THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

INDEX TO

VOLUME 31

1972

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Edited by
JOHN BOCOCK, B.Sc., F.R.E.S. (No. 294) and
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CONTRIBUTORS

SUBJECTS

COLEOPTERA

DIPTERA

LEPIDOPTERA (MOTHS: 'Micro')

LEPIDOPTERA (MOTHS: 'Macro')

(see also page 125)

PLANTS

VOL. 31

No. 294

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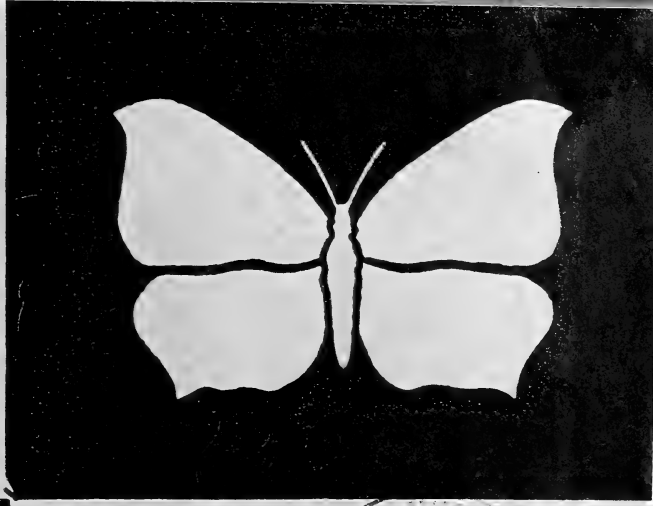
FEBRUARY 1972



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EDITED by JOHN BOCOCK, B.Sc., F.R.E.S.

AND

PAUL BOSWELL, M.B., Ch.B.

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AES BULLETIN

No. 294
FEBRUARY 1972

EDITORIAL

Following my comments in the last edition of the *Bulletin* I am pleased to announce the appointment by AES council of my successor to the post of *Bulletin* Editor. He is Dr Paul Boswell and his address will be found in "Where to Write" on the inside of the cover.

One of the most difficult tasks in editing the *Bulletin* lies in assessing members likes and dislikes. There are one or two members whose views are only too well known and whose infallible methods are the only ones acceptable to right thinking people. If I have tried in any way to influence the *Bulletin* it has been towards practical entomology and away from the pseudoscientific collecting whose results are pretty rather than useful. It is my view that if you gather together a hundred examples of any species you can find as many "varieties" as you want providing you have time to look for them. If a careful study is made of the ecological or the genetic factors affecting these variations then maybe the exercise is justified, but more often than not these collections are little more than centrepieces for big game hunting tales. I suspect there may be something of a generation gap here as most of the young entomologists in my locality are more interested in the living insect than in enlarging their collections. The setting board syndrome seems to be a feature of the older generation!

For those of you who have been wondering when there was going to be a field trip, a joint meeting has been arranged with the British Entomological and Natural History Society details of which are given in the back of the *Bulletin*.

Finally I would like to thank all those people who have assisted me over the last two years and pass on my best wishes to the new editor for an enjoyable term of office.

John Bocock (4211)

COLLECTING NOTES—FEBRUARY 1972

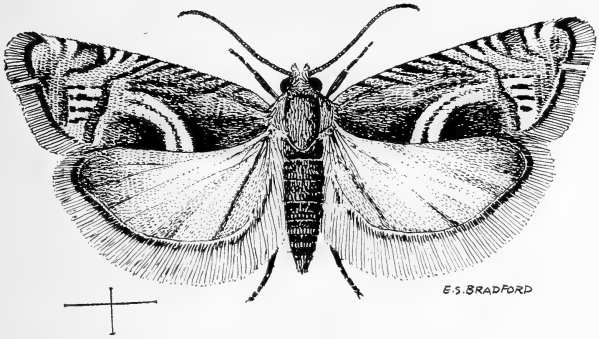
The Smaller Moths

The first of Mr E. S. Bradford's drawings is of *Grapholita jungiella* Linn. Formerly it was known as *G. perlepidana* Haw, a name that draws attention to the beauty of the moth. The ground colour is dark fuscous and yellow-ochreous; the curved dorsal blotch is white with a dark fuscous central line; the strigulae near the apex and the edges of the ocellus are leaden metallic, while the terminal cilia are golden metallic. The hindwings of the male are white with the apex fuscous; in the female they are fuscous all over. This attractive little moth may sometimes be found in late April and early May flying in numbers on downs and on the outskirts of woods where vetches grow. The larvae feed during the summer in the pods of several species of *Lathyrus* and *Vicia*.

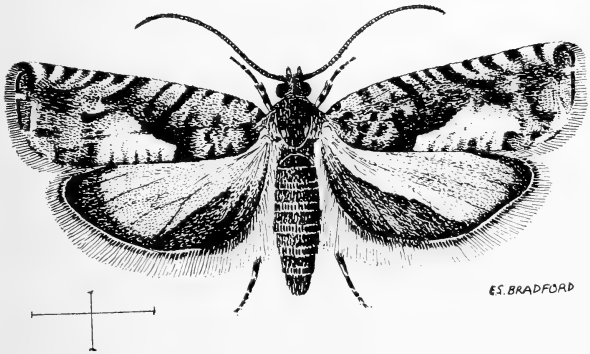
The second drawing is of *Pammene argyrana* Hübn. The forewings are fuscous with black and white markings. As in the previous species, the streaks near the apex and the edges of the ocellus are leaden metallic. The hindwings are dark fuscous with the central areas whitish, more largely so in the male. This is a common species in oak woods throughout the British Isles except, possibly, the north of Scotland. The moths are to be found in April and May resting in the crevices in the bark of oak trees, not infrequently *in copula*. The larva feeds during the summer in oak galls and is supposed to be easy to obtain; I have looked but never found it.

The third drawing shows *Phyllonorycter* (*Lithocolletis*) *trifasciella* Haw. I have written about this species once before (February 1968) but then I did not have the benefit of Mr Bradford's drawing. This species is trivoltine, so it has to be quick off the mark in spring. The larva makes inflated blotches on the underside of the leaves of Honeysuckle (*Lonicera*), and the mines may be found from late March onwards. The mined leaves are quite easy to see, as they turn purplish and develop a twist. The imago is reddish ochreous and the three white fasciae, which give it its name, are inwardly darkened with blackish scales. The moth is common with a distribution similar to that of the preceding species.

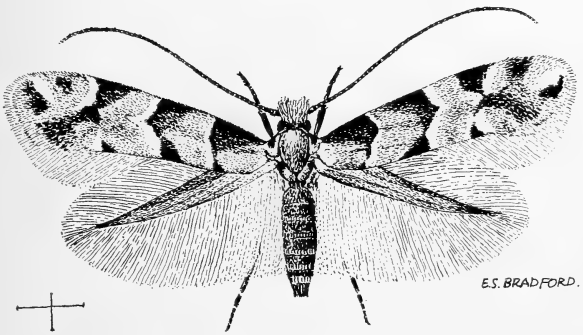
In general, the microlepidopterist goes on working longer in the autumn than his comrades who concern themselves only with the larger moths, but he tends to find himself unemployed in the spring, when the macro men are out sallowing or searching at night for post-hiberation larvae. Most micro larvae are inactive at this season, for, if they are seed or stem feeders, they have completed their growth in the autumn, and if they are leaf spinners or leafminers they are awaiting the new growth. The *Elachistidae* however, offer plenty of scope to the field-worker who is anxious to get started. I devoted my February notes to some of the species two years ago, and now I propose to continue the story. May I remind the reader that the larvae mine grasses and sedges.



Grapholita jungiella Linn.



Pammene argyrana Hübn.



Phyllonorycter (*Lithocolletis*) *trifasciella* Haw.

My earliest sortie for *Elachista* larvae in 1970 was on the 19th of February, when I searched a downland bank on the Surrey-Kent border where there were plenty of hawthorn bushes giving overhead shelter. Larvae of *E. rufocinerea* Haw., *E. albifrontella* Clerck were plentiful, but of greater interest were the mines of *E. unifasciella* Dup. feeding in leaves of *Dactylis glomerata*. (This is the species described by Meyrick under the name *gangabella* Zell., but the true *gangabella* is the one he called *taeniolella* Stt. We need not be surprised at our older entomological writers getting into a muddle over the identity of these very similar species; what is surprising is the narrow-minded hostility shown by some people to the professional entomologists who sort out our troubles for us.) Most *Elachistas* make a flat mine, distended only by the girth of the larva inside, but *unifasciella's* mine is different. The larva lines the interior with silk causing the walls to contract and pucker, so the mine resembles those made by species of *Phyllonorycter*—a name, incidentally, which is descriptive of this character. The larvae of *unifasciella* go on feeding throughout March and I collected some more during that month. My moths emerged from the 27th of April to the 24th of May, earlier than they would have done in the wild.

On the same day I found larvae of *E. atricomella* Stt. and *E. luticomella* Zell., also in *Dactylis*. The larvae of both species make very long, narrow mines working downwards and disappearing into the sheath embracing the stem—not the stem itself, as is suggested by our text books. Having progressed as far as is practicable, the larva comes out and starts a fresh mine near the tip of another blade of grass. The two mines are virtually indistinguishable, and though it has been said that *luticomella* prefers the edge and *atricomella* the centre of the blade, I do not think one can rely on this point of distinction. Of more value is the colour of the larva, *atricomella* being pale yellow while *luticomella* is more of a citron yellow. The best way to rear these species is to pull up and pot the grasses on which they are feeding.

Several species of *Elachista* mine the wood rushes *Luzula pilosa* Linn. and *L. sylvatica* Huds. I have found the reddish larvae of *E. trapeziella* Stt. in the leaves of both species at the end of March. They make a flat mine, sometimes reversing the direction of progress. They seem easy to rear but, in my experience, are heavily parasitised. At the same time the inflated *Phyllonorycter*-type mines of *E. magnificella* Tengst. are to be found, but my advice is to leave them, if possible, for another month, since the larva is a particularly slow feeder. I have also found a whitish larva in a flat mine in *Luzula*; I have not yet reared the imago, but it is probably *E. gleichenella* Fab. It is easier to rear these species in *L. pilosa* than in *L. sylvatica* since the latter is too large a plant to be potted up conveniently.

A. M. Emmet (1379)

SO YOU WANT TO STUDY BEETLES—PART 111

Beetles Associated with Wood

A great many beetles breed in dead timber in its various stages of disintegration. A few attack living timber and lead to the death of the timber, the most serious in this country being *Scolytus multistriatus* which causes the Dutch Elm disease, now a very serious threat to the elms in this country, by spreading the fungus causing the disease. Fortunately most beetles which attack the dead timber in the British Isles can be considered harmless, a few constitute a nuisance and still less can at times be a problem. *Hylotrupes badelus* L. has caused trouble in Surrey by attacking the timbers of roofing but whether the timber was infested before or after being placed in the roof cannot be known for certain. The Weevil, *Hylobius abietis* L., can be a problem in forestry and from time to time *Xestorium rufivillosum* D.G., the Death Watch beetle, ravages very old buildings while the various pin-hole borers furniture beetles and related species can cause considerable damage. Almost every sub-order of beetles has some species which attack timber, except the Water beetles and the *Geodephaga*. Although many *Brachyelytra* are associated with wood, I cannot recall one that is known to feed in timber; they seem mostly to be parasitic upon other insects inhabiting the same environment.

Although the principles of the techniques used in breeding these beetles are the same, the habits of the larvae, the actual site of breeding and the precise environment required, together with the desire to be able to observe the larval and pupal behaviour, dictates the kind of breeding vessel to be used. In the present notes I shall discuss my own personal experience and possible extrapolations from it. Any other methods and experience gleaned from the literature will be contained in a future series of articles dealing probably with the life cycles of individual beetles.

Though the techniques used are in many cases similar and the larvae of various sub-orders are often found in very similar conditions and in fact require similar environments, there are a number of differences and it is convenient to deal with the beetles sub-order by sub-order and I shall divide the wood-feeding larvae as follows: —

A. *Longicornia.*
B. *Rhyncophora.*
C. *Lamellicornia.*
D. *Teredilia.*
E. *Sternoxia.*
F. *Heteromera.*
G. *Clavicornia.*

A—*LONGICORNIA* (*Cerambycidae*)

The *Longicornia* which are often referred to as Timber beetles are perhaps the most attractive of all beetles, and their life histories are probably better known than those of many other Coleoptera. For the most part they are large, attractive and often highly coloured beetles. The adults frequent flower heads and are thus amongst those beetles most likely to be found by the beginner. The larvae when full grown are large, fleshy and firm and the segments are well marked. The head is flattened and possesses strong wedge-like mandibles. In colour they vary from clear white to brownish yellow depending on the age and species. According to the species the beetles develop in wood of various kinds and conditions; some in twigs, osiers or even plant stems whilst others are found under bark or deep in the heart of dead trees. In some cases it is difficult to be sure whether the tissue has started to decay(die) before it is attacked or whether the attack by the larvae has led to the death of the wood.

The beetle lays its eggs under the bark of the tree and the larva on hatching starts to feed under the bark but may later transfer to the heartwood of the tree. The first generation of beetles may develop completely under the bark but later generations may still infest the same tree penetrating further and further into the heartwood as the general breakdown of the timber proceeds. A few species prefer the roots. Some species are specific to one botanical species but most show more widespread tastes. Duffy is of the opinion that conditions of the wood (viz. moisture, content, decay, etc.) rather than species of tree is more important, a view with which I agree. Most species in this family of beetles require two or three years to complete their metamorphoses but a few species complete their life history in a shorter time. Nearly all larvae found are large and nearing the end of the larval stage and these are usually quite easy to rear. Smaller ones are usually overlooked as on removal of the bark they may fall to the ground and are lost. I do not know at the moment of any cases where the larvae have been successfully reared from the egg.

It is well worth making careful notes of all behaviour and conditions under which larvae and pupae are found. When pupating, some larvae build an eliptical cell with walls of fibrous wood under the bark. Others, although passing the whole of their larval life under the bark, when pupating will tunnel 3-9 cms. into the wood and then tunnel upwards or downwards 3-4 cms. before making a cell in which to pupate. Wood pulp from the cell is often used to block the tunnel leading to it. Pupae which are often found on searching under bark can readily be bred out by placing them in a glass specimen tube only slightly wider than the pupa, with the pupal head facing the mouth of the tube. The tube should have a cork stopper rather than a plastic one. Great care

must be taken that the pupa is kept in a cool place as any sweating by the pupa nearly always leads to fungal growth and death of the pupa.

I have bred nearly full grown larvae by the following three methods: —

1. Take a large log of the correct wood, drill a hole of the right size at the interface of the bark-wood and insert the larva, corking at the end. The log is placed out of doors and covered with gauze. At the appropriate time the bark is removed from the log and the mature beetles extracted.

2. Larvae feeding in older wood can be bred in a similar manner except that in order to insert larvae into the holes drilled in the wood, the larva must first be placed in a narrow glass specimen tube with the head facing the top. The tube should be only slightly longer than the larva. Drill out the hole in the timber for a short distance to take the tube. Insert the *mouth* of the tube firmly into the hole and tape it in position. This enables the larva successfully to work its way into the wood. The whole piece of timber is then sealed into a polythene bag. This seems to prevent loss of moisture and to keep the wood in the right condition of humidity. One or two crystals of Thymol should be placed in the bag to prevent the growth of moulds.

3. For those larvae which feed at the cambium/bark interface, the following method is very successful. Take a plastic cigarette container, one approximately 12cm. long by 7.5cm. wide by 2cm. deep (internally) does very well but the precise dimensions are not important except possibly the depth which should not exceed 2cm. Place as many pieces of bark outer side upward in the container and pack as much of the loose powdery wood, that is usually found under the bark, as possible into the remaining spaces, leaving only one or two small depressions in which to place the larvae; one in each. Two or three nearly adult larvae can readily complete their feeding and pupate under such conditions. Larvae tend to make tunnels along the bottom of the container and to prepare their pupal cells in the same position. They can readily be viewed by turning the container upside down or by placing it on a raised sheet of glass and viewing it by means of a mirror. The pupal cells are often invaded by fungal growth but this can be avoided by placing a couple of crystals of Thymol on the bottom of the container before filling it.

The following paragraphs contain a few notes on *Longicornia* which I have succeeded in breeding.

Aromia moschata L. (Musk Beetle). This green beetle, which sometimes has a coppery sheen and may be bright blue, is one of the most attractive of the British Beetles. It feeds in Willow or Sallow (*Salix* spp.) in the xylem. It may eventually kill the Sallow. The presence of this beetle is betrayed by the sawdust which is ejected in late May or

early June when the larva is making its pupal chamber. I have bred out the beetle by cutting the infested timber in June and enclosing it in a sealed polythene bag. It may be possible to observe the larval behaviour as follows. Cut the infested branch off as far as possible below the infested portion. Cut a hole in the correct place and extract the larva. Shave off one side of the branch (down the whole length) until about one eighth to one quarter of the circumference of the larvel tunnel has been removed (but not more).

Reinsert the larva and cover the side of the tunnel with loose polythene sheet (thus making a window). The branch is then placed in water which should be changed as necessary. If the branch roots it may be planted in a suitable flower pot. The polythene window should be covered with black paper or black polythene except when making observations.

Asemum striatum L. These I have bred by method No. 3 above.

Criocephalus rusticus L. These large brown beetles are found in pine stumps. They are very closely related to *C. polonicus* Mots. and both are found in the cambium of dead pine but as the stumps rot so they go deeper and deeper into the wood. I have successfully bred them using Method No. 3 above.

Anaglyptus mysticus L. I have always found this larva in dead Hawthorn (Crataegus spp.) branches and have managed to rear it using method 3 with Hawthorn bark.

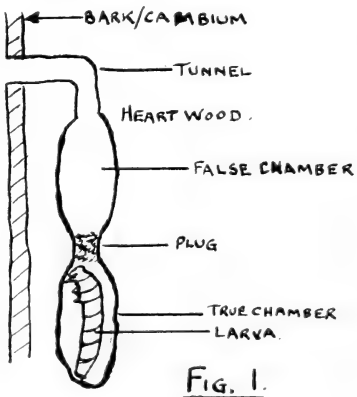


FIG. 1.

Phytomodes variabile L. Although I have not found the larva I have found the mature beetle in the pupal cell. The pupal cell is somewhat unique and is worth describing (see fig. 1). The larva lives under the bark of Oaks; when it is ready to pupate it bores about 1 to 3cms. into the heart wood and then vertically downward. The vertical tunnel is divided into two chambers, an upper or false pupal chamber and the lower one which is the proper chamber. Material chewed out to enlarge

the lower chamber is used to plug the very short tunnel between the two chambers.

Rhagium mordax De G. One of the commonest of British beetles. Larvae, pupae and adults can all be found under Oak, Beech and Birch bark. I have reared this beetle from half grown larvae by all three methods.

Rhagium indigator Gyll. This beetle is found in all stages under bark of dead Pine in Scotland. I have bred it successfully from half grown larvae by method No. 3.

Rhagium bifasciatum. Quite common in very old dead Pine wood in most parts of the country. It is not difficult to rear.

Acanthocinus aedilis L. Found mainly in Scotland under Pine and Spruce bark. Pupation occurs in cells made on the cambium under the bark. I have reared it from nearly full grown larvae by method No. 3.

Saperda scalaris L. I reared a number of half grown larvae of this beautiful beetle using the method No. 1 using Oak bark. I was unaware of the use of thymol at the time but this species seems to be able to withstand any amount of fungal growth.

Leptura (*Strangalia*) *quadrifasciata* L. This beetle, which is more often found on flowerheads, has a larva which feeds deep in the old dead Birch, after the bark has fallen off but before the wood has rotted. The tunnels and wood close round them seem fairly moist but the main body of the wood can be very dry. I have bred this beetle by the second method from quite small larvae.

Leptura scutellata L. This beetle breeds deep in old logs of Beech or Hornbeam; the tunnels seem to be made in the hardest and driest part of the wood; they seem very susceptible to fungal attack.

Nearly all the breeding I have described has been from fairly large larvae. If it is desired to breed from very small larvae or eggs, I suggest the larvae be started in $\frac{1}{16}$ inch veneers of the correct wood sandwiched between two thin plates of glass (cleaned old photographic plates are very good). The correct humidity conditions can probably be obtained by making the sandwiches of the right area and keeping them in a sealed container of a known humidity. Known humidities in sealed chambers can readily be obtained by having in them a vessel containing a saturated solution of the correct salt. Some experimental work would be needed to obtain exactly the correct conditions. As the larva grows it will need to be transferred to thicker veneers. Do not forget a few crystals of thymol to prevent mould growth. Many of our Longicornia are rare and may only be found once in a lifetime so one should always be prepared to breed them.

(To be continued). B. J. MacNulty (4528).

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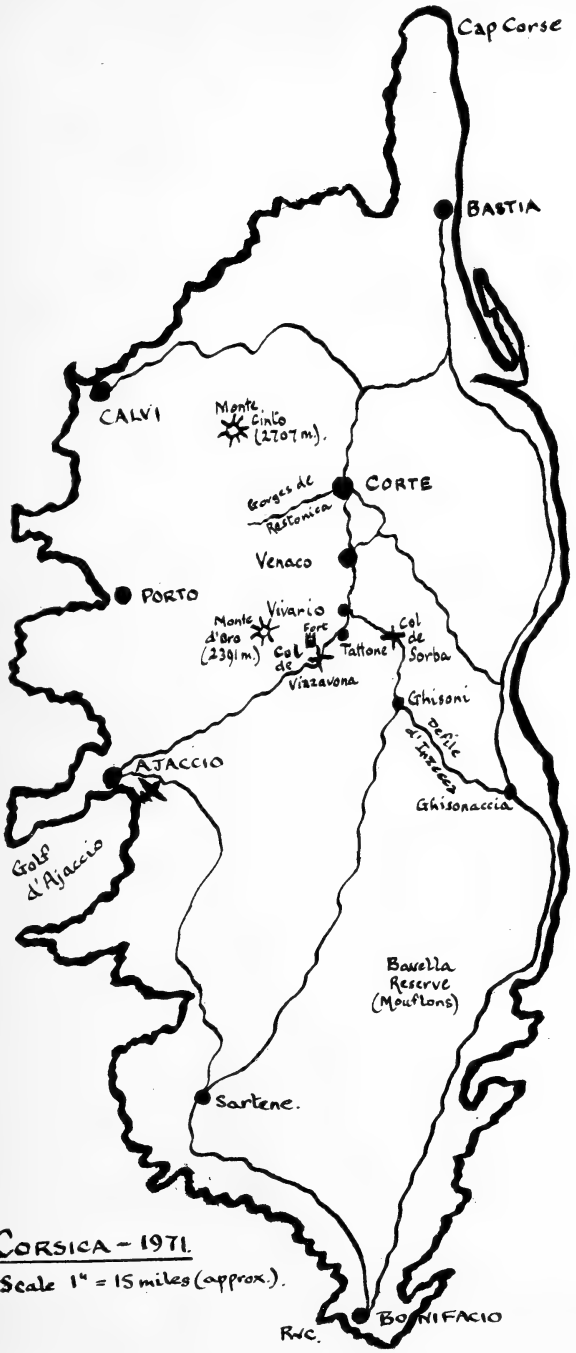
AN EXPEDITION TO CORSICA 1971

Because of the distance of Corsica and Sardinia from the mainlands of France and Italy and the fact that the separation is very ancient, the islands contain insects which are either unique specifically or are of distinct sub-specific status. Many species which have a wide range on the Continent are absent from the islands or are replaced by a similar species so that while the insect fauna is limited in its range it has many exciting rewards for the entomologist. R. F. Bretherton and Dr. C. G. M. de Worms visited the island of Corsica in 1962 at the end of July and the beginning of August and W. L. Coleridge had made a visit in 1965 at the beginning of July. A report of the formers' findings was published in the Entomologist's Record (Vol. 75 pp 93-104 (1963)) and they took most of the endemic species of butterfly. Coleridge had been less fortunate and had been much too early for the greater number of them. He invited me to accompany him on a further trip in the middle of July this year in order to capture those species which he had missed.

The quicket way to to reach Corsica today is by air and we flew from Heathrow in a "BAC 111" on the morning of July 10th to Paris where we transferred to an Air France "Caravelle" and flew on to Marseille and thence to Ajaccio. The air strip there is right on the sea front and one appears to be landing in the sea. At 7 p.m. after collecting our baggage (mine had been very roughly handled and damaged), we hired a Renault 8 car from the Hertz agent and drove off into the darkening mountains. We had booked accommodation at the same hotel that Coleridge had visited previously. The Grand Hotel de la Foret, which lies in the Forest of Vizzavona, just over the Col de Vizzavona almost in the centre of the island at some 36 miles from Ajaccio. After driving along a fairly straight and level road we left the narrow coastal plain and climbed in tortuous bends up into the mountains. The road was well made and fairly wide so that we made good time and arrived in the dark at the Hotel. A single track railway crosses the island from Bastia in the north east to Ajaccio and the hotel stood just above the railway where it enters the mountain tunnel below the high peak of Monte del Oro. This peak stood high above the hotel—a great bare craggy mass with snow still lying around the top. A cascade fell down the slopes to disappear into the woods which blanketed the lower slopes. The forest is a mixture of Corsican Pine and Beech, the latter growing tall and slim quite unlike our own Beeches. In the clearings grow Bracken, Elder (*Sambucus* spp.), Clematis and Bramble (*Rubus* spp.). The Bramble was of two distinct species, one in full flower with pure white blossoms, and the other just breaking its buds which were pink and white. It was in these clearings, the largest of which was the railway track itself, that we hoped to find the butterflies.


Cap Corse
BASTIA
CALVI
Monte Cinto (2707 m).
Gorges de Restonica
CORTE
Venaco
PORTO
Vivario
Monte d'Oro (2391 m.)
Col de Vizzavona
Foce
Tattone
Col de Sorba
Ghisoni
Defile de Tavera
AJACCIO
Ghisonaccia
Golf d'Ajaccio
Bavella Reserve (Mouflons)
Sartene.
CORSICA – 1971.
Scale 1" = 15 miles (approx.).
BONIFACIO
RVC.

Our hotel accommodation was a shared room with bath and toilet which at demi-pension rates cost 50F. each a day or nearly £4. Despite the 'Grand' in the name, the hotel was only mediocre—the bandits appear to have moved down from the hills to keep hotels. The next morning gave us our first taste of the blazing sunshine that we were to enjoy for most of our stay. We had coffee and toast on the verandah around which grew several lime trees in full flower. A man was gathering the blossom for making a tisane while bees buzzed happily all around him. Our first venture was to walk down below the hotel to the one-building station at the mouth of the tunnel and then along the railway track. Although it was not yet ten o'clock there were many species of butterfly on the move. Both *Pieris rapae* Linn. and *P. brassicae* Linn. were abundant and among them were a few specimens of *Pieris dubiosa* Rober., the Island's equivalent of *P. napi* Linn. This butterfly is generally larger than *napi* and while the male is very like that species the female is very faintly marked on the underside and rather like *P. rapae*. Two species of Small Heaths were present, *Coenonympha pamphilus lyllus* Esp., (the heat form of *pamphilus*) and the island species *C. corinna* Hbn. which is ginger brown with black borders to the wings. This species we found in most mountainous spots on the island that we visited—it flies faster than *pamphilus*—a fact which seems true of most of the island's butterflies. The winds caused by thermal currents probably require that the mountain species are strong on the wing. Another Satyr was the Wall Brown, *Lassiomata tigelius* Bonelli, similar to our own species *megera* in habits and given only sub-specific status by some authors. These were settling along the railway track where we were also able to gather ripe wild strawberries. The Lycaenids were represented by the island race of *Polyommatus icarus* Linn., ssp. *flavocinctata* R.B. The males are large but similar to the typical form but the females lack any blue markings other than around the lunules of the lower wings and the orange spots are large. They look very like *Aricia cramera* Esch. which were flying with them. This latter species is referred to as *Aricia agestis callida Vty.* by Bretherton and de Worms but I fail to see any difference between it and the *A. cramera* which we had taken in Spain the previous year. Another Blue was *Philotes baton* Bergstr. which were huge and nearly twice the size of those I had taken previously at Digne in the Basses Alpes.

Around some of the lime trees growing by the tunnel were several specimens of the Peacock, *Inachis io* Linn., and the Comma, *Polygonia c-album* Linn. The latter were very light in ground colour and I first mistook them for *P. egea* which does occur on the island. The Silver-washed Fritillary, *Argynnis paphia* Linn., was just beginning to emerge and we saw a few males flying over the bracken and I netted a female. The island race is referred to as ssp. *immaculata* Bell., as a large number of the males are devoid of the silver-wash markings.

However as several males seemed near typical and some had purplish streaks instead of silver and the females taken here and elsewhere had the silver markings, it would seem that the race is variable in the male and those that are without the silver should be referred to as form *immaculata*. Bretherton and de Worms refer to the form of the female *valesina* Esp. occurring but we did not see any.

Below the railway track is a rushing torrent coming from the mountain where there were several groups of scouts camping, using the pools for swimming and fishing. I attended the Mass in a small chapel sited in the forest beyond the hotel—so small that it held only the altar and a few seats. The congregation of scouts and others who appeared out of the forest sat outside the chapel on log seats or the ground—quite an ideal setting. After noon we took out the car and drove down the pass to the north through the villages of Tattone and Vivario to Venaco about ten miles distant. Near the road as it reached the crest of a mountain was a long spur jutting out, covered with Rock Rose (*Cistus* sp.) and bushy Heath (*Erica* sp.) A few Sweet Chestnuts grew near the crown and we fought our way through the waist high growth to the end of the spur. Here the thermal currents from the valley rush up on all sides and with them come the Swallowtails. The species, *Papilio hospiton* Gené., is taken in the island in the mountains and this sort of locality is probably best for capturing specimens. In the heat of the day it seems that they come up in the rising air and play around the hill crests, settling occasionally on the tall red thistles or on the bushes. We were not disappointed as several were sighted and with them the Scarce Swallowtail, *Iphiclides podalirius* Linn. We had equipped ourselves with very large nets in anticipation—the idea coming from Alan Waters on our Spanish trip in 1970. The largest size landing net (ring type) with a shortened handle and a very large bag give maximum control and coverage. Even with this aid the butterfly is extremely elusive, flying fast and always settling just out of reach. I was able to net one *I. podalirius* and two *P. hospiton*, both males. I was able to photograph the species as well using a telephoto lens.

Here we also took some fine specimens of the Meadow Brown, *Maniola jurtina emihispulla* Vty., and several Holly Blues, *L. argiolus* Linn., all of our summer form. Coleridge captured one specimen of *Hipparchia* neomiris Gdt., a Grayling marked with rich chocolate and peculiar to Corsica and Sardinia.

It had been a very hot day and we were glad to drive back to spend an evening setting at the hotel and to enjoy a cold bath. On the following morning we drove down to the village of Tattone where there is another one-building railway station and a huge new hospital on the slopes above. The meadows around were full of flowers and quite green from a damp trickle that ran down to woods beyond the

hospital. The first butterflies here were some fresh *Brintesia circe hispanica* Spuler. The beautiful Satyrids were sitting on the shady sides of the trunks of small Robinia trees out of the heat of the blazing sun—when disturbed they fluttered off only to return to the shade in a few seconds. Bath Whites, *Pontia daplidice* Linn., and Queen of Spain Fritillaries, *Issoria lathonia* Linn., were moving over the flowers everywhere and I took some specimens of the Skipper *Pyrgus armoricanus rufosatura* Vty., a sub-species peculiar to the islands. I climbed above the hospital to the rocky outcrops above. There were stunted Pines and among the boulders I disturbed some *H. neomiris* but here it was too arid for anything else. In the hospital grounds were a lot of Small Coppers, *Lycaena phlaeas* Linn., of the heat form *eleus*, some being almost black. Clouded Yellows *Colias crocea* Geoff., were moving through the mountains throughout our stay in the island, all fresh and with a few of the female form *helice*. After midday we walked back along the railway track to the hotel. There were butterflies all along the way, most seeking the shady areas in the heat of the sun. Wood Whites, *Leptidea sinapis* Linn., were everywhere, the size being much larger than our British race with the females mostly devoid of black markings. There were also a few Speckled Woods, *Pararge aegeria sardoa* Vty., which Verity considered to be a separate race although I could see no difference from those of the mainland.

On the following day we drove back over the Col towards Ajaccio, stopping to climb up to an ancient Genoese fort overlooking the Col. These forts, built by the Genoese when they owned the island, stretch across the island forming a signalling chain which enabled a warning to be sent from Ajaccio to Bastia in an hour. On the slopes among a dwarf gorse were large numbers of *Plebejus argus corsica* Bellier. The sub-species has a very distinct underside with the markings smudged with scaling making them look smokey. The female uppersides are suffused at the base of the wings with blue scales. There was a small farm on the slope with sheep pens in stone and along the wall grew some Stinging Nettles, *Urtica dioica* Linn., and here I found two groups of larvae of *Aglais ichnusa* Hbn. I collected these as I hoped to be able to breed them out and try pairings with *A. urticae* Linn., of which it may only be a sub-species. Unfortunately out of some three dozen larvae which eventually pupated there were only two males which emerged, the rest producing Diptera. Half way to Ajaccio we stopped to collect in a small hillside copse. It was extremely hot and again the butterflies sought the shade of the trees where large numbers of *A. cramera* were settled under the shade of the trees. Coleridge captured a specimen of *Pandoriana maja cyrnea* Schawerda, given sub-specific status on the grounds that it is smaller and has less silver markings on the underside. Those taken during our stay did not appear to differ from specimens taken at Albarracin in Spain. We spent the rest of the day in

Ajaccio where I had a swim and Coleridge tried to get a pair of shoes as the sharp stones made his own painful to wear. However it seems that all Corsicans have very small feet, no shoes being found large enough.

We decided to go to Corte the next day and drove off via Venaco beyond which we stopped to take both *A. paphia* and *P. maja* by the roadside on *Clematis vitalba* flowers. Just outside Corte we saw a field in which Fennel was growing and here were flying several *Papilio machaon* Linn., skimming about to settle occasionally on the thistles. We had forgotten that the day was the 14th July, Bastille Day, and all the shops at Corte were closed. After a drink at a small café we drove up the Gorge of Restonica which starts just below the town. A large stream runs through the wooded gorge and the road, narrow and winding, follows the stream up towards the bare slopes beyond. There seemed to be few butterflies other than Pierids about and after a somewhat hazardous drive we stopped above a deep pool where I had a swim. It had been a very hot day and we drove back early the twenty miles to the Hotel. Coleridge became very sick and I suspected heat stroke. We eventually got a young doctor from Venaco who seemed very competent, gave prompt treatment and advice at a fee of £7.50 (100F). However it was worth it as there was an immediate improvement and although it meant a day in bed and no food, Coleridge made a fairly rapid recovery. I spent the next day on my own, climbing up the slopes towards Monte d'Oro from the fort. There were massive rock falls among the Pines and among the rocks grew numbers of wild Cyclamens. I came eventually to the Cascade des Anglais where I bathed in a large pool at the foot of the cascade which was full of tadpoles. While drying in the sun I saw a few blues flying around the rocks above the pool and these turned out to be *Lycaeides idas bellieri* Obth. This subspecies is very well marked on the underside and the females have a lot of purple blue scaling on the upperside. Coleridge was able to take some soup for supper and seemed ready for the morrow.

Friday morning dawned as hot as every previous day and we decided to spend the day exploring. Near Vivario the road has a right fork which leads up to the Col de Sorba, a long winding pass crowned with giant pines.

We stopped briefly and saw a few specimens of *P. hospiton* sail by. Flying over the bracken among the trees we spotted some fritillaries flying low and at last netted one.. It proved to be another island species, *Fabriciana elisa* Gdt. The upperside is very ginger while the underside is reminiscent of the silver-spotted form of *F. niobe* Linn. The specimens were all males and had apparently just started to emerge. I also took a few *L. idas* here among the bracken. We then drove down the pass to the village of Ghisoni and into the Defile de Inzecca. This is a murderous road winding high above a gorge with sheer cliff above for much of the way. The road is narrow and with a rough surface.

The Corsican drivers do not slow down for anyone and I was glad when we at last reached the plain on the east side of the Island. Here the road ran as straight as a die to Ghisonaccia through hot and dusty fields planted with Olives, Peaches and Vines. The only butterflies seen were migrating *C. crocea* and *P. daplidice* and near the Peach groves an occasional *I. podalirius*. We drove nearly to the coast and then turned north on the road which leads to Bastia. The terrain changed to sandstone and seemed even more arid. Globe artichokes grew in small patches among fields of Vines while on the telephone wires perched single specimens of Bee-eaters and Shrikes. This area seemed too dry to support much butterfly life so we turned off back into the mountains towards Corte. The road followed the river coming down from Corte, a large river in a wooded gorge. We stopped to collect short of Corte and took many of the species which we had found at Vizzavona, *A. paphia* being very common on Bramble blossom. We took a small road across the mountains back to Venaco, a road that was in the course of reconstruction and had a bumpy ride back to the Hotel.

Saturday was to be our last day and we drove up once again to the Col de Sorba where we took a short series of *F. elisa*. There was a rocky clearing just below the Col and here I found a lot of *H. neomiris* on the rocks. They sat about on the shady sides and flew up when disturbed only to settle again fairly quickly. On the way back down the pass we stopped at a grassy ridge which lay above Tattone. This proved to be a very good area and *B. circe* and *H. neomiris* were both common with hundreds of *I. lathonia*. Coleridge disturbed a large Satyrid which turned out to be our first specimen of *Hipparchia aristaeus* Bonelli. This is like a ginger Grayling, *H. semele* Linn., and as we only found one other specimen it appeared that they were only just emerging. I netted three specimens of *A. ichnusa* settling on the pathway. It was now hotter than any previous day with a haze over the sun so we returned to the Hotel to pack in readiness for our departure on the morrow.

We rose early on the Saturday in order to make the most of this last period, settled our bill with the hotel and drove off towards Ajaccio. We came right down to the plain and stopped where some woods flanked the road. In the glades of the wood were large numbers of *A. paphia* and a few *I. podalirius*; a new species was *Pyronia tithonus* Linn., the Gatekeeper, and there were large numbers of *L. phlaeas*, *A. cramera*, *M. jurtina* and *P. icarus*. These woods needed much more attention than we had time to give them and it was a pity we had not found them sooner. We were due at the airport at 5 p.m. so drove on down to the beach near the runway where I had a last swim in the warm Mediterranean. We returned the car at the Airport to Hertz

and took off promptly at 5.55 p.m. across the sea. We flew along the coast giving us a good view of the Island and an appreciation of its mountainous nature. Over the Maritime Alps we ran into clouds and eventually came down through a terrific storm to land at Lyons. Here we collected a Fiat 850 and drove off into a rainstorm and darkening skies towards the French Alps for the second week of our holiday—but that is another story.

1.10.1971 P. W. Cribb (2270)

BOOK REVIEW

Cartographie des Invertebres Europeens, Faculté des Sciences Agronomiques de L'Etat Zoologie Genérale et Faunistique Gembloux. (Sole Agent E. W. Classey Ltd.) Edited by Jean Leclercq and Phillipe Lebrun.

We have recently had our first sample of the Provisional Atlas of Insects of the British Isles dealing with our Butterflies. (Reviewed *Bull. amat. Ent. Soc.* **30** (292): 104.)

We now have the first batch of maps covering some of the insects and Arthropods of Belgium. The general scheme for Europe will be maps divided on a basis of 50km. sided squares but in the case of smaller areas (ourselves and in this case Belgium) the division is on a 10 km. basis. The maps deal with some of the *Hymenoptera, Coleoptera, Diptera* and *Lepidoptera,* and the maps are marked to indicate records before 1940, between then and 1950 and after 1950. So far published are four lots of 100 maps in thick paper covers, the cost per hundred being £1 plus postage. The maps are very well produced and include maps showing types of terrain as well. Various experts have collaborated in the compilation and there are explanatory notes. Of particular interest are those concerning the Belgian Satyrids. A fifth volume deals with Arthropods other than insects and has 24 maps covering the *Myriapodes* (*Blaniulidae* and *Iulidae*). The price of this group is 50p plus postage. The task before the compilers of these maps is a massive one but one hopes that it will form a foundation for much more investigation and research into distribution patterns. Below are set out the subjects dealt with in each set of 100 maps. (Insects.)

1-100 Hymenoptera (Vespidae 13, Formicidae 16, Sphecidae 10, Pompilidae 20, Siricidae 4), Diptera (Rhagionidae 20, Syrphidae 4), Coleoptera (Cantharidae 12).

101-200 Hymenoptera (Tenthredinidae 16, Ichneumonidae 24, Formicidae 22, Sphecidae 12), Lepidoptera 26.

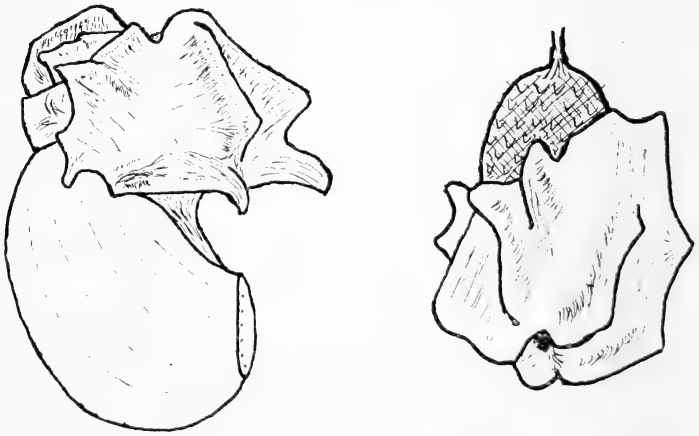
201-300 Hymenoptera (Formicidae 14, Pompilidae 26, Cimbicidae 5, Tenthredinidae 6, Pamphilidae 25), Coleoptera (Cantharidae 22).

301-400 Coleoptera (Scolytidae 76), Lepidoptera (Satyridae 24).

P.W.C.

A GALL TO WATCH OUT FOR

The sketches show galls caused by the agamic or unisexual generation of the gall-wasp *Andricus quercuscalicis* (Burgsdorff). These galls occur on the acorns of Common Oak *Quercus robur* Linn., and fall from the tree in the autumn at the same time as the healthy acorns, the adult insects leaving the gall in the spring. When still attached to the tree the gall is green and sticky, turning brown and hard when fallen. Often the growth of the gall tissue proceeds beyond the stage illustrated, and the acorn is reduced to little more than a lump at the base of the gall, which may completely enclose the acorn cup as well. There are usually from one to three galls on any one acorn, but I have found up to eleven. In such cases the galls are squashed up against each other and form a ball of intricately contorted gall tissue several inches across. If the individual galls of such a mass are carefully pulled off one by one, in the centre will be found a thin flattened disc, which is the acorn cup, and on it, surrounded by scars where the galls were attached, a tiny spike, which is the style, all that remains of the acorn. In the centre of the gall is a large chamber, at the base of which is the larval cell. The chamber has an opening at the top, but this is often blocked by the gall's growth, and the wasp generally escapes by chewing a hole through the base of the gall.



Galls caused by *Andricus quercuscalicis* (Burgsdorff).

The species is a common one on the Continent and in the Channel Isles, but very little was known about it on the British mainland till recently. It first came to my attention in 1969, when my brother found two galls on oaks in a field hedgerow at Heacham in Norfolk. Then in 1970 on an excursion of the Heacham and West Norfolk Natural

History Society to Ken Hill Woods at Snettisham, two miles away, some young children found several of the galls. When I later investigated the Snettisham site in more detail I found that one tree had some sixty per cent of its acorns galled, and they were laying on the ground at a density of about eighty per square metre. Several other trees nearby also supported a few. At this time only one other locality was known on the British mainland, at Salcey Forest near Northampton, where it was first found in 1961 (Claridge, 1962). It was at this point that I decided it would be rewarding to carry out a detailed study of the wasp, in view of its extreme rarity, and the scarcity of information about it. This spare time study has now developed into almost a full time job.

In 1970 it was found in Devon, and in early 1971 at another West Norfolk site, where scores of trees are affected. Then in the autumn of 1971, without any warning I was rapidly swamped with a flood of information, as over 40 new localities were reported. At the time of writing (December 1971) this gall has been found at forty-eight sites in southern England, and is very common in parts of Norfolk and in the Exeter region. It is recorded from the counties of Norfolk, Suffolk, Huntingdon, Northampton, Bedford, Devon and Dorset. The data accompanying these reports generally indicates that the wasp is a very new arrival. Thus it is obviously going through an explosive extension of its range in this country, as in the last century did its close relative *A. kollari* (Hartig) which causes the familiar Marble Gall, and it seems likely to continue this advance till it has colonised much of the country.

It is tempting to think that as it was first recorded in 1961 it is newly arrived from the European mainland, and having reached virgin territory it is able to establish itself rapidly. This easy explanation for the population explosion was dashed recently, when I received information indicating that it was present at one Norfolk site as long ago as the 1920's. Such a conspicuous gall could not have gone almost completely unrecorded for nearly half a century if it were not very rare until recently, and all the indications are that its present abundance is a new feature, so there are two questions now instead of one—not just "why is it spreading so rapidly now?", but also "why has it remained rare for so long and then suddenly spread in such a dramatic manner?" I suspect the reason may be that there has recently been a succession of years with the right climatic conditions for it, comparable to the present situation with Elm Disease. However proof of this must wait till I have spent several years rearing the wasp, to establish the details of the life cycle, and thus find just what weather conditions are necessary.

The gall has been found in a wide variety of situations, ranging from oak woodland to scattered hedgerow trees, or even on a single isolated tree in the centre of a town. Generally one tree has a heavy crop of galls, and several adjacent trees support just a few, while the rest of the trees in that area are completely free. This means that when searching for it, although none may be found, it cannot be concluded

absent from a locality till every single tree has been inspected. This may however just be a temporary state of affairs, as at several sites galls are so abundant that it is difficult to find a tree not affected.

The most interesting and the most confusing of my studies are on the life cycle. Most of the gall-wasps affecting oak have two alternating generations—one generation emerging from one type of gall and consisting entirely of females, which lay unfertilised eggs whose larvae cause at totally different gall, from which emerges a bisexual generation which reproduces normally and lays eggs leading to the unisexual generation again. On the Continent this is the case with *A. quercuscalicis* —the female wasps which emerge from the galls described lay their eggs on Turkey Oak *Q. cerris* Linn., producing galls on the catkins. From these comes a bisexual generation, formerly regarded as a separate species with the name *A. cerri* Beyerinck, the females of which lay their eggs in the Common Oak flowers to return to the unisexual generation and its acorn galls. However, this bisexual generation has not yet been found in this country, and many of the records for the acorn galls are from sites many miles from the nearest Turkey Oak. There is a similar situation with *A. kollari,* whose other generation (*A. circulans* Mayr) also affects the Turkey Oak—one finds the Marble Galls commonly almost anywhere, regardless of whether there is any Turkey Oak in the area. Thus it seems likely that there is a short cut in the life cycle of these wasps which enables them to bypass the sexual generation, and do away with males completely. In the hope of establishing this one way or the other, I am rearing several hundred of these galls, and will follow this up with sleeving experiments. The results I have obtained so far, though fascinating and voluminous, are utterly confusing, and I have very little as yet in the way of solid conclusions.

As this wasp is apparently still spreading, it could turn up anywhere, so I would appreciate it if members could keep an eye open for these very distinctive galls, either on the tree in late summer, or on the ground over the winter, and let me know if they come across it anywhere. Little is known about many other gall-causers (not just the gall-wasps) except that they exist, and there is vast scope here for someone with a little patience to select one or more of the lesser known galls, rear them through, and come up with much valuable and completely new information. If anyone is interested in taking up this subject, buy Arnold Darlington's book, priced at 125p when published—I cannot recommend it highly enough.

P. R. Cobb (4565)

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REARING COENONYMPHA IPHIOIDES Stdgr. (SPANISH HEATH BUTTERFLY)

Whilst collecting with Peter Cribb and Mr Coleridge at Riano, Spain on 15th July, 1970, I caught a female *C. iphioides* which readily laid ten green and shiny ova singly on grass blades in a plastic sandwich box. I wanted to try rearing this species as its life history seems to be unknown. Back in England the ova had all hatched between the 26th and 31st of July.

The new larvae were 2.5mm long with large pale green shiny heads and pale green bodies which had dark stripes running along the back. The bodies tapered slightly down towards the rear. When the larvae were disturbed they would bend their head and rear end back over towards each other until they touched and formed a 'hoop', at the same time dropping off their food plant, Annual Meadow Grass (*Poa annua*) which I had growing in a flower pot.

On the 12th September I could find only seven larvae and they were now 7mm long and still green but now with a white stripe along each side, pale stripes along the back, and very fine pale stripes running across the back. The head was still green but not shiny and having a frosted appearance.

In late September I put them down the garden to hibernate and I brought them indoors in January. I could see one about an inch from the ground on a grass stalk and still green. In February I searched the grass and found six larvae all eating well. They slowly grew until on the 14th April they were 11mm long. The whole surface including the head was now rough, and the anal points had a whitish streak terminating in a pinkish tinge at the tips. There was a distinct whitish stripe along each side of the body which joined just behind the head giving the appearance of a collar. There was also a distinct dark stripe running along the back which began just behind the collar. The underneath and legs were plain bluish green. The larvae always moved and ate slowly. Their appearance remained the same during May when they became fully grown and reached 19mm in length. On the 25th May the largest one pupated.

The pupa was pale green, the thoracic rings becoming darker towards the anal claspers where the colour was reddish brown. The back was very pale, almost white, and the wing cases darker. On the edge of the wing case, which would be the fore wing inner margin, there was a line of dark red almost black, edged on the wing case side with white. A similarly coloured line, almost broken in two, crossed the head near the eyes. These blackish lines were almost absent on the second pupa. The old larval skin remained attached.

After four weeks as a pupa the first butterfly emerged. It was a female and was smaller and much darker than its parent. I had found this also to be the case when rearing *C. arcania* Linn. under similar conditions.

Alan P. Waters (2615)

COMMON RHOPALOCERA OF JAPAN

During a visit to Japan to attend the Thirteenth World Scout Jamboree in August, 1971, I was able to observe some of the more abundant butterflies to be found in the region of the camp site. The Jamboree was held at Asagiri heights (800-1200 metres) on the foothills of Mount Fuji in the Shizuoka prefecture about sixty miles west of Tokyo. The area consists mainly of grassland and coniferous forest. All observations refer to the confines of the camp site unless otherwise stated.

Three magnificent Swallowtail species were noted. *Papilio xuthus* was the most regular of these, being sighted flying slowly over the grassland and settling frequently although only for short periods to fan their wings in the scorching sun. Although a calm and graceful flyer, it took very little noise to frighten it away. Far more erratic, and yet even more beautiful than *P. xuthus* was *Papilo paris paris.* I spotted four of these altogether, one of which I was able to follow for some minutes before losing it. Their wings are slightly irridescent and occasionally a flash of blue light shone out from the upperside of the hindwings. These seemed to prefer the shrubland to plain grass. The other papilionid was noticed outside the area of the camp, especially in the parks, and gardens of Kyoto, the former capital of Japan. Of the five specimens of *Graphium doson albidum* which I saw, two of them were flying in the shopping centre of one of Japan's busiest cities, a sight rarely seen in our country. They always flew high, at the level of the tops of buildings or around the tops of trees, but were however extremely slow and graceful.

By far the most abundant of any of the butterflies seen was a large, black satyrid. Their frequency on the camp site far exceeded that of the Meadow Brown Butterfly (*Maniola jurtina* Linn.) in this country and yet in spite of all my efforts in searching through books and asking other lepidopterists, I have not been able to identify this species. Very little literature dealing specifically with the Japanese species is available, but even in a small pocket-book which I bought in Japan, the butterfly is not featured among the numerous illustrations. It can, however, be compared to the European *Minois dryas,* which is similar in size and markings, although the forewings are more pointed at the apex. A remarkable feature of this butterfly was its ability to fly in quite adverse weather conditions. We experienced the best and the worst of Japanese weather, and apart from this insect being extremely common in burning sunshine, it was seen more than once during a forty-eight hour typhoon. This, I considered quite incredible, for owing to the large surface area of the wings, I would have thought it inevitable that the insect would have absolutely no control over its direction in such extremely high winds. The butterfly never flew higher than a few feet off the ground, and in its habits it resembled most common satyrids of this country. The only species in this family which I could positively identify was that of

Ypthima motschulskyi. Again, the flight was very slow and typical and as with the previous species, *motschulskyi* favoured open grassland, although it often ventured inquisitively into tents and stores.

Moving on to Nymphalidae, it was a pleasant experience to find a *Limenitis* species resembling *L. sibylla* in such great abundance and by no means restricted to woods. I saw at least a dozen of these and captured four. The flight was far less swift than that of *sibylla* in this country. Second in abundance to the unidentified satyrid was *Neptis hylas hylas* seen gracefully gliding from shrub to shrub, leaf to leaf, and basking with wings outstretched to enjoy the sun. One flap of the wings gave the insect enough momentum to glide several metres without further effort, and once settled, it was no problem to capture them, even without a net. One single specimen of *Vanessa indica indica* was seen sitting discreetly behind a dustbin at the entrance to one of the sub-camps. It had a striking similarity to our Red Admiral Butterfly (*Vanessa atalanta* Linn.), on the upperside, whilst on the underside, it was difficult to distinguish from the Painted Lady Butterfly (*Vanessa cardui* Linn.). Another similarity to two of our butterflies was shown in *Polygonia v-album*, which in shape and underside markings resembled our Comma Butterfly (*Polygonia c-album*) whilst the upperside was distinctly similar to the small Tortoiseshell Butterfly (*Aglais urticae* Linn.). Also related to the Comma was the magnificent *Polygonia canace canace*. I was fortunate in capturing the one specimen which I noticed quite well camouflaged on a tree trunk in Kyoto. The butterfly suddenly took flight and came towards me at a startling speed. I struck out blindly with my net and purely by chance captured the insect. It was larger than the Comma and completely different on the upperside, the brown and black being replaced by a thick blue stripe running continuously parallel to the outer margins of all four wings. The ground colour was black.

A species resembling *Pieris rapae crucivora* Linn. was found far less abundantly than the Small White Butterfly in this country, whilst *Leptidea amurensis*, which closely resembles our Wood White Butterfly (*Leucophasia sinapis* Linn.) was far more frequent than our Wood White and by no means restricted to woods. A species closely resembling *Colias croceus* var. *helice* (Clouded Yellow var.) was exceedingly common within the camp site, at least a dozen being taken. The insect frequented shrubland and open grassland and flew fast, never venturing close to crowds of people. *Eurema hecabe*, another sulphur butterfly, which was just as common as the *Colias* species, completed the pierid quartet. It flew mainly in open grassland, and very slowly.

Zizina otis otis was the only lycaenid which I was able to positively identify. It flew low and slowly over the meadows and heathland in a similar fashion to our Blues.

A *Udapses* species skipped often through the pine forests. It resembled

U. folus, but lacked the white markings on the hindwing. Commoner than this was *Pamara guttatus,* another hesperid, found also in the pine woods, resting and flying in a manner truly representative of all our native skippers.

Finally, moving away from Rhopalocera, the occurrence of an Indian moon moth (*Actias selene*), 5,000 miles away from its native country, must surely be worth a mention. I found it inside a giant store tent, calmly laying hundreds of eggs on the canvas while the typhoon battered away outside. Whether a Japanese subspecies [? *Actias selene* var. *gnoma,* Butler editor] of this exists, or whether the Indian species is distributed over such a wide range, I have yet to learn, but it seemed fascinating to see in its natural environment, a species which is reared by so many collectors in this country.

R. Harrington (4678)

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NOTES ON BREEDING THE BUFF ERMINE

On the 22nd July a female *Spilosoma lutea* (Buff Ermine) was captured in my light trap. It was placed in a pill box and laid 203 eggs. When first laid the eggs were pale green. Prior to hatching the eggs became olive green. When the eggs hatched the larvae were pale grey in colour. The larvae were fed on honeysuckle, upon which they thrived. During the day the young larvae remained on the underside of the leaf. They fed on the cuticle for the first three instars. When they started feeding they became green. It was noted that before ecdysis the larvae became pale yellow, presumably due to the emptying of the alimentary canal. They did not feed for approximately 6 hours after ecdysis. One could tell when a larva was about to change skin for it became grey, being dark grey where the segments joined. The hairs which covered the body were grey for the first two instars, light brown for the third instar and brown to dark brown with grey tips in the remaining three instars. At all times the larvae were quick in their movements, except when engaged in ecdysis. The heads of the larvae were yellow in all instars. The quantity of food the larvae ate was prodigous, especially in the later instars. I am, at the time of writing, awaiting the pupation of a number of the larvae. It is hoped that any resulting imagines barring aberrations will be released.

3.9.1971 R. M. Parsons (4795J)

A PRELIMINARY SURVEY OF THE FOOD AND FEEDING HABITS OF ADULT BUTTERFLIES

Introduction

Much has been written about the larval food of butterflies, but other than observations scattered in the periodicals little interest seems to have been taken in the type of food taken by the adult insect—or even if it takes any at all.

In studying the adult food and feeding habits of the Marbled White, in view of the possibility that it might have some effect on the butterfly's distribution, I became interested in other species, and for some years I have been compiling records of food sources visited by all the British species. Like most aspects of natural history the subject is never-ending, and the more one learns the more interesting it becomes.

The following paper, therefore, is an attempt to collate my own observations with those of others and present, if possible, the whole picture of the adult butterfly's food sources which range through flower nectar, salts, fermenting substances, sap, carrion and fungal juices, etc. My own observations have been carefully made and nothing has been recorded unless the proboscis was seen to be extended, therefore assuming the insect was feeding, or attempting to feed, and not merely resting.

I have dealt in detail with each one of the British species showing their food preferences, but for the few species I have not met with personally I have been obliged to quote the records of others in order to complete the list.

P. W. Cribb's "List of European Butterflies" has been used for the nomenclature of the British and European species and J. E. Dandy's "List of British Vascular Plants" for that of the British plants. Paul Knuth's "Handbook of Flower pollination" has been consulted for his observations on some species in Europe and for his measurements of proboscis etc. Other references are given in the Bibliography.

I am also indebted to Mr. Cribb for his kindness in supplying me with observations on several species I have not met with.

Means of Feeding

With regard to the actual taking of food the Lepidoptera can be divided into three main groups: —

(1) Those furnished with a fully functional proboscis enabling them to suck up liquid food i.e. all butterflies and a large number of moths.

(2) Those that cannot take food in the imaginal state, e.g. the *Saturniidae** (rudimentary proboscis) and the *Hepialidae* (proboscis absent).

(3) The primitive *Micropterygidae*, of which the Eriocephalids have retained functional mandibles and browse on pollen grains. (The nearly related Eriocraniids have the rudiments of a proboscis in addition to non-functional or degenerate mandibles).

As we shall see later the length of the proboscis determines to a *certain extent* the flower chosen for the extraction of nectar but this is not the only reason. It is well known that the *Sphingidae* head the list for the possession of the longest proboscides. Our European *H. convolvuli* Linn. (according to Knuth 1906) has a tongue varying in length from 65-80 mm., while those of some extra-European and tropical Sphingids are even longer—from 140-250 mm. The same author gives the length of some other species, of which a few are quoted here: namely *Vanessa atalanta* L. and *V. cardui* L. from 13-15 mm., *Pieris napi* L. 10-12 mm., *Papilio machaon* L. 18-20 mm., down to small butterflies such as *Coenonympha pamphilus* L. 7 mm., very slightly longer than the tongue of the honeybee (*Apis mellifera* L.) which is about 6 mm.

It is not necessary here to go into detail of the construction of the proboscis, as this aspect is fully dealt with in most textbooks on butterflies, but it must be remembered that the organ is not only a sucking tube but in many instances possesses sharp processes capable of piercing the delicate membranes of nectarless flowers, releasing the sweet sap. This method reaches its full development in the fruit-piercing moths (q.v.).

It is interesting to note, however, that any one state of development of the proboscis is not confined to families. Ford (1955) mentions, for instance, that some *Sphingidae* e.g. *Mimas tiliae* L. have imperfect tongues only a few mm. long, and in the *Brephidae* the proboscis is fully developed in some species of the family and in others degenerate; while in the *Ennominae* some are well developed and other rudimentary. In summary then, we get a line of development from the disappearance of functional mandibles to the appearance of a rudimentary proboscis evolving into the fully functional organ for the assimilation of liquid food—to its gradual degeneracy and final disappearance.

* Several species of this family, however, have recently been observed to be able to drink water (see Sneyd-Taylor *Ent. Rec.* **69:** 151.)

LENGTH OF PROBOSCIS AND SOURCE OF NECTAR

Flowers with exposed nectar such as *Umbelliferae* are not favoured by long-tongued insects. As the proboscis has to be fully extended to feed it is obvious that it has to be bent when the insect is in the normal settled position on such plants, in the case of say, *Inachis io* L. or *Vanessa atalanta* L. to a position almost at right-angles. This condition cannot be as favourable to the butterfly as a flower with a deeper corolla tube, where it can thrust the proboscis straight down into the nectary.

The following list shows the average proboscis lengths of some species of butterflies compared with the proboscis of the Honeybee and indicates the advantage held by most butterflies as to additional sources of nectar, i.e. flowers with deep corolla tubes, where the nectar is inaccessible to the honeybee.

It is interesting to note from this list that length of proboscis is not correlated with wingspan. It will be seen that the two "skippers" *O. venata* and *H. comma* both have longer tongues than *V. cardui* and *V. atalanta,* and that of *P. rapae* longer than *A. paphia.*

Average length of Proboscis (mm.)
According to Knuth

mm.		*mm.*	
5	*C. minimus*	13	*L. megera*
6	*Apis mellifera* (The Honeybee)		*F. adippe*
7	*C. pamphilus*		*A. paphia*
	P. icarus (male)		*V. atalanta*
	C. semiargus	14	*V. cardui*
8	P. *argus*		*A. urticae*
	M. arion		*A. flava*
	C. rubi	15	*M. aglaia* (male)
9	*C. selene*		*P. rapae*
	M. athalia		*C. crocea*
	P. icarus (female)		*H. comma*
10	*M. jurtina*	16	*P. brassicae*
	E. aethiops		*G. rhamni*
	L. coridon		*O. venata*
	L. sinapis	17	*M. aglaia* (female)
11	*I. lathonia*		*I. io*
	P. napi	18	*I. podalirius*
12	*M. galathea*	19	*P. machaon*
	E. cardamines		
	C. hyale		

Conditions for Feeding—Weather

Generally speaking butterflies will only feed in sunshine, but there are numerous exceptions and in the *Satyridae,* in particular, we have extreme examples of behaviour; *Erebia* which disappear completely when a cloud obscures the sun and *Maniola* and *Aphantopus* which will feed in dull conditions. During the poor summer of 1954 I noticed *M. jurtina* L. and *M. tithonus* L. were feeding even in light rain, the succession of sunless, rainy days evidently compelling them to do so.

The two fritillaries *Argynnis paphia* and *F. adippe* as well as *Limenitis camilla* L. usually cease feeding as soon as the sun is obscured and fly up into the lower branches of trees, to resume again as soon

as the cloud has passed. *Polygonia c-album* L. observed at bramble bloom on a day of intermittent sunshine flew from where it had been resting with spread wings on a leaf to feed immediately the sun came out, returning to rest again on the passing of another cloud. On the other hand all these species have been seen to feed in the early evening in complete shadow, but these late feedings only occur in very warm calm weather.

Sunshine however, seems essential for most of the Lycaenidae especially for *Lycaena phlaeas* L., although I have seen *Quercusia quercus* L. active after sunset but not necessarily feeding.

TIME OF DAY

Some of the woodland butterflies certainly appear to have definite times for feeding; I have observed *L. camilla* and *A. paphia* in particular and have found that these two species favour about mid-day and again in the early evening, sometimes as late as 7 p.m. G.M.T.

Heslop (1964) has dealt with the feeding habits of *Apatura iris* L. showing the sharply defined feeding times of that species.

Of course, variation in nectar flow has to be taken into consideration in relation to feeding times and there are many factors affecting this (see Part V.1.)

(To be continued.)

B. R. Stallwood (1547)

FIELD MEETINGS, 1972

The British Entomological & Natural History Society (formerly the South London Entomological Society) is this year, 1972, celebrating its centenary. This Society, nearly the oldest and certainly the largest field entomological society in Great Britain, has offered to hold two special Field Meetings for the Members of the AES as part of its centennial activities. These are intended to interest the younger members and those who would like to extend their interests beyond the Lepidoptera to other orders in entomology. One will be "An introduction to the study of Diptera in the field" led by A. Stubbs, BSc, FRES, of the Nature Conservancy, and he will be assisted by others who are like him experts in the Diptera. The other will be "An introduction to the study of Coleoptera in the field". This will be led by S. A. Williams, FRES, who is an expert on the Staphylinidae, and likewise assisted by others who are experts on Coleoptera. The meetings will be in August and September, and the dates and meeting places will be announced later in the "Wants and Exchanges List" or may be obtained from the Secretary.

G. Prior

A VISIT TO NORTH WEST SCOTLAND

The following is a report on a trip to study the butterflies and moths of North West Scotland, financed mainly by the Trustees of Hulme Hall (University of Manchester), to whom I am most grateful.

I travelled by train to the guest house in Fort William on Thursday, 22nd July. The train journey from Glasgow to Fort William is extremely beautiful, the train weaves its way in and out of breathtaking scenery.

Unfortunately the weather was rather poor for the first few days of my stay. There was little sun and some (mainly light) rain.

On Sunday my first Fort William butterflies were seen, three Green-Veined White (*Pieris napi* Linn.), which seemed to be freshly emerged.

The following day was cooler and nothing more was seen.

On Tuesday, however, the weather improved considerably. The sun shone for long periods and it was fairly warm. Three more *P. napi* and one Silver Ground Carpet (*Xanthorhoe montanata* Schiff.) were seen near Spean Bridge (about seven miles from Fort William).

The same evening I decided to inspect some rough ground near the guest house with a gas lamp. The night was almost cloudless, in fact faint glimmerings of light could still be seen above the horizon at 11.30 p.m. Only two moths flew to the sheet, one Antler Moth (*Cerapteryx graminis* Linn.) and one Light Arches (*Apamea crenata* Hufn.) However, upon inspecting clumps of flowering Common Rush (*Juncus conglomeratus* Linn.), four Common Rustics (*Apamea secalis* Linn.), four Smoky Wainscots (*Leucania impura* Hb.) and one *X. montanata* were found feeding on the flowers.

On Wednesday the weather was even better and I decided to walk over the hills immediately behind Fort William. One Small Tortoiseshell (*Aglais urticae* Linn.) was seen in the town and four Small Heaths (*Coenonympha pamphilus* Linn.) were seen on the hills. I then descended into Glen Nevis through a Forestry Commission plantation of conifers. One Green Carpet (*Colostygia pectinataria* Linn.) was seen amongst the trees. At the foot of the plantation there was a small sheltered clearing in which about twenty or thirty specimens of the Scotch Argus (*Erebia aethiops* Esp.) were flying, together with two or three *P. napi,* all of which seemed freshly emerged. I then returned along Glen Nevis, where I found a female Drinker Moth (*Philudoria potatoria* Linn.) clinging to a grass stem. (She later laid some eggs in captivity but they hatched at home, where I was unable to find any grass which they would feed upon, so unfortunately they all died.)

That evening I again ran the gas lamp in the rough ground adjacent to the guest house. The evening was quite cool and the moths were not inclined to fly. I did find about six (*L. impura* and twelve *A. secalis* feeding on the flowers of *J. conglomeratus*).

Thursday brought more sunshine so I went to Onich. The country was similar to that around Fort William, although the Forestry Commission had blasted a road through the hills, apparently within the last year. The butterflies were flying well, about twenty *P. napi,* twenty *E. aethiops,* one *A. urticae,* two Meadow Browns (*Maniola jurtina* Linn.), four speckled Woods (*Parage aegeria* Linn.) and one worn Large Heath (*Coenonympha tullia* Mull.) were seen, together with several dragonflies, which look very like butterflies when seen from the corner of the eye!

The following day I set off up Ben Nevis to see if I could find any trace of the Mountain Ringlet (*Erebia epiphron* Knoch) which was too late to see any on the wing, and searching for eggs amongst the short grass and mountain plants was a hopeless task.

On the North side of the mountain there is a perfect example of a glaciated valley. It is carpeted with Heather (*Calluna vulgaris* Linn.), Bilberry (*Vaccinium myrtillus* Linn.) and associated moorland plants. Amongst these plants were flying about twenty Twin Spot Carpets (*Colostygia didymata* Linn.) five Northern Spinach (*Lygris populata* Linn.), two Grey Mountain Carpets (*Entephria caesiata* Schiff.) and one *X. montanata.* Lower down the valley, where the heather gave way to grass, I saw several *E. aethiops* and disturbed one Square Spot Rustic (*Amathes xanthographa* Schiff.) from its hiding place.

Saturday was a very wet day.

Sunday was better, although the wind was fairly strong. I went to Roybridge where I saw two *P. napi* and six *E. aethiops* flying in the valley formed by a small salmon stream. That evening, at the guest house, two *C. graminis* and two Wormwood Pugs (*Eupithecia absinthiata* Cl.) were attracted to my bedroom light.

Monday meant changing my scene of operations to Portree. Before I left Fort William I saw seven *P. napi.* I arrived in Portree in the evening.

On Tuesday the sun was shining again so I decided to tour around Portree. I saw six *P. napi,* four *E. aethiops,* four *M. jurtina,* one *C. pamphilus,* one Magpie Moth (*Abraxas grossulariata* Linn.), one Shaded Broad Bar (*Ortholitha chenopodiata* Linn.) and one *A. urticae* (I was never able to catch *A. urticae,* they were unusually skilful at avoiding the net).

That evening I took the gas lamp along a path through fields of grass bordered by trees. Before it became pitch dark I observed six Grass Rivulets (*Perizoma albulata* Schiff.) and four Oblique Carpets (*Orthonama lignata* Hb.) flying amongst the grass stems. When darkness fell, one Gold Spangle (*Plusia bractea* Schiff.) one Flame Carpet (*Xanthorhoe designata* Hufn.) and one Dark Arches (*Apamea monoglypha Hufn*) flew to the light. Inspection of flowering *J. conglomeratus* revealed one *C. graminis* and one *A. secalis.*

Next day I went on the special bus for Dunvegan Show and walked around Denvegan Castle grounds. It was cloudy and all I saw were four *E. aethiops* and three *P. napi.*

Thursday was wet, although in the evening the rain stopped and I disturbed two *P. albulata* from some long grass.

On Friday I travelled to Harris for the day on the steamer. Unfortunately, yet again, the weather marred the day. The wind was quite strong and it was rather cool. I did see one *E. aethiops* and one *M. jurtina.*

Saturday was a glorious day. The sky was almost cloudless. I went to Broadford where there were large numbers of *P. napi* flying. Also seen were about thirty *E. aethiops,* about one third of which were rather undersized although these were flying freely with full size specimens. About twenty *C. pamphilus* were seen, as was one True Lovers Knot (*Lycophotia porphyrea* Schiff.) fluttering about the heather.

That evening I again ran the gas lamp, which attracted two *C. didymata* and three *O. lignata.* One *L. impura* was found again feeding on flowers of *J. conglomeratus.*

The following day was cold and fairly wet, although I did disturb one *O. chenopodiata* from a dry stone wall not far from Portree.

The next day (Monday) I travelled home in the train. I saw one *E. aethiops* near Mallaig, my last butterfly of the trip.

I made the following observations on any difference observed between these Scottish specimens and English specimens (where possible) of the same species.

SPECIES WHICH WERE NOT NOTICEABLY DIFFERENT

C. graminis, L. porphyrea, A. lithoxylea, X. montanata, P. bractea,

DOUBTFUL CASES

M. jurtina was slightly paler than most Stanmore specimens, but was similar to examples seen at Ivinghoe Beacon in Buckinghamshire.

A. xanthographa, A. grossulariata and *A. monoglypha* are all variable species where found, and as only one specimen of each was seen, it is rather difficult to say whether or not the 'typical' Scottish specimen is any different from its English counterpart.

C. tullia was only seen once, and was much too worn to show any distinct differences in markings.

A. urticae was never seen closely enough to see the wing markings in detail.

SPECIES WHICH EXHIBITED SOME DIFFERENCES

P. napi was generally smaller with the dark markings larger than Southern English specimens. One rather splendid female was seen which had the forewings nearly half obscured by black scales.

P. aegeria was generally darker than specimens seen on the South Downs.

C. pamphilus was perhaps slightly paler than Southern English examples.

E. aethiops. I have never seen English specimens. It is worth mentioning the small specimens which were encountered at Broadford.

P. potatoria was considerably paler than English specimens, the two small marks in the centre of the forewings were almost absent.

E. caesiata and *C. didymata* were more heavily and clearly marked than examples seen in North Yorkshire.

A. secalis was present in a wide range of forms. The dark specimens were darker than those seen in Stanmore.

L. impura had forewings slightly paler and hindwings slightly darker than Stanmore examples.

L. chenopodiata was slightly darker than English specimens.

L. populata was present in a fairly typical range although it was generally darker than those seen in England.

P. A. Cattermole (3652)

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ANNUAL EXHIBITION

The 1971 Annual Exhibition was, on paper, a success. The attendance was slighly lower than that of the previous year, but was still one of the highest ever. Those who came certainly found enough to feed their interests, and the exhibition was certainly a financial success.

But in other ways the exhibition was a disappointment. The number of dealers present was greater than any year before, and the place began to take on the atmosphere of a market. Added to this, the number of exhibits was down, and the junior exhibits were particularly disappointing in their scarcity. Owing to the illness of its organisers, we were without the usual impressive display put on by the St. Ivo School, but even with this in mind one could reasonably have expected better for the annual exhibition.

With this in view, the Council of the Society have agreed to certain changes which will be made as from next year.

Firstly, even with an exhibition hall as large as the one that we are now using, a saturation point has to be reached, and we are now

at this point. We therefore feel that in future we must be far more selective in the number of dealers that we permit to trade at the annual exhibition.

The presence of dealers at an exhibition such as ours is always a sore point. This is perhaps the only opportunity in the year for members actually to see the major dealers and their displays, and it must not be forgotten that they are one of the major attractions for the exhibition. Nevertheless, they are beginning to dominate the exhibition, and a sense of proportion must be maintained. We have also had complaints from established dealers, who depend on their sales for their livelihood, that they are subject to unfair competition from amateurs who make a few pounds on the side by rearing up stock and selling it on trade tables at the exhibition.

We intend to tackle the problem by compiling a register of approved dealers, who will be the only dealers permitted to trade at the 1972 Exhibition and those following. DEALERS WHO INTEND TO TRADE AT THE NEXT ANNUAL EXHIBITION MUST APPLY TO THE EXHIBITION SECRETARY NOW FOR INCLUSION ON THIS REGISTER.

But we also acknowledge that there is a legitimate demand for members to be able to sell off their genuine surplus stock and equipment. Facilities for this, in the form of the members' tables, have always existed; and more space will be allocated for this purpose in the future. In previous years, there has been a tendency for members to arrive early and dominate the members' tables, leaving no room for those who arrive later. In future the use of the tables will be more tightly controlled, and this difficulty should be eliminated.

In addition to cutting down on the dealers, we hope to boost up the number of exhibits, and this is dependent upon each and every member of the society. As an experiment, the next exhibition is to be given the theme of "Back Garden Entomology"—a subject to which almost every member of the society should be able to contribute.

We are especially anxious that there should be a better response from the junior members of the society in the future, and we intend awarding prizes for the best junior exhibits.

The winter months are often idle months for the entomologist: may I suggest that one of the ways of filling them would be to plan out projects for your 1972 exhibits.

One last thing on the subject of personal exhibits: there is always a psychological trick which makes people feel that the work that they have done in the last year, or the collection that they have put together, is somehow inadequate: and that, if they were audacious enough to put it on display, it would be greeted with sneering and contempt. Nothing could be further from the truth: we are glad to have any contribution to the exhibition, be it large or small. If you are coming along to the

exhibition, why not contribute to its success by bringing along something of your own to put on display?

Finally, I must thank all those who made the 1971 exhibition a success. All the exhibitors, who were not to be blamed for the way that their impressive displays were marred by sparseness. The dealers who have co-operated with our requirements so exactly. And, of course, the other members of the Council, who helped so much in the running of the exhibition, notably Peter Taylor for his sterling work on the Wants and Exchanges Table, and Peter Cribb, the retiring exhibition secretary, without whose help and advice I would have been lost.

My gratitude also goes to Mrs Hilliard and all the ladies of the catering corps, and to all the strong-arm men who helped with the furniture shifting.

Martin Hough (3354)
(Exhibition Secretary)

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological and Natural History Society announces that, as a result of applications received by 30th September, 1971, awards have been made to Miss J. M. Ruse, Department of Zoology, University of Manchester, to help her reasearch into the biology of leaf miners and their parasites on *Sorbus aucuparia* and related host plants; and to Mr. P. R. Cobb, Editor of the Proceedings of the Heacham and West Norfolk Natural History Society, for continuation of his work on the life-cycle and distribution in Britain of the gall-wasp *Andricus quercus-calicis* (Burgsdorff).

Further applications are invited for awards to be made after 31st March, 1972, for the promotion of entomological research with particular emphasis on: —

(a) Leaf miners
(b) Diptera, particularly Trypetidae and Agromyzidae
(c) Lepidoptera, particularly Micro-Lepidoptera
(d) General entomology

in the above order of preference, having regard to the suitability of the candidates and of the plans of work proposed.

It is envisaged that awards would be made to assist travelling and other expenses necessary for field work, for the study of collections, for attendance at conferences or for exceptional costs of publication of finished work. In total they are not likely to exceed £120 in 1972.

Applicants need not be resident in the United Kingdom, and research in any part of the world may qualify.

Applicants should send a statement of their qualifications, of their plan of research, and of the precise objects for which an award is sought, to R. F. Bretherton, C.B., M.A., F.R.E.S., Hon. Treasurer, Folly Hill, Birtley Green, Bramley, Guildford, Surrey, *early in 1972 and in any case not later than 31st March.*

LETTER TO THE EDITOR

THE EXHIBITION—A MEMBER'S VIEW

When I joined the Society in 1965 I knew very little of entomology. My main interest is the breeding of the British Butterflies. Since joining I have bred such rare species as the Purple Emperor, the British Swallowtail and Black Hairstreak and many other species which I never thought that I would see. I know that had I not joined the AES I would not have the knowledge that I now have nor bred the species that I have. Using the membership list and attending each Annual Exhibition has brought me into contact with some friendly and helpful members who have assisted me in many ways. I am happy to be a member of so friendly a Society and hope to continue my membership for many years to come. One of the occasions I look forward to most in the year is the Annual Exhibition. Not only is it a good opportunity to meet old friends and discuss matters of inerest but I have the chance to make new contacts, to find others with interests akin to my own. The exhibits are always interesting and one can learn from them. However I do feel rather concerned about the last two exhibitions. Since moving to Holland Park School it seems we are not using the extra space for the purpose for which it was intended. Instead it appears that all or the greater part of it is being used for the purposes of trading. I would emphasise that I do not for one moment suggest that the Entomological dealers should be barred or that members should lose the opportunity for selling off their surplus material. Within reason these facilities are useful in helping members to see what is available for sale and to dispose of their own unwanted material. However I think we must have our priorities right and see that a lot more members *do exhibit*. This is the main purpose of the day. So, I say, come on members, let us see a bit more effort and let us make the 1972 Exhibition one to be remembered. I must admit that in the past there has not been much effort made on my part as I have not thought my material worthy or important enough to exhibit. There must be other members who feel the same. But believe me, this is the wrong attitude and I intend to correct it in the future. Always there are exhibits which are below 1st class standard and a few are perhaps poor but it is not the quality of the exhibit which is so important—what is important is that some one has made the effort.

Next exhibition, provided that nothing stops me, you will be able to see an exhibit from me. I hope yours will be there too.

1.11.1971 David Tyler (3865)

AN ANCIENT METHOD IN MODERN GUISE

"On dark nights a good plan for a single person to pursue is to have a small 'bull's eye' lanthorn, with a lamp burner, fastened to his hat by means of straps. If two persons are in company, one may carry the common lanthorn on a stick, elevated as high as his head, the other following him with the clap net." Thus says Abel Ingpen in his *Instructions* of 1827.

On a cold night in late October, having failed to obtain a satisfactory sample of November Moths (*Oporinia* spp.) a small party of entomologists including myself put the advice of this Ancient to effective use.

The team formed a phalanx with two stalwarts brandishing twelve-foot hazel wands, two aspiring Nijinski's armed with kite nets, and myself bedecked with a 78 lb. generator and the mercury vapour bulb on its long pole. Thus prepared, we solemnly processed along a ride in the wood with the stalwarts jarring the sallows and hazels with their long wands and the net-bearers mopping up the moths as they flew around the lamp.

And our reward? One hundred and twenty-five November moths, of which five were females retained for ova, two were Autumnals (*Oporinia autumnata,* Borkh.), twenty-four were Pale November moths (*O. christyi,* Prout) and ninety-four were November moths (*O. dilutata,* Schiff.).

Do I hear you say "but who wants one hundred and twenty-five November moths?" But my dear fellow, would you have us perish in silence standing around a stationary lamp whilst the *Oporinia* mock us from their roosts? What a travesty of entomology! How Mr Ingpen would turn in his grave!

Richard Dickson (3674)

REFERENCE

INGPEN, Abel (1827): *Instructions for Collecting, Rearing and Preserving British Insects;* James Bulcock, London, p. 39.

Printed by Ellis & Phillips Ltd., Rye Street, Bishop's Stortford and published by The Amateur Entomologists' Society, 355 Hounslow Road, Hanworth, Feltham, Middlesex. 1972

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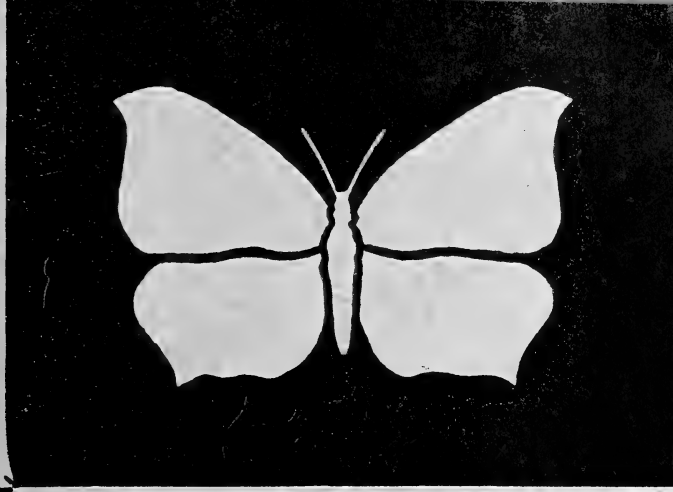
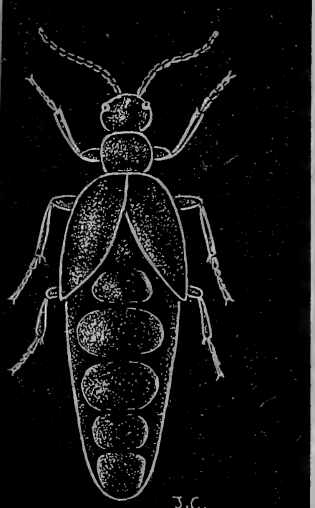
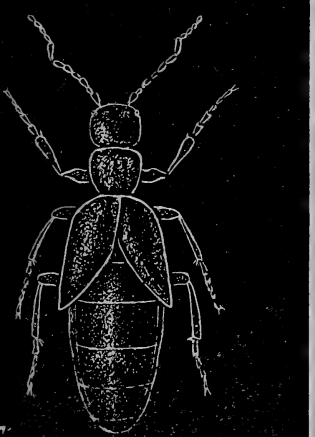






THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

World List abbreviation : Bull. amat. Ent. Soc

EDITED by PAUL BOSWELL, M.B., Ch.B.

AES NOTICE—where to write

Membership applications and first subscriptions to:	D. Keen, *3 Woodbourne, Farnham, Surrey.*
Changes of address and non-arrival of Bulletins to:	P. W. Cribb, *355 Hounslow Road, Hanworth, Feltham, Middlesex.*
Advertisers and for Prospectus of Society and Application forms to:	R. D. Hilliard, *18 Golf Close, Stanmore, Middlesex.* 01–954 0460.
Manuscripts, drawings and books for review to:	P. A. Boswell, *Bacteriology Department, St. Bartholomew's Hospital, London, E.C.1.*
Subscription renewals (£1.25 per annum, 0.63p under 18 years) to:	G. A. Henwood, *18 Gannet Close, Kempshott Park, Basingstoke, Hants.*
Youth matters to:	D. Ollevant, *95 West Heath Road, Farnborough, Hants.*
Annual Exhibition matters to:	Martin Hough, *44a Windmill Hill, Ruislip Manor, Middlesex.*
Offers of help, queries, etc. to the Hon. General Secretary:	G. Prior, *23 Manor Way, North Harrow, Middlesex.*

SUSSEX ODONATA SURVEY. Information sought for Sussex Trust for Nature Conservation survey of dragonflies in Sussex. All records useful, however old. Also wish to contact anyone willing to help in the survey. David Chelmick (4663), 31 Wolstonbury Court, Burgess Hill, Sussex.

WANTED: Butterflies of the British Isles (South); Caterpillars of British Butterflies (Stokoe); Caterpillars of British Moths (Stokoe). Please write stating condition and price. Philip Jenner (4647), 40 Nursery Road, Bishop's Stortford, Herts.

WANTED: 10 to 15 drawer butterfly cabinet. Also wanted vols. 1 and 2 of Moths of the British Isles, by Richard South. Condition and price to R.R. Smith (4695J), Killingsough Farm, Fernyhalgh Lane, Fulwood, Preston, Lancs., PR2 5SU.

WANTED: Bees, Wasps, Ants and Allied Insects, by E. Step (Warne, 1932). Any edition. Please write, stating price, to T. Blackman (4814J), 72 Cross Lane East, Gravesend, Kent, DA 12 5HB.

WANTED: Good second-hand kite net with serviceable bag. David W.P. Sneath (2857), 65 Stoughton Road, Oadby, Leics.

FOR SALE: Livestock and entomological equipment. Write for complete list, specifying for which, to T. Blackman, address above.

LIVESTOCK FOR SALE: Orders now being taken for the following ova. Prices per dozen unless otherwise stated. Poplar Hawk 10p, Lime Hawk 10p, Eyed Hawk 17p, Elephant Hawk 20p, Puss 15p, Emperor 15p, Brindled Beauty 10p, Pale Tussock 11p, Garden Tiger 30p for 50, Melanic Peppered 20p for 50. Foreign silkmoths: Antheraea pernyi (var. harti) 12p, Phyllosamia cynthia 15p. Please send S.A.E. for annotated price list. Stephen Fry (4302), 1 Parkstone Delph, Gleadless, Sheffield, S12 3HZ.

WANTED: Wild or locally bred livestock of any stage of the Magpie Moth (Abraxas grossulariata) throughout the year, in quantities large or small. Please write stating price and numbers available. C.R.M. Stribling, 32 Streetly Lane, Four Oaks, Sutton Coldfield, Warwicks.

LIVESTOCK FOR SALE of Indian Moon Moth and Assam Silkmoth. Also a few papered specimens of silkmoths and Malaysian butterflies. Send S.A.E. for lists. C. Johnson, 7 Hoppet Lane, Droylsden, Manchester.

LIVE GLOW-WORMS WANTED. Will refund postage and packaging costs. Please include date and place obtained and any other information. J.D. Pratt (4479J), School House, Leighton Park School, Reading, Berks.

WANTED: Identified or unidentified fungus-gnat larvae (Mycetophilidae: Diptera), alive or dead. Required for systematic study. S. Trifourkis (4258) Department of Biological Science, North East London Polytechnic, Romford Road, London, E.15 4LZ.

STUDENT TEACHER/MEMBER requires advice and/or livestock of large, colourful beetles suitable for class-room breeding by young children. Also eggs of any easy, small moths as food source of small types of frogs and toads. Anthony G. Perry, 12 Tybenham Road, London, S.W.19 3LA.

WANTED: Beetle specimens, with data, especially Pyrochroids. Will exchange for papered Scottish Lepidoptera. E. Pickard, 105 Kirkhill Road, Aberdeen, AB1 4ET.

OVA FOR SALE: per 20: Indian Stick Insect 6p, Cinnabar 9p, Buff Ermine 9p per 10: Privet Hawk 10p, Assam Silkmoth 6p. Postage 4p each. M. Payne (4673J), 17 Manor Drive, Birchington, Kent.

WANTED: Livestock (preferably) of any stage of hawkmonths, particularly the species not resident in Britain, in exchange for other livestock or for cash. D.J. Boucher, 18 Old Market Place, Harlston, Norfolk. Tel. 037985 888, any time.

WANTED: Living mantids (ootheca or young nymphs); also stick and leaf insects, other than A. titan and C. morosus. Please write, stating species and price. D. Solman, 30 Hall Road, Hull, HU6 8SA.

WANTED: Information on known localities and aberrations of the Cabbage Moth, Mamestra brassicae. D. Hodges, 20c Barcombe Avenue, Streatham Hill, London, SW2 3AY.

WANTED: Nymphs of praying mantids, any species. State price and number for sale to Clive Bickley, 4 Durham Close, Midway, Burton-on-Trent, Staffs.

NEW INSECT SERVICE... open May 5th to August 11th. Going on holiday and don't know what to do with your livestock? Send to above address. Fees 25p per two weeks, each species; reptiles considered. Write now and book, giving details. W. Caswell, 46 Lewgars Avenue, Kingsbury, London, N.W.9.

STICK INSECTS FOR SALE: Nymphs of Indian Stick Insect (C.morosus) 10p per dozen post free. K. Jones, 19 Little Oxhey Lane, South Oxhey, Watford, Herts.

FOR SALE: Butterflies from Malaya, Mexico, India, South America. All reasonably priced. 3p for list. G.D. Trebilcock, 42 Normandy Avenue, Barnet, Herts.

WEST OF IRELAND. R.W. J. Uffen wishes to contact anyone going to the Killarney district and likely to have room to bring back a petrol generator and other equipment stranded there. Use of lamp and generator might be arranged.

WANTED: 10 or 15 drawer entomological cabinet. Within reasonable reach of Preston in Lancashire. R. Smith (4695J), Killingsough Farm, Fernyhalgh Lane, Fulwood, Preston, Lancs.

HAWKMOTH AND TROPICAL SILKMOTH livestock for sale, including A.selene, M.cecropia, S.pyri, A.pernyi, P.canningi, S.ligustri, L.populi, S.ocellatus and many more. S.A.E. for list to P. Woods, 513 High Road, Harrow Weald, Harrow, Middx., HA3 6HL.

FIELD STUDIES COUNCIL field courses in 1972 include the following entomological ones. 6-13 Sept. Betws-y-coed, Field Entomology (P. Skidmore). 16-23 August. Flatford Mill, Essex, Introduction to Insects (D.M. Waghorn). 23-30 August, Juniper Hall, Surrey, Insect Study Course (J.M. Chinery). 9-16 August Taunton, Somerset, Butterflies and Moths (J. Heath and J. Reid). 23-30 August Malham Tarn, Yorks., Flies, Midges and Gnats (R.H.L. Disney). Further details of FSC courses from Information Office, Field Studies Council, Preston Montford Hall, Montford Bridge, Shrewsbury, SY4 1DX.

AES WANTS AND EXCHANGES LIST NO. 97 is due for publication on 1st August, 1972. Entries should reach R.W.J. Uffen (1660), 4 Vaughan Avenue, Stamford Brook, London, W.6. by 10th July. Advertisements of items for sale are charged at 1p per word, and are for the personal use of members only. Make all monies payable to the Society.

WANTED: 50 - 100 pupae of large or small Yellow Underwing moths (Noctua pronuba and Panemaria tenebrata). R. Harrington (4678), 5 Freemantle Road, Weymouth, Dorset.

FIELD MEETINGS

AUG. 13th Sun. 'An introduction to the study of Diptera in the Field'.
A. Stubbs — Meet Bookham station. 11.00 a.m. (W'loo.10.14.a.m.)

SEPT. 10th Sun. 'An introduction to the study of Coleoptera in the Field'.
S.A. Williams — Meet Sandwich station. 11.20.a.m. (W'loo. 9.13.a.m.)

AES BULLETIN

No. 295
MAY 1972

EDITORIAL

Thanks to the efforts of the retiring Editor and other members of the AES Council, I have taken over with an ample supply of material for this issue of the *Bulletin*. As a result I shall confine myself to a few words only.

I am very pleased that Mr Alan Stubbs has agreed to write a series of articles about Craneflies, the first of which appears in this *Bulletin*. Members will however notice the absence of short notes and observations. Please try and send me as many of these as possible, they don't have to be typed, as they make the task of editing much easier.

Paul Boswell (2853)

CORRECTIONS

The August, 1971 *Bulletin* was in Vol. 30, not 31.

Dr MacNulty's article "So you want to study beetles-Part III", was in fact Part IV.

COLLECTING NOTES — MAY 1972

The smaller moths

Mr E. S. Bradford's drawings show three Tortricid species. The first is *Croesia forskaleana* Linn., the smallest of the three. The forewings are pale yellow, reticulated with red-brown. Midway between the base and the apex there is generally a dark fuscous angulated fascia. In some specimens, like the one illustrated, the lower half of this fascia is outwardly suffused with dark fuscous so as to form a dorsal blotch. Within this blotch you will see two small dark spots; these are scale-tufts which appear more conspicuous in pale specimens.

Let me draw your attention to the attractive wing-shape of *Archips podana* Scop. (*oporana* sensu auct.). Mr Bradford has drawn a male, but in the female the sinuations in the costa and termen are even more pronounced, giving the apex a falcate appearance. The forewings of the male are red-brown, while the darker markings are a deeper red-brown

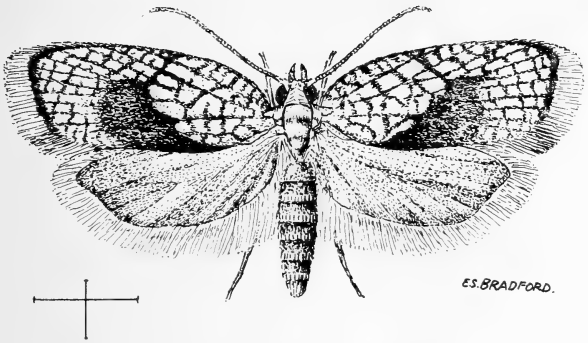
more or less mixed with fuscous; the terminal streak is almost black. The area above the dark basal spot is whitish grey. These basal scales are larger and coarser than those on the rest of the wing and consequently seem to be slightly raised. If you look carefully at the picture you may be able to detect how, at the base of the dorsum, these larger scales form a small tuft projecting over the hindwings. The female lacks the coarse scales and the dark markings are less pronounced. In both sexes the hindwings are rather dark grey, merging into orange apically. A not uncommon variety of the male has the forewings suffused with purplish fuscous.

Archips xylosteana Linn. has the same wing-shape as *podana,* but the sinuations are slightly less pronounced. The light parts of the wing are greenish or golden ochreous and slightly metallic. The darker markings are red-brown.

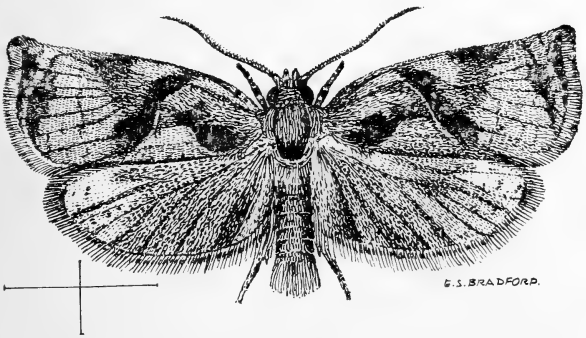
Each of these three species is common and they are distributed almost throughout the British Isles. Their larvae feed in spun leaves in the spring, but there is an important difference. *C. forskaleana* is monophagous, or, more strictly, oligophagous, because, though its normal foodplant is Maple (*Acer campestris* Linn.), it may also be found on Sycamore (*Acer pseudoplatanus* Linn.) when Maple is not readily available. The other two are polyphagous, being found on a wide range of trees and bushes. Ford (1949) gives only a selection of their foodplants. This makes them rather more difficult to find, because one does not know exactly where to look. They can be anywhere, unlike the monophagous larvae which obligingly turn up where you expect them to be. Thus if you want *forskaleana* you should search maple leaves in June. If you find a leaf with the edge folded over, it is likely enough that *forskaleana* is responsible, though it may be the work of *Epinotia trimaculana* Don., which sometimes chooses Maple instead of its more usual foodplant of Elm. On the other hand if you want the other two species illustrated, they are to be found on so many different foodplants that they may well be missing from the particular ones you decide to search. Incidentally, I have bred *xylosteana* from Maple.

The last two species, therefore, are likely to be bred from mixed bags of unidentified spinnings and rolled leaves; you may not know you have them until the moths emerge. I am describing my own experiences; others more skilled than I may readily recognise each from some characteristic feature in the spinning.

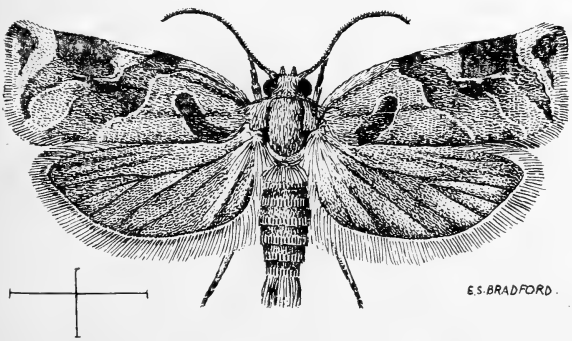
My argument is for rather than against mixed bags. There is something exciting about collecting an assortment of spun shoots and rolled leaves from some popular foodplant such as Oak or Birch and waiting to see what imagines you get. There is always the chance of breeding something out of the ordinary. It is a good plan to concentrate on one or two foodplants each season. This facilitates the feeding of the larvae and gives some pattern to one's researches. Ideally you should carefully annotate your material, describing the type of spinning and what and



Croesia forskaleana Linn.



Archips podana Scop. (*oporana* sensu auct.)



Archips xylosteana Linn.

how the larva eats. One finds that some will only accept the buds, while others like the tender young growth; some prefer the blossoms, others again will take the maturer foliage. Some larvae eat only the upper surface of the leaf, others only the lower. Some make holes in the leaves, which may be round, oval or irregular in shape. Some store their frass at one end of the spinning, others eject it. I feel a hypocrite as I write these words; I know what should be done, but I so seldom find time to follow my own precepts!

Then there is the larva itself. The decision must be made whether to pull open the spinning and examine the occupant, or to leave it as far as possible undisturbed. I far prefer the latter course, which is more conducive to the successful rearing of the moth, but it has the disadvantage that one then fails to learn what the caterpillar looks like. When one has several examples of the same species there is no problem, since you can open up one or two spinnings, leaving the rest intact. Some larvae use their spinnings only for concealment when resting, and sally forth for feeding purposes. In these cases a gentle pinch at the right spot will generally send the larva scuttling out for your inspection and it will readily return home in due course.

The most baffling problem is the handling of the foodplant, especially for those larvae which dislike changing their abode. Low plants can be potted up, but not trees or bushes. One seldom has the foodplant in the garden, so if you sleeve your larvae they are too far from home for detailed observation. Some foodplants stay fresh long enough in water, but others, like Birch, quickly dry up. A few remain in good condition in an air-tight plastic sandwich box or polythene bag, but most go mouldy within a few days if given this treatment. In these cases a small handful of damp sphagnum moss tends to provide the necessary humidity and delay the onset of mould. Most larvae survive mould better than dessication, but it is better to remove the pupae, whether they are in the moss, the tissue lining of the container or still in the spinnings, and let them dry off in a well ventilated situation. I myself have no set rules and modify my treatment according to circumstance.

I apologise for not dealing with particular moths on this occasion, but having taken mixed bags as my theme, I could hardly avoid writing in generalities. During the season covered by these notes insects are so abundant that no one need be short of ideas for suitable field-work.

A. M. Emmet (1379)

REFERENCE

FORD, L. T. (1949). *A Guide to the Smaller British Lepidoptera.* South London Ent. and Nat. Hist. Soc., London.

SO YOU WANT TO STUDY BEETLES
PART IV (Continued) BEETLES ASSOCIATED WITH WOOD

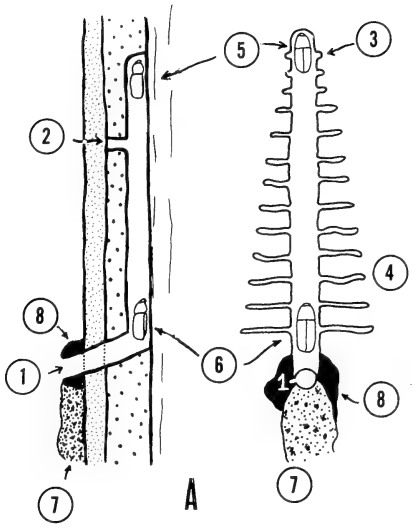
B-*RHYNCHOPHORA*

This superfamily forms on the whole a close knit and easily recognised group. Usually they are small to medium sized beetles and possess a very noticeable long beak or rostrum and the antenna has a scape at the base. The rostrum is an extension of the head and is quite characteristic of the group. The family Curculionidae (Weevils) shows this very well. The scape is a considerably elongated first joint of the antenna. The scape and rostrum usually suffice to identify the superfamily but there are a few exceptions and as these are wood feeders it is necessary to indicate them. In the families Scolytidae (Bark beetles, etc.) and Platypodidae the rostrum is very short or absent. In the family Platystomidae (Anthribidae) the rostrum is short and the scape absent, but as there are only about a dozen species, most of them rare, they can be neglected for present purposes. They are in fact easily recognised and if found they usually present no difficulty.

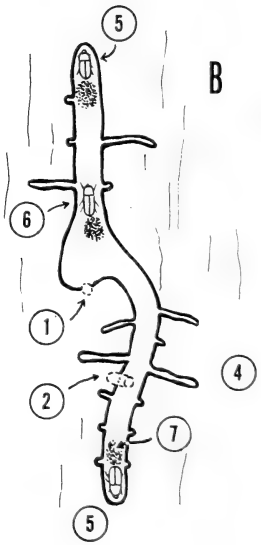
Scolytidae

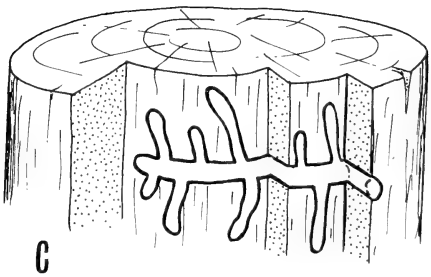
Nearly all the larvae are definite wood feeders; the few exceptions feed in the stems of various plants, so that the environment is not very different from that of the majority of the family. Most of the larvae live in tunnels between the wood and the bark, some in the bark only, whilst a lesser number of species bore straight into the wood. The former two groups are easily found by stripping the bark from dead or dying trees. Those which bore straight into the wood are more difficult but can usually be obtained by 'smoking out'. This is performed most satisfactorily in the following way. Fill the bowl of a small pipe about a quarter full and light in the usual manner; when it is burning well, put the mouthpiece against one of the bore holes and, placing the mouth over the bowl, blow a jet of smoke into the bore hole. Two or three such applications will usually make the beetle leave the hole and, provided a sheet has been carefully placed below the tunnels to catch them as they emerge, the desired specimens are easily captured. The larvae of these species, when more than half grown, and the pupae seem quite easy to rear by keeping the bark and covering the exposed tunnels with the wood debris that is usually found beneath the bark.

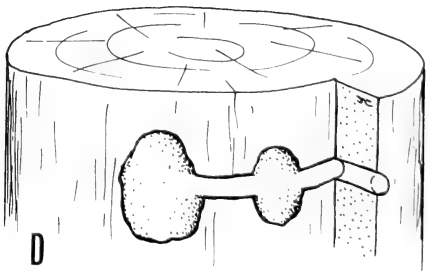
The Scolytidae and Platypodidae differ from the rest of the Rhyncophora in that the female enters the timber to deposit her eggs. In the other wood-boring species of this superfamily the eggs are deposited externally. In starting a brood, a hole is bored perpendicularly through the bark to the surface of the wood, except in the wood-boring forms where it is continued deep into the tree. Usually the female bores the entrance hole, but in polygamous species this task seems to be undertaken by the male. In polygamous species such as those of the genus *Ips,*



Key: (1) entrance; (2) nuptial chamber; (3) egg-niche; (4) larval gallery; (5) female; (6) male; (7) sawdust; (8) resin.







the male gnaws out a part of the tunnel, making a small nuptial chamber to one side where mating takes place. A first mating often takes place on the bark prior to the boring of the first tunnel. The fertilised females then proceed to hollow out tunnels, one to each female. As she proceeds, the female makes small niches at regular intervals in each of which an egg is laid. The larva bores into the bark or wood perpendicularly to the egg-laying tunnel. When full-grown, the larva makes a pupal chamber and subsequently the adult bores its way to the surface. After mating the tunnels are excavated by the females while the male chews out chippings and sawdust, pushing the debris out through the entrance hole. The type of tunnel and the species of timber are indicative of the species of beetle.

Blastophagus (*Myelophilus*) *piniperda* (Linn.) has an egg tunnel under the bark running vertically upwards, with larval galleries perpendicular to it around the circumference of the tree (Fig. A).

Scolytus destructor Ol. (=*scolytus* (Fab.)) is a common beetle which is responsible for the spread of Elm Bark Disease. Its tunnel pattern is very similar to the previous species. Both feed in Elm (*Ulmus* spp.).

Scolytus ratzeburgi Jan. has a tunnel similar to the previous two species. It occurs only in the Highlands of Scotland in Birch (*Betula* spp.). Fowler (1891) states that it is found in old birch stumps, but I have found it only in horizontal dead or dying branches of an otherwise healthy tree.

Blastophagus minor (Ht.) has an egg tunnel very like the previous species except that there are usually two egg-laying tunnels running, in opposite directions from the entrance hole, horizontally around the circumference of the tree. The larval galleries are vertical above and below the egg tunnel (Fig. H). This is a rare species confined to Scotland.

Ips typographus (Linn.) is rare in Britain but abroad has caused serious damage to pine forest, especially in central Europe. This species is bigamous and makes two egg-laying tunnels, one vertically upwards, the other downwards (Fig. B).

Many *Ips* species are polygamous and in these each female makes a separate egg-laying tunnel off the central entrance chamber, producing a rather different pattern. Similar patterns are produced by *Pityogenes* spp. (Fig. G).

Leperesinus (*Hylesinus*) *fraxini* (Pz.) makes a tunnel system almost identical to that of *I. typographus* except that it is horizontal.

A number of species form a central mating chamber only. The female then lays her eggs around the circumference of this chamber and the larvae burrow into the wood so that the pattern produced is like the spokes of a wheel (Fig. F). Amongst the beetles with this habit are those of the genera *Xylechinus* and *Cryphalus*.

Those Scolytidae that feed within the timber wood as opposed to the bark also seem to make characteristic tunnels: —

Xyleborus spp. Beetles belonging to this genus, of which about six are known in this country, bore into timber and make a somewhat irregular horizontal tunnel which ends in a flattened table (Fig. D). The larvae of these species feed on parasitic fungi and sap. The fungus appears to be brought into the tunnel by the parents, probably as spores in the alimentary canal, as specific fungi appear to occur with specific beetles. The fungal growth must be eaten regularly or it takes over and destroys the colony. The fungus is referred to as "ambrosia" and beetles that breed in this manner are called Ambrosia beetles. *X.* (*Anisandrus*) *dispar* (Fab.) makes a main tunnel which runs horizontally and, more or less, perpendicularly to the length of the trunk or branch. The side tunnels are winding, but usually run parallel to the length of the wood fibres (Fig. C). It is the female that makes the entire borings and then lays the eggs. The larvae do not bore.

Trypodendron spp. bore a hole straight into the wood, preferring hard and solid wood. The larval galleries branch off from the main tunnels (Fig. E). As with *Xyleborus* they feed on sap and fungi. The beetles spend most of their lives in the tunnels and are therefore often difficult to obtain. However I have frequently found *T. domesticum* (Linn.) just under the bark of Beech (*Fagus sylvatica* Linn.) where bracket fungi are just beginning to grow on a newly fallen tree.

Platypodidae

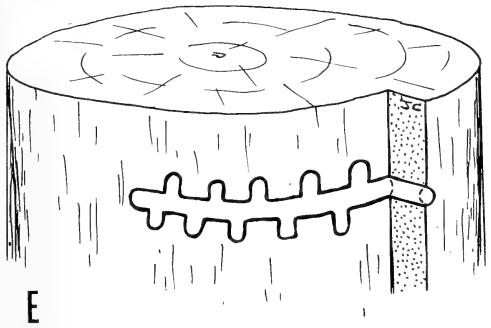
Platypus cylindrus (Fab.). In this species each pair of beetles bores a single perfectly cylindrical tunnel, between six and seven inches long, straight into the side of a dead or dying trunk or stump. Eggs are laid at the extremity which is rounded off. The parents then start making side burrows. The larvae feed on fungus which grows in the tunnels and then start eating wood when they are nearly fully grown. A very full account of the life history has been given by Chapman (1871).

Curculionidae

Pissodes spp. and *Magdalis* spp. also breed in wood, chiefly coniferous, but dead hedges also provide breeding places. Mostly these beetles attack dead and dying branches, making galleries under the bark, and may by their attacks hasten the death of the branch.

Hylobius (*Curculio*) *abietis* (Linn.) is one of the best known of the weevils that attack dead timber. It usually breeds in dead pine stumps. The adult is usually found easily enough by scraping away the debris around the roots of these or by turning over logs that have been lying in the open for about a year. It is an attractive beetle but has the unfortunate habit of attacking the growing tip of young conifers in the Spring and killing them.

Some life histories have been worked out fairly fully, but others are known only in outline. It seems likely that those beetles such as *P. cylindrus* which live in the wood could be persuaded to make their tunnels in prepared veneers of about the thickness of the diameter of their tunnels. The type of cell used for the study of dry-wood termites



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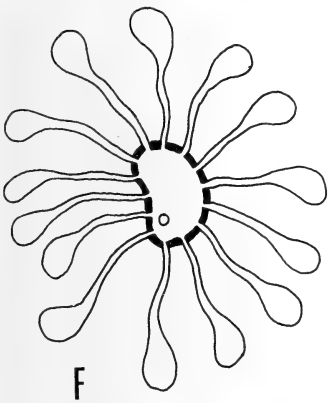

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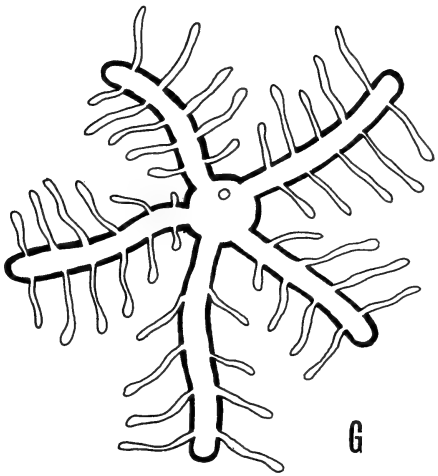

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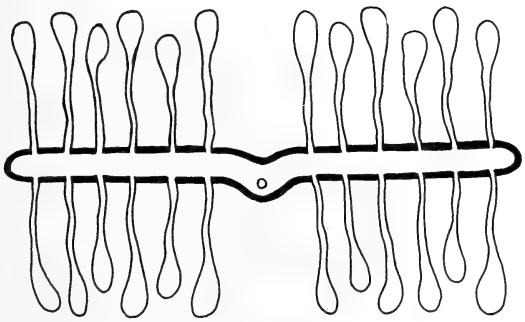

H

(Butterworth, Kay and MacNulty, 1966) would seem to be ideally suited for this.

Bark beetle larvae will usually feed up very well if placed in a thin plastic box which has been packed with bark and then filled with the loose powdery material usually found under loose bark. An alternative method is to remove the bark, disturbing the larvae or beetles as little as possible, and cover its inside smoothly with a piece of thin pliable plastic or plastic wrapping paper. Except when observing the beetles or larvae, keep the plastic covered bark in an airtight tin, with a small piece of wet cotton wool to keep humidity up, and a couple of crystals of thymol to prevent fungal attack.

Whenever a beetle is found under bark or in timber, note should be made of the species of wood and of the pattern or regularity of the tunnel system.

I should like to thank Fredk Warne and Co. for permission to use the illustrations of tunnels from *Beetles of the British Isles* by E. F. Linssen. These were redrawn for this article by Mr Jonathan Cooter (3290).

(To be continued) B. J. MacNulty (4528)

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INTRODUCTION TO CRANEFLIES

Craneflies are a familiar group to most entomologists, yet one which is generally neglected. Even the layman shows recognition by giving the friendly name 'daddy long legs', though they are generally far from welcome when they come to light in our homes in the autumn. To the gardener and the farmer the larvae of some species have achieved unfortunate fame as pests and are given their own name of leatherjackets. Certainly a few of the larger Craneflies are familiar, yet it comes as a surprise to most entomologists that there are over 300 species in Britain.

As a group for the entomologist to study they have many advantages. They are mostly large and are easily obtained. Unlike many insects they will fly almost regardless of weather and time of day and

will also come to moth traps. They are no more difficult to identify than most other groups of insects and much easier, for instance, than many groups of Diptera (Hoverflies may be more attractive, but many of the genera are difficult). Perhaps one of the greatest advantages of studying Craneflies is that there is so much to find out about them, and there is scope for even the beginner to make useful observations.

What are Craneflies?

Craneflies are among the most primitive two-winged flies of the order Diptera. They belong to the sub-order Nematocera which contains many familiar flies of similar build, like mosquitoes and gnats. The majority of these related groups, incidentally, are particularly difficult to identify and consist mainly of small species. The distinction of Nematocera is the presence of long antennae consisting of more than three antennal segments and usually of thirteen to sixteen in Craneflies.

The term Craneflies is rather artificial since it includes four separate families of Nematocera. These are the Tipulidae, Trichoceridae, Anisopodidae and Ptychopteridae. Except for Anisopodidae, the Craneflies are of 'daddy long legs build', but it should be noted that there are many small species as well as large ones, the smallest having wings only 2.5mm long. Most species (302) belong to the Craneflies proper, Tipulids (family Tipulidae); the other families have only a few species. Trichocerids, the Winter Gnats, include some of the familiar dancing swarms of gnats seen on milder winter days. Anisopodids are small insects of a more compact build and with short legs. Ptychopterids are not closely related, but look very like true Craneflies; they are medium-sized blackish species found by water.

Why study Craneflies?

If one studies a popular group, such as Lepidoptera, it is difficult to make original contributions to knowledge. Diptera offer endless scope for the entomologist to make observations and records which increase our understanding. As with so many insect groups the beginner soon stumbles on endless difficulties, especially since there are no fully illustrated books of reference. Diptera constitute a quarter of the British insect fauna, a bit much to cope with at once.

Craneflies are the subject of a national recording scheme (as with butterflies and larger moths), so that records and observations are particularly needed. They are chosen because they are one of the less difficult groups to identify and are especially good for ecological studies. Perhaps most critical to the beginner, help is available in identifying material.

Collecting Craneflies

Craneflies are generally rather slow flying insects so they are easy to catch. An ordinary butterfly net will do. The one I have used for a number of years consists of a collapsible fisherman's landing net frame with a home-made bag consisting of tough fine netting bought as remnants of net curtaining and a rim of tough material such as calico.

One needs a fairly durable bag since one of the best ways of collecting craneflies is to sweep vegetation. One soon learns to avoid brambles but inevitably one catches on the occasional unexpected snag. Proper sweep nets consist of close weave material, but this is no good for Diptera since one can only see what one has caught by looking into the mouth of the bag, and all the Diptera rapidly fly out. In a netting bag one can see something of what one has caught even with the mouth of the bag sealed. The trick is to turn the base of the net bag towards the sun, and with luck all the Diptera will fly towards the end of the bag whilst you are looking in through the mouth. With a net of this sort, at a moment's notice one is also prepared for making aim at the faster flying craneflies which need netting individually.

Craneflies may be removed from the net by tubing each one individually, but this is a slow process which risks loss of other craneflies from the net and demands a large cumbersome supply of glass tubes. A killing bottle may be used, as with Lepidoptera, providing care is taken that the wings do not get wet and crumpled (a layer of cotton wool is placed at the bottom of a corked bottle or tube and a few drops of ethyl acetate are poured onto the cotton wool). Some big species do require individual treatment, but for most species a pooter (aspirator) is a very quick way of retaining a representative sample of craneflies. It is surprisingly simple to 'poot' these insects even though they look totally unsuited to go through the small entry tube. Relatively little damage is done to these fragile-looking flies, as long as they are not overcrowded. The flies are removed by gently sucking in ethyl acetate fumes (just above the surface of the fluid or killing bottle, but do not get the liquid into the pooter), and stop as soon as it is judged that some fumes have entered; and certainly stop if fumes enter your mouth (ethyl acetate is relatively harmless, though if inhaled too much one would eventually become unconscious. Do not use cyanide!). When the flies are unconscious transfer them to a corked tube, putting in a piece of paper (to absorb condensation) with a note of where they were taken. Dab a bit of ethyl acetate on the cork (e.g. by turning a small ethyl acetate bottle upside down with the cork over the mouth) and this will be sufficient to kill the flies. Ethyl acetate relaxes the insects, and they will keep left in the tube providing they do not sweat as a result of the tube getting warm. It is best to keep the tubes in a cardboard box, or a tin with paper packing, so there is some insulation. If Craneflies are individually tubed, they may be treated in the same way by dabbing ethyl acetate on the cork. If wished they can be taken home alive, providing they are not big ones thrashing about in a tube, but remember to put a small piece of paper in the tube, to absorb condensation, preferably adpressed to the curved side of the tube so the insect does not damage itself.

The bigger Craneflies can be pinned with ordinary butterfly pins, but the smaller species would require micro pins and staging on

polyporus strips. The smaller species are best pinned through the side of the thorax. They may be set like butterflies, but the long legs are very brittle and when spread out take up a lot of room. A cheap, neat method of mounting craneflies, which also provides some protection for the legs, is to glue them by the side of the thorax onto card. The British Museum finds point mounting best, carried out as follows. So the insect does not splay out in all directions, let it dry flat in an envelope; if you use the semi-transparent ones designed for photographic negatives, you can see how the legs are arranged and can manoeuvre them into the position required (all hunched up or all splayed out downwards below the thorax). The insect can be put in with both wings over the back (like a butterfly with its wings closed). Cut up some card into triangles with sides a bit longer than the legs and put a pin through one side. When the Cranefly has dried, lay it on a piece of paper; push the pin through the card until its head is flush with the card, turn upside down, and place a small blob of glue (e.g. balsa cement) on the tip of the triangle furthest from the pin. Bring the glued point down onto the thorax of the Cranefly, the legs orientated towards the pin. Lift up with fly adhering to the underside of the point, invert so the fly is on top of the card and push the card part way back down the pin. One **must** keep note of where the insects were found, so a data label must be put on the pin giving at least date, locality and county.

Where to look for Craneflies

Craneflies can be found almost anywhere at all seasons of the year and on most types of ground: some species can be found right through the winter during mild spells. The best places are marshy woods but over 300 species of Cranefly cannot all live in one place. To find a wide range of species one may look in open grass spots, open marshes, stream and river sides, bogs, dry woods, hedgerows, coastal cliffs, salt marshes; some species will be found in gardens even within cities. The main peak of emergence is in late May and early June, but there is a succession of species through the year, July and October being especially good. The Winter Gnats are, as their name suggests, out mainly between October and March.

There is thus endless scope. If one collects in a good locality for several years some 70 or more species may be found and one locality in Surrey has yielded 110 species. My record for a single day, in Wales, is 80 species, but that was by searching several very good localities in the peak emergence of early June. Working a reasonably favourable district should yield 150 species, half the British fauna.

Craneflies may be found by disturbing or sweeping vegetation to make them fly out if they are not already conspicuous. Many species of Cranefly do not like hot sunny conditions, so most tend to be found under the shade of trees. Some species specialise in camouflage and will be found on tree trunks. Other species live in dead wood or fungi so it is worth looking in such situations. In the evening some species will be

found swarming, the males flying in a dancing up-and-down manner as a group, usually under the bough of a tree. Moth traps and other lights often attract Craneflies.

Recording Craneflies

We have considered how to catch and mount Craneflies and now know where to look for them. We have the basis for collecting Craneflies, but will this achieve anything more than having a box of insects on pins? If we record even a few facts about where the Craneflies were taken, what sort of situation they were in, and any observations on behaviour, we may be able to contribute new knowledge.

The minimum information for a data label as mentioned earlier is date, locality and county, e.g. 12th June 1970, Godstone, Surrey (date is usually given in the form 12.VI.1970, with roman numerals for months). One may identify a species, but already have it represented in your collection: perhaps you would consider throwing it away, if you are absolutely sure of your identification, entering the information in a notebook or diary. Supposing you have built up a number of records from different places and perhaps compared them with someone else's records as well, what significance has your record from Godstone? Very little since one knows nothing of where it lives; it may have been chalk grassland, beech woods, alder marsh, lake side, etc. If one has recorded habitat, one is now in a much stronger position since it is possible to compare the various records. This may show that a species is only found in alder marshes in one district but another habitat may be preferred in another district. As such information builds up one may be able to interpret the significance of distribution patterns. Dates of flight activity can also differ from area to area, and this again may have significance.

Let us consider a record where we have given some meaningful information by saying heathland. One can provide valuable data by dividing heathland into dry heath, pine woods, birch woods, bog, wet sallow wood, pond side, etc. By knowing what type of habitat a species likes on one heathland, one may perhaps see the reason for its absence at another.

Life cycle of Craneflies

For present purposes most attention is being paid to the adult Craneflies. There is still a great deal to learn about the early stages.

As with most higher insect orders, there is a complete metamorphosis from egg, larva, pupa to adult. The eggs are small, seed-like objects which are usually inserted into the ground or other medium by the pointed ovipositor of the female (in some the whole abdomen is inserted into the soil) whilst others simply broadcast their eggs whilst flying. The larva is a cylindrical leatherjacket shape, with a small head and, in most Tipulids, two spiracles at the hind end which are encircled by a cluster of protuberances. In some there is considerable specialisation, especially in aquatic larvae. Ptychopterids have the hind spiracles

placed on the end of a long telescopic tail so that they can breath air from the surface whilst submerged in mud. The pupae generally have two 'horns' (breathing tubes) on their head.

The place to find the early stages is usually in the soil, especially damp woodland soil. Some species are found in dead wood, fungi, moss, wet leaves, dung, seepages on trees, around certain plant roots, compost heaps, wet mud, etc. They are often surprisingly difficult to find and the species vary according to the season. The early stages are easy to rear. Simply place them in a container with some of the medium in which they were found, making sure soil, etc., is kept moist, and leave enough room for the adults to emerge. Larvae can be preserved by killing in water which is nearly boiling and then stored in tubes of alcohol (methylated spirits can be used but is not so good). If you have several similar larvae from the same habitat it is as well to preserve one (or more) and rear the rest. Empty pupae should be staged with the adult.

Behaviour

In the adults very little is known about behaviour. Egg laying has been observed in only a few species; 'pricking behaviour' (just poking the ovipositor into soil) is often not egg laying. An interesting type of study is the relationship between the shape of the ovipositor and the behaviour of the egg-laying female (functional morphology). Some Craneflies have characteristic ways of flying or resting, in the latter case with wings spread or closed. When a Cranefly is seen in a collection it is at its worst; its true character can only be seen when alive. The colour of the legs and wings may be a careful adaptation to camouflage the species in the places the fly normally chooses to rest, for example many of those species which sit on tree trunks have mottled wings and banded legs. Other species, though harmless, may exhibit the warning colours of wasps and ichneumons, this being a form of protection by mimicry. Some species are apparently more active at night, when some carry out their egg laying, but little is known of nocturnal behaviour. The place where an adult is found, and its behaviour, may lead one to locate the place where the larvae live. For a species to survive, the habitat must provide the correct conditions for the larvae (often very small areas in soil where larvae may be abundant) and conditions on the surface (vegetation, etc.) must also suit the adult. As with moths, Craneflies often have certain times of day when they prefer to emerge from the pupae, but virtually no information of this sort is known. One of the best ways to find out where the early stages live is to search for empty pupal cases sticking out of the ground (or moss, etc.) when one is lucky enough to find newly-emerged adults still too feeble to fly (the wings and outer skin take a time to harden before flight is possible). Some species have, on rare occasions, been found feeding at flowers; it is strange that the habit is so rarely seen since nectar gives the fly energy which will help its survival: valuable observations can be made on this topic, noting plant species, time of day and weather conditions. However

some species are very short lived as adults, lasting less than a day. These are but a hint at the many aspects of behaviour of which we know little and where many useful studies may be made by anyone prepared to take an interest in Craneflies.

Further study

Before attempting to identify Craneflies, it will be useful to consider briefly some aspects of the further study of Craneflies. As with most insect groups, and increasingly even with moths, a microscope is invaluable for observing the diagnostic features which separate species. It is the purpose of this paper to enable progress to be made with a magnifying glass, and indeed this is all that is necessary for recognising many species. However, if there is opportunity to use a binocular stereoscopic microscope (which gives 3D vision) do so (at school, the biology master should be able to help). A microscope only becomes essential when looking at the genitalia (sexual parts at the tip of the abdomen) of some of the smaller species; for this purpose a slide mount under a monocular microscope can be used. The latter microscopes are more easy to come by, there being plenty of cheap ones on the market. Unfortunately stereoscopic microscopes are expensive but it is sometimes possible to buy them second-hand.

The best general introduction to Diptera is by Colyer and Hammond (1968). A chapter is given to Craneflies and includes some excellent illustrations by Mr Hammond. The introductory chapter concerning the structure and biology of Diptera is also well worth reading.

The main reference work for Craneflies is by Coe, Freeman and Mattingly (1950) which enables identification of all the British species known when it was published. It is unfortunately out of print but efforts are being made to republish with the addition of the further species now recognised as occurring in Britain.

A very useful work is that of Edwards (1938), which is particularly valuable for its photographs of wings. As with any reference work, a local library can arrange the loan of a copy through the national lending libraries service.

For the early stages of Craneflies, and details of how to preserve them, etc., two papers by Brindle (1960, 1967) form the standard works. Note that care is needed in identifying species since there are many whose larvae and pupae are unknown.

Some of the Cranefly names have been changed since these works were published. Reference may be made to a paper by Hutson and Vane-Wright (1969) for corrections.

If you are taking up the study of Craneflies your help with the national recording scheme will be welcome. Details of the scheme, including further information on how to collect and record, are available from me, one of the organisers, at Foxhold House, Thornford Road, Crookham Common, Newbury, Berkshire. A list can also be supplied giving all the name corrections and characters for newly recognised

species. Assistance is available with identifications. Initially it may be best to send representative material unmounted in envelopes (as previously described) since these should not get damaged in the post if properly packed in a small box or tin. Don't forget to write the locality data on the envelope. The name will be added and on their return, the sender can mount the specimens for his reference collection. If the grid reference can be determined from maps, this information should be given. Mounted material may be sent through the post, but legs may fall off. If you are able to deliver and receive mounted material in London this can be relayed through the Diptera Section in the Department of Entomology at the British Museum (Natural History), South Kensington, where Tony Hutson and Dick Vane-Wright are the other co-organisers of the recording scheme.

It helps considerably to gain access to a collection against which to compare one's specimens and it is also invaluable to have access to an entomological library. These needs can be achieved by joining a society which provides facilities and where it is possible to meet other entomologists. The British Entomological and Natural History Society at its London headquarters has an extensive library and is building up a reference collection of Craneflies. A number of local natural history societies have entomological books and may be able to advise on where collections are available. Unfortunately collections are few and far between, though several museums have Craneflies. Take care to ask whether the names are reliable since many of the collections are full of errors. It is hoped to eventually revise the names in all museum collections. The main provincial collections are at the National Museum of Wales in Cardiff, Manchester University Museum, the Royal Scottish Museum in Edinburgh and Dublin Museum.

In addition to Mr Brindle at Manchester University Museum, other Museums with staff at present known to have a personal interest in the recording scheme are at Belfast (Roger Nash) and Liverpool (E. G. Hancock). There is a good local collection at Malham Tarn Field Centre (Field Studies Council). Collections needing revision include those at Dorchester Museum, Birmingham Municipal Museum and Leicester Museum (the latter is under revision). The organisers of the recording scheme will be glad to hear of any collections needing attention.

Alan E. Stubbs

(This paper will be continued: the next part will give help in identifying the commoner species of Craneflies.)

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A PRELIMINARY SURVEY OF THE FOOD AND FEEDING HABITS OF ADULT BUTTERFLIES (Continued)

Feeding behaviour

Lepidoptera behave in different ways when feeding which can be roughly graded as follows:

(a) In flight, without settling at all, which is well exemplified by those insects usually too heavy to rest on a flower, e.g. the Sphingidae, in particular *Herse convolvuli* Linn., *Macroglossum stellatarum* Linn. as well as certain Noctuids such as *Heliothis*, but not by butterflies except the big 'Birdwings' (Papilionidae).

(b) Settling very briefly with rapidly vibrating wings which is typical of *Plusia gamma* Linn.

(c) Settling but with intermittent wing-fluttering, a characteristic of various *Papilio*.

(d) Settling very briefly and passing rapidly from flower to flower, again exhibited by various *Papilio*.

(e) Settling to feed with widely spread wings, occasionally fanning but in no particular hurry to pass on, e.g. various Nymphalids such as *Vanessa atalanta* Linn. and *Aglais urticae* Linn.

(f) Those which feed with wings tightly closed such as the Pierids *Gonepteryx rhamni* Linn. and *Colias crocea* Geoff. Some Pierids however, e.g. *Pieris rapae* Linn. and its near relatives, feed with wings slightly open.

Behaviour of young adults

The males of many butterflies emerge from the pupa before the females, sometimes by as much as a week, and the general opinion is that the latter stand a better chance of being found and fertilised than if both sexes emerged together. The behaviour of these young males is quite distinct and much of their time is spent in feeding and investigating anything which resembles a female of their species. Butterflies seen at mud puddles are almost always freshly emerged males and although we do not see the vast congregations of insects at wet mud and sand as in

the tropics, the phenomenon is not unknown in Britain, but usually involves only a few individuals.

An instance of contrasting behaviour comes to mind in *Heodes alciphron* Rott. in S.W. France in 1964. Freshly emerged males of this large 'Copper' were noticed feeding from flowers, a very attractive sight as this purple glossed butterfly is very nearly as large as a Small White (*P. rapae*). They were docile and easily approached, but a week later the insects had taken up territory, appeared to be uninterested in flowers, were extremely alert and darted belligerently at other insects in the typical 'Copper' manner.

Species rarely or never seen to feed

It is alleged that some species of butterflies are rarely or never seen to feed in the adult state, those most frequently referred to being: *Hamearis lucina* Linn., *Pararge aegeria* Linn., *Eumenis semele* Linn., *Celastrina argiolus* Linn., and *Coenonympha tullia* Müll. My own observations do not agree with these findings and I have personal records for all those mentioned, to which I shall refer later. It may be that the species mentioned above are not obvious feeders and are usually to be seen sitting on leaves, etc. It is worth noting however, that *aegeria* and *semele* are mainly, but not exclusively, sap-feeders and *argiolus* is addicted to honeydew.

It is interesting to note that according to Butler and Covell (1957) none of the members of the genus *Megathymus*, the North American Giant Skippers, feed at all in the adult stage. I have no personal experience of this genus, but it does not hold true for our own Hesperiidae.

Periodic and local interest in flowers

The fact of butterflies frequenting certain flowers in some years and ignoring them in others has been noticed. This applies also to locality. Dunk (1953) referring to *Strymon w-album* Knoch remarks, "There seems to be no consistency in the type of flower chosen in different years or indeed in separate areas in the same year". Wadey (1954), referring to the visits of honeybees to Hawthorn says, "Something in the soil permits nectar secretion by some hawthorns and prevents it in others".

In 1965 I found the Common Ragwort (*Senecio jacobaea* Linn.) particularly attractive to butterflies in Surrey, whereas in most other years I have found it of very little attraction. I think, though, that it is an established fact that this plant is more attractive in coastal areas than inland.

Species frequenting one food source only

Some butterflies appear to restrict themselves to but one or two sources of food, but the only species I have found to confine itself to one only is *Limenitis camilla* Linn. This flower is of course *Rubus fruticosus* Linn., sensu lato (Bramble). I have made observations on quite a few colonies of *camilla* and although young males sometimes suck salts from wet mud, Bramble is the only plant seen to be visited.

I once observed an individual settle on *Daucus carota* Linn. (Wild Carrot) but was unfortunately too far away to see if feeding took place, but I think not, as the flower with its shallow nectaries is unsuitable for a long-tongued butterfly.

Limenitis reducta Stdgr., *camilla*'s near relative on the Continent, is slightly more catholic in its tastes. I saw it feeding avidly from Privet (*Ligustrum vulgare* Linn.) in S.W. France in 1964 and 1965. This species is also attracted to human perspiration and will settle quite boldly on one's arms to imbibe.

Other species of *Limenitis* namely *L. archippus* Cramer, *L. artemis* Drury and *L. astyanax* Fab. in North America are, however, attracted to "sugar" and fermented fruit, but this does not seem to apply to the European species.

Connection (if any) between larval and imaginal food

I have found little connection between larval and imaginal food sources, and this is borne out by Klots (1951) who remarks that there is not necessarily any correlation between the plant eaten as a larva and that visited as an adult. *Danaus plexippus* Linn. (in North America) is said to visit flowers of *Asclepias,* its larval foodplant, and the majority of species of the Heliothidinae (Noctuidae) appear to frequent the blossoms of their foodplants. However, the only butterfly species I have observed to do so is *Cupido minimus* Fuess. on *Anthyllis* which is also its larval pabulum, but it is by no means confined solely to this flower. Mr P. Taylor has observed *Lysandra bellargus* Rott. feeding on the flowers of *Hippocrepis comosa* Linn. on the South Downs in June 1971.

(To be continued.) B. R. Stallwood (1547)

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EDWARD NEWMAN 1801–1876

This is the first of a series of short life histories of some of the great entomologists of the past. It is to these men that we owe the vast storehouse of knowledge on this subject that is available to us in the many text books, articles, etc. We should never forget the debt that we owe to those in the past, the Souths, Tutts, Staintons, Fowlers, Westwoods and a host of others, whose painstaking records and observations gave us the knowledge that we take for granted today. My first subject will be Edward Newman, a man whom I have always admired since I first took an interest in entomology.

Edward Newman was born in 1801 at Hampstead, the son of fairly

well-to-do middle class parents. After local schooling he went to a boarding school in Gloucester until he was sixteen, but unlike many others in similar conditions did not go to a university. His religious beliefs, he was a member of the Society of Friends (Quakers), were probably responsible for this. At this time entry to university was restricted to members of the 'Established Church'. It was however fortunate that both his parents were deeply interested in natural history, and managed to instil a deep interest of this in all their children. With the result that whilst still at school he started to take a keen interest in botany, ornithology and entomology, and, what is more important, make careful observations and records, a practice which lasted throughout his life. Though we know Newman mainly as an entomologist he was in fact a fine all-round naturalist and throughout his life wrote with authority on many subjects.

After leaving school he joined his father in business in Godalming as a wool merchant. His interest in the wool business lasted until he was twenty-five, he then removed to Deptford and took over a ropemaking business. His interest in this lasted until he was thirty-six. In 1839 he went into partnership with a printer called Luxford who specialised in printing and publishing books on the natural sciences. Shortly afterwards he took over the firm completely and he remained in this business until he retired.

Though he does not appear to have started writing or publishing his works until in his thirties, he early on made a large number of friends in the world of entomology, and it is obvious that his knowledge of the subject was widely respected among all. In fact so much of his early life seems to have been spent in the study of natural history in the field, and so little to his wool and ropemaking businesses, that it is a tribute to the foremen who ran these affairs that they survived at all. In 1826 he was one of those who assisted in founding the Entomological Club. It is significant of the impact that he had already made in the world of entomology that in 1832 when the *Entomological Magazine* was commenced he was appointed its first editor. The following year he was elected a fellow of the Linnean Society, and in that same year 1833 he was among that body of enthusiasts who founded the Entomological Society of London, now the Royal Entomological Society. He was a member of its first Council and was elected its President in 1853. His first work on entomology was published in 1832 and from then on he continued writing until the end of his life, books, papers, articles, on a variety of subjects. In 1840 he commenced the publication of the *Entomologist*, but this only lasted until 1842 when it went into abeyance. The next year he commenced to publish the *Zoologist*. He continued to edit this until his death and was also a major contributor to its pages. From 1858 until his death he was a natural history editor of the *Field*. In 1864 the *Entomologist* was reactivated, as it were, and he continued to edit this until he died. The two works for which he is perhaps best

known to us are *The Illustrated Natural History of British Moths* and *The Illustrated Natural History of British Butterflies*. Despite the fact that many species have been added to the British list since, and there has been a good deal of changing of names, these books are still fine and accurate records of the species that he described and incidently the basis upon which many later books by other authors were built. These were published in 1869 and 1871 when he was quite an old man.

The last two centuries have seen many eminent entomologists who have made a great contribution to the science. Newman was one of these, he was also an extremely kindly man, always willing to help others, particularly the young. His letters and writing show none of the irascibility and rancour of some of his contemporaries. He was a lifelong member of the Entomological Club and for some forty years was its Curator and Librarian. During a great part of this time he gave open house at his home where the collection and books were housed, on one evening each week. These 'at homes' were well known for the advice and help that he was always ready to give to the visitors. He was a member and fellow of a great many scientific societies, and he was elected a member of the Austrian Imperial Academy of Leopold Charles, membership restricted to the forty most distinguished naturalists known to the Council throughout the world. This membership conferred on him the title of Doctor. He died after a short illness in 1876.

G. Prior (3909)

BREEDING THE PURPLE HAIRSTREAK BUTTERFLY (Thelca Quercus Linn.)

With the aim of obtaining a photographic record of the life history of the Purple Hairstreak I decided to search for a few eggs in late August. I had noticed the butterfly flying round the upper parts of a fairly small Oak tree which was due to be felled to make way for building so, with a clear conscience, it took me less than an hour to find eight eggs on branches about six feet from the ground. The eggs were laid on the twigs close to next year's buds and, although very small, being white they were easily seen. I trimmed the twigs down to pieces about one inch long, each bearing an egg, and put them in a plastic box in my cold garage for the winter. When trimming the twigs one of the eggs popped loose but I kept it in the box with the twigs.

During the winter I inspected the eggs about once a month and gave them a light mist spray of water. At the end of March the box of eggs was brought into a cool room in the house (about 15°C) and at the same time I obtained some fresh oak twigs and stood them in water in the same room. Three days later one of the eggs hatched and the tiny

hairy black-brown larva crawled off the dead piece of twig onto the side of the plastic box; from there it was easy to slide it off with a small brush and transfer it onto a bud on one of the fresh twigs which I stood in a very small jar of water, sealed with cotton wool, and put inside a plastic box stood upright. Within an hour the larva had disappeared into the bud but later evidence of its well-being was provided by its minute droppings on the floor of the 'cage' where I then placed a piece of white paper to amplify the evidence. From then onwards, as the box was fairly air-tight, the twig remained fresh and the process was trouble-free until the larva became quite large and began to feed from the outside of the sprouting buds.

All the other eggs hatched, with the exception of the one which had come loose. With a powerful lens it was possible to see the black shiny head of the larva eating a hole in the top of the egg; the larva ate only sufficient of the egg to enable it to emerge, so most of the shell remained.

In three instances much more excreta than could reasonably be expected appeared on the papered floors of the boxes. It transpired that this came from equally tiny blue-grey larvae which must have come in with the fresh twigs. These were smooth, not hairy, and ate from the outside of the bud so they were quickly exiled back to their tree.

After about fourteen days the larvae had become relatively large and were feeding from the outside of the buds. This was just as well as the original twigs were by then somewhat 'grotty', so fresh ones were placed temptingly in contact with the used ones and the larvae needed no persuasion to transfer to the new food. At this stage I transferred them to a larger cage.

The fully grown larvae were flat wood-louse shaped but under the lens were furry and beautifully marked in black and brown. I now provided soft dry leaves and moss at the bottom of the cage and in due course they crawled down and pupated among them, each in a flimsy web cocoon.

As pupation took place about thirty-two days after hatching I began to realise that conditions had been too warm and that I had rather hastened their larval life. All seven butterflies emerged about twenty days after pupation, that was around the end of May, so I had certainly played havoc with their natural date of appearance and it was not an appropriate time to release the butterflies. Nevertheless they were all of full size, five males and two females, and my final disappointment was that they just would not open their wings to be photographed in their full splendour, although I spent a considerable time sitting them in the sunshine on oak leaves smeared with sugar solution which they evidently thoroughly enjoyed.

P. R. Grey (3820)

EXIT SPECIES "X"

The position of 'Chief Bore' in our family carries with it a certain responsibility. Just before bedtime, when my brain is about to collapse after the effort of keeping awake for sixteen hours, my wife has a habit of asking such questions as "What makes a species become extinct?". A favourite lecturer of mine used to refer to such people as possessing a 'Reader's Digest-type mind' (with due respect to that periodical), but as my wife has read *The Doomsday Book* and I still haven't, there are times when I must hold my tongue.

Of course, I could no more serve up the final answer to the extinction question than the next man. But, after years of study in the field and at our work-tables, we ought at least to attempt to draw together the factors we understand to be playing a part in controlling the number of individuals of a butterfly or moth species we see flying every year.

To this end, I set out to construct in schematic form the various factors which my personal experience tell me have a part in the scheme. The number of eggs which a female insect is on average capable of laying is referred to as the 'biotic potential' of the species. The sum of all the factors involved in (subjectively speaking) working against the wish of all eggs to reach reproductive maturity is known as 'environmental resistance'. This latter may also be regarded as a system of taxation in which lives rather than sums of money are forfeited to 'The State' (the environment).

In the schematic presentation (Fig. 1) it is assumed (quite arbitrarily) that each female actually lays 100 eggs, and in so doing realises its full biotic potential. A population of Species 'X' contains 200 individuals of reproductive age, of which 100 (the females) are capable of laying the eggs. 10,000 eggs are therefore laid and these represent the new generation. Some days later the parent insects have all died and environmental resistance has shifted completely from adults to eggs.

At this point the sudden incidence of an 'anti-egg factor' of unusually great proportions can completely eliminate the population. Whilst the eggs of many species are scattered and therefore unlikely to be exterminated en masse by all except the most diligent and numerically abundant of small predators or parasites, a change in the physical nature of the environment can destroy the whole population without (figuratively speaking) even knowing it is there. The same holds true for the other 'early stages', at which however, predation and parasitism often come to occupy a position of no mean importance.

As regards the scheme itself, I simply wrote down the factors that came to mind and, without reference to previous stages and their estimates, I then added an estimate of the percentage of the original number (10,000 being 100%) that I thought might reasonably represent the loss due to the relevant factor. Reaching the last point, I found I had just 7% of the original population surviving to become reproducing imagines.

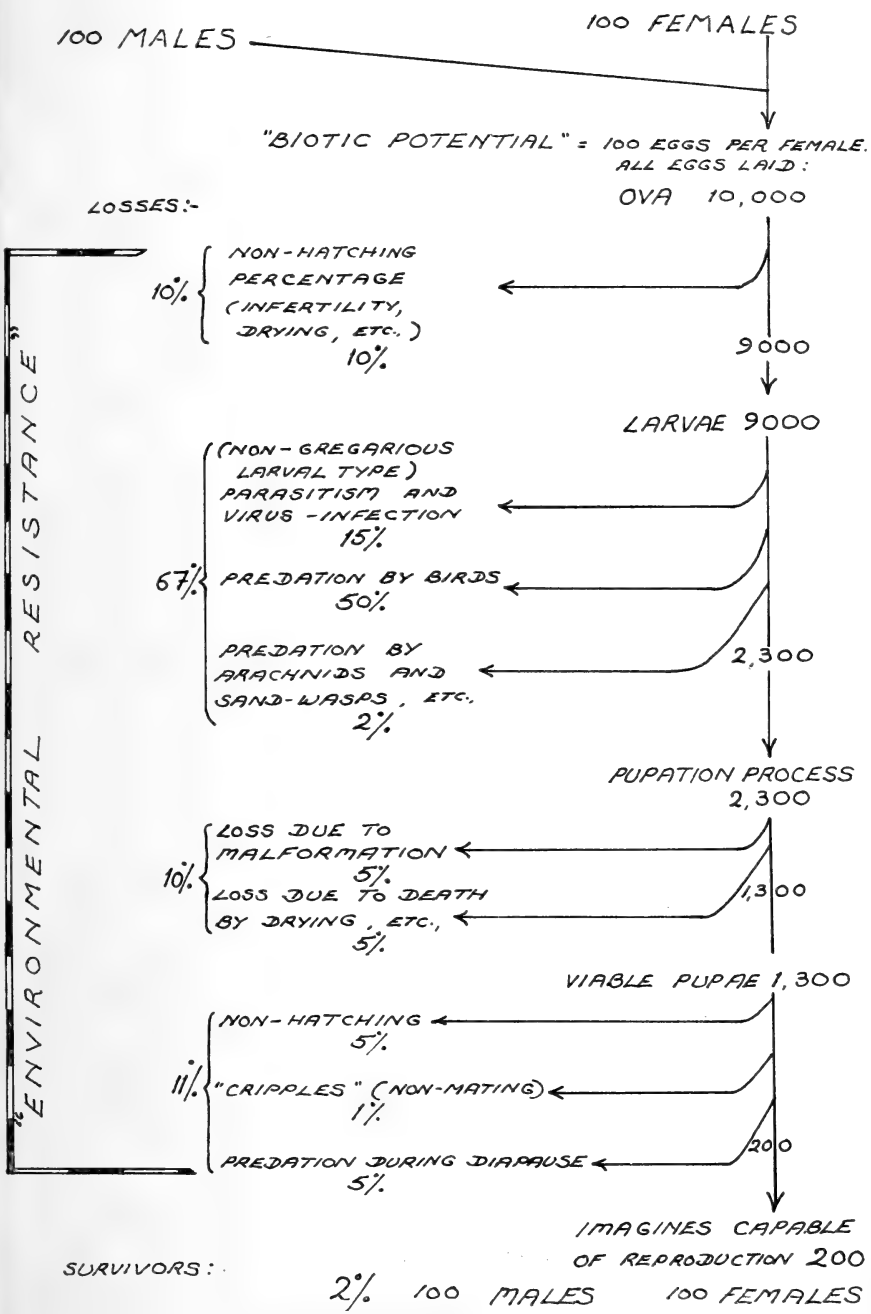

Fig. 1: The principle of a 'balanced' population of a butterfly or moth species. 'environmental resistance' is working against 'biotic potential'.

In the long run for every male and female parent one new male and one new female should survive to mate and lay, thereby over a period of time keeping the population at a virtually constant level. I therefore cheated, increasing the loss due to parasitism of caterpillars to 15%, leaving just 2% surviving.

Certain factors have been omitted. No allowance is made, for instance, for imagine loss prior to reproduction; a factor which could well be of importance when the consumption of night-flying moths (mainly males?) by bats and owls, for instance, is taken into account.

Because the number of species (even of Lepidoptera) is practically legion, somewhere the percentages given for my population of Species 'X' could conceivably apply in practice. Other species, even in the light of the rather sparse quantitative data gathered to date, show themselves to depart so greatly as to seriously upset the scheme of percentages presented. The percentage fatality in larvae of the Large Tortoiseshell Butterfly (*Nymphalis polychloros* Linn.) has in fact long been quoted as being as high as 98%. Clearly in such a case even a relatively small increase in the value of one other unfavourable factor, especially if it is repetitive (e.g. annual), will result in the absence of male to replace male, female to replace female. Such a species would tend to steadily decline in numbers, possibly even to the point of extinction.

Since factors involved in environmental resistance fluctuate greatly from time to time, a system such as that depicted is as a whole in a continual state of change, or flux. In the long run, though, the number of individuals of reproductive age present usually remains about the same. Looked at another way, the environment has reached a 'carrying capacity' for that species. However, it is quite possible for the environment to acquire a new personality, owing to a permanent, or at least long-term, change in the value of some factor. Then the number of individuals regularly present may steadily increase, reach a new level, and establish a new constant about which periodical (e.g. annual) fluctuations will again occur.

Conversely, the continual application of an unfavourable factor at an unusually high level will cause a sort of debilitation of a population, wiping out all except the very fit, or the lucky, and causing a decrease in the number of survivors. When this happens to a great number of the existing populations, it may be the prelude to extinction. As with the famous British Large Copper (*Lycaena dispar* Haw. ssp. *dispar*), male plus female suddenly produces nil.

I personally am of the opinion that selective death due to parasitism and predation is based largely on luck (with certain noteworthy exceptions, e.g. when 'melanics' and 'normals' occur under the same conditions). In other words, the slight individual variation in pattern or behaviour observed in nearly all larvae and imagines is of insufficient magnitude to be of prime importance in deciding which individuals survive and which perish at the hands of predators or parasites.

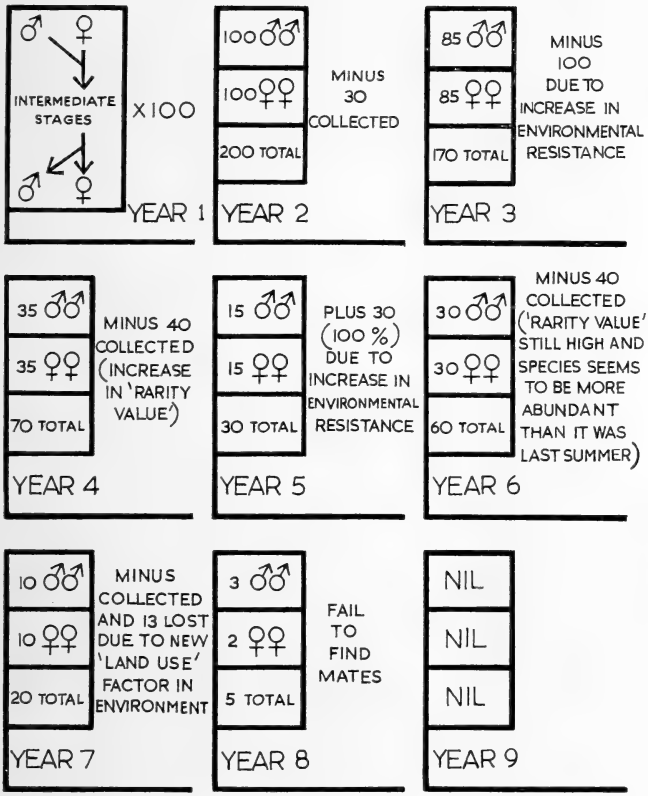

Fig. 2: The final stages in the history of a contemporary population of a butterfly species.
Description and history: An established population of a butterfly, possibly the White Admiral (*Limenitis camilla* Linn.), 200 individuals strong in Year 1, inhabits a small deciduous wood in which the amount of foodplant is not a limiting factor. The locality is widely known among the members of a local natural history society, who have organised field meetings to it on a roughly biennial basis (excluding the war years) since 1890. The wood suffered its last great loss of timber in 1950, when one third was turned into rough pasture for horses.
Note: The losses due to unfavourable factors and numbers collected are probably more than would occur in a natural population. It is assumed throughout that the sexes suffer equally.

Man, from a biological viewpoint unfortunately, presents himself as an all-encompassing unfavourable factor who uses ecological webs for his fiddle-strings. In well-populated countries one cannot easily separate his influence from the rest. Let us consider an example (Fig. 2).

Significant events in the progressive reduction of numbers in the population were likely as follows. In year 4 there was an exceptionally cold early spring following upon the emergence of the caterpillars from

hibernation. Between years 5 and 6 was a favourably mild winter, dry, but not too cold. The population in the summer of year 6 was actually seen to have increased in numbers. In the early spring of year 7 the farmer owning the wood turned his pigs into it. Honeysuckle (*Lonicera* sp.) was routed up, withered, and some larvae starved to death, or were metamorphosed to bacon. Blue-tits (*Parus coeruleus* Linn.), attracted by the abnormal disturbances caused by the pigs, searched the torn-out Honeysuckle for aphids and caterpillars. A boy, highly 'conservation-minded', conscientiously collected no more than two specimens (one of each sex), in spite of being informed by his elders of the abundance of specimens to be had the previous summer (year 6). Mr A even went so far as to say "It's definitely on the increase".

In the autumn of year 9, at an annual meeting, Mr A says he visited the area during June, but was disappointed (his series of 16 'normals' is unhappily still incomplete). Mr B asks, "Do you know where I go for mine?" and produces a map. The boy who caught two specimens in year 7 and was a factor in the decline of the population shows some silk moth pupae he has carefully bred. His biology teacher is unable to give him much encouragement, as the programme of work for 'O levels' is rather tight, so the boy joins a natural history society where he receives tuition and encouragement. This is important. Of the people gathered today at the meeting, he will be the only one alive in forty years time.

The ensuing may be discarded by the scientifically minded as a work of fiction. After all, I invented the population. I invented it, I moulded it, and I made it extinct. But near where I used to go forth into the field there is indeed a small wood. It harbours the White Admiral (*Limenitis camilla* Linn.), or, at any rate, it used to. In about the year 1961 a farmer did turn his pigs into it to rout out the Honeysuckle (which they did), and he did not sound a very friendly man. Someone who saw me in the wood said (under the protection of a dog and barbed wire), "If he catches you in there, kid, you'll be for it. He don't like nobody interferin' with his pigs." I often wonder whether the butterfly flies there still.

Coming in halfway along the process, we might feel inclined to point the finger at climate, or land use, or collection, as the main unfavourable factor at work in the annihilation of my population of Species 'X', and this we must always guard against. Of course, it was a combination of all three. It is unfortunate that by the time we have worked such details out the population will probably have perished. Somebody will possibly have tentatively suggested re-introduction, another will have urged to wait until the long-term effects of such undertakings are known. Our language has thoughtfully prepared itself to meet the needs of both sides: 'He who hesitates is lost' and 'Look before you leap': but I involve myself in matters of conservation, and the question was one of unadulterated extinction.

None of the foregoing exhausts the smallest facet of the issue. It is

fair to say that, short of indiscriminate slaughter by Man, or climatic catastrophe interfering with protoplasm as a whole, a unique set of values must be looked for in every single case.

When this had been said, I thought for a moment before asking my wife a question, "Does it matter if a rare species should become extinct owing principally to over-collecting?".

"It speeds it up," she said. There, at any rate, is food for further thought.

Leigh Plester (2968)

JUNIOR NEWS

Readers will be sorry to hear that Mr Berman has had to give up the post of AES Youth Secretary due to ill health. I am sure that we are all very grateful to him for all the work he has done for the AES.

I have taken over and it has taken me some time to pick up the threads. However, I can now provide a regular 'Junior News' if members will write to me and provide the necessary material to put into it.

The winner of the 1971 Exhibition Junior prize was Keith Porter (4505j) of Cumberland. He exhibited a number of water colour studies of living larvae and pupae of Lepidoptera which he had bred. He also exhibited a small collection of set insects, including dragonflies which were typical examples of Lake District insects.

There will be, of course, a prize at the next Exhibition in the autumn. If you wish to compete for it you must put your exhibit on the Junior Table and label it clearly with your name, address and age. If possible, be by the table when the judging is taking place, usually about 3 p.m. I suggest that original studies rather than rows of set butterflies will be looked upon more favourably. A good subject for 1972 will be examples of insects in your local stream and notes on its state of pollution (or lack of it!). If you took part in the 'Sunday Times River Pollution Project', or have read about it, this is a good guide. This is not, of course, an essential subject, just a suggestion.

Keith Porter reports "collecting in my particular area is real pioneer work, as there are no previous records for West Cumberland that I am aware of. I am friendly with the Insect Curator at Carlisle Museum, which houses all our county's collections. This area is very interesting in that it is the only area in Cumberland for *Maniola tithonus* Linn. (Hedge Brown or Gatekeeper). Another interesting species which does occur locally is *Cupido minimus* Fuessl. (Small Blue); I have seen a specimen which was caught in 1960, probably from the only colony left in the whole of Cumberland.

"The local species of great interest is *Erebia epiphron* Knoch

(Mountain Ringlet). It flies on our Cumbrian part of the Lake District as well as the Westmorland part. To find this butterfly it must be sunny, for it will only fly in sunlight; and so with our notorious weather conditions, one must be lucky to see it!"

Keith is seventeen years old and says that he only knows of five or six active entomologists in Cumberland. He makes up for the lack of fellow enthusiasts by writing to entomologists throughout the country. If anyone would like to write to him, his address is: Keith Porter, 20 Snebro Road, Mirehouse, Whitehaven, Cumberland.

I have, incidentally, seen a collection of Lepidoptera in the Keswick Museum. I have an idea that a list was published in the *Entomologist's Record* about ten years ago. Perhaps someone could help.

Another Junior Member who would welcome correspondents, boys or girls, is Michael A. Smith, 210 Perth Street West, Kingston-upon-Hull, Yorks., HU5 3UB. He is interested in breeding Lepidoptera and also in pond life. He seems to be fortunate in that he has a shed in the garden fitted out by his father as a small laboratory. He hopes that it will be wired up to the mains shortly so that he can have heated cages in which he can breed locusts, mantids and other insects. His problem is excessive heat in summer, which means that his pupae dry up very easily. Does anybody have any good ideas for this? Presumably those pupae which are fastened to the sides of the cages by their silk are the worst off. I should have thought that the use of damp moss, fresh green leaves, and a mist-sprayer should help to solve the problem.

The letters I have so far received have all come from the North of England, perhaps because the members there are more isolated, or is there some more profound reason?

A letter has been passed on to me by Mr Berman from Andrew Kent (4242j) of Bradford, Yorks., and contains so much valuable news that I will have to condense it somewhat, but perhaps I can put some more of it in another News Letter; if I am allowed to write one!

Andrew says in his letter "I am using the AES *Checklist of British Macrolepidoptera*, and arranging my specimens in the same order as they come in this Checklist. Where there is only one known form of a species I will only keep one specimen in the reference collection, but in species with different males and females, e.g. *Lymantria dispar* Linn. (Gipsy Moth) there will be one good specimen of each sex. If there are many varieties, the best known ones which are as common as the ordinary example or nearly so will be put in; any acute or rare aberrations will be set aside in a special box for aberrations, freaks, subspecies, etc.

"Regarding livestock, numerous species have been and gone recently; I sometimes sell off excess. To a large extent this is to establish contacts with other entomologists who can provide me with other species and information. There are some species that I would be happy to give away, but do not, for it is only when people have to pay, I have found, that they realise the value of the creatures. Whenever they get

them free, they neglect them, thinking 'Never mind, he'll give me some more . . .' and I most certainly will not if the first lot have been mishandled.

"In 1969 my privet supply must have had something wrong with it, for my entire Indian stick insect stock died off, leaving just a few infertile eggs. At the moment I have about 600 eggs of the Indian stick insect, and about a dozen or so healthy egg-laying adults. A friend who bought some nymphs last year now has a further 300. By the time you receive this letter (October) the number may be over a thousand altogether. I must confess that I only feed them once a week, but I find it quite sufficient if the new food is always perfectly fresh and not wet or limp."

Andrew goes on to say that the best food plant for these insects is lilac, rather than privet. The local lilac bushes must take a thrashing!

As Juniors have a habit of growing up and my present three correspondents will soon no longer be Juniors, I very much require others to write to me. You will find my name and address on the inside of the cover of the Bulletin. All letters will be answered, as soon as I can.

D. Ollevant (1514)
AES Youth Secretary

ANNUAL EXHIBITION, 25th SEPTEMBER, 1971

This was our third Annual Exhibition at the Holland Park School and the five halls were fully utilised. Upwards of 2,000 members and friends attended and the enthusiasm shown left no doubt as to the increasing interest in the wildlife of both our country and overseas. Not least among the facilities available was the excellent catering service from mid-day onwards, provided by the ladies.

The one disquietening feature was the disparity in numbers between the complete range of commercial features and the personal exhibits provided by members. It is appreciated that the Exhibition offers a unique opportunity for inspecting and purchasing the equipment and tools of our trade and also meeting friends but basically the intention is to keep in touch with the activities of other entomologists.

Possibly one of the main reasons for this trend is that many members have insufficient leisure to prepare and present an elaborate exhibit. To encourage members with small individual exhibits to feel that they are making a real contribution, the Council has decided to re-introduce a scheme which was successful in the immediate post-war years. A theme is being suggested so that members can expect to find other exhibits related to their own. The theme for 1972 is Back Garden Entomology and it is hoped that as many members as possible will contribute something to a comprehensive exhibit.

Activities presented by the Society included: a film show of some of our coloured slides together with others of special interest lent by members, the sale of members' surplus equipment by Mr P. Taylor, the proceeds going to the Society's funds, a demonstration of genitalia dissection by Mr. Richard Dickson, to assist in the identification of similar species and lastly, the special prize for the most interesting exhibit provided by a junior member. This was awarded to K. Porter (4505j) for his fine drawings from life of butterflies, larvae and pupae.

As in past years, we are giving brief details of some of the exhibits for general interest and also as a guide to members intending to take part in the 1972 Exhibition.

AES CONSERVATION GROUP. Details of aims and activities.

APPLETON, D. (3631) Series of long-horned beetles (Longicornia) from Hampshire localities.

BANCE, R. G. (4560) Early stages of Elephant Hawk Moth (*D. elpenor* Linn.).

BENHAM, B. R. and MUGGLETON, J. (3253). Studies in the ecology of lady-birds (Coccinellidae) with full illustrations.

BRADFORD, E. S. (3068) Smaller moths (microlepidoptera) bred from localities in the home counties.

BRITISH BUTTERFLY CONSERVATION SOCIETY. Details of this Society's activities. Also ingenious method of breeding the Large Blue butterfly (*M. arion* Linn.) in small plastic boxes utilising half a walnut shell as the ants' nest.

COOK, P. L. (3916) A collection of British Coleoptera and a detailed life study of *Gnorimus variabilis* Linn.

COOTER, S. (3290) A selection of typical Coleoptera to be looked for in Britain.

CRIBB, P. J. Butterflies collected in Peru and Bolivia during a recent botanical expedition.

CRIBB, P. W. (2270) Butterflies taken during expeditions to the Isle of Corsica, The Dauphine (France) and the Hautes Alpes. Full reports are appearing in the *Bulletin*.

CURRIVAN, N. Paintings of Meadow Brown butterfly (*M. jurtina* Linn.) from one of our very young members.

DICKSON, R. (3881) Series of British moths to illustrate salient points of difference between allied and similar species.

ELSE, G. R. (3881) Larvae and imagines of the Swallow Prominent moth (*P. tremula* Clerck.) and the Lesser Swallow Prominent (*P. gnoma* Fab.) for easier identification.

EXOTIC ENTOMOLOGY GROUP. Formerly the Silkmoth Rearers' Group and now extended to cover a wider field. The Section showed live material and slides. Also a humidifier for simulating tropical conditions when breeding relevant species.

GARDINER, B. O. C. (225) A wide range of silkmoths (Saturniids) successfully bred in this country.

HEATH, G. (4409) and HEATH, JUDY (4573). Types of Praying Mantids (Orthoptera) from several regions.

HILLIARD, R. D. (99) Moths normally seen in the early months of the year in the Stanmore (Middx.) district.

KITTLE, W. Macro- and micro-lepidoptera of special interest.

LLYN-JONES, A. (4172j) Butterflies seen when on holiday in the Austrian Tyrol.

LOW, A. M. A. A striking and comprehensive collection of Papilionidae (Swallowtail butterflies) with some emphasis on geographical forms.

MARDLE, K. W. (4668) A representative series of Diptera.

MCCORMICK, R. F. (3375) and PENNY, C. (3880). Three collections covering moths attracted to sugar this year, local species of moths recorded in 1971 and varieties of Lepidoptera found over the last few years.

PEYER, R. and A. de (4319j) Butterflies collected in the French Pyrenees.

PORTER, K. (4505) Detailed drawings of all stages of butterflies occurring in the Northern Counties of Britain.

SADLER, E. A. (2966) Lepidoptera and photographs taken in the Burren area of Co. Clare. Also a typical wasps' nest.

SKINNER, B. F. (2470) Bred series of British moths with local distribution. Also a specimen of *Celerio galii* Rott. (Bedstraw Hawkmoth), an immigrant species, taken this year.

STUBBS, A. E. Ecological distribution of Tipulidae (craneflies) on chalklands at Sheepleas, Surrey, showing sections from the sallow areas in the valley to the high beech woods.

TREBILCOCK, G. D. and LOW, A. Specialist's collection of Ornithoptera.

WARREN-SMITH, C. D. (3908) Butterflies from Andorra, Spain including specimens, prints and map. Also butterflies taken on a short visit to Stromboli, Italy.

WILSON, T. and WATERS, M. Representative collection of Coleoptera.

ZOOLOGICAL GARDENS. As for many years, the Curator of the Insect House, London Zoological Gardens, showed live specimens of many striking insects and other orders.

R. D. Hilliard (99)

LETTERS TO THE EDITOR

Another dwarf Orange Tip

Dear Sir,

In the November 1971 edition of the AES *Bulletin* Mr K. A. Moseley (4733j) reported the capture of an unusually small male Orange Tip butterfly (*Anthocaris cardamines* Linn.) with a wingspan of only 34mm. The normal wingspan is over 40mm.

I would like to report the capture of a dwarf female Orange Tip

with a wingspan of 32mm, which I still have in my collection. This was found on April 8th 1964 on a window-sill in my sitting room, early in the morning, before any windows had been opened. It is possible, but I think unlikely, that it flew in the day before. The only plant in the room was an Azalea, not a likely foodplant. Where it came from is a mystery.

Many books record varieties of the markings of the Orange Tip, but I can find no mention of variation in size. I would welcome any helpful comments from your readers.

S. H. G. Humfrey (2988)

Ford (1945) records that dwarf specimens of the Orange Tip have been reported from many localities and that they appear in advance of those of normal size. He suggests that this is due to a recessive gene which speeds up development, so that the larvae do not attain their full growth.

Presumably, if this is so, breeding from these dwarfs would produce 25 per cent dwarf specimens in the F_2 generation. Why not try it if you come across one?

Ed.

REFERENCE

FORD, E. B. (1945). *Butterflies*. Collins, London.

Trade exhibits at the AES Exhibition

Dear Sir,

I am sure that the remarks on this subject by Mr Martin Hough (Exhibition Secretary) in AES *Bulletin* No. 294 will be echoed by all the traders who have supported the AES over the years and have the Society's welfare at heart.

Let me make it clear that my words are not prompted by any selfish thought of gain by the restriction of competition, in fact I should not like to think that it would be impossible for any new firm to be included on the Register once it has been compiled, but the exhibition has rather tended to get like an Eastern Bazaar, to the detriment of the purposes for which it is really intended, i.e. the encouragement of amateur entomology through the display of materials which have either been bred or captured by members, apparatus of the home-made sort, demonstrations of setting and other techniques, etc., etc.

As a very early member of the AES and an Exhibition Secretary of pre-war vintage, I have seen the Exhibition go from strength to strength. I also feel sure that the move to the present venue has been of great benefit. We must not risk sacrificing the advantages gained by failing to take action against undesirable developments which could, if allowed to continue and increase, eventually destroy the exhibition. I congratulate Mr Hough on his bold approach by speaking out in time and stating

somewhat unpalatable facts without rancour or offence.

Let us hope that 1972 will see a bumper exhibition, both in numbers attending and in private members' exhibits.

E. W. Classey (46)

Collecting v. Photography

Dear Sir,

It has been suggested, not once, but several times, that the insect collector is the immature adolescent in the development of the amateur entomologist. In actual fact, the true function of the amateur is presumed to bear little or no relation to what seems to me to be the core activity of amateur entomology. The amateur, contrary to what we have all assumed to date, seeks solace in photography: the collection, not of insects, but of photographic slides. While I agree that development and maturity are vital if interest is to be sustained, it seems to me that development is retrogressive if one is led to swop one's net for a camera.

One question that may be asked is whether collecting, as distinct from entomology, is a sport? But first, can one distinguish collecting and entomology? A lot of people seek to do just that, though perhaps not so much in this country. Certainly, as an entomologist, one would find it extremely difficult to avoid collecting in some degree, however one defines it; whether you collect in the field or purchase specimens from suppliers. This compulsion is not concerned with the temperament of the entomologist but with the need to have some tangible focus for research or study. Can one collect and yet fail to practice entomology in any degree? Yes, you can. While successful collecting requires a knowledge of food plants, local characteristics, distribution and identification—in its pure state it does not involve science. Is this an appropriate distinction? For the professional, the scientific element is paramount. For the amateur, who may lack any scientific training, the scientific element will be much restricted (except in a few exceptional cases). For the collector, the scientific element is shunned in favour of a more aesthetic approach. Freedom of action is the blessed gift of all men and if an individual should feel the need for this form of spiritual stimulation then there is no argument which can seriously seek to condemn his actions. But there is no suggestion that this will manifest itself in unconstrained destruction. Someone who turns to collecting as a source of release is likely to be someone with balance and an appreciation of the ecological circumstances. If destruction is sought, it can be sought much more vividly in other fields.

In this sense can collecting be viewed as a sport? Certainly it exhibits two of the definitive features of a sport, the element of uncertainty and something to be killed. But it lacks the competitive element, except to the extent that people introduce a quasi-competitive element, if competition is assumed to be necessary to pure sport. To say that there

is something to be killed, and so imply that some people may be attracted to collecting as a means of satisfying whatever sadistic tendencies they may secretly nurture, may be an inappropriate expression. But the essential is clear; the ultimate death of one's object of search is a signal, mediaevally crude though it may be, of one's conquest. With this element in mind, the pure and simple collection of insects is to be deplored not only from a conservation point of view (if one assumes that collecting is a cause of insect population depletion and there is no clear evidence of this) but from a social morality point of view.

This leaves the element of uncertainty. This more than anything else seems to commend collecting without the practice of entomology. There is an undefinable excitement and absorption inherent in the very act of chasing a butterfly, or, for that matter, in seeking out any insect. The ridiculous aspect of the collector who appears to race across the meadows flailing his net in apparently lethal fashion is forgotten in the all-embracing commitment to capture and to triumph. But this triumph, being hard won, is long cherished and one's object carefully treasured. Not for the collector the plunder of victory; for him there is only humility and respect. What greater honour is feasible? It is here that my objection lies. No camera, no photographic skill can replace this glorious uncertainty. One's senses are so cluttered with technical considerations that the essential simplicity of the act is lost. While photography may be an approach of its own, it is not an alternative to collecting.

Michael Coleman (4187)

Setting boards

Dear Sir,

Mr Prior's letter in the August *Bulletin* anent setting methods leaves me unabashed. Readers with a reasonable amount of skill should follow Mr Finbow's advice and try making their own boards. I used his alternative method, but as stated in my letter of November last, I use balsa wood.

I have no use for paper covered cork boards. Have you ever tried to put a No. 18 black pin into a cork or composition board? One big advantage with balsa is that it lends itself to a wide variety of groove widths, unobtainable in bought ones. I observe that Mr Prior repapers his boards after three pinnings: I have a better use for my spare time. Some of my boards have several hundred pin holes in them with no adverse effect on subsequent settings. They will be good for many years yet.

I am not hidebound, see my use of balsa boards, nor are my methods 'Holy Writ', merely the result of 70 years experience.

Any challengers?

L. G. F. Waddington

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No. 296
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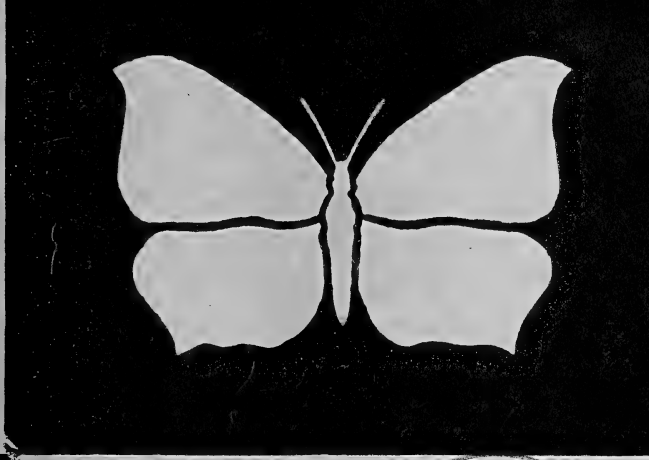
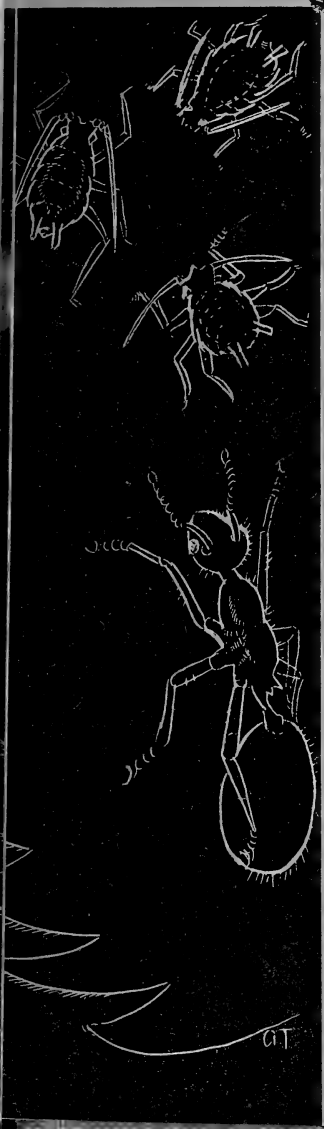
AUGUST 1972





THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

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EDITED by PAUL BOSWELL, MB, ChB, FRES.

AES NOTICE—where to write

Membership applications and first subscriptions to:	D. Keen, *3 Woodbourne, Farnham, Surrey.*
Changes of address and non-arrival of Bulletins to:	P. W. Cribb, *355 Hounslow Road, Hanworth, Feltham, Middlesex.*
Advertisers and for Prospectus of Society and Application forms to:	R. D. Hilliard, *18 Golf Close, Stanmore, Middlesex.* 01–954 0460.
Manuscripts, drawings and books for review to:	P. A. Boswell, *Bacteriology Department, St. Bartholomew's Hospital, London, E.C.1.*
Subscription renewals (£1.25 per annum, 0.63p under 18 years) to:	N. H. Cooke, *36 Glendarvon Street, London, SW15 1JS.*
Youth matters to:	D. Ollevant, *95 West Heath Road, Farnborough, Hants.*
Annual Exhibition matters to:	Martin Hough, *44a Windmill Hill, Ruislip Manor, Middlesex.*
Offers of help, queries, etc. to the Hon. General Secretary:	G. Prior, *23 Manor Way, North Harrow, Middlesex.*

SUSSEX ODONATA SURVEY. Information sought for Sussex Trust for Nature Conservation survey of dragonflies in Sussex. All records useful, however old. Also wish to contact anyone willing to help in the survey. David Chelmick (4663), 31 Wolstonbury Court, Burgess Hill, Sussex.

WANTED: Butterflies of the British Isles (South); Caterpillars of British Butterflies (Stokoe); Caterpillars of British Moths (Stokoe). Please write stating condition and price. Philip Jenner (4647), 40 Nursery Road, Bishop's Stortford, Herts.

WANTED: 10 to 15 drawer butterfly cabinet. Also wanted vols. 1 and 2 of Moths of the British Isles, by Richard South. Condition and price to R.R. Smith (4695J), Killingsough Farm, Fernyhalgh Lane, Fulwood, Preston, Lancs., PR2 5SU.

WANTED: Bees, Wasps, Ants and Allied Insects, by E. Step (Warne, 1932). Any edition. Please write, stating price, to T. Blackman (4814J), 72 Cross Lane East, Gravesend, Kent, DA 12 5HB.

WANTED: Good second-hand kite net with serviceable bag. David W.P. Sneath (2857), 65 Stoughton Road, Oadby, Leics.

FOR SALE: Livestock and entomological equipment. Write for complete list, specifying for which, to T. Blackman, address above.

LIVESTOCK FOR SALE: Orders now being taken for the following ova. Prices per dozen unless otherwise stated. Poplar Hawk 10p, Lime Hawk 10p, Eyed Hawk 17p, Elephant Hawk 20p, Puss 15p, Emperor 15p, Brindled Beauty 10p, Pale Tussock 11p, Garden Tiger 30p for 50, Melanic Peppered 20p for 50. Foreign silkmoths: *Antheraea pernyi* (var. *harti*) 12p, *Phyllosamia cynthia* 15p. Please send S.A.E. for annotated price list. Stephen Fry (4302), 1 Parkstone Delph, Gleadless, Sheffield, S12 3HZ.

WANTED: Wild or locally bred livestock of any stage of the Magpie Moth (*Abraxas grossulariata*) throughout the year, in quantities large or small. Please write stating price and numbers available. C.R.M. Stribling, 32 Streetly Lane, Four Oaks, Sutton Coldfield, Warwicks.

LIVESTOCK FOR SALE of Indian Moon Moth and Assam Silkmoth. Also a few papered specimens of silkmoths and Malaysian butterflies. Send S.A.E. for lists. C. Johnson, 7 Hoppet Lane, Droylsden, Manchester.

LIVE GLOW-WORMS WANTED. Will refund postage and packaging costs. Please include date and place obtained and any other information. J.D. Pratt (4479J), School House, Leighton Park School, Reading, Berks.

WANTED: Identified or unidentified fungus-gnat larvae (Mycetophilidae: Diptera), alive or dead. Required for systematic study. S. Trifourkis (4258) Department of Biological Science, North East London Polytechnic, Romford Road, London, E.15 4LZ.

STUDENT TEACHER/MEMBER requires advice and/or livestock of large, colourful beetles suitable for class-room breeding by young children. Also eggs of any easy, small moths as food source of small types of frogs and toads. Anthony G. Perry, 12 Tybenham Road, London, S.W.19 3LA.

WANTED: Beetle specimens, with data, especially Pyrochroids. Will exchange for papered Scottish Lepidoptera. E. Pickard, 105 Kirkhill Road, Aberdeen, AB1 4ET.

OVA FOR SALE: per 20: Indian Stick Insect 6p, Cinnabar 9p, Buff Ermine 9p per 10: Privet Hawk 10p, Assam Silkmoth 6p. Postage 4p each. M. Payne (4673J), 17 Manor Drive, Birchington, Kent.

WANTED: Livestock (preferably) of any stage of hawkmonths, particularly the species not resident in Britain, in exchange for other livestock or for cash. D.J. Boucher, 18 Old Market Place, Harlston, Norfolk. Tel. 037985 888, any time.

WANTED: Living mantids (ootheca or young nymphs); also stick and leaf insects, other than A. titan and C. morosus. Please write, stating species and price. D. Solman, 30 Hall Road, Hull, HU6 8SA.

WANTED: Information on known localities and aberrations of the Cabbage Moth, Mamestra brassicae. D. Hodges, 20c Barcombe Avenue, Streatham Hill, London, SW2 3AY.

WANTED: Nymphs of praying mantids, any species. State price and number for sale to Clive Bickley, 4 Durham Close, Midway, Burton-on-Trent, Staffs.

NEW INSECT SERVICE... open May 5th to August 11th. Going on holiday and don't know what to do with your livestock? Send to above address. Fees 25p per two weeks, each species; reptiles considered. Write now and book, giving details. W. Caswell, 46 Lewgars Avenue, Kingsbury, London, N.W.9.

STICK INSECTS FOR SALE: Nymphs of Indian Stick Insect (C.morosus) 10p per dozen post free. K. Jones, 19 Little Oxhey Lane, South Oxhey, Watford, Herts.

FOR SALE: Butterflies from Malaya, Mexico, India, South America. All reasonably priced. 3p for list. G.D. Trebilcock, 42 Normandy Avenue, Barnet, Herts.

WEST OF IRELAND. R.W. J. Uffen wishes to contact anyone going to the Killarney district and likely to have room to bring back a petrol generator and other equipment stranded there. Use of lamp and generator might be arranged.

WANTED: 10 or 15 drawer entomological cabinet. Within reasonable reach of Preston in Lancashire. R. Smith (4695J), Killingsough Farm, Fernyhalgh Lane, Fulwood, Preston, Lancs.

HAWKMOTH AND TROPICAL SILKMOTH livestock for sale, including A.selene, M.cecropia, S.pyri, A.pernyi, P.canningi, S.ligustri, L.populi, S.ocellatus and many more. S.A.E. for list to P. Woods, 513 High Road, Harrow Weald, Harrow, Middx., HA3 6HL.

FIELD STUDIES COUNCIL field courses in 1972 include the following entomological ones. 6-13 Sept. Betws-y-coed, Field Entomology (P. Skidmore). 16-23 August. Flatford Mill, Essex, Introduction to Insects (D.M. Waghorn).
23-30 August, Juniper Hall, Surrey, Insect Study Course (J.M. Chinery).
9-16 August Taunton, Somerset, Butterflies and Moths (J. Heath and J. Reid).
23-30 August Malham Tarn, Yorks., Flies, Midges and Gnats (R.H.L. Disney).
Further details of FSC courses from Information Office, Field Studies Council, Preston Montford Hall, Montford Bridge, Shrewsbury, SY4 1DX.

AES WANTS AND EXCHANGES LIST NO. 97 is due for publication on 1st August, 1972. Entries should reach R.W.J. Uffen (1660), 4 Vaughan Avenue, Stamford Brook, London, W.6. by 10th July. Advertisements of items for sale are charged at 1p per word, and are for the personal use of members only. Make all monies payable to the Society.

WANTED: 50 - 100 pupae of large or small Yellow Underwing moths (Noctua pronuba and Panemaria tenebrata). R. Harrington (4678), 5 Freemantle Road, Weymouth, Dorset.

FIELD MEETINGS

AUG. 13th Sun. 'An introduction to the study of Diptera in the Field'.
A. Stubbs Meet Bookham station. 11.00 a.m. (W'loo.10.14.a.m.)

SEPT. 10th Sun. 'An introduction to the study of Coleoptera in the Field'.
S.A. Williams Meet Sandwich station. 11.20.a.m. (W'loo. 9.13.a.m.)

AES BULLETIN

No. 296
AUGUST 1972

EDITORIAL

In this edition there appears *A Code for Insect Collecting* which has been produced by the Joint Committee for the Conservation of British Insects. The AES Council has decided that it agrees with this code in principle and would recommend it to all members. There are some minor points with which some of us will of course disagree. For example the Committee has decided to list only species of macrolepidoptera as being in danger. It seems a pity that other threatened insects such as the Silver Water Beetle (*Hydrous piceus* (Linn.)) are to be denied official recognition. I shall be very pleased to receive members' views on the 'Code'.

What do you think about the trade in dead insects? It seems a great shame that entomologists are willing to pay money for specimens for their collections, thus reducing their hobby to mere 'stamp collecting'. Exchange and donation of entomological material, living or dead, is of course essential, but does money have to change hands?

Paul Boswell (2853)

COLLECTING NOTES — AUGUST 1972

The smaller moths

The three drawings by Mr E. S. Bradford which accompany this article are of moths which belong to widely separated genera. The first is of *Carcina quercana* Fab. This is one of our commonest and prettiest species of microlepidoptera. It is likely to come to the attention of any observant person, for it frequently visits lighted windows between late July and September. The forewings are pale yellowish orange with markings of greyish purple, deeper yellow, brown and carmine. Some specimens are of a much richer colour than others. The hindwings have a satin texture and are of a delicate yellowish white. The pale yellowish antennae are very conspicuous, being unusually thick and as long as, or longer than, the forewings. The pale green larva feeds in late spring on a number of trees, including Oak (*Quercus* spp.), Beech (*Fagus sylvatica* Linn.), Apple (*Malus* spp.) and Sycamore (*Acer pseudoplatanus* Linn.). It lives beneath a web spun on the underside of a leaf, generally in an angle of veins.

The second drawing is of *Scythris quadriguttella* Thumb. (*chenopodiella* Hübn.). Mr Bradford used to find the moths resting on the white walls of his greenhouse in June. The forewings are shiny vandyke brown and the zig-zag streaks and blotches are creamy buff. The larva feeds on *Chenopodium* and *Atriplex* spp. in May and August, making a web amongst the flowers and shoots. The second flight of moths is in September.

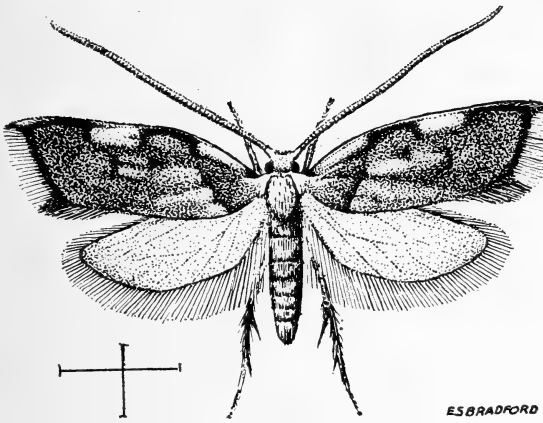
The third drawing is of *Pammene fasciana* Linn. (*juliana* Steph.). I mentioned this moth briefly in these notes last August, but as I find I have written about some 300 species in the last six years, perhaps I may be forgiven for occasional repetition, especially as there was no illustration of *fasciana* last year. The forewings are creamy white, heavily mottled wih bluish grey on the basal patch, costa and termen. The ocellus, which contains a vertical row of elongated black spots, is outlined by a dull metallic blue; the terminal cilia and one or two costal streaks above the ocellus are similarly metallic. There are two or three conspicuous black spots, one above the other, just before the ocellus. The hindwings are blackish fuscous.

The larva feeds in acorns and Spanish chestnuts. Then, according to Ford (1949), it makes a strong cocoon on the ground. However, this is not always the case, for it also pupates in the living bark of oak trees. My journeys often take me past a common in north-east London and I sometimes stop there for a walk. For several summers I was puzzled by empty pupa cases projecting from oak bark, but at last, in mid-July 1969, I was there when the moths were emerging and I found them to be *fasciana*. I boxed four which were still drying their wings close to the pupal skin, but those which had completed this process were too frisky and flew away before I could get near them.

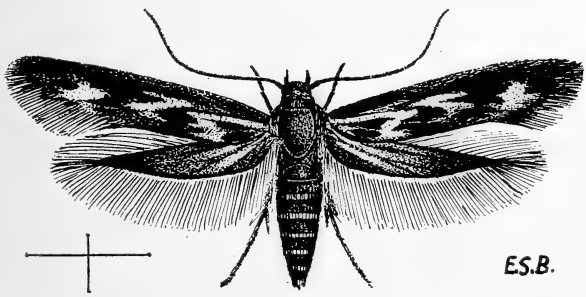
August and September are the months in which to find the larvae of most of our species of *Bucculatrix*. As a rule they start as leaf miners, constructing a short, narrow gallery resembling a miniature *Nepticula* mine. They leave their mines when they are ready to change their skins for the last time and construct a small circular cocoon on a leaf for this purpose, curling up like a horseshoe inside. After the moult, they emerge from the cocoon and feed externally on the underside of the leaves. At this stage they drop off at a touch and are therefore best obtained by beating. When full-grown, they spin rather long, narrow, ribbed, whitish cocoons on almost any convenient surface: in captivity they choose leaves, twigs, tissue or the walls or lid of their container, whilst in the wild the cocoons may sometimes be seen on tree trunks.

The best plan of campaign is to learn to recognise the mines; then, having located the mines, which will probably be vacated, you can start beating. To this end I shall now describe the mines, confining myself to those species which feed on trees.

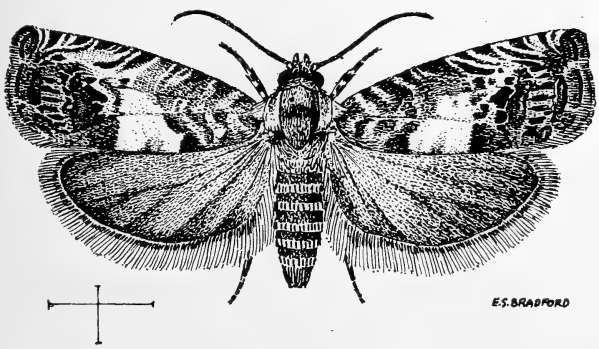
Bucculatrix frangulella Goeze (*alnella* Vill.) feeds on the buckthorns (*Rhamnus catharticus* Linn. and *Frangula alnus* Mill.). The mine starts



Carcina quercana Fab.



Scythris quadriguttella Thumb. (*chenopodiella* Hübn)



Pammene fasciana Linn. (*juliana* Steph.)

as a small, compact spiral which appears as a purple spot on the leaf. The chamber, that is the piece of mine last occupied by the larva and free of frass, breaks away from the spiral. This is a very common species.

B. albedinella Zell. (*boyerella* Dup.) feeds on Elm (*Ulmus* spp.). The mine is a fine, irregular gallery, with the frass disposed in a thin, interrupted central line leaving clear margins. A curious feature is the larva's habit of changing its mind. Having started mining in a certain direction, it pulls back about a millimetre and then strikes off at right angles on a new course, leaving a frass-free spur projecting from the mine. There are nearly always two of these spurs and I suspect that they mark the first two moults.

B. cidarella Zell. feeds on Alder (*Alnus glutinosa* Gaertn.). The mine is a small, narrow, irregular gallery resembling that of the previous species without the spurs.

B. thoracella Thunb. feeds on Lime (*Tilia* spp.). I have not yet met the imago, its larva or its mine. According to Meyrick (1928) its range is from Gloucester to Derby and Lancashire.

B. ulmella Zell. feeds on Oak. The mine is very small, generally alongside the midrib and completely filled with frass, thus being hard to see. The chamber, however, generally gives it away, for it projects out into the blade of the leaf and is transparent. It is often angled and the sides are irregular. There are usually several mines in the same leaf.

B. crataegi Zell. feeds on Hawthorn (*Crataegus* spp.). The mine is rather similar to that of the previous species, but is sometimes situated away from a rib, and the frass is less densely packed. The larva's season is relatively early and unless this issue reaches you by the beginning of August, you will be too late for it this year.

B. demaryella Dup. feeds on Birch (*Betula* spp.) and Hazel (*Corylus avellana* Linn.), but I only possess examples of the mine on Birch. It is very small, forming a narrow gallery completely filled with frass. At first the course is extremely irregular, twining back on itself repeatedly, but not in a neat spiral like *frangulella*. This section forms a brown blotch, reminiscent of that made at the start of its mine by *Nepticula continuella* Stt. The gallery straightens out in the chamber, which is unusually long and narrow.

A. M. Emmet (1379)

REFERENCES

FORD, L. T. (1949). *A Guide to the Smaller British Lepidoptera.* The South London Entomological and Natural History Society, London.

MEYRICK, E. (1928). *Revised Handbook of the British Lepidoptera.* Watkins and Doncaster, London (reprinted 1967, E. W. Classey).

SO YOU WANT TO STUDY BEETLES
PART IV (Concluded) BEETLES ASSOCIATED WITH WOOD

C – *CLAVICORNIA*

This superfamily contains all those beetles with clubbed or unusual antennae, but it has tended to become a rag-bag for those beetles that cannot readily be assigned to one of the other superfamilies. Fowler (1887-1913) divides the superfamily into Clavicornia and Serricornia, which also includes the Elateridae.

Joy (1932) covers the same ground with four superfamilies: Malacodermata, Sternoxia (Click Beetles), Teredilia and Clavicornia. Crowson (1956), however, assigns the whole complex into twelve superfamilies. This difficulty of classification will be fully discussed later in this series. In this paper I have for convenience followed Joy.

Many members of this superfamily are found in rotten wood or under bark; however not all feed on timber. Some are in the wood in association with ants, whilst others are present in the tunnels of the larvae of other beetles on which they are parasitic, notably on Cerambycidae and Scolytidae. I have no doubt that those which are wood feeders can be bred, if correct humidity conditions can be attained, in the glass cells already mentioned in the previous article. However no precautions should be taken against fungi as it is likely that many of the species found in rotten wood or under bark feed on the minute fungi found there or at least need the fungus in addition to the wood. If serious fungal infestation threatens these larvae, a short temporary drying out of the wood may control it. Larvae living under bark can usually stand drying out for a short period as this often happens naturally during warm weather. I have not been very successful in my few attempts at breeding these species, but patience should be rewarded as little is known of their life histories.

D – *TEREDILIA*

Most of these beetles occur either in association with dry dead timber or grain and seeds. Included are the Powder-post Beetles (*Lyctus* spp.), Furniture Beetles (*Anobium* spp.) and the Death-watch Beetle (*Xestobium rufovillosum* (De G.)).

Lyctus fuscus (Linn.) is fairly common. Fowler says it is found in freshly cut oak saplings, on trees and under bark, especially Oak (*Quercus* spp.) and Beech (*Fagus sylvatica* Linn.). Linssen (1959) states that the larvae burrow in living sapwood, mainly Oak but also Beech, Walnut (*Juglans regia* Linn.) and others. If they do only feed in living sapwood they will be difficult to breed, but I suspect that they will feed on freshly cut sapwood. The name Powder-post Beetle comes from the nature of the very fine powdery detritus from the borings.

Anobium punctatum (De G.) is the only really common member of

its genus. They are all found in old wood or dead hedges, but *punctatum* also attacks furniture, rafters and floor-boards. The female lays her eggs on rough surfaces of dried out sapwood or the unpolished parts of domestic wood. Old holes also are used for reinfestation. In the wood, borings are made in any direction. Finally the larvae burrow to just below the surface, where they pupate. Usually the life cycle takes about two years indoors, but is believed to be more rapid outside.

It should not be difficult to breed this beetle in suitable veneers, especially as the female will oviposit in holes. Introduction of a gravid female into a hole prepared in a veneer between glass plates should be sufficient. (For information about this type of breeding cell see Butterworth, Kay and MacNulty (1966).) The veneer plates should be kept in a close-fitting tin or plastic box so that you do not ultimately infest your home or furniture. In the case of this beetle, do not free mature beetles as there are quite enough of them around already!

Xestobium rufovillosum (De G.) (Death-watch Beetle) attacks old wood, particularly Oak which may be several hundred years old before it is attacked. It also occurs in old trees, in the dead branches of Oak, Willow (*Salix* spp.) and others. It appears that certain wood destroying fungus must be present if the larvae are to survive: the length of the life cycle varies from ten months to three years, depending on the concentration of this fungus. Dampness, stagnant air and periodic soaking with water all render the timber more susceptible to attack. If you search in May and June the floor of an old church beneath the main roof beams, you will often find this beetle.

Breeding this species should not be too difficult, but it would probably need a supply of previously infested wood to ensure the presence of the fungus.

There are a number of wood feeding members of this family, but it is not possible to mention them all. In any case the general features of breeding each species would tend to be mere repetition. It must be mentioned that rearing methods must not be used blindly but carefully adapted to the environment in each case.

E – *ELATERIDAE*

Nearly all the species of the genus *Elater* pass their early stages in decaying Oak or Birch (*Betula* spp.). Some are very particular and seem to require very old Oaks, feeding on the inside of the hollowed out trunks. The commoner species like *E. balteatus* Linn. should not be difficult to rear and with appropriate apparatus their habits could be observed.

Ischnodes sanguinicollis (Pz.) is a beautiful beetle found in rotten trees, particularly Elm (*Ulmus* spp.), Oak and Maple (*Acer campestre* Linn.). On two occasions I have found it common in Poplar (*Populus* spp.). The beetle appears to emerge from its pupa in the spring and to

take shelter deep in the chinks in the bark of the tree, very often at the far end of woodlouse workings; it appears to be tolerant of and tolerated by these creatures. Breeding apparently takes place inside the rotting tree.

Megapenthes spp. and *Ludius* spp., which according to Fowler are all rare, occur in rotting timber. So do *Melanotus rufipes* (Hb.) and *M. castanipes* (Pk.). *Athous rhombeus* (Ol.) breeds in decaying trees and logs. It is most readily found by searching suitable trees at night. *Denticollis linearis* (Linn.) breeds in old birch stumps.

F – *LYCIDAE*

The three very beautiful scarlet members of this family, *Dictyopterus aurora* (Herbst.), *D. affinis* (Pk.) and *Platycis minuta* (Fab.), are found and apparently breed, in spruce, oak and fir stumps respectively. They are usually discovered sitting on bracken on warm sunny days.

G – *DASYTIDAE*

The larvae of *Haplocnemus* spp. are found in decaying wood and under the bark of Oak, Elm, Pear (*Pyrus communis* Linn.) and other trees.

H – *LAMELLICORNIA*

A number of Lamellicorns are relatively easy to breed in captivity as long as the humidity is kept within tolerable limits. Most of the larvae are root feeders but a few of the Lucanidae, *Gnorimus variabilis* (Linn.), *G. nobilis* (Linn.), *Trichius fasciatus* (Linn.) and possibly *Cetonia aurata* (Linn.) have larvae that dwell in rotten wood.

Lucanus cervus (Linn.) (Stag Beetle). This magnificent beetle is often seen resting on fences or tree trunks. It is also often seen flying around oak trees on summer evenings. It is sometimes very common in some districts, for instance south London between 1930 and 1940 although it has been reported less frequently in recent years. It is easily captured when flying, even if it is out of reach of a net, by throwing a cap or similar sized object in front of the beetle and to about the same height. Usually the beetle will try to keep the object in sight as it falls to the ground, this leads it to tilt its head forward, causing it to stall and fall to the ground.

The larva is a fleshy grub which occurs in rotten trees, Oak when it is old enough and Elm; I have found it in Birch and at the base of oak fence posts where these had been softened by fungal rotting. The larva is reported to take three years to reach maturity, but I feel that with the right conditions it can be faster. Larvae can be placed in a 5 or 10 lb. biscuit tin. A little earth should be placed on the bottom and

the tin then filled nearly to the top with large pieces of rotten wood. All the spaces between should be filled with wood mould from the same source. The tin should be tightly sealed to prevent loss of moisture. If fungus starts to grow a few crystals of thymol will usually keep it under control without harming the larvae. To view larval habits, a large piece of rotten wood, smoothed on two parallel sides and of a thickness equal to that of the larva, is sandwiched between two glass plates and the whole held together by an elastic band. A starting tunnel is hollowed out and the larva inserted. This experimental plate should be kept in a biscuit tin on top of rotten wood and only removed for observation. As the larva grows, it can readily be transferred to a larger plate. The secret of rearing these larvae is to ensure that the humidity is correct. If the biscuit tin is filled with wood collected two days after the last rain, the humidity tends to be about right as long as the tin is kept tightly closed. The tin must be kept cool and never allowed to stand in the direct rays of the sun.

Dorcus parallelipipedus (Linn.) resembles a smaller edition of the previous species but the male does not have greatly developed horns. The larvae feed in the soft, slightly rotted wood of Ash (*Fraxinus excelsior* Linn.), Elm and other trees. I have bred it from Poplar, Willow and Alder (*Alnus glutinosa* Gaertn.). The larva seems to thrive in somewhat drier conditions than the previous species. To rear the larvae, I inserted them into holes drilled in large half rotten logs, sealing them in with corks. They could no doubt be treated in the same way as the previous species.

Sinodendron cylindricum (Linn.) is the most widespread of the Lucanidae. Whereas the other two species are more or less restricted to the south, it occurs widely and is found in Scotland. Both larvae and adults are found in dead Ash and Beech. I have found it in Poplar and Hazel (*Corylus avellana* Linn.). I have always found it in dead branches attached to living trees. Although I have not actually reared this species, I have no doubt that it can be treated in much the same way as the two previous species.

Gnorimus variabilis (Linn.) and *G. nobilis* (Linn.) are very similar in general habits. The larvae feed in rotten wood, the former in Oak, the latter in old fruit trees. They normally feed only in the deep wood mould of old trees.

Arichius fasciatus (Linn.) is a beautiful yellow and black beetle which superficially resembles a wasp. I have found it on Ox-eye Daisy (*Chrysanthemum leucanthemum* Linn.), thistles (*Cirsium* spp.) and Wild Carrot (*Daucus carota* Linn.). Fowler reports it from Umbellifers. The beetle has an unusual distribution, occurring mainly in Scotland, but Fowler also reports it from Swansea and Neath in South Wales. I have found it in Swansea and just outside Carmarthen and I suspect that it is widespread in South Wales. The larvae are found in dead dry decayed logs. I have found it in very old elder logs. It is quite easy to rear.

I – *HETEROMERA*

A number of species of this superfamily are found under bark. However many are not wood feeders, but are parasitic on the larvae of other beetles such as Scolytidae, or feed on fungus growing there.

Amongst the wood feeding species are:

Hypophloeus unicolor (Piller) breeds under the bark of Beech and Elm, whilst *H. bicolor* (Ol.) feeds in dead oak trunks and under elm bark.

Helops caeruleus (Linn.) is found in decaying Willow and other trees. I have found it in profusion in very rotten timbers from an old barn. It seems easy to rear.

Pseudocistela ceramboides (Linn.) has larvae which feed in the dead branches of various trees.

Prionychus ater (Fab.) is found in decaying Willow, Ash and other trees. The adults should be looked for on the trunk at night.

Melandrya caraboides (Linn.) is found in decaying Willow.

Abdera spp. are found under the bark of decaying boughs of various trees; it is possible that they feed, at least partly, on fungus.

Pytho depressus (Linn.). The larvae, pupae and adults of this bright blue beetle are found under the bark of Scots Pine (*Pinus sylvestris* Linn.). It seems to be confined to Scotland. The larvae resemble those of the Pyrochroa. It is easy to rear. Although it is supposed to feed on wood, I suspect that it is partly carnivorous.

Salpingus spp. are all found and appear to breed in the dead twigs of various trees.

Lissodema quadripustulatum (Marsh.) is found in the dead branches of hedges and firs. *L. cursor* (Gy.) is found in dead twigs and under the bark of various trees.

Rhinosimus spp. are fairly local but widespread. They are found in dead hedges and under bark. They are not difficult to rear.

Nacerdes melanura (Linn.) is found in old timber near the sea. Considering the habitat is should not be difficult to rear.

Ischnomera caerulea (Linn.) breeds in the rotten wood of Elm, Willow, Ivy (*Hedera helix* Linn.), Poplar and other trees. *I. sanguinicollis* (Fab.) lives in similar habitats.

Pyrochroa coccinea (Linn.) has a very characteristic flat larva which is found under the bark of decaying Oak. It is comparatively easy to rear. *P. serraticornis* (Scop.) is very similar and is found in Oak, Beech and other trees. *Schizotus pectinicornis* (Linn.) is a Scottish species found in rotten birch stumps.

Tomoxia biguttata (Gy.) seems to be confined to the New Forest in Hampshire. It develops under the bark of decaying deciduous trees.

Mordella villosa (Sk.) has larvae which feed under the bark and in the rotten wood of many trees.

With a little ingenuity it should be possible to rear most of the

beetles whose larvae feed on wood, under conditions in which they may be observed. The most important factor would seem to be control of humidity, although with some species this can vary considerably without detriment to the larvae. The habitat under the bark of dead trees and logs can vary from wet during rainy weather to bone dry in conditions of drought.

In concluding this article I have thought it advisable to depart from the precise order of superfamilies that I suggested in the Introduction.

(To be continued) B. J. MacNulty (4528)

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BOOK REVIEW

Butterflies by Robert Goodden. Illustrated by Joyce Bee. pp. 159. Hamlyn, London. £0.40.

It is relatively easy to cover the 50/60 species of butterflies occuring in the British Isles in a slim volume but when the reference is the whole world, the task takes on different dimensions. Robert Goodden has produced a most readable survey, generously illustrated by the talented Joyce Bee and also including a sizeable section on the basic knowledge for an intending lepidopterist.

Generally the book is aimed at the younger or less experienced collector but could well influence the older enthusiast who has confined his interests to the British fauna. The life cycle is set out in some detail including the main families and small sections cover such topics as butterfly migration, protective colouration, seasonal variation and necessary equipment. The description of breeding techniques from a professional dealer is especially valuable.

Some 200 species illustrated in colour provide typical examples of the major groups. They are divided between seven distinct areas of the world which have been relatively accessible to entomologists. The reader is given a glimpse of the temperate species of Europe, the Fritillaries and Milkweed from North America, iridescent Morphos and Heliconids from Central and South America, Charaxes and Pierids from Africa, the specialised fauna of the Australian continent and Asian species from the frozen north to the tropics.

I enjoyed reading this book and appreciated the impact of the boldly coloured plates. At 40p, it is a surprisingly good bargain.

R. D. H.

INTRODUCTION TO CRANEFLIES
The Identification of British Craneflies

The standard reference works previously listed are set out on formal lines, but here I intend, as far as possible, an informal approach to the identification of Craneflies. Particular attenion will be paid to some of the commoner species so that once some familiarity with the group is achieved, it will be possible to face the standard works with some degree of confidence.

With butterflies and moths identification can often be achieved by matching a specimen with a picture in a reference book, but there can be many pitfalls with this procedure. The majority of insects are identified on the basis of 'keys'. At first sight a key may look confusing, but it is really a highly organised questionnaire. Most keys are dichotomous (two branched), in that questions are arranged in pairs, the 'questions' being descriptions. You decide which description fits your insect and your decision leads you on to the next pair of questions and so on until you arrive at the name of the insect.

The name will typically consist of three words—the genus, species and person who described it. To help those who find scientific words difficult, English names have been invented on the lines of those used with moths. These names only have any basis in this paper, so every effort should be made to use the scientific ones.

In order to follow a key you must understand the features referred to in the questions. Legs black or yellow is easy to understand, but prescutum with 4 or 5 stripes involves a term to be explained. We shall consider some of the main parts of a cranefly, emphasising the most important features used in the keys.

The main disadvantage of a key is that despite looking at a variety of small features, there is still little information on the overall appearance of the species. It is therefore possible to take a wrong turning in the key, and finish up with an incorrect name which applies to an insect far different from your own specimen. An insect may have distinctive characters, yet it is difficult to tell whether there are any other similar looking species which may have caused confusion. In this introduction to Craneflies, it is intended to concentrate on the overall appearance of the species and point out unique characters or draw attention to similar species. If you find a large yellow cranefly, then for a beginner it is more helpful to know the distinction between the few common species than being confronted with a key to over 300. At the time of writing this paper, there is little immediate prospect of the *Handbook* being reprinted, so with at least the larger species some reference will be made to all of them.

Structural features

Don't be put off by all the terms, you won't need them all at once. Refer to *Fig.* 1 as you meet structural parts later in the text.

(a) Head. The compound eyes are usually bare, but in one group they are hairy. With a good hand lens and contrasting background the hairs will show up. Small simple eyes, ocelli, are only present in Trichoceridae and Anisopodidae. They are situated on top of the head between the compound eyes. The antennae are composed of a number of segments, the one nearest the head being called the scape, followed by a small segment called the pedicel and the rest of the segments are termed the flagellum. The palpi are situated on a tubular extension of the mouth parts, the rostrum.

(b) Thorax. The sides are referred to as the pleura. On the dorsal surface, the large front portion is referred to as the prescutum. In Tipulidae and Trichoceridae there is a 'V shaped' suture across the thorax, with the scutum (paired) behind and a median scutellum. The postnotum is situated just before the abdomen. The halteres are modified hind wings, as in all Diptera.

(c) Abdomen. The segments are composed of dorsal and ventral units. Tergites are dorsal, sternites ventral. In the male the last segment is the ninth. The eighth and ninth are often both modified as part of the genitalia in the male. *Fig.* 1A shows one type of genitalia (*Tipula*); there are several other types to be discussed later. The female has an ovipositor at the end of the abdomen consisting of paired dorsal elements, the cerci and paired ventral elements, the sternal valves (*Fig.* 1B).

(d) Legs. Each consists of a coxa, trochanter, femur, tibia and tarsus. Tibial spurs, on the underside of the apex of the tibiae, consist of two spine-like bristles, but in some groups these are absent.

(e) Wings. These provide important features for identification purposes. The terminology may look complex but it is logical, and once mastered, can be applied to all Diptera and many other insect groups. The wings are strengthened by a series of veins. The intervening wing membrane is divided by these veins into areas called cells.

To face a completely annotated wing map for the first time can be confusing, but the following gentle approach should iron out most major difficulties.

It is simplest to consider the main cells to begin with. There are two large elongate cells towards the base of the wing, the Upper Basal Cell and the Lower Basal Cell—these are always present and provide good markers (there is only one cell in *Mycetobia* and Anisopodidae). On the distal end of these, there is usually a small cell which is called the Discal Cell. This is the best reference point for identification of veins, but occasionally an important feature of a species is the absence of this cell. The other major cell is the narrow Costal Cell which runs parallel with the fore-edge of the wing (*Fig.* 2A).

We can now add some wing veins, taking a simple theoretical example (*Fig.* 2B). Firstly take the vein from the top outer corner of

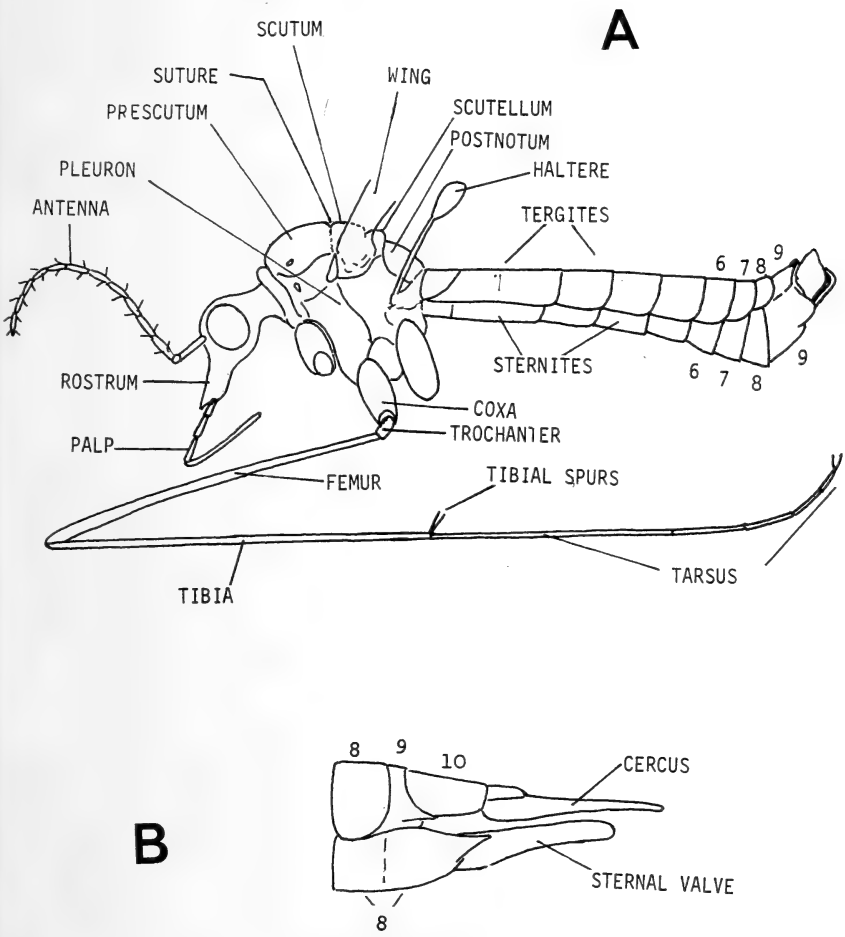


Fig. 1: Structural parts of a cranefly, *Tipula czizeki*. A. General side view of a male. B. Side view of the ovipositor of a female.

the Discal Cell—this is M_1+_2. Above there are only two veins towards the outer edge of the wing before the tip of the Costal Cell bounded by R_1—these two veins are R_2+_3 and R_4+_5.

A more complex situation (*Fig.* 2C) arises if these veins branch. Vein M_1+_2 divides, giving rise to a wedge shaped cell, M_1. Vein R_2+_3 divides into R_2 and R_3, so that there are now three veins between the Discal Cell and the tip of R_1.

That is really the major battle settled, the rest of the characters fall easily into place and are shown in *Fig.* 2D. Veins with small letters are cross veins, whilst the radial veins have capital letters. A few minor veins will be described in diagrams when required. The differences in

vein Sc between *Figs.* 2B and 2C will be referred to below. The stigma is a coloured patch about the tip of R_1, though this is absent in some species. The squama is a thickened lobe near the base of the wing.

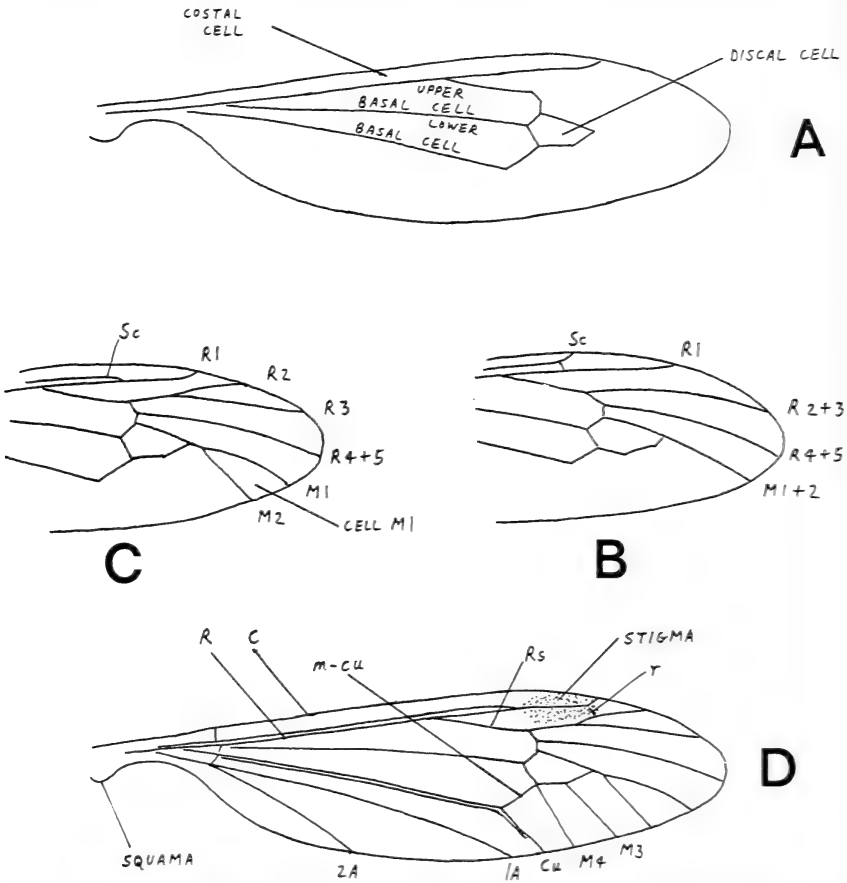


Fig. 2: Diagrammatic wing maps. A. Main cells. B. Simple wing venation as in *Limonia*. C. More complex venation as in *Tipula*. D. Complete wing venation as in *Tipula czizeki*.

Key to families

1. Two distinct and complete anal veins (veins 1A and 2A, *Fig.* 2D). Suture across thorax 2
   One distinct anal vein. Suture absent 3
2. Ocelli absent. Vein 2A moderately long (*Fig.* 2D). True cranefliies. Tipulidae.
   Ocelli present. Vein 2A very short. Winter gnats. Trichoceridae

3. Ocelli present 4
   Ocelli absent 5
4. Tibiae spurred and Rs forking at or just beyond r-m. Small species ..... Anisopodidae
   If tibiae spurred, Rs forking (if at all) well beyond r-m ..... other Nematocera
5. Ten veins reaching wing margin. Not moth flies or mosquitoes. Predominantly black species ..... Ptychopteridae
   At most eight wing veins reaching wing margin ... other Nematocera

In practice, the cranefly families are quite distinct except for one genus of Anisopodidae.

TIPULIDAE

Most craneflies belong to this family, including all the largest Nematocera, indeed one of the two largest British Diptera is a Tipulid. There are two major groups—the Long-palped Craneflies and the Short-palped Craneflies.

Long-palped Craneflies (subfamily Tipulinae)

This group contains 95 species, almost one-third of our fauna, and all are large species. The smallest has a minimum wing length of 6 mm. If you have a Cranefly with wings at least 11 mm long, and often considerably more, then with a few notable exceptions it should belong to this group.

As a check, vein Sc ends in R as in *Fig.* 2C. *Fig.* 2D shows the wing of *Tipula* (some species differ in detail). The veins are never as in *Fig.* 2B (R_{2+3} is always divided). The palpi are long (often as long as the head), with the terminal (fourth) segment always longer than the preceding one (note that the palpi tend to shrivel up).

Other large Craneflies can be eliminated on the following basis. Vein Sc ends in C, as in *Fig.* 2B. Wing veins may be as in *Fig.* 2B with R_{2+3} undivided. Palpi usually short and fourth segment shorter. Eyes may be hairy. Of the ten or so species likely to cause confusion *Pedicia rivosa* is a very large species with bar shaped markings on the wings. Other species include some *Limonia* (R_{2+3} undivided), *Pedicia littoralis* and *P. occulta* (with hairy eyes), *Pseudolimnophila* and *Limnophila* (male genitalia of a very different pattern).

Ptychopteridae, with wing span 7-12 mm, look like Tipulids, but have only one anal vein and no suture (black, or black and yellow species: also no discal cell).

Key to genera of Tipulinae

1. No discal cell. Blackish species with tarsi pure white ... Dolichopeza
   Discal cell present. Tarsi not pure white 2
2. Antennae with whorls of hairs 3
   Antennae without whorls of hairs 4

3. Yellow and black species. (Sc ends close to base of Rs) ..... *Nephrotoma*
   Colour grey, brown, dull yellow, orange, rarely black (Sc ends far from base of Rs) ..... *Tipula*
4. Grey species. Antennae of male serrate (saw-toothed) ... *Prionocera*
   Black, black and yellow, or black and red species. Antennae in male with long lobes ..... *Ctenophora*

Genus *Tipula*

This large genus contains 60 species, so a key can become lengthy and difficult for the beginner to handle. This can be a troublesome genus since the Handbook key is not easy to use and the sparsity of illustrations gives little chance to check determinations.

Most species of *Tipula* have a well defined period of emergence and there is a succession of species through the season. However, date of emergence is affected by weather and local variation arises from geographical location and altitude. Some species occur throughout the warmer months. On balance, it is possible to break down the 60 species on the basis of emergence period, an autumn group of species being especially distinctive.

Autumn species of Tipula

The species dealt with below include all the species known to occur in September, October and early November (these are dealt with first in view of the date of publication). Some of these are confined to the autumn, others can appear in other months.

Place your specimen into one of the following unique sets of characters.

A Wing with a dark spot just below the centre of lower basal cell. Large species.

B Brown costal cell. Large brownish or greyish species.

C Yellowish abdomen with a dark dorsal stripe.

D Wings mottled with at least a white spot in the centre of the lower basal cell or
Wings without markings, body dull grey or brownish without dorsal line on abdomen or
Females with very reduced wings.

E Characters not as above.

A. Isolated dark spot between veins Cu and 1A just below the centre of the lower basal cell. Apart from clear area around spot, rest of wing with ill defined brown or grey smudgy markings. (One of the species of the sub-genus *Acutipula*.)

Single-spot Tipula *Tipula fulvipennis* Degeer. This is a large species which is brown in the female and greyish in the male (wing length 12-19 mm). The wing spot is a unique character. Wet spots in woods and hedgerows. July-September.

B. Brown costal cell, rest of wing transparent, *Fig.* 2D (these species

are robust. The only other species with a brown costal cell, more marked, is *T. marginata*, a rare species of slender build related to *T. lateralis*). (Sub-genus *Tipula*). The genitalia are fairly uniform, as illustrated in side view in *Fig.* 1A, and the tip of tergite 9 is shown in *Fig.* 3a.

1 Eyes narrowly separated under head (= at most width of antennal scape); female with long wings. Antennae with 13 segments (including minute one at tip). Brownish species. Mostly May-June, Sept.-Oct. ..... *T. oleracea*
Eyes well separated under head (= at least $1\frac{1}{2}$ times width of antennal scape) 2

2 Antennae with 14 segments (minute one at tip). Females with wings not nearly reaching tip of abdomen. Brownish species. Mainly July-early October ..... *T. paludosa*
Antennae with 13 segments. Females with long wings. Greyish species. Only out in mid-October, scarce ..... *T. czizeki*

Marsh Brown-edged Tipula *Tipula oleracea* Linn. The main emergence is in early summer with a partial autumn appearance. Prefers damp meadows and woods.

Meadow Brown-edged Tipula *Tipula paludosa* Meigen. A common species whose larvae are the most frequent leatherjacket in lawns. July-August in Upland districts, August-early October in the south.

October Brown-edged Tipula *Tipula czizeki* de Jong. A little known species. Always check for this species when recording this group in October. In the field it is readily recognised by its grey, rather than brown appearance, but occasionally late specimens of *paludosa* can look greyish.

C. Dull yellowish abdomen, which has a blackish dorsal stripe. Thorax grey or yellow-grey.
The two species are out from August until October. (Sub-genus *Platytipula*.)

Yellow-winged Autumn Tipula *Tipula luteipennis* Meigen. The wings are strongly yellowish, including most of the wing veins. In the male, tergite 8 is distinct (*Fig.* 3b), and sternite 9 lacks a median plate. Locally frequent around ponds, marshes and marshy woods.

Bog Autumn Tipula *Tipula melanoceros* Schummel. The wings are not noticeably yellow and most wing veins are blackish. The male has a distinctive table-tennis bat shaped process from sternite 9 which projects upwards (seen from behind), *Fig.* 3d, and tergite 9 is very different—the downward pointing median spine is shown in *Fig.* 3c. Locally common around bogs and acid wet woods.

D. (Sub-genus *Savtshenkia*.) Most species are confined to the autumn, two occur more widely through the year, and three (*T. cheethami*, *T. grisescens* and *T. subnodicornis*) only occur earlier in the season. With 11 autumn species, this is the predominant group at this time

of year. Since females are often difficult, main emphasis is placed on males.

The best character for separating the species is the form of the eighth sternite, as illustrated in *Fig.* 3e-o where the features of the hind edge are shown.

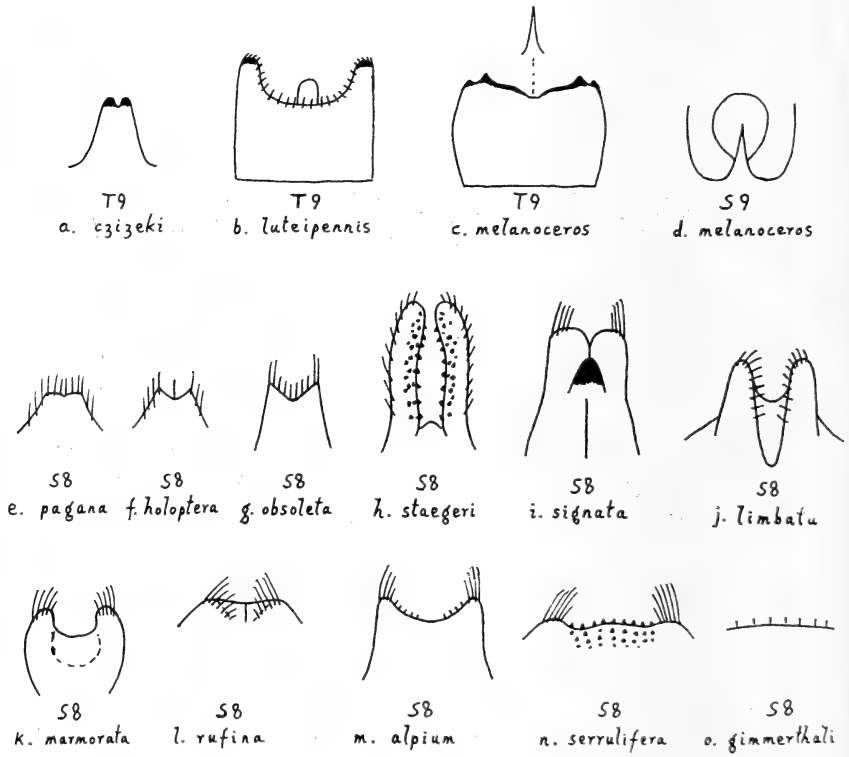


Fig. 3: Details of the male genitalia of autumn *Tipula* species. (Not to scale.) *a.* Dorsal view of tip of tergite 9 of *czizeki*. *b.* Dorsal view of complete tergite 9 of *luteipennis*. *c.* Dorsal view of complete tergite 9 of *melanoceros*, with indication of shape of downward projecting spine. *d.* View from behind to show upward projection at tip of sternite 8 of *melanoceros*. *e-o.* View from below to show hind margin of sternite 8 of *Savshenkia* spp. (Note that *k* is a view obliquely from behind, giving a distorted impression that the segment is heart-shaped.)

The species fall into the following groups: —

(a) Plain wings. *T. pagana* males and both sexes of *T. holoptera*. The details of a slight median tab-like extension to sternite 8 separate the males (depth of notch and presence or absence of conspicuous median hair in notch). *Fig.* 3e and f.

(b) Mottled wings and distinct tab-like extension to sternite 8. *T. obsoleta*. *Fig.* 3g.

(c) Mottled wings and paired median lobe like exensions to sternite 8. *T. staegeri, T. signata, T. limbata. Fig.* 3d-f.

(d) Mottled wings and membranous or fairly simple median area to hind edge of sternite 8. *T. marmorata, T. rufina, T. alpium, T. serrulifera, T. gimmerthali. Fig.* 3k-o. Note that *T. rufina* in both sexes has a strongly marked and continuous black band running from the neck to a point on the pleura below the base of the wing.

(e) Females with very reduced wings. *T. pagana* and *T. gimmerthali.* In *pagana* the wing venation is normal, but in *gimmerthali* the venation becomes very complex at the wing tip.

Drab Autumn Tipula *Tipula pagana* Meigen. A dull brownish or greyish brown species with uniformly clear brownish wings which is common in open or lightly wooded situations, even on moorlands. It occurs between August and November. The flightless female should be searched for on the ground.

Scarce Drab Autumn Tipula *Tipula holoptera* Edwards. The males can only be separated with great care (note a median hair isolated within a V-shaped notch at the end of the slight tab). The fully winged females are readily recognised. Of the few known localities, heathlands predominate. October.

Tabbed Autumn Tipula *Tipula obsoleta* Meigen. A frequent species whose habitat requirements are poorly known; open grassland has been recorded. Only the preceding two species have a median tab-like extension to sternite 8 but in this species it is much more strongly marked and it differs in having mottled wings.

Long-lobed Autumn Tipula *Tipula staegeri* Nielson. One of the easiest Craneflies to recognise because of its long lobe-like extensions to sternite 8, with small spines on the inner sides. This species occurs in marshy woods, as well as some drier situations, in September and October.

Trifid Autumn Tipula *Tipula signata* Staeger. This species is often found with the previous species, but the three part extensions to the eighth sternite, consisting of two lobes and a short median black tab, are very distinct. September-November.

Northern Autumn Tipula *Tipula limbata* Zetterstedt. A rare species known from Scotland and Northern England. The well-spaced lobes with a whitish median wedge shaped area between are unmistakable. September.

Mottled Autumn Tipula *Tipula marmorata* Meigen. Very common in a wide variety of situations, but elusive in the field, though often coming indoors. The larvae live in moss and the adults can be found flying over mossy ground in woods. The adults also tend to sit on tree trunks where they are well camouflaged. The wings are heavily mottled and the pleura are also mottled with dull patches. This tends to be a rather delicately built species with the two lobes on sternite 8 situated at the corners of a yellowish

U-shaped membranous area. Sometimes as early as July, but mainly September and October.

Striped Mottled Tipula *Tipula rufina* Meigen. A very distinct species when the broad chocolate brown stripe on the side of the thorax, extending from the neck to a point just below the wing base, is well marked (*marmorata* and *alpium* have a less distinct stripe). The larvae live in moss in open or wooded situations. It is widespread and sometimes comes indoors, but in the south it is difficult to find in the field even where mosses are abundant. April until November.

Upland Mottled Tipula *Tipula alpium* Bergroth. In hilly districts in Wales and the north this species can be common from high on mountains down to low level situations. It is particularly fond of hiding under overhangs of peat on peat hags and by trackways etc. or of sheltering around boulders. There is a broken brownish stripe less complete than that on *T. rufina*, but some individuals can be easily confused. The small spines along the hind edge of the eighth sternite are diagnostic but require close scrutiny. May-September.

Long-horned Autumn Tipula *Tipula serrulifera* Alexander. A very rare species known from the Edinburgh district and the Wyre Forest in Worcestershire. Great care is needed in identifying this species since the diagnostic features of the eighth sternite are not easily seen—the rows of tiny black teeth between ill-defined lobes with brushes of golden hairs. The antennae are exceptionally long in the male, as long as the thorax and head together. August and September.

Pentland Autumn Tipula *Tipula gimmerthali* Lackschewitz. Originally described from the Pentland Hills near Edinburgh but now also known from the north Pennines. A greyish species with poorly marked wings. The eighth sternite is simple with only a row of small hairs along the hind margin. The female is wingless, as in *T. pagana* but the wing venation is complex at the tip. October. (Note some specimens may appear to have uniformly greyish wings as in *T. pagana*, but sternite 8 is characteristic. It is just possible that *T. scripta* could appear as late as early September and this has a simple sternite 8; *scripta* is a large yellowish brown species with a yellow first flagellar segment rather than black as in *gimmerthali*.)

E. Others. There are only three other Tipula species recorded in the autumn, but these belong to summer groups (occurring as late as September), so will be considered in detail in the next part where closely related species will be considered.

Tipula lateralis Meigen. A common waterside species with a grey stripe along the dorsal line of the abdomen and flanked by a broad dark brown line either side. Wings dull greyish with a white patch below the stigma.

Tipula solstitialis Westhoff. A closely related scarce species with predominantly yellow, instead of predominantly black, genitalia.

Tipula cava Riedel. A large completely orange-yellow species usually found on heathland and dry woods.

In addition, *T. scripta* Meigen could occur as late as September. See footnote under *T. gimmerthali.*

Note that the genus *Prionocera* can easily be mistaken for *Tipula.* One species occurs as late as September on boggy ground and is the only large cranefly in the autumn which is grey with a black dorsal line along the abdomen.

(To be continued) Alan E. Stubbs

REPORT OF THE AES COUNCIL FOR 1971

During the year the Council met six times under the chairmanship of Mr Eric Bradford. The Council is happy to report that the expansion of the Society continues, the nett membership increase for the year being 70.

Bulletin

During the year the Society was affected by the postal strike and this caused delays in publication and posting of the *Bulletin.* The standard of material published continued to be high; the articles on the study of Coleoptera, commenced the previous year, continued and Mr Bradford illustrated more of the Microlepidoptera.

Publications

The stocks of the very popular pamphlet, *Killing, Setting and Storing Butterflies and Moths,* ran out and it was decided to publish a revised pamphlet including extra material. The result is that a new pamphlet of twenty pages is now ready for the printers.

Exhibition

The Annual Exhibition was again held at the Holland Park Schools. It was better attended than in previous years and was financially successful. However, the fall off in exhibitors and the increase in the sales of material by traders and members has caused the Council to take the action published in the February 1972 *Bulletin.* It is hoped that this will remedy the situation.

Finances

Despite the warning that subscriptions would need to be raised, careful management of the finances and increased membership has enabled the Council to postpone this for at least a year. However printing and postal charges have again risen steeply and increases seem inevitable. The sale of the Society's publications have again proved very satisfactory and the Society is indebted to its agent, Mr L. Christie.

Groups

Following previous practice, the report of the groups will be given at the AGM by representatives of the groups. Every member has the right to join any group and support of the Conservation Group should be considered by all our members.

Each year we record with sorrow the deaths of some of our senior members. This year we recall in particular Sir Robert Saundby, a member for many years and one of our Trustees at the time of his death, and Mr T. R. Eagles who was well known and distinguished in many branches of natural history and who had been a member since before the War.

The Council also records its thanks to retiring members of the Council and to Mr Phil Grey, retiring Treasurer, Mr John Bocock, retiring *Bulletin* Editor, Mr Raymond Uffen, former General Editor. and to Mr Glyn Henwood who has taken over as Treasurer from Mr Grey for a short period before he leaves to work in Nigeria.

G. Prior (3909)
Hon. Secretary

HONORARY TREASURER'S REPORT FOR THE YEAR 1971

Presenting the final accounts of our Society for 1971, I am pleased to be able to report that, despite our misgivings about the increased cost of printing and postage, we have emerged wtih a surplus greater than last year.

The Income and Expenditure Account shows that there has been a small increase in Bank Deposit Interest and also in the surplus from the Annual Exhibition. On the Expenditure side, although postage costs inevitably increased from £91 to £134, there was a reduction in expenditure on stationery and, of course, the expense of 1970 Conservation Year did not recur in 1971. The Society therefore had an excess of Income over Expenditure of £394, compared with £294 the previous year, to add to the General Fund.

On the Assets side of the Balance Sheet, the increase of £80 in the Building Society Deposit is the interest therefrom; this income goes to the Publications Fund. The Deposit Account at the Midland Bank has risen to £1,000, which will give us a useful boost of interest income.

The Publications Fund, which by decision of the Council was separated last year from the General Fund, now stands at £1,767 and is represented on the Assets side of the Balance Sheet by the Building Society Deposit of £1,320 plus Publications Stock of £650, totalling £1,970. The Publications Fund is therefore, at this moment, subsidised by the General Fund to the extent of £200; but, as the production of publications is one of the objects of the Society, this is a fair situation. As there is always fluctuation in reprinting of publications and sales of them, it would be impossible to maintain an exact division between the

two funds. £212 was spent in reprinting leaflets, etc., during 1971.

When this report is presented at the Annual General Meeting I should be far enough away to avoid answering awkward questions about the accounts! It is nice to be able to hand over the Treasurership to Glyn Henwood while the finances of the Society are in such a healthy state; it appears that he will have no headaches on that score in the foreseeable future, unless in some obscure way our joining the Common Market should put us asunder.

I would like to thank the Council members for their co-operation during my term of office. I shall deeply miss my association with them and the cheerful way in which they devote such an enormous amount of their leisure time to the successful running of our Society.

Phil Grey (3820)

THE AMATEUR ENTOMOLOGIST'S SOCIETY

Income and Expenditure Account for the Year ended 31st December, 1971

1970	Expenditure	£	1970	Income	£
554	Bulletins	592	930	Subscriptions	921
71	Stationery	25	67	Donations	89
91	Postage	134	7	Profit on Sale of Badges	11
22	Rentals, Insurance, etc.	27	19	Advertising	27
	Conservation Year Ex-		78	Annual Exhibition ...	109
59	hibit	—	13	Bank Deposit Interest ...	27
	Grants to AES Con-				
15	servation Group ...	5			
	Depreciation on Dupli-				
8	cator	7			
	Excess of Income over				
294	Expenditure ...	394			
£1114		£1184	£1114		£1184

Balance Sheet—31st December, 1971

	Liabilities			Assets	
170	November 'Bulletin' ...	170		Halifax Build. Society	
—	L. Christie	5	1240	Deposit	1320
33	Subs. Paid in Advance	52		Midland Bank—	
	Publications Fund,		100	Deposit A/c ...	1000
1527	Building Soc. Interest ...	80	210	Current A/c ...	224
	Add Net Sales, 1972 ...	160	1	Typewriter	1
—	1/1/71	1527	1	Addressograph	1
926	General Fund, 1/1/71	926	74	Duplicator	67
	Add Excess of Income		7	Stock of Badges ...	—
	over Expenditure ...	394		Stock of Publications—	
			50	General	150
			629	Handbooks	600
			334	Debtors	41
				Caxton Hall—Rent in	
			10	Advance	10
£2656		£3314	£2656		£3314

P. R. Grey, Hon. Treasurer

D. Ollevant, W. J. Beer } Hon. Auditors

SUGARING

I justify a full account of sugaring on two scores. Firstly, I can find no current text on the practice of entomology which covers the subject satisfactorily. Either it is summarily dismissed, or the account gives the impression of being an amalgam of other authors' attempts paraphrased by a non-sugarer. Secondly, after a long series of excellent accounts of mercury vapour lamp methods, the time has arrived for the balance to be restored. An additional reason is that few beginners and fewer proficient entomologists use the method and, in my arrogance, I hope to enrich their hobby with a relaxing, rewarding and time-honoured art. Only open a man's cabinet at the Copper Underwings (*Amphipyra* spp.) or Red Underwings (*Catocala* spp.) and you will easily pick out the initiated. For only to the sugar patch do these species come a-plenty and in full plumage.

Sugaring is a collecting technique by which moths are attracted to a sugary solution and rendered less agile by strengthening the solution with alcohol. According to Allan (1937), sugaring started when the Doubleday brothers noticed that moths were attracted to empty barrels in which sugar had been stored. They later developed the idea by painting an aqueous solution onto trees, and so started an entomological revolution paralleled only by the discovery of the mercury vapour lamp. Four main factors determine the efficacy of sugaring: the season, the weather, the habitat, and the technique.

Season. Sugaring will attract moths chiefly between April and early November but large numbers are a feature of August, September and early October, at least in southern Britain.

Weather. The ideal night has full cloud, warmth, and a light to moderate southerly or westerly wind. If the humidity is high, so much the better. The wind may be fresh or strong or totally lacking without unduly affecting the performance, but if the wind is in the north or east, don't waste too much valuable sugar. The catch will be sparse if the night is clear, and meagre indeed if the moon be full. Exceptions exist, especially at the extremes of the year, and rain matters little.

Locality. Maximum numbers occur in August and September on chalkland and grassland, but if the prospect of a legion of Large Yellow Underwings doing battle with ten tribes of Heart-and-Darts around your nectar fails to impress you, visit your local deciduous woodland and perhaps the variety will. When working woodland, sugar rides and perimeters, but not the interior unless the wood is naturally very open. It is my impression that fences tend to be more rewarding than trunks.

The sugar: traditional and 'modern'. Traditional sugar is a royal beverage indeed, but it is expensive, it doesn't keep, it soaks into many surfaces and runs off others. In its favour are its relative resistance to rain and its capacity for remaining attractive several days after application, even in very dry weather. 'Modern' sugar is cheaper, it keeps well,

and it doesn't soak into porous surfaces or run off smooth ones. But it does tend to dry out after the first night, and to wash off in rain. Concrete posts are a strong indication for 'modern' sugar. No practitioner of the art and science of sugaring is fully armed without both of them.

Traditional sugar contains:
Barbados sugar, 2 lb
Fowler's Black Treacle or molasses, 1 lb
brown ale or stout, $\frac{1}{2}$ pint
Old Jamaica Rum, 2 generous tablespoonfuls

Barbados sugar is *not* 'brown sugar' or 'Demerara', and the only supply I know of at the present time is the health food stores. It comes as a sticky, almost black mess. Fowler's Black Treacle is readily obtained, but I've not seen molasses for several years. The method is to mix the first three ingredients in a large saucepan and heat very slowly to the boil, do not confuse the dissipation of the fizz from the beer with true boiling, and simmer for ten minutes. Great patience is needed as the brew boils very suddenly and continues to rise after removal from the flame and burnt-on sugar is not easily dislodged. Allow the saucepan to cool, stirring the scum in occasionally. When no warmer than blood-temperature, stir the rum in until evenly distributed. An equal quantity of methylated spirit appears equally acceptable. If the brew is not for immediate use, the rum should be left out until the time arrives. Sugar crystals separate out after about seven days without the rum, and within twelve hours of the rum being added. The really big disadvantage of traditional sugar is this rapid deterioration as it takes more time to redissolve the separated crystals than it does to prepare the brew initially. Unless you sugar on every second night, the implication is that you must rebrew on each occasion and this takes a lot of time at a busy period. One short cut is to mix the ingredients cold (except the rum), and then divide this into one-night portions. On the night, the ready-weighed ingredients are turned out into a saucepan (the sugar will have settled to the bottom) and boiled for ten minutes. It may then be returned to the tin and by the time you arrive at your beat it will be cool enough to add the rum.

'Modern' sugar is a general term covering a multitude of wicked liquors. My current recipe contains:

over-ripe bananas or rotten apples, 2 lb
Barbados sugar, 2 lb
methylated spirit, 25 ml (=5 medical spoonfuls)
amyl acetate, 5 drops (optional)

I prefer bananas to apples, and my mother has obtained ten pounds of over-ripe bananas at the local market for 12$\frac{1}{2}$p although the supply has recently become more tenuous and is anyway restricted to the warmer months. The method is to pulverize the fruit with its skin into a homogenous slush. I achieve this in a Kenwood 'liquidizer', removing the strigs from the bananas first. Apples that have gone bad in parts should

be kept in a dry place until they are fully rotten and have shrivelled to about half their size. They may then be pulped either as for bananas or manually, squeezing them repeatedly through the fingers. The skins, particularly of bananas, are an essential ingredient. It is they that give the brew body, and prevent it from running off or soaking in. Put the slush into a large saucepan and thoroughly mix in the Barbados sugar. Then heat to boiling with constant stirring, and simmer thus for ten minutes. Pour the boiling sugar into clean tins. Before use add the methylated spirit and (optionally) the amyl acetate.

Technique. Traditional sugar is best applied with the aid of a stiff paint brush of about an inch in breadth, and by long hallowed practice is painted in a strip an inch wide and a foot long. "Modern" sugar may be applied with a brush but is more rapidly and effectively administered with the bare hand, using a smearing action. A rubber glove may be worn. Apply the sugar at early dusk to any suitable surface and revisit it hourly until one o'clock or until you collapse, whichever is the sooner. The bulk of the material has come by half past midnight at high summer and eleven o'clock is late enough for September. In the cold months the catch disappears as the temperature falls, so get cracking as soon as the light begins to fade and your boxes will be full before closing time!

My concluding paragraph is an amalgam of technical niceties. Spread sugar at dusk and not before if you wish to avoid inebriated wasps. Work in a route you will remember later. Use the sheltered side of posts and trees when the night is blustery, and similarly use the unlit surfaces if the night be clear and moonlit. In open country fence-posts are ideal, but unless they are bark-clad traditional sugar may soak in or run off. When using traditional sugar on lichenous or alga covered surfaces, especially in dry weather, scrub the surface with the sugar remaining on the brush from the previous patch before applying a coat of any generosity, or the sugar will not adhere. Do not sugar the cow-ward side of fences. Sugar foliage as well as trunks, stumps, concrete and wooden posts, walls, sheds, wrecked cars, thistle heads and bulrushes. Some species, such as the Old Lady (*Mormo maura* Linn.) and the Sallows seem to prefer to banquet on foliage, so you may miss them unless you apportion them a share suitably offered. Use a weak torch or a red beam to examine the patches with; my preference is for the former as I have great trouble identifying my guests through rose-tinted glasses. Have a net handy, and if anything does elude you, have a look on the ground since not a few species jump off and fall to the ground without actually flying. And it is worth calling again as a few species will return when you have turned your back. Indeed, some species, notably the Old Lady, may consider a certain post as their 'local', and return night after night. Examine the unsugared side of the posts and the drops that have run down the stem and onto the underlying herbage. Never trap insects between the sugared surface and pill box or a sticky

hand, pill box and moth will be your reward. Or your Desired may escape when you attempt to put the lid on her. Either use a scissor action, hinging the lid of the pill box against the rim furthest from the patch or alternatively hold the pill box beneath her and knock her in with the lid. The latter method requires both hands, but is the method of choice in most cases. Finally, do not sugar at the roadside if you can possibly help it, whether there are street lamps or not. For reasons I do not understand, but assume to concern the headlamps or bow-waves of vehicles, the results are invariably disappointing.

May your pill boxes swell with rarities!

Richard Dickson (3674)

REFERENCE

ALLAN, P. B. M. (1937). *A Moth Hunter's Gossip.* Watkins and Doncaster, London. 94-98.

JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS
A Code for Insect Collecting

This Committee believes that with the ever-increasing loss of habitats resulting from forestry, agriculture, and industrial, urban and recreational development the point has been reached where a code for collecting should be considered in the interests of conservation of the British insect fauna, particularly macrolepidoptera. The Committee considers that in many areas this loss has gone so far that collecting, which at one time would have had a trivial effect, could now affect the survival in them of one or more species if continued without restraint.

The Committee also believes that by subscribing to a code of collecting entomologists will show themselves to be a concerned and responsible body of naturalists who have a positive contribution to make to the cause of conservation. It asks all entomologists to accept the following Code in principle and to try to observe it in practice.

Collecting—general

1 No more specimens than are strictly required for any purpose should be killed.
2 Readily identified insects should not be killed if the object is to 'look them over' for aberrations or other purposes: insects should be examined while alive and then released where they were captured.
3 The same species should not be taken in numbers year after year from the same locality.
4 Supposed or actual predators and parasites of insects should not be destroyed.
5 When collecting leaf-mines, galls and seed heads never collect all that can be found; leave as many as possible to allow the population to recover.
6 Consideration should be given to photography as an alternative to

collecting, particularly in the case of butterflies.

7 Specimens for exchange, or disposal to other collectors, should be taken sparingly or not at all.

8 For commercial purposes insects should be either bred or obtained from old collections. Insect specimens should not be used for the manufacture of 'jewellery'.

Collecting—rare and endangered species

1 Specimens of macrolepidoptera listed by this Committee (and published in the entomological journals) should be collected with the greatest restraint. As a guide, the Committee suggests that a pair of specimens is sufficient, but that those species in the greatest danger should not be collected at all. The list may be amended from time to time if this proves to be necessary.

2 Specimens of distinct local forms of macrolepidoptera, particularly butterflies, should likewise be collected with restraint.

3 Collectors should attempt to break new ground rather than collect a local or rare species from a well-known and perhaps over-worked locality.

4 Previously unknown localities for rare species should be brought to the attention of this Committee, which underakes to inform other organisations as appropriate and only in the interests of conservation.

Collecting—lights and light-traps

1 The 'catch' at light, particularly in a trap, should not be killed casually for subsequent examination.

2 Live trapping, for instance in traps filled with egg-tray material, is the preferred method of collecting. Anaesthetics are harmful and should not be used.

3 After examination of the catch the insects should be kept in cool, shady conditions and released away from the trap site at dusk. If this is not possible the insects should be released in long grass or other cover and not on lawns or bare surfaces.

4 Unwanted insects should not be fed to fish or insectivorous birds and mammals.

5 If a trap used for scientific purposes is found to be catching rare or local species unnecessarily it should be re-sited.

6 Traps and lights should be sited with care so as not to annoy neighbours or cause confusion.

Collecting—permission and conditions

1 Always seek permission from landowner or occupier when collecting on private land.

2 Always comply with any conditions laid down by the granting of permission to collect.

3 When collecting on nature reserves, or sites of known interest to conservationists, supply a list of species collected to the appropriate authority.

4 When collecting on nature reserves it is particularly important to

observe the code suggested in the next section.

Collecting—damage to the environment

1 Do as little damage to the environment as possible. Remember the interests of other naturalists; be careful of nesting birds and vegetation, particularly rare plants.
2 When 'beating' for lepidoptera larvae or other insects never thrash trees and bushes so that foliage and twigs are removed. A sharp jarring of branches is both less damaging and more effective.
3 Coleopterists and others working dead timber should replace removed bark and worked material to the best of their ability. Not all the dead wood in a locality should be worked.
4 Overturned stones and logs should be replaced in their original positions.
5 Water weed and moss which has been worked for insects should be replaced in its appropriate habitat. Plant material in litter heaps should be replaced and not scattered about.
6 Twigs, small branches and foliage required as foodplants or because they are galled, e.g. by clearwings, should be removed neatly with secateurs or scissors and not broken off.
7 'Sugar' should not be applied so that it renders tree-trunks and other vegetation unnecessarily unsightly.
8 Exercise particular care when working for rare species, e.g. by searching for larvae rather than beating for them.
9 Remember the Country Code!

Breeding

1 Breeding from a fertilised female or pairing in captivity is preferable to taking a series of specimens in the field.
2 Never collect more larvae or other livestock than can be supported by the available supply of foodplant.
3 Unwanted insects that have been reared should be released in the original locality, not just anywhere.
4 Before attempting to establish new populations or 'reinforce' existing ones please consult this Committee.

25th January 1972

JUNIOR NEWS

As this report has had to be written just after the appearance of the May *Bulletin*, and nobody has written to me yet this year, it is going to be a short one. It is a bad time to write, anyhow, what with examinations and the hot English Summer (I must remember to turn up the central heating).

As you will have seen in this and the previous AES *Bulletin*, the theme for the 1972 Exhibition is 'Back Garden Entomology', and I hope

that this will give some of you an idea of what to do for the Exhibition. It would be nice if you could show something connected with this theme, but it is not essential. Junior exhibits should be clearly labelled and put out on the tables set aside for them. Please also put your name, address, and age on them. It would also help if you were by the table at about 3pm when the judging will take place. The prize for the best junior exhibit, taking into account age, will be Oldroyd's book *Collecting, Preserving and Studying Insects*. This book is full of information and well worth having.

What the judges will be looking for is an attempt to do a study of some kind, rather than long series of set specimens. The winner last year exhibited single specimens of several orders and water colours of the life histories of several butterflies. So will you please make an attempt to come along with something, be it specimens, livestock, photographs, drawings, or all the lot.

One thought about 'Back Garden Entomology'—have you tried beetle traps? Dr MacNulty has probably written about them in his excellent articles on beetles, but, as a reminder, you sink jam jars into the garden until the rims are on a level with the surrounding soil (or better, raise the soil up to the rim a little). You then put something flat over the jar, raised a little on stones so that animals can crawl into the jar but rain is kept out. I have found some old white tiles very useful for this as they are easily spotted if you forget where you put the jars. You leave the jar just like this or put odd pieces of meat or fish in them as bait.

I found a young dead bird (fallen from a nest) and put that in one. It was a complete failure as a few days later ants had left only a skeleton. I am not quite sure how the ants had got out with the tit-bits of meat, as it came on to rain just as I was investigating. I think, on the whole, that the younger members had better leave them unbaited, or I shall have mothers writing to accuse me of being instrumental in poisoning their offspring. Investigate the jars at least twice a week as some creatures cannot live for long in the jars, and some eat the others. Try not to lose your temper when you take the jar out of the hole to investigate and all the soil falls into it—just take a trowel with you. I tip the contents out onto my white tiles and can see clearly the hundreds of woodlice that come out. Sometimes there are beetles, too.

I have no doubt that all this can be worked up into a proper scientific experiment to see what the population of ground beetles is in the area you are studying. However, make sure that you are not studying the population of stupid ground beetles which fall down holes in the ground. Anyhow, it will give you a good idea of what sort of things are walking about on the surface of the soil. Apart from beetles and their larvae, and woodlice, I have had Lepidopterous larvae, spiders, springtails, and slugs. My real aim was to see if any of the 'bugs' (Heteroptera) could be caught in this way; but they seem to be more intelligent.

If you want your name in the *Bulletin*—and fame, don't forget to write to me.

D. Ollevant (1514)
AES Youth Secretary.

ANNUAL EXHIBITION 1972

Since my item in the February *Bulletin* about the next Exhibition, I have received several letters offering opinions and suggestions. I am very grateful for all of them. Any change in policy over a matter such as the Exhibition is bound to cause some difficulties, but I am glad to say that the response was, on the whole, favourable.

But, as I pointed out in the last article, the success of the Exhibition really rests upon the contributions of the members in the form of exhibits. The prestige of the Society is growing, and I would like to see this growth reflected in the quality and number of exhibits this year. There can be very few members indeed who have absolutely nothing that they could bring along to help the Exhibition. I especially hope to see a better response from the junior members. The prize for the best junior exhibit will be a copy of Harold Oldroyd's *Collecting, Preserving and Studying Insects*, which is one of the best introductory books on practical entomology available.

This year's theme for the Exhibition, 'Back Garden Entomology', is one that makes a wide range of contributions possible. Perhaps you have designed a new form of light trap, or a new kind of sleeve for rearing larvae. Why not bring it along, so that others may use your idea? An interesting contribution would be a set of specimens of insects caught over a period; or even, in the more numerous orders, in a single day or night. Or if you have made a single, special 'find', why not pop it into a case and bring it along?

Please see the back of this *Bulletin* for deatils of the date, time and whereabouts of the Exhibition. Members will help considerably by sending in the form accompanying this *Bulletin*, so that I may know what contributions I may expect. This is especially important if you hope to use the members' tables for sale of surplus material.

Despite the rumours, a wide range of dealers will be present. Slides will be shown, and demonstrations of setting, etc., will be given. I look forward to meeting a lot of my old friends and hope to make many new ones in what I trust will be the best AES Exhibition yet.

Martin Hough (3354)
Exhibition Secretary

LETTERS TO THE EDITOR

Trading at the Annual Exhibition

Dear Sir,

Having just read the report on the 1971 Annual Exhibition in the February *Bulletin*, I would like to give my personal views on this controversial issue.

It has been noticeable that there is a growing dissatisfaction about the various functions of the Exhibition. Certainly the number of dealers should be limited, so that members may be given the chance to participate more fully. But I feel that it is time to make a greater distinction between the various types of dealers eligible to trade at the Exhibition. There seems to be an enormous trade in preserved specimens, particularly foreign butterflies and, more recently, exotic Coleoptera, some of which are listed as rare by the dealers who sell them. I feel that it is this type of dealer, of which there was a noticeable rise in numbers last year, that should be restricted. Priority should be given to those dealers who sell equipment, books and livestock.

This will create hardships for many dealers, but will not, I think, be a loss to the Exhibition, since it is livestock that attracts young people, especially those visiting the Exhibition out of curiosity. As John Bocock observed in his editorial in the February *Bulletin*, most young members are interested primarily in live insects and not in amassing large collections.

I am glad to see that the facilities for members wishing to sell excess livestock, equipment, etc., are to be increased. If this means severe competition for some established professional dealers, then they will have to face it: after all ours is basically an **amateur** society, and the Exhibition is for its members.

All must agree that the main way to improve our Annual Exhibition is to increase the number of exhibits, particularly those by younger members.

Michael Sweeney (4013j)

Hoorah for John!

Dear Sir,

John Bocock must be thanked for his succinct assessment, in the February *Bulletin*, of the controversy which has raged over the past few years between the living and the dead. I trust that you will continue his enlightened work of trying to achieve a balance.

Current pressures are such that the days of massed collections of trivial varieties are numbered, so the sooner we come to terms with the alternatives of observation and photography the better.

Hugh Clark (3910)

I shall cerainly aim for a balance, but I feel that my own views may be different from those of the previous editor.

Ed.

BOOK REVIEWS

Les Bombycoïdes (Lepidoptera-Bombycoïdea) de l'Europe et du Bassin Méditerranéen. Vol. I. Lemoniidae, Bombysidae, Brahmaeidae, Attacidae, Endromididae by P.-C. Rougeot. Masson et Cie, 120 Boulevard **St.-Germain, Paris 6e. 1971.**

Here at last is a book, a cross perhaps between 'Seitz' and the *Silkmoth rearers Handbook*, which really is indispensable for anyone interested in breeding these superb moths or collecting them anywhere in Europe, Asia Minor or the North African littoral.

The book is profusely illustrated with 195 figures, depicting just about every aspect of the subject, moths, larvae, close-ups of antennae, typical localities, genitalia and a frontispiece of the author in a typical posed collecting situation which will be familiar to all who attend field meetings in England! There are also two superb colour plates depicting an example of the adult of four of the families dealt with and the magnificent larva of *Graellsia* feeding.

Every species is described with its distribution; details are given of characters to distinguish the various subspecies or races; where known, larvae and pupae are also described and details of the biology given, as also is a list of known parasites. Although the length of the treatment given appears to vary rather, this reflects the availability of knowledge about a given species and the number of its subspecies rather than bias.

The genus *Lemonia*, unknown in England, consists of a number of medium-sized moths superficially similar to our Eggars. This book indicates that the early stages, and indeed even the females, of some of the species from Asia Minor, are still unknown and this should stimulate the interest of the more intrepid entomological holidaymaker.

A useful feature is the giving of the common names of those moths that have them in the languages of various countries they occur in. This brings to light such curiosities as finding our dayflying Emperor moth called 'Le Petit-paon de nuit' in French. It would have been helpful if these common names had been more extensive and included Turkish, African and East European vernacular names.

There is a very extensive bibliography of seven pages, useful indeed to those who like to consult original sources and pinpoint exact localities. One has the impression, however, that the essential essence of all these cited papers has been distilled by M. Rougeot into his book. There are separate indices of foodplants, species and contents.

Unlike so many continental works I have come across, this book is well printed on very good quality paper and is rather attractively bound in cloth covered limp boards. Even without a working knowledge of French, the illustrations and lists of names and foodplants will be of inestimable value to all interested in silkmoths in the broadest sense.

Brian O. C. Gardiner (225)

APRIL BUTTERFLIES IN TENERIFE

On holiday between 10th and 24th April 1972 I found butterflies few in number, bu I succeeded in seeing and obtaining good colour photographs of nine species, including two which are rare migrants to Britain and some which are restricted to the Canary Islands.

On the north coast at Puerto de la Cruz my first find, in the hotel garden, was an Indian Red Admiral (*Vanessa indica* Godart) which was sharing some mauve Statice flowers with a couple of ordinary Red Admirals (*V. atalanta* Linn.); this gave me a good opportunity to compare the two species. *V. indica* has a much wider, but broken, red band on the fore wing and the underside pattern is noticeably different. According to Higgins and Riley (1970), who give detailed coverage of the Canary Islands, this species occurs in India and other parts of Asia but not in Europe or Africa apart from the colonies of the *vulcania* variety in the Canary Islands and Madeira.

The local Botanical Gardens proved a good hunting ground and I found a Monarch (*Danaus plexippus* Linn.) with splendid gliding flight, like that of a White Admiral, several Canary Speckled Woods (*Pararge xiphioides* Stand.), the Canary variety of Large White (*Pieris brassicae cheiranthi* Hueb.), a Clouded Yellow (*Colias crocea* Geoff.), Red Admirals and Small Whites (*P. rapae* Linn.). The Canary Speckled Wood closely resembled the European species (*Pararge aegeria* Linn.) on the upperside, but had a distinctive underside pattern; it had the same habit of sitting open on leaves in dappled sunlight, but on two occasions I photographed it sitting on a Strelitzia flower, although I do not know whether it was actually feeding. The Canary Large White was a fine variety with much larger spots. It is perhaps worth noting that Higgins and Riley (1970) state that *V. indica* and *P. xiphioides* occur from May onwards, while I observed both on April 14th.

In the second week on the dry west coast near Puerto de Santiago, I found another Monarch, an African Grass Blue (*Zizeeria knysna* Trimen) and a colony of Bath Whites (*Pontia daplidice* Linn.).

According to Higgins and Riley the Monarch colonised the Canary Islands in 1880, but is not resident elsewhere in Europe, although it is, of course, known as a rare migrant. Living on a different food plant with different predators and in a strange habitat of black volcanic rock, one might expect that there would be considerable pressure to adapt by forming a new variety. I have compared my new photographs with some I took (on the same camera, all with magnification 1/4) of a Monarch in the USA. There were no major differences; possibly the orange marks near the apex of the forewings were a little weaker on the Tenerife specimens.

A. G. Gaydon (3198)

REFERENCE

HIGGINS, L. G. and RILEY, N. D. (1970). *A Field Guide to the Butterflies of Britain and Europe*. Collins, London.

HENRY DOUBLEDAY 1809–1875

Henry Doubleday was born in 1809 at Epping, which was then in the centre of a much more extensive forest than now. Like Newman he was the son of parents who were members of the Society of Friends (Quakers), but unlike him, Doubleday lived all his life and eventually died in the house in which he was born. His father ran a grocery and general store in a converted coaching inn that had formerly been the 'Black Boy'. There was one other child, a younger brother, Edward, who in his short life was also to attain some fame as a naturalist and entomologist. It was Henry's fate in life first to assist his father in the business, and later to inherit and carry on that business for almost the whole of his life. Unlike some other famous entomologists of the nineteenth century, his schooling was confined to attending at the small local Quaker school run by a man named Payne. The schooling received there must have been excellent, for it enabled the brothers to hold their own with contemporary naturalists who had received a university education. Edward left home in his early twenties and went to America for two years and on returning home took a post as an assistant at the Natural History Department of the British Museum. He was for some time the Secretary of the Entomological Society of London (now the Royal Entomological Society) but died in 1849.

Henry unlike his brother and the other entomologists of that day was no traveller, he made only infrequent journeys in England and left the country only once; in 1843 he visited France for the purpose of meeting his lifelong friend Achille Guenee. His first major interest was ornithology and the careful records and observations that he kept were printed in the scientific journals of the day and were also incorporated in the published works of other men. He was an excellent shot and a first class taxidermist, stuffing all his own birds. He recorded several birds for the first time in this country. However it was for his knowledge of the British Lepidoptera that he was known and honoured by his contemporaries. Over the years he amassed one of the finest collections of the century, but his vast knowledge of the Lepidoptera undoubtedly came from his careful observations, and the fact that he bred so many of his specimens, probably more than any other entomologist of his day. He is credited with inventing the practice of 'Sugaring', which is still, despite the MV lamp, one of the most effective ways of catching moths. It is said that the idea originated when he saw how the empty treacle barrels in his father's back yard attracted moths. He was a regular contributor to the *Zoologist* and the *Entomologist*, but his only major work was the *Synonimic List of the British Lepidoptera*. This work undoubtedly sprang from his visit to Guenee, a man whom he regarded as one of the greatest entomologists of the day, and with whom he carried on a life-long correspondence. From this visit he was able to see the great differences and confusion that existed in the nomenclature of the

Lepidoptera, and this work was intended to present a list of the names of the butterflies and moths that would be internationally acceptable. This work first appeared in parts between 1847 and 1850, and was republished as a second edition in 1855, when it included the micro-lepidoptera; supplements were produced in 1865 and 1873. It named some 2,100 British species. It was an arduous task, but this monumental work brought order and uniformity to the British Lepidoptera and gave British entomologists the first list that was in conformity with continental practice.

Since the death of his father he had run the family business, but having suffered a severe financial loss due to the collapse of a bank, things got worse and by 1870 he was ruined. It was necessary to sell the business as well as his great collection of birds, Lepidoptera and books. As a result of these misfortunes he suffered a breakdown and entered a hospital run by the Quakers at York. He recovered and was rescued from his difficulties by his friends, particularly Edward Newman. They formed a small trust and together subscribed enough money to buy back and present to him his wonderful collection of Lepidoptera and his books. An annuity was also provided, which was enough to enable him to live out his days in comfort in his old home. It is today very fashionable to decry the Victorians, but can we imagine a similar situation today if one of the better known entomologists fell on hard times? It also shows the esteem and affection in which Doubleday was held by his contemporaries. He spent the few remaining years of his life revising his *Synonimic List*. He was an original member of the Entomological Society of London, but never held any office. On his death his great collection went to the Bethnal Green Museum, then a part of the British Museum of Natural History. Later it was transferred to South Kensington where it still is. He was buried in the graveyard behind the small Quaker Meeting House at Epping.

G. Prior (3909)

WHERE ARE THE COUNTRY'S BUMBLE BEES?

The first two preliminary maps of bumble bees in Britain and Ireland have just been published by the Bee Research Association. Twenty-five species altogether have been recorded for the Bumble Bee Distribution Maps Scheme, which was started in 1970 by the Association. The Scheme is being extended this summer with the aid of support from the Natural Environment Research Council.

Further observers for the Scheme would be welcome, including those who are interested but cannot identify the different species of bees. If you would like to know how the Scheme works, write to the Bee Research Association, Hill House, Chalfont St. Peter, Gerrards Cross, Bucks. Ask for leaflet BDMS/1, which gives introductory information; a leaflet *Save our pollinating insects* will also be sent free of charge.

THE AMATEUR ENTOMOLOGISTS' SOCIETY

ANNUAL EXHIBITION, 1972

SATURDAY, 30th SEPTEMBER
12.30 to 4.30 p.m.

HOLLAND PARK SCHOOL, AIRLIE GARDENS, CAMPDEN HILL, KENSINGTON, W.8

ADMISSION FREE

EXHIBITS. The Hall will be open from 11.30 a.m. for receipt of exhibits. Bring along your specimens (any Order, living or set), equipment, apparatus, photographs, drawings, etc. If you require a large space, notify the Meetings Secretary in advance. Please label exhibits clearly.

DEMONSTRATIONS. Members will demonstrate setting of insects and slides will be shown during the afternoon.

GROUPS. Members of Groups who have been corresponding will be able to meet for discussion.

SURPLUS TABLE. This will be available for the sale of Members' surplus material. There is no charge.

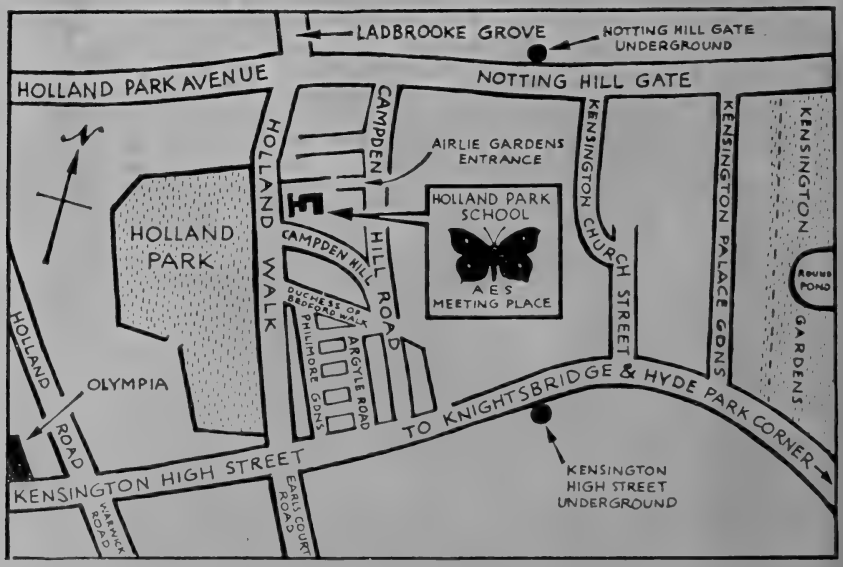
ENTOMOLOGICAL TRADERS will be in attendance.

Light Refreshments will be available from 12.30 p.m. to 4 p.m.

To get there: Notting Hill Gate Station (Underground) or Kensington High Street Underground or Buses 27, 28, 31, 46 and 52 run along Kensington Church Street

CARS MAY BE PARKED IN PERMITTED AREAS OF THE SCHOOL GROUNDS

Notice is hereby given that neither the Amateur Entomologists' Society nor the Inner London Education Authority can accept any liability for damage to vehicles or property which are left in these grounds



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World List abbreviation : Bull. amat. Ent. Soc

EDITED by PAUL BOSWELL, MB, ChB, FRES.

AES NOTICE—where to write

Membership applications and first subscriptions to:	D. Keen, *3 Woodbourne, Farnham, Surrey.*
Changes of address and non-arrival of Bulletins to:	P. W. Cribb, *355 Hounslow Road, Hanworth, Feltham, Middlesex.*
Advertisers and for Prospectus of Society and Application forms to:	R. D. Hilliard, *18 Golf Close, Stanmore, Middlesex.* 01–954 0460.
Manuscripts, drawings and books for review to:	P. A. Boswell, *Pathology Department, The Middlesex Hospital Medical School, Riding House Street, London, W1P 7LD.*
Subscription renewals (£1.25 per annum, 0.63p under 18 years) to:	N. H. Cooke, *36 Glendarvon Street, London, SW15 1JS.*
Youth matters to:	D. Ollevant, *95 West Heath Road, Farnborough, Hants.*
Annual Exhibition matters to:	Martin Hough, *44a Windmill Hill, Ruislip Manor, Middlesex.*
Offers of help, queries, etc. to the Hon. General Secretary:	G. Prior, *23 Manor Way, North Harrow, Middlesex.*

AES BULLETIN

No. 297
NOVEMBER 1972

EDITORIAL

If this edition of the *Bulletin* reaches you late it will be at least in part my fault. During its production I will have changed jobs, moved house and taken an examination. I hope therefore that members will forgive me.

Do not be dismayed by the absence of an article on Craneflies by Mr Stubbs. As his next article deals with spring and summer species it seems more appropriate to publish it in February. Instead you will be able to read various accounts of collecting in sunnier climes which I hope may cheer you during the dark winter days.

Will members please note my new address which appears in the 'Where to Write' panel.

Paul Boswell (2853)

COLLECTING NOTES – NOVEMBER 1972

The smaller moths

The species illustrated here by Mr E. S. Bradford have already been mentioned in these notes, but are portrayed for the first time. Mr Bradford has supplied the following notes on the two species of *Mompha*.

"*Mompha raschkiella* Zell. I have found the larvae and bred specimens of this moth from two areas near my home in Borehamwood. The foodplant is Rose-bay Willow-herb (*Chamaenerion angustifolium* (Linn.) Scop.) and the larvae may be found during June and July and again in September. When collecting leaves, the larva is fairly easily seen as the tenanted mine is yellowish; once the larva has left the leaf, the mine turns whitish. I gathered the leaves of the overwintering specimens when the larvae were nearly full fed and put them in a box with an inch of earth in the bottom. The date of emergence on the label of the drawn specimen is June 1st, but examples emerge earlier and later. I have found *raschkiella* together with *M. fulvescens* Haw. and *M. lacteella* Steph. flying in the sunshine around a patch of Rose-bay Willow-herb in May.

"The forewings in fresh specimens are a dark leaden grey with sometimes just a bit of a blue sheen. There is a yellow-orange blotch

near the base and two more about three-quarters along the length of the wing with a whitish costal blotch above. The two scale tufts are black. The hindwings and cilia are dark fuscous. The cilia have a yellow-gold sheen at certain angles to the light.

"*M. propinquella* Staint. The moth from which I made the drawing was taken from a sugared post in my garden on September 13th, 1966 at about 10.00 p.m. I was inspecting the posts with a torch when I came across this moth. It was in fresh condition; usually the moth is found as an adult in June and July so this specimen was rather late in emerging. The larva makes blotches from February until April in the leaves of Great Hairy Willow-herb (*Epilobium hirsutum* Linn.) and Broad-leaved Willow-herb (*E. montanum* Linn.). It then makes its cocoon within the blotch.

"The head, thorax, labial palps and base of the wings are ochreous white. The tornal and costal blotches are also whitish. The rest of the forewing is dark fuscous with several orange-brown spots on the dorsal half. There is a thin whitish or sometimes orange line around the central sub-costal spot which, like the edge of the basal patch, is darker than the rest of the wing. There are also several black scale tufts which are only really noticeable in fresh specimens. The hindwings are dark fuscous."

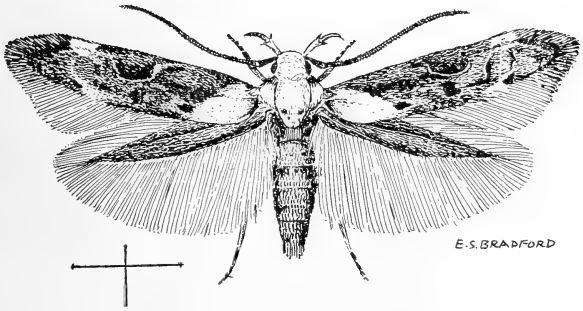
The third of Mr Bradford's drawings is of *Agapeta zoegana* Linn. The forewings are deeper yellow than those of its near relative *A. hamana* Linn. The darker markings are reddish fuscous. The hindwings are fuscous. The variety *ferrugana* Haw. has the whole of the forewings suffused to a greater or lesser extent with ferruginous. The moth flies in July and August and is widely distributed but never as common as *hamana*. The larva may be found in the winter months when it feeds on roots of Lesser Knapweed (*Centaurea nigra* Linn.).

Field-work hints for the winter inevitably follow restricted lines. Thus I have written about imagines to be found in thatch or evergreen (1966), winter-feeding larvae in moss and birds' nests (1967), in roots (1969), in stems (1969 and 1971), and in seedheads (1971), late 'neps' (1967 and 1969) and *Phyllonoryter* (1968 and 1970) in fallen or evergreen leaves, together with scattered miscellaneous oddments. What remains to be covered before repeating the programme? Fungus.

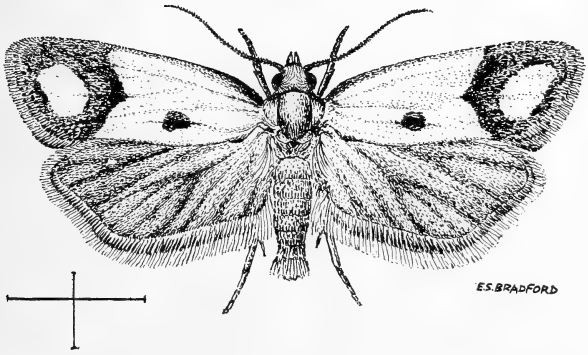
Fungus-feeding larvae are to be found throughout the winter, but the majority are not full fed until the spring. They pupate in their feeding-place and doubtless thrive best in the habitat selected for them by their mothers. Accordingly I recommend locating your quarry during the dark days of entomological stagnation but delaying collection until April.

Some fungi are very hard but are attacked and broken up by beetles. This makes it easier for the more tender-jawed lepidopterous larvae to chew their way through an abnormally hard food substance. Therefore beetle-infested fungi should never be rejected by the lepi-

Mompha raschkiella Zell.



Mompha propinquella Staint.



Agapeta zoegana Linn.

dopterist. Often, but not always, tell-tale frass extruded from the lower surface of the fungus betrays the presence of the caterpillars. Bracket fungi (such as the *Polyporus* you collect for your staging mounts) yield the best results in my limited experience.

The infected fungus may be kept in a 'polythene' bag and I have reared a culture of *Nemapogon granella* Linn. to the third generation by this primitive method. A snag is that the accompanying beetles are apt to chew holes in the bag through which your moths can escape. A refinement I advocate is to ventilate your bags as follows. Cut the top and bottom off a tin of, say, peas and tie the resulting tube securely in the mouth of the bag; then cover the open end of the tin with a piece of nylon stocking. Put a noose of string around the tin neck and hang the bag by the loose end of string from a nail in an outhouse. This gives the contents of the bag plenty of air and the moths when they emerge fly up to the nylon where they are easy to spot.

Ford (1949) lists fifteen species of microlepidoptera as feeding on fungus and I refer you to him for their names. The majority belong to the Tineidae or 'clothes-moth' family. An interesting exception is *Myelois neophanes* Durr. whose larvae feed in *Daldinia* spp., the globular black fungi which grow on dead birch and gorse stumps. The moth is not uncommon on the heaths to the south and west of London. In this instance it is certainly best to delay collection until late April or May when the larvae should have pupated.

A. M. Emmet (1379)

REFERENCE

FORD, L. T. (1949). *A Guide to the Smaller British Lepidoptera.* South London London Entomological and Natural History Society, London.

REFERENCES

FORD, E. B. (1945). *Butterflies.* Collins, London.
KNUTH, P. (1906). *The Handbook of Flower Pollination.*
TAYLOR, S. (1957). Notes on the proboscis in Lepidoptera. *Ent. Rec.*, **69**: 25, 53, 151.

SO YOU WANT TO STUDY BEETLES
PART V – IDENTIFICATION AND CLASSIFICATION

Introduction

I am writing this in the middle of a heat wave. I am at the top of a Cornish cliff looking down into the clear blue sea. I have had a good day seeking some of our more rarely met beetles. There is liquid refreshment at my elbow and the prospect of an excellent dinner to come.

When you read this the weather will no doubt have changed and the long winter evenings will be with us. So now is the time to consider what one has learnt and how interested you have become. There is in winter less opportunity for seeking and finding, observing and breeding, but more for study. The student must decide just how interested he (or she) has become and whether he wishes to proceed further with what

could provide several lifetimes of enthralling and interesting discovery.

So far a few beetles have been found, some of which I hope have been bred or are hibernating as larvae or pupae. No doubt the names of some of these beetles have been found either by comparison with a picture in a book or a specimen in a collection, or by the help of a more knowledgeable friend. If however one wants to become more than a dabbler it is necessary to be able to identify one's own specimens and therefore to possess a reasonable knowledge of the classification of the beetles and the methods used for their identification.

Unlike Lepidoptera most beetles do not have 'English names' but only 'Latin names'. This does have the advantage that entomologists of any nationality will know which beetle you have. Do not be put off, after all it is just as easy to remember *Calophorus styx* (if there is such a beetle) as 'The Dark River Calophorus'.

From this point on you will need to acquire a small library of relevant books. Many of these are difficult to get and are out of print. You will probably also want to join a local and/or national society in order to make contact with others with the same interests as yourself. The study of beetles will be much more interesting if you have a friend with whom you can compare notes and discuss problems.

Literature

Many of these technical books are, of course, expensive and can only be obtained second-hand. It is unlikely that you can obtain all of them and you will have to be selective. Certainly it is unlikely that you will be able to afford all of them at one time.

The following are most of the books that you will at least want to see at some time:

Handbooks for the Identification of British Insects. Royal Entomological Society of London. Published in parts at prices varying from 25p to £1.25.

These keys are for the most part excellent but one or two are not easy to follow. Volumes IV and V cover the Coleoptera but they are at present incomplete and cover only some groups of beetles. They are obtainable from the publisher's agent: E. W. Classey Ltd., 353 Hanworth Road, Hampton, Middlesex.

Beetles of the British Isles by E. F. Linssen. Two volumes published in 1959 by Fredk. Warne and Co., London. Price £1.75 per volume.

These volumes are good value. They do not cover all beetles and lack adequate keys. However the many coloured plates can be helpful, especially when used in conjunction with a more technical work.

The Coleoptera of the British Isles by Canon W. W. Fowler. Five volumes published between 1887 and 1891 by L. Reeve and Co., London. There is also a sixth volume in the form of a supplement by the same author and H. StJ. K. Donisthorpe which was published in 1913.

This is still the standard work on British beetles. It is out of print. Second-hand copies are available from time to time and the price depends on the condition. The illustrated edition is beyond the pockets of most entomologists as it usually costs £80 or more.

A Practical Handbook of British Beetles by Norman H. Joy. Two volumes published in 1932 by H. F. and G. Witherby, London.

This is an excellent book which suffers from two deficiencies: a number of species have been omitted and it takes time and experience to understand exactly what the author means by some of his terms and descriptions. Nevertheless it is a work to be recommended. Unfortunately it is only available second-hand priced from £12 to £20 depending on condition.

Fauna Germanica. Die Käfer des Deutschen Reiches by Edmund Reitter. Published in five volumes by K. G. Lutz, Stuttgart in 1908.

An excellent work, profusely illustrated, in which most of the British beetles are described. It is of course in German but if you read or are learning the language you could find it a most useful work. The keys are adequate. It is out of print. Price will depend on the usual factors.

Die Käfer Mitteleuropas by H. Freude, K. W. Harde and G. A. Lohse. So far Volumes 1, 3, 4, 7, 8 and 9 of a projected eleven volumes have been published at a price varying between £5 and £7 per volume.

This is an excellent work and is readily available. It covers most of the British beetles. Every coleopterist should try to possess it even though it is again written in German.

Faune de France.

There are a number of volumes in this series devoted to Coleoptera and most of the British species are covered. It is an excellent work, but expensive and difficult to obtain.

Entomologist's Monthly Magazine.

This now appears quarterly. It is a most useful adjunct to the library. Revisions of many groups of beetles appear here from time to time, as well as notes on the habits of beetles and occurences of new British species. It is a must for all serious coleopterists. It is available at a subscription of £3.50 per annum from 7 Thorncliffe Road, Oxford.

Societies

The cost of acquiring a good library on Coleoptera may at first glance seem astronomical. But one can begin very well by acquiring suitable parts of the Royal Entomological Society Handbooks and the two volumes of Linssen. Other works can be borrowed, perhaps from your local library or by joining a society.

Local societies. There may be a local society in your area. Probably the librarian at your local library or the curator of your local museum will be able to give you the address of the secretary.

The Amateur Entomologists' Society. As this article appears in this society's *Bulletin* you will already know about it. It is mainly a correspondence and publishing society (among its publications is the useful *Coleopterist's Handbook*). It also holds an annual exhibition.

British Entomological and Natural History Society. This society meets at the Alpine Club, 74 South Audley Street, London, W.C.1. Meetings are held on the second and fourth Thursday of each month except August. The society possesses an excellent library and reference collections of insects, including the Joy collection of Coleoptera. The society devotes much attention to field work and frequent field meetings, some in conjunction with the AES, are held throughout the year. Subscriptions are £2.62 per annum for ordinary members, £1.57 for country members and for those aged less than twenty-one 75p. Enquiries should be made to the Honorary Secretary at the above address.

The Royal Entomological Society of London. This society possesses a very fine library but no collections. Meetings are held on the first Wednesday of most months. It is the premier entomological society in the country and membership is by election. The annual subscription is £10. Enquiries should be addressed to the Secretary at 41 Queens Gate, London, S.W.7.

In this article I have attempted to give advice about books which are useful for the identification of beetles and also about the societies which may be helpful. I shall continue this part in the next *Bulletin* by describing the important anatomical parts of the beetles which are used in classification and also given an introduction to their classification.
(To be continued) B. J. MacNulty (4528)

SOME OBSERVATIONS ON THE EGG LAYING HABITS OF TWO JAPANESE BUTTERFLIES

On the 21st April 1968 at about 10.15 a.m. I observed a female of the butterfly *Polygonia c-aureum* Linn. laying eggs on the fern-like plant *Equisetum arvense* Linn. growing along the banks of the Nagara River in Hashima City, Gifu, Japan. The female was not fresh, being an overwintered specimen. She also deposited on dead leaves and small stones near the road side.

P. c-aureum usually lays its eggs onto the larval foodplant, in Japan normally *Humulus japonicus* Sieb. and Zucc. I have note of a similar report of this unusual phenomenon at Kyushu in Japan. This occurrence has been observed in the Fritillaries and I would be interested to hear of examples observed in Europe. I was able to photograph the female on the *Equisetum* (Bottle Brush plant).

On the 26th April 1970, I watched the Pierid, *Eurema hecabe mandarina Orza*, depositing her eggs on to the young leaves of a fern. Unfortunately a shower occurred and the butterfly stopped laying and

flew away. Afterwards I checked the leaves of the same fern and found 12 eggs. I brought five of them home and tried to find out if the larvae would feed on the fern. The eggs all hatched but the larvae died without biting the fern. *E. hecabe mandarina* is a familiar Japanese butterfly. The following food plants are known—*Aeschynomene indica* G. Don, *Lespedeza cuneata* Linn., *L. cyrtobotrya* Mig. (*Fabaceae*). There is no record that I can find of it laying on fern. The female in question was not fresh but antennae, legs and wings were perfectly all right.

Yukiharu Mori (4657).

The above notes were sent to me by our Japanese member who is a keen observer of butterflies. As he states, the habit of laying eggs on plants or objects other than the foodplant is known among the Fritillaries. *Clossiana euphrosyne* Linn. often lays on plants growing in the vicinity of Violets (*Viola* spp.) while *Argynnis paphia* Linn. deposits her eggs in crevices of bark. Many of the Satyrids shed their eggs freely over grasses and I have observed *Erebia pluto* de Prun. depositing on rocks near its food plant. Any observations on this subject will be welcomed.

P. W. Cribb (2270)

CANON W. W. FOWLER 1849 – 1923

My subject for this article is one of that long list of clerical entomologists, the Greenes, Hopes, Kirbys, Harper-Crewes and many others who have contributed so much to our present knowledge of the science, Canon W. W. Fowler. It is popularly supposed that these clerical men who spent so much time on the study of insects neglected their parochial duties. Of the great majority of them this was not so and none less so than Fowler. They somehow managed to squeeze more time into their day than we do now.

William Weekes Fowler was born in 1849 the son of a clergyman at Barnwood in Gloucester. His main schooling was at Rugby, which he attended soon after Dr Arnold's reorganisation, and so must have benefited from that great man's influence. He then went as a scholar to Jesus College, Oxford, and after graduating he became a master at Repton in 1873. He took Holy Orders and became a House Master in 1875. It was whilst he was at Repton that his interest in entomology began, being drawn to this by the local activities, there being a flourishing natural history society at the nearby town of Burton-on-Trent. In 1880 he became the Headmaster of Lincoln Grammar School and remained so for the next twenty years. In 1887 he was appointed a canon of Lincoln Cathedral. From 1901 to 1904 he was the Rector of Peppard, a village near Henley, but being an energetic man he wished for a more arduous task and so exchanged livings and became the Vicar of Earley, a suburb of Reading, a parish of some 6,000 people. He remained until his death in 1923, appropriately 'in harness', whilst con-

ducting the Sunday morning service. Like most of us he started as a lepidopterist, but soon moved on to beetles. He was a regular contributor to the entomological magazines of the day and was, from 1885 until his death, one of the editorial panel of the *Entomologist's Monthly Magazine*. He did work on the Hemiptera-Homoptera of South America, and was the author of a volume, *The General Introduction to the Coleoptera of British India*, issued by the Indian Government. But the work for which his name is of course famous is the *Coleoptera of the British Isles*. This was issued in five volumes between 1887 and 1891. He was the joint author with Donisthorpe in 1913 of a sixth volume. It contained within its pages a full description of every species of beetle then known in the British Isles; nothing on this scale had appeared before. Though many new species have been discovered since, it is still a widely used reference book.

He became a Fellow of the Entomological Society of London (now the Royal Entomological Society) and was its Secretary from 1886 to 1896 and its President for the year 1901–2. He was also a Fellow of the Linnean Society and one of its Vice-presidents for the year 1906–7. In 1902 Oxford University conferred on him the Doctorate of Science, an unusual honour for a clergyman. He was an excellent field naturalist and a kindly and generous person helping others with advice and specimens from his own collection.

G. Prior (3909)

SUMMER BUTTERFLIES IN SOUTH AFRICA

The sunshine in the Cape Peninsula during the summer months is fiercely hot and, although the heat is frequently tempered by cool winds off the sea, the result is a parched countryside in which few butterflies manage to survive. This did not prevent my visit to Cape Town between mid-December 1971 and mid-March 1972 from providing plenty of interest and there follows a general account of my discoveries in the South-Western Cape during that period.

I did not have the benefit of guidance from any local lepidopterist so my identifications were made by the laborious study of several books available in the public library in Cape Town and in the library of the Department of Nature Conservation. There is evidently plenty to be done towards completing the study of South African butterflies although the number of species is very much smaller than in parts of Africa further north.

Danaidae

I had expected to see plenty of *Danaus chrysippus* Linn. as it is reputed to be a common and widespread species in Africa but I only saw six, all singly and in different localities. All were of the normal form

with the large black apical patch on the forewings and all seemed to be in a hurry to go elsewhere except the last one which was sheltering behind a farm shed from a stiff southerly wind in mid-March and was feeding on some yellow cruciferous flowers. This specimen I was able to photograph successfully despite the species' habit of continuously opening and closing its wings while feeding.

Acraeidae

The Acraeas are weak but buoyant in flight and look rather like small Danaids. I only identified one species, *Acraea horta* Linn., and this was abundant around many species of deciduous trees; it seemed particularly fond of the many large Oaks (*Quercus* sp.) which were planted in Cape Province by earlier generations of settlers. Like many of its family, *A. horta* lacks scales on the outer half of its forewings and the scaled areas seem quickly to get rubbed so that their wings are often so transparent that they look more like large damsel flies than butterflies. The fresh male has a beautiful orange-brown colour similar to *D. chrysippus* and looks very handsome fluttering round the trees in the bright sunshine. The females are of a duller colour and some are dark green; I at first thought that these might be of a different species but later found one paired with a normal male.

The females deposit their eggs in large masses and become so intent on their task that one can gently pick the sprig of leaves off the tree and place it in a more favourable sunny and windless position for photographing while she continues to lay. The eggs are shiny yellow, the full grown larva is black and spiny, rather resembling a Nymphalid, and the pupa is long and slender, black with white and orange markings. I found one small tree, of a species I did not recognise, which was severely denuded of leaves by the larvae of this butterfly; all the instars were represented and eggs were still being laid so I was able to photograph the life cycle in one session.

Satyridae

I identified three of the 'Meadow Brown' species and all had a preference for sheltered open woodland. Instead of the fulvous colour of the European species these all had patches of rich red-brown similar to the ground colour of the Peacock Butterfly (*Inachis io* Linn.); in all three cases the eyespots on the forewing were double pupilled.

Dira cassus Linn. was found in December on the wooded lower slopes of Table Mountain; the eye spot on the forewing has only a slight yellow ring round it and the reddish colour patch almost encircles it.

Melampias vigilans Trim. is a similar species to *D. cassus* and was fairly common in the same areas in February and March. The forewing eyespot is encircled by a bright yellow ring and the reddish patch does not reach the eyespot.

Melampias cassius God. is a smaller species than the previous two and I found it in the rain forest at Tsitsikama, about 400 miles east of Cape Town, and also near the stream at the lower end of Orange Kloof.

the valley behind Table Mountain. This species also has a bright yellow ring round its forewing eyespot and is further distinguishable by the fine submarginal lines on the upper side.

A larger Satyrid which is similar in flight behaviour to the previous three species is *Dira clytus* Linn. This was found on the lower slopes of the Table Mountain area, again in the vicinity of trees, and there was a very strong colony in mid-March just above the Rhodes Memorial Park. This species has a yellow apical patch with dark brown veins running through it and containing two blue eyespots. The hindwing has four eyespots each ringed with red-brown or, occasionally, yellow.

The fifth Satyrid was a large and most attractive species, *Aeropetes tulbaghia* Linn., locally called the 'Mountain Beauty'. Again these were common on the lower slopes of the Table Mountain area. They flew strongly and liked to settle in the sunshine on the bare sandstone banks where a track had been cut into the hillside; I noticed that if a stone were thrown near where one had settled it would glide down to where the stone had fallen as if to investigate the intrusion. The outstanding feature was the row of blue submarginal eyespots on the hindwings. The females reached a wingspan of 10 cm.

The larval foodplant of all these Satyrids was various grasses. It was difficult to find undamaged butterfly specimens.

Nymphalidae

The only Nymphalid I saw was our friend the Painted Lady (*Vanessa cardui* Linn.) and this only on three occasions, one each in January, February and March; all were in rough open country near Cape Town, feeding on flowers. They were all smaller than those generally seen in Europe but more richly coloured, there being a large amount of pink in the brown areas of the wings.

Pieridae

I saw more Whites than I was able to net and identify but the two I did study were interesting and attractive. *Pontia helice* Linn., very similar to the Bath White (*P. daplidice* Linn.) but with broad and distinct yellow shading to the veins on the underside of the hindwings, was locally common in open areas where its larval foodplant occurred, notably beside the river estuary east of Hermanus where there was a certain amount of moisture.

Nepheronia buquetii Bois. was a strong flier rather like the Brimstone (*Gonepteryx rhamni* Linn.) and was devoid of other colour except for the brown spot at the end of the cell on the underside of the hindwings; this species occurred in open scrubby areas near the coast.

Another Pierid was *Colias electo* Linn., a richly coloured 'Clouded Yellow' resembling a small *Colias crocea* Geoff. The normal female has a green area on its hindwings; there is also a cream coloured form like the *helice* variety of *C. crocea*. *C. electo* was abundant everywhere in grassy areas and even survived strongly in orchards where so much spraying is necessary to protect the crops that one would expect insect

life to be somewhat precarious, presumably with the exception of the bees which pollinate the blossom!

Lycaenidae

The Blues and Coppers were strongly represented and there appears to be room for much further study of the Lycaenids of South Africa. Many of the species flew in the most arid places in intense heat and one wondered how they managed to survive.

In dry grassy habitats there were at least four species of 'Small Blue' of the size, shape and colouring of our *Cupido minimus* Fuess.; two had a dark spot at the anal angle of the hindwings and two had plain unspotted undersides.

Abundant also in similar places and among Ericas and Proteas were two small tailed species, *Cacyreus marshalli* But. which was rich brown with brown and white fringes, and *Cacyreus palemon* Cram. which was similar but had a purple sheen to the wings. At higher levels there were two larger species, *Cacyreus lingeus* Cram. and *Tarucus thespis* Linn.; the latter has a brilliant blue male reminiscent of a small *Lysandra bellargus* Rott. and the female is black with a deep blue sheen, and speckled with white, a most attractive insect.

The most abundant blue of all was *Lampides boeticus* Linn. which flew everywhere on the lower slopes of the Table Mountain area, especially around leguminous trees and bushes. *Syntarucus telicanus* Lang was also common in the same places.

Finally a Blue called the Black Eye (*Leptomyrina lara* Linn.) which in fact was brown with a silver grey sheen and with two relatively large black marginal spots on each of its four wings. This is reputed to be a very local species and there was a small colony of it in February on the east side of Orange Kloof behind Table Mountain.

I found the Coppers more fascinating than any other butterflies in the Cape. Like the Blues they were mostly found flying in the most uninviting arid conditions of dried grass and scrub near the coast. One such area was at Oysterbeds, at the mouth of the Breede River, where during one hour in early March I found five species of Copper on the sandy scrubland there; the most striking was the Opal Copper (*Poecilmitis thysbe* Linn.) which was in fair numbers; I had seen this species also on the sand dunes of the Atlantic coast of the province. The inner halves of the wings are bright iridescent blue and the outer halves brilliant copper with blackish brown markings. This species struck me as being a delightful illustration of the Coppers being of the same family as the Blues. There were three other slightly smaller Coppers, *Poecilmitis chrysaor* Trim., a yellow gold species with black spots, *Crudaria leroma* Wall., dull brown above but obviously a copper on the undersides, and another species, dark brown with a variable orange subapical bar, which I was unable positively to identify.

The highlight of my discoveries at Oysterbeds was a very large Copper which I at first thought must, with its twin hindwing tails, be

some sort of Nymphalid but when I noticed that while settled it carried out the circular 'rubbing together' motion of the hindwings so characteristic of Lycaenids it put me on the right track and it turned out to be the Hooked Copper (*Phasis thero* Linn.); it has a 5 cm wingspan and its English name is derived from the large angular silver markings on the underside of the hindwings.

I discovered a strong colony of another large Copper at 3,000 feet on the shoulder between Table Mountain and Devil's Peak. The habitat there differed considerably from the one previously described as the cloud which builds up on the mountain tops (the famous 'table cloth') provides moisture to counter the hot sunshine on the rocky surface, giving rise to some lush Ericas and shrubs. This species was *Phasis thyra* Linn. but despite reference to all the books I could find I could not discover any mention of some specimens having grey ground colour on the underside of their wings and others being distinctly purple, regardless of sex.

I must now mention two 'off-beat' Coppers; *Thestor obscurus* Van Som. which is dull brown-black in colour with a narrow black and white fringe to its wings; I at first took it to be a Geometrid moth; this was common at about 2,500 feet on the slopes of Table Mountain in January. Finally another rather dull species *Durbaniella saga* Trim., brown with small orange postdiscal spots on all wings was common in January at Steenbras Dam, 30 miles east of Cape Town; this is appropriately called the Rock Creeper because of its habit of alighting on rocks.

None of the Coppers seemed to fly far from their chosen area; when disturbed they soon returned to the same place.

Hesperidae

I came across several Skippers in the Cape which I could not identify, the various works of reference appearing to be incomplete; all were small species, unlike some which are found further north in Africa, and with their rapid flight they were difficult to follow.

There were at least two 'Grizzled' species, one of which was *Spiala spio* Linn. with a large white central spot on its hindwings. There were also two 'Chequered' species, rich brown with orange spots; one of these was *Metisella metis* Linn. which was attracted to gardens as well as to the bushy areas round Table Mountain.

There were several plain brown species, some with slight yellow spotting, also a plain olive-brown species with orange undersides *Gegenes hottentota* Lat. which inhabited the grassy areas below Table Mountain in February.

Papilionidae

I have left the Swallowtails until last as I want to be long-winded about *Papilio demodocus* Linn., the Christmas Butterfly. This 'tail-less Swallowtail' was to be seen everywhere in the South-Western Cape throughout the three months of my stay not only on the hillsides but also in gardens and even among the acres of Australian gum trees which

have been planted over the centuries to stabilise the flat sandy areas. In gardens it has adopted citrus trees as its larval foodplant and with a little patience it was easy to observe the females laying their shiny, round, yellow eggs.

The eggs were laid singly and surprisingly indiscriminately. It seemed that, so long as the butterfly had the scent of citrus in its nostrils, it would lay on any part of a leaf, a woody twig or even on other plants nearby, alive or dead, and quite out of reach of the tree for a newly-hatched larva. The trees were inhabited also by birds, chameleons, praying mantids and large locust-like insects so it is perhaps not surprising that in many searches I found only one fully grown larva. However despite my lack of facilities while away from home, they proved to be easy to rear so I obtained a photographic record of the life cycle by that means.

The eggs turned dark and hatched after five to seven days and for the first three instars the larva was spiny and black with the typical white 'bandage' round its middle. In the fourth instar the spines became more prominent, there was more white along the sides and ochreous yellow segments fore and aft. In the fifth and final instar the larva was mainly apple green, with widely varying ochreous markings; some specimens had black markings in addition, giving them a handsome appearance.

The larva at all stages usually rested along the rib of a chosen leaf, venturing away to other leaves for voracious feeding sessions. It had a long, soft, retractile organ behind the head which emitted a pungent citrus odour when the larva was heavily disturbed.

The larval stage lasted five to six weeks then it secured itself with girdle and cremastral pad and generally formed a long, brown, angular, woody-looking pupa on the woody stem of the foodplant. I did rear a few green pupae and tried to tell myself that these were the ones attached to green stems or leaves, but they did not always conform to this rule, no doubt due to a last-minute change of mind of the larva! In this and other respects the life history of *P. demodocus* bore many similarities to *P. machaon* Linn.

The freshly emerged insect, after two to three weeks in pupa, offered the only opportunity for photography as, typical of Papilios, the active butterfly never ceased to flutter its wings while feeding or egg-laying. The female butterfly has a vermilion surround to the blue and red spot at the costa of the hindwings.

P. demodocus is reputed to be the only species of the family in the Cape Peninsula but, further east in the indigenous rain forest at Tsitsikama, during a brief visit I saw several male *P. dardanus* Brown flying buoyantly and gracefully round the lush vegetation and also three specimens of, probably, *P. nireus* Linn.

Conservation

The move towards nature conservation in Cape Province is very strong and apart from the game reserves there are a great many small nature reserves protecting the flowers for which the province is so famous. I was fortunate in meeting the Warden of Orange Kloof Forest Station who, once he was convinced of my peaceful aims, afforded me wide facilities which not only helped me to explore the butterfly population but also enabled me to photograph the four large *Disa* orchids which flourish under fierce protection on top of and around Table Mountain. He even lent me his black Labrador who, apart from being good company, effectively saw off the snakes which frequently lie in one's path.

Among the recollections of my climbs and walks around Table Mountain it is the heat and the rocky terrain which stand out in my memory—not really the conditions under which one should venture by oneself, especially at my age, and most uncomfortable for carrying a heavy camera and other equipment. I was the proverbial mad Englishman and would walk for hours without seeing another soul.

P. R. Grey (3820)

JUNIOR NEWS

Here are some reports from members which have come in during the Summer. The first one is from Miss Jane Rushton who on September 2nd was breeding the larva of the Indian Moon Moth (*Actias selene* Hübn.) on Hawthorn (*Crataegus monogyna* Jacq.). She was very proud of her 7.5 cm long larva and includes with her letter an excellent drawing of it.

T. Newnham reports the capture of a female Orange Tip Butterfly (*Anthocharis cardamines* Linn.) with a wingspan of 30 mm. It was caught on the 3rd of April this year flying over Staplefield Common, near Haywards Heath, Sussex.

D. Hodges of 67 Mersham Road, Thornton Heath, Surrey CR4 8NS, would like correspondents from any part of the country, but especially from the South. He spent two weeks collecting in the New Forest this summer, having first applied for a 'Collecting Permit'. At his suggestion here are a few details of this permit in case any member is thinking of going there. The permit is obtained from the Deputy Surveyor New Forest, Forestry Commission, Crown Office, Queen's House, Lyndhurst, Hants. SO4 7NH. You will have to state the equipment you will use, what you want to collect, whereabouts in the New Forest you wish to collect, and the inclusive dates. Most of the conditions of issue are common sense, but the Head Keeper of the area has to be informed if sugaring is to be carried out. A special permit is needed for M.V. lamps. Certain rarer insects cannot be collected, including the Purple Emperor

(*Apatura iris* Linn.). A return of insects collected must be made by the end of the year in which the permit is valid.

My correspondent had a reasonably successful two weeks and caught a Green-veined White (*Pieris napi* Linn.) which has two large black spots on the forewing and one on the hindwing. The venation on all the wings was very pronounced in black. He has tried pit-fall traps for Coleoptera, and used apple slices as bait. These attracted slugs but also a great many Ground Beetles.

This Junior News has had to be written before the Exhibition. The next one will include a report of the Junior exhibits and any correspondence that may come my way. If you live near enough, don't forget the A.G.M. next March!

D. Ollevant (1514)
AES Youth Secretary.

JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS BRITISH MACROLEPIDOPTERA: RARE AND ENDANGERED SPECIES AND FORMS

The following list of species which the Joint Committee for the Conservation of British Insects considers should be collected with restraint because they are rare and endangered should be read in conjunction with the recent *Code for Insect Collecting*. The list contains one species, *Maculinea arion Linn.* (Large Blue Butterfly), which should not be collected at all. The Committee recommends that the other species and forms listed should be collected with the greatest restraint and suggests that a pair of specimens is sufficient. A few species are rare and endangered in only part of their range in the British Isles; these are noted in the list. Names of species follow the most recent editions of 'South'; they are listed aphabetically. More information is required on the status of many of the species mentioned.

Butterflies

Carterocephalus palaemon Pall. (Chequered Skipper)
Coenonympha tullia Müll. (Large Heath) In England
Erebia aethiops Esp. (Scotch Argus) In England
Eumenis semele Linn. form *thyone* Thompson (Grayling)
Hesperia comma Linn. (Silver-spotted Skipper)
Lysandra bellargus Rott. (Adonis Blue)
Maculinea arion Linn. (Large Blue) Not to be collected
Melitaea athalia Rott. (Heath Fritillary)
Melitaea cinxia Linn. (Glanville Fritillary)
Nymphalis polychloros Linn. (Large Tortoiseshell)
Papilio machaon Linn. (Swallowtail)
Plebejus argus Linn. form *caernensis* Thom. form *masseyi* Tutt (Silver-studded Blue)
Strymonidia pruni Linn. (Black Hairstreak)
Thymelicus actaeon Rott. (Lulworth Skipper)

N.B. Collection of *Lycaena dispar* Haw. (Large Copper) at Woodwalton Fen is forbidden by the Nature Conservancy.

Moths

Acontia luctuosa Schiff. (Four-spotted)
Acosmetia caliginosa Hübn. (Reddish Buff)
Aegeria chrysidiformis Esp. (Fiery Clearwing)
Aegeria scoliaeformis Borkh. (Welsh Clearwing)
Anepia irregularis Hufn. (Viper's Bugloss)
Aplasta ononaria Fuess. (Rest Harrow)
Arenostola extrema Hübn. (Concolorous)
Arenostola morrisii Dale (Morris's Wainscot)
Aspitates gilvaria Schiff. (Straw Belle)
Calophasia lunula Hufn. (Toadflax Brocade)
Coenophila subrosea Steph. (Rosy Marsh Moth)
Colobochyla salicalis Schiff. (Lesser Belle)
Coscinia cribraria Linn. (Speckled Footman)
Cosymbia pendularia Clerck (Dingy Mocha)
Cucullia gnaphilii Hübn. (Cudweed)
Cucullia lychnitis Ramb. (Striped Lychnis)
Drepana harpagula Esp. (Scarce Hook-tip)
Emmelia trabealis Scop. (Spotted Sulphur)
Endromis versicolora Linn. (Kentish Glory)
Epicnaptera ilicifolia Linn. (Small Lappet)
Epione verspertaria Fab. (Dark Bordered Beauty)
Eriogaster lanestris Linn. (Small Eggar)
Euphyia luctuata Schiff. (White-banded Carpet)
Eupithecia egenaria H.-S. (Fletcher's Pug, Pauper Pug)
Eupithecia millefoliata Röss. (Yarrow Pug)
Euplagia quadripunctaria Poda (Jersey Tiger)
Eustroma reticulata Schiff. (Netted Carpet)
Eustrotia bankiana Fab. (Silver Barred)
Gortyna boreli Pierret
Hadena albimacula Borkh. (White Spot)
Heliothis viriplaca Hufn. (Marbled Clover)
Hydraecia hucherardi Mab. (Giant Ear)
Hydrillula palustris Hübn. (Marsh Moth)
Idaea lineata Scop. (Black-veined)
Lithosia pygmaeola Doubl. (Pigmy Footman)
Lithostege griseata Schiff. (Grey Carpet)
Luperina nickerlii Freyer (Sand-hill Rustic)
Malacosoma castrensis Linn. (Ground Lackey)
Meliana flammea Curt. (Flame Wainscot)
Nola albula Schiff. (Kent Black Arches)
Nonagria algae Esp. (Rush Wainscot)
Nonagria neurica Hübn. (White-mantled Wainscot)
Nyssia zonaria Schiff. (Belted Beauty) In England and Wales
Orygia recens Hübn. (Scarce Vapourer)
Pachetra sagittigera Hufn. (Feathered Ear)
Paracolax derivalis Hübn. (Clay Fan-foot)
Pareulype berberata Schiff. (Barberry Carpet)
Pelosia obtusa H.-S. (Small Dotted Footman)
Perizoma sagittata Fab. (Marsh Carpet)
Phothedes captiuncula Treits. (Least Minor)
Phragmataecia castaneae Hübn. (Reed Leopard)
Plusia chryson Esp. (Scarce Burnished Brass)
Scopula immorata Linn. (Lewes Wave)
Scopula nigropunctata Hufn. (Sub-angled Wave)
Scopula rubiginata Hufn. (Tawny Wave)
Sterrha degeneraria Hübn. (Portland Ribbon Wave)
Sterrha dilutaria Hübn. (Silky Wave)
Sterrha ochrata Scop. (Bright Wave)
Sterrha vulpinaria H.-S. (Least Carpet)
Thalera fimbrialis Scop. (Sussex Emerald)
Thetidia smaragdaria Fab. (Essex Emerald)
Trisateles emortualis Schiff. (Olive Crescent)
Zygaena exulans Hoch. and Reim. (Scotch or Mountain Burnet)
Zygaena loti Schiff. and Denis (Slender Scotch Burnet)
Zygaena purpuralis Brünn. form *segontii* Trem. (Transparent Burnet)
Zygaena viciae Schiff. and Denis (New Forest Burnet)

LA GRAVE REVISITED — 1971

Since my first recorded visit to La Grave in the French Hautes Alpes in 1957 many of our members have made this area a happy holiday hunting ground and Mr M. J. Perceval (3798) (1970) has contributed to the knowledge of the area by his article. In July 1971, after eight days in Corsica, Mr W. L. Coleridge and I flew back to Lyons to spend a week revisiting the spots which had been so rewarding in earlier years. We had booked accommodation with our good friends at the Hotel de la Meije and arriving at Lyons in a terrific storm we collected a Hertz Fiat and set off towards Grenoble and the mountains. Conditions were terrible with the road flooded and thousands of motorists hurrying northwards away from the Alps and the storm. The car had faulty brakes and after some 70 kilometres we drew off the road and tried to sleep until the storm should abate and make the road safe again. At 4 a.m. in the first light of dawn we continued, driving round Grenoble by a new by-pass road complex to Vizille and into the valley leading up towards La Grave. Heavy mists shrouded the peak of La Meije and its glaciers as we reached the hotel at 6 a.m. We had two hours sleep and a good breakfast before the sun reached down into the valleys. We found that the village had changed very little though there were more shopping facilities and obviously more visitors than in earlier days.

During the week that we spent here we were able to make sorties to all our old spots. As the month was well advanced, much later than on our previous visits, we hoped to find species not previously seen. We spent the first day on the Col du Lautaret, parking the car near the Alpine Gardens there. Because the valley of the Romanche runs east to west there is considerable difference between the flora and fauna of the two sides of the valley. It is probably the reason why the area has such a wide range of species of plants and insects. We met some botany students from Manchester who were camping at Briancon. They were carrying out a study of the varying ecological conditions in the valley and the plant colonies associated with each and we were able to discuss some of the relationships that these had to the distribution of the various butterflies in the area. On the north facing slopes there were large patches of *Vaccinium* spp. with a dwarf Juniper. This area supports two butterflies which feed on *Vaccinium* and we found them both on the wing, *Colias palaeno* Linn. and *Vacciniina optilete* Knoch. The former were in perfect condition and were found both in copula and laying. *V. optilete* was quite difficult to see and catch. Its blue is mauvish and the butterfly is dark on the wing. Many were past their best but others had obviously only just emerged. By traversing the slopes we were able to secure a short series in good condition.

The gradation of butterflies on these slopes is quite revealing and most species have a distinct belt of habitation. Just above the roadway are undulating meadows, with short grass, across which flow several

streams. This is the area of *Erebia cassioides* Hohenwarth and *Erebia alberganus* de Prun. which were common. Along the streams were flying *Parnassius phoebus* Fab. I have observed the females laying their eggs on the *Sempervivum* spp. growing on the shingly patches by the stream so that in the spring these eggs must be immersed in the water. Beyond the meadows there grows *Vaccinium* and from here up to the bare rocks flies *Erebia pandrose* Borkh. It has a jinking unsteady flight but is fairly easy to net. The Alpine Rhododendron grows in this area as well with patches of *Viola alpina*. Skimming around these were large numbers of *Boloria pales* Schiff. and *B. napaea* Hffsg. Also stated to occur here is *B. graeca* Stdgr. The differences between these three alleged species is very small and it is not possible to distinguish them certainly in the field. Their being together in this one area at the same time gives one doubts as to how separate in fact they are. There were also flying in this area a lot of Wood Tigers (*Parasemia plantaginis* Linn.). I climbed from here up to the rocky screes beyond which are the summer snows. Among the rocks were flying two more Erebias, *E. pluto* de Prun., black and fast flying, and *E. gorge* Hübn., another species that flies very quickly and hides among the rocks when disturbed or whenever the sun goes in. I was able to watch *E. pluto* laying its eggs. This was done on the rocks. The butterfly settled on the face of a rock at the base of which were small patches of fine grasses. It tucked the end of its abdomen below the edge of the rock and curled it up to touch the undersurface where it placed a single egg. They are rightly named 'Rock eaters'. When I put

my net over a specimen, instead of flying up into it, the butterfly crawled down among the rocks and then flew out from the side. The only way to catch them was when they were flying, a very difficult task on the boulder strewn slopes. Other *Erebia* species in this area were *E. montana* de Prun. and just below the scree there were *E. pharte* Hübn. and *E. epiphron* Knoch. I climbed right up to the snows and found a group of skiers using the slopes of the valley. They had a small motor operating a tow rope to pull them up to the top of the slopes and then were slaloming down.

On the south facing slopes at the bottom of which is the Alpine Garden (run by the authorities from Grenoble) the vegetation is much richer, with thick grasses at the foot of the slopes rising through flowery meadows until just below the snows where there are the Gentians, *Dryas* and other alpine species growing in short turf until recently covered in snow. *Erebia alberganus* de Prun. flies here with some *E. euryale* Esp. Both the Large Blue (*Maculinea arion* Linn.) and *M. rebeli* Hirschke are found in the hollows and sides of the gullies scarring the meadows and, among the Geraniums, the Blue, *Eumedonia eumedon* Esp., is quite common. I netted one or two *Colias phicomone* Esp. which dashed past me; they fly very fast and seem to settle infrequently. In previous visits I had found *Oeneis glacialis* Moll. at the edge of the scree on the face of the Galibier which rises above the Col du Galibier but on this occasion I had no luck. *E. pluto* and *E. gorge* were both present and below their flying grounds there were hundreds of *E. pandrose*. As I climbed down across the scree towards a stream which ran through short-turfed meadows I disturbed a butterfly sitting on a clump of Rock Rose. There was a flash of white on its wings and I suspected that it might be the high mountain species of *Euphydryas, E. cynthia* Schiff. This butterfly lives in fairly small colonies and it took me about an hour of quartering the slopes before I came on this colony. It was in a small sheltered valley with steep sides and here it was flying with *E. debilis* Obth. Higgins and Riley (1970) give this last butterfly as a sub-species of *E. aurinia* Rott. I have found it common on the Simplon but here it was abundant. I was able to take a short series of *E. cynthia* and photograph both males and females. This was a delightful spot and the alpine flowers covered the ground between the turf. A German botanist was busy photographing and collecting specimens while I was there. Later in the day when we were on our way down to the bottom of the Col we met a member of the AES, Mr Brian Wurzel of London, collecting with some French friends and we stopped to pass the time of day.

The valley of the Romanche just below La Grave is a very rich area for butterflies and we paid it a visit in the hopes of taking *Limenitis populi* Linn. which haunts the Aspens (*Populus tremula* Linn.) growing there by the stream. Coleridge saw one but none came to the net. The Apollo (*Parnassius apollo* Linn.) was very common all along the stream in the meadows and Blues, Fritillaries and Coppers were every-

where. I took a perfect female *Glaucopsyche alexis* Poda here and several specimens of *Aricia nicias* Meig. Leaving Coleridge to collect in the valley I climbed up to the foot of the Glacier below the Meije and collected in the alpine valley there. *Pontia callidice* Hübn. was common and *Erebia mnestra* Hübn. and *M. arion* were flying in the sheltered dells. Up on the rocky scree there were a few *E. pluto* but the sun disappeared soon after I arrived there and the butterflies disappeared with it. While eating my loaf and cheese I watched a small aeroplane come out of the cloud cover and head straight for the face of the Meije. At the last moment it turned aside and flying low over the face of the glacier it disappeared through a col in the mountain pass to the right of the peak. The view from the glacier is well worth the long climb up. One looks down across larch forest to the valley of the Romanche with La Grave looking so small tucked into the side of the vast slope. Above it are the little villages of Le Chazalet and Hautes Terrasses surrounded by neat little terraced alps which reach up to the skyline. One is again made aware of the difference between the two sides of this valley: above La Grave there are alps and habitation, for the side faces south: above the Romanche on the north facing slope one passes through flowery meadows in the valley but from then upwards it is wild and fit only for summer grazing of the village cattle, goats and sheep.

I made one further sortie on this side of the valley. I started early in the morning and climbing up the path to the Meije I crossed over the stream pouring down from the glaciers by a tree trunk bridge and entered the belt of Larch forest. This is the haunt of the Blue, *Aricia nicias* Meig., and I found it along the pathways as I climbed. The path winds back and forth through forest and out into meadows. Very few butterflies were on the wing here. I saw *Pieris bryoniae* Hübn. and a few *Mellicta athalia* Rott. but it was not until I had got above the forest and out into the alpine meadows that I found butterflies in plenty again. There were *Albulina orbitulus* de Prun. and *Polyommatus eros* Ochs. all over the slopes with *E. cassioides, E. pandrose* and *E. pharte* with *C. palaeno* where the *Vaccinium* patches occurred. I spent quite a time here wandering about and taking samples of *B. pales* which was more plentiful here than it had been on the Lautaret. Above the slopes is the Lac de Puy and Le Chancel Refuge. I had a drink from the lake and sat enjoying the sun and scenery after my five hour climb up to this point. It was well worth the effort.

After a week of good weather and interesting collecting we left on the Saturday morning to drive back to Lyons. On the way to Grenoble we stopped at another spot we had visited in earlier years where we had found *M. arion* to be very common. The meadow was still there although the new road had changed the look of the place a lot. Above the Thyme were still flying the beautiful Large Blue Butterflies, as large and as brilliant as our Devon/Cornwall race. If only ours were still as abundant as they were here. We arrived at Lyons Airport before 5 p.m. and flew

to Paris by Caravelle where we changed to a BEA Trident which landed us in London Heathrow at 9 p.m. on 24th July.

P. W. Cribb (2270)

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A PRELIMINARY SURVEY OF THE FOOD AND FEEDING HABITS OF ADULT BUTTERFLIES (Continued)

Floral nectar

Flower nectar is a solution in water of a number of sugars, together with traces of proteins, salts, acids, enzymes and aromatic substances. Most nectars contain a high proportion of sucrose (cane sugar). The concentration of sugar in nectar varies considerably, e.g. the nectar of pear bloom is very dilute whereas that of the lime tree is very concentrated. Concentration also varies from hour to hour. Since concentrated nectar contains from 25–75% solids, considerable food as well as water is obtained by flower-visiting insects. Each kind of plant secretes its own particular kind of nectar which differs from those of other plant species. Undoubtedly this is one of the factors leading to the flower preferences of Lepidoptera.

Nectar flow

The phenomenon referred to by beekeepers as 'Nectar (or Honey) Flow', i.e. the availability of nectar, is by no means constant and is dependent on many factors, e.g. temperature and humidity of the air; temperature, dampness and character of the soil; geographical position, altitude and climate; time of day and amount of sunshine; the growth and nature of the plant itself. Nectar secretion is dependent on all these and the adverse action of any one factor, however well the remainder may be acting, will result in failure.

I well remember on one occasion seeing a number of Buddleia bushes completely ignored by Vanessids who were feeding from other nearby flowers, whereas a few days later Buddleia was the main source of food. I can only assume that conditions had changed and they were now secreting nectar.

The fact that Ragwort (*Senecio jacobaea* Linn.) is generally more attractive on the coast than it is inland is probably due to a combination of different factors.

Persistently low soil temperature has an important adverse effect on nectar secretion. The winter of 1952 was particularly cold and this resulted in poor nectar secretion in most parts of Britain in the summer of 1953.

Extrafloral nectar

Extrafloral nectaries are found on some plants. Their purpose appears to be to divert the attention of wingless insects from robbing the true nectaries in the flowers, as these insects, such as ants, beetles, etc., are unlikely to subsequently visit other flowers and thus effect cross-fertilisation.

These nectaries are found on the undersides of the leaves of the Common Laurel (*Prunus laurocerasus* Linn.), on the green buds of cornflowers, field beans, peaches, etc. Nectar is also secreted in considerable quantities by the involucral scales of the flower heads of certain knapweeds and various other Compositae.

It is difficult to separate extrafloral nectar and 'honeydew' (aphis secretion) as far as the attentions of Lepidoptera are concerned. I have no direct evidence of butterflies feeding from extrafloral nectar, but I will later quote various records for 'honeydew' which may include the former.

Tree nectar

Although butterflies are known to visit flowering shrubs and low plants in search of nectar, it is quite possible that they visit the blossoms of trees more than is generally noticed. From the honeybee's point of view trees such as *Tilia, Acer, Robinia, Prunus, Pyrus* and *Aesculus* spp. are all sources of nectar and it is quite likely that some of these are visited by butterflies unnoticed from ground level. In the tropics some butterflies (e.g. *Morpho* spp.) fly above the canopy and a friend once told me that the glint of their blue wings can be plainly seen from low-flying aircraft in South America.

I have seen *Aglais urticae* Linn. on ornamental *Prunus* but it would be well worth while to look out for others particularly the woodland species such as *Limenitis camilla* Linn., *Fabriciana adippe* Schitt. *Quercusia quercus* Linn. and *Argynnis paphia* Linn. that spend a lot of their time flying into and around trees. I have seen Pierids flying into Horse-chestnut (*Aesculus hippocastanum* Linn.) when in bloom, but without binoculars it was impossible to see if feeding took place.

Flowers which appear necessary to some species

Certain species of butterflies are nearly always found in association with particular flowers and as far as my experience goes the outstanding example is *Melanargia galathea* Linn. I have studied several colonies of this butterfly and found that *Centaurea scabiosa* Linn. (Greater Knapweed) is always present and is the insect's favourite source of nectar. This is closely followed by *Knautia arvensis* (Linn.) Coult. (Field Scabious), which I found present in five out of six colonies.

In view of the restricted colonies to which *galathea* keeps in Britain, it makes one wonder if it is more than a coincidence that Greater Knapweed should be always present and to a slightly lesser degree Field Scabious; are these two plants necessary to the butterfly to the extent of affecting its distribution?

Of *Lycaena dispar batavus* Oberth Ford (1945) says: "The butterfly is very fond of flowers and a sufficiency of these seems to be essential for its welfare, particularly *Lythrum salicaria Linn.* (Purple Loosestrife) and *Thalictrum flavum* Linn. (Meadow Rue)." [*Thalictrum flavum* is nectarless according to Knuth (1906).]

On the other side of the picture many 'local' butterflies favour flowers that are found everywhere such as *L. camilla* and Bramble.

Flower preferences

"In the Lepidoptera choice of flowers is generally correlated with length of proboscis" (Knuth, 1906). This is no doubt true as one cannot imagine *Cupido minimus* with a proboscis length of 5 mm obtaining nectar from, say, Buddleia with a corolla tube length of 8 mm, but there are many other factors determining flower preference for example colour, scent, nectar flavour, etc.

The following colour preferences have been recorded: —

Colias crocea Geoff. Blue and yellow preferred to red and white.
Euchloe ansonia crameri Butler. No record on a red flower.
Iphiclides podalirius Linn. All colours except red.
Gonepteryx cleopatra Linn. Unrestricted tastes.
G. rhamni Linn. Decided preference for blue and violet-purple.
Pieris rapae Linn. }
P. brassicae Linn. } Generally blue and yellow.
Aglais urticae Linn. Preference for orange flowers.

I have not, however, made a particular study of colour preferences and have no records of my own, but for those interested there are various papers on the subject.

(To be continued) B. R. Stallwood (1547)

REARING THE PUSS MOTH (*Cerura vinula* Linn.)

On June 3rd, my father and I went to a woody lane in Holme, near Scunthorpe, in North Lincs (this lane is in view of the famous 'Anchor Project' site) and as we were walking back to the main road, I noticed two small red dots on a leaf of Aspen (*Populus tremula* Linn.). On closer inspection, these were found to be the ova of the Puss Moth. Altogether five were found, all on Aspen, though Sallow (*Salix* spp.) was close by.

Four of the ova were in pairs and the other was a singleton. At 11.00 p.m. on June 15th, 1972, I observed two tiny black larvae begin to hatch from one pair of ova. By the next day all five had hatched.

The larvae carried on feeding until June 22nd, when one of them shed its skin. By June 25th all the larvae were in their second instar, but now they were green, with the characteristic 'saddle' mark. On their heads were small black horns, and at the other end their tails were chewed, as seems to be the fashion in Puss Moth larvae. Two of them only were perfect, the others were all lacking one or more 'flagella'. They remained as such until July 4th, when two of them went into their third instar. On July 5th and 6th the other three followed. Apart from the fact that they were bigger, the larvae were much brighter than before. All this time I had been feeding them on Sallow and my tiny bush had been getting smaller.

These larvae seemed to have been growing at an alarming rate, and on July 10th two of them had gone through their final moult. They were now quite ferocious looking creatures, but they failed to impress my niece, who had the sheer audacity to call them worms. (I photographed these larvae as a record, but in my opinion photography can never completely cancel out collecting.) As was the case in the third moult, in the fourth there were three slow-coaches, but even these moulted on July 12th.

The larvae fed happily until July 22nd, when the first started to pupate. A second started to pupate on the 29th, and on August 1st the rest of them were spinning cocoons. Three however failed to complete their cocoon and caught some kind of virus and died. So now I await the arrival of next spring and my two Puss moths. Also I have been rearing the Orange Tip Butterfly (*Anthocaris cardamines* Linn.) and have four pupae.

Ronald K. Moore (4508j)

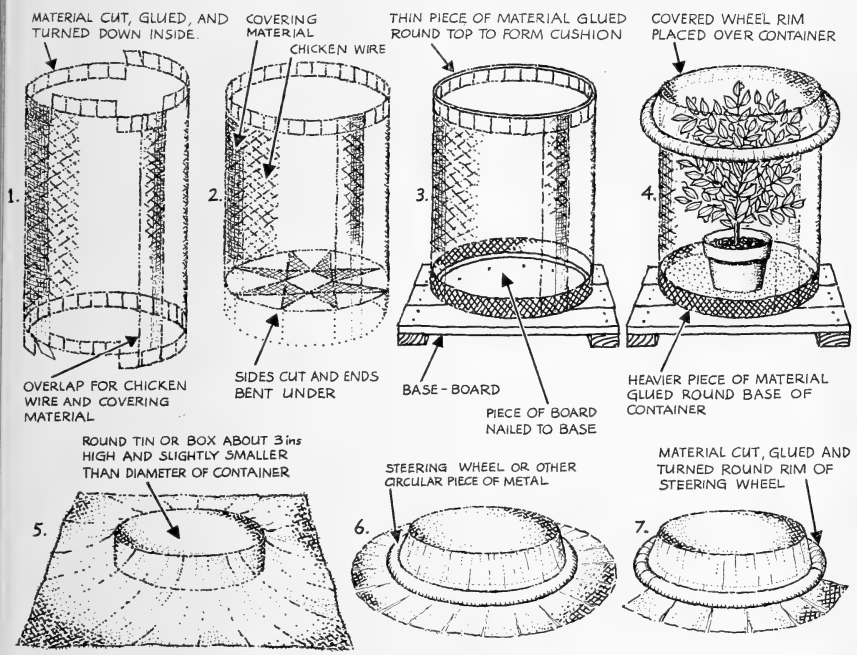
BREEDING CAGES

Mr Cribb's very interesting article on breeding cages in the August 1971 *Bulletin* has prompted me to write about some cages I have been using for some years now and which are similar to his in that they can stand out in the open, exposed to the elements and with maximum ventilation.

To make this type of breeding cage you need chicken wire (I find $\frac{1}{2}$ inch mesh is the best and strongest but it can be 1 inch if desired), a fine material for covering the cage, and old car or lorry steering wheel rims, or any old wheel rims with a little weight in them. If they have a hard rubber tyre so much the better as this will help with weight. Mostly my containers or cages are limited in diameter by the size of the wheel rims, which form the seal or cover for the top. The diameter of the cage should leave about 2″ between it and the wheel rim. Much larger cages can be made if you use reinforcing rod for the rim of the cover and bend it into a circular shape.

First of all from a 2 ft or 3 ft width roll of chicken wire cut a piece aproximately 4 ft long, this allows about 3″ overlap. Now make the wire into a tube or barrel shape, overlap the 3″ and carefully bend the cut ends of the overlap through the mesh to the inside and bend back so that they lock to the mesh. Bend the other cut ends through the mesh to the outside and bend these back and you have both ends firmly locked. Turn the cage on its side on the work-bench and gently hammer the join flat.

The next thing is to cover the cage with fine mesh material leaving about 1″ overlap at both ends and the same at the side (fig. 1). To glue the material you need a latex adhesive that when dry is waterproof (Copydex is, I find, perfect for the job, and when set is somewhat rubbery, waterproof and stands up to all weathers extremely well). Apply the adhesive along one edge of the material, allow to get a little tacky, then wrap the material round the cage pulling tight and overlapping on the glued edge. Once roughly stuck more glue can be added at ease if needed. The overlap at the top and bottom is cut in a number of places, glued and allowed to get a little tacky, then turned in and pressed down the inside. Keep the top as even as possible. This can be moved and pressed about by hand or tapped level with a piece of wood. A thin piece of felt or other material can be glued around the top to give a cushioning fit when the cover is placed on (fig. 3). If you wish to stand the cages on the ground or on a base-board it is necessary to turn the bottom under to form a flat base. Although the cage is round and covered with material it can be turned and bent under in several places and made as flat as possible. You can if you want, instead of bending under, clip up the sides in a number of places about 4″ apart and turn under each piece separately (fig. 2). Around the outside base of the cage glue a 2″ or 3″ strip of heavier material which will delay any rotting



due to rain or damp for a long time. If fixing the cages to a base-board cut a piece of wood slightly smaller in diameter than the cage, place inside over the turned-in base and nail to the base-board (fig. 3). An inch of sand, peat or sieved earth can be placed on the bottom and this part is ready.

Now we come to the second piece of the breeding cage. This consists of old wheel rims covered with a fine mesh material. Most of the old steering wheels I use have been obtained from abandoned vehicles in rubbish dumps, gravel pits or breakers' yards. Those from gravel pits or other pits and dumps cost nothing, the breakers' yards make a charge. One should be able to find enough abandoned vehicles for one's needs. Keep a hacksaw with you and once you have found an abandoned vehicle (make sure it is a wreck and has been abandoned) saw the wheel spokes away as near to the rim as possible. File any sharp edges and smooth off. To cover the wheel with material you need, first of all, a round tin or box about 3″ high and slightly smaller than the diameter of the cage. When placed inside the wheel it should leave about 3″ all round. Put the tin or box onto a work-bench and drape the material over this and spread out as evenly as possible (fig. 5). Place the wheel rim over this (fig. 6) and clip the surplus material away, leaving enough

to turn round the wheel rim and tuck under. Clip the material up to the rim every 2″ or 3″ to facilitate the tucking under. Next cover the wheel rim with adhesive and replace over the material. Allow to get a little tacky and then work the material round over the rim and tuck under as far as possible (fig. 7). More adhesive can be added later if needed. If still tacky after some hours talcum powder sprinkled on and rubbed over will get rid of the stickiness. When finished the wheel is just placed over the cage and should hang down the side about 3″ (fig. 4). The weight of the wheel rim pulls the material over and down the sides, no tying is necessary.

You can now put in your potted plants or whatever food material you are using, plus the larvae and everything is under as natural conditions as it is possible to get. If you do not want everything to get too wet in the rain a board or piece of clear plastic can be placed on top. An alternative is to place a thin piece of polythene sheet over the cage before replacing the top.

The cages can be made any size you wish, squat barrel shape, tall and thin, etc. I have made them from 6″ long by 4″ in diameter with long overlaps at each end so that they can be tied and hung up, to 3 ft tall and 2 ft wide, which is quite capacious, plus many sizes in between.

Repairing them if they get a tear or hole is very easy. You just cut a patch of material (it need not be the same) and glue it over the damage. Most of the nets, nylons and muslins I have tried so far have proved very successful.

My own cages have been used solely for the breeding of microlepidoptera, for which they have proved ideal. Whether they would stand up to numbers of some of the much more powerful 'macro' larvae I do not know, although I have several times had the experience of finding 'macro' moths that have emerged in the cages, the larvae having unknowingly been introduced with the food material. As a bonus I have on a number of occasions bred a 'micro' not suspected of being on the plants placed in the cages. The best way to box any moths that may have emerged is to take the cage indoors, and where convenient place near a window and remove the top. Many moths will fly straight to the window and settle there or on the curtains or walls where they can be boxed or tubed with ease.

E. S. Bradford (3068)

PROBLEM PUGS

I wonder what members think of the two Pugs designated the Wormwood Pug and the Ling Pug (*Eupithecia absinthiata* Clerk. and *E. goosensiata* Mab.) in our text-books? 'Splitters' separate these very close species by some very suspect characters. Meyrick (1927), in his

key, falls back on the 'a-little-bit-more' kind of character. He also mentions that the caterpillar of the Ling Pug may be any of five colours including purplish-pink. The Wormwood Pug, he says, has larvae of four of these colours, but not purplish-pink. I think all but the most reckless of entomologists would hesitate before dividing the Pale Tussock (*Dasychira pudibunda* Linn.) into two species based on finding a new colour form of the larva in any area!

Authorities differ over the emergence times of the two, some saying that the Ling Pug is single-brooded, and the Wormwood Pug double-brooded, whilst others give different combinations. My own work on the Cockayne-Ketterwell Collection by kind permission of the British Museum (Natural History) shows that the specimens are scattered unimodally over a long season, with the Ling Pug 'peaking' slightly later. But this is only negative evidence. It could imply a protracted emergence period, or a partial second generation, or it could simply be a figurement of the large percentage of bred specimens in the series.

Juul (1948) has the more impressive evidence. They differ in the colour of the wing cases of the pupa, he maintains. The Wormwood Pug has a yellowish-brown pupa with pale green wing sheaths, whilst the Ling Pug has a yellow pupa with the wing sheaths not green. Herein lie great possibilities for the breeder, as I will say later.

Now we come to the 'hairy' part of the story. Juul goes on to describe differences in the genitalia. The Wormwood Pug has twenty-six to twenty-nine crista hairs and the Ling Pug thirteen to twenty-four by his reckoning. I have begun to work on this and find myself at odds. My first observation was that the hairs are not easy to count. The high-power objective of a monocular microscope is essential. A variety of technical hazards were encountered. Adding these difficulties to the already masochistic task of counting small, irregularly spaced dots down a microscope, I find that at best I have an error of three in thirty. I have been hampered by the difficulty of being certain of the material I have been dissecting, but even so I am sure some of the moths are of the Ling variety, yet the results show not the slightest evidence of a bimodal distribution. Moreover the range of counts was much wider than that given by Juul, occasionally exceeding fifty. Finally, amongst my dissections were some unusually large moths bred from Golden Rod (*Solidago virgaurea* Linn.) which proved to have a rather higher hair count. For several reasons it is difficult to relate wing-span to hair-count with acceptable accuracy, but there does appear to be a simple relation.

The Ling Pug is usually given as feeding on Heather (*Calluna vulgaris* (Linn.) Hull) the Heaths (*Erica* spp.) and Scabious (*Knautia arvensis* (Coult.), which the Wormwood Pug feeds on a wide variety of low-growing plants. The Ling Pug frequents the heaths and the Wormwood Pug seems almost an insect of populated areas.

All this data seems to suggest a very simple breeding experiment that members might feel worthwhile, for certainly the Wormwood Pug is an easy insect to rear. If some egg-batches of either or, preferably, both moths were split in two, one half being fed on its own foodplant, the other on that of the other species, it would be possible to check both of Juul's statements at the same time. If the colour of pupal wing-cases and the genitalia hair-counts are dependant only on the parent, and are not related to food-plant, then he is in the clear. If anyone does feel like breeding along these lines but finds the prospect of endless dissections of the genitalia daunting, I would be happy to take care of that. The usual precautions (different areas, controlled conditions, etc.) would be worthwhile if possible.

My own view is that these moths belong to the twilight of biological races.

Richard Dickson (3674)

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NOTES ON BREEDING THE JAPANESE OWL MOTH

I bought from a dealer a dozen ova of the Japanese Owl Moth (*Brahmaea japonica* Butl.) and received them on April 5th. I do not know when they were laid, but it is reported that they take a month to hatch. The egg was whitish grey with a black spot in the middle.

The first larva emerged on April 10th and six more emerged up to April 15th the other five failed to emerge. The newly emerged larvae were entirely black and possessed seven spines; four at the front and three at the back. The first larva changed its skin on April 15th.

The second instar larvae were very different, being white with black spots and blotches and yellow-orange markings. The larvae prefer lilac to privet as a foodplant. The larvae shed their skins four times. The second to fourth instar larvae have similar markings, but the spines become more crooked after each moult. The first larva changed its skin for the last time on May 2nd. The fifth instar larvae have no spines.

The larvae were now transferred from a plastic box to a cage with two inches of peat on the bottom and a sheet of glass as a roof, supported at each corner by a stone. On May 10th the first larva turned orange over its back and, after wandering for two days, burrowed under the peat to pupate. Others did the same later. Next year I hope to breed from the adults.

P. D. Brock (4792j)

LETTERS TO THE EDITOR

Birds and Lepidoptera

Dear Sir,

Whilst gardening I saw a Robin vigorously wiping its beak on a branch. It flew away leaving something white fluttering in the breeze. This proved to be a wing and the body of a male Orange Tip (*Anthocharis cardamines* Linn.). The wing was soft and damp indicating that the insect had only just emerged and had not flown. It is to be hoped that the Robin learnt the lesson and sampled no more Orange-tips!

Swallows in the garage are a mixed blessing but they do occasionally drop something more interesting than excrement. On the floor I have found a moribund Purple Hairstreak (*Quercusia quercus* Linn.) and a Clouded Magpie (*Abraxas sylvata* Scop.). One would expect the latter to be distasteful, perhaps the former just could not be stuffed into a nestlings beak.

John E. Knight (94)

Photographing insects

Dear Sir,

As a 'new boy' in the AES my interest within the wonderful insect world is mainly in macrophotography. I photograph subjects which are bred in my home or collected in the garden or woods nearby. Within the AES membership lists I can only find some five or six members who are listed as being interested in the photographic side of entomology. Upon reading Michael Coleman's letter in the May 1972 *Bulletin* 'Collecting v Photography', it does seem rather apparent that quite a number of members must in fact be very interested in the photographic side, if only secondary to that of collecting. I therefore wonder if interested members would like to write to me at 'Woodview', Duke Street, Aspley Guise, Bletchley, Buckinghamshire.

A. F. W. Lewis-Jenkins (4916)

Code for Collecting

Dear Sir,

I am writing as Secretary of the Joint Committee for the Conservation of British Insects to thank you and the AES for its support with the principles of the Code for Insect Collecting. I am sorry, however, that the Committee has not apparently made it clear that groups other than Macrolepidoptera are recommended for protection. The list of Macrolepidoptera produced by the Committee has always been intended to be

merely the first of a series of schedules of species which are rare or endangered. Lists of Odonata and Orthoptera have been agreed and will, I hope, be published soon in the entomological journals. These are to be followed by a 'miscellaneous' schedule containing species such as the Cicada (*Cicadella montana* (Scop.)). It is very far from the Committee's intention to deny official recognition, as you put it, to species other than Macrolepidoptera. Indeed the Committee is at pains to make it clear that the Macrolepidoptera are not to be singled out for special attention, nor Lepidopterists made to feel that they are the only collectors whose activities are to be curtailed. I am very sorry that you should have come to an opposite conclusion.

On the specific point on the protection of *Hydrous piceus* (Linn.), you may be interested to know that the Committee considered the protection of this species in some detail over the last year or so but the advice of the specialists in freshwater Coleoptera was unanimous that far from showing a decline the species was actually slightly increasing in numbers. The Committee would, of course, be very happy to consider any evidence which gives a contrary view and if you or your members have any such, I would be grateful to receive it.

M. G. Morris

The trade in dead insects

Dear Sir,

I tend to disagree with your Editorial article in the August 1972 *Bulletin* concerning the trade in dead insects.

For collectors like myself who wish to build up a comprehensive collection of British butterflies and moths I would definitely state that this trade is a necessity. For instance, have many collectors encountered the Monarch butterfly (*Danaus plexippus* Linn.) or the Bath White (*Pontia daplidice* Linn.) in the wild state in the British Isles? The answer is surely "No". It is largely only through dealers that we have the opportunity to acquire even foreign specimens of these beautiful insects. I was born and resided in Caernarvonshire, North Wales for seventeen years, not perhaps the best area in Britain for insects and although I have been a keen field collector since 1958 I have never encountered the Clouded Yellow (*Colias crocea* Geoff.) even when living in the south of England for some years!

Since 1958 I must have spent about £200 on cabinets, store boxes, equipment, books, set specimens etc but now I have an admirable collection which includes almost every butterfly and macro-moth to be found in Britain, including many interesting varieties which one seldom takes in the net. I know that I have had value for money as I have spent many happy hours arranging these insects systematically in my

cabinet and reading about their distribution and habits.

Although, as with most other commodities, prices have risen since 1958 I still believe most dealers give value for ones money when I compare the inflated prices I have to pay for one of my other hobbies—collecting Roman coins.

Concerning the Diptera, a sadly neglected Order, I was most impressed to read Mr Stubbs' scholarly and masterly articles on the Craneflies. It is high time more articles like these were published on this complex but highly interesting Order and I should like to see keys of this calibre published in our *Bulletin* to cover *all* the known British species, although I know that this task would prove arduous since there are over 5,200 species and some families are complex—the Chironomidae,

In a curious way I find our Diptera more interesting even than our for example.
Lepidoptera and as they are not so well known much remains to be learned about their life histories and distribution. I admit I have purchased set specimens of Diptera for my collection (getting some laughs from my shipmates when they discover I have been paying money for 'dirty flies') but then in the field I have established two new localities for at least two of our species. These are Lewes, Sussex in May 1964 for *Ferdinandea ruficornis* (Fab.) (Diptera: Syrphidae) and Rosyth, Fife in July 1972 for *Tropidia scita* (Harris) (Diptera: Syrphidae).

On the whole I think it is the difficulty in obtaining suitable literature for the identification of most species of Diptera that puts many people off—I myself have sometimes been daunted by this. Even when one has access to excellent publications like the late Mr R. L. Coe's Handbook for the Identification of British Insects—Diptera (Syrphidae) 1953, it is still somewhat difficult to identify exactly some species as many look superficially the same and even under a good lens one cannot always be sure of accurate identification.

Although I do collect flies generally in the field, I have tended to concentrate on the Syrphidae and would be pleased to communicate with anyone who is interested in this family. However, Mr Stubbs' articles have given me an impetus to start looking at the Craneflies more closely and I hope these articles will affect others, especially my own younger generation, in a similar way. Well done, Mr Stubbs! Long live our more respectable dealers!

M. O. Hughes (3612)

A plea for sanity

Dear Sir,

A lot of letters and articles recently published in the *Bulletin* adequately put both sides of the collecting against conservation controversy. I will not attempt to add to the vast amount which if published

would undoubtedly be larger than the *Complete Oxford Dictionary*.

The conclusion to be drawn from this (for want of a better word) literature is that neither 'side' intends to budge an inch. So if it is found too repulsive to kiss and make up, may I request that at least the bickering is kept out of the precious pages of our *Bulletin*.

W. Coster (4697)

BOOK REVIEWS

Collecting from Nature by T. J. Jennings. Illustrations by Lacey Hawkins. A. Wheaton and Co., Exeter. 240 pp. £1.75.

This is a revised edition of a book published first in 1958. The whole format has been changed and much has been rewritten. It has been written with the amateur in mind and collecting and preservation techniques are simply explained. The style is reminiscent of AES pamphlets and the first three chapters deal with matters entomological—Butterflies and Moths, Beetles and Dragonflies. Simple home-made equipment is described and illustrated and the book would make an excellent gift for any beginner with an interest in almost any sphere of natural history. A useful chapter deals with the preservation of spiders and isopods. There are chapters on plant collecting, mollusc shells, birds' nests, animal skulls and making plaster casts of animal footprints. Less space is given to the keeping of living specimens and today with the emphasis on conservation and the observation of living animals this section could have been given much more attention. Each chapter has a list of further reading and a glossary of scientific terms is included. It is a book well worth its republication and should be an easy choice for the Christmas present seeker.

P. W. C.

Animals in the Home and Classroom by T. J. Jennings. Published 1971 by A. Wheaton and Co., Exeter (Pergamon Press Ltd.). Drawings by Lacey Hawkins. 188 pp. £1.40.

This book is in the main a handbook for the keeper of small pets, many of which are imported into this country more for the 'pet owner' than for any scientific interest purpose. The rightness of such importations are now seriously doubted but Mr Jennings' book will at least enable those who do acquire pets, for whatever purpose, to keep them alive as long as possible and perhaps enable them to reproduce themselves. Mammals, birds, reptiles and amphibians are considered under

a series of headings which include breeding, behaviour and health. To the entomologist the most useful chapters are the last ones which deal with Pond Life and Chapters 31 to 39 which consider invertebrates including Lepidoptera, ants, Phasmids and locusts. These are well done with the beginner in mind and should prove of special help to the school teacher dealing with practical elementary biology in the classroom.

P. W. C.

Woodlice by Dr Stephen Sutton. Published 1972 by Ginn & Co. Ltd., London. Illustrated by Hilary Burn. 143 pp. 8 coloured plates. Price £2.00.

This book one hopes is the first of a series to be published by Ginn and Company as its title is prefaced with the words 'Invertebrate Types'. It deals with the British Woodlice and is an excellent production both as to content and presentation. The line drawings in the text and the coloured illustrations have been done from life and are of a high standard. This is the first text on the subject since a monograph in 1906 by Webb and Sillem. Dr Sutton writes in an interesting and competent style, dealing with the structure, physiology, behaviour and genetics of Woodlice. Further chapters consider feeding, predators and parasites and there are chapters for the practical biologist and student on population ecology, distribution and techniques for studying. There is a key to the British species prepared in collaboration with Paul Harding and David Burn which should encourage many to have a second look at these lowly isopods. In an appendix the Isopod Survey Scheme operated by the Biological Records Centre at Monks Wood is introduced and there is a six page bibliography for those who wish to pursue their studies of the Woodlice further.

The book is a credit to those who have produced it and will certainly be useful to every teacher of biology but it will also encourage many to take up the study of Woodlice as its simple and straightforward approach to the subject is the ideal way by which the uninitiated's interest may be whetted.

P. W. C.

How to Begin the Study of Entomology by Anthony Wootton. Published by the British Naturalists' Association. 15 pp. including 2 pages of photographs. Available from the BNA Secretary, Willowfield, Boyneswood Road, Four Marks, Alton, Hants at 15p plus 3p postage.

It is difficult to believe that the reader who needs to be told, on page two of this booklet, that insects consist of head, thorax and abdomen, will be ready to use Royal Entomological Society keys by the time

he has reached page nine. Many readers will find something useful in the booklet: the half page sections on metamorphosis, senses, food and classification are clearly intended for readers who have little or no background knowledge; the three page run down of insect orders might be useful to elementary zoology students but really needs some illustrations; the bibliography includes a very varied selection of references although it would have been better if the out-of-print works had been indicated as such.

I do not believe that anyone starts the study of entomology by reading booklets such as this. Most people start with a well illustrated popular book, graduating slowly to more specialised works. Those following an academic course begin with general zoology or entomology texts. Since the booklet is published by the BNA it is probably intended to interest existing naturalists and nature-lovers in a new group of animals. Even for this audience the author has tried to condense too much into his fifteen pages.

D. C.

A PLEA FROM THE EDITOR

During recent years there has been a great decrease in the number of short articles submitted for publication in the *Bulletin*. This makes the editor's job very difficult at times as he has no material with which to fill up small spaces such as this. Please will you all make an effort to send in as many short articles as possible.

If you can type your submissions, please do. There are three things in particular which make editing much easier: lines should be double-spaced, authors for all scientific names should be given and nothing should be underlined.

At present I have a number of longer articles to publish and as a result it is hoped that some of the future editions of the *Bulletin* will be larger. I hope that this will be some consolation for the inevitable increase in the subscription rate.

P. A. B.

1974-75