortly after they had mated a second male flew by taking an interest in this pair of butterflies and this happened five or six times whilst they were in copula showing that some butterflies assemble even after mating has taken place. At 11.05 a.m. a male settled near this pair and became aggressive by attempting to separate them. This aggression forced the pair from the original resting place causing them to move several yards up the chalkpit and it was several minutes before they finally came to rest on a stone in the main chalkpit bowl after several attempts at finding a place to settle. I noticed that the male carried the female whilst in flight. They finally separated at 12.45 p.m. The male flew off almost immediately after retracting its anal claspers whilst its mate stayed for nearly 3 minutes before flying off leaving two drops of fluid on a blade of grass. A time of 2 hours 5 minutes had elapsed after mating had taken place.

The marbled white (*Melanargia galathea* L.)

On 7.vii.84 I left for Tennyson Down shortly after 10 a.m. and at 10.45 a.m. I observed a pair of *Melanargia galathea* L. in copula. They were making undue movement due to the fact that the female had only just emerged and the wings were not fully stretched or dry. As they were finding difficulty in selecting a place on which to settle I decided to place them on a wild mignonette (*Reseda lutea* L.) plant in the shelter of a chalkpit 20 yards away. The female faced west and the male east although for some time they faced north-west and south-east. I noticed that there was small abdominal movement after they had been in copula for over 45 minutes, and that the male was responsible for this movement. After an hour they became a little restless and moved up the stem. They resettled with the female facing south and the male due west with an angle of 90 degrees being held between their wings. At 12.20 p.m. they separated with the male leaving almost immediately. The female seemed quite content to remain on the plant. As it was slightly crippled I decided to take it back to the spot where pairing had taken place and it quickly settled amongst these surroundings. They had been together for 1 hour 45 minutes.

The meadow brown (*Maniola jurtina* L.)

On 3.vii.84 I decided to go to Tennyson Down during the afternoon and shortly after 3.00 p.m. I noticed a pair of *Maniola jurtina* L. in copula on a blade of grass. The female faced due north and the male due south in bright sunshine and there was no wing movement whatsoever. I accounted for only one movement when this pair of butterflies flew several feet to another blade of grass. I returned at intervals of 15 minutes and finally at 4.25 p.m. they separated. The male flew off almost immediately while the female remained on the grass for 5 minutes before flying off.

Summary

The duration that each species spent in copula varied from 32 minutes for *Pyrgus malvae* L. to 3 hours 5 minutes for *Lycaena phlaeas* L. and these times are given below:

Date	Species	Time	Duration
13.v.84	*Pyrgus malvae* L.	12.28–1.00 p.m.	32 min
12.ix.84	*Pieris rapae* L.	4.30–6.15 p.m.	1 h 45 min
26.ix.83	*Lycaena phlaeas* L.	11.35 a.m.–2.40 p.m.	3 h 5 min
27.vii.84	*Lysandra coridon* Poda	10.40 a.m.–12.45 p.m.	2 h 5 min
7.vii.84	*Melanargia galathea* L.	10.45 a.m.–12.20 p.m.	1 h 35 min
3.vii.84	*Maniola jurtina* L.	3.05–4.25 p.m.	1 h 20 min

After separation the male always left first whilst the female remained static for a few minutes before flying off.

It was noticed that except for *Maniola jurtina* L. it was always the male that carried its mate whilst in flight in copula.

In four out of the six cases mating took place around noon when the sun was at its zenith.

It will be interesting to learn of the behavioural patterns of other species of butterfly. Although I have often seen *Inachis io* L., *Pararge aegeria* L. and *Aglais urticae* L. flying in twos and sometimes threes I have yet to observe them in copula. More study into this subject should pay sound scientific dividends.

INDOOR MEETINGS

8 December 1988

Exhibits

Dr I. F. G. McLean showed a specimen of the minute predatory fly *Stilpon subnubilus* Chvála (Diptera: Hybotidae) which has been recently added to the British list. It was found running over gravel-covered benches in a glasshouse at the University of East Anglia, Norwich, Norfolk, on 15.iii.78. In a recent paper in the *Entomologist's Mon. Mag.* (**134:** 225–231, 1988), Milan Chvála split what was previously regarded as *Stilpon nubilus* Collin into two species. Specimens originally thought to be *nubilus* and sent by Dr McLean to Dr Chvála have now been included in the type series of *S. subnubilus*.

Mr R. D. Hawkins showed two specimens of the local beetle *Nacerdes melanura* L. (Coleoptera: Oedemeridae). One was collected by Mr J. Tyler at the Sevenoaks Wildfowl Reserve, Kent, on 4.vii.85, the other was found by the exhibitor crossing a street in the centre of Horley, Surrey, on 15.vi.88. The beetle is associated with old timber and, although found inland, mainly occurs in coastal areas.

Mr R. A. Jones showed specimens of *Sargus bipunctatus* (Scop.), (Diptera: Stratiomyidae), the largest British species of the genus, and one that exhibits remarkable sexual dimorphism. Although in other species the sexes are of different colours, only this species has a two-coloured abdomen. Nunhead, London SE15, appears to have a strong colony of this widespread but local species and specimens came from ivy flowers (6.viii.85, two females), crawling on the pavement (21.ix.86, female) and alighted on washing on a line (15.ix.88, male). It was remarked that dung and refuse-breeding stratiomyid species were metallic (e.g. *Sargus*, *Chloromyia*, *Microchrysa*), whereas those breeding in rotten wood were dull black (e.g. *Pachygaster*) and those that were aquatic were dull black with yellow, white or green markings (e.g. *Stratiomys*, *Oxycera*, *Odontomyia* and *Nemotelus*). This shiny body form, it was suggested, allowed oviposition into, and emergence from, a sticky medium.

Announcements

The Secretary, Dr J. Muggleton, gave details of an exhibition being staged by the South Essex Natural History Society at Southend Central Museum. It would run from 12 November to 7 January 1989 and marks the 50th anniversary of the Belfairs Nature Reserve. During the 1930s the BENHS's predecessor, the SLNHS, was instrumental in encouraging the purchase of this reserve by the Council.

Mr M. Simmons said that it had been suggested that a future indoor meeting might consist of several short talks of about 15 minutes each. Any members interested in giving a talk of this nature should contact Mr Simmons.

Communications

Mr R. A. Jones said that he had found the weevil *Apion semivittatum* Gyll. on annual mercury (*Mercurialis annua* L.) in the previous week in his garden in Nunhead, London. At the end of the 19th century this species was only known from Kent but in recent years it has become more widespread. Prof. J. Owen has recorded it at Epsom, Surrey (*Br. J. Ent. Nat. Hist.* 1988; **1:** 50), and A. A. Allan has taken it in Blackheath, London (*Entomologist's Rec. J. Var.* 1988; **100:** 277).

Lecture

Mr D. M. Armitage gave a talk on air-breathing fish of the family Anabantidae. These unusual fish have poorly developed gills and breathe through a lung-like organ. As a consequence of this they can only breathe air and cannot extract oxygen dissolved in water. There are about 100 species and they are mainly found in streams and pools in tropical rain forest areas of India, China, SE Asia and central Africa. Their air breathing ability allows them to move over wet land in search of new ponds, and they are sometimes found considerable distances from the nearest water. Various breeding strategies were described. The more primitive species lay eggs which float free in the water, other species deposit their eggs in scrapes on the pond bottom or in 'nests' of bubbles. Some species care for the newly hatched fish by taking them into their mouths when danger threatens.

12 January 1989

The President, Dr I. F. G. McLean reported the death of E. C. Pelham-Clinton, the tenth Duke of Newcastle, who had been a member since 1940.

Exhibits

Dr I. F. G. McLean showed a small tephritid fly, *Cryptaciura rotundiventris* (Fallen). It has distinctively patterned wings and is rare in Britain with only a few recent records in Berkshire and Hampshire. A single male was found on 14.vii.86 at the recently declared NNR at The Flits, Herefordshire. The larvae have been recorded abroad as leaf miners in a wide range of umbelliferous plants, and it has been reared in Britain from *Heracleum*.

Mr R. A. Jones showed two specimens of a black spiny chrysomelid beetle, *Hispa* sp., collected in August 1988 at Cairns, Queensland, Australia. *Hispa* spp. occur in Europe and are dubiously recorded from the UK. The peculiar spiny processes on their bodies are apparently unique in the Coleoptera.

Mr I. D. Ferguson exhibited a beetle determined by Dr M. J. Davis as *Stenagostus villosus* (Fourc.) (Coleoptera: Elateridae). It was taken at light on 9.ix.88 at Bore Place Farm, near Bough Beech, Kent. It is said by Fowler to occur 'in decaying trees and logs; also by sweeping bracken; rare; New Forest, Sherwood Forest, etc.' It is an ancient woodland indicator species 3 and is attracted to lights. Mr Hawkins said he had seen a specimen of the click beetle *Stenagostus villosus* during daylight in Surrey; Mr Plant said he had taken a specimen at light in Epping Forest and on a wall in the south of France.

Mr R. D. Hawkins showed a specimen of the staphylinid beetle, *Staphylinus dimidiaticornis* Gemm. found on a house wall on a warm sunny day at 12 noon. It was taken at Horley, Surrey, on 6.ix.88 and was named with the assistance of David Boyce.

Mr R. Softly showed a live specimen of the grey shoulder-knot moth, *Lithophane ornitopus* Boursin (Lepidoptera: Noctuidae) taken at actinic light at Hampstead on 7.i.89. Specimens have previously been taken there on 20.iv.79, 17.x.85 and 29.iii.88. Volume 10 of *Moths and butterflies of Great Britain and Ireland*, (1983), shows no Greater London records for this moth but the above records suggest it may be established in the oak woodlands of Hampstead Heath.

Mr A. J. Halstead showed some shoots of hawthorn, *Crataegus monogyna* Jacq. which were already well into leaf. The specimens came from a hedgerow plant

growing under the shelter of a conifer windbreak at RHS Garden, Wisley, Surrey. The weather to date in the winter of 1988–89 has been unusually mild.

Membership

The names of Raymond Reginald Cook, Peter Cooke, Darren Mark Willets, Guy Knight, Iain David Goss, Anthony John Wilfred Allen, Neill Ashley Clark, John Harold Frederick Wotton, P. A. Standing, David Reginald Copestake, Marc G. A. Houghton, Samuel Maurice Jackson and Malcolm Callow were read for the second time and duly elected as members.

Announcements

The Secretary, Dr. J. Muggleton, said that just before Christmas the Society had been notified that the Alpine Club would be giving up the lease of 74 South Audley Street during 1989. A meeting with the Alpine Club will be held shortly to clarify the situation. If our association with the Alpine Club cannot be continued at their new premises, we will need to make alternative arrangements. The new meeting place needs to be in central London, have a lecture room capable of taking 60–70 people and have a room or rooms nearby in which the Society's library and collections could be kept securely. A discussion followed in which several possible meeting places were suggested.

Dr Muggleton gave details of a new exhibition and other activities being held 15–23.7.89 at the Gilbert White Museum to mark the bicentenary of the publication of White's *Natural history and antiquaries of Selborne*.

Communications

Dr I. F. G. McLean reported the death of a non-member, Mr F. Stubbs of Leyburn, Yorks, who was a founding member of the British Plant Gall Society.

Mr E. Bradford recalled a previous meeting in which he pointed out that the high acid content of many modern papers made them unsuitable for labelling purposes as they would disintegrate before too long. He passed round some pages from a book published in the late 17th century which, although discoloured, were in excellent condition. He also showed some fragments of paper used as packing in the book's binding which were presumably of an earlier date. Mr Bradford showed his current source of labelling paper which is a plain paper ledger produced in the 1890s.

Mr C. Plant said that he had asked the book conservator at the Passmore Edwards Museum to look at some Neuroptera record cards he had recently received from the Biological Records Centre. These were found to have a very high acid content with a life expectancy of 2–5 years! Mr R. D. Hawkins asked if this mattered, since the records would be transferred onto computer records. Mr Plant replied that floppy discs also deteriorate with time and need regular replacement.

Mr K. Merrifield asked if anything was known about the quality of commercially available labels. Mr Plant said that Peter Hugo card labels were acceptable but their paper labels might not last if used on a pin, but were all right for specimens kept in alcohol.

Lecture

The scheduled speaker, Mr P. Hammond, was unable to speak on the Coleoptera of Sulawesi. His place was taken by Mr R. A. Jones, who showed slides taken during his visit to New Zealand and Australia in 1988. Apart from insects and other invertebrates, these slides featured tree ferns and volcanic activity in New Zealand, and the coral reefs off the coast of Queensland.

The bizarre spiny chysomelid beetle *Hispa* from Cairns, Queensland, Australia. This 4-mm black beetle is very similar to a pink species found in Europe and reputed to have been British at one time. From a slide shown by R. A. Jones.

The aggressive green ant in threatening pose from Cairns, Queensland, Australia. These ferocious insects are about the same size as the wood ant *Formica rufa*. They build football-sized nests of leaves, loosely sewn together and hanging from the branches of trees. From a slide shown by R. A. Jones.

26 January 1989

The President, Dr I. F. G. McLean, announced the death of Mr A. Valetta of Malta.

Exhibits

Dr I. F. G. McLean showed a specimen of the sphecid wasp *Passaloecus clypealis* Faester. A single female was swept from *Juncus* and *Phragmites* alongside a dyke at Walberswick NNR, Suffolk, on 16.vii.83. This is a rare species in Britain, being recorded by Richards (1980; *Handbk Ident. Br. Insects* **6 (3b):** 72) at Wicken Fen, Cambridgeshire; Benfleet, Essex and Higham, Kent. Lomholdt (1976; *Fauna Ent. Scand.* **4:** 127) states that this species is also rare in Scandinavia, where it has been recorded nesting in the stems of *Lonicera* and *Phragmites*. He also suggests that empty *Lipara* galls may be used but this is yet to be confirmed.

Prof. J. A. Owen showed four specimens of the carabid beetle *Elaphrus lapponicus* (Gyll.) and the chrysomelid *Plateumaris discolor* (Panz.). The former were taken in pitfall traps on Beinn Dearg, Wester Ross, in the summer of 1988, the latter were from various sites. Both species of beetle occur on sphagnum moss on moorlands and they show the same wide range of metallic colours. Polymorphism may benefit these beetles in some way but the reason for it is not known. Mr R. Jones noted that metallic colours of insects were usually caused by the diffraction of light rather than pigments. Small variations in the structure of the cuticle might cause the colour range shown by Prof. Owen's beetles. Prof. Owen said that some weevils with metallic colouration did not show any variation. Dr McLean wondered if polymorphic beetles might change their colour as they matured. Prof. Owen said this might be possible but the colours did not change after death. Mrs F. Murphy noted that some spiders can also be very variable in their coloration.

Membership

The name of Julian Parkes was read for the second time and he was duly elected as a member.

Announcements

The Secretary, Dr J. Muggleton, said that a meeting with the Alpine Club had taken place. It now seems that the BENHS could probably remain at 74 South Audley St until the end of the year. However, the Alpine Club thought it unlikely that there would be room for us at their new premises. Alternative meeting places are being investigated.

Dr Muggleton gave details of an International Congress on Butterflies in Europe, being held in Holland between 12 and 15 April 1989.

Communications

Mr G. Prior said that on 15.i.89 he had found a queen bumblebee, *Bombus terrestris* (L.) crawling in the gutter at Woodstock, Oxon. This had been placed in his conservatory and he wondered if it would survive having emerged so early from hibernation.

Mr S. Paston said that he had also seen an active queen *B. terrestris* at Beckenham, Kent, in the week before Christmas.

Mr R. Softly recalled seeing a *Bombus* sp. visiting flowers on the Isle of Wight at Christmas some years ago. He subsequently reported that the species was *Bombus*

lucorum (L.). The occasion was New Year's Day 1976, when, despite dull chilly weather, he had seen two specimens actively feeding on the flowers of winter heliotrope (*Petasites fragrans* Vill.) on the coast at Ventnor.

Prof. J. A. Owen said that on about 10.i.89 he had found his two kittens playing with a worker honeybee in his house at Epsom, Surrey.

Lecture

Dr J. Field spoke on the natural history of solitary wasps and in particular of the sphecid wasp *Ammophila sabulosa* (L.). This species provisions its nests with caterpillars but has several alternative strategies. A female may dig a tunnel and then temporarily close it while finding a caterpillar on which a single egg is laid. This is placed in the nest and up to four more caterpillars may be added to provide food for the larva that eventually hatches. The nest is finally closed and another nest will be started. If a female is able to locate another female's nest, she may pull out the caterpillars and remove the egg before laying her own and replacing the caterpillars. Alternatively, the caterpillars may be stolen and placed in another nest after the original female's egg has been removed. The egg in some nests may be substituted many times by one or both of these processes. Dr Field's studies showed that a female saved a substantial amount of time by raiding the caterpillars from another nest rather than hunting for caterpillars. However, an egg laid in another female's nest was much more likely to be substituted by another wasp than if it had been placed in a newly constructed nest. Dr Field also gave some details of the relationships of *Ammophila sabulosa* and some other solitary wasps with the sarcophagid flies that lay eggs in their nests.

9 February 1989

Exhibits

The President Dr I. F. G. McLean, showed a specimen of the dolichopodid fly, *Systenus scholtzii* (Loew). During a field meeting on 6.vi.87 at Mark Ash in the New Forest the exhibitor had collected some damp, black wood mould and decaying leaves from a rot hole about 10 feet above ground level in an ancient beech trunk. A single female *S. scholtzii* subsequently emerged on 28.vi.87. All five British *Systenus* species are scarce flies; the adults are particularly elusive and only occasionally are found near rot holes or sap runs. Most records are of specimens bred from rot hole debris from deciduous trees. *S. scholtzii* has previously been recorded in association with beech and elm in southern England and East Anglia.

Mr R. Jones showed a specimen of the minute lathridid beetle *Adistemia watsoni* (Woll.) found crawling on the mildewed wall of a store room in an old office building in High Holburn, London WC1, on 7.ix.81. This appears to have been the fifth British record since it was discovered in the Geology Department of the BM (NH) by Champion in 1912. The last published record was out of doors in Stourbridge (K. A. Mosely, *Entomologist's Mon. Mag.*, 1981, **117:** 1).

Announcements

Mr J. Cooper said that he had seen a small tortoiseshell butterfly at St Ives, Cambs., on 5.ii.89.

Several members speculated on the likely effects of the unusually mild winter on insects. Some insects may become active earlier than usual but others, which require

a period of low temperatures, may emerge late or stay in diapause for a second year. Those insects which rely on increasing day-length will be unaffected by temperature. Previous studies of butterfly numbers and winter conditions suggest that summer weather has a more important influence on these insects.

Lecture

Mr J. E. Cooper spoke on 'Mantids, mites and maladies—a veterinary approach to invertebrates'. Many of the speaker's veterinary colleagues take a narrow view of invertebrates as parasites and disease vectors of vertebrate animals. He has been campaigning to have invertebrates recognized as animals worthy of a vet's care and attention alongside the higher animals. He pointed out that the purchase price of a pet tarantula can be more than for a puppy. As well as private collections of invertebrates, there are butterfly houses and commercial mass rearing facilities producing insects for laboratory work or as food for other animals. Illness in invertebrates can be caused by infectious diseases, parasites, adverse environmental conditions, nutritional disorders, physical injury and poisoning. Such problems can cause considerable economic loss and there is a need for the veterinary profession to be able to offer advice and treatment.

23 February 1989

Ordinary Meeting

Exhibits

The President, Dr I. F. G. McLean showed a female hoverfly, *Xylota xanthocnema* Collin, taken at Windsor, Berkshire, on 10.viii.87. This is a scarce southern England species. It was seen crawling around the base of a mature, apparently sound, oak tree. Probing motions, with the tip of the abdomen being inserted into fissures in the bark, were observed, as though the fly was seeking oviposition sites. However, no eggs were found.

Mr C. B. Ashby showed a male and female *Eriogaster arbusculae* Freyer (Lepidoptera: Lasiocampidae) from Sweden, and a cocoon of this moth from Norway. All of these specimens have been donated to the Society's Scandinavian collection by Mr Stig Torstenius of Stockholm. Examples of the very similar small eggar, *E. lanestris* L., bred from larvae collected in Sweden by the exhibitor in 1984, were shown for comparison. Moths had emerged in 1986 and the following years; the last, a male, emerged on 11.ii.89. Three empty *lanestris* cocoons were displayed. Each of these had three small holes spaced at roughly equal distances from each other around the equator of the ovate cocoon. They were not parasite emergence holes as they were constant in number and position on cocoons from which adult moths had emerged. The holes do not penetrate the inner cocoon but lead into small enclosed chambers in the cocoon wall. The function of these chambers and the holes appears to be unknown.

Membership

The names of Brian Edward Slade, Christopher Bentley and Graham Stafford Coulson were read for the second time and they were duly elected as members.

Announcements

The President announced that a new distribution secretary was needed as Mr M. Henderson was unable to continue.

Communications

Mr C. Plant said that page 188 in his book *Butterflies of the London area* had been omitted. A replacement, showing the distribution of the Ringlet, was now available from him. He also displayed some copies of the Neuroptera recording scheme's newsletter, *Neuro News*.

Col. D. H. Sterling said that on 25.xii.89 he had found four live specimens of the early moth, *Theria primaria* Haw. on a cobweb in his garden.

Mr A. J. Halstead said that frogs had started spawning at RHS Garden, Wisley, Surrey, on 21.ii.89, which is about 10 days earlier than usual.

The Ordinary meeting was then followed by the AGM and the President's address. After this the new President, Mrs F. M. Murphy, announced that an offer of accommodation for the Society had been received from the BM(NH). This and other possible meeting places were being investigated. She said that if anyone could suggest further possible new homes for the Society she would be pleased to receive details. The new venue is likely to be in central London and it should have a private room or rooms for the collections and library with a total floor space of at least 700 square feet. There should also be a nearby lecture room capable of taking up to 60 people.

Annual General Meeting

Minutes of the Annual General Meeting of the Society held at the Alpine Club at 6.30 p.m. Chairman: The President, Dr I. F. G. McLean. *Present:* 44 members.

Minutes of the last Annual General Meeting were read and signed.

The Secretary read the Council's report, followed by the Treasurer who read his report. The Editor, Librarian and Curator then read their reports and Dr M. Scoble read the report of the Hering Memorial Research Fund. The President proposed the adoption of the reports, the motion was seconded by Mr A. Stubbs.

The President then read the names of the Officers and Members of Council recommended by the Council for 1989–90 and, as no other names had been submitted, he declared the following duly elected:

President: Mrs F. M. Murphy; Vice-Presidents: Dr I. F. G. McLean and C. W. Plant; Treasurer: Col. D. H. Sterling; Secretary: Dr J. Muggleton; Editor: R. A. Jones; Curator: P. J. Chandler; Librarian: S. R. Miles; Lanternist: M. J. Simmons; Ordinary Members of the Council: N. A. Callow, J. M. Chalmers-Hunt, I. D. Ferguson, A. Godfrey, R. D. Hawkins, M. K. Henderson, R. S. Key, R. K. Merrifield, Prof. J. A. Owen and B. K. West.

The Secretary then read Bye-law 22(d) and invited motions or questions. There were none.

The President then read his report and gave his address.

The President then installed the new President, Mrs F. M. Murphy.

The President proposed a vote of thanks to the retiring President, and this was seconded by Mr R. A. Jones. The President asked for permission to publish the Presidential Address, this was given.

Col. A. M. Emmet proposed a vote of thanks to the retiring Officers and Council, this was seconded by Col. D. H. Sterling and passed.

Auditors: the re-election of Messrs A. J. Pickles F.C.A. and R. A. Bell was proposed by the President, seconded by Messrs R. A. Jones and B. Goater, and passed unopposed.

OFFICERS' REPORTS FOR 1988

Council's Report

There were seven Council meetings during 1988 and, on average, 14 members attended each meeting.

The Society's membership descreased slightly in 1988, standing at 689 at the end of the year; 13 new members were elected during the year, but 39 members were struck-off for non or under-payment and seven resigned; four deaths were reported during the year. The rather high number struck-off represents a need to deal with members who persistently underpay their subscriptions. Their removal should result in a healthier, if smaller, membership. It must be noted, however, that the Society attracted few new members in 1988, and we probably need to examine the reasons for this. At the end of the year Mr R. F. Haynes completed 50 years continuous membership of the Society and was elected a Special Life Member.

In his first year as Indoor Meetings Secretary, Michael Simmons arranged a varied programme of 18 meetings covering topics as diverse as continental drift and air-breathing fish. Four 'Open Days' were also arranged. After 5 years arranging our field meetings, Andrew Halstead drew up his final programme of 15 meetings. The Council would like to thank him for maintaining a varied programme of meetings and for all the hard work necessary to recruit volunteers to lead the meetings. Roger Key will succeed him as Field Meetings Secretary.

1988 saw the Annual Exhibition at Imperial College for the second year, and our favourable impressions of this new venue were confirmed. Andrew Halstead, having relinquished one job, took on the task of Exhibition Secretary and was rewarded by an increased attendance; 195 members and 90 visitors signed the attendance book. There were more than 100 exhibits, and a migration shortly before the exhibition enlivened the moth exhibits in what was, otherwise, a poor year for the Macrolepidoptera. There were 14 Diptera and 15 Coleoptera exhibits but generally the non-Lepidoptera were poorly represented. The exhibition also boosts the Society's publication sales, with £490 being taken this year. Once again Dr MacNulty organized the Annual Dinner with the efficiency we have come to expect of him, and 66 members and their guests sat down to a very enjoyable meal.

Two of the Society's Assistant Secretaries resigned at the end of 1988. David Yendall, who for 6 years has ensured that we all received the Society's publications and notices, decided that the time had come to find someone new to fold paper and fill envelopes. The Council is very grateful for the time he has spent on this job which is not one of the most rewarding that the Society has to offer, but which is, nevertheless, essential. Pressure of work has caused Paul Johnson to resign as Membership Secretary after 4 years in the post, during which time some 197 membership applications have passed through his hands. Again, the Council is grateful to him for carrying out this vital rôle.

The Society's publications continue to sell well, thanks to the effort put in by Andrew Callow the Sales Secretary. The second edition of the *Field guide to the smaller British Lepidoptera* was completed on time and was available for sale in October. Col. Emmet is to be congratulated on the speed and efficiency with which he tackled his editorial work, and the Society is indebted to him, and to the individual contributors who up-dated their accounts, for providing this much-needed second edition. Robert Dyke produced a very attractive Christmas card,

featuring the Red Admiral Butterfly, this year. This is the first new card for several years and it is selling well.

At the close of the year the Society learnt that the Alpine Club had surrendered its lease on 74 South Audley Street, and thus our Society will need to leave its rooms by the end of 1989 and end a 25 year association with the Alpine Club that has been mutually beneficial to both societies. The Council must therefore anticipate a busy year in 1989, with much time being devoted to a search for new premises. This will need to be done with care so that the nature of the Society is not changed. The Council will keep the membership informed about future developments.

British Entomological and Natural History Society
Balance sheet as at 31st December 1988

1987 £				1988 £	
22 828		*GENERAL FUND*	Opening balance	24 574	
153			Gain on investment disposal		
1593	24 574		Excess of income over expenditure	2170	26 744
	2308	*HOUSING FUND*	Balance		2308
16 180		*SPECIAL*	Opening balance	18 685	
2505	18 685	*PUBLICATIONS*	Surplus from sales	3381	22 066
30 806		*HAMMOND &*	Opening balance	31 229	
3177		*CROW BEQUEST*	Income	3671	
		FUND	Crow bequest (part)	15 000	
33 985				49 900	
2754	31 229		Expenditure	1365	48 535
3215		*HERING*	Opening balance	3494	
154		*MEMORIAL*	Gain on investment disposal		
645		*FUND*	Income	417	
4014				3911	
520	3494		Expenditure	417	3494
	80 290		*TOTAL FUNDS*		103 147
			THESE FUNDS ARE REPRESENTED BY:		
			INVESTMENTS AT COST (details appended)		
24 711			General and bequest investments	39 658	
3060	27 771		Hering Memorial Fund investments	3340	42 998
			STOCK		
3970			Special Publications at cost	8499	
98	4068		Christmas Cards	309	8808
			(The value of the library, collections, ties, back numbers of Proceedings and Journals and the computer system is not included in the accounts)		
			LIQUID ASSETS		
38 256			N.S. Investment Account	41 559	
356			Debtors and advance payments	1536	
9181			Cash on Business Reserve account	7682	
3048			Cash on Current account	3528	
50 841				54 305	
2390	48 451		Less subscriptions in advance, amounts owed and provisions	2964	51 341
	80 290				103 147

British Entomological and Natural History Society
Income and expenditure account for 1988

1987 £		1988 £	1987 £		1988 £
5207	Publications Account	3744	5332	Subscriptions	5556
1778	Rent and Insurance	1793	3916	Interest and Dividends	4020
568	Stationery and General Expenses	512	58	Donations	66
718	Indoor Meetings and Exhibition	673	208	Surplus on Christmas Cards and sales	84
	Cabinets and Collections	330	442	Over-provisions in 1986 accounts	
92	Subs/Donations Other Societies	86		Surplus on Dinner	26
	Library	444			
1593	Excess Income over Expenditure	2170			
9956		9752	9956		9752

PUBLICATIONS ACCOUNT FOR 1988
(Publications free to members)

6373	Production of Journal	3694	652	Sales	846
906	Distribution Costs	896	1420	Hammond Bequest grant for plates	
			5207	Net Cost to Income & Expenditure	3744
7279		4590	7279		4590

SPECIAL PUBLICATIONS ACCOUNT FOR 1988
(Publications for sale)

1074	Opening Stock	3970	4720	Sales	6044
4677	Hoverflies 2nd Edition		3970	Closing Stock	8499
	Field Guide 2nd Edition	6756			
434	Distribution & General Costs	436			
2505	Surplus to Spl. Publications Fund	3381			
8690		14 543	8690		14 543

Schedule of Investments as at 31st Dec. 1988

		Book value at cost		*Assessed current market value*	
		General & Bequests £	*Hering Memorial* £		£
1230	Shell T&T 25p Ord.	477.79	771.83	@ 327	4022
750	Unilever 5p Ord.	248.45		@ 464	3480
6214	M&G Charifund Units	19 091.17	817.24	@ 501.5	31 163
£2258.84	Treas 9½% 1999	771.22	1451.21	@ 96 15/16	2190
£3863.71	Treas 8¾% 1997	3687.94		@ 91 13/16	3547
£3892.90	Treas 9% 1994	3759.57		@ 93 31/32	3658
£4098.06	Treas 13¾% 1993	4041.44		@ 111 3/8	4564
£2138.90	Funding 5¾% 1991	1670.00		@ 90	1925
£6836.92	Treas 8¼% 1990	5910.00	300.00	@ 95¾	6546
		39 657.58	3340.28		61 095

Treasurer's Report

The past year has been very satisfactory so far as finance is concerned. In spite of the continued production and distribution of four parts of our new journal, overall expenditure has been kept well within our income.

We have received £15 000 as the first instalment of a legacy from our late member, Mr P. N. Crow and your council decided to add this to the Hammond Memorial Fund, which in future will be known as the Hammond and Crow Memorial Fund. The capital of this fund will be reserved to meet any emergency expenditure and the income used to finance items that could not be met from normal income; some recent uses having been the donation to assist towards the purchase of Abernethy Forest, the purchase of a computer system for membership and subscription records, the provision of coloured plates in some of the past proceedings, the purchase of a modern microscope for use of members at meetings and the purchase of a commercial vacuum cleaner.

You will notice from the income and expenditure account that the cost of running the society in 1988 was £7582, whilst members subscriptions only brought in £5556 and the balance of £2026 came from general fund investment income. Should the solution to our accommodation problems necessitate selling the investments which are currently producing this income then by 1990 I estimate that we would require something like £3000 per year more than our current rate of subscription produces—that is more than a 50% increase. I am not saying that this will take place, but only giving a warning of what could possibly happen and demonstrating why at this meeting it is impossible for me to make any forecast of next years subscription rates. This determination must wait until we know what is happening over future accommodation.

Thanks to Geoff Burton, our new computer system for membership and subscription records is working very well and we are particularly grateful for his hard work in a year when he has been suffering from a lot of pain and has undergone an operation.

I should also like to offer the society's thanks to our honorary auditors, Tony Pickles and Reg Bell once more for carrying out the audit of our accounts.

D. H. Sterling

Auditor's report

In our opinion the annexed balance sheet gives a true and fair view of the Society's affairs as at 31st December 1988 and the income and expenditure accounts give a true and fair view of the Society's results for the year.

A. J. Pickles F.C.A.
R. A. Bell

Professor Hering Memorial Research Fund

The committee made two awards for 1988/89. Dr Kenneth Spencer receives £200 towards the cost of typing a manuscript for a book on hostplant selection in Agromyzidae. Support for work on these Diptera is among the priorities of the Fund, and the award will permit Dr Spencer to complete his substantial study. A sum of £167 is awarded to Dr Donald Quicke, University of Sheffield to help with travel expenses and the cost of materials for photography and microscopy for his preparation of a key to the British species of *Bracon* (Braconidae). These Hymenoptera are principally parasitic on concealed larvae of microlepidopterans, particularly several leaf-miners.

Reports have been received from two recipients of awards made in 1987/88. Dr

Margaret Redfern-Cameron delivered a paper at the VII International Symposium for the Biological Control of Weeds in Rome about the density and survival of a tephritid gall-fly on the thistle *Cirsium vulgare* in British Columbia. The fly had been introduced into Canada as an agent of biological control against the thistle—itself an introduction. The visit also enabled Dr Redfern to make contact with colleagues from all over the world, which generated many ideas on thistle-insect research.

Dr Kathleen Goldie-Smith visited several sites in Sussex, Kent, and Scotland in 1988 during the course of her work on Dixidae. Her studies have ranged from distribution mapping to the study of egg sculpture, and she has made and shown a video on the life history of dixids.

From the estate of the late Edward Pelham-Clinton, 10th Duke of Newcastle, the Fund has been bequeathed a Wild M.3 stereo microscope, with accessories, together with a Volpi 250 illuminator. The thoughtfulness of Edward Pelham-Clinton for considering the Fund when he drew up his will is greatly appreciated. It is expected that the equipment will be offered, on loan, to successful applicants, and this matter is currently under discussion.

Support is acknowledged, with thanks, from editors of the various journals who continue to advertise the Hering Memorial Research Fund without charge. It is hoped that recipients of awards will give strong consideration to submission of their manuscripts to these journals.

MALCOLM J. SCOBLE

CURATOR'S REPORT

Work on the collections during the past year has been concentrated in two areas, on the one hand to improving their layout and accessibility and on the other in cataloguing, both to record their precise composition and to establish where additions are necessary.

Labelling of cabinets, according to a four colour code system for the different orders, has been completed. Also, individual drawers of British insects have been labelled with details of their contents. Labelling will be updated as future changes are made to the layout of particular collections. It is hoped that any member will now be able to rapidly find the desired collection or specimen.

Cataloguing of the British Lepidoptera has been completed and it can be stated that 2063 species are represented, all but 100 by more than four specimens. Lists of the latter and of the 240 species which are presently lacking will be published in the Society's Journal so that members may be made aware of where the opportunities lay for making beneficial donations.

The Coleoptera collections are currently being catalogued and the results of this survey will be reported similarly in due course.

Early in 1988, the rearrangement of the Joy collection into 30 drawers was completed as were the three drawers of the Ashdown collection of varieties of Coccinellidae. The Joy collection has now been restored to the arrangement of Joy's 'handbook' of British beetles. This collection contains 3176 of the 3390 species included in the 'handbook', although no attempt has been made to check determinations.

A start can now be made on the rearrangement of the main British Coleoptera collection, which will be carried out according to the latest Check List, as updated by Prof. Owen. At present it is planned to amalgamate the Massee collection with the Henderson collection, and to provide space for the absent species. This is intended to

improve access for members, but any advice from Coleopterists on this matter would be welcome.

The Orthoptera, Dictyoptera and Dermaptera have been arranged in a single Hill unit, according to the 1964 check list, the opportunity being taken to amalgamate the A. E. Gardner collection of these orders with the Society's original collection. All species in the British check list are represented as well as a number of exotic species. The same principle has been followed with the Odonata collections, incorporating the Gardner collection and the collection of nymphal skins with the original collection, only the C. O. Hammond collection of dragonflies still being kept separate for the present.

The Odonata and other smaller orders are, however, being temporarily housed awaiting rearrangement because of the need to clear a 40 drawer cabinet in preparation for the Hymenoptera. The drawers of the latter cabinet have been lined with plastozote and are now ready for this work to commence in the near future, which will begin with the layout of the sawflies and then proceed with the aculeates, according to the latest check list.

David Moore has continued his work on the British Butterflies. Having dealt with the Lycaenidae and much of the Nymphalidae, more than half of his task is complete. I am also grateful to him for the benefit of his knowledge of tropical butterflies in assessing the contents of four drawers of these insects in the Hammond collection. These may be disposed of in due course as it is current policy to restrict the foreign collections to Palaearctic Lepidoptera. Rearrangement of these latter and of the British moths are both desirable but cannot be contemplated, without assistance, in the near future.

In response to requests from members, the lighting in the Society's Room has been improved during the year and I am grateful to the President for his interest in the cleanliness of the room following the acquisition of a modern vacuum cleaner.

Finally, I would like to thank Bill Parker for his continued support during the year.

P. J. CHANDLER

LIBRARIAN'S REPORT

The variety of work done in the Library during the past year is quite adequately summarized by saying, more of the same that has been reported to the membership over the past 5 years. The major tasks have been the continued pruning of the international exchange list, stocktaking and the disposal of surplus material.

A small number of surplus books and journals were sold at the Annual Exhibition raising the sum of £35. The sale of a long run of *British Birds* magazine recently, realized £300. Additionally a number of runs of obscure journals, previously received on exchange were offered to and received by the British Library. All of these disposals helped to relieve the pressure on space for the items the Society really needs.

As a change I thought I might present a few statistics on the amount of use of the Library during the year. The total number of books and journals loaned was 138. The greatest use was of the standard British entomological journals, amounting to 35% of total loans. Foreign journals accounted for 16%. Regarding the major subjects of books on loan the figures were as follows: General Subjects 15%, Lepidoptera 12%, Diptera 9%, Coleoptera 6%, Hymenoptera 4% and Hemiptera 3%.

One significant development has been the purchase of a large-type Dymo labelling machine. This was obtained with the purpose of allowing subject headings and individual journals to be more easily located. This valuable work is being done by Ian Ferguson, for whose help I am most grateful.

Two further batches of separates have been added to the Library stock, one under the title, Palaearctic Lepidoptera, the other covering various other orders.

On behalf of the Society I would like to thank those organizations and individuals who have presented books to the Library in the past year particularly, Mr I. D. Ferguson, Mr S. N. A. Jacobs and Mr C. E. Dyte.

I would also like to thank Frances Murphy and Messrs I. Ferguson, C. Ashby, M. Henderson, E. Bradford, M. Simmons and P. J. Chandler for their help in connection with the Library.

S. R. Miles

Editor's Report

Under its new title, the Society's journal completed its first year uneventfully. Its target of 192 published pages was met, and there are plenty of notes, articles and reports for 1989. The future looks bright.

The colour plates from the 1987 Annual Exhibition can at last be printed, along with those from 1988. The indexes are still slightly late, but I hope that this has not unduly inconvenienced anyone. That for 1987 is now ready, that for 1988 will, I hope, follow shortly.

The Editorial Committee has been a great support, and its members have never balked at a plea to read 50 large sheets of galley proofs in 3 days.

The printers have maintained a high standard and the typesetters have coped well even with the trying task of following the complicated manuscripts of the Annual Exhibition report.

It seems that any initial teething problems with new typesetters, new printers or new name have been overcome and the journal can now enjoy a routine of continued success.

R. A. Jones

FIELD MEETINGS

Chippenham Fen National Nature Reserve, Cambridgeshire
2 July 1988

Day-time Leader: **Ian McLean.** Night-time Leader: **Paul Waring**. This was a combined day and night-time meeting. The day-time leader and 10 members had an enjoyable excursion around the fen.

Chippenham Fen is a top national site for Diptera. Dipterists and records of flies were well represented during the day. Along the main ride *Oxycera nigricornis* (Stratiomyidae) was common, and among the other soldier flies recorded were *Oxycera trilineata* and *Oplodontha viridula*. Craneflies found included *Tipula nigra, Pilaria batava* and *Molophilus bihamatus*, and a wide range of Empididae and Dolichopodidae were found, among the latter *Dolichopus longitarsis, D. latelimbatus* and *Hercostomus chrysozygos* were good records. Chippenham Fen has the richest fauna of Sciomyzidae (snail-killing flies) known so far in Britain, and two of the rare fenland species were discovered during the day. *Antichaeta analis* and *Psacadina vittigera*. One member also recorded some Coleoptera including the longhorn *Agapanthia villosoviridescens* as well as 11 species of sawflies.

Butterflies seen include a painted lady, *Cynthia cardui*, as well as the resident large skippers, *Ochlodes venata*, meadow browns, *Maniola jurtina*, and speckled woods, *Pararge aegeria*. One of the reserve's specialities, the silver-barred moth, *Deltote bankiana*, was flushed during the day—one individual in the northern meadows (compt 1), and two in the tall fen vegetation (compt 5).

A major aim of the night work was to ascertain the distribution on the fen of some of the rarer moths, and to find out if any were associated with particular types of management. Unfortunately, as the night shift was gathering, the heavens opened and it poured with rain. By dusk the rain was over and we were left with a cool night with broken cloud, no wind but very wet vegetation. This did not deter the night leader and 20 members operating 29 lights dispersed over the fen, although one member was cut off from his chosen trap site by flood water! Owing to the number of lights, most of the choice macros that fly in early July on the fen were recorded, but only in small numbers dispersed between the traps. These species included the reed-leopard, *Phragmataecia castaneae*, ash pug, *Eupithecia fraxinata*, maple prominent, *Ptilodontella cucullina*, round-winged muslin, *Thumatha senex*, striped wainscot, *Mythimna pudorina*, southern wainscot, *Mythimna straminea*, obscure wainscot, *Mythimna obsoleta*, flame wainscot, *Senta flammea*, dark brocade, *Blepharita adusta*, small clouded brindle, *Apamea unanimis*, small rufous, *Coenobia rufa*, silky wainscot, *Chilodes maritimus*, silver hook, *Eustrotia uncula*, silver-barred, *Deltote bankiana*, cream-bordered green pea, *Earias clorana*, blackneck, *Lygephila pastinum*, pinion-streaked snout, *Schrankia costaestrigalis* and dotted fan-foot, *Macrochilo cribrumalis*. The red leopard, flame wainscot and silver-barred are classed as vulnerable or rare species in the Insect Red Data book (Shirt, 1987).

A number of Microlepidoptera were recorded including the fenland pyralids *Chilo phragmitella, Schoenobius gigantella, Eurrhypara perlucidalis* and *Nascia cilialis* and the oecophorid *Agonopterix bipunctosa* which was by sawwort, *Serratula tinctoria*, upon which the larva feeds.

While the lights were running a search was made for female reed leopards which are said to rest on the stems and flower-heads of common reed, *Phragmites australis*, but no females were seen.

Reference

Shirt, D. B. (ed) 1987. *British red data books: 2. Insects.* Peterborough Nature Conservatory Council.

Cranwich Heath Plantation, near Mundford, Norfolk, 23 July 1988

Leaders: **Gerry Haggett and Paul Waring.** This was a combined afternoon and evening meeting held jointly with the members of the Norfolk Moth Survey and the Conservation group of the Amateur Entomoligists' Society. Cranwich Heath is a Forestry Commission plantation established on a breckland heath site. Remnants of the breckland flora remain in the rides between the stands of conifers. The two leaders were joined by only three members for an afternoon of beating and sweeping for moth larvae. Some members may have been deterred by the forecast of wet weather. However, the rain held off and a good variety of larvae were found, amongst which were those of the brimstone butterfly, *Gonepteryx rhamni*, broken-barred carpet, *Electrophaes corylata*, mottled pug, *Eupithecia exiguata*, small angle shades, *Euplexia lucipara* and one larva of the least black arches, *Nola confusalis*, all from purging blackthorn, *Rhamnus catharticus*. A maple prominent larva *Ptilo-*

dontella cucullina from purging buckthorn under a Norway maple proved to be parasitised by the chalcid wasp, *Eulophus larvarum* (det. Mark Shaw), which is a common ectoparasite of macro-lepidopterous larvae from trees and shrubs.

The wild privet produced a larva of the privet hawk, *Sphinx ligustri*, the vapourer, *Orgyia antiqua* and on the privet flower heads the larvae of the satyr pug, *Eupithecia satyrata*, double-striped pug. *Gymnoscelis rufifasciata* and the V-pug, *Chloroclystis v-ata*. A pine hawk, *Hyloicus pinastri* was beaten from Scots pine.

Sweeping by day produced large numbers of clouded-bordered brindle larvae, *Apamea crenata* from the grassheads, some larvae of the burnet companion, *Euclidia glyphica* from among the trefoils and larvae of the shaded pug, *Eupithecia subumbrata* from the flowers of field scabious, *Knautia arvensis*. Sweeping by night added many more *E. glyphica*, larvae of the purple bar, *Cosmorhoe ocellata*, common carpet, *Epirrhoe alternata* and one mottled grey larva, *Colostygia multistrigaria* from lady's bedstraw, *Galium verum*, as well as an adult royal mantle, *Catarhoe cuculata*.

Nine members joined the leader for the night-time work and thirteen lights were operated. It proved to be one of the best mothing nights of a rather tricky season in terms of weather—a dry, windless night with the temperature falling only two degrees from 17 to 15 degrees Celsius between 2200 and 0215 hours. The traps were buzzing with moths, several members recorded over 100 species of macros per trap, and the first light of dawn was in the sky by the time most of us left. The last lights were switched off at 0400 hours.

The moth trapping produced a total list of 168 species of macros, of which the most interesting were the plain wave *Idaea straminata*, oblique striped *Phibalapteryx virgata*, large twin-spot carpet, *Xanthorhoe quadrifasciata*, royal mantle, *Catarhoe cuculata*, wood carpet, *Epirrhoe rivata*, white-banded carpet, *Spargania luctuata* (two specimens one male, one female), sharp-angled carpet, *Euphyia unangulata*, pimpernel pug, *Eupithecia pimpenellata*, brown tip, *Chesias rufata*, clouded magpie, *Abraxas sylvata*, satin beauty, *Deileptenia ribeata*, maple prominent, *Ptilodontella cucullin*, archer's dart, *Agrotis vestigialis*, dotted rustic, *Rhyacia simulanis*, lunar yellow underwing, *Noctua orbona*, slender brindle, *Apamea scolopacina*, mere wainscot, *Photedes fluxa*, silver hook, *Eustrotia uncula*, black-neck, *Lygephila pastinum* and the pinion-streaked snout, *Schrankia costaestrigalis*. Two gold spangle, *Autographa bractea*, turned up, not the first records from East Anglia for this northern species. One laid over 150 eggs, some of which have been reared by Roy McCormick. The other was a male. The range of macros, from Breck specialities to lime-associated and wetland species, demonstrates the varied moth fauna that these plantation sites can continue to support provided sunny, open spaces remain between the conifers and provided the native flora is conserved rather than treated as 'weeds'.

Microlepidoptera included the pyrales *Catoptria falsella, C. pinella*, and *Dioryctria mutatella*, the plume moths *Platyptilia ochrodctyla, P. pallidactyla* and *Adaina microdactyla*, and the oecophorid *Batia lunaris*.

OBITUARY

Anthony Valletta (1909–1988)

By the death of Anthony Valletta in Malta on December 8th 1988 the Society has lost a valued member. He was an all-round naturalist, specializing in his later years in the Lepidoptera, but interested in other insects and in the birds, trees and wild flowers of the island. But he travelled and collected widely and made many friends in England and abroad. He joined the Society in 1978, and was also a Fellow of the Royal Entomological Society of London and of the newly formed Societas Europaea Entomologica. He frequently attended our meetings and the exhibition whenever his visits to England allowed.

Valletta wrote two short books on the butterflies (1972) and the moths (1973) of the Maltese Islands. These were designed to attract popular interest but have full scientific value. He listed and briefly described and commented on the habits of 22 Rhopalocera, immigrant or resident, and of 413 species of Heterocera. These include 250 micros, illustrating his expertise in that field also. He also wrote many shorter notes for the *Entomologist* from 1948 to 1961 and later for the *Entomologist's Record* in which he added five species to the Maltese Rhopalocera and further accounts of their breeding. He also gave in 1978 details of a short visit to Mt Etna and in 1978, 1981 and 1982 of collecting with H. G. Allcard in Teneriffe and other Canary Islands. The last of his notes was published in 1987.

Anthony's wife died in 1973, but he is survived by six children. To one of these, Mrs Kathleen Spiteri in London, I am grateful for help with this note.

R. F. Bretherton

SHORT COMMUNICATIONS

Gregarious behaviour of *Elampus panzeri* (Fabricius) (Hymenoptera: Chrysididae).—In a previous note in this journal, Jones (1988) described a mass emergence and apparent 'perching' behaviour of this cuckoo wasp (cited by him under its synonym *Notozus panzeri*) in a West Sussex locality. M. Edwards and myself had a very similar experience late on the afternoon of 3.vii.83 on Morden Bog NNR, Dorset. Casual sweeping of short, sparse, heather (*Calluna vulgaris* L.) along a few metres of sandy path traversing the heathland produced scores of *E. panzeri*. A closer examination revealed hundreds, if not thousands of individuals of this species perching on the sprays of heather and adjacent plants, the vegetation glistening and shimmering in the sunlight from the effect of so many of these colourful insects. Others were flying low over the same plants, apparently moving into and assembling in the area. Subsequent study and dissection of a sample collected at this site, revealed these to be males, from which it was concluded that the majority of those encountered in the field were probably of this sex. The reason for such unusual, gregarious, behaviour can only be guessed; perhaps these specimens were attracted to a nesting site of one of their sphecid wasp hosts (red-bodied *Psen* species), from which female *E. panzeri* were emerging.—George R. Else, Northcroft, St Peter's Road, Hayling Island, Portsmouth, Hants PO11 0RX.

References

Jones R. A. 1988. Mass emergence and apparent 'perching' behaviour of *Notozus panzeri* (F.) (Hymenoptera: Chrysididae). *Br. J. Ent. Nat. Hist.* **1:** 189–190.

A nocturnal beetle active in bright sunlight.—*Orectochilus villosus* (Muller, O. F.) is usually regarded as being nocturnal and is widely reported as such in the literature. I was more than a little surprised, therefore, to find it abundant and active in bright sunshine recently.

On 30.vii.89, heavy rain at Eridge in East Sussex finally stopped and by 12 noon the clouds had given way to bright sunshine. By a bridge over a small stream—the perfect spot for lunch—my father A. W. Jones suggested that I discard my still sodden sweep net and instead try and catch a whirligig.

Whirling about on the flowing water were several dozen gyrinids, and a couple of stabs with the water net secured one—immediately identifiable as *Orectochilus*. After capturing several more, it was obvious that this was the only species present.

Although the stream emerged from deep shade cast by trees, it was only beside the bridge, in full sunlight that the beetles appeared to be active, dashing around from stone to stone and even attacking a struggling spider as it was swept gently by.

Apart from Balfour-Browne (1950) who also found it active one day in West Mayo in 1909, I can find no report of day-time activity in this species.

At about 3.00 p.m. we again passed the bridge; and although the sun was still out, the beetles were not.—Richard A. Jones, 13 Bellwood Road, Nunhead, London SE15 3DE.

Reference

Balfour-Browne, F. 1950. *British water beetles*, volume 3, page 368. London: Ray Society.

INSTRUCTIONS TO AUTHORS

Contributions must be double-spaced with 3cm margins either side to facilitate marking up. They should be typed if possible, on one side only of A4 paper. Layout should follow that of the journal, but apart from underlining scientific names, no marks should be made to define typeface.

Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

Authors of original papers of more than one page qualify for 25 free reprints. Extra copies (prices on application) must be ordered when proofs are returned.

MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 28th October 1989 at Imperial College, London SW7.

Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings.

The current Programme Card can be had on application to the Secretary at 32 Penton Road, Staines, Mdx. TW18 2LD.

SUBSCRIPTION RATES 1989

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IMPORTANT ANNOUNCEMENT

At the end of 1989 the Society will vacate its rooms in the Alpine Club. Until the Society moves into new premises (at present this seems likely to happen at the end of 1990), the library and collections will be put into storage. Indoor meetings will be held at the Royal Entomological Society, 41 Queen's Gate, London SW7 on the second and fourth Wednesdays of each month, with the exception of the AGM which will take place on Tuesday 27 February. **The Journal will continue to be published as normal.** Without a permanent address, it is important that members have clear and easy communication with the various officers to ensure the continued smooth running of the Society. The following is a list of useful addresses.

Subscriptions and changes of address to the Assistant Treasurer: G. N. Burton, Mar-y-Mar, Minster Drive, Minster-in-Sheppey, Kent ME12 2NG.

Applications for membership to the Membership Secretary: A. Godfrey, 10 Moorlea Drive, Baildon, Shipley, W. Yorks, BD17 6QL.

Non-arrival of the Journal, faulty copies or other problems arising from distribution of the Journal or notices to the **Distribution Secretary:** D. Young, 32 Valley Road, Burghfield Common, Reading, Berks RG7 3NF.

Orders for books and back numbers of the Journal and Proceedings to the Sales Secretary: R. D. Hawkins, 30d Meadowcroft Close, Horley, Surrey RH6 9EL.

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General Enquiries to the Secretary: J. Muggleton, 30 Penton Road, Staines, Middx TW18 2LD (Tel: 0784-464537).

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SOME MOTHS OF THE RESERVE MICHEL-HERVE JULIEN, CAP SIZUN, BRITTANY

ADRIAN SPALDING
Tregarne, Cusgarne, Truro, Cornwall.

INTRODUCTION

The Cap Sizun nature reserve is a small area of cliff about 8 km from the Pointe du Van in Brittany. It was created in 1959 as an ornithological reserve for the protection of birds, particularly razorbills, guillemots and kittiwakes. However, the reserve is also interesting for its fauna and flora, with areas of maritime heathland similar to the heathland communities of Cornwall. Some of the moths already known on the reserve (e.g. *Euproctis chrysorrhoea* L.) are largely coastal in the northern colder parts of Europe (e.g. in Britain) and they are more abundant in warmer regions.

AIMS

To establish a list of the moths on the reserve with special reference to their rarity and distribution in northern Europe. To compare the moths of the reserve with the moths of the cliffs of Cornwall.

METHODS

I studied the moths of the reserve in Brittany between 2 and 5.vi.88. There are two main sections of the reserve (An Aoteriou and the public part both of which contain named areas) and both were sampled on three nights and occasionally during the day. In An Aoteriou one site in the lee of a large granite outcrop was trapped twice, whilst on the third night the trap was placed at a nearby site called Stang Kermadeu by a stream. In the main public part of the reserve, three sites (Porz Kanape, Porz N'Hallen and Kastel Ar Roc'h) were sampled at night as well as by day, whilst a fourth site (Begalochou) was sampled during the day only.

In Cornwall, a site comparable to the reserve in Brittany was chosen and sampled in comparable weather conditions. The trap was placed at Hodder Downs, Reskajeage, which is a north facing cliff with typical Cornish cliff plants such as *Calluna vulgaris* (L.), *Silene maritima* With., *Cochlearia officinalis* L. and *Armeria maritima* (Mill.). On 12.vi.88 the trap was placed in the lee of a granite outcrop that was covered with the lichen *Ramalina siliquosa*.

Most collecting was done at night using Heath traps. The traps were placed out of the wind as far as possible, but on one windy night one trap had to be weighed down with a large stone. Meteorological conditions are critical for catch size; the ideal conditions for moths are warm, still, cloudy nights when the atmospheric pressure is low. High winds, low temperatures and clear skies all mitigate against moths flying. The catch was collected in the morning, the immediate surrounds being searched for moths which might have settled on rocks or vegetation. Any moths that could not be named immediately were taken back to the house for identification. All others were released on site.

In conditions where wind is not a problem, a mercury vapour bulb over a white sheet may be used. This method of attraction is more powerful, and up to 40% more moths may be caught (Heath, 1970). However, some smaller species are perhaps less likely to be caught this way, and no comparisons of catches can be made unless a trap such as the Robinson trap is used. It had also been intended to try sugaring, which is a method by which a sweet alcoholic mixture is painted onto rocks and vegetation, but it was decided that the weather was unsuitable for this technique.

Some searching was done during the day for diurnal species and larvae, and some flying insects were caught by netting. No sweeping was done, as much of the habitat was unsuitable because of the closely cropped vegetation.

Identification of most moths represented little problem. With a few species, it was necessary to dissect the moths to examine the genitalia. This was done with the *Oligia* and *Eupithecia* species, and also with *Bactra lancealana*, *Schrankia costaestrigalis* (a very worn specimen), and *Scoparia pyralella* (f. *ingratella*). A few larvae were taken by me and bred through to adult form by a colleague, J. L. Gregory.

Results in Brittany

An Aoteriou

The total night-time catch (over three nights) was 152 moths representing 49 species. The first night (2.vi) was the most productive, 113 moths and 43 different species being caught. Weather conditions were good, the wind was slight and the night was warm (12°C). The following night, with the catch at the same station, only two more species were added to the list. Although the trap was placed on the lee side of a large rocky outcrop out of the strong westerly wind and the temperature was 11°C, just 19 moths and 11 species were found. On the third night the trap was placed at the edge of the valley at the eastern edge of the reserve (Stang Kermadeu), a different kind of habitat where the vegetation included *Rubus fruticosus* (L.) and *Hedera helix* L. Although the trap was sited out of the strong northerly wind, only 20 moths (12 species) were caught, adding four more species to the list. The commonest moth on this part of the reserve was *Ceramica pisi* (21 individuals), followed by *Spilosoma lubricipeda* (13), *Diaphora mendica* (10) and *Hadena confusa* (9). Also found here in profusion were the diurnal *Cydia internana*, which flies actively around bushes of *Ulex* species; the males are readily distinguished by their white hindwings. Larvae of *Cleorodes lichenaria* were numerous, well camouflaged on the lichens on which they were feeding. Some of the larvae had pupated and the pupal cases were constructed of silk covered with tiny strands of lichen and fastened to the lichen fronds hanging from the rock. I collected a pupal case on 3.vi, and a moth emerged on 14.vi. A small green larva with a black spot on its back was found on lichens by the trap on 3.vi and was taken back to Britain. By the 7.vi it pupated, and *Nudaria mundana* emerged on 16.vi. I also found several larvae of *Euproctis chrysorrhoea* feeding on *Prunus spinosa* L., and the larval case of *Psyche casta* which is constructed of longitudinally placed grass stems. The butterfly *Callophrys rubi* was flying at the southern edge of the reserve.

The main part of the reserve

I found 41 species, including two unidentified species, one adult moth and one Geometrid larva. I brought the larva to Britain, where J. L. Gregory bred it through to the pupal stage. It will probably prove to be *Colostygia multistrigaria*. On the first night (2.vi) the trap was sited in a bed of *Oenanthe crocata* L. by the stream at the western edge of the reserve below the quarry; 63 moths of 30 species were caught. The most common moth was *Ochropleura plecta*. This site was not typical of the reserve, with six species not being found elsewhere. *Alcis repandata*, *Spilosoma luteum*, and *Diarsia mendica* were only found here and at Stang Kermadeu, which similarly did not have direct coastal exposure. The next night was very windy, and the trap was placed at Porz N'Hallen where the catch was only 10 moths (three species). On the final night, the trap was placed at Kastell Ar Roc'h, where the northerly wind was so strong that it was necessary to weight the trap down with a large stone. Only

three moths were caught here, all *Hadena perplexa perplexa*. This was the most common moth on this part of the reserve along with *Ochropleura plecta* (11 individuals of each species). The next most common moth was *Spilosoma lubricipeda* (nine individuals).

Also found here were several larvae, including the cases of one of the Psychidae (not identified to species). Several *Euproctis chrysorrhoea* larvae were seen on a

Table 1. Moth list Cap Sizun 2–5.vi.88.

Name	Status	Numbers
Hepialus hecta L.	C	2
Psyche casta Pall.	C	1L
Neofaculta ericetella Gey.	C	1
Hedya pruniana Hübn.	C	2
Bactra lancealana Hübn.	C	*
Cydia internana Guen.	L	*
Scoparia ambigualis Treits.	C	2
Scoparia pyralella f. ingratella Zell.	C	1
Lasiocampa trifolii D.&S.	L	1L
Macrothylacia rubi L.	C	2
Philudoria potatoria L.	C	2
Idaea subsericeata Haw.	SL	1
Xanthorhoe spadicearia D.&S.	N	2
Xanthorhoe ferrugata Clerk	C	3
Xanthorhoe fluctuata L.	C	1
Epirrhoe alternata Mull.	C	1
Chloroclysta truncata Hufn.	C	1
Colostygia pectinataria Knoch	N	3
Euphyia unangulata Haw.	L	1
Eupithecia pulchellata Steph.	W	1
Eupithecia vulgata Haw.	C	1
Eupithecia subfuscata Haw.	C	1
Eupithecia nanata Hübn.	H	5
Lomaspilis marginata L.	C	1
Petrophora chlorosata Scop.	C	11
Opisthograptis luteolata L.	C	3
Plagodis dolabraria L.	C	1
Biston betularia L.	C	1
Peribatodes rhomboidaria D.&S.	C	5
Alcis repandata L.	C	4
Cleorodes lichenaria Hufn.	L	*
Lomographa temerata D.&S.	C	1
Sphinx ligustri L.	L	1
Laothoe populi L.	C	1
Eligmodonta ziczac L.	C	2
Calliteara pudibunda L.	C	4
Euproctis chrysorrhoea L.	C	*
Nudaria mundana L.	L	1L
Eilema complana L.	C	1L
Spilosoma lubricipeda L.	VC	21
Spilosoma luteum Hufn.	C	5
Diaphora mendica Clerk	C	11
Axylia putris L.	VC	8
Ochropleura plecta L.	VC	14
Noctua pronuba L.	VC	4
Lycophotia porphyrea D.&S.	L	2
Diarsia mendica F.	C	2
Diarsia rubi View.	C	3
Xestia c-nigrum L.	VC	5
Discestra trifolii Hufn.	C	1
Hada nana Hufn.	C	6
Ceramica pisi L.	C	27
Hadena perplexa perplexa D.&S.	C	14
Hadena confusa Hufn.	C	10
Mythimna pallens L.	C	2
Rusina ferruginea Esp.	C	2
Euplexia lucipara L.	C	5
Phlogophora meticulosa L.	C	3
Oligia strigilis L.	C	1
Oligia versicolor Borkh.	L	2
Hoplodrina ambigua D.&S.	C	3
Caradrina morpheus Hufn.	C	1
Diachrysia chrysitis L.	C	1
Autographa jota L.	L	1
Rivula sericealis Scop.	C	1
Schrankia costaestrigalis Steph.	L	1
	Total	228

Key: * = several (larvae or adults); 1L = one larva. Distribution in Europe: VC = very common; C = common; L = local; N = northern; W = western; S = southern; H = heathland. Note: this list excludes a possible *Colostygia multistrigaria* larva, one unknown moth and one unidentified *Luffia* species.

variety of plants; it appeared that they had eaten all the *Prunus spinosa* L. (their natural foodplant) available in the vicinity. One larva of *Lasiocampa trifolii* was recorded at Begalochou. A larva of *Eilema complana* was taken at Kastell Ar Roc'h, bred through by J. L. Gregory and emerged on 8.viii. Also present were several larvae of *Cleorodes lichenaria*, some having already pupated.

Some moths were found during the day, including *Epirrhoe alternata*, which was disturbed from the vegetation, and the common *Neofaculta ericetella*, which feeds on *Calluna vulgaris* (L.). In the wet flush near the public section of the reserve, I found several of the very common *Bactra lancealana*, which feed on various species of *Juncus* and *Scirpus*. Also flying were the butterflies *Pyrgus malvae* and *Lasiommata megera*.

Overall

Sixty-eight species were found, excluding a small dark unidentified moth (found on 5.vi on the main reserve) but including the two unidentified larvae which have been placed into family. The two parts of the reserve had similar moth fauna with considerable duplication of species, so that although the species totals for each part of the reserve were 54 and 40, the total number of species caught was only 68. Both sections of the reserve were surveyed in similar fashion, with similar sampling time and under similar weather conditions. Comparing the two communities using the Sorenson coefficient of similarity $C_s = 2j/(a+b)$, where j = the number of species in common and a and b are the number of species at the two sites. $C_s = 0.568$ (where a result of 1 would mean total similarity and 0 would mean total disimilarity).

Over 228 moths were caught in all (Table 1), excluding those larvae and day-flying species which were too numerous to count, e.g. *Cydia internana*. Apart from these, the most common moth was *Ceramica pisi* (27 individuals), which is common throughout Europe in open areas and although polyphagous probably feeds on *Pteridium aquilinum* (L.) on the reserve. The second most common moth was *Spilosoma lubricipeda* (21 individuals), which is widespread in Europe. *Spilosoma luteum* was represented by only five individuals; although as widespread as the previous species, I have found it to be less common in coastal areas. Only seven species were found more than 10 times, and 22 out of the 68 species were represented by one individual only, which indicates high species diversity.

Table 2. Comparison catch Hodder Downs, Reskajeage, Cornwall 12.vi.88.

i) Daytime
Macrothylacia rubi L. Fox Moth (several males flying)
ii) Heath trap 12°C

Name	Numbers	Name	Numbers
Hepialus lupulinus L.	3	Xanthorhoe fluctuata L.	2
Aspilapteryx tringipennella Zell.	1	Eupithecia pulchellata Steph.	3
Ypsolopha dentella F.	1	Spilosoma luteum Hufn.	1
Elachista argentella Clerk	1	Agrotis exclamationis L.	1
Aesthes cnicana Westw.	1	Ochropleura plecta L.	2
Hedya pruniana Hübn.	1	Lycophotia porphyrea D.&S.	3
Epiblema scutulana D.&S.	1	Diarsia rubi View.	1
Scoparia pyralella D.&S.	1	Hada nana Hufn.	1
Idaea subsericeata Haw.	1	Hadena confusa Hufn.	18
Xanthorhoe montanata D.&S.	5	Hadena bicruris Hufn.	4
		Total	52

Comparison with moths in Cornwall

The catch here (12.vi) was a week later than the catches in Brittany, but as many moths fly slightly later in Cornwall so the time difference should not have been critical. A warm still night was chosen (temperature 12°C), comparable with the night of 2.vi. The total catch was 52 moths, representing 20 species (Table 2). The most common moth was *Hadena confusa* (18 individuals); 12 species were represented by one moth only. Twelve species were common to both Brittany and Cornwall, including *Macrothylacia rubi*, which was seen flying during the day but which did not come to light. A comparison with the single catch at An Aoteriou on 2.vi is instructive. Here, the catch was 113 moths, representing 43 species, but only seven moths were common to both catches. The Sorenson coefficient of similarity between the two sites was 0.222. The catch at Porz Kanape on 2.vi yielded 63 moths representing 30 species, with five species in common. The Sorenson coefficient of similarity for this site and the site in Cornwall was 0.2, whereas between the two catches in Brittany the similarity coefficient was 0.548 (0.568 for the total catch over 3 days). The two sites in Brittany have greater similarity than has either site with the site in Cornwall.

Simpson's index of diversity D was used to compare the species richness of the three catches. This index gives little weight to rare species and greater weight to common species, and measures the probability of picking two organisms at random that are different species. The larger the value of index D, the greater its equitability. The species diversity according to Simpson's index for An Aoteriou (2.vi) was 21.106, for Porz Kanape (2.vi) 13.186, whereas for Hodder Downs (12.vi) species diversity was much lower at 6.563.

Discussion

The moths of Cap Sizun

The most common family here was the Noctuidae. The Noctuidae is the largest moth family worldwide, and many noctuids are highly adapted to their various habitats. Being robust, they are capable of flying in adverse weather conditions, and on the very windy night of 3.vi 14 out of 19 species caught at An Aoteriou were Noctuids, and in the trap at Porz N' Hallen only Noctuids were caught. Of the 68 species caught in total, 22 were Geometridae and five were Arctiidae. Since no sugaring was attempted, at night only light-sensitive species were caught, and the smaller moths were mainly taken in daytime. Most of the specimens caught are generally common over much of Europe (Table 1). Distributions for many species tend to be better known for Britain since more recording work has been done here in an area which is much smaller than mainland Europe. There is a correlation between the foodplants of moths and their distribution, although migrant moths may be found at great distances from their foodplants. However, many moths are much rarer than the distribution of their foodplants would indicate. Most of the moths at Cap Sizun feed on common plants. Of the 68 species, 35 are polyphagous, and most of these are widespread, although *Idaea subsericeata* is locally common. Four species (*Cleorodes lichenaria*, *Nudaria mundana*, *Eilema complana*, and *Luffia* sp.) feed on lichens, generally those species growing on trees, but *Nudaria mundana* feeds on lichens growing on rocks. *Psyche casta*, which is common everywhere, feeds on lichens and also grasses. Many species have either a southern or northern distribution in Europe (Meyrick, 1927; Novak, 1980; Carter, 1982), but this zonation is too broad to apply to Brittany. *Idaea subsericeata* is more common further south, but as it occurs in southern Britain its presence here was not unexpected. Species such as *Lasiocampa trifolii*, which are scarce in Britain and generally confined to the coasts, are

widespread over Europe, especially in the warmer south, even high into the mountains. Some species may be more common in the west of Europe, and this appears to be the case with *Eupithecia pulchellata* (Forster & Wohlfahrt, 1981), which is represented in eastern Europe by the subspecies *digitalaria*. Many species are on the western edge of their range in Brittany, and we might expect unusual forms to occur, as happens with the butterfly *Maniola jurtina* (Dowdeswell, 1981), but no extreme forms were found. *Arctia villica* has been found here previously, which may be ssp. *britannica* which is found in northern France. *Hoplodrina ambigua* is widespread in Europe in treeless areas, and has been expanding its range northwards into Britain, the Netherlands, Denmark and Sweden (Heath, 1983) from about 1940. However, it may have been established on the warm coasts of Cornwall well before this date.

Comments on individual moths in Brittany

One of the most interesting species which was pointed out to me was *Cleorodes lichenaria*, the larvae of which were found feeding on lichens of the genus *Ramalina*. P. W. James [BM(NH)] confirmed the lichen to be *Ramalina siliquosa*, producing a salazinic acid stain when tested chemically. *Ramalina cuspidata* is similar, but grows lower down the shore than *R. siliquosa*, and it may be that *C. lichenaria* will feed on this lichen as well. In Britain, the larvae are only known to feed on lichens on trees and fence posts (usually *Usnea* species), and even on Mull they probably feed on the lichen-covered stunted trees that grow there (B. Skinner pers. comm.) The larvae are so well camouflaged that they are very difficult to find. Apparently, the adults have been found at Kynance Cove, on the Lizard in Cornwall (P. Siddons pers. comm.) where there are no trees, and P. W. James reports that he found similar pupal cases on *Ramalina siliquosa* on the Lizard so it is possible that the larvae may also feed on *Ramalina* species in Cornwall. I brought two pupae back to Britain, and they emerged within 2 weeks. It is interesting to note that these specimens were much lighter than most British examples I have seen which are usually heavily dusted with dark green and well camouflaged on dark tree trunks. One of the Breton moths was lightly dusted with green scales, the other was a light brown colour with little green coloration and both these forms would be well camouflaged on the granite rocks of the reserve.

One common (nine specimens) moth was *Hadena perplexa*. Culot (1909–1913) gives two varieties, *capsophila*—now given sub-specific status—(which is a very dark form with the stigmata outlined with white) and *ochracea* (which is a light form). The subspecies *perplexa* occurs throughout Britain and Europe, whilst the darker *capsophila* is mainly coastal and occurs in Ireland, the Isle of Man, southern France and Corsica. At Cap Sizun, lightish specimens like *ochracea* were found which were *perplexa perplexa*, and these would be double-brooded here as they are in southern Britain.

The moths of Cornwall compared with those of Cap Sizun

Being some 100 miles further south than Cornwall, I would expect the climate in Brittany to be warmer and the moths to be flying earlier. In Brittany I found *Rivula sericealis* on 2.vi, which is some 3 weeks earlier than I have found it in Cornwall. Also early were: *Philudoria potatoria*, *Euphyia unangulata* and *Schrankia costaestrigalis*. Many species are double-brooded in Cornwall and Brittany, but single-brooded further north; I could not detect any differences between the moths of either place in this respect. The lack of *Ulex* spp., *Prunus spinosa* L., *Juncus* spp. *Pteridium aquilinum* (L.) and *Galium* spp. at the Cornish site limited the number of moth

species here. *Hepialus lupulinus* was present at Reskajeage rather than *Hepialus hecta*, which feeds on *Pteridium aquilinum* (L.) and is more common in wooded areas where the foodplant abounds.

Hadena confusa was found in some numbers (10 in Brittany, 18 in one night in Cornwall). This species is widespread throughout Europe (Reichholf-Riehm, 1984) except the extreme north, and varies greatly at the extremities of its range. Some Cornish specimens have ochreous coloration instead of white on the forewings (var. *ochrea* Culot Vol. 1:117).

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BOOK REVIEW

A field guide to the smaller British Lepidoptera Second Edition Revised and Enlarged by Members of the British Entomological and Natural History Society. Edited by A.M. Emmet. 288 pp, published by the British Entomological and Natural History Society. Paperback £18, Cased £22.50 (special price to BENHS members £12 and £15 respectively).

This is a wholly comprehensive convenient-sized reference providing an immediately-available data source of the habits and foodplants, critical dates of appearance for both larvae and adults of all 'micro' species recorded in Britain whether of resident status, migratory origin, or of casual importation, currently some 1524 species. It follows the previous edition's general format, and invaluably includes the serial notation of Bradley & Fletcher's 1986 indexed log book, thereby replacing Ford's notation used in the first edition. The main text is followed by full indexes of families, genera, species and foodplants etc, and in addition includes a useful memory-jolting simplified index of common English foodplant names.

During the nine years that have elapsed since the first edition, much additional information has revised our knowledge, and almost 50 species have been added to the British list, all of which has been incorporated into the guide, together with some 128 nomenclature and classification changes.

It is perhaps worthy of comment that according to the BENHS membership list currently over 70% (around 480 members) list their principal interest as being lepidoptera — a well-supported field meeting would certainly pose an interesting logistical problem — a considerable proportion of these members I know to be avid collectors of 'macros' but who totally ignore the 'micros' — WHY? Much potentially exciting information is thereby unrecorded; I recall one July evening recording 184 species of moth at m/v light by 02.00 hours, of which 88 species were 'micros'. They really are amongst the most beautiful of all small creatures, the breeding of which in captivity offers a considerable challenge and adds a further exciting dimension to their study. This guide certainly helps to make that challenge a little easier. There will always be difficult areas encountered in virtually any insect order studied, the resolution of which is surely a serious part of the challenge and justification for collecting.

My only disappointment is that no interleaved copies appear to be available in this edition, so essential in my view for such a work to be capable of progressive annotation with critical dates, supplementary information etc. Nevertheless, this is an indispensible standard reference treasure that no field worker can afford to be without, and the very considerable efforts of the editor with the support of members should be rewarded with a rapid sell-out.

N.F. Heal

PHEASANTS AND FRITILLARIES: IS THERE REALLY ANY EVIDENCE THAT PHEASANT REARING MAY HAVE CAUSED BUTTERFLY DECLINES?

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INTRODUCTION

Corke (1989) recently correlated the pattern of decline of certain butterflies with that of over-wintering pheasant density, and concluded that pheasants might be responsible for their declines. The main basis for his conclusion is that the decline of several species, as shown on published BRC maps (Heath, Pollard & Thomas, 1984), appears to be greater in SE Britain, and that this region coincides with the highest densities of reared pheasants. Unfortunately there is only circumstantial evidence on the subject and he has been extremely selective in his analysis. He has also overlooked several crucial facts about the ecology and behaviour of both pheasants and woodland butterflies. His conclusions are therefore misleading for the following reasons.

PHEASANT ECOLOGY AND DIET

The ecology and rearing of pheasants has been thoroughly studied (see review by Hill & Robertson, 1988) and does not support Corke's hypothesis. Intensively reared pheasants are released between July and August and are at their highest density from then until the shooting season starts in October. The majority are then shot during the winter so that their breeding density the following spring is not greatly increased (never more than doubled) above the normal density expected for wild breeding birds. During the spring, the density is largely determined by the suitability of the habitat and is only slightly influenced by the numbers released the previous year. Male pheasants then set up their breeding territories in February (the end of the shooting season) and are joined in March by the females. Territories are nearly always established within 50 m of woodland edges, usually where this borders fields with low vegetation where the males can display prominently. Another relevant fact is that various studies on pheasant diet during the winter (ie September–April) have shown that the vast majority of their food consists of grasses, leaves and roots. Only a small proportion (usually about 2% though this can rise to 10%) comprises animal food, including insects. Most of their foraging is carried out at ground level, up to a maximum height of 1 m, where they scavenge among the vegetation and visually search for food items. In a study on Brownsea Island in Dorset, the bulk of their insect prey was ants and beetles and, in an earlier British study, earthworms accounted for most of their animal diet. The diet of young pheasants is broadly similar, with only a small proportion comprising animal food. All feeding is carried out during daylight hours, with peaks of activity just after dawn and before dusk.

This means that only ground breeding species of butterfly are likely to be selected as food. Also, the main period of possible risk of predation by the release of *reared* pheasants is in the Autumn between August and October. Furthermore, the only species at risk are those which occur as large larvae at this time of year; those with small larvae will almost certainly be ignored by foraging pheasants. In common with most birds, pheasants probably optimize their foraging by selecting larger prey items

Martin Warren is a conservation consultant. This paper is in reply to David Corke's article (1989) which Dr Corke will further discuss in a lecture to the Society to be held on 14 December 1989.

unless they are conspicuous and highly abundant such as ants (eg Krebs & McCleery, 1984). Unfortunately, this does not seem to have been examined for pheasants, apart from a study on 2-week-old pheasant chicks which showed that they ignored insects less than 3 mm in size and preferentially selected insects larger than 6 mm (Whitmore, 1982). It therefore seems reasonable to assume that adults will select even larger prey, probably over 1 cm.

Additional support for the selection of larger insects by pheasants is provided by numerous life table studies on the Lepidoptera which have consistently shown that the main predators of the earlier, smaller instars are invertebrates. Birds and other vertebrates tend to restrict their predation to the later and larger instars (see review by Dempster, 1983). The chief possible risk for butterflies which only occur as large larvae in the spring will therefore be from *breeding* pheasants. However, as these will be concentrated near the wood edges during the spring, few woodland butterflies will be at risk as most colonies breed within the interior of woods, generally in rides, glades, or young plantations.

The assessment of risk to butterfly larvae from pheasant predation

In the light of these facts, we can now make an objective re-examination of Corke's assessment of the degree of risk from pheasant predation of Britain's declining butterflies. The assessment that he uses in his Table 4 seems inaccurate for many species, yet it is fundamental to his analysis. It is surely more realistic to say that if a species rarely or never breeds within woodland, or along wood edges, then it is not at risk, regardless of its other attributes. Thus the silver-spotted skipper, small blue, silver-studded blue and adonis blue, are at no risk whatsoever. The brown hairstreak breeds mainly in hedgerows, although adults usually congregate on a wood edge for mating, and is thus unlikely to be at risk (Thomas, 1974). Similarly, only a tiny proportion of marsh fritillary colonies have ever bred in woodlands (and these probably never persisted for long), as have only a very small proportion of dark green fritillary and marbled white colonies, so the overall risk to these species is again small. I agree with the assessment that the white admiral, purple emperor, and large tortoiseshell are not at risk as they all breed well above ground and out of reach of foraging pheasants (eg Pollard, 1979 and Willmott, 1987). However, on this basis, the wood white is also at low risk because its larvae feed high up on their vetch foodplants, usually 50–150 cm above ground (Warren, 1981, 1984). The larvae of the brown hairstreak also usually feed above 1 m and are consequently out of reach even where their breeding habitats do occasionally coincide with pheasant foraging areas (Thomas, 1974). Moreover, a thorough 7-year study of this species in an area of woodland that was devoted to pheasant rearing showed no evidence whatsoever for pheasant predation: willow warblers and small passerines predominantly ate the larger larvae on bushes, and small mammals the ground-living pupae (Thomas, 1974, and unpublished data).

The next point to examine for those species that do regularly breed in woodland is the size of the larvae during the main period of risk from reared pheasants, which is between August and October. At this time of year the larvae of the pearl-bordered, small pearl-bordered, and heath fritillaries are all very small and hibernate in their third or fourth instar, less than 1 cm long (Brooks & Knight, 1982). The high brown fritillary over-winters as an egg and the silver-washed and dark green fritillary as newly-hatched larvae (about 2 mm long). The silver-washed fritillary larvae will also be unavailable as they hibernate in grooves in tree trunks, usually 1.5–3 m above ground level (J. A. Thomas, pers. comm.). Thus, these fritillaries are unlikely to be

at any great risk from predation by the over-wintering pheasants that Corke has considered in his correlations. Their larvae do not become large enough to be considered as potential pheasant prey until the spring, by which time most reared pheasants have been shot and those that are left will be breeding around the wood edges. Even where breeding areas of pheasants and fritillaries do coincide, species such as the small pearl-bordered, high brown, and silver washed fritillary are probably at only a small risk due to the behaviour of their larvae. These spend nearly all their time resting under dead leaves or other vegetation and only emerge for brief bouts of feeding. The only fritillaries at some potential risk in the spring are the heath and pearl-bordered whose larvae spend long periods basking in the sun and are relatively conspicuous. However, for reasons explained above, it is unusual for their breeding areas to overlap greatly with those of pheasants. If there is any direct effect of reared pheasants on fritillaries, it is more likely to be due to the consumption of their food-plants. The effect of intensive pheasant rearing on the woodland ground flora has been shown to be detectable only within and immediately outside the release pens (within about 15 m, Ludolph, Payne & Robertson, 1989).

The only ground-dwelling woodland butterflies that have declined substantially and whose larvae are large enough to be potential prey for reared pheasants during the autumn are the chequered skipper, wood white, and Duke of Burgundy. The larvae of the former spin together the leaves of their grass foodplants into a tube, within which they spend most of their time (Brooks & Knight, 1982). They are probably at minimal risk, apart from the brief period when they move from one shelter to another. Similarly the Duke of Burgandy caterpillars are at minimal risk for most of their lives because they are nocturnal and rest during the day concealed close to the ground at the base of thick vegetation. However, they also feed during the day during their final instar, often on the tops of leaves (Butterflies Under Threat Team 1986), and may be vulnerable during this comparatively short period. The wood white may be at some risk, but, as mentioned above, most larvae will be out of reach. It is worth noting that one of the largest British populations of this species (which I have studied for many years, eg Warren, 1984) is at Yardley Chase, Northamptonshire, where pheasants were reared intensively and were often abundant in the same rides where wood whites were breeding. I only spent about 10 hours in hides observing potential bird predators, but never once saw a pheasant come close to one of the numerous wood white larvae.

My conclusion is therefore that the correlations identified by Corke are very unlikely to be the product of a causal relationship with pheasant predation. If such predation does occur, it is likely to be on a very local scale and where palatable larvae are present at a high density alongside pheasants. Such populations should be able to withstand any extra predation by pheasants. Pheasant predation could be expected to have a serious effect on butterfly colonies only if these were already small, if the larvae of the species are particularly vulnerable (and few of the declining species considered are), and if the main breeding areas were either immediately adjacent to the main pheasant release pens or close to woodland edges which were particularly suitable for breeding birds. Pheasant predation is therefore likely to be small for most of the rapidly declining woodland butterflies (and probably also small for the commoner species not discussed here) and could hardly affect the distribution of numerous species in the manner suggested by Corke. It is also relevant to note that butterfly losses in the Netherlands, including most of the woodland fritillaries, have been even greater than in Britain (Geraedts, 1986). However, few pheasants are reared there and releases are restricted by law to one bird per hectare of suitable cover. Clearly, there must be other factors responsible for the particularly severe decline of butterflies in some areas.

Data available on larval predation by pheasants

The only direct study of pheasant predation on butterfly larvae, not mentioned by Corke, is that of Porter (1981) who analysed the droppings of pheasants for remains of insect larvae, particularly the marsh fritillary. His study site was in a rough field adjacent to a wood where reared pheasants were regularly released, and foraged during the spring in the marsh fritillary breeding area. He analysed 150 pheasant droppings, and looked for larval remains such as spines or head capsules which would not be fully digested. He found signs of larvae in just two droppings (and there was some doubt as to the identification of these remains) and concluded that pheasants were a negligible cause of larval death and had little impact on the population, particularly when compared to the high mortalities caused by parasites. In another trial, I have fed full-grown larvae of the heath fritillary and marsh fritillary to young chickens, which, although not exactly the same as pheasants, are similar enough to act as a model. Larvae of the heath fritillary were consumed without any obvious ill-effects, but those of the marsh fritillary were picked up and immediately spat out again (Warren, 1985). A further observation of this is in captive blue-tits which only picked warily at marsh fritillary larvae, with much bill-wiping, a typical indication of distastefulness (K. Porter, unpublished data). I conclude that heath fritillary larvae are palatable but marsh fritillaries are far less so, perhaps due to the greater number and sharpness of the larval spines. The evidence therefore suggests that pheasants may find the larvae of some fritillaries edible, but there is considerable variation in the palatability of different species.

The heath fritillary and pheasants

Apart from his correlations, the only evidence presented by Corke are three old references to local extinctions of the heath fritillary, reputedly as a result of game rearing. These amount to single sentences in the literature and are purely anecdotal or conjecture. None of the authors present evidence to back their supposition, and one cannot help but infer that they, along with many other naturalists, were strongly biased against game rearing, often because it meant restrictions on their access to good localities. In my 10 years of detailed study of the heath fritillary, I have come across no direct evidence that the larvae are particularly at risk from pheasant predation. On the contrary, the three colonies that were close to pheasant rearing areas in Kent have thrived for many years. I remain convinced that the main cause of the decline of this species is the massive change in the suitability of its woodland habitats, particularly the decline in coppicing (Warren, 1987). There are many examples of this factor causing the extinction of heath fritillary colonies, such as the loss at Belfairs Nature Reserve in Essex during the 1960s (Down, 1989).

Pheasant management on important butterfly sites

My last piece of evidence on the subject is again circumstantial, but highly relevant to the debate. In a review of butterfly conservation in central southern England that I have just completed for the Nature Conservancy Council, I have compiled a list of 308 important butterfly localities, including 153 woodlands. Detailed surveys were conducted on all these sites, including assessments of the population size and precise breeding areas of 28 key species (ie all those declining or rare species). Out of the 39 woodland sites that were graded A or B (ie that were the most important for the rarer species, particularly the woodland fritillaries) at least 26 (67%) had been used

for intensive pheasant rearing or had specifically been managed for pheasants for many years. Particularly relevant are the data for the 29 pearl-bordered fritillary colonies, which is probably the species most at risk due to its larval behaviour. Over two-thirds of these were in woods with intensive pheasant rearing and in several cases the main breeding areas were in clearings immediately next to the main rearing pens.

Although this does not prove that pheasants never predate the larvae of some butterflies, it shows that they can co-exist, provided the habitat conditions are suitable. Clearly, it does not prove whether pheasant predation might tip the balance in less favourable habitats where pheasant numbers are exceptionally high at the critical time of year. However, in these circumstances, butterflies will exist as small populations which will be prone to chance extinctions due to other ecological factors, notably weather variations (eg Pollard, 1988). The results of the above review may even suggest the reverse of the hypothesis suggested by Corke: that management for pheasants can be beneficial to butterflies. Some species, including the fritillaries, regularly occurred at high densities in areas where pheasants were abundant. Also, a slightly greater proportion (67%) of good butterfly woods were managed for game than is the average for woods in central southern England (thought to be about 50%).

The patterns of butterfly declines and their causes

If pheasants are not to blame, then what are the likeliest causes of Corke's correlations? To start with, correlations do not demonstrate causal relationships and there are serious doubts about the validity of using the BRC data for a statistical comparison of the rate of decline in different regions. As Corke points out, the interpretation of such data is difficult due to the distribution of recorders etc. For example, there is almost certainly a bias due to greater recording in SE England, particularly for the earlier historical records (eg Dennis & Williams, 1986). If butterfly declines were spread evenly over the whole country, this bias could result in them showing up worst in the south-east. Even if we assume that some butterfly declines have indeed been more serious in SE England, as the present evidence suggests, there are many factors other than pheasants that might be responsible. Barbour (1986) has analysed the butterfly distribution data in a similar way and has shown that the region with most declines coincides with lichen depletion zones, thereby implicating air pollution. However, as in Corke's study, no direct evidence is presented and a causal relationship is far from proven. It is perhaps surprising that no-one has examined far more plausible factors such as hedgerow removal or agricultural intensification which have also been most severe in SE England. Similar correlations would undoubtedly be found by comparing butterfly declines with the proportion of steep, unploughable land, which is far greater away from the SE, or with grade one and two agricultural land which is concentrated in the SE.

As far as the woodland fritillaries are concerned, there is a far simpler explanation for the pattern of their decline. Virtually all these species have always been confined to woodland habitats in SE England, but as you go further west, and for some species north, many colonies are found in more open habitats such as rough grassland. This has been well established for the heath fritillary in the west country (Warren, Thomas & Thomas, 1984) and by examination of the BRC records for the high brown, pearl-bordered, and small pearl-bordered fritillaries (Heath *et al.*, 1984). To give just two examples, the latter two species are quite abundant in the rough grasslands of the north Cornish coast, and in open grassland and moorland in Scotland (Thomson, 1980). Such habitats do not occur in much of central southern

and south-east Britain where these species have always been confined to woodland clearings. In the past, such clearings were created regularly by the traditional management of coppicing whereby portions of each wood were cut on rotation. However, during the 19th century, this form of management declined and is now practised in only 2% of British woods. Most modern woods are simply too shaded for these and several other woodland butterflies, and lack the continuity of regular clearances. It is worth noting that the woodland fritillaries have died out on many nature reserves where there has been no pheasant rearing but often a period of little or no management (eg Thomas, 1984). Nearly all the remaining coppice (largely sweet chestnut) is in Kent and E Sussex, and contains the last few populations of the heath and pearl-bordered fritillaries in the south-east. Throughout most of Britain, coppicing has ceased entirely and the woodland fritillaries have been increasingly confined to areas of the country where alternative types of habitat are available. For geological and climatic reasons, these happen to be concentrated in the south-west and in the north.

Conclusions

The evidence available suggests that, given the correct habitat management, woodland butterflies can withstand any possible minor increase in predation that might be associated with pheasant rearing. My main conclusion, therefore, is that entomologists with an interest in conservation should concentrate on ensuring that habitats are managed in a suitable way for butterflies. At a time when most woods contain few open areas and early successional stages where many of our woodland butterflies can breed, it is in the butterflies' interest to encourage any management that might lead to the creation of sunny rides or clearings. In this context, the management of woodlands for game may well be a positive benefit to butterflies and other wildlife, although the precise form of that management is likely to be crucial (eg Warren & Fuller in press). In addition to the data presented above, Robertson, Woodburn & Hill (1988) have shown that a greater abundance and more species of butterflies were found in areas of woodland that were managed for pheasants. However, there are still major problems to overcome before management for game can be fully integrated with good nature conservation, such as the practice of spreading straw on the rides in pheasant feeding areas, and the control of predatory wildlife. Also, much better information is needed on the management of woodland, particularly the rides and glades, for the benefit of both wildlife and game interests. In short, there are many more positive research areas in which to place scarce resources than into the examination of any impact of pheasant predation on butterfly larvae.

Acknowledgements

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FIELD MEETINGS

Thorndon Park, Essex, 22 July 1989

Leader: Colin W. Plant. A small gathering of members arrived at Thorndon Park on what was probably the hottest day of the year. The sun beat down mercilessly as we wandered slowly around the park and we rapidly realized that almost all of the park's insects were hidden away out of the sun and certainly nowhere to be seen by entomologists! Notwithstanding, some valuable additions were made to the already impressive invertebrate list for this site of special scientific interest. Most notable were the Diptera. Amongst these were several examples of *Pipiza austriaca* (Syrphidae), a species not widespread in Essex. Peter Chandler took a male of the dolichopodid fly *Orthoceratium lacustre*, normally a salt-marsh species, and the pallopterid *Palloptera usta* (two females on conifer logs) — usually a species associated with Scotland. Another notable was a female of *Asteia elegantula* (Asteidae) taken by the Childerditch Pond. This is essentially a Scottish and western species in Britain and this record constitutes the first for the south-east of England. Amongst the other orders recorded were the Orthoptera, with sub-adults of *Metrioptera roeselii* "singing" near Childerditch. This is an abundant insect in southern Essex. We were fortunate in having as a visitor on the trip Mrs Melanie Hollins, an expert in plant galls, who has provided a list of several species recorded including an unidentified form causing an upwards rolling of the leaves of *Quercus petraea*. A combination of heat and the generally poor moth season so far was no doubt responsible for the non-attendance of lepidopterists at the evening light-trapping session. Suffering from a rather nasty bout of heat-stroke obtained during the day's entomologizing, the leader decided to forgo trapping alone in favour of somewhere cool, dark and quiet in which to hide!

Beachy Head (Holywell to Cow Gap), East Sussex, 26 August 1989

Leader: M. Parsons. The leader spent the afternoon on his own in the Holywell area. During sunny periods several species of butterfly were noted, including a number of *Lysandra bellargus* Rott. Some time was spent flushing insects out of the vegetation, a few examples of *Gnophos obscuratus* D.&S. were noted by this method. Closer inspection of the vegetation produced a surprising find of a single pupa of *Cynaeda dentalis* D.&S., peculiar because of its late date. By evening the wind had got up and rain was threatening, though it was still fairly warm. The leader had contemplated calling it a day when he was joined by two members and two friends. Four m.v. lights were operated in the relative shelter of the Holywell water catchment area. Although not a lively evening a good number of species were noted, though no migrants! Perhaps the most interesting species noted were as follows; *Euxoa obelisca* D.&S., *Eupithecia phoeniceata* Ramb., *Gnophos obscuratus* D.&S. *Scopula marginepunctata* Goeze and *Ypsolopha sequella* Cl.

PREY CAPTURE IN *TACHYDROMIA ANNULIPES* (MEIGEN) (DIPTERA: EMPIDIDAE)

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Enormous gaps exist in our knowledge of insect behaviour. For example there are nearly 400 species of predatory empids (Diptera, Empididae) in the British Isles yet prey capture and feeding behaviour of most species is little understood (Smith, 1978). Considerable scope therefore exists for making original observations, particularly on small species such as tachydromines (Smith, 1978).

Predatory behaviour is easy to observe, involving little more than offering live prey to empids in tubes. Prey capture was recorded in this way using a small tachydromine fly, *Tachydromia annulipes* (Meig.).

Tachydromines are small (0.7 to 5.5 mm long) and have modified legs (Collin, 1961; Chvala, 1975). Leg modifications vary but in *T. annulipes* they consist of the two anterior legs having enlarged femora and tibiae and with the mesothoracic legs having two latero-ventral rows of short black spines on the femora and a single mid-ventral row on the tibia. The tibial spines fit between those on the femora when the two parts of the leg are closed together (Lundbeck, 1912).

Tachydromines are reputedly rapacious (Lundbeck, 1912; Chvala, 1975). Lundbeck (1912) found remnants of insects between mesothoracic femora and tibiae and Chvala (1975) states that they hold prey with their middle legs.

METHODS AND RESULTS

From 25.v.1988 to 12.vi.1988 both sexes of *T. annulipes* were present on the leaves of a two-metre *Fagus sylvaticus* L. hedge at Newbattle Abbey, Midlothian, Scotland (NT 6532). Field observations were made on about 30 flies for an approximate total of 4 h during the study period.

T. annulipes adults ran rapidly over the foliage interspersed with short flights to adjacent leaves and periods of immobility. Their mode of running was very distinctive with the femora of the mesothoracic legs held straight out from the sides of the thorax.

Actual prey capture was not observed in the field although apparent searching movements were frequent. These involved orientation and slow approach towards similar sized, stationary or slow-moving flies ending with a run or jump at the potential prey. Occasionally, *T. annulipes* adults would twist their heads and lift the anterior part of the body up and down in apparent attempts to fix the position of potential prey before approaching it.

To observe prey capture in detail, adult *T. annulipes* were pooted individually into empty, 75 × 25 mm corked, glass tubes and, to standardize hunger levels, were left for 12–15 h in an outdoor insectory. After this period, live test prey, consisting of adults of *Phytomyza ranunculi* (Schrank) (Agromyzidae), which were found on the *F. sylvaticus* hedge, were added one to each tube. Tubes were observed continuously until prey were discarded.

Prey capture was observed 17 times in 11 flies and was, in each case, similar suggesting an underlying pattern of behaviour. To capture prey *T. annulipes* ran rapidly towards or jumped on the prey and grabbed its wings or legs with the mesothoracic legs. The struggling fly was very rapidly (< 5 sec) manipulated until its wing bases were held between the femora and tibiae of the mesothoracic

Fig. 1. *Tachydromia annulipes* attacking *Phytomyza ranunculi*.

legs with the dorsum of the prey turned towards the empid with the head of the prey uppermost. The predator spread its metathoracic legs and with the tip of the abdomen of the prey, three points of contact were formed with the substrate. This upright stance was the typical position in which initial feeding took place (Fig. 1).

The prey was pulled towards the mouthparts of the predator using the prothoracic legs which, when necessary, also warded off the still active legs of the prey. Using the prothoracic legs the predator pushed the head of the prey forward to expose the anterior part of the thorax into which it inserted its mouthparts. The prey ceased to move once the mouthparts of the predator were inserted but whether a venom is injected was not determined.

Average feeding time was 17.3 ± 4.8 min (n=8). When it ended the prey was turned upside-down and the predator inserted its mouthparts into the base of the abdomen and fed for a further 3.4 ± 2.8 min (n=5) before finally discarding the prey. If the predator was disturbed by approaching it with a brush or pin, feeding stopped and the predator moved away with the prey held between the tibia and femora of one of the mesothoracic legs.

To see whether prey capture was elicited only by active flies, prey were experimentally removed with a paintbrush (n=5) from a feeding predator and left in the tube. They were ignored although the predators readily attacked fresh, live *P. ranunculi* when added. In another series of experiments, live prey were killed by placing them in a freezer. They were then warmed to room temperature and individually introduced into tubes each containing a 12 h starved predator (n=6). These prey flies were similarly ignored.

In a separate investigation, nine 12 h starved predators were exposed individually to non-dipterous insects to see if they would be attacked. The insects were *Drepanosiphum platanoides* (Shrank), the sycamore aphid, *Psylla mali* (Schmidberger), the apple psyllid and an unidentified collembolan. Three replicates were made for each species of potential prey. None were attacked after 2 h exposure. These same predators, however, readily attacked unidentified flies about the size of *P. ranunculi* belonging to the families Lonchopteridae and Chloropidae at the end of the 2 h period.

Finally, using nine 12 h starved predators, larger (> 5 mm long) unidentified flies belonging to the families Muscidae and Calliphoridae and one identified syrphid, *Melanostoma scalare* (F.), were exposed to the predators. Again three replicates were made for each species of potential prey using different predators each time. None of these insects were attacked after 2 h.

Discussion

Some empids recognize prey using visual cues (Smith, 1978). The behaviour of *T. annulipes* in the field with its head twisting and movements towards other insects suggests that this species also relies on visual cues. That vision is important may also explain why only active prey were attacked: prey movement may provide essential visual cues eliciting an attack.

Poulton (1913) suggests that tachydromines feed mostly on Diptera. The observations made here support this suggestion: none of the non-dipterous insects presented to hungry adult *T. annulipes* were accepted but adults from three families of Diptera (Agromyzidae, Chloropidae and Lonchopteridae) were attacked. Furthermore, it appears that only flies of a similar size to *T. annulipes* elicit an attack. This could be due to the superior ability of large flies to defend against *T. annulipes*. However, no hungry *T. annulipes* attempted to attack large flies which would have provided a test of this possibility.

T. annulipes first manipulates the prey until the mouthparts have access to the front of the thorax. Apart from being a source of high-quality food, feeding on the thorax may have the added advantage of immobilizing the prey as the contents of the thorax are eaten. Discarded prey had empty thoraces.

T. annulipes caught and physically overcame prey using its legs. Each pair of legs has a separate role to play. The prothoracic legs are the shortest (length of prothoracic legs 2.86 mm; mesothoracic 3.80 mm; metathoracic 4.24 mm) and the femora are enlarged although they lack spines (maximum width of prothoracic femora 0.2 mm; metathoracic 0.3 mm; metathoracic 0.1 mm). The prothoracic legs manipulate prey into various positions during capture and feeding. The mesothoracic legs are greatly enlarged and possess rows of spines. They perform the important task of holding prey in a tight grip. The metathoracic legs are long, thin and lack spines. In its characteristic upright feeding position, they help to balance the fly and prevent it from falling over.

Given the specialized prey-handling technique of *T. annulipes*, it is highly probable that tachydromines with other types of leg modification use different methods. A comparative study of prey handling techniques is clearly indicated.

Acknowledgements

I am grateful to Iain MacGowan for confirming the identification of *T. annulipes*.

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SHORT COMMUNICATION

***Hister quadrimaculatus* Linnaeus on Dungeness, Kent.** — As part of a Nature Conservancy Council survey of the invertebrate fauna of Dungeness a series of pitfall traps have been operated during 1989 on various sites throughout the Ministry of Defence Land.

Whilst sorting through the material collected from the 6 to the 20.vi.1989 two large histerid beetles were found in a single pitfall. I identified both as *Hister quadrimaculatus*, a determination which was kindly confirmed by Mr A. Foster. The trap was situated at TR027187 in the South Brooks area of Dungeness, the habitat being dry, sheep grazed grassland on alluvial soil.

The *Red Data Book: 2. Insects* (Shirt, 1987) lists the species as vulnerable, the last record being that of a single specimen which was found under a stone in a field at Stoke, north Kent, by L.S. Whicher on the 1.vi.1952.

I would like to take this opportunity to thank the Ministry of Defence for access permission to the site. — Mark Parsons, The Forge, Russells Green, Ninfield, Nr Battle, East Sussex.

Reference

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OVERWINTERING IN THE BIRCH APHID, *EUCERAPHIS PUNCTIPENNIS*

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INTRODUCTION

The birch aphid, *Euceraphis punctipennis* (Zetterstedt) lives on birch (*Betula pendula* Roth or *B. pubescens* Ehrh.) throughout the year. The first (fundatrix) generation hatches from the egg in early spring and gives rise to a series of parthenogenetically reproducing generations during the summer. In autumn, sexual males and females (oviparae) are produced which mate and the overwintering eggs are laid. It is generally supposed that aphid oviparae lay their eggs quickly after mating and then soon die (Blackman, 1974), since leaf fall or early frosts will result in loss of food supply and death. *E. punctipennis*, however, is a relatively large aphid which can feed on small twigs as well as leaves (Stroyan, 1977) and thus the apparent loss of food supply to this aphid in autumn may not be a problem. This study was therefore undertaken to investigate the occurrence of birch aphid oviparae in autumn, during and after leaf fall. The winter of 1988–89 was exceptionally mild in southern Britain and this provided an excellent opportunity to follow the abundance of this aphid during an unusual winter.

MATERIALS AND METHODS

Five *B. pendula* saplings were selected at random from a group of eight growing in grassland at Silwood Park, Berkshire. One hundred buds were selected randomly from the five trees, the number of buds on each tree being decided by a random number table. Buds were examined *in situ* and the number of birch aphid oviparae and eggs associated with the buds recorded. Eggs when freshly laid are yellow, but soon darken to black if fertile (Blackman, 1974), making them easily seen. This method has been shown to be reliable for counts of aphid eggs in the field (Leather & Lehti, 1981). Sampling began on 5.x.1988 and was continued weekly until the first fundatrix was found in spring 1989. Daily temperature recordings were taken from the Silwood Park weather station.

RESULTS

The numbers of oviparae associated with 100 buds are shown in Figure 1. Oviparae were found for a considerable period after leaf fall, the last individual being found on 18.i.1989. Aphid mortality occurred primarily in late October and again in late November. The daily minimum temperature is also given in the figure and it can be seen that some oviparae survived the cold spell during late November, despite temperatures as low as −5.3°C.

The numbers of eggs recorded on 100 buds are also shown in Figure 1. Egg numbers reached a peak in late October thereafter fluctuating around 70 eggs per 100 buds. Freshly laid eggs were found until 11.i.1989, indicating that the oviparae remaining were still actively ovipositing. The first fundatrices were found on 3.ii.1989.

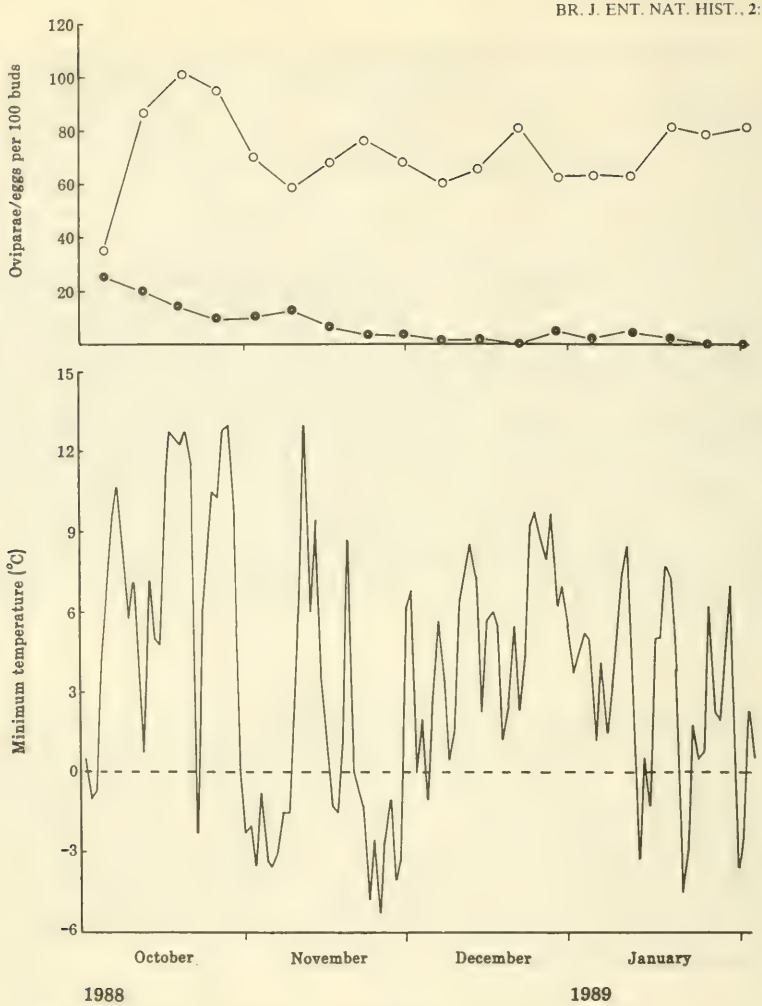

Fig. 1. Numbers of birch aphid oviparae (●) and eggs (○) per 100 buds and daily minimum temperature at Silwood Park, Berkshire, during the winter of 1988–1989.

Discussion

These results demonstrate that oviparae of the birch aphid are able to survive on birch trees long after leaf falls. Aphids were observed feeding on the young twigs and it appears that these provide a suitable food source, enabling egg laying to be prolonged late into the autumn. The fact that freshly laid eggs were found in the middle of January demonstrates this, although it has not been shown that these eggs were fertile. Dixon (1987) has proposed that since egg laying ends the aphid's population growth, this event should be postponed as late as possible in a season. For most species this means just before leaf fall, because the oviparae can develop and feed on the senescing leaves, which in late autumn provide a rich food supply (Dixon, 1985). In the case of the birch aphid it appears that the change to sexual morphs could

take place later in the season than most other aphid species. This would allow the final parthenogenetic generations the opportunity to develop on the nitrogen-rich leaves, since the oviparae are able to feed and survive on the twigs.

Fundatrices of *E. punctipennis* always hatch very early in the year. In this study they were recorded during the first week of February, and this is not unusual for Silwood Park (Gange unpublished observations). The reason for hatching so early is that the offspring of the fundatrix generation are able to feed on the exceptionally good food supply provided by the very youngest leaves. The fundatrices have to feed on the unopened buds and this means that there must be a very heavy mortality due to birds, wind and rain, as has been shown for the sycamore aphid, *Drepanosiphum platanoidis* (Schrank) which also hatches in February (Dixon 1976). In the case of the birch aphid it appears that this mortality may be offset to a certain extent by the fact that the autumnal generations may be able to postpone sexual production and that ovipara life may be long, due to twig-feeding. In addition, it appears that unless late autumn temperatures are particularly severe, this is unlikely to be a significant cause of mortality. Sexual production in aphids is generally controlled by photoperiod and affected by temperature (Dixon 1985). It would be worth determining the critical photoperiod for the birch aphid and whether this may be affected by mild autumnal weather.

The winter of 1988–89 was exceptionally mild, as shown by the fact that a normally diapausing aphid, *Macrosiphum rosae* (L.) was reported to be actively increasing in numbers on 20.i.1989 (Kirkman, 1989). Since it appears that prolonged periods of cold may seriously affect survival of the birch aphid, it may be that in a more 'normal' winter ovipararae would not be able to survive as long as has been reported here. The rapid decline in egg and ovipara numbers in late October is typical of winter mortality patterns in aphids and is a likely result of predation by anthocorid bugs, before their hibernation (Gange & Llewellyn, 1988). Other environmental factors such as wind and rain will also reduce egg and ovipara survival, and this winter was also rather dryer than usual (Silwood Park meteorological data). However, these results demonstrate that in very mild winters, the birch aphid can survive in the active form for up to 11 months of the year. The gap between the last recorded ovipara and the first fundatrix was only 16 days in this study and a more intensive sampling programme may have revealed a smaller interval still.

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INDOOR MEETINGS

9 March 1989

Exhibits

Mr A. J. Halstead showed a female specimen of *Cephalcia lariciphila* (Wachtl) (Hymenoptera: Pamphiliidae), collected at Glenelg, Invernesshire, by Prof. J. A. Owen in July 1988. This sawfly has larvae that live inside silk tubes and feed on larch foliage. It was first recorded in Britain at Alice Holt Forest, Hampshire, in 1953 and soon became a widespread pest in forestry plantations. Since the 1970s, however, its numbers have been much reduced by the ichneumonid parasitoid *Olesicampe monticola* Hedwig.

Rev. D. Agassiz showed a piece of stone bearing the cases of the psychid moth *Dahlica triquetrella* (Hübn.) found at Grays chalk quarry, Essex, on 2.iii.89. This scarce moth has previously been recorded in Kent and Westmorland, and this is believed to be the first confirmed record for south Essex.

Dr I. F. G. McLean showed a male and female of the dolichopodid fly *Syntormon miki* Strobl. They were swept from ditches and low-lying damp areas of reclaimed saltmarsh at Lower Abbey Farm, Suffolk, on 20.vii.83. *S. miki* is a scarce species which had previously been recorded on the coast in Hampshire and Cornwall, and at an inland site in Norfolk.

Mr M. Simmons brought some surplus larvae of the Glanville fritillary for distribution to members.

Announcements

The Secretary, Dr J. Muggleton, said that some of the recently distributed copies of the membership list had faulty pagination. Any members with such copies should return them to the distribution secretary for replacement.

Mr R. Softly gave details of a Congress on the Preservation of European Butterflies to be held at Wageningen, Holland, on 12–15.iv.1989.

Communications

Mr N. Hall said that on 5.iii.89 a light trap in his garden had recorded five *Orthosia* spp, *Conistra rubiginea* D. & S. and a very early 'early thorn'.

Mr G. Danahar noted that spiders, *Pardosa* sp., had been sunning themselves in north London in the previous week.

Mr S. Paston said that he had found in his house on 28.ii.89 a specimen of the tortrix moth *Cacoecimorpha pronubana* (Hübn.) which had presumably been feeding on a houseplant.

Mr P. Cook said that he had found a pupa of the speckled wood butterfly a month ago in his Devon garden. It had pupated about 1 foot above ground level on a vertical pane of glass. Mr E. Bradford had noted a similar pupa about 7 inches above ground level on the stem of male fern. Mr R. Softly remarked that a caterpillar of this

butterfly that he had raised from an egg found in Devon in late September 1988 had pupated in December.

Dr I. F. G. McLean said that the BM(NH) was disposing of some BM Bulletins and other older publications. These were available free of charge on personal application to the Entomology Department.

The President, Mrs F. M. Murphy said that Mr K. Alexander of the National Trust would welcome details of any biological records made on Trust properties.

Lecture

Mr R. Revels spoke on natural history photography techniques. He showed transparencies of a wide range of subjects and illustrated the effects of using various types of lens, filters and lighting.

13 April 1989

Exhibits

The President, Mrs F. M. Murphy showed a live male specimen of *Coelotes terrestris* (Wider). This spider of the family Agelenidae was bred from a female collected from under yew trees at Box Hill, Surrey, in July 1988. It lives under stones, where it builds a fine sheet web.

Mr C. Plant showed specimens of the weevil *Caulophilus oryzae* (Gyll.). These had been brought to the Passmore Edwards Museum recently for identification by an Environmental Health Officer, who had found them infesting a sample of grain at Ilford, Essex. Dr J. Muggleton said that he thought the correct name for Mr Plant's weevil was *Sitophilus oryzae* L. This species is very similar to *S. zeamais* Motschulsky, which infests the same range of stored grains, and the two species can only be separated by examination of the genitalia.

Mr Plant also circulated a map of the London area which showed the squares which were under recorded for the Macrolepidoptera, and invited members to submit records.

Mr R. Softly made available copies of *London Atalanta* (the newsletter of the London Natural History Society, Ecology and Entomology Section), March 1988. This contains an article by Mr Softly on some Hampstead Heath moths noted in 1987.

Membership

The names of John Ivor Robbins, Anthony Charles Warne, John Edward Wilkes and Walter Wuertz were read for the second time and they were duly elected as members.

Announcements

The Editor, Mr R. Jones announced that the next edition of the Journal would shortly be ready for distribution. He displayed copies of the colour plates for the 1987 and 1988 Annual Exhibitions, which would appear in the issue.

The President said that the Society was still trying to locate some new rooms. Mr G. Prior said that the Chalk Farm/Belsize Park/Swiss Cottage area might be suitable as it was well served by public transport.

Communications

Mr A. J. Halstead said that in the roof space of a house at Knaphill, near Woking, Surrey, he had found several empty pupal cases of the large cabbage white butterfly. The caterpillars were assumed to have crawled about 30 feet from the vegetable

garden and then about 20 feet up the wall before entering the roof space. Mr E. Bradford said that he had seen a similar occurrence with this species.

Several members reported observations relating to the earliness of the season. Mr S. Miles had noted hawthorn in flower 2 weeks previously; Mr E. Bradford had seen a swallow at Pean Hill, Kent, on 11.iv.89, and Mr D. Cuthbertson had seen an unidentified mayfly at the Barbican, London, on 9.iv.89. Mr R. Tubbs reported seeing a red admiral in fresh condition at Sidmouth, Devon, on 27.iii.89. Dr J. Muggleton said that despite the early season he was catching few moths in his trap. Mr C. Penney agreed with this but said that on 16.iii.89 he had found a smooth newt in his trap!

Lecture

Mr R. Softly spoke on a decade of observations of the Lepidoptera of Hampstead Heath. He described the work of earlier entomologists who had surveyed the Heath and compared his records with these earlier lists. He had run an actinic light at his flat just outside the Heath at Parliament Hill and also in the grounds of Kenwood House. Other recording methods included searching for moths and larvae by torchlight and breeding larvae from catkins. Mr Softly had been able to record 85% of the moths recorded at Hampstead Heath in the 19th century, including some common species which appeared to have been absent or overlooked when other surveys had been carried out earlier this century.

27 April 1989

Exhibits

Mr C. B. Ashby showed three noctuid moths recently donated to the Society's collections by Mr S. Torstenius. These were *Lamprotes c-aureum* Kn. from Skåne, S. Sweden, *Syngrapha diasema* B. from Norway, and *Abrostola asclepiadis* D. & S. from Öland, an island in the Baltic Sea.

Mr A. J. Halstead showed a live specimen of the death watch beetle, *Xestobium rufovillosum* Deg. (Coleoptera: Anobiidae). This was found in the centre of an old hollow oak at RHS Garden, Wisley, Surrey, on 26.iv.89. He also showed some specimens of the woolly vine scale, *Pulvinaria vitis* (L.) (Hemiptera: Coccidae) with its eggs masses. The host plant was a grape vine grown in a conservatory.

Announcements

The Secretary, Dr J. Muggleton, circulated a copy of the new meetings card which would shortly be distributed with the Journal. He announced that the AES exhibition will be held on Saturday, 7.x.89, and, as last year, will be at Kempton Park race course.

Communications

Mr R. Softly commented on the temperatures required for butterfly activity. He had bred a speckled wood on 23.iv.89 and it had remained immobile for 24 hours due to overcast and rainy weather. During the night of the 24.iv the temperature had fallen to 1.5°C. At 9.30 a.m. the next day the temperature had reached 6°C when there was a brief spell of pale sunshine and the butterfly flew off.

Lecture

The scheduled speaker was unable to give his talk due to a car accident. His place was taken by Mr D. Cuthbertson who spoke on British pseudoscorpions. He illustrated the various habitats in which these animals live and described their biology. Pseudoscorpions are sometimes found attached to other invertebrates and this behaviour, known as phoresy, is usually assumed to be a means of dispersal. The speaker pointed out that more information was required concerning the species of pseudoscorpion involved, their age and sex, in order to ascertain whether phoretic pseudoscorpions are really trying to reach new areas or whether they have literally got carried away while trying to bite off more than they could chew.

11 May 1989

Exhibits

Mr E. Bradford showed live specimens of two beetles found at Childs Forstal Wood, East Blean, Kent. One was the very local longhorn beetle, *Mesosa nebulosa* F. which emerged from a dead oak branch on 9.v.89. The other was the anobiid beetle *Hedobia imperialis* L., a local beetle that emerged from dead stems of *Rosa* sp. The larvae had taken at least 2 years to complete their development.

Mr A.J. Halstead showed a live specimen of the longhorn beettle, *Phymatodes alni* (L.). This local insect was swept from birch/oak/aspen on Wisley Common, Surrey, on 11.v.89.

Miss J.M. Iliffe showed some photographs of an unidentified fly taken with the electron microscope at Kew Gardens. Dr I. McLean said he thought Miss Iliffe's photographs might be of a chloropid fly.

Mr R.A. Jones showed an unidentified *Lyctus* species (Coleoptera: Lyctidae), which had emerged in February 1989 from a carved wooden 'story-board' bought in Papua New Guinea in 1987. Despite its tropical origins, the beetle was very similar to the British species *L. brunneus* (Steph.) — the powder-post beetle. He also showed the rare lacebug *Physatocheila costata* F. (Hemiptera: Tingidae), swept from a woodland ride, Scaynes Hill, near Haywards Heath, Sussex, 9.iv.89, which is rather an early date. It is associated with lichen-covered apple trees and is recorded from only a few very southern localities. The smaller, more widespread *P. dumetorum* (Herrich-Schaffer) is also associated with lichen-covered trees and was included for comparison.

Mr P. Beuk showed specimens of the stratiomyid fly, *Zabrachia tenella* (Jaennicke). This small black fly is in the subfamily Pachygasterinae and its larvae develop under the bark of dead pine, fir, larch and birch. There are few records of this fly, possibly because of its small size (2–3.5 mm) and lack of bright colours, and it is more likely to be recorded by searching for the larvae. Up until 1988 only four localities were known to the exhibitor; these were at Horrington, near Wells, Somerset, Craigmore near Nethy Bridge, Inverness-shire, Coombe Bissett, Wilts, and Blundell Sands, Lancs. In 1989 three new localities were found, all in Surrey, at Walton on the Hill, near New England and at Esher Common. The larvae were quite numerous at these places.

Announcements

The Secretary, Dr J. Muggleton, said that a programme card had been received from the Lancs and Cheshire Entomological Society, giving details of their lectures and field meetings. They had also sent a request for records of microlepidoptera in

the Lancs and Cheshire area. These can be sent c/o their secretary, Mr S.J. McWilliam, 4 Priory Close, Halton, Runcorn, WA7 1BN.

Communications

Mr E. Bradford said that the holly blue appeared to be having a good year at Blean, Kent. Several other members also reported seeing this butterfly.

Mr R.A. Jones said he had seen a butterfly at Corfe, Dorset, the previous weekend which he believed had been a wall brown.

Rev. D. Agassiz said that the site for the cochylid moth *Agapeta williana* (Brahm) at Grays, Essex, was soon to be redeveloped, so anyone wanting specimens should take the opportunity while it lasted.

Dr Chatwyn said that the army had large tracts of countryside used for training areas. Some of these were of considerable botanical and animal interest and there were about 200 local groups actively involved in recording work. Some insect orders, especially the Diptera, were under-recorded and anyone interested in doing recording work on MOD land should contact the Conservation Officer for permission

Lecture

Dr K.N. Chatwyn gave an account of his investigations into Japanese encephalitis, a widespread disease in the Far East which reached Nepal in the 1970s. It causes swelling of the brain, resulting in most cases in permanent brain damage or death. Children are especially vulnerable and this can have serious social consequences in countries like Nepal where most old people are wholly dependent on the younger members of their family. Japanese encephalitis is a zooenotic disease which in most countries causes a mild disease in pigs, from which it is spread to humans by mosquitoes. In Nepal, however, although pigs are common domestic animals and suitable mosquito vectors are present, the usual disease transmission pattern does not seem to occur. Testing of pigs and many other domestic and wild animals has so far failed to find the non-human carrier of the disease. This gap in the knowledge of how the disease is being transmitted is a great handicap in devising a programme for reducing the incidence of infection.

25 May 1989

The Secretary, Dr J. Muggleton, in the chair under the provisions of Bye-law 14(b).

Exhibits

Mr R.A. Softly exhibited a large blister mine in oak leaves which had been collected on Hampstead Heath 2 days earlier. It was remarkable for its size, and although appeared to be empty, Mr P. Chandler observed that he could see several larvae inside the mine.

Communications

Mr R. Dyke reported that both the holly blue and the wall butterfly were having a very good year in the London area.

Lecture

The six members present heard an enthusiastic account by Mrs I. Palmer on the

subject of corticolous fungi and myxomycetes. Illustrations of many, often very small, fungi found on dead wood were shown to illustrate the diversity of fungal forms in this habitat. The speaker stressed that rotting wood was as important for fungi as it was for insects, and that many fungi have relationships with insects. The biology of the myxomycetes was then discussed; these strange organisms have animal-like motile plasmodia which give rise to plant-like fruiting bodies which may be only 2–3 mm tall. The speaker said that if a piece of bark was taken home, moistened and left in a closed petri dish there was a very good chance that myxomycetes would develop on it, and this was, in fact, the best way of observing them. The lecture was illustrated by excellent slides which had been taken using natural light and long exposures.

8 June 1989

Exhibits

Mr R.A. Jones showed on behalf of Mr D. Moore a specimen of the 7-spot ladybird, *Coccinella septempunctata* L. taken 8.vi.89 at Frogmore gravel pits, Park Street, near St Albans, Herts. The elytra were extensively 'stained' or damaged on emergence but the beetle was quite active and was found *in cop*.

Mr R.D. Hawkins showed a specimen of *Argogorytes mystaceus* (L.) (Hymenoptera: Sphecidae) taken at Coulsdon, Surrey, on 20.v.89. It was taken on the flower of a fly orchid, of which this species of solitary wasp is known to be the pollinator. The wasp had two pollen sacs stuck to its face.

Mr A.J. Halstead showed a male and female of the sexually dimorphic sawfly *Strongylogaster xanthocera* Stephens. It is a widespread species whose larvae feed on bracken and other ferns. It was collected on 21.v.89 at Pamber Forest, Hants.

Mrs F.M. Murphy showed some live spiders collected during May 1989 in Corsica. These were *Philaeus chrysops* (Poda) of the family Salticidae, a *Heriaeus* sp. of the family Thomisidae, a *Nomisia* sp, which is an ant-eating spider of the Gnaphosidae family, and a *Zoropsis* sp. of the Zoropsidae family.

Announcements

The President confirmed recent press reports that the late Duke of Newcastle, E.C. Pelham-Clinton, had left the Society £100,000 in his will.

Communications

Prof. J.A. Owen said that the holly blue butterfly had been more abundant in his Epsom, Surrey, garden than in any previous year he could remember. He had noted a female laying eggs on the flowers of *Pyracantha*. Mr Simmons said this species had a habit of laying eggs in odd places. He had observed eggs being laid on broom flowers but the larvae that hatched failed to develop. Mr R.D. Hawkins said that a letter on the holly blue had appeared in a Reigate local paper and in the two following weekly editions there had been a full page of correspondence on the butterfly.

Dr. J. Muggleton said that he had taken a lesser yellow underwing moth at light in his garden at the end of May, which is about 6 weeks earlier than usual.

Lecture

Dr A. Wright gave a talk on sawflies in which he outlined the characteristics of the British families. He described the biology of the adults and larvae, and suggested

methods of collecting, mounting and storing specimens. British sawflies have not been extensively collected or studied and there are many gaps in our knowledge of the approximately 500 species so far recorded. This is particularly true of the larval stages and their host plants. A sawfly study group has been established to exchange information through a newsletter and it is hoped to launch a recording scheme with a Biological Records Centre card within the next 12 months. The speaker has written an Aidgap key to the sawfly genera which is currently at the test stage. When this is published in its final version it should make the sawflies accessible to a wider group of entomologists and help to popularize sawflies.

22 June 1989

The vice president, Dr I.F.G. McLean, in the chair.

Exhibits

Mr A.J. Halstead exhibited some flower buds of the day lily (*Hemerocallis*) which had been galled by larvae of the gall midge *Contarinia quinquenotata* (Loew) (Diptera: Cecidomyiidae). Affected buds are greatly enlarged and contain swollen petals which fail to open from the bud. This species, which is new to Britain, is also found in Austria (type locality), Sweden, Poland, Czechoslovakia, East and West Germany, Hungary, Yugoslavia and Holland. The specimens came from the RHS Garden, Wisley, Surrey and the fly is also known to occur in Weybridge, Surrey.

Dr I.F.G. McLean showed a male *Rhagio tringarius* (L.) (Diptera: Rhagionidae) that he had reared from a pupa found in May 1989 in soil in his garden at Brampton, Cambs.

Membership

The names of David Maurice Clifford Jones, Mark Robert Thomas Ashman, Sean Phillip Clancey and S. Button were read for the second time and they were elected as members.

Communications

Mr R.A. Jones said that he had examined under a microscope the ladybird exhibited at the previous meeting. There was no actual damage to the elytra and the discoloration appeared to be due to fluid trapped within the wing cases. He also reported that he had received a moderately painful bite from an anthocorid bug.

Mr M. Simmons said that he had noticed large numbers of the hoverfly *Volucella pellucens* (L.).

Mr Halstead and Mr P. Beuk gave a report on the Diptera Recording Schemes' recent week in the Bideford, Devon area.

Slide Evening

Mr Jones showed a series of slides of five beetles added to the British list after publication of Joy's *A practical handbook of British beetles*. These were the weevil *Euophryum confine* (Broun), the ladybird *Harmonia quadripunctata* (Pont.), and the colydiid beetles *Synchita separanda* (Reit.), *Cicones undata* and *Pycnomerus fuliginosus* Er.

Mr Halstead showed some slides of abnormal growth of the flowers, fruits and foliage of various garden plants.

Dr McLean showed slides on a wide range of subjects, including a series showing a chamaemyid fly, *Leucopis* sp., laying its eggs in the galls caused by the psyllid *Trichochermes walkeri* (Forster) on purging buckthorn leaves.

Mr K. Merrifield showed a selection of slides taken in recent years of insects, snails and flowers.

13 July 1989

Exhibits

Miss B. Day showed some slides of the very local dragonfly, *Brachytron pratense* (Muller) (Odonata: Aeshnidae), which she had found at Higham, Kent on 25.v.1989.

Mr A. Morris, a visitor, showed a specimen of a large gall found on *Hieracium* sp. at Bletchingley, Surrey in May 1989.

Comments on exhibits

Mr R.D. Hawkins said that he had found the dragonfly *Brachytron pratense* at Ash, Surrey.

The speaker, Mr J.P. Bowdrey, said that the galls found on *Hieracium* by Mr Morris were produced by the wasp *Aulacidea hieraci* (Bouché) (Hymenoptera: Cynipidae), and that this was an uncommon gall.

Communications

Mr R.D. Hawkins reported that, in Surrey, the large first generation of the holly blue had given rise to an even larger second generation.

Mr M.J. Simmons remarked that the wood whites that he was breeding in captivity had produced an almost complete second brood this year, instead of the partial second brood which was normal in captivity.

Lecture

Mr J.P. Bowdrey gave an illustrated talk on plant galls. He began by defining galls as abnormal plant growths that involved a proliferation of cells. He said that there were more than 2000 species of plant gall-forming organisms in Britain, and that the British Plant Gall Society was preparing a check list of these organisms. He then went on to summarize the different types of gall-forming organism, and emphasized that not all were invertebrates. Thus bacteria produce root nodules on some plants and even plants themselves may produce galls on other plants; for example the proliferation of cells produced at the point of attachment of mistletoe to its host. The eriophyid mites produce galls which range from the nail gall on lime trees to the witches broom gall on crack willow which can be 6–7 inches. Other groups with gall-forming members include the psyllids, aphids, Diptera and Hymenoptera. Among the Hymenoptera the cynipid wasps were interesting as many species have two generations each producing a different type of gall on a different host plant. The talk was illustrated by slides showing some of the many different types of gall produced by each group of organisms.

27 July 1989

The President, Mrs F.M. Murphy announced the death of Mr A. Gould.

Exhibits

Mr A.J. Halstead exhibited a pale yellow spider, identified by Mrs Murphy as an immature specimen of *Misumena vatia* (Clerck). This species also occurs in a white

colour form and individuals camouflage themselves by sitting on flowers of the appropriate colour. They feed on flies, bees and other insects that visit the flowers.

Mr K. Merrifield showed a colour photograph he had taken of a leaf cutting bee on a strawberry leaf at Ruislip Manor, Middx., on 21.vii.89.

Mr C.B. Ashby showed some recent acquisitions of Scandinavian moths and gave the following account. The Society's Torstenius collection of Scandinavian Lepidoptera, begun in 1977 and now in excess of 870 species, is mainly of material from a wide variety of Swedish habitats: the pastoral lowlands and marshes of the south, the lakes and forests of the taiga, the Baltic littoral and islands, the birch zone and tundra of the far north. Of recent years our member Stig Torstenius has turned his attention increasingly to the wilderness areas of Norway, and the Society has been fortunate in receiving from him some notable additions to the collection from these further habitats. For example, this exhibit includes six paratypes of the noctuid moth *Agrotis luehri* sp. n., sent by Mr Torstenius from the Leirdalen area of the Jotunheimen mountains in northern Oppland, Norway. An account of this new species by Erik von Mentzer and Arne Moberg is published in *Entomologisk Tidskrift* 1987; **108**: 33–43, Umeå, Sweden, ISSN 0013-886X. The paratypes will be put in drawer 20.

The collection contains examples of *Lasiestra dovrensis* Wocke, a noctuid close to *Anarta* spp. (Hadeninae). Originally named from the famous Dovrefjell region of Norway, this species is known also in Sweden, flying by day on the high moorlands and mountainsides of Lapland. Two examples from Oppland, Norway, were exhibited and will be put in drawer 23. The related genera of *Lasiestra*, *Anarta*, *Sympistis* and *Anartomima* are well represented in Scandinavia, with 13 species in the collection; but of these only *Anarta myrtilli*, *A. cordigera* and *A. melanopa* are so far known in Britain.

Mr M. Henderson showed some montane beetles and bugs he had collected in May 1989 at Lake Garda, Italy. He also displayed some record cards for the carabid beetle recording scheme.

Mr P. Beuk showed three species of hoverfly taken at the Wey Navigation Canal at Send, Surrey, on 22.vii.89. These were *Pipizella varipes* (Meig.), *P. virens* (F.) and a male and female *Pipiza lugubris* (F.). The male had wings which were almost clear of the dark patch normally found in this species. Mr Beuk reported that despite the temperature being 30°C he had been able to record 30 species of hoverfly at the canal.

Membership

The names of Peter C. Forder, Ian Williams Staples and John Brimmell Steer were read for the second time and these persons were duly elected as members.

Announcements

The President announced that it would be unlikely that the Society would be able to find suitable new premises for its collections and library before the end of the year. Arrangements had been made for lecture meetings to be held at the rooms of the Royal Entomological Society.

Lecture

Mrs J. Marshall spoke on British Orthoptera and allied insects. Her talk was illustrated with slides of grasshoppers, ground hoppers, crickets, cockroaches, stick insects and earwigs, showing different colour forms and variations in wing length. She also showed some exotic species sometimes imported with bananas and other goods. Leaflets publicizing the phasmid study group and the newly formed Blattoidea culture group were displayed.

ANNOUNCEMENTS

Atlas of Gwynedd butterflies

The Gwynedd branch of the British Butterfly Conservation Society is preparing an atlas of the butterflies of Gwynedd (Anglesey, Caernarfonshire and Merioneth). We would appreciate receiving copies of butterfly records from the area. We would like the species, date and location, as precisely as possible (map reference if available is a useful addition!). Any additional observations on abundance of species in particular areas or years would of course be welcome. Although we would be pleased to receive any records, even of common species from any part of Gwynedd, we are particularly short of records from the old county of Merioneth. We know of a number of reintroduction attempts in Gwynedd and would be delighted to hear of others, whether successful or not. We will acknowledge all records used in the subsequent publication.

Records should be sent to the Secretary of the Gwynedd branch, Mrs Lynne Harrison, 19, Gwêl Eryri, Llandegfan, Anglesey, Gwynedd, LL59 5PY or the Chairman, Dr Paul Whalley, Ger y Llan, Llangeinwen, Dwyran, Anglesey, Gwynedd, LL61 6RP.

The Microlepidoptera of Kent

I am collecting material for an account of the microlepidoptera of Kent, being a continuation of my *Butterflies and moths of Kent* and should be most grateful if entomologists would kindly send me their records. On publication proper acknowledgement will be given of all help received. — J. M. Chalmers-Hunt, 1 Hardcourts Close, West Wickham, Kent BR4 9LG.

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INSTRUCTIONS TO AUTHORS

Contributions must be double-spaced with 3cm margins either side to facilitate marking up. They should be typed if possible, on one side only of A4 paper. Layout should follow that of the journal, but apart from underlining scientific names, no marks should be made to define typeface.

Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

Authors of original papers of more than one page qualify for 25 free reprints. Extra copies (prices on application) must be ordered when proofs are returned.

MEETINGS OF THE SOCIETY

are held regularly and the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 27th October 1990 at Imperial College, London SW7.

Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings.

The current Programme Card can be had on application to the Secretary at 32 Penton Road, Staines, Mdx. TW18 2LD.

SUBSCRIPTION RATES 1990

London members £11.50. Ordinary members £6.50. Juniors £3.00. Send to: Asst. Treasurer, Mar-y-Mar, Minster Drive, Minster-in-Sheppey, Kent, ME12 2NG.