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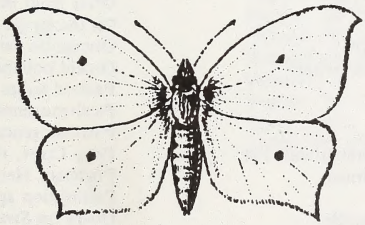
Edited by
Brian O. C. Gardiner FLS



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SUBJECT INDEX

CONTRIBUTORS

BOOKS REVIEWED

BOOKS NOTICED

ERRATA ET CORRIGENDA

p 53, para 2, line 1: for of read on
p 53, para 2, line 3: for Comlmittee read Committee
p 53, para 2, line 15: for imnportant read important
p 53, para 4, line 1: for *Calopterix* read *Calopteryx*
p 53, para 4, line 3: for *Ophiopomphus* read *Ophiogomphus*
p 53, para 4, line 4: for *tetraphulla* read *tetraphylla*
p 54, para 2, line 2: for *Apartura* read *Apatura*
p 54, para 2, line 4: for *Coenonomympha* read *Coenonympha*
p 54, para 10, line 1: for *styrca* read *styriaca*
p 55, para 2, line 1: for *Vespae* read *Vespa*
p 55, para 3, line 3: for *Argynnis* read *Argynnis,*
p 55, para 3, line 4: for *melitaea* read *Melitaea*
p 55, para 3, line 10: for *Tyria* read *Thyria*
p 210, para 3, line 3: for 0⅛2 read ±2
p 220, para 4, line 5: for ⅜ read))
p 235: para 2 of DISCUSSION: Delete "a President of the Royal College of Surgeons of 200 years ago" and substitute "John Hunter who was the most outstanding surgeon of his time, Surgeon Extraordinary to King George III and an FRS, although he was never President of the Royal College of Surgeons."
p 247: bottom of page: for 1 May 1988 read 1 November 1988

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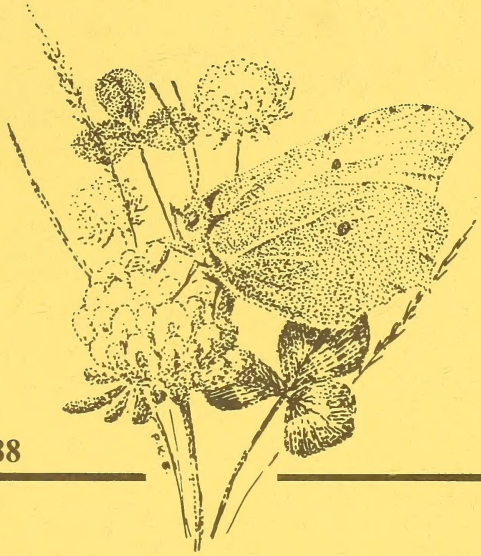

Volume 47, No. 358, February 1988

The Bulletin of the Amateur Entomologists' Society

EDITOR
BRIAN O.C. GARDINER, F.L.S.

The Amateur Entomologists' Society

Founded in 1935

President:	E. LEWIS	11 Court Farm Road, Warlingham, Surrey.
Hon. General Secretary:	C. C. PENNEY	109 Waveney Drive, Springfield, Chelmsford, Essex CM1 5QA.
Hon. Treasurer:	R. A. FRY	The Hawthorns, Frating Road, Great Bromley, Colchester CO7 7JN.
Registrar:	NANCY CRIBB (Mrs)	355 Hounslow Road, Hanworth, Feltham, Middlesex TW13 5JW.
Hon. Bulletin Editor:	B. O. C. GARDINER	18 Chesterton Hall Crescent, Cambridge CB4 1AP.
Hon. General Editor:	P. W. CRIBB	355 Hounslow Road, Hanworth, Feltham, Middlesex TW13 5JH.

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A.E.S. Exotic Insects Group:	C. J. ESCHBACHER, 38 Frith Road, Bognor Regis, Sussex PO21 5LL.
A.E.S. Insect Behaviour and Ants Study Group:	B. L. WILLIAMSON, 73 Little Brays, Harlow, Essex CM18 6ES.

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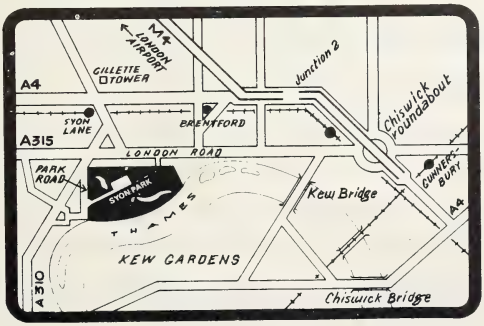

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AES BULLETIN

No. 358

CHANGE OF PUBLICATION AGENT

AES PUBLICATIONS IS UNDER NEW MANAGEMENT

We welcome Mrs Wendy Fry who has taken over the job of handling our publications as from the beginning of this year. She will continue to operate under the name of AES PUBLICATIONS, to whom cheques etc should continue to be made out, and in future all requests for our publications should be sent to her at THE HAWTHORNS, FRATING ROAD, GREAT BROMLEY, COLCHESTER, ESSEX CO7 7JN.

In the early days when very few publications were involved, such requests for those available tended to be mainly from new members and were dealt with by the then Secretary, or else the Editor. As our publications multiplied and became increasingly well-known and sought after by other than our membership, a separate person to deal with them became necessary and the Society has been fortunate in that during the nearly forty-five years that have passed since our first agent was authorised by our constitution there have only been three publications agents, which has ensured efficiency and continuity. During that time there has been an enormous increase in both the number and bulk of our publications and the work involved has increased accordingly. We wish Wendy every success in the job.

THE ROGATE FIELD CENTRE

This Field Centre belongs to King's College, University of London, and is used for residential courses in a range of subjects, particularly concerned with the natural environment. It is available for use by other parties and by school groups. The Centre is situated in the small village of Rogate and is contained in its own grounds of some eleven acres. The

river Rother is nearby and the Cities of Portsmouth, Chichester and Winchester are all within easy reach. The accommodation is comfortable; there is a large modern well equipped laboratory and lecture room; teaching courses can be modified to suit needs or individual research projects can be undertaken; there is a minibus available.

Inclusive charges of bed, meals and bench fees are £12.90 per day. Enquiries from those interested should be sent to Mr David Risley, Rogate Field Centre, The Red House, Rogate, Near Petersfield, Hampshire GU31 5HN.

IRISH WILDLIFE CONSERVATION CENTRE

by R. Gilliland, Crossgar Project Manager

The Ulster Trust for Nature Conservation, which is a charitable body affiliated to the Royal Society for Nature Conservation, is preparing a wildlife conservation education centre at Crossgar, Co. Down. The centre will include examples of various wildlife habitats; wildflower meadow; woodland, wetland, moorland, and a central wildlife area all inside a walled garden. A large conservatory will contain a native butterfly house and a section demonstrating plants useful to man. Lecture, display and study facilities will also be provided. The Centre is due to be opened this spring of 1988 and will be the first of its kind in Ireland.

EXPEDITION ADVISORY SERVICE

The Expedition Advisory Service provides an information and training service for those planning an expedition. It was founded, and is jointly administered by, the Royal Geographical Society and the Young Explorers Trust, and is a Shell International Petroleum Company funded project.

In addition to organising a variety of seminars and publications, which includes an annual one on the planning of a small expedition, the Centre provides a number of specialist services to those planning scientific and youth projects overseas. These include:

> Access to expedition reports; directories of equipment suppliers, funding bodies and scientific agencies; a register of personnel available to join expeditions; specialist advisers; contact with leaders of past expeditions.

The Centre is open from 10.00am to 5.00pm Monday to Friday, and welcomes enquiries from the general public by appointment or letter. For further information members should contact Mrs Shane Winser, Information Officer, Expedition Advisory Centre, 1 Kensington Gore, London SW7 2AR (Telephone: 01-581 2057).

BUTTERFLIES ON FARMLAND

by John W. Dover

The Cereals and Gamebirds Research Project, The Game Conservancy, Burgate Manor, Fordingbridge SP6 1EF

The Game Conservancy, an organisation set up and funded by farmers and landowners interested in shooting, has an active programme of research into wildlife conservation on arable farmland. Since 1984, studies on butterflies have been undertaken funded by the Nature Conservancy Council and the World Wildlife Fund (UK).

The Cereals and Gamebirds Research Project (CGRP) was started by the Game Conservancy in an attempt to reverse the decline of the English partridge (*Perdix perdix*) in lowland Britain. The central theme of the work is that the partridge and other wildlife have declined on farmland through the undesirable side-effects of modern farming, especially chemical pest control (Potts, 1986).

Agrochemicals used on arable fields are not directly toxic to gamebirds, but indirectly cause a high chick mortality. The survival of gamebird chicks is related to insect abundance; the birds rely exclusively on an invertebrate diet for the first 21 days of life (Southwood and Cross, 1969). The density of insects is in part determined by pesticide use; by the use of insecticides but also by herbicides eliminating the weed species which act as the food plants for many species (Potts and Vickerman, 1974; Sotherton, 1982, Vickerman, 1974).

These background studies led to the development of selectively sprayed crop margins or "Conservation Headlands". These are defined as the outermost 6m of a cereal field, they do not receive any pesticides after 1st January to harvest. The reduction in pesticide at the field edge follows the work of Green (1984) who demonstrated that insect numbers were highest there. Conservation headlands had been tested throughout England and have been shown to dramatically improve the survival of partridge chicks (Rands, 1985, 1986).

In 1983, it was noticed that there were apparently more butterflies flying over conservation headlands than over fully sprayed ones. In 1984, this observation was tested on a farm in Hampshire with the aid of a volunteer from the Hampshire and Isle of Wight Naturalists Trust. A modified Pollard walk (Pollard *et al.* 1975; Rands and Sotherton, 1985) was devised which consisted of field edges paired for habitat, i.e. short hedge, tall hedge, woodland edge, etc, for length and for orientation, in such a way that the only effective difference was that one of each pair

had fully sprayed headlands and the other conservation headlands. The walk was carried out once a week during the summer following the scheme in Hall (1981).

The results of the first butterfly transect were dramatic with 3x the number of butterflies and a wider range of species seen over the conservation headlands compared with normally sprayed field edges (Rand and Sotherton, 1985). The butterfly walk was repeated, in different fields in 1985 and 1986 and has confirmed that significantly more butterflies are seen over conservation compared with fully sprayed fields (Dover, 1985 and 1987; Fig. 1).

In order to try to understand why there was this distinction between the two regimes, a study of butterfly behaviour was undertaken. The technique consisted principally of following butterflies through paired, sprayed and conservation headlands and rapidly dictating into a small tape-recorder exactly what the butterflies were doing. The categories of behaviour recorded were flying, feeding, basking and settling, interacting (with other butterflies), mating and ovipositing; the location of these activities (hedge or headland) and species on which feeding or basking/settled were also recorded. The speed of movement of the butterflies could also be estimated by reference to numbered canes staked out at regular intervals along the field edges. Activity profiles could be

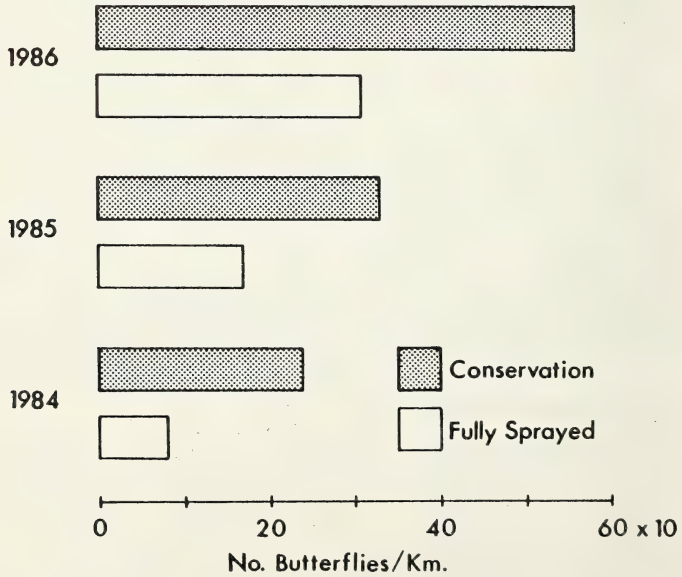

Figure 1. The number of butterflies seen at the margins of fields with fully sprayed and conservation headlands 1984 - 1986. 1984 data from Rands and Sotherton (1985), 1985 and 1986 data from Dover (1985 and 1987).

made up for each butterfly under the different spray regimes by going over the taped records with a stopwatch. Examples of activity profiles for the Green-veined white butterfly (*Artogeia napi* (L.)) are presented in Fig. 2.

The reaction of some Pieridae to the management changes is striking and essentially results in the switching of the site of activity from the hedgerow to the headland. This is often associated with a reduction in the proportion of time spent flying and a large increase in the time spent feeding. The nectar resources provided by the conservation headlands have a profound effect on butterfly activity and have a consequent knock-on effect on the speed of movement through arable fields. This implies that the nectar resources currently available for butterflies (and presumably other insects) is not sufficient for their needs and they quickly vacate areas which do not meet these requirements. This may have a substantial effect on the degree of exploitation of butterfly host-plants on farmland and may in part be one of the reasons for the paucity of butterflies on farms.

One aspect of conservation headlands which was examined in 1987 was the reduction of spray drift into the edge habitat — the hedge and hedgebank, the grass verges, etc. areas which contain butterfly host plants. A reduction of pesticide drift into these areas may contribute to the higher incidence in Satyrid butterflies which we observe over conservation headlands.

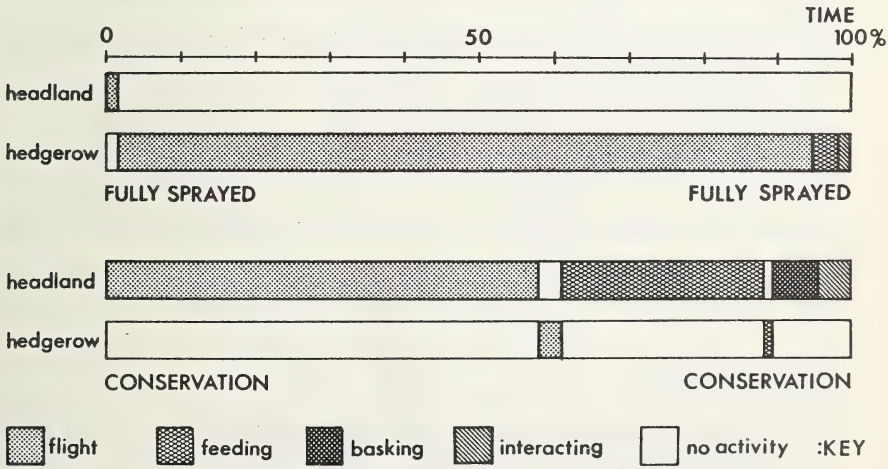

Figure 2. Examples of activity profiles for males of the green-veined white butterfly in field margins with fully sprayed and conservation headlands. The data is presented as the percentage of time spent in a particular activity, and where it took place — either in the adjacent hedgerow or over the headland.

Last year saw the start of a new multi-disciplinary investigation into the ecology of butterflies on farmland. The Game Conservancy, The Institute of Terrestrial Ecology and Southampton University are collaborating to try to understand how butterflies interact with the farm environment, what the effect of farm management practices are on butterflies, and how they can be modified to encourage butterflies.

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BOOK REVIEWS

Greek Insects by Malcolm Davies and Jeyaraney Kathirithamby. Pp.211, 8vo, illustrated. Gerald Duckworth 1986. Price £24.00.

An absolutely fascinating book this, and full of all sorts of miscellaneous information, but anyone returning from their Grecian holiday with a boxful of interesting lepidoptera and strange-looking beetles and hoping to identify them will not get very far with the task, for this is not a

taxonomic entomological book but an etymological entomological one. Apart from the Greek, Roman and Byzantine sources are drawn upon.

Starting with the insect in fable (Aesop), poetry and drama (Aristophanes has a large number of references to insects in his Comedies), we go on to consider insects known to the Greeks of Classical times, with such as the bees, the fly, beetles and lice getting a good deal of attention. The difficulties of the correct interpretation of some of the archaic names is dealt with and alternative versions given. We are then given much of the folklore and the ancient beliefs concerning the insects in question. Some of those in respect of the dung beetle are quite disgusting, but as opposed to the modern tourist, the ancients actually liked and enjoyed the shrilling of the Cicada and the butterflies of course were the repositories of souls.

Basically this book deals with all the insects known to the ancient Greeks and which are mentioned by the classical authors; depicted on their coinage; sculpted, drawn or painted (there are paintings of butterflies still existing on the palace wall of Minoan Crete); or of which traces have otherwise been found by the archaeologists.

While perhaps the less well informed may tend to think of the scientific names of our insects as being derived from the Latin tongue, here we have proof, if indeed proof were needed, that many of them derive from the archiac Greek tongue and this derivation is gone into rather thoroughly.

One good thing to be thankful for is that the authors have taken into consideration that a classical education is now a thing of the past (how many of our members I wonder can read Greek today, let alone speak it?) and all the Greek quotations are in English script and not in the Greek alphabet.

When we see the purity of so many ancient statues and admire the remains of their great temples, the impression is given that the city states of ancient Greece were clean and pleasant places to live in. They were not. As the book points out, in the section on Lice, in those days going to the hairdresser was a delousing exercise rather than to have a cut and perm. This in all social classes.

Clearly very thoroughly and knowledgeably researched and with an impressive list of references and quotations from both ancient and modern authors, my one grumble about this book is its use of abbreviations which makes for heavy reading. For instance "(b) The *pyraustes* (HA 605b11; cf. Aelian NA 1.58, below p. 109)." Still, once you find the right edition (and can read Latin) it makes it easy to go right to the source reference if you want to without having to search right through a perhaps indexless book!

Brian Gardiner

Butterfly Houses in Britain: The Conservation Implications by N. M. Collins. A4 spiral bound, pp.110, IUCN 1987. Price £6 post included.

This report has been sponsored by the WWF, the NCC and the DoE. It documents the dramatic rise and popularity of these Houses during the past ten years and details the total number of species of butterfly and their origins that are used and flown in these mini-zoos. As a summary of the industry it is a concise and useful document, not only to those who need to know about such things, such as the Board of Trade, but also to the owners and managers of the Butterfly Houses, for it points out the pitfalls and complex and confusing legislation with which they need to become involved.

It turns out that between them the 50 Butterfly Houses use about half a million insects of some 300 species during a year, these being obtained from over 20 different countries, but mainly from the Far East. While the purpose of the Houses is display, some of them also sell live and deadstock but this is shown to be a very small part of their turnover in insects, and the livestock they do sell originates from eggs laid by the display butterflies in their Houses. Some of the Houses, on principle, do not deal at all in deadstock.

The report goes into all aspects of the stocking and running of Butterfly Houses and how they cope with and are affected by the various legal and other regulations. On the whole they show up very well in this respect and are not using threatened species in their displays.

The report lists the names and addresses of all known Butterfly Houses and also lists all species of butterfly that are regularly used by them, together with a number of the moths that are also displayed. The origins of these lepidoptera and whether or not they are collected or bred are given. Up to 35% of butterflies used are in fact home reared, and many of those imported are also reared or farmed in their country of origin. One reason for this being the far more satisfactory transport of pupae over imagines, the transport of the latter, particularly in envelopes, is to be discouraged and generally results in substantial losses. It is also against the postal regulations.

While the account of the industry cannot be faulted, what can be considered controversial are the no less than 20 recommendations that the report calls for. This is not the place to detail them, but I cannot, for instance, see the Houses working together and jointly funding research for the good reason that they are in competition with each other and the small individual Houses certainly could not stand the financial strain of coping with some of the other recommendations.

Butterflies are a very visual and emotive subject, which may be why this report was commissioned. On its own therefore the report rather gives the impression that the use of butterflies for display in these Houses

could lead to endangering some at least of the species used. Now half a million butterflies used a year may seem a lot. It is not and must be taken in context with the other uses of butterflies and perhaps of other insects. The total use of insects in a year cannot be accurately quantified but certainly runs into the hundreds, possibly thousands, of millions. Mostly pests being used for insecticide testing, but also crickets, locusts, cockroaches, fleas and other bloodsuckers which do not have the emotive appeal of butterflies and which some sections of the community at any rate would like to see totally exterminated, as has been done with the screwworm. Even as regards butterflies one must put into perspective the total use of them outside the Butterfly Houses. There is an enormous trade in specimens for all sorts of purposes, as anyone who has attended any of the trade fairs, been to almost any curio shop (particularly in South America where they are on sale at almost every street corner) or received catalogues from one or more of the hundreds of dealers who regularly advertise. This reviewer knows of one insectary in this country whose annual output of one British species exceeds 250,000 butterflies. An output equal to one half of all those used by the Butterfly Houses and yet this is not where that quarter million are going. To further put this usage of butterflies into perspective, consider that far more birds are shot while migrating across the Mediterranean and that some ten or twelve million other animals, mostly fish, birds and reptiles are also imported yearly into this country.

The recommmendation that the Butterfly Houses should fund research and promote conservation may apply to the larger owners, but why should they? With several million people visiting them each year, they have already brought an awareness to many of their visitors just how worthwhile saving the butterflies are and educating the public about such things is just as important as carrying out any research.

Although some industries, particularly those involved in pharmacy and pesticides, do indeed undertake the funding of much research, many do not and it is hardly fair in this instance to expect Butterfly Houses to generate enough income indivually or collectively so to do, for research is enormously expensive and must show a return. Indeed from the estimated income of the Houses there can hardly be any surplus to spare for such things. Nevertheless this reviewer has reason to believe that more research than is apparent already takes place, particularly as regards rearing in captivity. Now the rearing of butterflies and other insects is a farming operation. The Government is already calling on farmers to diversify into other activities than the more traditional ones and so cut the enormous cost of maintaining the CAP food mountain. Recently the AFRC granted £400,000 for research into pigs. This is a declining industry and this reviewer knows of one instance at least where a profitless piggery has been turned into a profitable insectary and if so

much money can be useful to a declining industry then surely it should also be the duty of the AFRC to support research into a rapidly expanding farming activity likely to show a profit and not further burden the taxpayer. Millions of pounds yearly are expended on finding better ways to kill insects. What the Butterfly House owners and managers should do is get together and lobby their MPs and/or the AFRC to start funding the research that this report calls for, not to kill insects, but to breed, save and conserve them.

A Member.

Dung Beetles and chafers by L. Jessop. Pp.53, 94 figs, 8vo, (card cover). *Handbk. Ident. Br. Insects. Vol. 5 Part 11.* RESL, London 1985. Price £5.00. (£3.50 to Fellows).

This is the new-look and totally revised edition of E. B. Britton's original work, from which some of the text and figures have been taken. The book not only covers the identification of both the adults and larvae of Dung beetles and Chafers, but also gives brief notes on the ecology and distribution of each species.

Jessop includes also chapters on natural history, collecting and preservation, and a complete check-list, which helps with the taxonomy of the group. A total of 94 figures are featured and these are placed at the back of the book. Twenty-four of these are of complete insects, the rest are of parts of the insects' anatomy and are designed to be used in conjunction with the keys.

The key to the adults has been rearranged into systematic order, which makes working through it that much easier. Provided that they have some prior knowledge of insect anatomy, most amateurs would have little difficulty identifying insects using the key (apart, that is, for species in the genus *Aphodius* in which some species are very hard to separate). Explanatory diagrams to the key are, however, included.

Overall a definite addition to the entomologist's bookshelf, though perhaps rather few Amateur Entomologists enjoy having to investigate the contents of dung in search of their quarry.

D. J. Mann

An atlas of Oxfordshire Orthoptera by D. Shepard and J. M. Campbell. A4, pp.26 plus 22 full page maps. Price £2.00.

An atlas of Oxfordshire Heteroptera/series Pentatomorpha by J. M. Campbell. A4, pp.21 plus six full pages and 16 quarter page maps. Price £2.00.

These publications are Occasional papers No. 5 and No. 6 from Oxfordshire museums.

Well worth buying for anyone interested in the distribution of the Orders dealt with. These two papers are well put together and very easy to understand. The maps are based on tetrads (2 x 2 km squares) with 10 km shown in heavier print. Three of the maps cover the geography of the area showing major towns, woodland and calcareous rock deposits.

The Orthoptera paper has full-page maps for each species with local habitat preferences. The Heteroptera paper lists the bugs in systematic order with a short description of habitat and status, although only 19 of the species are represented on maps.

Other atlases in this series comprise butterflies, mammals, reptiles and amphibians, freshwater fish and freshwater molluscs. While non-entomological these may be of interest to some members.

D. J. Mann

AN EARLY RED ADMIRAL IN STAFFORDSHIRE

by Jan Koryszko (6089)

On May 9th 1987 while observing Green hairstreaks, Holly blues and Orangetips at Barlaston Close Common, Staffordshire, I came across a single example of the Red admiral (*Vanessa atalanta*) basking in the sun on a path. I informed our County Recorder, Mr R. G. Warren who informed me that it was indeed an early record for the Midlands and since we had had warm and sunny weather it may well have been a primary immigrant.

TOPICAL TIP

Keeping foodplants fresh: One of the problems when not using a potted plant is keeping foodplants in fresh condition for as long as possible. This applies particularly when they have to be fetched, as sometimes happens, from some distance and one does not want to make the journey too often.

Before placing the freshly-cut foliage in a pot of water it is best to retrim the cut stems after gathering and also to put only similar sized pieces in each pot. A plastic bag is them placed over the foliage and this should be of sufficient depth to come well down over the water pot. The whole lot is then placed in a refrigerator, set not too low, about 4°C. being optimal. The foodplant then keeps for up to a week before signs of yellowing or wilting start to appear. Some foodplants when kept in bulk (such as cabbage, horseradish, stinging nettle and long grass) can also be kept refrigerated this way just in plastic bags without the benefit of being stood in water.

HYALOPHORA CECROPIA (SATURNIDAE)

(AN URBAN PIONEER)

by Chris Young (5236)

(Continued from Vol. 46, page 244)

Pairing is another stage that seems to confuse the experts. The 24 hour mating time is often quoted and usually holds true. However, in the cold May of 1986 when high temperatures were in the 50s and lows in the mid 40s, I had a pair for three full days and another for two days. Under natural conditions pairing does not usually occur until about 3.30 am, Eastern Daylight Time. If one has the energy, it's an experience to wait for a warm night in June, when the air has travelled a thousand miles from the moist Gulf of Mexico over countless blossoms, over forests, lakes and hills, when hot nights are still new enough to be enjoyed, with a freshly emerged female. Silently the splendid males fly in — we can only guess how far they came, but almost always they arrive to a calling female. Mating is usually immediate. The females seldom have to be tied. Put them on a comfortable sheltered limb, and next morning you should find them still there.

Actually, I'm teasing you, for it is not that way in the U.K. In 1985 I took a dozen pupae to England on a trip to visit my parents in Devon. Upon emergence, I released them into a large well ventilated glass porch. Although unmolested, they refused to mate at all. Not even a sign of matrimony. Perhaps it was jet lag, perhaps the time difference confused them, perhaps they were so impressed with the scenery that they forgot all about their duty to reproduce. The year before, a friend of mine had the same experience with adults that she reared from ova. Incidentally, I resisted the urge to "plant" one moth into someone's moth trap, which could have had amusing results. I did lose one however, as a health professional who was visiting my father, slipped one into her purse on the way out.

I digress. The newly-emerged female is frequently too heavy to fly far, and will lay several ova on the tree where she paired. This is one of the reasons that several cocoons can be located on one tree, and another of the same type right next to it will have none.

Many people have ventured the opinion that the adults stay paired during the following day as a defence mechanism. The argument goes that if a bird spots the pair, then the female has a fifty per cent chance of escape. I'm not so sure that this is indeed the case. It seems to me that any bird worth his salt would go for the larger body first and let the male go. Some other species, such as the Spicebush moth (*Callosamia promethia*), which also mates in daylight, sometimes have a "decoy" male stay close to the mating pair, presumably waiting to sacrifice himself to save the pair. I don't follow this reasoning either, it has not

been my experience that the sex rate of adult *promethia* varies substantially from one to one, as would be necessary to maintain a defence of this sort. Perhaps we can assume that *Cecropia* pairs for 24 hours because it wants to, and wait for a better explanation to come along. As a last word, *Cecropia* is a difficult species to disturb while pairing, and both could easily be eaten by a hungry bird. I'll address other defence mechanisms later.

It appears that *Cecropia* do not fly large distances (another assumption). However, they have colonised large areas of the American west within present memory, and is now common in parts of Wyoming and Colorado. Whenever it colonises urban areas, it builds up high populations. It has been said that in some rural areas, it can also maintain good population. Wooded river valleys in dry areas may also be an example of this. Certainly with its wide range of foodplants, it could adapt very easily.

Cecropia adds a touch of nature to some of the most depressing urban environments, especially in the old cities of the midwest. In Detroit, it is to be found amongst abandoned homes and vacant lots. Perhaps it deserves the title of "Urban Pioneer". Collins and Weast indicate that it is also common on Lakeshore Boulevard in Chicago; although I only found one there on a visit in 1986, and I have had individuals from Chicago write to me for cocoons.

Actually, I'm so so used to looking for *Cecropia* cocoons in winter that I catch myself frequently looking up at the trees for them on my visits to the U.K. Maybe one day . . .

In any event, *Cecropia* is a welcome addition to the city environment, certainly more so than the rat (*Rattus rattus*) and other residents. (Why does Detroit have to spray them?) The larvae can eat leaves that are incredibly dirty. I've frequently found full grown healthy larvae eating leaves so dirty that no semblance of green remained, and cocoons that would blacken the hand at a touch.

Adult moths seem reluctant to come to light, a positive attribute to a city dweller. I've been told of the large moths causing a little confusion amongst spectators at a well-lit baseball game, but I can only remember ever seeing one at night at a motel in Dayton, Ohio.

Holland (1903) makes reference to the general public being amazed at the size of the moth, and certainly it has the ability to impress the most urbane city dweller. Friends of mine who see it for the first time cannot believe it is actually a common species.

The adult may not appear to have warning coloration, but when disturbed, it slowly moves its wings in a rotating manner; almost producing a mesmerising effect. I once saw a crippled female on my lawn surrounded by four birds who, though curious, would not peck at it.

Most other Saturniidae flap their wings wildly to escape. The large striped body of *Cecropia* may or may not also be a deterrent.

Once I found a cocoon on honey locust (*Glenitschia triacanthos*). The tree was in the median strip of a busy highway with a few others of its kind, but no other tree species were close. For the larva to crawl from a ditch on the side of the road, would have taken it over fifty feet of mown grass, then a sprint across the road, then it would have had to find and climb that tree. Now, honey locust is not a recognised food plant for *Cecropia,* why not? It eats almost everything else. I believe the reason lies in the leaves. Honey locust has tiny leaves, certainly not large enough to provide cover for a fully grown *Cecropia* larva. A concern in nature, but not in the rearing cage where hopefully birds are not permitted.

I have excluded from this article references to *Cecropia*'s cousins (*Hyalophora gloveri, H. rubra* and *H. columbia*), as I do not possess the experience observing or rearing them.

The Robin moth is a splendid species, not difficult to rear, tricky to pair, but worth the trouble. A welcome sight in an otherwise urban environment.

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SOME OBSERVATIONS ON ROOSTING BEHAVIOUR OF THE SMALL WHITE *ARTOGEIA RAPAE* L.

by J. H. F. Notton (5459)

An evening visit was made to the church at East Wellow, near Romsey in Hampshire, which is well-known as the burial place of Florence Nightingale. The churchyard was estimated to have an area of just over an acre. At the time of the visit rather more than half of this had the grass growing between the graves quite untrimmed. After paying proper respect to the august Lady's grave, a tour of the churchyard revealed large numbers of Small white butterflies roosting in the long grass. Mixed in with these were

occasional Large whites (*Pieris brassicae*) and Green-veined whites (*A. napi*). A direct visual estimate indicated more than 500 individuals present, whilst an attempt to estimate the mean density per unit area suggested a figure closer to 2000. Parts of the churchyard were inaccessible for direct counting without trampling over areas already thick with insects, so that the upper figure is considered closer to the true population.

The question arose as to why the butterflies were present in such numbers and the author would be interested to hear of any expert explanation that other members care to offer after considering the evidence.

Potential nectar sources in the churchyard were ragwort (*Senecio jacobaea*), hawkbit (*Leontodon spp.*), harebell (*Campanula rotundifolia*). Although the density of these plants did not appear at first sight to represent a very large nectar supply, a field some hundred yards away had, in addition to some ragwort, blackberry (*Rubus fruticosus*) in the hedgerow, common and spear thistles (*Circium arvense* and *C. vulgare*) and was seemingly a more attractive site. The nearest field of a cultivated crucifer was about four acres of oilseed rape (*Brassica napus*) about a quarter of a mile southeast. The wind throughout the observations was a westerly direction so that the rape field was always downwind from the churchyard.

The initial visit was at about 8.30 pm on July 29th 1986 and was followed by two more at noon and 7.30 pm on the following day in order to check the progress of the roosting.

During the midday visit the weather was cloudy but bright with intermittent sun and the butterflies were fairly active. The number in the churchyard had dropped considerable but many were seen within half-a-mile of the church. In particular many were feeding from the thistle and bramble blossom in the adjacent field. Others were being attracted to adventitious cruciferous plants in the hedgerows. Some were seen to feed from blossom and others may have been ovipositing. In the churchyard the main feeding attraction was the ragwort. Butterflies were also seen on the hawkbit and harebells but for the latter the overhang of the bells seemed to give the butterflies difficulty in locating the nectar. The only other plant which was flowering in the churchyard in any quantity was Ladies bedstraw (*Galium verum*) and this was being ignored.

Other species present in the churchyard were several each of Gatekeepers (*Epinephele tithonus*), Meadow browns (*Maniola jurtina*) and Small skippers (*Adopaea flava*), all of which were competing for the nectar from the ragwort.

By the 7.30 pm visit it was overcast and prematurely dark. The butterflies were again roosting in the churchyard although the impression was that there were less than the previous evening.

Two possible interpretations of these observations have been considered, although neither seems to me to be satisfactory.

Firstly, the butterflies may be a migrating group, in which case the reason for selecting the churchyard as a roost and remaining are a little obscure with an apparently better site close by.

Secondly, the site may have been selected as a communal roost for a local catchment area, but again, what is the favourable determining factor?

Whatever the reasons for the swarm, even the humble Small white can present an enthralling sight when seen in such numbers.

A DAY OUT AT ABERDULAIS

by M. Pavett (8263)

On the eighth of July 1986, a warm bright day, I decided to take a walk along the canal which stretches from beyond Neath and up the valley almost to Glyneath. I decided to begin my walk in the Aberdulais Basin some four or five miles from Neath and to head towards Glyneath. Along the footpath you are flanked to the right by the Neath river and to the left the canal. On the far bank of the canal woodland stretches into the distance.

Along the banks of the canal three species of dragonfly abounded, these being the Azure damselfly (*Coenagrion puella*), the Blue-tailed damselfly (*Ischnura elegans*) and the Large red damselfly (*Pyrrhosoma nymphula*). Two other damselflies could be seen, but not so commonly, these being the beautiful metallic Banded demoiselle (*Calopteryx virgo*) and the scarce Emerald damselfly (*Lestes sponsa*). Only two species of the larger Anisoptera did I see, these being the common Broad-bodied chaser (*Libullela depressa*) with its eyecatching abdomen of sky blue and the large and impressive Golden-ringed dragonfly (*Cordulegaster boltonii*). I found the formidable-looking nymph case of this latter species and put it into a matchbox. A few days later I opened the matchbox, having completely forgotten what it contained, and nearly frightened myself to death, throwing the box across the room in the process!

In the grass I found the large impressive dipteran *Tabanus sudeticus,* which fortunately was a male; unfortunately the clegs were not.

It is however, the beetles which were the jewels of the place. On this one day, just by casual looking as I was walking along, no sweep net, beating tray or baits, I came across over thirty species. The first to be come across was the very common *Plateumatris sepicea* which was seen in an assortment of beautiful metallic colours, green red, purple, blue etc. Two other reed beetles were also found, *Donacia simplex* and *D. semicuprea*. On the herbage was the scarab *Hoplia philanthus* which was quite common. The high point of the day, however, was when I went to

search a small patch of umbelliferous plants growing in an opening in the adjoining woodland. The flowers were alive with beetles such as *Judolia cerambyciformis, Strangalia maculata, S. quadrifasciata, Grammoptera ruficornis, Rhagium mordax, Pyrochroa coccinea* and *Trichius fasciatus* to name but a few. On thistles were *Cassia rubiginosa* with its curious larvae. On alder was *Christens aeneas* and under bark among many other species was the Lineate bark beetle (*Tripodendron lineatum*). Underneath a stone lying in thick wet mud I found about twenty *Hydroporus duodempustulatus.* Numerous carabidae were also to be seen including *Carabus violaceus, C. granulatus, Cychrus caraboides* and *Cicindela campestris,* all common species perhaps but all adding up to make this canalside a place of beauty with its diversity of life.

I came away after a few hours feeling satisfied and happy to know that there are still places where insect life is still in such abundance.

EFFECTS OF INSECTICIDES ON NON-TARGET INVERTEBRATES

from *Insect Conservation News* No. 13

Most research in this area continues to concentrate on species which obviously are useful to mankind as natural enemies of pests or as pollinators etc. Despite this relative lack of altruism, it is encouraging to see scientific data which support the use of less harmful methods of pest control. Protection of honeybees is the most widely appreciated example of avoiding mortality of non-target species, and most farmers are aware that it is in their own interests to avoid spraying when large numbers of bees are visiting flowers. A Hungarian research worker, P. Benedek, has pointed out that a careful choice of insecticides can also help to minimise mortality.

Benedek tested five pyrethroid-based products in laboratory and field studies: Ambush (permethrin), Chinetrin (permethrin + tetramethrin), Sumicidin (fenlaverate), Ripcord (cypermethrin) and Decis (deltamethrin). Separate tests were also carried out by Benedek and K. Sagi on a new organophosphorus insecticide, Nevifosz 50 EC (phosmethilan). All the products except Decis were highly toxic in direct laboratory exposure tests against honeybees, but they differed in their rate of breakdown and, therefore, in their effects on bees visiting flowers several hours after spraying. The best performers with respect to quick breakdown were fenlaverate, cypermethrin, deltamethrin and phosemethilan. The lower toxicity of deltamethrin was an added advantage and Benedek recommends its use in either of two formulations: Decis 2.5 EC and Decis ULV.

One of the problems with concentrating on honeybees is the tendency to neglect the fact that even 'short-lived' insecticides can be very harmful to non-target arthropods which are permanently resident in and around the crop. A report by W. T. Vorley on spider mortality (International Rice Research Newsletter, 1985, Vol. 10. pp.19-20) in Malaysian rice crops is a salutary reminder of this. Vorley looked at the effects of the carbamates carbofuran and BPMC (fenobucarb) and the pyrethroids cypermethrin and *cis-2*-cypermethrin on pests of rice and their natural enemies. Both the pyrethroids were highly toxic to spiders, and they actually encouraged the resurgence of pests; the Whitebacked planthopper (*Sagatella furcifera*) with cypermethrin, and the Brown planthopper (*Nilaparvata lugens*) with *cis-2*-cypermethrin. The carbamates were less toxic to spiders and other natural enemies.

THE INVERTEBRATE CHARTER

from *Insect Conservation News* No. 13

The Council of Europe publication *Newsletter-Nature (Naturopa)* No. 86 is a special issue devoted to invertebrate conservation. It begins with an introduction to the Invertebrate Charter by Mario Pavan, former Chairman of the European Committee for the Conservation of Nature and Natural Resources and Professor of Entomology at the University of Pavia, Italy. He writes:—

"Once again the Council of Europe has shown perspicacity in the priority area of nature conservation, coming out unequivocally in favour of invertebrate animals. With Recommendation No. R. (86) 10, its Committee of Ministers adopted the Charter on Invertebrates, which among other things states: 'No animal or plant species must be allowed to disappear because of man's activities'. Invertebrates constitute the living basis needed for regulating the preservation of the wealth of animal and vegetable life, of man and his activities. Many invertebrates are extremely important for human nutrition, and for industry and crafts: for example; marine and terrestrial molluscs and crustaceans. All soil arthropods are essential to humus formation, to the recycling of organic matter and to soil fertility. They are important for scientific research (for example in genetics, pharmacopoeia, etc), and medical research as a source of medicinal substances.

Eighty per cent of plants cultivated by man are fertilised by pollinating insects, and we would have no food, textile fibres or medicines and so on, were it not for these insects. On the other hand, 98 per cent of insect species potentially harmful to plants are kept under control by other insects and arthropods: they are in effect a living, natural, permanent, non-polluting and free means of protecting plants and the ecological balance.

The Charter acknowledges that clearly certain invertebrates may at times be harmful, and recommends that the defence of human interests be rigorously taken into account in seeking to control such excess, impairment or destruction which are not strictly necessary.

The active defence of invertebrates has now become necessary for the interests of mankind, demonstrated by the enormous decrease in numbers caused by chemical products indiscriminately discharged into the environment, and by the impairment and destruction of their terrestrial and aquatic habitats. The novelty of its concepts and its practical implications make the Charter on Invertebrates a real and unexpected cultural revolution."

BOOK ANNOUNCEMENTS

by the Editor

The Naturalists' Handbook Series. In our last issue we commented on the appalling quality of the hardback edition of one of this series, which had been published by the Cambridge University Press. We are now pleased to announce that the series has been taken over by the Richmond Publishing Co. Ltd., Orchard Road, Richmond, Surrey TW9 4PD and having seen an example of a hardback produced under their imprint can state that it was properly bound and not just a stapled-in paperback. We now look forward to this series being continued under new management and Messrs Richmond have announced that the next title in the series will be *Common Ground Beetles* by T. G. Forsythe.

One never knows what is going to turn up, but in what is known as a National book sale, usually held just after Christmas and again in the summer, some surprising entomological bargains sometimes appear. These are often limited to one particular shop and perhaps only a hundred copies in total may be involved. We have come across both Wayside and Woodland as well as New Naturalists in these sales, sometimes marked down to only a quarter of the normal price, to which they return after the sale. These are not books being remaindered and therefore widely available. They need to be searched for and as many participating shops as possible visited.

Although published over three years ago, a very interesting paper only recently came to our notice. It is *Genetics and the Evolution of Muellerian Mimicry in Heliconius Butterflies* and it is by (the late) Professor P. M. Sheppard, FRS., J. R. G. Turner, K. S. Brown, W. W. Benson and M. C. Singer. A substantial quarto size publication it appeared as pages 433-610 of Vol. B 308 of *Philosophical Transactions of the Royal Society of London* and is illustrated with figures, tables and four colour plates depicting 48 of the various forms of *H. melpomone* and *erato*.

While the genetics of the situation are exceedingly complex and will not be understood by every reader, the fact that *Heliconius* species are now common in this Country and widely bred by numbers of people, makes this a very useful guide to the innumerable colour variations that occur in the two species *melpomone* and *erato* and gives an explanation of the how and why there is such variation. While this publication is not on general sale, it may be obtainable either through a specialist bookdealer or even direct from the Royal Society. It may also be worth while trying to obtain it through a library.

BOOK REVIEWS

Butterfly Conservation by T. R. New, Department of Zoology, La Trobe University, Bundoora, Victoria 32083, Australia. Pp.50, 6 figs. b/w illustrations. Price £1.60 (available from author).

A few years ago butterflies were for collecting. Suddenly, or so it seems, the inexhaustible supply of them has become very "exhaustible". Many of us are concerned at the way butterflies have declined in numbers.

Using the abundance and diversity of butterflies to assess the health of the environment has made us even more aware of the fragility of our environment.

Although we know from the fossil record that butterflies evolved at least 50 million years before man, their future survival is very much in our hands. Unfortunately we have such destructive powers that many of the habitats where butterflies were common are now disappearing fast.

Loss of Habitat

Understanding the problem of loss of habitat, making the public aware of the importance of conservation and explaining how we can help protect our environment, is the theme of this stimulating little book.

The examples given are based on a wide variety of conservation projects from the New or Old World and, of particular interest, some of the problems faced in conserving the New Guinea and Australian fauna.

The introduction discusses butterfly biology and looks at the factors influencing the type of population structure, considering just how closely plants and animals are inter-dependent. In the discussion the author points out the importance of managing the habitat to assist in conservation and makes many practical suggestions.

A chapter is devoted to case histories of butterfly conservation from different continents. Many different techniques have been adopted to conserve butterflies and these are discussed together with species' protection using laws to regulate national and international trade in butterflies.

Butterfly ranching

The value of butterfly farms as conservation tools is considered. In New Guinea farming (or "ranching") projects have been organised in which bird-wing butterflies are treated as a crop.

The butterflies are "harvested" and sold through the Agricultural Department Marketing Service. The farmer gets an income, the international demand for birdwings is satisfied and some of the pressure is taken off the wild butterfly population.

Furthermore, the farmer grows the foodplant of the birdwings, which would otherwise be destroyed and replaced with commercial crops. Perhaps we ought to reduce the demand for trade in butterflies but in the case of some of the New Guinea birdwings this might be counter-productive, affecting not only the farmers themselves but also be detrimental to conservation.

An interesting dilemma!

The use of farmers to breed butterflies may be of wider application as a practical method of encouraging conservation of a natural resource. However, the ever-present menace of habitat destruction is not overlooked.

This is a book packed with information and ideas. In an age when book prices are high don't miss the bargain of the month.

Dr Paul Whalley

(The above review is reprinted from *Butterfly News* No. 15.— Ed.)

The Management of Chalk Grassland for Butterflies. Focus on Nature Conservation No. 17. Nature Conservancy Council, Peterborough, 1986. Pp.80 ISBN 0 86139 344 9. Price £5.50.

This attractive publication was produced by the BUTT (Butterflies Under Threat Team) whose secretary, Caroline Steel, will accept enquiries and comments (with a view to an updated issue) at: Brasenose Farm, Eastern By-pass, Oxford OX4 2QZ.

We are presented first with a "Perspective" which explains the severity of the decline of chalk grassland habitats, and moves on to the happier prospects for the development of recovery programmes, outlining the kinds of management required for this purpose. The importance of vegetation mosaics, with a range of heights of herbage, is strongly emphasised. A following section describes management regimes in very useful detail and makes some extremely important points. For example, although winter grazing is less disturbing to invertebrates than summer grazing, it is necessary to avoid grazing so intensively that overwintering shelters are lost. Also, the need to avoid an over-zealous attack on scrub is mentioned.

In a very positive vein, a short section follows under the title "Creating chalk grassland for butterflies" and is an excellent mixture of general hints and notes on individual sites where habitat enhancement of new surfaces, viz road cuttings, has been carried out. Another short section on the re-introduction of butterfly species is a useful summary of when and why re-introduction may be appropriate, together with all the necessary warnings about protocol.

The major section of the book is a series of accounts of individual species, giving notes on their current status, favoured habitats, life cycles and advised habitat management regimes. Twenty-seven species are thus covered. Finally, there are some extremely useful appendices, including a list of foodplants and a chart of turf heights suitable for the various species, as well as a sample grazing licence.

This is a commendable contribution to insect conservation, and well worth acquiring by anyone involved in chalk grassland management. If there are any details with which some lepidopterists may disagree, your coleopterist reviewer has not spotted them. Having lavished praise on the book, I must voice a slight unease over its very title and content because of the way in which it juxtaposes biotope and taxon. Butterflies are not the only form of animal life which deserves protection on chalk grasslands and it should not be taken for granted that what is good for them is good for everything else. Indeed, the author of the opening section complains that chalk grassland conservation has in the past been dominated by a narrow botanical interest. There is also a more general problem which should have been more firmly acknowledged; that of habitat isolation. Passages dealing with the dangers of local extinctions and the value of re-introductions are an indirect admission that there is such a problem, but the overall flavour of the book seems to perpetuate the emphasis on the intensive management of nature reserves — which are inevitably isolated — rather than encouraging the less formal protection and creation of habitat oases and corridors in the wider landscape.

DL

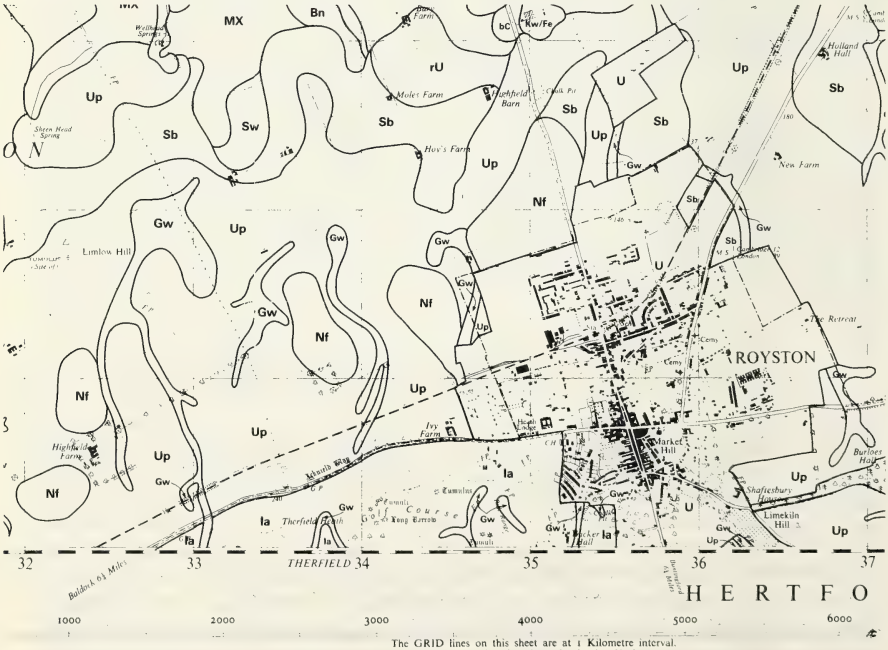
(The above review is reprinted from *Insect Conservation News* No. 13.— Ed.)

Soil Surveys of England and Wales. Published by the Soil Survey of England and Wales, Rothamstead Experimental Station, Harpenden, Herts AL5 2JQ. Numerous areas available, prices from £4.00 to £10.00, post included.

The soil surveys take a small area, at a scale of 1:25000 (=2½ inches to the mile), and consist of a detailed map, based on the standard Ordnance Survey. Not coloured, but detailed in, are all the various types of soil in the area under consideration. This is done by the use of contour

lines and abbreviated lettering in bold type. On the map sheet the soil types are detailed together with the geology and landscape. Each map is accompanied by an explanatory book giving a full description of the area and the soils in it.

What, one might ask, has this to do with the entomologist? Well, the sheet we examined is Cambridgeshire IV which happens to contain (just) the formerly famous area for Blue butterflies, Royston Heath. It is unfortunate that it is right on the bottom edge of the map and to avoid confusion it needs to be pointed out that the Heath is actually referred to as Therfield Heath and that it is in Hertfordshire and not Cambridgeshire. The area where the Blue butterflies occur is shown to be a shallow calcerous humose soil not over 30 cm in depth overlying chalk rubble. Such a soil gives a springy hardwearing turf and is most suitable for grazing, golfcourses and horseriding purposes, which fortunately, do not conflict too badly with the needs of the butterflies. Other soils, such as a coarse loam, are so suitable for working that they are mostly now given over to monocultural acres of wheat or barley, leaving nothing for a butterfly to flourish on although thrips in particular seem to multiply exceedingly on such crops.



The GRID lines on this sheet are at 1 Kilometre interval.
Heights are in feet above Mean Sea Level a. Newlyn

So, having identified a soil where certain insects flourish, by studying these maps is should be possible to locate other similar areas which perhaps, unlike the famous and overworked areas as Royston Heath, may have been overlooked in the past and would be worth investigation. Since the accompanying book gives not only a description of the soil but also the use to which it is being put (arable, grassland, recreational purposes etc) it gives one an idea of which areas may still be worth a survey and since the flora that grows in any area is dependent on the underlying soil, and the insects that may occur are in turn dependent on the flora, these maps can be of particular use when carrying out a survey of insects in a localised area. In any ecological study they are probably essential.

At present it is a matter of chance just which areas are covered, for on the scale being used only a part of the whole country is as yet covered. Nevertheless a number have recently been published and these cover areas in particular in Buckinghamshire, Cambridgeshire, Clwyd, Cumbria, Essex, Lincolnshire, Norfolk, Oxfordshire, Surrey, Warwickshire, Wiltshire and Yorkshire.

The series is well-produced and printed, and supplied in a thick clear plastic envelope which could be used for carrying them around in the field.

A.N.O.

The Moths and Butterflies of Northumberland and Durham. Part 1: Macrolepidoptera by T. C. Dunn and J. D. Parrack. *The Vasculum: Supplement No. 2.* A5; pp.iv + 284. Northern Naturalists Union 1986. Price £7.00 post frree from T. C. Dunn, The Poplars, Durham Road, Chester-le-Street, Co. Durham.

The publication of this volume ends a 75-year famine for entomologists in the North-east wanting an up-to-date regional fauna. Robson's catalogue of 1899-1913 has hitherto been the only comprehensive reference available, if "available" accurately describes such a long out-of-print and long out-dated work.

Now Messrs Dunn and Parrack (respectively the County recorders for Durham and Northumberland) have admirably filled the void with a work of painstaking research and detail.

The concise introduction notes some of the changes which have occurred since Robson's day, notably coniferation of the uplands, which has affected the survival and abundance of many species. Indeed one of the aims of the work is to compare his early records with those of today, and this is done throughout the main, systematic, section of the book, which commences with the butterflies and then runs through the usual arrangement of the moths.

Each species is numbered according to the list of Bradley and Fletcher (*Recorder's Logbook,* 1979) with Robson's catalogue number following in parentheses. Brief but detailed notes then give the past and present status of the species within the area, with dates, localities and recorders often noted in some detail. Only occasionally is more discursive comment entered into, with such regional specialities as *Aricia artaxerxes salmacis* (Castle Eden argus). The authors also give some taxonomic advice for the perennially-confusing genera such as *Epirrita, Eupithecia* and *Diarsia*; as ever the aim being to increase the number and accuracy of records from future recorders of the region.

My only criticism of the text is that perhaps a little too much detailed information has been given for the rarer species, confined to just a few sites; it is now widely accepted that works of flora and fauna may legitimately 'gloss over' exact localities in the interests of conservation. I would also question the need in a modern work to give no less than *ten* synonyms for such a well-known species as the Common blue (*Polyommatus icarus*).

Accompanying the text are a large number of distribution maps, covering the three vice-counties 66, 67 and 68 on a 2 km tetrad basis. Records are divided into pre-1900, 1900-1950, and post 1950 categories, signified by dots, circles and crosses. Although the maps are undoubtedly a boon to local entomologists, my major criticism of the book is in their quality and presentation. Whilst having four to a page always renders them close to the relevant text, the scale is such that detail is obscured. The grid for the 2 km squares has been printed on, such that where records are close together they simply merge into an indecipherable blur. When the coastal or vice-county boundary also crosses a cluster of records the result is then an unmitigated smudge. The handwritten species legend, often unsuccessfully crammed into an inadeqeuate box in the corner, also detracts from the otherwise professional production quality of the textual matter.

A brief list of references and Latin and English indices completes the volume. Overall this is a work of considerable scholarship and thoroughness, indispensable to the Northern entomologist. The second volume, in preparation, on the microlepidoptera is keenly awaited.

CJG

The Spiders of Great Britain and Ireland Vol. 2: Linyphiidae by Michael J. Roberts, pp.204; 94 line drawings and four coloured plates; 4to. Harley Books, Colchester. Price £45.00.

With the publication of this much-awaited middle volume the series is now complete and available to arachnologists. It marks a magnificent landmark in the study of British spiders as only two works of comparable

importance have hitherto appeared. More than 120 years ago Blackwall's two-volume classic came out with 29 coloured plates, in the 1950s the two excellent but rather technical volumes came from Locket and Milledge followed by a third volume in 1971 from Merrett. These volumes had no coloured plates.

This volume deals with the large family Linyphiidae for which, at present, 267, mainly small, species are recognised as British and which comprises 43 per cent of the British spider fauna. Identification is based on the arrangement of tibial spines, metatarsal trichobothria, adult size, the genitalia, male carapaces and finally consultation of the text and illustrations. In these the range of variation of the genitalia is well stressed, eg for *Porrhomma pygmaem* eight forms of the epigynes are given. For each species there is a short description and for each genus help towards separating the species and comments upon distribution.

Since the preparation of volumes 1 and 3 six new species have been added to the British List, one for each of the families Dictynidae, Zodariidae (a new family for Britain), Gnaphosidae, Clubionidae, Agalenidae, and Theridiidae. All these are included in the Check List which names 617 species and gives synonomy additional to and more recent than Locket and Milledge.

There is an adequate Index which also refers to the appropriate coloured plates of volume 3.

Without a doubt the three volumes cost a lot of money — against this must be put the very positive advance made by the publication of the set. Arachnologists, whether they be professional or keen amateurs or ecologists, have needed, will need, these books, and once obtained, the worker will have an efficient tool for the rest of his life. The cost is certainly going to give problems to the librarians of educational establishments in the light of tight money allocations. If our student biologists in the various levels of higher education are going to be adequately supplied with the up-to-date books that they need then the libraries will either have to have more money from official funds or the establishments will have to find other sources of cash.

I have seen extremely little in the way of printer's errors, the appearance of the books, printing, colour, layout, presentation, all are very satisfactory. Perhaps the only snag is the amount of space on the work bench they will need when being used. On the other hand there will be the satisfaction of being able to have well identified specimens.

Congratulations are due to the author for creating such a fine series, the printers for making such a clearly readable job of it and the publishers for embarking on such a necessary piece of biological literature.

R. S. George

THE MOST DISTINCTIVE BEE-FLY

by Frank Marples (8226)

Of the twelve species of bee-fly found in Britain, *Bombylius major* must be the most distinctive and the most familiar. Its appearance about the fresh spring flowers is as great a delight to me as that of the Brimstone and Peacock butterflies. Sightings of this species have become more frequent for me in recent years, here in South-east Hampshire.

The gentle, high-whirring refrain of *Bombylius* in flight, with the lower buzz of Bumble-bee and Drone fly contrapuntal, or in continuo, and the sweetly haunting music of the wayside is complete!

Bombilius is hairy and Bumble-like in form, but its long proboscis and its long, slender legs provide it with an apearance, and a 'character' all its own. Ironically perhaps, the larvae of this bee-like fly parasitize the larvae of true bees!

500 BRITISH INSECTS FACE POSSIBLE EXTINCTION

New Red Data Book spells it out

A Nature Conservancy Council Press Release

Almost 1800 of Britain's 22,500 insect species are threatened and over 500 are in imminent danger of extinction. This is the conclusion of the British Red Data Book for Insects which was published on 9th October last year by the Nature Conservancy Council.

One of the examples quoted is the Violet click beetle (*Limoniscus violaceus*) which is now known from only a single dead tree in Windsor Forest. On the other hand, the bone skipper fly (*Centrophlebomyia furcata*) has not been noted since 1906 and there seems little chance of its habitat returning — it breeds in the bone marrow of large dead animals!

Edited by Dr David Shirt of the Nature Conservancy Council the Red Data Book has taken nine years of intense research to produce, involving collaboration between most of Britain's top entomologists from the Nature Conservancy Council, the Institute of Terrestrial Ecology, the British Museum (Natural History), the National Trust, local museums, colleges and universities, as well as many expert amateurs.

Nature conservation in Britain has tended to concentrate on birds, mammals and wild flowers, with butterflies the only insects to have received much attention. The aim of the Red Data Book is to bring the importance of insect conservation to the attention of naturalists, planners, those responsible for managing nature reserves and the general public.

"The Bee-fly"

A piece for two recorders
by
Frank Morples, 1987

Allegretto

Sopranino

Treble

Bombylius major

The Red Data Book's introduction includes a section on the legal protection of British insects, a code of conduct for entomologists and other useful background information. The book then lists all threatened British species of dragonflies, grasshoppers, bugs, caddis flies, butterflies, larger moths, beetles, ants, wasps, bees and flies. For the species in most danger, it describes where they occur, their ecology, the threats they face and the measures needed to ensure their survival.

Collecting by entomologists is a threat to only a few species of butterflies and other insects: ***the real threat is loss of habitat.***

Whilst the effects of intensive agriculture, modern conifer forestry, pollution of rivers and lakes, building development and destruction of peat bogs are common to many fields of nature conservation, other habitats are vital only to insects. For example, shingle beds in rivers often have no vegetation, but support rare flies and beetles, as does tidal debris on beaches and salt marshes. Crumbling south-facing cliffs are extremely important for wasps and bees which nest in the warm soil.

On a smaller scale, dying trees and dead wood are often put on the bonfire, but they are arguably the most important part of a woodland nature reserve, vital for many rare beetles and flies. Other important sites are areas of bare ground on heaths and sand dunes. These are hunting-grounds for predatory beetles, sun-spots where flying insects can bask and nesting sites for bees and wasps.

British Red Data Books: 2. Insects is available from the Nature Conservancy Council, Dept. PR, Northminster House, Peterborough PE1 1UA, price £10.00 post free.

HABITAT CHANGES THE REAL THREAT

An International Conference of Conservationists and Directors of Zoos was held in Bristol last September. Perhaps the most important point brought out at this conference was that the greatest threat endangering species was pesticides, building, and general erosion and pollution of the countryside. Amongst the other points brought out was that in order to ensure the survival of endangered species there should be greater co-operation between zoos to establish breeding techniques and to maintain in captivity genetic lines of endangered with extinction animals, and while we may think of zoos as being rather mammal orientated, it is intended that other phyla, which of course includes insects, be taken into account. Amongst the speakers was Jeremy Thomas who stated that more than 40 of our 55 resident butterfly species can now be said to be living on a knife-edge. With the keen amateur interest there is in rearing these creatures, it seems that a considerable amount of help and co-operation might well be available to any zoo that asks for it.

SAD STATE OF LOCAL MUSEUM

by Ian Mascall (6056)

After an absence of eight years I was glad to rejoin the AES and, having read the article last May on *Concerning Museums and Collections* (*Bulletin* 46:82-90), regret to have to report that I have yet to see a collection in my area (Cleveland) which is worthy of a public viewing. I am referring to the town where I live, where the insect collection in the Museum is a laughing stock, consisting of a display case about 3 x 2 feet containing some thirty of the most scruffy moth-eaten (pardon the pun!) tatty specimens I have ever seen.

They include a specimen of the *Teinopalpis imperialis*, a normally beautiful and handsome butterfly. This one has no head, is suffering from dust and has rips in its wings. There is not one perfect specimen in the whole case which annoys me like mad and it is in the same room as the stuffed seabirds and their eggs which I think is a disgrace.

At one time the Museum had maybe a dozen cases of insect life including many orders as well as spiders and scorpions. These also were in terrible condition. I know the Museum is underfunded and undermanned, but surely they could make an effort. How many of the non-entomological public will want to see such tatty specimens of insects?

BUSH CRICKET UNDER INVESTIGATION

Habitat reports

Because of increasing worry over the fate of Britain's most endangered bush cricket, the Wart-biter (*Decticus verrucivorus*), the Nature Conservancy Council is funding a three-year study into the life history and habitat of this insect. Currently known on only a handful of sites in Dorset, Kent, Sussex and Wiltshire, with populations ranging from 20 to 200 adults, the Wart-biter is listed on Schedule 5 of the Wildlife and Countryside Act (1981) which prohibits the deliberate killing, capture or disturbance of the species.

OFFER FROM BUTTERFLY NEWS

Although perhaps already well-known to quite a few of our members, this bi-monthly paper would like to reach those who may not yet have come across it and it is therefore offering to send an issue to anyone who sends them a *large* addressed envelope bearing a 20p stamp on it. Envelopes should be sent to Butterfly News, The Butterfly Farm Lodmore Country Park, Weymouth, Dorset DT4 7SX.

THE THREATENED SCOTTISH PEATBOGS

Nature Conservancy Council calls for their protection

In August 1986 this Journal published a report (*Bulletin* 45:124-125) on how the Pine beauty moth was helping to save the Scottish peat bogs (the largest wetland habitat in Europe apparently) from the danger of destruction by afforestation. Now the NCC has come out with a report calling for a complete moratorium on further trees in the area. The account below is taken from *Habitat, vol. 23, no. 8, Aug/Sept 1987* which we reprint with due achnowledgement:—

"*AREA OF GLOBAL IMPORTANCE THREATENED*

The Nature Conservancy Council has recently launched what it describes as a purely 'scientific document' (available, price £10 post free from the NCC (Dept. PR) Northminster House, Peterborough PE1 1UA) entitled *Birds, Bogs and Forestry: The Peatlands of Caithness and Sutherland.* This document which met with considerable opposition from those concerned with forestry and employment in the region, calls upon the Government to "declare a moratorium on all planting and on all grants in this area", a zone protected under four separate pieces of international legislation. William Wilkinson, Chairman of the NCC, went on to explain that the moratorium "needs to be of sufficient length for appropriate solutions to be worked out which will bring benefit to the people of Caithness and Sutherland and at the same time protect in perpetuity this unique piece of our, and indeed the world's, natural heritage". The 401,375 ha of blanket bog has developed as a result of the cool, wet and windy climate of northern Scotland and is possibly the largest single expanse of blanket bog in the world besides being the largest single area of habitat in the UK. To date 16% of the peatlands have been planted and the survey estimates that up to 19% of the breeding wader populations have been displaced and their habitats irreversibly changed. The area supports a particularly wide range of birds not found in identical composition anywhere else in the world and includes divers, birds of prey, wildfowl and waders. The survey further indicates that currently designated Sites of Special Scientific Interest are inadequate to meet conservation needs and that a broader designation such as an Environmentally Sensitive Area is required."

(Although there is a great emphasis placed on the birds of the area, for which the peatbogs are indeed of very great importance, there are a considerable number of lepidoptera — and I have no doubt other, as yet uninvestigated, insects — that also occur in Caithness and Sutherland. Being in the northern limits of their range, many of these also exhibit variation and forms not to be found further

south and are as unlikely to survive in a pine forest as are the birds. While there may be other, perhaps more recent, information, the Macrolepidoptera of north-east Caithness were methodically listed by J. H. Rosie in the *Entomologists' Gazette* in 1958 and 1961.— Ed.)

TOPICAL TIP

Tutt's hints on Pyralides: (The following is taken from Part III of his *Practical Hints*. His original nomenclature is retained with the English and modern names added, taken from Heslop's *Revised List of Names of British Lepidoptera* and the English plant names from Keble Martin's *Concise British Flora in Colour*. These names are given in parentheses.)

The larvae of *Scoparia mercuriella* (Small grey *Eudoria mercurea*) are to be found in March and April feeding in galleries made in mosses growing upon tree-trunks, rocks, stone walls, &c, in fact in all sorts of situations, even on the spreading roots of trees, on the ground, and on the roofs of houses (Barratt).

The larvae of *Scoparia murana* (Wall grey *E. murana*) are to be found from February to May on various mosses — *Hypnum cupressiforme, Diacranum scoparium, Bryum capoillare,* &c — growing on old walls, dykes, rocks etc.

In January and February, if the weather be mild, the hibernating larvae of *Scoparia prunalis* (Dusky brindled pearl *Udea nivealis*) are to be found on the underside of the leaves of (yellow Archangel) *Galeobdolen luteum* (deadnettles) *Lamium,* &c, nibbling little channels out of the lower cuticle, causing a change of colour on the upper surface and betraying their situation; but cold weather at once causes them to become dormant again; also found on nettle, elm, (germander) *Teucrium,* (woundwort) *Stachys,* etc.

In March, the hibernating larva of the *Scopula olivalis* (Olive brindled pearl *Udea olivalis*) feeds rapidly drawing together the leaves of its foodplants — (elder) *Sambucus nigra* &c — tightly round itself with a few threads, as it eats portions out of them, and feeds secure from observation until about the middle of April or the end of the first week of May, according to the season when it is fullfed.

The hibernating larvae of *Psammotis (Botys) hyalinalis* (Translucent straw pearl *Microstega hyalinalis*) recommence feeding on (knapweed) *Centeaurea nigra* in middle March, when they begin to spin short galleries from their hibernacula to the young *Centaurea* leaves just coming out of the earth; they then feed up pretty rapidly, and are fullfed from mid-May to early June, pupating about a fortnight after the cocoons are spun.

TOPICAL TIP

February larvae: While the folklore of the fens may have it that the month of February is 'Filldyke' month, it is our experience lately that the dykes get filled in July and August, whereas February is more likely to have a covering of snow and ice. Nevertheless when the sun does shine and it is somewhat above freezing there are a surprising number of larvae, mainly noctuids, that come up for a nibble and these are best searched for at night, perhaps the best places being alongside hedges and ditches, although any open ground somewhat overgrown may yield some and a sweepnet can come in very useful on these occasions. Good tufts of grass are also profitable sites to search. At this time of year the vegetation is at its lowest, there is not too much of it about to confuse the issue, or such dense undergrowth as to hide dropping larvae. The larvae of the following species might be expected to be around during February and March, although some of them are distinctly local.

The Anomalous (*Stilbia anomala*); Northern rustic (*Standfussiana lucerna*); Heath rustic (*Xestia agathina*); Double squarespot (*X. triangulum*); Black rustic (*Aporophyla nigra*); Feathered ranunculus (*Eumichtis lichenea*); Beautiful gothic (*Leucochlaena oditis*); Small clouded brindle (*Apamea unanimis*); Lunar yellow underwing (*Noctua orbona*); Lesser yellow underwing (*N. comes*); Lesser broad-bordered yellow underwing (*N. ianthina*); Broad-bordered yellow underwing (*N. fimbria*); Double line (*Mythimna turca*); Clay (*M. ferrago*); Angle shades (*Phlogophora meticulosa*); Uncertain (*Hoplodrina alsines*); Small rufus (*Coenobia rufa*).

TOPICAL TIP

Do not forget the sallow catkins! As soon as these are well out it is well worth while collecting up a quantity as they are almost certain to contain various larvae. Nearly a century ago the late J. W. Tutt recommended that they be put into strong calico bags. There is perhaps something to be said for this oldfashioned method as such bags allow for plenty of ventilation and do not suffer the condensation problems given by modern plastic!

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological and Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

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

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

Awards may be made to assist travelling and other expenses necessary to fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £350 in 1988/89.

Applicants should send a statement, if possible in sextuplicate, of their qualifications, of their plan of work, and of the precise objects and amount for which an award is sought, to Dr M. J. Scoble, Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD, as soon as possible and not later than 30th September 1988.

DEATH'S-HEAD IN SUSSEX

by Tim Newnham (4597)

On the evening of 23rd September 1987, at about 9.00pm, my brother called me outside to show me something. I went out with him and there, sitting on the wooden fence by a spotlight which illumines our side wall, was a male Death's-head hawkmoth (*Acherontia atropos*). The specimen looked fairly fresh so I would imagine that it was a second generation moth descended from a primary migrant that had come over earlier in the year. I checked with the other entomologist in the area and he had not bred any.

OBSERVATIONS ON THE HOLLY BLUE

by Jan Koryszko (6089)

During both 1985 and 1987, in the spring, I have seen singletons of the Holly blue (*Celastrina argiolus*) in my garden at Meir, Staffordshire. In order to attract this species I have both holly and dogwood growing, but very few butterflies are to be seen and these only of the spring generation: no doubt numbers fluctuate from year to year. I have seen this butterfly resting on both cherry tree and rhododendron which I also have in my garden. Both these trees have pink and white flowers and I have also seen the butterflies chase after falling petals. I have also observed this butterfly to rest upon and also walk over the unopened rhododendron flower buds as if in search of nectar, for these buds get very sticky before, during and after flowering and perhaps this is attractive to them.

SOME THOUGHTS ON CONSERVATION

by M. Dobson (8533)

The speed at which our butterflies are disappearing cannot be emphasized enough. In the area of Cheshire where I live, over the past few years, I have seen disappear from sites known to me, the Wood white, the Small blue, the Grizzled skipper, the Meadow brown, a large colony of the Common blue, and the Sixspot burnet moth. In 1972 I watched a Silver-washed fritillary feeding of a bramble bush on one of these sites and have not seen one since. Why? For the good reason that these breeding sites have been totally destroyed by Bureaucrats on the local Council who decided to bulldoze all that heather-clad common, that small wood and to get rid of the flowery meadows. They seemed to think that by turning them into flat desolate landscapes with nicely mown grass and a few young saplings dotted here and there it would make for a nice country walk in a neat and tidy landscape. Of course they do this in May just when the birds are having their young and the butterflies on the wing have just laid their eggs.

Total sacrilege — and I sat back and watched it happen, saying to myself "Well, what can I do against the Council to stop it?" If only I had then known of any conservation groups around, as I now do, I could have reported what was happening and probably got advice and help on how to try and stop it.

The day will come when the poor lepidopterist will be blamed for the lot and the very same Bureaucrats, who fund these crazy schemes, will cry "Our butterflies are disappearing, it's those *** people with nets called lepidopterists who are the cause, catching all those butterflies. Yes, we shall soon put a stop to that." So, at the next sitting of Parliament, a Bill will be passed totally protecting all butterflies from being caught by law. So, if you see or hear about this kind of habitat destruction going on, shout, and get as much backing as you can to shout with you. Write or speak with your local MP; let your views be known as widely as possible. You may not succeed, but at least you will have tried and hopefully made the powers that be think for the future. In future, too, I shall shout and not sit back and watch a similar thing happen again.

Another way of helping the butterflies we have left is, when you catch a female, see if she has a fat abdomen and instead of killing her for your collection, put her in a pill box and when back home transfer her to a laying cage and supply her with sugar/water or potted flowers and a plant on which to lay her eggs. Then, when you have reared these to maturity, keep a few for your cabinet and return the rest to where you captured the female in the first place. Should you be able to return fifty

then that is some 45 more than would normally have survived in the wild and I guarantee you will feel immense satisfaction when you release them, knowing that you have given nature back something that has given you and will now give others, much pleasure over the years.

GHOSTLY HUMULI

Will-o'-the-Wisp explained

by R. H. Heath (8243)

In July 1953, as dusk was deepening, in rough pasture adjacent to the Handlesow Wood, Chartley Estate, Staffordshire, I was amazed and a little perturbed to see a ghostly wraith-like whitish substance pass over the rough sedge of the meadow!

When honest folk are tucked into bed,
Does Will-o'-the-wisp canter o'er the sedge,
Seeking to scare both poachers and keepers,
And of course other night-walking creatures!
Or is it male *'humuli'* in formation keeping,
Waiting for Madam in pupa still sleeping?

On July 3rd 1987, just before midnight, I was sitting on the embankment of the Foxfield light railway, when the same ghostly wraith-like substance I had seen in 1953 came sailing with the wind down the rails, but suddenly sweeping round to fly against the wind! It came closer and with a sigh of relief I saw it for what it was — males of the Ghost moth (*Hepialus humuli*) flying in assembly. I am now convinced that this is the origin in folklore regarding sightings of the "Will-o'-the-wisp."

ICHNEUMON

As black as any witch she comes
Silently skimming through the grass-stem forest
Riding her ovipositor like a broomstick
She is searching for a victim
On which to cast her spell
On which to lay her curse
More terrible than any fiction
This one eats its victim
Slowly
From the inside.

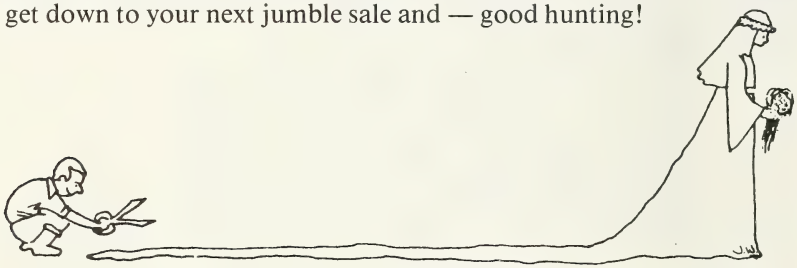
Chris Bindon

ALL THE NET YOU NEED FOR LESS THAN A POUND

by M. Dobson (8533)

Yes, that's right — and I will tell you how to get it for less than two pence per metre. Look in the local paper and you will be surprised to see just how many Jumble Sales are advertised (usually these are held on a Saturday). It is amazing just how much fine nylon net is on sale at these events.

The extra fine nylon mesh lace curtains that are used to ornament windows is the same type of net that is sold for cages except that it is white instead of black. That can be remedied by dyeing with a nylon dye available from many shops. Also ideal for indoor cages is the type of netting used for wedding veils which also turns up at these sales. The usual price for many of these pieces of netting is often only a few pence, so get down to your next jumble sale and — good hunting!



MAKE YOUR OWN KITE NET

by M. Dobson (8533)

A kite net that is strong, has a pole that unscrews, a top that folds up and is light in weight can be quite easily made and in my opinion is of much better quality than many that are expensively on the market.

First, go along to your local fishing-tackle shop and ask for a kite-shaped landing net frame with a nylon top-piece and a four-foot aluminium pole. These should cost about £4 - £5. Pay a bit more and they can be obtained in fibreglass.

Next using nylon net make a bag that will fit onto the frame. This is best done with a sewing machine and while not difficult, some male members may prefer to prevail upon their spouses, mothers or girlfriends to do this job for them. The bag should be deep enough, two to three feet, so that when twisted it well covers the opening and there is enough hanging free comfortably to hold your captured specimen.

When finished, you will have a net that looks professional costs less than those sold specifically for entomology and which will last for many years.

PARTHENOGENESIS IN MANTIDS

by Dr David B. G. Oliviera (8726)

I was interested to read the report by Phil Bragg in the August last issue (*Bulletin* 46:160) describing a case of parthenogenesis in a mantid (possibly a *Miomantis* species).

Although, as Mr Bragg implies, parthenogenesis is rare amongst mantids, there are some known examples. There is one North American species, *Brunneria boralis,* for which males are unknown and which reproduces exclusively by parthenogenesis (White 1948). *Miomantis savignii* may also occasionally exhibit parthenogenesis (Adair 1925) and the subject has been studied experimentally in *Coptopteryx viridis* (Cukier et.al. (1979)). In this latter species the hatching rate was low and none of the nymphs passed the second instar, living from 0-14 days. In view of this, the death of Mr Bragg's nymphs may have been inevitable rather than due to his ignorance.

The possible identification of the mantis as a *Miomantis* species is also of interest in the context of the report by Adair referred to above. However, the taxonomy of the Mantodea is in general rather confused and identification at the species level for many of the genera is uncertain.

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THE MARSH PUG IN STAFFORDSHIRE

by Jan Koryszko (6089)

During early July 1987 while on a collecting trip to Parkhill Country Park, I took a specimen of the Marsh pug (*Eupithecia pygmaeata*) flying in the sunshine. I showed it to our County recorder, Mr R. G. Warren, who confirmed it and informed me that it was a new record for the area. He possesses specimens taken many years ago at Cannock Chase and the Manifold valley. The Victoria County History of Staffordshire also lists it as a very local and uncommon species but it may be locally common where it has been recorded as at Madeley, Dovedale, Burnt Wood and Chorlton Moss. I hope to turn up more at Parkhill in the future.

ORCHID POLLINATORS

The problem of the insect/orchid relationship

by Andrew MacLellan (5256)

The orchids of particular interest are the Pyramidal (*Anacamptis pyramidalis*), the Common spotted (*Dactylorhiza fuchsii*), the Fragrant (*Gymnadenia conopsea*), the Common twayblade (*Listera ovata*), the Early spider (*Ophrys sphegodes*), the Late spider (*O. fulciflora*) and the Early purple (*Orchis mascula*). The number of insect species involved are probably few and restricted to the orders Lepidoptera, Coleoptera, Hymenoptera and Diptera. You may wonder why I have not looked up the pollinators in the literature as all this information has surely been known for a long time. The answer to that is, I have. But the records fall into three categories:

(i) The pollinator has not been identified at the species level.
(ii) The records are for outside this country and the insect species identified as pollinators do not occur here.
(iii) The records are very old when there was a tendency to include any insect that visited the flower as a pollinator whether pollination occurred or not.

The interesting feature about insect - flower interactions is that they are not always what they seem. Pollination is only one of the possible outcomes. For instance, small insects may be able to crawl past the pollen -laden anthers to feed on the nectar so that when it leaves for another flower it takes no pollen with it. Thrips would be such an example although in small flowers such as heather they may be the sole pollinators. Another interaction is that of the 'robbers'. These are usually bees or bumble-bees, and occasionally lepidopterans, that by-pass the normal entrance to the flower and instead bite into the nectar receptacle from the outside of the flower and feed without gaining or depositing pollen. The last form of interplay is that of the 'antipollinators' where a predatory insect or crab spider lies in wait in the flower to catch and devour any pollinating insects that land.

How can the pollinator be separated from all the other insects, and arachnids, that pursue their business in the flower? Fortunately, with most orchids, including all those I listed earlier, the task is relatively easy, because orchids do not have stamens that are left to dangle and brush against hairy insect bodies. Instead they have evolved a very effective mechanism to transfer all the pollen at one go to the pollinating insect that arrives at the flower. The pollen is contained in discrete sacks or pollinia of which there are usually two per flower. The pollinating insect almost cannot fail to leave without these two pollen sacks firmly attached to its proboscis, head, abdomen or legs. The precise

arrangement depends upon the insect and flower involved. At this stage it is very easy to see the bright orange/yellow pollinia. Each is about the size of a pin-head and usually positioned at the end of a short stalk. The insect will then fly or crawl onto the next flower, by which time the pollen sack will have started to become friable as it dessicates and so enables pollen to be dusted off onto the stigma.

Once the pollen grains land on the stigma they germinate and send a pollen-tube down through the stigma until it reaches an ovule where fertilization can take place. One orchid may have many thousands of ovules in the ovary of each flower so this gives an idea of the amount of pollen required. It may also explain why the orchid does not rely on the usual pollen transfer system that, for instance, honey-bees are so well known for, as there would not be enough pollen transferred from flower to flower by a single visit.

(Editor's note— The above was sent us with Dr MacLellan's request for information last year (*Bulletin* 46:90-91) on this subject and which we did not then have space to publish. I am sure that he would still welcome information on this intriguing problem.)

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BREEDING THE SPRING RINGLET, *EREBIA EPISTYGNE*

by Peter W. Cribb (2270)

In the spring of 1986 while in Var, France, with David Marshall and Mark Colvin, we took some females of *E. epistygne.* The season was late and we were fortunate to take them as late as the 10th May. They had obviously deposited most of their eggs but did deposit a few for me on the blades of a *Festuca* grass. These hatched on our return to England after 14 days from laying and the small brownish larvae were fed on *F. rubra,* growing very slowly. At each moult the pattern of longitudinal lines became more pronounced. I kept them outside until Christmas when frosts were forecast. They were then placed in front of a south-facing window indoors where they continued to feed. The larvae are squat and when fully grown measure only ¾″ but are very plump. They are heavily striated with longitudinal lines, a dark-green dorsal line and yellow and green ones on the flanks. Feeding is at dusk and into the night. On the 13th February the first pupated, the pupa lying amongst

the grasses and not suspended. The first, a male, emerged on the 10th March, nearly two months earlier than the date when we had taken the parents. This early emergence is the reason why I have missed the species so often in the past. In Spain the butterfly is on the wing much later — May to early June

The imago is so unlike other *Erebia* species and resembles very closely the African satyrid *Torynesis mintha* and others of this genus. The larvae of *Torynesis* are also very similar, being clearly marked dorsally and laterally, the markings becoming more pronounced with each instar. The pupa is also unsuspended. Perhaps there is a case for re-assessing the status of *epistygne*.

A QUERY ON SYNTOMIS PHEGEA

by John L. Gregory (4116)

I would like to raise a query about the identity of the larva seen by Dave Moon (*Bulletin* 46:51-52). It is worth pointing out that the larvae of *Syntomis phegea* looks superficially very similar to some of the lavae of Footmen moths, in particular the Rosy footman (*Miltochrista miniata*), or perhaps the Four-dotted footman (*Cylosia mesomella*). The fact that he says he found his larvae at the edge of woodland where perhaps there were suitable algae on the tree trunks, would seem to confirm this possibility, especially as *phegea* is not a true woodland species in its natural wild state.

A CAMBERWELL BEAUTY AT TAUNTON

by Lt. Col. W. D. H. Duke

On Saturday 17th October 1987, near Fivehead, Taunton, Somerset, I saw a good specimen of the Camberwell beauty (*Nymphalis antiopa*) feeding on bramble bushes in company with a few Red admirals (*Vanessa atalanta*).

CONVOLVULUS HAWK AT HARROGATE

by Ian MacFadyen (6218)

On the morning of Thursday 24th September 1987 Mr Allan Murray of the Home Office Central Planning and Instructor Training Unit based in Harrogate, Yorkshire, found a large moth on the side of his unit and this I identified as a Convolvulus hawk (*Agrius convolvuli*). It was in good condition and thinking it a female kept it for a week in the hope of eggs, but no luck. By this time it was unfortunately rather ragged.

FURTHER RECORDS OF THE LEPIDOPTERA OF BARLASTON ROUGH CLOSE COMMON

by Jan Koryszko (6089)

Since the publication of previous lists of the lepidoptera to be found on this Common (Koryszko 1981, 1983), a considerable number of additional species have been added to the list and two rare butterflies have been confirmed. One of these, the Small skipper (*Thymelicus sylvestris*) which was only a doubtful sighting in 1977 has now become quite common in the area after spreading steadily across Staffordshire. Sixty years after the first record by B. Bryan in 1923, the Comma (*Polygonia c-album*) has been taken by myself in the summer of 1983. Of moths, two further specimens of the Grass emerald (*Pseudoterpna pruinata*), a local and uncommon species in Staffordshire, have been confirmed.

In the list which follows, the moths are not placed in subfamilies, but in their main family groups, as they appear in the colour plates of Bernard Skinner's book *Colour Identification Guide to the Moths of the British Isles.*

LYCAENIDAE

Common blue (*Polyommatus icarus*). First recorded in 1983 when three specimens were seen on the Common and in which year there was quite a large second brood in parts of Staffordshire. A single example was sighted the following year, but none noticed since.

PIERIDAE

Clouded yellow (*Colias croceus*). The year 1983 was a good one for this migrant and it was recorded from all over Staffordshire, including a first record from the Common early in August and further butterflies were seen there throughout that month, all typical. I did, however, take a var *helice* in Parkhill Country Park a few miles away on July 30th.

Orange-tip (*Anthocaris cardamines*). Although this species was recorded in my first list of the area in 1981, it is worth mentioning that since 1985 a dwarf form has occurred in and around the Common. In 1985 Mr R. H. Heath took one of the smallest examples I have ever seen at Blythe Bridge which is just a couple of miles to the east. In 1986 another was seen on waste ground at Florence Colliery by Mr. A. Flanigan. In 1987 I saw yet another on the Common. Now while all these examples were males it is likely that female dwarfs also occur but get overlooked not having an orange patch on the wing to attract attention. In the years 1985-1987 this species was also very common with many larvae also being found on the Common and in many gardens around

Fig. 1. The author, Jan Koryszko, on a collecting trip on Barlaston Rough Close Common (photo by Burt Adams).

and in some years the species was on the wing until early July, a very late date for this spring butterfly. While no doubt weather conditions, with late springs, may account for this I do think that such conditions benefit this species and that is why it has become so very common in Staffordshire in recent years.

HESPERIIDAE

Dingy skipper (*Erynnis tages*) One only recorded in June 1984, but this species is spreading in Staffordshire.

NOLIDAE

The Short-cloaked (*Nola cucullatella*) One example taken at dusk in 1985 at a lighted window. This species is quite common in Staffordshire and while more are likely in the area it seems scarce on the Common and areas nearby which I have visited. Indeed all examples I have come across have been attracted to lighted windows and I have no doubt it is also to be seen at light traps.

GEOMETRIDAE

Northern winter moth (*Operophtera fagata f. boreata*) Scarce, as only one male in 1985 on the outskirts of the Common, near to gardens where plenty of trees and shrubs grow. This species is much more local than the Winter moth (*O. brumata*) in the county. While both are apparently scarce on the Common it is likely they have been overlooked.

The V-moth (*Semiothosa wauaria*) One taken on the wing in 1985 on the far south-western side. Again, may well occur around the gardens where currant and gooseberry bushes are to be found and may well be established in the area.

The Mottled umber (*Erannis defoliaria*) One example in 1985 found after an autumn storm with rain and gales. It was an almost dead male which was lying on the edge of the road.

The Dotted border (*Agriopsis marginaria*) In 1985 a male of the dark form *fuscata* was found at rest on an oak tree and although searched for, no females were found. Warren states that this species and its dark form is quite frequent in the county.

The Early tooth-striped (*Trichopteryx carpinata*) One specimen only was found flying out of bushes during a sunny day. Bernard Skinner, who saw this specimen remarked that it was a well-marked form of this species. It may well occur on the Common as both sallow and birch grow in scattered clumps and further examples are to be found just outside the area.

The Barred yellow (*Cidaria fulvata*) An unconfirmed record from a possible sighting by Mr Frank Massey in 1986, who described the moth to me after he had seen it settled on a leaf after being disturbed from the undergrowth by his dog. Its larval foodplant, wild rose, occurs in the area and it is a common moth in Staffordshire.

The Common white wave (*Cabera pusaria*) Quite common and has been recorded every year from 1983 to 1986 and in 1984 larvae were found on birch.

The Common wave (*Cabera exanthemata*) One example only beaten from undergrowth in 1985.

The Early moth (*Thera primaria*) This species may prove to be more common than first thought as it can be quite easily overlooked. Small numbers of both sexes were seen during January and February 1985 commonly on hawthorn on the outskirts of the Common and one was seen on the east of the Common in a biting cold wind after a snow shower.

The Small engrailed (*Ectropis crepuscularia*) One example only in 1985 found at rest on a tree near the pond.

The Engrailed (*Ectropis bistortata*) First recorded on July 6th 1984, this was a moth of the second brood, smaller and more weakly marked

Fig. 2. Jan at home identifying one of the day's records. (Photo by Kathleen Koryszko.)

Fig. 3. A view of the small pond (c. ⅓rd acre) situated at the North-western edge of the Common.

than normal, it was also melanic. It could be that the weather was unusual in 1984, for the second brood does not usually occur in Staffordshire. Examples of the first brood were then found in the following two years.

The Willow beauty (*Peribatodes rhomboidaria*) This species was quite common in 1984 to 1986, being beaten from trees and shrubs.

The Large emerald (*Geometra papilionaria*) Uncommon, one larva in early autumn 1985 found feeding on birch and a moth beaten out of an ash tree on the west side of Lightwood Road in 1986.

The Slender pug (*Eupithecia tenuiata*) Only one example seen, in 1984, at rest on a fence near the pond. It is likely to occur where sallows grow.

The Yellow shell (*Camptogramma bilineata*) Only one seen and this where rubbish had recently been dumped on the far south-western side of the Common where pipe-laying had been taking place, the spoil from which had been taken over by a mixture of grass and weeds. This species occurs quite commonly about a mile away on a rubbish tip near to Cocknage wood. I feel it will turn up again in this area.

The Feathered thorn (*Colotis pennaria*) This species is not very common and two moths only have been recorded, in October, at rest on birch trees, one in 1984, the other in 1985.

The July belle (*Scotopteryx luridata*) One moth only was beaten from gorse bushes in July 1985 and although I have no other records it seems likely to occur on the Common, for the larval foodplant, gorse, is widespread in the area. It is also possible that its congener, the Lead belle (*S. umbrifera*) may also be present, for although not seen, both these species have been recorded elsewhere in Staffordshire, although the Lead belle is more local and occurs a little earlier than does the July belle.

The Streak (*Cesias legatella*) There was a possible sighting of this species when a moth was disturbed from a broom bush in October 1985 and it has been recorded nearby at Moddershall by Canon T. G. Edwards, prior to 1940, and also from the Stone region.

The Riband wave (*Idea aversata*) Quite common from 1983 to 1986, both the plain and the banded forms occurring.

The Small phoenix (*Ecliptera silaceata*) Rather common and often disturbed from rose-bay willowherb, its foodplant, between 1983 to 1986.

The Dark marbled carpet (*Chloroclysta citrata*) Two moths only seen, both in 1983, but it seems likely it will be found again.

The Common marbled carpet (*Chloroclysta truncata*) Not very common, a few in 1983 and 1984. The examples here are very variable in colour, some quite dark.

The Lime-speck pug (*Eupithecia centaureata*) One moth only, found at rest on a birch tree.

The Light emerald (*Campea margaritata*) Uncommon, but regularly beaten from trees between 1984 and 1986.

The Small fanfooted wave (*Idaea biselata*) Two examples recorded, one in 1984, the other in 1985, both having been beaten from bushes.

The Plain wave (*Idaea straminata*) One example only found and this was disturbed when walking through grass after rain.

The Currant pug (*Eupithecia assimilata*) One example only in 1984. I have also seen this species in my own garden where currant bushes have grown for many years and it is no doubt established in other similar gardens near to the Common.

The Mottled beauty (*Alcis repandata*) A few moths recorded between 1984 and 1986 but clearly not common. Those found were at rest during the day or were beaten out of foliage. Some dark forms occur and this species is common throughout Staffordshire.

The Pale brindled beauty (*Apocheima pilosaria*) One specimen was found drowned in a ditch early in 1983 and it looked like the melanic form *monacharia* which is reported by R. G. Warren to be frequent in North Staffordshire.

The Green carpet (*Colostygia pectinaria*) An example was beaten from bushes in 1985, on the outskirts of the area.

The Barred straw (*Eulithis pyraliata*) One worn example was disturbed from undergrowth, on the south-west side of the Common in 1987. Cleavers (*Galium aparine*) one of its larval foodplants grows commonly in this area.

Small rivulet (*Perizoma alchemillata*) Four moths were taken during the day in 1987 and a further three in the Meir area with yet another at Parkhill Country Park. These three localities are new records for this species and it seems to be spreading from other parts of the County and becoming common and more widespread. Mr R. G. Warren took an example with no white band (ab *obscura*) at Trentham.

Shaded broad-bar (*Scotopteryx chenopodiata*) This species was reported in small numbers at Florence colliery, which is near the Common, and as its foodplants grow there it is a future possibility.

The Early thorn (*Selenia dentaria*) Although quite a common species in Staffordshire, only one example seen on the Common, this having been beaten from hawthorn in the spring of 1986.

The Twinspot carpet (*Perizoma didymata*) Another species common in parts of Staffordshire, but not so on the Common. Two were found at rest in 1984 on the sandstone face of the quarry and in 1985 one was disturbed from willowherb; both records being in July. A fine melanic form was found in 1986 a few miles away by Mr A. Flanagan.

The Grey birch (*Aethalura punctulata*) There was an unconfirmed specimen in 1983 and a definite one in 1986 when it was seen at rest on a fence. Widespread in the county and there are several records from nearby localities.

The Broken-barred carpet (*Electrophaes corylata*) Again found nearby only a mile or so away, at both Moddershall and Cocknage woods, but only one actual record from the Common itself, this having been beaten from an oak tree in 1984.

The Narrow-winged pug (*Eupithecia nanata*) One possible example was too damaged (being taken from a spider's web) for certain identification, but in 1985 a confirmed example was beaten from heather.

. . . to be continued

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The Bulletin of the Amateur Entomologists' Society

EDITOR
BRIAN O.C. GARDINER, F.L.S.

The Amateur Entomologists' Society

Founded in 1935

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Hon. General Secretary:	C. C. PENNEY	109 Waveney Drive, Springfield, Chelmsford, Essex CM1 5QA.
Hon. Treasurer:	R. A. FRY	The Hawthorns, Frating Road, Great Bromley, Colchester CO7 7JN.
Registrar:	NANCY CRIBB (Mrs)	355 Hounslow Road, Hanworth, Feltham, Middlesex TW13 5JW.
Hon. Bulletin Editor:	B. O. C. GARDINER	18 Chesterton Hall Crescent, Cambridge CB4 1AP.
Hon. General Editor:	P. W. CRIBB	355 Hounslow Road, Hanworth, Feltham, Middlesex TW13 5JH.

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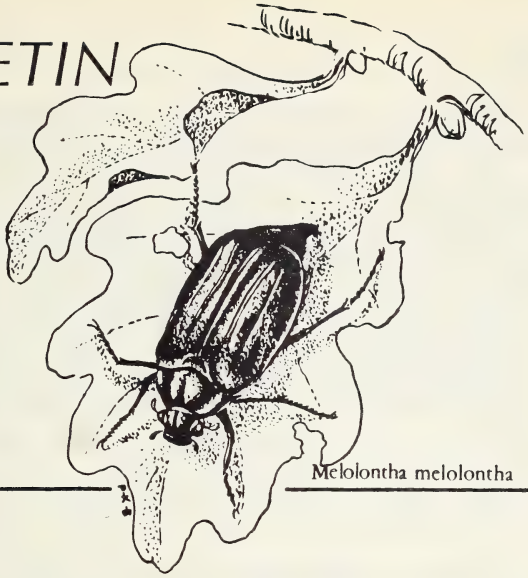
No. 359



Melolontha melolontha

EDITORIAL

Fifteen million trees, many of them large, are reliably reported as having been blown down in Southern England by the great gale last autumn. This will have an important and significant effect, not only on insects, but on flora and fauna generally and changes will occur which deserve to be documented. It will work both ways. Millions of insects still feeding, or pupating on, the trees, will have been blown away and killed. Large swathes of potential foodplant will have disappeared, although it does seem from the experience of Dutch elm disease that this does not have quite the disastrous effect expected. A number of species can be expected to really flourish as a result of the disaster, being those which feed upon dead and decaying timber and litter. Fungi, woodboring and bark beetles, crickets, thysanoptera, millipedes, centipedes, slugs and other such creatures which enjoy the shelter and nourishment provided by rotting wood and decaying piles of branches. Even the disturbance of the soil due to uprooting will provide fresh habitats to some. Too often in the past such habitats have been few and far between, not from any lack of their origins, but due to the 'tidymindedness' of owners and Local Authorities who immediately tend to clear away or burn any fallen foliage. We only hope that as many as possible of the casualties of the gale, which are neither a nuisance nor have commercial value, are being left *in situ* to provide for an increase in their natural inhabitants.

One of the groups in particular that may be expected to flourish on the fallen timber is the longhorn beetles and it is by an opportune chance that Messrs Shire Publications recently brought out a book (reviewed elsewhere in this issue) about these which may well serve to focus attention upon them.

While it is obvious that a massive replanting must take place, and appeals for finance to undertake some of this have already gone out, it is a shame that we have already seen reports of misguided enthusiasm where fallen trees have been cut up for firewood and the residue burnt off. This has destroyed, not just a natural habitat, but in many cases a valuable timber which had it been left intact would have been worth many hundreds of pounds to a timber merchant. Indeed if only ten per cent of the blown over trees proved to be of merchantable quality, this would provide enough income to replant almost all of those that had gone. As it is, I feel we shall be fortunate if even ten per cent of the total are left as they fell. While not decrying that use must be made of much of the fallen timber and some tidying up must indeed be done, I think that this could be done with circumspection, and while much of the tree can be used, stumps, piled branches, and the more awkward to cut up trunks, could well be left *in situ* in order to provide wild-life habitats.

Be that as it may, where whole areas have been blown over. whether the debris is removed or not, open space will have been created and this would have the same effect as the former thinning and coppicing that used to take place in past centuries and was the reason why some of our woodland butterflies were so common in the last century. The cleared, and now less shaded areas, will, if they are allowed to, soon develop a riot of new growth which, at least in the short term, should support a variety of butterflies and other insects. All these changes deserve to be recorded and I hope that members will consider our *Bulletin* as a fit medium in which to record for posterity some at least of the changes that are bound to occur as a result of such a massive disaster.

THE MILD WINTER

Insects on the wing in London

by Stuart Paston (7906)

The tailend of 1987 being very mild, I thought the following observations on insects still about might be worth recording.

On December 19, a bright and mild day a queen Bumble bee (*Bombus terrestris*) was active beside the railway footpath at Finsbury Park, N4.

On the last day of the year I was even more fortunate in seeing a Red Admiral (*Vanessa atalanta*) flying in sunlight in Hay's Mews, Mayfair W1. It fluttered about the face of the buildings before disappearing over the rooftops. The day felt less mild than many of those previous and there was a fresh southwest wind.

THE JEALOTS HILL PHOTOGRAPHIC COMPETITION

The subject for this year is:—

INSECTS AND WATER

LEGISLATION ON INSECTS

by Mark Collins

Legislation concerning insects in Europe was recently summarised in AES Pamphlet No. 13 *Legislation to conserve insects in Europe.* Although this should serve as a basic guide for some time to come, it is inevitable (and indeed necessary) that changes will from time to time be made. We hope to keep you up to date on these changes through the pages of the *Bulletin.* This will enable those of you who have obtained a copy of Pamphlet 13 to update it and keep abreast of your position with regard to the law.

BERN CONVENTION

The Convention of the Conservation of European Wildlife and Natural Habitats has 18 European Parties (including Britain and the European Community). At the meeting of the Standing Comlmittee, 8 - 11 December 1987, the Appendices were quite radically revised, notably to include invertebrates and fish. The selection of invertebrates followed several years of research, correspondence and collaboration with entomologists throughout Europe, and the publication by the Council of Europe of reports on *Threatened Rhopalocera (butterflies) in Europe* (by J. Heath), *Invertebrates in need of special protection in Europe* (by N. M. Collins and S. M. Wells) and *The protection of dragonflies (Odonata) and their biotopes* (by J. van Tol and M. J. Verdonk).

Additions to Appendix II: Parties to the Convention are now obliged to take appropriate and necessary legislative measures for the strict protection of the following species, including the conservation of their most imnportant habitats and the prevention of their capture, trade and other forms of exploitation:

Mantodea:

Apteromantis aptera.

Odonata:

Calopterix syriaca, Sympecma braueri, Coenagrion freyi, Coenagrion mercuriale, Aeshna viridis, Stylurus (Gomphus) flavipes, Gomphus graslinii, Ophiopomphus cecilia, Lindenia tetraphulla, Cordulegaster trinacriae, Oxygastra curtisii, Macromia splendens, Brachythemis fuscopalliata, Leucorrhinia albifrons, Leucorrhinia caudalis, Leucorrhinia pectoralis.

Orthoptera:

Baetica ustulata, Saga pedo.

Coleoptera:
Carabus olympiae, Dytiscus latissimus, Graphoderus bilineatus, Osmoderma eremita, Buprestis splendens, Cucujus cinnaberinus, Cerambyx cerdo, Rosalia alpina.

Lepidoptera
Papilio hospiton, Papilio alexanor, Zerynthia polyxena, Parnassius apollo, Parnassius mnemosyne, Apartura metis, Fabriciana elisa, Euphydryas aurinia, Melanargia arge, Erebia christi, Erebia sudetica, Erebia calcaria, Coenonomympha hero, Coenonympha oedippus, Lopinga achine, Lycaena dispar, Maculinea arion, Maculinea teleius, Maculinea nausithous, Plebicula golgus, Hypodryas maturna, Eriogaster catax, Hyles hippophaes, Proserpinus proserpina.

Araneae:
Macrothele calpeiana.

Additions to Appendix III: Parties undertake to regulate any exploitation of these species within the limits of the ability of the species to sustain their populations, and to prevent indiscriminate means of capture or killing.

Coleoptera:
Lucanus cervus.

Lepidoptera:
Graellsia isabellae.

AUSTRIA

It was stated in Pamphlet 13 that the Austrian state of Steiermark would shortly publish a new regulation. This has now become available, dated 25 May 1987. Protected insects are as follows:

Odonata:
All species.

Mantodea:
Mantis religiosa.

Neuroptera:
Mantispa styrca, Libelloides macaronius, Dendroleon panthemnus, Distoleon tetragrammicus.

Coleoptera;

The carabids *Calosoma sycophanta, Calosoma inquisitor* and *Procerus gigas,* all *Carabus, Arctaphaenops* and *Antisphodrus* ssp.; the hydrophilids *Hydrous piceus* and *Hydrous aterrimus;* all Cleridae, Buprestidae, Pyrochroidae, and Meloidae; the scarabaeids *Copris lunaris, Sisyphus schaefferi, Osmoderma eremita, Polyphylla fullo,* all *Cetonia, Potosia* and *Liocola* ssp.; all Lucanidae; the cerambycids *Megopis scabricornis, Ergates faber, Prionus coriarius, Tragosoma depsarium, Cerambyx cerdo, Aramia moschata* and *Rosalia alpina.*

Hymenoptera:

Formica (all species), *Vespae crabro* (except in buildings and gardens), all Sphecidae and Mutillidae.

Lepidoptera:

All Papilionidae; all Pieridae except *Pieris brassicae, Artogeia rapae, Artogeia napi* and *Leptidea sinapis*, all Nymphalidae except *Vanessa atalanta, Cynthia cardui, Aglais urticae, Argynnis melitaea* and related species; all Satyridae except *Coenonympha pamphilus* and *Maniola jurtina;* all Lycaenidae and Hesperiidae; all Sphingidae except *Herse convolvuli, Hyloicus pinastri, Pergesa elpenor* and *Pergesa porcellus*; all Zygaenidae; all Saturniidae except *Saturnia pyri* and *Eudia pavonia*; the arctiids *Rhyparia purpurata, Pericallia matronula, Arctia caja, Arctia villica, Callimorpha dominula, Callimorpha quadripunctaria, Tyria jacobaeae*; and all noctuids in the genera *Catocala* and *Mormo.*

Other protected invertebrates are *Euscorpius germanus, Helix pomatia,* all *Cepaea, Bythiospeum, Iglica, Bythinella, Belgrandiella* and *Graziana.*

BELGIUM

The Walloon region of Belgium published a new law on the protection of insects on 9 July 1987. The species list in Annex I of the law does not differ significantly from the previous law (as laid out in Pamphlet 13), with the exception that *Maculinea alcon* is now listed as *M. rebeli.*

BOOK REVIEWS

F. W. Frohawk: His Life and Work by June Chatfield. Hardback quarto, pp.184, well illustrated. The Crowood Press, 1987. Price £16.95.

To us entomologists, F. W. Frohawk is best known for his three books on butterflies. Some of us are also aware that he was also an ornithologist, but perhaps rather fewer realise that he was primarily an artist, self-taught, who made a living by illustrating natural history

subjects. Of all kinds; from the living; from the dead; even from a description. Like all good Victorians a shotgun was, to him, a means of bringing down a subject to illustrate. He worked for many of the famous naturalists of his day and served a long term as natural history editor of the Field. This book brings out all the many aspects of his life and shows him for the complete naturalist that he was. Far more, indeed, than just an entomologist, although this was the subject in which he did indeed excel, having been not only the discoverer, by sheer persistence, of the life-history of the Large blue, but he also bred all the British species of butterfly. Can anyone today make this last claim?

Towards the end of his life Frohawk wrote an autobiography and, from the excerpts that are given in this book, it is clear that he was a gifted writer with a great deal of interesting matter to divulge and it is a great pity that it has never been published. These excerpts give us a fascinating insight into the abundance of insects a century ago. Who, today, can expect to have a Large tortoiseshell butterfly come and settle on him and when was a Small copper last seen on Tooting Common where it used to swarm?

In our days of easy and fast travel, it is difficult to realise the dogged persistence and stamina of our forebears. Not only did Frohawk regularly walk to work in order to save the train fare (he was struggling to support his brother and sister at the time), but he thought nothing of walking thirty to fifty miles a day while out on a natural history ramble.

What comes through in this book is that Frohawk was an exceptionally hard and dedicated worker, living by his art (never a well-paid occupation), being supportive financially to his brother and sister. Never prosperous, fortunate in that he came to the attention of and impressed some wealthy naturalists with his talents, who took pains to put work in his way; peripatetic and only owning his own house towards the end of his life and for this he had to sacrifice his butterfly collection. It must, however, be borne in mind that very few people owned their own houses in those days and renting one was the easiest thing in the world; indeed from some of the houses he lived in, it is clear that he attached more priority to a comfortable home and garden than he did to travelling.

The book is very liberally illustrated, both in colour and in black and white with examples of Frohawk's art, taken from many sources, and these demonstrate the extraordinary versatility of the man. Although not illustrated here, it is perhaps something of a lasting epitaph to his memory that an illustration he did in 1890 for the title page and cover of *The Entomologists' Record* is still in use 98 years later.

In previous *Bulletins* there have been comments on the excellent productions of some small publishers while deprecating the poor quality of typography and production of some books produced by large firms.

To the band of small firms must be added Messrs Crowood. This is an excellently produced book and the layout has clearly been well thought out with an eye to quality without having to keep the other one on the production budget laid down by some anonymous accountant. Even the legends which, uncommonly but by no means unheard of, are printed in *Italic* with the scientific names in Roman (or, as modern computer jargon would have it, 'reverse video'), fit in with and are appropriate to the layout. A book which the artistically gifted FWF would have approved of and which will complement any of his own books and deserves to be on the shelves of entomologists, ornithologists, general naturalists and indeed all those appreciative of good art.

Brian Gardiner

A Manual of Forensic Entomology by Kenneth G. V. Smith. Published by the Trustees of the British Museum (Natural History), London, 1986. Price £24.00. ISBN 0-565-00990-7.

This is a most unusual book. Written by an experienced entomologist, it covers those insects (and a few other invertebrates) whose lifestyle or habits are relevant to forensic science. This is a subject that has not hitherto attracted much attention in Britain and very little has been published on it since the classic work by Mégnin at the end of the last century. As the author states in his Introduction, the main aim of the book is to rectify this situation "principally for the British and European fauna, but also for some of the more important non-European genera".

The book does not consist of chapters in the conventional sense but is divided into sections and subsections. The first topic covered is "The Fauna Succession on Cadavers" and this is discussed under such headings as "Exposed corpses", "Buried corpses", "Burnt bodies", "Light and shade" and "Manner of death". It is followed by a section on "Methods and techniques" which includes descriptions of equipment, procedures on site and in the laboratory and a certain amount on experimental work.

The next topic consists of "Case histories". In the reviewer's opinion these twelve pages might usefully have been placed at the front of the book since they provide excellent examples of the value of entomological studies in forensic work. They and certain other parts of the text are not for the squeamish but the author cleverly emphasises the entomological aspects of the cases rather than dwelling for too long on details of the history or *post-mortem* findings.

The largest section is on "Diptera" and includes identification keys to adult flies and maggots as well as descriptions of the more important Sub-orders and Families. Subsequent sections briefly cover other Orders of insects, arthropods other than insects (millipedes, spiders, mites etc.), insects in transport and cannabis insects. There is a Glossary — of great

value to the non-specialist — a useful Bibliography and a fairly extensive Index.

It is not easy to give a straightforward review of this book. It is well written and professionally produced but its appeal may depend upon the background of the reader. The forensic scientist will undoubtedly find it of great value as will the entomologist or more broadly based biologist who is asked to provide evidence or assist with a case. The medical pathologist will find it a useful adjunct to his/her more conventional texts on the changes that take place *post mortem* although he may express surprise at some statements such as the one that heart muscle decomposes rapidly since this organ is often remarkably well preserved in histological sections. The veterinary graduate with an interest in forensic matters — an expanding and increasingly important discipline — will relish the references to various animal species including non-mammalian vertebrates but note with regret the author's failure to include the word "veterinary" in the Index even though it and "veterinarian" occur in the text. It is tempting to say that the book is primarily aimed at the professional and that it is likely to be of only very limited relevance to amateur entomologists. This is to forget, however, that so many of these "amateurs" are true naturalists with broad interests in all things living (and dead!). In the reviewer's opinion most entomologists will find the book fascinating, an insight to some of the complex interactions that occur between the Class Insecta and other animals and another timely reminder that our hobby can be of benefit to human society as well as providing us with pleasure and satisfaction. Not every member of the AES will want to purchase this book but few will be able to resist the temptation to borrow and peruse it and a good number will wish to add it to their entomological library.

John E. Cooper

Holding Your Ground: an action guide to local conservation by Angela King and Sue Clifford. Maurice Temple Smith, London, 1985. Pp.325 (paperback). ISBN-0-85117-250-4. £5.95

This book was written for "Common Ground", a small limited company and charity, which promotes the importance of the common cultural heritage and explores practical and philosophical links beteen the arts and the conservation of nature and landscape (address: 45 Shelton Street, London WC2). Its publication was grant-aided in the research and drafting stages by the Countryside Commission, the Ford Motor Co., British Petroleum and various charitable trusts.

The emphasis of the book is on the everyday, commonplace things . . . "It is imperative . . . that we do not let our rationale for nature conservation in particular to become too biased towards such evaluations" (rarity value) — reviewer's parentheses — "otherwise we

will end up with little pockets of nature reserves surrounded by land empty of animals and plants, except monocultures of wheat, barley and conifers. These reserves, in any event, will gradually disappear, as they cannot exist in isolation.'' The message of this book is clearly very much in line with the thoughts of many invertebrate conservationists, and it touches on several points made in this issue of ICN.

Although the book is a general treatment of countryside matters, there are a few passages which have special relevance for insect conservation. Unfortunately, one such passage indicates a failure to see that firewood removal is often a danger to wildlife. The tidying-up of a woodland is portrayed as a worthwhile community project which benefitted both the woodland owner concerned and the local people.

DL

Creating and Maintaining a Garden to Attract Butterflies by John P. Killingbeck. National Association for Environmental Education, Walsall, 1986. Pp.54 (paperback) ISBN-0-907808-12-3. £1.90 incl. p&p.

This is a recent addition to a growing number of booklets on butterfly gardens, among which is one written by Peter Cribb on behalf of our own AES Conservation Committee during Butterfly Year 1981-82, and entitled ''How to encourage butterflies to live in your garden''. John Killingbeck's contribution is written largely with schools in mind and so to some extent fills a niche which is only partially covered by earlier publications. If does, however, cover familiar ground, having sections dealing with nectar plants and with larval foodplants. The author gives fairly detailed advice on the establishment and maintenance of a butterfly garden and, in this context, he is careful to point out the need to assess the nature of the site with a view to determining the type of garden which can usefully be created and recognising any existing features of ecological value which should not be destroyed. Among the line-drawing illustrations are several suggested layouts for butterfly ''nectar borders'', supplied with specific notes on management.

The practical hints given in this booklet and other details which add to its size are probably worth the price (£1.90, as compared with 60p for the more modest AES publication), but the amount of horticultural advice provided is no more than a starting point for the novice. Like other butterfly garden booklets, this one supplies useful appendices of addresses and literature references, although no wildflower seed merchants are listed; an omission in a text which warns against the follies of digging up plants from the wild.

On the whole this is a readable and practical introduction to butterfly gardening and, despite a good deal of overlap with other booklets, its educational slant is most welcome. DL

Longhorn beetles of the British Isles by Norman Hickin. Pp.24, coloured and line illustrations. A5, cardcovered. Shire Publications, Aylesbury, 1987. Price £1.25.

Another excellent little publication from the same stable as *Hawkmoths* (reviewed *Bulletin* 44:209) and of even better quality in that the illustrations are uniformly well printed.

This book will be an excellent introduction to take advantage of the upsurge in abundance of the Longhorn beetles which can be expected to occur as the result of the great storm damage, for all are species that breed in fallen or decaying timber. Being both largish beetles, often colourful, they are noticed by the non-entomologist and, although comparatively easy of identification, this is fraught with hidden possibilities. Just how many British species there are is rather a moot point, for as pointed out in this book, so many kinds of foreign timber are imported that beetle species from all over the world arrive here and may even breed in both the short and long term. A few of these are detailed in the text.

The author should need no introduction and the text is stamped with the mark of his knowledge and authority and the illustrations, both the line drawings in his usual inimitable style, and the colour photographs, have clearly been selected with care and an eye for rejecting the unsuitable.

The book starts with an introduction to the group, goes on to give an account of their biology, life cycle and ecology; gives an account of the principal British species, all excellently illustrated, and ends with information on collecting and conserving these beetles. Here it brings to our attention that the greatest threat to them is the wood-burning stove and the "tidy-mindedness" attitude of owners and authorities who do not seem to like seeing dead wood lying around, as it should, to decay naturally.

Such a very reasonably priced book as this, available freely to the general public, and also timber merchants and users of wood, cannot do anything but good in bringing these creatures to their notice and, hopefully, they will then pass on this information to their entomological friends, all of whom should have (and at only £1.25, can afford to have), a copy in their library. Brian Gardiner

BOOK REVIEW CORRECTION

The author of the book review on *The insects of Thorne Moors* (*Bulletin* 46:211) has asked us to correct the final sentence of the second paragraph, which should have read as follows:—

. . . the beetle *A. elegans* Dej has been listed as an error, as confirmed by recent evidence.

Butterfly Survey Programme by David Newman. In Mallard basic on a three inch CF2 Amstrad computer disc. Self-loading. Price £12 (post free) from David Newman, 17 Merlin Way, Chipping Sodbury, Avon BS17 6XP.

Back in my young days, when migration records were the "in" thing, and later when the Biological Records Centre was calling for distribution records, one was sent a pile of printed cards on which one ticked off the names of insects seen. Later these were transcribed into more permanent record books, and the results finally written up. Although reference lists have, for many people, now been transferred from card indices onto computer tracks, now, I believe for the first time, we have a computer programme to keep a record of all our sightings of butterflies. Of course the actual physical recording of them will still have to take place in the field and notes made at the time on the back of an old envelope, filofax, printed index card, or whatever. However, on arrival back home these observations may now conveniently be entered onto a disc by the use of this programme.

Basically the programme already possesses a list of the English names of our butterflies and a facility is provided for adding extra species, such as dayflying moths for instance, which then slot in in alphabetical order.

In order for the user to familiarise himself with the programme, one side of the disc supplied contains a selection of the author's records upon which the new user can practise and see what the results look like when a considerable amount of data has been entered. When this space is required for his or her own records this practise data can be erased. This can be done at any time when the records are finished with (by being published for instance) and, very usefully and helpfully, the prompt that does this asks twice if you really want to erase them — which should avoid accidents. When the recorder comes to use the programme for the first time then the disc should be empty of localities and these and the species recorded from each are added (using the appropriate prompts in the programme) as and when required. A maximum of 16 localities is available and for each a maximum of 20 butterfly species can be fitted in. Now while these numbers may seem a limiting factor, for all but the dedicated recorder they should prove sufficient for most purposes and the problem is in any case easily solved. If over 20 species in a locality split it in two and call them "Cambsone" and "Cambstwo" for instance. Over 16 locations? Then use another disc. Of course a little thought should be given at the start so that any one location is not split between two discs. Users will have an idea of how many localities and species they are likely to have to accommodate in the light of their previous recording experience. Particularly useful is the facility of being able to add the OS grid reference number of the localities and this is then prominently displayed on printouts.

Butterfly Survey * B.GARDINER * 1987

Gatekeeper

	15/ 7	17/ 7	24/ 7	25/ 7	27/ 7	29/ 7	30/ 7	31/ 7	3/ 8
Home	-	-	1	1	2	-	1	-	-
Wicken Fen	-	3	-	-	-	12	-	11	14
Chippenhan Fen	-	-	-	1	-	-	-	-	-
Royston Heath	4	-	-	-	-	-	-	-	-
Sheeps Common	-	-	-	-	-	-	-	-	-

	6/ 8	9/ 8	10/ 8	25/ 8	27/ 8	30/ 8
Home	-	-	1	-	-	-
Wicken Fen	4	1	-	-	-	2
Chippenhan Fen	-	-	-	-	-	-
Royston Heath	22	-	-	7	3	-
Sheeps Common	-	7	-	-	-	-

Butterfly Survey * B.GARDINER * 1987

Wicken Fen ST699810

	6/ 5	27/ 7	3/ 7	4/ 7	5/ 7	10/ 7	11/ 7	17/ 7	28/ 7
Large Skipper	-	5	7	27	19	6	9	11	1
Small Tortoiseshell	-	-	1	5	9	5	7	10	3
Small White	-	-	-	1	-	-	-	-	1
Marbled White	-	-	-	3	3	2	2	3	3
Meadow Brown	-	-	-	1	-	1	-	1	44
Small Copper	-	-	-	1	-	-	-	-	-
Ringlet	-	-	-	1	3	6	3	13	1
Common Blue	-	-	-	-	1	-	-	-	-
Small Heath	-	-	-	-	1	-	-	-	-
Small Skipper	-	-	-	-	-	1	-	-	3
Gatekeeper	-	-	-	-	-	-	-	3	-
Orange Tip	2	-	-	-	-	-	-	-	-
Red Admiral	-	-	-	-	-	-	-	-	1
Peacock	-	-	-	-	-	-	-	-	3
Large White	-	-	-	-	-	-	-	-	13
Speckled Wood	-	-	-	-	-	-	-	-	-
Green-veined White	-	-	-	-	-	-	-	-	2
Silver-barred	-	2	-	12	-	6	-	-	22
Mother Shipton	-	4	-	3	-	22	-	-	33

	29/ 7	30/ 7	31/ 7	3/ 8	4/ 8	6/ 8	9/ 8	22/ 8	25/ 8
Large Skipper	5	2	2	4	2	-	-	1	-
Small Tortoiseshell	11	1	10	7	-	-	-	2	2
Small White	2	-	4	3	-	-	-	2	3
Marbled White	2	2	1	-	-	-	-	-	-
Meadow Brown	-	2	1	-	-	-	-	-	-
Small Copper	-	-	-	1	-	-	-	3	2
Ringlet	1	-	4	1	1	-	-	-	-
Common Blue	-	-	2	1	-	-	-	1	-
Small Heath	-	-	-	-	-	-	-	-	-
Small Skipper	24	4	5	2	1	-	-	-	-
Gatekeeper	12	-	11	14	-	4	1	-	-
Orange Tip	-	-	-	-	-	-	-	-	-
Red Admiral	4	4	3	-	4	-	-	1	-
Peacock	3	12	2	1	5	-	-	2	-
Large White	22	3	22	2	2	-	-	2	-
Speckled Wood	-	-	-	-	-	-	2	-	1
Green-veined White	2	2	4	2	3	-	-	1	-
Silver-barred	44	12	11	8	6	-	2	3	-
Mother Shipton	55	9	14	9	6	2	2	2	-

I found the programme to be extremely "user-friendly", not only with good menus but also adequate prompts. A little disconcerting at first to a mainly locoscript or IBM mainframe user was the programme reacting to

the answer typed in *without* the need for touching the Return key. One soon gets used to this and it does perhaps add to the speed of use. Nevertheless the Return key is utilised for some purposes and I feel it might be better not to have the mixture.

As perhaps occurs with many programmes, there is, perhaps not so much a bug, as a gremlin lurking in the system. On two or three occasions, when asked to do a printout, instead of closing the box at the end of the last species, the printer carried on for a few blank lines, ruling in the box until the message "Improper argument in line nnn" came up on the screen and the programme exited. In every case that this happened to me the second attempt was, however, successful. Another disconcerting event can happen when the user is faster on the keys than the "prompt" of the programme and this can result in a closed loop being entered into, with, for instance, the number of species seen being entered into the space where the name of the species should be. This is no fault of the programme but of the operator and the only way out is to exit the programme and re-run. I am pleased to say, however, that such events did not result in any loss of data.

The option that is going to be most heavily used is clearly that where dates and numbers of butterflies recorded are going to be added to localities. This is done by the prompt requesting the date (in the form 12/8 for August 12) and then the locality. The species already listed for that locality are then presented in the order in which they were originally entered and the numbers seen on the already entered date put in. For a long list and when only a couple of species have been recorded on a particular day this requires hitting the Return key (for a zero record) until the required species come up. Note that species are listed here, not alphabetically, but in the order of entry. Based on previous experience, therefore, it will be worth giving some thought to which species are most likely to be recorded at each locality and entering them, not as they come to mind, but according to how commonly they are likely to be recorded, with the most common at the top of the list. Some may prefer to do this alphabetically.

One of the greatest advantages of having one's records on a computer is the ability, not just to add to them, but, having done so, to print them out. On the old system the whole lot would have had to have been re-typed and it was never in any case either easy or tidy to insert an overlooked column of data into an existing record neatly confined within already ruled columns.

A great deal of thought has gone into the printout system, which enables one's records to be sent off in a very readable form, either to a recording centre or for direct publication and the table illustrating this review (which, I state now in order to avoid future confusion over records, *is imaginary and not actual*) is taken direct from the print-out

and has not been re-typeset. Now this table can either be shown on the screen or printed out on paper. The first selection shows all the localities and dates on which the Gatekeeper was recorded and the second a list of all the species recorded on Wicken Fen over a few weeks. Also available is a printed histogram option for the printer, but while useful as a visual graphical representation, the 8256 Amstrad printer does not have the clarity for facsimile reproduction when in this mode. It is however a very useful option to have available, for it is much easier to assimilate a state of affairs from a graph, which might instantly show up an anomaly, than it is to visualize a trend from a series of figures. In the Wicken list observe that a couple of day-flying moths have been added to the butterflies. In addition one can also print out a list of all the butterflies (including added moths!) and all the localities that one has entered.

It will be noted by referring to the printout table that a maximum of nine dates is possible across a sheet of A4 paper. The next nine (or less) dates are then printed out below with the names of the butterflies repeated. In order to print out the second and subsequent lots a prompt appears requiring a Return key to continue. This is to ensure that the printer is not running out of paper. While admitting the necessity of this, I personally would prefer to use fanfold paper and let the print run straight on to the end of the file.

According to the author, the programme is in a continual state of improvement and can be up-dated. Indeed since we first heard of it the number of localities available was doubled. While it is at present marketed for butterflies, there is no reason at all why dragonflies and other orders cannot be substituted and we understand that this option is to be available.The limiting factor with large files of moths, however, would be the capacity of the computer.

This programme is clearly a complex one and at £12 is remarkably good value for money. One only has to look in any computer store or magazine to realise that many programmes of similar calibre are priced at from £40 to £99. It was originally written, not as a commercial venture, but for the very practical purpose of keeping records of butterflies for a survey being carried out at Bristol. It has therefore been used and tried practically and emmended as necessary in the light of use. The instructions that come with the disc are short and to the point and I had no difficulty in following them. For anyone seriously recording and with access to an Amstrad it will prove a very useful asset indeed.

Brian O. C. Gardiner

COMPUTERS AND ENTOMOLOGY

PART 1 — INTRODUCTION AND COMPUTER LANGUAGES

by David Chesmore (7375)

There can now be few households without a computer of some form or other, from programmable calculators at one end of the scale to powerful business computers at the other. This situation has resulted from the so-called "microprocessor revolution" of the past few years when integrated circuit ("chip") manufacturing technology has evolved very rapidly. To illustrate just how rapid these changes have been, the maximum number of bits of information that could be stored in a memory chip five years ago was apporoximately 33,000 (32 kbits in computer terminology) whereas the current upper limit is over 16 million bits (16Mbits). Microprocessors (chips that perform all the calculations in a computer) have become more complex, faster and, most importantly, cheaper. Consequently a number of manufacturers have been able to market powerful low cost computers suitable for home use.

Unfortunately, the majority of home computers tend to be used for games playing or simple programming, if at all. It is the purpose of this series to show that computers, particularly home computers, can be used successfully in entomology, from record storage to data analysis. This introduction gives a brief overview of the scope of the series and shows how computers may be used.

Why can a computer be of use? A good starting point is to look at the definition of a computer:

> "A Computer is a machine capable of performing calculations according to a list of instructions or commands."

A computer can automatically process a list of commands known as a program at much higher speeds than possible for a human (the latest microprocessors are capable of executing 17 million instructions per second). Computers are particularly useful when large numbers of calculations or highly repetitive tasks are involved. When considering potential uses of computers in entomology, several possibilities exist — storing records, keeping notes and performing both simple and advanced calculations on data.

(i) *Storing Records*

As will be seen in a future article, programs known as databases are available which enable efficient storage and retrieval of records. The following list is an example of record storage:

DATE	SPECIES	LOCATION	GRID REF
02.06.1987	*Artogeia rapae*	Embankment	SE 214 650
02.06.1987	*Pieris brassicae*	Chalk Pit	SE 450 641

12.06.1987	*Noctua pronuba*	Garden	SE 980 780
14.07.1987	*Aglais urticae*	Roadside verge	SD 120 300

Using a database it is a simple matter to extract any desired record by a keyword or search pattern. For example, the keyword "Artogeia" would find the first record. Keywords can even be parts of a word, eg "Noc" or a combination of different parts of a record so as to be able to find, for example, all occurrences of *Artogeia spp.* in June of each year from 1976 to 1988 in the 100km square "SE". It is also possible to sort records for printing in any form, by species, location or chronologically. A similar software package called a cardbox allows records to be stored as they would be in a card index file, again with the ability to do keyword searching. A more advanced facility would be to automatically print data labels from the records in the required format.

(ii) *Notekeeping*

It is feasible to keep permanent records of field notes on a computer. Notes from a field notebook can be typed using a word processing program and then converted into a standard format. At first sight, this may seem to be a waste of time, but it is guaranteed to be readable and accessible to other programs such as spell-checkers and databases. Another use for word processors is in producing documents for publication.

(iii) *Data Analysis*

There are many areas of entomology where data is gathered. Typical examples might include population estimation from capture - mark - release methods, calculation of moth species numbers from trap data or the correlation of temperature with perhaps moth trap records. Graphics, if available, enhances data analysis and presentation.

These are just a few examples of possible applications which will be covered in more detail in future articles. The following list gives a more comprehensive list of topics that will be covered:

(a) *Computer Languages.*

BASIC is the language most readers will be familiar with. There are, however, a number of other computer languages available for most computers. These include Pascal, Fortran, Assembler, Forth, Logo, Lisp and Prolog. Choice of language depends on the type of application being considered, ie whether processing numbers or handling large quantities of text. Each language will be briefly described and analysed with respect to the applicability for entomological problems.

(b) *Word Processing*

As there are many word processing programs available, it is impossible

to describe them in detail. This topic will therefore only highlight the general advantages (and disadvantages) of word processing for report writing, keeping notes, mail-shots and producing documents for the *Bulletin*!

(c) *Databases and Cardboxes*

The principle of operation of databases and cardboxes will be given, together with examples and hints on producing results such as data labels.

(d) *Data Analysis Techniques*

A basic introduction to statistical analysis methods will be given (including mean, standard deviation, Chi squared, etc). The use of spreadsheets for performing calculations on tabular data will also be illustrated. There are a number of advanced analysis methods used primarily in engineering that can also be applied to entomological data. These include autocorrelation, crosscorrelation and Fast Fourier Transforms (FFTs). As far as possible a non-mathematical approach will be taken.

All topics will be illustrated by examples, particularly where mathematics is used. Program listings will be made available and can be obtained by writing to the address given at the end of this introduction. They will be written in Basic, Pascal and pseudo-code (easily readable "English-like" statements) and, wherever possible, be computer independent in that they will run on different machines with minimal modification.

By the end of this series, it is hoped that an insight, however brief, will be gained into the possible applications of computers in the field of entomology, and that professional results can be obtained, even by amateurs.

Address for correspondence: 4 Olde Tatham, off Old Road, Holme upon Spalding Moor, North Humberside.
(Dr Chesmore is a lecturer in Electronic Engineering at the University of Hull.)

TOPICAL TIP

Computer data labels: This tip is really only useful to those who own or have access to a suitable word processor, and of these the Amstrad PCW 8256 or 8512 print excellent labels although other models may be quite capable of producing the same results. A dot matrix printer is the most suitable output device for the good reason that the makers of daisywheels do not seem to manufacture one with 4½ point diamond type.

On the Amstrad first of all set the Superscript or Subscript, set the margins three inches apart, centre all lines, set the linespacing to ½, the pitch to 17 with a line pitch of 6. This gives a neat-looking label but if small size is of the essence then a line pitch of 8 may be used which gives a fractionally smaller sized label but with the lines rather squeezed up. The use of pitch 15 and line pitch 6 gives slightly larger labels which some might prefer, and on some printers the output appears to be a little sharper. Using the copy facility run on as many data labels as required, putting a line space between each (which of course is actually ½ a line as that is what is set) and this gives just enough space to neatly cut the labels. If very large numbers are needed, either use a narrow ribbon of paper, or do a page at a time, editing the text between page print-outs so that the margins are moved a label's width each time across the page. The output produced when using a fresh ribbon is almost as good as professionally printed data labels, and of the same size, 4½ point diamond. For those who would like really minute (and difficult to read!) labels, print out a sheet of them, then take it along to one of the many shops that now offer a Xerox service and have your labels reduced to only half - or less - size. Just the thing for micros. Of course this method of size reduction can also be used on the output of the larger daisywheel type, but the clarity of the daisywheel output may then be lost in the Xeroxing.

A NOTE ON THE DESIGN OF NATURE RESERVES FOR INSECTS

by Dr A. J. Hollier

1. INTRODUCTION

The increasing public awareness of, and concern with, conservation is becoming a significant factor in entomology (see Stubbs 1985 for example). Entomologists are positively involved through site assessment projects such as the NCC Invertebrate Site Register, and increasing the understanding of the ecology and distribution of the British fauna through Biological Record Centre schemes. The problems (with some solutions) associated with using insects in site assessment are discussed by Disney (1986a, 1986b). The design of resources for invertebrates has received less attention.

2. THEORETICAL CONSIDERATIONS

Conventional thinking about reserve design (see Usher 1973 for example) is based on the Island Biogeography theory of MacArthur and Wilson (1963). From the observations that species richness increases with area, and decreases with distance from sources of colonisation, the theory was used to predict that a single large reserve is better than a number of small

reserves in the same total area, and that a round reserve is better than a long thin one of the same area (see May and Diamond 1981). The dynamic basis of the theory has been called into question following new work on interspecific competition (e.g. Price 1984, Strong, Lawton and Southwood 1984), and the predictions about shape are challenged by Swiberloff (1986).

3. *ENTOMOLOGICAL CONSIDERATIONS*

Insect herbivores tend to monophagy (Edwards and Wratten 1980), most have specific parisitoids, others have specific requirements for oviposition sites (eg Brown 1983). In short, insects are specialists, and this has implications for the potential interactions between species (Price 1984). It also provides a non-dynamic explanation of the species-area relationship; that larger areas contain mono microhabitats available for colonisation (Swiberloff 1986). Maximum species richness will thus be achieved by maximising the habitat diversity of the reserve.

4. *APPLICATION*

It may be argued that in real life conservationists will buy as many of the most threatened areas as possible, and that theory is not as important as finance. There are cases where design is important, and the Montgomery Canal is a good example. This waterway supports a large and varied flora and fauna, which seems typical of remainder canals (Hollier, Wistow and Walmsley *in press*), and 26 of the 56 km are SSSI. Although the canal forms a single, well defined habitat, various species, or groups of species have different distributions along the canal. These seem to be determined by water quality, substrate, the nature of the surrounding areas and past and present management (Briggs and Hollier 1986). The proposed restoration of the canal for boating is likely to lead to the loss of species unless steps are taken to protect them, and the restoration budget includes money for reserves. The theory suggests that a single large reserve is ideal, but it seems likely that reserves placed in sections of the canal with different water sources, and which currently support different floras and faunas, would stand a greater chance of maximising species' richness. A series of smaller reserves was decided on, to take advantage of the slight habitat differences along the canal's length, and this strategy is already bearing fruit (Davidge and Briggs 1986. Briggs 1987). There is clearly a lower size limit below which areas of habitat cannot support viable populations (see Swiberloff 1986), but it has been shown that for the canal areas as small as 2000 m^2 make a significant difference to richness (Hollier 1986). The distance of reserves from sites from which recolonisation can occur if stochastic variation causes local extinction will also be important, but no data is available to quantify this. A series of smaller reserves may act as "stepping stones", allowing less isolation than a single site.

5. CONCLUSIONS

If conservation is aimed at maximising species' richness it is clear that several small patches of a given habitat (with their associated differences in climate, vegetation or adjacent land use) can be at least as valuable as a large patch of the same total area. To allow maximum richness information about the requirements of individual species is desirable, to highlight relevant differences between patches of habitat, and to assess the minimum size such patches need to be to support the species. Since nearly all insects tend to be specialists different results may be obtained for each one.

Although this is a great challenge to the skills and resources of entomologists, the "defence" of networks of small reserves increases the importance of small patches of habitat, and emphasises the value of individual projects in gardens, parks and commons. In ecological studies and practical conservation work entomologists have a lot to offer.

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FURTHER RECORDS OF THE LEPIDOPTERA OF BARLASTON ROUGH CLOSE COMMON

by Jan Koryszko (6089)

(Continued from page 49)

HEPIALIDAE

The Orange swift (*Hepialus sylvina*) Single examples found flying over bracken in 1983 and 1984. Not seen since and appears to be the rarest Hepialid in this area of Staffordshire.

NOCTUIDAE

The Flame shoulder (*Ochropleura plecta*) Quite common and is fond of ragwort flowers. In 1983 a captured female laid a quantity of eggs and the larvae from these I reared up on dock.

The Lesser yellow underwing (*Noctua comes*) One example only in 1983, flying at dusk (it was taken for identification and released next day).

The Least yellow underwing (*Noctua interjecta*) Examples of this species were seen flying in both 1984 and 1985 where they seem to like dashing about over the hedgerows in the late afternoon.

The True lover's knot (*Lycophotia porphyria*) Another species that likes to fly in the afternoon, one was recorded in 1984 feeding on heather flowers. Rare in Staffordshire, the crossleaved heather (*Erica tetralix*) occurs on the Common.

The Clouded drab (*Orthosia incerta*) Although very common in the county, only a singleton recorded in 1985.

The Hebrew character (*Orthosia gothica*) One worn example in 1986.

The Gothic (*Naenia typica*) One found at sugar and another taken flying in 1986. Seems to be becoming more common nearby at Meir where I have been seeing it regularly.

The Squarespot rustic (*Xestia xanthographa*) A few, all of the dark form, taken, mainly at dusk on heather and ragwort, from 1983 to 1986. A red form also in 1986 and it is also common nearby at Meir.

The Feathered gothic (*Tholera decimalis*) Although this species is common and generally distributed in Staffordshire, only one has been recorded, this having been found on the Common by Mr Gary-Davis, who showed it to me.

The Grey chi (*Antitype chi*) A couple were found, at rest, in each of the years 1984 and 1985. Another species becoming commoner at nearby Meir.

The Rosy minor (*Mesoligia literosa*) Seen in 1984 and 1985, all of the black form.

Fig. 4. A view of the disused sandstone quarry east of Lightwood Road.

The Marbled minor (*Oligia strigilis*) One example only, at rest on a fence in 1984.

The Tawny barred minor (*Oligia latruncula*) Again only a single example, also in 1984.

The Marbled beauty (*Cryphia domestica*) Although common in the stone-wall country to the north and in suburban areas, only one on a white stone wall, in 1986, has been seen and this on the outskirts.

The Beautiful yellow underwing (*Anarta mytilli*) There was a possible sighting of this species in 1984 and it is a likely moth to occur.

The Ingrailed clay (*Mendica mendia*) Quite a common species in Staffordshire, but only two recorded from the Common in 1985.

The Dotted clay (*Xestia baja*) One each in the years 1984 and 1985, both flying at dusk.

The Broom moth (*Ceramica pisi*) A couple of the brown colour form of the larvae were found on bramble in 1984, reared up and the moths released back onto the Common the following year.

The Mother Shipton (*Callistege mi*) I have seen this moth regularly nearby at Meir between 1968 to 1984, but only two, one each in the years

1985 and 1986 have been seen on the Common. I consider it to have recently spread there, for I feel I would have observed such a conspicuous sun-flying moth had it been there earlier.

The Black rustic (*Aporophyla nigra*) An example was taken at Lightwood by Mr S. Cooper in September 1983. There are very few records of this species from Staffordshire and it could be a recent arrival to our county.

Autumnal rustic (*Paradiarsia glareosa*) One moth was found resting on heather in September 1987. It may have come from Cocknage or Moddershall woods which are to the North and South of the Common respectively.

Garden dart (*Euxoa nigricans*) A worn example of this local Staffordshire species was taken just before dusk in late August 1987. It was taken on ragwort and seemed far more interested in the dead flowerheads than in the fresh ones and was easily caught.

Dusky brocade (*Apamea remissa*) A single example was beaten from shrubs in July 1987.

Red-line quaker (*Agrochola lota*) One moth was found in mid-September 1987 in the sandstone quarry area. It was roosting on a patch of the michaelmas daisy hybrid which has small white flowers. I am surprised that the Yellowline quaker (*A. macilenta*), equally common in Staffordshire, has not yet been recorded from the Common.

Green-brindled crescent (*Allophyes oxycanthae*) One worn specimen of the typical form was found in the road near to the pond on September 27 1987. I have seen this species at Meir from time to time at light, together with var *capucina* which is frequent in the Potteries and the species is widespread in the county.

Svenson's copper underwing (*Amphypyra berbera svenssoni*) One example only was found at rest on a rustic fence in 1985.

The Rustic shoulder knot (*Apamea sordens*) Quite a common Staffordshire species but only a singleton, taken at dusk in 1985.

The Light arches (*Apamea lithoxylea*) Clearly not very common as only seen in 1984.

The Six-striped rustic (*Xestia sexstrigata*) One specimen only, taken at dusk in 1986.

The Early grey (*Xylocampa areola*) This species may be more common than generally believed, for it is often overlooked. One example only was found at rest on the wall of a garden adjoining the Common in 1986.

The Common quaker (*Orthosia stabilis*) One example only in 1986, at dusk by the pond.

The Sallow (*Xanthia icteritia*) A common moth in Staffordshire, one

Fig. 5. A view looking west onto Lightwood Road above the disused sandstone quarry.

worn example was taken in 1984 by beating bushes.

The Flounced rustic (*Luperina testacea*) One worn specimen caught on the wing in 1984.

The Beaded chestnut (*Agrochola lychnidis*) One of the commonest autumn species to be found in Staffordshire, so should occur on the Common, but the only record is of a badly damaged moth found in late September 1985 on the road which while hard to identify was considered to be this species.

NOTODONTIDAE

The Bufftip (*Phalera bucephala*) The larvae were quite, indeed very, common in 1983 and 1984, on oak trees and on bushes which they had defoliated. Not seen since, however.

The Pebble prominent (*Eligmodonta ziczac*) One larva was found on willow in 1987. A likely species as it is widespread in the County.

DREPANIDAE

The Chinese character (*Cilix glaucata*) One example only in 1986. This was close to the gardens where there is plenty of mixed hedgerows and

bushes. I am also certain I had seen one near the pond in 1984, but it flew off before I could be absolutely certain of its identity. It certainly occurs not uncommonly in some years in nearby localities.

The Pebble hooktip (*Drepana falcataria*) Again one specimen only recorded, a worn example at rest on a birch tree in 1986.

The Oak hooktip (*Drepana binaria*) Again represented by a singleton, beaten from oak by Mr R. H. Heath in 1985.

LASIOCAMPIDAE

The Drinker moth (*Philudoria potatoria*) Yet another singleton recorded, a female in mid July 1986 which was shown to me by two schoolboys who had found it near the pond where they were fishing. It looked very fresh but was not active. A locally common species in the county.

LYMANTRIIDAE

The Vapourer moth (*Orgia antiqua*) A mint condition male was found sitting on a window in Lightwood Road by Mr R. H. Heath on September 20th 1987. In the last few years quite a few such late records have been reported in the county and it seems that this normally single brooded species does sometimes have a second autumn brood in favourable years.

ADELIDAE

The Green longhorn (*Adela reaumurella*) First seen in 1983 when quite a few were flying around oak trees near to the pond on a sunny day. Recorded again in 1984, absent in 1985, a few again in 1986. Usually around the oak trees, but also bilberry bushes.

Degeer's longhorn (*Nemophora degeerella*) One specimen was taken in 1983 while flying in the sunshine. After identification it was returned the following day.

PLUTELLIDAE

Tooth-streaked hooked smudge (*Ypsolopha dentella*) Not very common. Two moths were beaten from bushes on the Common outskirts in 1985, where its foodplant, honeysuckle, occurs. I also once found two moths (which survived!) floating in a watering-can left beside the honeysuckle bush in my own garden at Meir.

Grey-streaked smudge (*Plutella porrectella*) A single example was disturbed from bushes in 1987. This is an uncommon species in Staffordshire and it may well occur in gardens where Dames violet (*Hesperus matronalis*) used to be much grown for its perfume.

Fig. 6. The view looking South-west from above the sandstone quarry at about 800 feet elevation. Meaford power station can be seen and on a clear day one can see right across Staffordshire to the Wrekin and Longmynd in Shropshire.

Fig. 7. The view looking North-west from above the sandstone quarry at about 800 feet elevation. On a clear day the whole of the Potteries are visible.

Grey diamond-backed smudge (*Plutella xylostella*) A common migrant in some years, a pupa (emerged in 1987) was found near a small patch of rape (*Brassica oleracea*).

PTEROPHORIDAE

Triangle-marked plume (*Platyptilia gonodactyla*) Rare. One moth was disturbed from vegetation at the far south-western edge of the Common where rubbish has been dumped. On this tip, coltsfoot, the larval foodplant, has started growing, so it may have been introduced. Sadly further rubbish dumping is presently stopping the spread of the coltsfoot which may be why I have not recorded this moth again since 1984.

Large white plume (*Pterophorus pentadactyla*) A few moths generally disturbed when out beating or walking and it has been seen every year since 1983.

Pale plume (*Platyptilia pallidactyla*) Two moths in 1986 and in the same year I found one at Meir.

PYRALIDAE

Dark-inlaid grass veneer (*Crambus nemorella*) Not very common as only small numbers seen when walking on grassy areas. This is a very common moth in Staffordshire.

Yellow satin grass-veneer (*Crambus perlella*) A scarce species. Single examples disturbed when walking through grass from 1983 to 1986. Also more seen along the boundaries of the Common. Both the foodplants, tufted hairgrass and fescue are plentiful on the drier ground.

Common grass-veneer (*Agriphila tristella*) Another rarity, only one recorded in 1983 in the disused sandstone quarry.

The rush veneer (*Nomophila noctuella*) Only one record of this migrant species, in August 1983, although it is quite common in Staffordshire in some years.

Pale straw pearl (*Udea lutealis*) Quite a few of this species were seen in 1987 although these were mainly on the outskirts of the Common. They were very abundant both in my garden (one night I recorded fifty) and elsewhere and frequented various plants by day as well as at dusk.

The Beautiful china mark (*Nymphula stagnata*) Only one found, a worn example on vegetation beside the pond in July 1986. It is exceedingly likely that it is established and it is likely to colonise a pond in a nearby field which was recently enlarged and cleaned out, then fenced in and is now ripe for insects to move into.

The Pebble (*Evergestis forficalis*) This species is quite common being seen from 1983 to 1986 amongst the heather and other shrubs. Often also noticed caught in spiders' webs.

Fig. 8. The view from the pond area looking South across the western portion of the Common. Hartwell Lane lies to the South of the area but is hidden behind the trees. This lane is the only road which runs along the edge of the Common; elsewhere they tend to cut across it.

Fig. 9. The view from the pond area looking South across the western portion of the Common. Lightwood Road runs North/South but is hidden by trees and several houses can be seen on the skyline above the quarry.

Allied shade (*Cnephasia incertana*) Two moths were beaten out of shrubs in 1987.

Greater grey shade (*Tortricodes alternella*) Three moths recorded, all flying in the spring sunshine in 1987. These were by oak and birch on the west side of the Common.

Common rough-winged button (*Acleris variegana*) Two moths disturbed out of the undergrowth near to the pond in 1987. Also in 1987, on September 4th, I recorded the first one in my garden at Meir.

Three-dotted rose bell (*Epiblema cynosbatella*) A few moths in 1987 were taken while flying over roses on the southern edge of the Common, where the larval foodplant grows. A common species in the county and also found in my garden.

TORTRICIDAE

Cloudy white marble (*Hedya nubiferana*) Not very common, but seen in 1983 and 1985. This species which looks so remarkably like a bird-dropping, can so very easily be overlooked and may be more common than I believe.

Cloudy white marble (*Archips podana*) One male only, which was found sitting on an oak leaf, was taken in 1984.

Uddmann's bell (*Epiblema uddmanniana*) While only one specimen has been recorded, beaten from a mix of thick bushes which included its foodplant, bramble, it seems likely that it is established.

Indefinite marble (*Oletehreutes lacunana*) Although quite common in Staffordshire, only one example, which was beaten from herbage near to the pond in 1984 has been recorded.

OECOPHORIDAE

Fuscous brindled flatbody (*Depressaria pastinacella*) A very common moth in Staffordshire but only recorded from the Common in small numbers in the years 1983 to 1986.

The March day (*Diurnea fagella*) Another common Staffordshire species of which only one example has been found. This was a worn specimen on an oak tree in the spring of 1984.

Sulphur-underwinged tubic (*Esperia sulphurella*) A sunshine flyer, I first recorded this species in my garden at Meir in 1985, and on the Common in 1986.

Fig. 10. The view looking North. A number of trees east of the pond appear to have been wind-trimmed to some extent, the prevailing wind being apparently from the South-west.

GLYPHIPTERIGIDAE

Fabricius's nettle-tap (*Anthophila fabriciana*) Usually seen on stinging nettles (its foodplant) and also where there is thick undergrowth from which it can often be disturbed.

Allied fanner (*Glyphipteryx simpliciella*) In 1987 this species was very abundant on buttercups and could be seen flying in the sunshine in scattered localities on and around the Common. One day in June I recorded over 200 moths covering the flowerheads of buttercups. It is a common species in the county and is also found in the Meir area.

MICROPTERIGIDAE

The Small gold (*Micropteryx calthella*) Quite common in Staffordshire, two moths were found on buttercups on the outskirts of the Common in 1884.

TISCHERIIDAE

The Red-feather carl (*Tischeria ekebladella*) This species can often be beaten from oak trees, particularly the young ones only a few feet high and the larval mines on the leaves are very common.

TINEIDAE

Common clothes moth (*Tinea pellionella*) A common species in Staffordshire and while it is perhaps more often thought of as an indoor species, the larvae occur in birds' nests where they feed on feathers and other debris. One moth was disturbed by beating on the Common in 1984.

SUMMARY

It will be evident that the list of the lepidoptera in the area is incomplete, particularly in the case of the microlepidoptera. With many species yet to be found, as they are easy to overlook, more of the macrolepidoptera may also be found in the future. Barlaston Rough Close Common is an interesting locality also for other insect orders, and to the Naturalist in general. It will continue to be interesting and a haven for wild-life so long as it retains its present status.

ADDENDUM: THREE RARE PLANTS

It is worth reporting, in addition to the lepidoptera, that three rare plant species have been located on the outskirts of the Common. These are also noted by Mr I. J. Hopkins in his 1984 plant list.

Bird cherry (*Prunus padus*) This tree is found in scrubby woodland by the banks of a stream near Cocknage wood just to the Northwest of the Common. Small specimens are also sometimes to be found planted on reclaimed land and in parks.

Red pondweed (*Potomogeton alpinus*) This rare plant has been found growing alongside the Common broadleaved pondweed (*P. natans*) in a nearby pond and would be well worth looking out for in other ponds in the area.

Marsh arrowgrass (*Triglochin palustris*) This is a plant which may be overlooked and while I have not yet encountered it, it was found on the Common in 1941-42 by Mr E. S. Edees.

ACKNOWLEDGEMENTS

I would like to thank Mr Bernard Skinner for the identification of many species I sent to him and thus confirming those of which I was doubtful. Also Mr Eric Bradford for help with some of the Microlepidoptera. Thanks are also due to Mr R. G. Warren and my friend and fellow AES member, Mr R. H. Heath who have supplied me with information on various species of both moths and plants they have also encountered on and around the Common.

Although the photographs illustrating this article were taken by me, this would not have been possible without help, advice and loan of

equipment, and so I sincerely thank the following: my old friend, who is a photographer, Mr Conrad Lavinski; Mr Leslie Grocock, and finally my sister Kathleen.

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THE BUTTERFLY VIVARIUM

by Julie Harvey (BMNH)

In 1858 Henry Noel Humphreys published 'The Butterfly Vivarium or Insect Home; being an account of a new method of observing the curious metamorphoses of some of the most beautiful of our native insects''. This work, published during the peak of Victorian interest in natural history, instructed the reader how to build, stock and maintain an insect vivarium.The coloured frontispiece illustrates a highly decorative glass and zinc case, containing aquatic, land and flying insects. This idea was clearly influenced by the growing popularity of aquaria and ornamental fern cases. These had become part of the furniture of an educated, middle-class Victorian home. Indeed, Humphreys describes the structure of the ''insect home'' as a drawing room object and clearly expected it to provide both scientific and aesthetic interest.

Today, a reader purchasing such a book would expect to find detailed plans and clear instructions. Unfortunately this book lacks any specific details at all. Instead there are only four pages of text relating to construction and these provide very little information. The basic structure was a case consisting of three zinc panels soldered together with a glass front cemented into place. As the case was intended for rearing aquatic and land insects, part of the vivarium contained a water reservoir. This was achieved by soldering a piece of curved sheet Zinc to the bottom of the case and to the uprights at the sides. Just above the water level there was a joint so that the upper part of the case could be lifted off. The side panels were constructed of a perforated zinc to allow ventilation. On one side a glass door was inserted to allow access to the vivarium.

Most of the book concentrates on the general biology of insects and how to collect and rear them. Various suggestions were made concerning the internal decoration of the case including; ''pretty pebbles'', ''tasteful rock work'', ornamental ferns and ''small plants in flower''. Tin or zinc tubes containing water were placed in the earth ''in which stalks of different kinds of plants required for food of the caterpillars may be plunged''. To keep the ''miniature lake'' clear, water snails and aquatic plants were recommended. Humphreys also wrote that to give the water a sense of life and movement even sticklebacks could be added!! Insects suitable for such a ''little crystal palace'' included species of dragonfly, the water beetle *Hydrophilus piceus,* the privet hawkmoth *Sphinx ligustri,* the clouded yellow *Colias croceus,* the peacock butterfly *Inachis io* and the orange tip *Anthocaris cardamines.*

For those enthusiasts whose interests did not extend as far as constructing the cage or indeed those incapable of following the instructions, an advertisement at the back of the book stated that Messrs

THE VIVARIUM; OR, INSECT-HOME.

FOR OBSERVING THE TRANSFORMATIONS OF BUTTERFLIES, MOTHS, AND OTHER INSECTS.

J. W. Sanders of Grays Inn Road, London, had constructed vivaria "in accordance with the plan described in this volume". A case 3′x2′6″x1′6″ was priced at four pounds.

Although the reader is promised "an ample harvest of delightful and instructive amusement", one cannot help but wonder at the impracticality of such a scheme. The idea of dragonflies, butterflies and other insects all confined together in such a crowded watery cage seems a recipe for disaster.

I have looked at contemporary entomological and natural history journals, and have found no further information about Humphrey's Butterfly Vivarium. Nor do I know of any surviving examples, although it is quite likely that such vivaria may have been misidentified as fern cases.

CONSERVATION NEWS

(Extracts from *Insect Conservation News* No. 13, selected by Colin Hart)

In the Council of Europe publication *Newsletter-Nature* is a report by Dr Mark Collins of IUCN, Cambridge, UK, dealing with the following topics: assessing the problem, important biotopes (ecosystems); and action. On the first of these, Dr Collins refers to some recent European statistics; 403 species of invertebrates declared to be declining in Finland, 34% of 10,290 surveyed species threatened in the Federal Republic of Germany, 22% of a sample of 9694 Austrian invertebrate species declining, and 13% of a sample of 13,741 UK insect species declining and 4% endangered.

Obviously, these studies involving thousands of species are not detailed, and they represent a warning rather than a source of data on which action could be based. Although detailed data are something of a pipedream, two of ". . . the most visible and readily identifiable . . ." insect groups, butterflies and dragonflies, have been selected for a special study, supported by the Council of Europe.

Dr Collins writes: "Of the 380 or so European butterfly species, 15 are endangered throughout Europe, 51 are vulnerable and a further 30 are a cause for concern. In all, 25% of species are in decline. The dragonfly data reveal that, of the 164 European taxa, 12 are endangered, 24 vulnerable and 26 rare. Such high proportions of threatened species are an indictment of the damage that has been done even before the problem was properly appreciated."

On the "important biotopes", Dr Collins reports that butterfly and dragonfly studies showed alike that the main causes of decline are damage to and destruction of biotopes, rather that the entomologist with his collecting net. Despite the adaptability of many invertebrates, certain biotopes are proving to be especially vulnerable. Dr Collins places wetland at the head of this list and cites the case of the Large copper butterfly *Lycaena dispar* which became extinct in England as early as 1851 due to drainage of the fens. Dragonflies are declining in a range of

wetland habitats, especially lakes, peat-bogs, mesotrophic marshlands and rivers.

Second on the list are woodlands, particularly those with a wide age profile. Dr Collins writes: "Changes in forestry practice, particularly from deciduous to non-native conifer plantations, but also towards excessive forest hygiene, have resulted in a catrastrophic decline in invertebrate habitats." It is encouraging that ancient woodland insects, such as the cerambycid beetles *Cerambyx cerdo* and *Rosalia alpina* have earned the concern of the Council of Europe. Accordingly, a project is under way to identify valuable sites. Grassland is third on the list and Dr Collins blames changes in grassland management for the severe reduction in the populations of butterflies such as *Maculinea arion, Lysandra bellargus* and *Hesperia comma.*

Dr Collins' suggested action covers the co-ordination of the work of organisations and the development of recovery plans for endangered taxa. Organisations can do a lot more to help give invertebrates the recognition they deserve, both on the educational front (which includes the education of politicians) and in relation to the commissioning of surveys. As far as practical measures are concerned, he rightly criticises some of the traditional approaches to the use of nature reserves which have evolved with vertebrates and plants in mind, and points out that much good work can be achieved by the inexpensive and sympathetic management of hedgerows, roadside verges, ponds and other marginal habitats across the everyday landscape, rather than by the absolute protection of isolated sites. Again, he emphasises the essential need for survey work and ecological research in respect of individual threatened species.

It is to be hoped that the powers-that-be will take careful heed of the conclusion of this report . . . "The Charter for Invertebrates is an important statement and milestone in invertebrate conservation, but it is only a beginning; not an end. Europeans must look to the future and strive through political, legislative, social and economic means to halt and reverse the present slide towards extinction of thousands of their invertebrate species."

Conservation of the British Macrolepidoptera (Larger Moths): an introduction to a new project.

by Paul Waring, NCC, Peterborough

As you may know, the Nature Conservancy Council are collecting information on the habitat requirements of insects and other invertebrate animals so that these may be considered when deciding on management plans for nature reserves and sites of special scientific interest. Considerable progress has been made regarding the needs of butterflies

and the intention is to improve the situation regarding the other invertebrate groups. The available information on these groups is often scattered widely throughout the literature with the result that it is difficult for our regional staff to act upon, given that they have to deal with the conservation of a wide range of plants and animals. I am now collecting information regarding the habitat needs and management requirements of some of the rarer moths.

There are over 2,500 species of moths in Britain, so to target the work at the areas of greatest need, the Nature Conservancy Council is developing a system of priorities. So far, basic information has been collected on the "macro moths", which may be defined as those species included in Bernard Skinner's "Colour Identification Guide to the Moths of the British Isles" which was published in 1984. Approximately 730 of the "macros" are resident in Britain (Rutherford, 1983). The "micros" are currently under review. Of the macros, about 250 species have been recorded from less than 100 of the ten-kilometre squares in the British Isles, according to the maps and other information available from the Biological Records Centre at Monks Wood. I shall be concentrating on these rare or localised macros which have been termed "nationally notable" species. Five of the species are so rare that they are afforded special protection under Schedule 5 of the Wildlife and Countryside Act of 1981 and I shall give these special attention. They are:

New Forest Burnett *Zygaena viciae*
Essex Emerald *Thetidia smaragdaria*
Barberry Carpet *Pareulype berberata*
Black-veined moth *Siona lineata*
Reddish Buff *Ascometia caliginosa*

I shall approach the remainder of the national notables on a habitat by habitat basis, starting with those species associated with fens, because of the scarcity and vulnerability of this type of habitat. There are nearly thirty nationally notable species associated with fens, nine of which depend specifically on the Common reed, *Phragmites australis*. Examples of other habitats that will be studied include lowland heaths and ancient woodland. In each case the occurrence of adult and/or larval stages of moths will be examined in relation to the different types of management being practised on known breeding sites.

In the past, some entomologists have been critical of the NCC for not considering the needs of invertebrates. The expansion of the Invertebrate Site Register and the inclusion in the publications lists of titles such as "The Management of Chalk Grassland for Butterflies" demonstrates that this is not the case. The main problem is the logistical one of collecting available information and translating it into practical recommendations which can be followed by those involved in the management of sites. My role is to provide that link with regard to the macro-moths.

As with earlier projects, the success of this venture will depend on the contributions of a large number of volunteers in monitoring sites and providing sound information on the biology of the species involved. Also there must be a flow of information from those involved in land management, so that entomologists are kept well informed regarding the other objectives that have to be met on each site. The voluntary wardens' meetings provide this opportunity and some entomologists already involve themselves in this way and keep in touch with management decisions. Over the next three years I intend to make many opportunities for us to meet in groups to discuss particular sites, species and types of management.

This project will result in the publication of habitat management guidelines for macro-moths, and conservation plans for selected rare species. These publications will serve to collect together present knowledge in a form that can be used for the conservation of moths so that future generations can see and study them. The booklets will also help to focus attention on aspects that require further work, such as the habits of the larvae of many species and the situations in which they occur.

In conclusion, if you are concerned that nationally or regionally rare species of moths are threatened on a particular site, *always* contact the regional staff of the NCC so that they are at least aware of your concern and have the opportunity to act. If necessary they will contact me. If you have studied a particular species or if you have case histories of management that has benefitted uncommon moths, please contact me directly just to let me know that the information exists. It may help to conserve the species on other sites, in which case I can contact you for details.

(Paul Waring may be contacted at: The Invertebrate Section, Nature Conservancy Council, Northminster House, Peterborough PE1 1UA.)

OUR ANNUAL EXHIBITION

As already announced there is a change of venue. The exhibition this year is to be held at Kempton Park, which has easy access not only from the M25 for those coming by car, but also by bus and rail. The date — enter it in your diary now — is Saturday October 22.

BREEDING THE DEATH'S-HEAD HAWKMOTH (*ACHERONTIA ATROPOS*) IN CAPTIVITY

by Mr and Mrs P. A. Aindow (7152)

INTRODUCTION

The basic requirements essential for successful breeding of this moth are warmth, light, humidity and larval foodplants.

When adult, most of the females live for five or six weeks, males for three to four weeks depending on the captive conditions. Our breeding cage is 12 ft x 8 ft and has two 2 ft grolux tube light heaters. It also has tables on which we keep the foodplants in plant pots. This cage also has a false ceiling to help keep the heat in. The flight cage has two pieces of hardboard 27 inches across which form the top and base of the cage and is cut circular. It has netted sides 56 inches long with two zips to make it easier for access to remove the moths for feeding. We have a hook in the ceiling for holding up the flight cage and with this cage being so long we can put a large foodplant inside the cage without the moths banging into it. We often put a plant either side of the flight cage, namely a member of the nightshade family in hanging baskets, which helps them to lay more ova.

One Saturday 6th August 1983, a female got out of the cage and laid 98 ova on the nightshade and it took my wife and I four-and-a-half hours — well into Sunday — to collect all the ova and this is a record no moth has broken for egg-laying. The temperature was 76°F.

If you do not have a greenhouse to keep the moths in, but do have a room in the house like we have, with the basic requirements as above, you should be successful.

OVA

We keep the ova in small plastic boxes and put tissue paper in the base with ten ova to a box. All the boxes have lids and with no foodplant leaves the ova normally hatch eight to ten days after they were laid.

LARVAE

After the larvae have hatched and have fed on their ova shells we move them to larger plastic boxes and put slightly damp tissue paper in them. We then put four to six young larvae to a box. The larvae are cleaned out twice a day and are fed fresh food twice a day too. When the larvae get to the fourth stage we put them in bigger boxes still and in their final stage into the rearing cages, five to six larvae to a cage.

When the larvae leave the foodplant to pupate, we put them in margarine tubs which also have damp tissue paper in, and clean out these

Fig.1 The Death's-head moth and its caterpillar from a nineteenth century French edition of Figuier's *Insects*. This illustration was much copied by English books of the Victorian era and was still being used in 1930s editions.

larvae tubs every day until they pupate. The larval stage can be shortened by raising the temperature.

PUPAE

When the larvae have pupated we put them into large cardboard boxes with a dry tissue lining. Small trays are then put in place with pupae on the trays about ten to a large box and checked about once a month. You can keep them in the breeding cage where they will emerge after a few weeks to a few months. There is no reason why you can't put these boxes in a cool dry place to overwinter them if the boxes are well padded with cotton wool, but do not let them go below 55°F. The best ones to overwinter are from late larvae maturing from November to December.

ADULT MOTHS

When the pupae turn black we take them out of the cardboard boxes and put them into an emerging cage so when the moths emerge they have room to dry their wings properly. We often use the emerging cage as a day cage and do not feed the moths for two or three days after they have emerged. After pairing, feed the females every day and the males every other day. The moths are fed on honey and water, younger moths get 70% honey and 30% water while older moths get 80% water and 20% honey.

Temperatures should read as follows: day 68°F to 84°F; night 68°F to 76°F. Humidity 50% to 60% is best.

Notes on Breeding this Hawkmoth.

We first bred this moth on the 16th June 1983, and since then we have bred them often. I first took an interest in this Hawkmoth in 1974 and knowing it took Mrs M. Beer 25 years to successfully breed them, we have not done badly considering we have only started breeding attempts since 1981. It took us only three years with a lot of help from Mrs Beer and helping notes from Mr G. O'Connor, Mr T. Wise and Mr B. C. Farrell, and finally using the AES book of *British and European Hawkmoths* by Paul Sokoloff.

Our first attempts at breeding this Hawkmoth failed because we did not know how to look after them, so you should take notes from any breeder who has bred this moth or go to book shops or the library for advice. We do not want breeders to make the same mistakes that we made.

The main disadvantage with the larvae is the amount of food eaten — i.e. keeping them supplied with enough food! You must also avoid sappy, brown, wilted or contaminated leaves, or leaves which have been frost-bitten, as the larvae will not eat any food of this description. If you do feed them on Privet, you must not under any circumstances change them

Fig. 2. The Death's-head moth as figured by Moses Harris in his *Aurelian* (1840 edition).

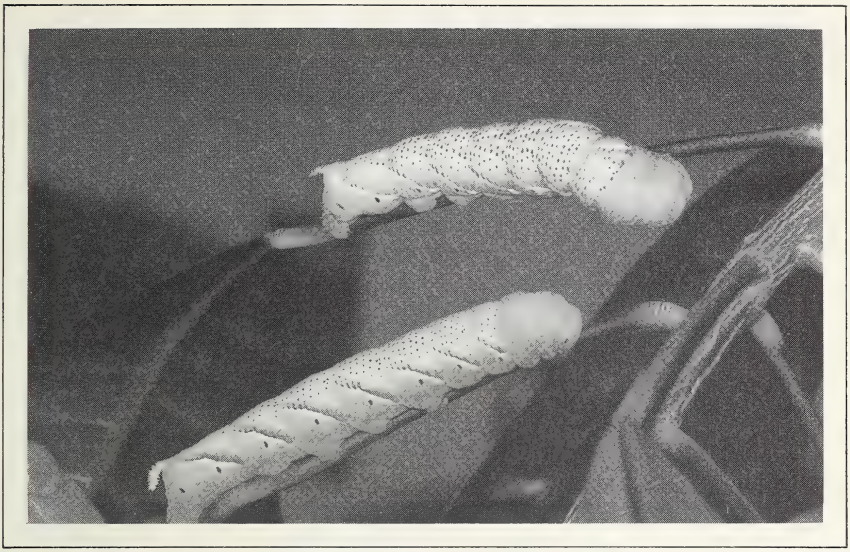


Fig. 3. Caterpillars of the Death's-head moth.

Fig. 4. The Death's-head moth upperside.

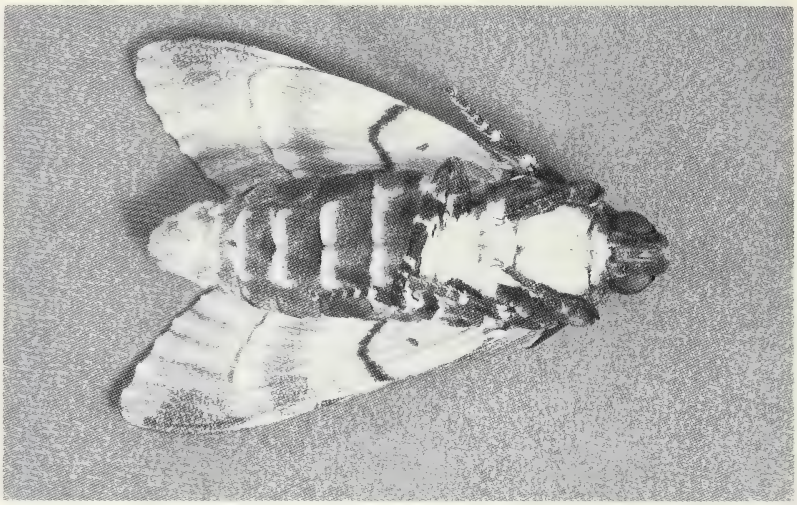


Fig. 5. The Death's-head moth underwide.

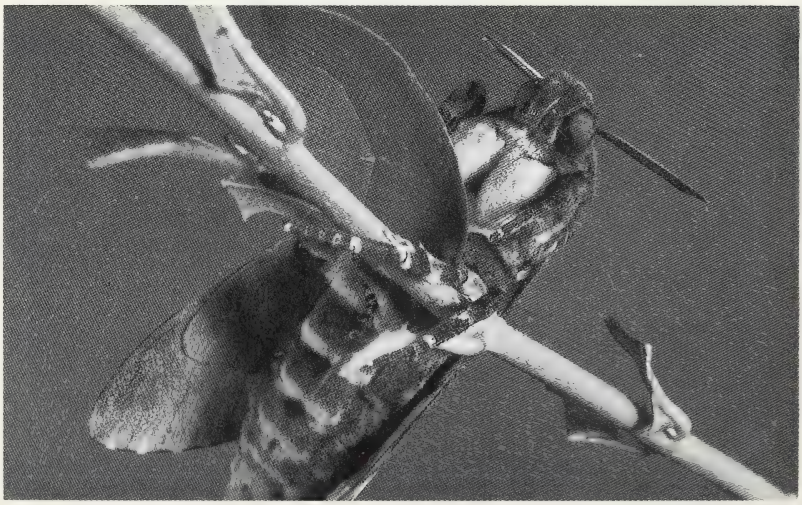


Fig. 6. The Death's-head moth underside seen when it is sitting on a twig. Notice very conspicuous furry forelegs.

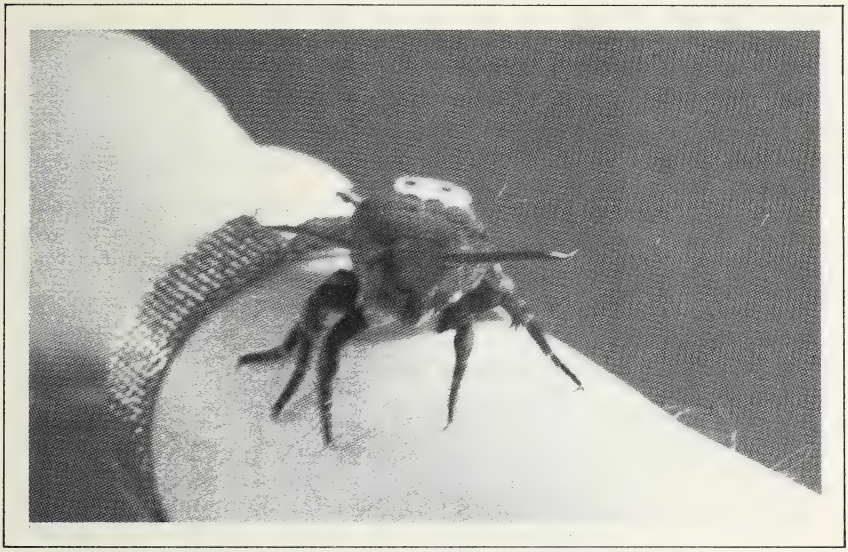


Fig. 7. Unusual shot of the Death's-head moth walking across your editor's hand. Note how prominently the 'skull' on the thorax protrudes.

to another plant. We are now working on a plant which can be used by them for food in winter. We have four large plastic bins with a privet plant in each, and in this way we can put them outside for the summer and inside a cold frame for the winter which will keep the frost away from them.

Some people have asked us why *do* we breed moths, and the answer is simply that they give us as much pleasure and interest as some people get from keeping dogs, cats or fish.

TABLE OF LARVAL FOODPLANTS OF THE DEATH'S-HEAD HAWK MOTH

The larvae will feed on any of these plants in the wild and in captivity.

Woody Nightshade or Bittersweet *(Solanum dulcamara)*
Deadly Nightshade *(Atropa belladonna)*
Henbane *(Hyoscyamus niger)*
Thorn Apple *((Datura stramonium)*
Tobacco Plant *(Nicotiana tabacum)*
Small Tobacco Plant *(Nicotiana rustica)*
Potato Plant *(Solanum tuberosum)*
Duke of Argyll's Tea Plant *(Lycium barbarum)*
Winter Cherry *(Physalis alkekengi)*
Perennial Nightshade *(Solanum crispum)*
Egg Plant *(Solanum melongena)*

OLEACEAE

Ash (Fraxinus excelsior)
Common Privet *(Ligustrum vulgare)*
Broad-leaved Privet *(Ligustrum ovalifolium)*
Lilac *(Syringa vulgaris)*

HYDRANGEACEAE

Mock Orange *(Philadelphus coronarius)*

Syringa *(Philadelphus virginal)*

ROSACEAE

Apple *(Malus sylvestris)*
Pear *(Pyrus pyraster)*
Plum *(Prunus domestica)*
Cherry *(Prunus avium)*
Wild Strawberry *(Fragaria vesca)*

SALACACEAE

Crack Willow *(Salix fragilis)*
Walnut *(Juglans regia)*

CHENOPODIACEAE

Good King Henry *(Chenopodium bonus-henricus)*
Shrubby Orache *(Atriplex halimus)*
Saltwort *(salsola kali)*
Sea Beet *(Beta vulgaris)*

RUBIACEAE

Wild Madder *(Rubia peregrina)*
Field Madder *(Sherardia arvensis)*
Hedge Bedstraw *(Galium mollugo)*

URTICACEAE

Pellitory of the Wall *(Parietaria judaica)*
Hop *(Humulus lupulus)*

JASMINUM

Jasmine *(Jasminum officinale)*

CORNACEAE

Dogwood *(Cornus sanguinea)*
Cornelian Cherry *(Cornus mas)*
Dwarf cornel *(Cornus suecica)*
Table Dogwood *(Cornus controversa)*
Nuttall Dogwood *(Cornus nuttallii)*
Japanese Dogwood *(Cornus kousa)*

CAPRIFOLIACEAE

Honeysuckle *(Lonicera periclymenum)*
Snowberry *(Symphoricarpos albus)*

SCROPHULARIACEAE

Great Mullein *(Verbascum thapsus)*
Dark Mullein *(Verbascum nigrum)*
White Mullein *(Verbascum lychnitis)*
Moth Mullein *(Verbascum blattaria)*

COMPOSITAE

Blue Fleabane *(Erigeron acer)*
Small Fleabane *(Pulicaria vulgaris)*
Common Fleabane *(Pulcaria dysenterica)*
Irish Fleabane *(Inula salicina)*

MORACEAE

Black Mulberry *(Morus nigra)*

VITACEAE

Grape-vine *(Vitis vinifera)*

LOGANACEAE

Buddleia (Butterfly Bush) *(Buddleia davidii)*

MAKE BETTER USE OF YOUR BREEDING TUB

by M. Dobson (8533)

As most breeders of butterflies know, the tub method makes for the ideal cage for creating the most natural conditions possible and can be used for all stages of the butterflies' life cycle. There are, however, certain disadvantages.

Firstly, if growing other than low-growing plants, then the tub is of little use except as a mating and oviposition cage. Secondly, tall plants call for the need of a further cage, the ringed sleeve, which has a lot of disadvantages.

Well, to cut a long story short, I wanted a cage that was large enough to house tall plants and shrubs; be planted so as to simulate natural conditions and yet still give the butterflies plenty of flight area; at the same time be easy to erect and manage; could be used for all stages; was capable of withstanding the rigours of winter.

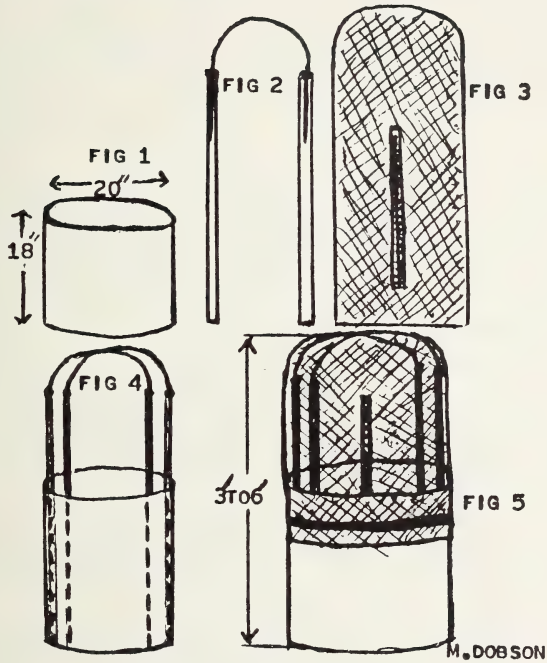
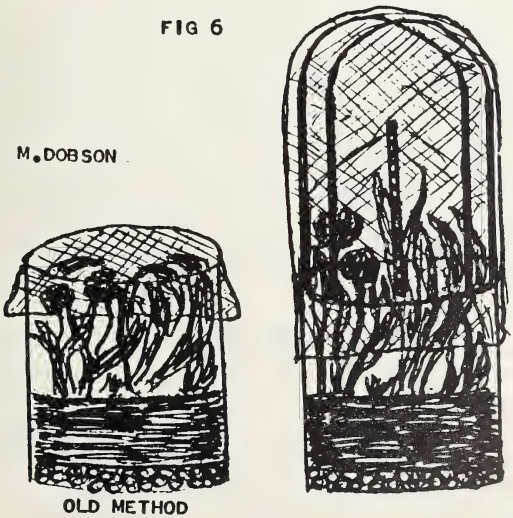


FIG 6

M. DOBSON



OLD METHOD

The solution I came up with was to combine the tub and the wire hoop type cage and I have used my construction successfully over many years. The only other cage I found to match it is the large flight type of cage, built along the same lines, which is used in the construction of aviaries, the wire netting being replaced by fine mesh net. Entirely suitable but needing a large garden and only necessary if you are rearing on a very large scale.

The size of the tubs constructed can be as large as you wish, and the measurements given in Fig. 1 serve as guidelines only, but are suitable for the smaller and medium sizes. For large sizes, over six feet in height, the tubs should have the base removed, be sunk into the ground, and the supporting poles driven at least two feet into the ground and be at least of 2 x 2 inch timber.

There is no reason why the tubs should not also be made oblong rather than round and this can be achieved by incorporating a strip of foam material round the sides to ensure a tight fit and keep out pests. The corners in particular may need foam padding to take up the slack that often occurs at this point.

I find that a long oval cage is ideal for species of the families Satyridae and Hesperiidae whose caterpillars feed on grasses. It gives a long flight area and I plant half of it with grass and the other half with nectar plants.

The cages are made as shown in Figures 1-6. As already mentioned, the size is up to the user. Fig. 1 shows the tub. Fig. 2 is cane or wooden dowel, drilled to take the wire hoops which are of strong plastic covered wire. Fig. 3 shows two pieces of net which are cut and sewn to form a sleeve and into which is sewn a nylon zip fastener. The size of this net will of course be determined by the diameter of the tub. Fig. 4 shows the positioning of the rods in the tub. Before they are positioned the tub needs to be filled, to within a few inches of the top with a coarse sand/compost mixture into which the canes or dowels are firmly pushed. Fig. 5 shows the net placed over the supports and secured round the tub with nylon string or strong elastic. Fig. 6 shows the finished product and how much more spacious it is compared to the use of the standard tub that is used on its own.

BREEDING THE PLAIN TIGER, *DANAUS CHRYSIPPUS*

by Anthony Valletta (1879)

Tuesday the 21st of October was a red-letter day — for a long-cherished dream came true . . .

. . . On that windy morning I happened to disturb a visitor, a new settler to our Island of Malta, which may well have just arrived from Africa's

shores. There, sheltering among a mass of false fleabane (*Inula viscosa*), in the Wardija area of Malta, was a Plain tiger, *Danaus chrysippus* L. The butterfly was not in good shape as both hindwings were damaged. Nevertheless I decided to net it and succeeded in so doing. To my surprise it turned out to be a female, a rather small example, smaller indeed in size compared to other specimens I had acquired from Saudi Arabia, Egypt, Tunisia, West Africa and India.

My mind went back to 1977 when I gathered some seeds of this butterfly's foodplant, milkweed (*Asclepias curassavica*) from the Canary Islands. I had managed to grow this plant in my garden in the hope that some day it would be needed for the breeding of either the Milkweed (*D. plexippus*) or the Plain tiger (*D. chrysippus*) should either chance to come my way and by chance I had luckily transferred some of these plants into pots only a few weeks earlier and now they would come in handy if this butterfly was going to oblige!

On October 22nd the butterfly laid an egg on a tender leaf and on the following day two more were laid, followed by another couple the next day again. For some reason the fifth and final egg laid was smaller than the others and the butterfly died the following day even though I had been feeding her several times a day.

I was surprised that the eggs only took five days to hatch and thus I soon had five tiny blackish caterpillars feeding lavishly on the fresh leaves of my potted milkweed plant.

As they grew, the caterpillars became more colourful, showing short yellow stripes on each segment and white stripes between each segment. They also grew three pairs of long fleshy filiaments; one pair on the head; a pair on the fourth segment; another on the last segment. By the second week they were three cm long and the bigger they grew the longer the filiaments became. On November 15th and the following few days four of the caterpillars were four cm long and feeding ceased.

The first chrysalis formed on November 18th, the second on the 19th, the third on the 20th, the fourth on the 21st and the fifth and last (the smallest larva from the smallest egg) on the 24th. The chrysalis of this species is smooth, barrel-shaped, and has metallic spots. It hangs freely suspended by the tail and, of the five, one was light blue, the others being beige in colour.

The second chrysalis to have formed, that of November 19th, turned almost black during the early hours of December 9th and a female butterfly emerged during the night of December 10/11th, having been 21 days in the chrysalis stage. Unfortunately, while emerging, she lost her grip on the empty chrysalis case and dropped down onto her back, could not develop the wings properly and although unable to fly could crawl about and feed, but died after seven days.

The first-formed chrysalis eclosed on the night of December 12/13th and was a perfect male. The third emerged at noon on the 14th and was also a male, to be followed by yet another male the following day. Although the fifth changed colour and the wings became visible, no emergence unfortunately occurred.

With mixed feelings I cleaned up the breeding cage and hope for better luck with the FEMALES next time.

A NOTE ON THE PARENT-BUG

by Anthony Wootton (3331)

Many members will, I am sure, be aware of the unusual devotion that certain Heteropterid bugs, more especially *Elasmucha grisea* (Linn.), display towards their eggs and young. I usually find *E. grisea* parents on birches in a local wood about the 2nd June, the females crouching over the yellow egg batches on the undersides of leaves and later displaying equal maternal devotion to their nymphs, which feed together, with the females in close attendance. (In winter it is sometimes possible to find the adults hibernating beneath the bark of trees.) On one occasion I found a female guarding eggs with an adult male (rather smaller, darker and more narrow-bodied than her) in close attendance. I took this pair home to observe eclosion and general behaviour and was later intrigued to observe the pair copulating with the female still crouching over her eggs. A triumph of sex over maternity one might say!

The eggs hatched in captivity and the nymphs were, I noted, occasionally prone to wander, although I never saw them actually follow the mother about, as mentioned by Southwood and Leston (*Land and Water Bugs of the British Isles*). I did, however, demonstrate one point about the parent's domesticity, in that an extended forefinger would prompt her to incline her body over eggs and nymphs as if to shield them from injury or attack.

A SHORT BREEDING BIOLOGY OF LANG'S SHORT-TAILED BLUE (*SYNTARUCUS PIRITHOUS*) IN MALTA

by S. E. Turner (7205)

This small lycaenid has a wide distribution across southern Europe and western north Africa, including the larger Mediterranean islands. Its range may still be extending. It was first recorded from Malta some 80 years ago; Colonel Hartford obtained a specimen in 1910. Like many other lycaenids *S. pirithous* generally feeds on legumes, but in Malta it prefers a plant distant from legumes, plumbago (*Plumbago capensis*). Plumbago, a well-known tender shrub, is an introduction to Malta, where it is found almost exclusively in gardens. Its genus has an extensive distribution being found in every continent but Australia. As its name implies, *P. capensis* is a native of South Africa. Possibly other foodplants are used in Malta (*Rubus sp* look likely) but in four years of constant observation (1978/82) no alternative larval foodplant was found.

S. pirithous is trivoltine and on the wing throughout the year. Generally absent between December and March, specimens have been seen flying in every month except February. The butterfly is common in gardens, flying in numbers around flowering trees and shrubs, particularly pellagonium, passiflora and tecoma (another introduction). The butterfly is seldom seen far from gardens.

The three broods are in March/April, June/September and October/December. Females are mated immediately they emerge, males tending to emerge up to 48 hours before females. Eggs are laid on newly developing flower buds of *P. capensis* or on embryonic leaves immediately adjacent to flower buds. Ova hatch normally within 48 hours. First instar larvae are 2 mm long, pale straw in colour turning bright green in the second instar but retaining their black heads. The flower bud on which they hatch out is about 15 mm long. The larvae burrow into this and remain inside throughout the first instar. The larvae grow quickly, feeding only on developing flower buds. Coincidentally, the larvae bear a striking resemblance to the Plumbago flower buds.

As the larvae develop the light green colour acquired at the second instar brightens until the final instar when pale green lines above the legs

develop. By this time each larval segment is also highlighted.

The larvae become restless just before pupation. They descend to the ground beneath the foodplant and pupate in the leaf litter forming a loose coccoon of scraps of available vegetable matter. In breeding cages, larvae usually prefer peat to leaf litter.

When a suitable place to pupate is identified, the larva spins a small pad of yellow silk at the head and drags together a small pile of bits of leaf. The larva remains bright green for up to three days turning paler just before shedding its larval skin to reveal the pupal case. In 25 pupations two turned plum coloured just before shedding the larval skin, one turned mid-brown with yellow highlights to segments.

The pupa is similar in appearance to most other lycaenids and hard to distinguish from *Lampides boeticus*. It is 11 mm long and can move violently when touched. The duration of pupal development varies: adults emerging between 25 and 35 days after pupation. New pupae are transparent, turning brown over the next 24 hours. Most are plain shiny brown, some have irregular highlights of lighter brown. The pupae become transparent again immediately prior to emergence.

Many are parasitised, usually by braconid wasps. More rarely the larvae are parasitised by flies. Wasp attack is revealed just before pupation when the larva turns bright yellow. The wasp pupates on the dead larva. Incidence of parasitisation appears higher in the second brood, but this reflects the higher numbers available in the second brood.

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MEMORIES OF TIMES PAST: 1883

A plethora of butterflies in Cambridge

(Member Malcolm Simpson (4859) kindly drew my attention to the following account which was published in *The Entomologists' Monthly Magazine* Vol. 20, p.131. Sadly nearly half of the species mentioned are not to be found today in the *county,* let alone in the *City* of Cambridge! Such is the result of a century of habitat destruction. The sentiments expressed by the writer, however, are very apropos and could equally well apply today.— *Editor.*)

The butterflies of Cambridge— The following is a list of the *Rhopalocera* I have noticed or captured here. I say noticed, as I am always loath to exterminate rare or uncommon insects, and, as a rule, let a butterfly or moth of that description enjoy its liberty when I have satisfied myself as to its identity. By Cambridge, I mean the immediate

neighbourhood of the town itself. I have frequently seen insects reported as having been taken here that have really been captured at places ten or fifteen miles away. I think such loose description should be avoided, or we may for ever despair of seeing the insect fauna of Great Britain correctly mapped out.

Argynnis Aglaia, Euphrosyne, Selene; Vanessa urticae, exceedingly abundant this year, *polychlorus Io,* very abundant this year; *Pyrameis Atalanta,* abundant, *cardui, Apatura Iris* (one); *Melanargia Galathea* (one); *Satyrus Semele,* not common; *Epinephele Janira, Tithonus,* abundant, *Hyperanthus; Coenonympha Pamphilus,* abundant; *Lycaena Aegon, Icarus,* abundant, *Corydon; Colias Edusa* (one); *Rhodocera rhamni; Papilio Machaon; Anthocaris cardamines; Pieris napi, rapae,* exceedingly abundant, *brassicae,* exceedingly abundant; *Hesperia malvae, Sylvanus.*— Albert H. Waters, Mill Road, Cambridge: *October 8th, 1883.*

The above is given as originally printed. Notice the curious random use of capitals. For ease of reference the modern English names are listed below, together with the likelihood of finding the species within the City boundaries.

Argynnis aglaia	*Dark green fritillary*	*No*
Argynnis euphrosyne	*Pearl-bordered fritillary*	*No*
Argynnis selene	*Small ditto*	*No*
Vanessa urticae	*Small tortoiseshell*	*Yes*
Vanessa polychlorus	*Large tortoiseshell*	*No*
Vanessa io	*Peacock*	*Yes*
Pyrameis Atalanta	*Red admiral*	*Yes*
Apatura iris	*Purply emperor*	*No*
Melanargia galathea	*Marbled white*	*No*
Satyrus semele	*Grayling*	*No*
Epinephele janira	*Meadow brown*	*Yes*
Epinephele tithonus	*Gatekeeper*	*Yes*
Epinephele hyperanthus	*Ringlet*	*No*
Coenonympha pamphilus	*Small heath*	*Yes*
Lycaena Aegon	*Silver-studded blue*	*No*
Lycaena icarus	*Common blue*	*Yes*
Lycaena corydon	*Chalk hill blue*	*Yes*
Colias edusa	*Clouded yellow*	*No*
Rhodocera rhamni	*Brimstone*	*Yes*
Papilio Machaon	*Swallowtail*	*No*
Anthocaris cardamines	*Orange-tip*	*Yes*
Pieris napi	*Green-veined white*	*Yes*
Pieris rapae	*Small white*	*Yes*
Pieris brassicae	*Large white*	*Yes*
Hesperia malvae	*Grizzled skipper*	*No*
Hesperia sylvanus	*Large skipper*	*Yes*

OBSERVATIONS ON COLEOPHORA SERRATELLA

The Raven-feather case moth

by John L. Gregory (4116)

The detailed life-history of the early larval stages of this species seems to have been virtually unnoticed, or perhaps unrecorded in available literature, which is rather surprising for a moth which is very common both in Cornwall and elsewhere. My own observations are very far from complete, as I have not yet seen a natural wild pairing nor yet observed the female in the act of ovipositing. However, ova are laid in the late summer on hazel (*Corylus*), birch (*Betula*) or alder (*Alnus*), which are all members of the Betulaceae, although on occasions larvae have been found feeding on the leaves of various other trees and even low-growing plants.

The length of time passed in the ova stage does not seem to be reliably known, but by early autumn the eggs will have hatched, and the tiny larvae will have started feeding in a very small inconspicuous mine from which the first case is constructed.

Several larvae may attack the same leaf, suggesting that ova are laid in batches and not as singles, although each mine is usually the work of only one larva.

The case seems to be made from the upper and lower cuticles of the mined area, or perhaps only a part of the mined area, the two pieces being spun together with silk to form the two "valves" of the case. The case is in the form of a curved tube, usually tapering towards the tail end, sometimes almost to a point, and the curvature of the case is through about 90 degrees so that four cases placed end to end would form a rough circle.

They sometimes appear to be slightly flattened laterally, and there is often a keel either ventrally or dorsally, or both. As feeding progresses the case may be lengthened slightly by the addition of a ring of silk at the mouth end.

Long before the leaves begin to wither and fall, the larva selects a site for hibernation on a twig of the foodplant where the case is extremely well-camouflaged to resemble a minute piece of a torn brown dead leaf or part of the outer covering of an overwintering leaf bud.

By the following spring the cases have become dark brown or blackish, and on awakening from diapause, each larva seeks out a newly opened leaf-bud, and commences a new mine in a young leaf, feeding from the underside of the leaf, sometimes only one but often several larvae choosing the same leaf. The larva first secures the mouth of its case to the lower cuticle of the leaf with silk, then proceeds to bite through the

cuticle and mines as far as it can reach whilst still holding on to the inside of the case with its posterior prolegs and/or claspers, and after feeding it reverses into the case again, ejects any frass from the opening at the tail end of the case, breaks the silken ties between the mouth-opening and the cuticle, and walks away on its thoracic legs to find a new feeding-place nearby. At this time larvae in their cases are sometimes dislodged from their feeding areas and can often be found not far above the ground, suspended by a long strand of silk from the upper part of the tree, which is undoubtedly an aid to dispersal by the wind.

One of the most fascinating things I have ever observed in my studies of the microlepidoptera is to watch what happens when the larva of this species has grown too big for the case it has lived in for about eight or nine months. In late May, or early June, before the leaves of its foodplant have reached full size, and probably immediately after a moult, although this has not been verified, the larva starts a rather special mine, often near the base of a leaf and not too far from the petiole. Why this part of the leaf should be favoured is uncertain, but perhaps the texture of the cuticle and the distance between two adjacent parallel veins in this area may be important factors in determining the quality of the new case. The special mine is larger than any previous mine, and it occupies much of the space between two veins, but for the first time the larva continues to mine until the anal claspers are completely free from the case, and in smaller leaves this mine may extend almost to the edge of the leaf.

As feeding progresses in the special mine, the larva not only eats all the parenchyma between the cuticles, but actually bites through both the upper and lower cuticles along the edge of the mine and spins the two edges strongly together with silk. When the mine is large enough a small part of one end is not spun up, and this becomes the mouth opening of the new case. After it has been completely bitten free from the leaf, the second case looks very different from the first, not only in its much larger size, about a quarter of an inch long, but also in its shape and colour. It is more cylindrical than the old one, almost straight ventrally with a slightly serrated edge dorsally. It is at first whitish but gradually it darkens to a pale straw-colour or a light rusty brown. The palest cases are usually from hazel, the more rust-coloured from birch, and on alder they soon turn almost black.

In June, leaves with an elongated hole between two veins and a tiny empty curved Coleophorid case at one end of the hole on the underside are a common sight on hazel hedges.

In its second case the larva makes a number of much larger mines, still nearly always feeding from the underside of a leaf between two veins, and still retreating backwards into the case when not actually feeding. Although the first case is always a true bivalve, the second case usually

has the appearance of being a trivalve at the tail end, due to the folding or bending of one of the pieces of leaf-cuticle at that point.

After several mines have been made, with frequent wanderings from one leaf to another between feeds, the larva becomes full grown and selects a site for pupation. This is often on the upperside of a leaf well away from the last feeding place, or upright on a low-growing plant other than the foodplant. The mouth opening of the case is firmly anchored with silk, and the larva makes a U-turn inside the case before pupating, to allow the moth to emerge from the former tail end of the case.

Moths emerge in July, sometimes at the end of June, but due to their small size, up to about three-eighths of an inch in wingspan, and dull blackish colouring with no discernible markings on the wings, they are not easy to find by searching in daylight, and furthermore they are not strongly attracted to artificial light.

Old feeding-places are often very conspicuous throughout the summer. Although appearing whitish when fresh, they gradually turn brown, but are always instantly recognisable by the neat round hole in the lower cuticle, which is so typical for a number of other Coleophorid species, and of course by the complete absence of any frass in the mine.

LETTER TO THE EDITOR

Dear Editor,
While G. R. Ward's enthusiasm for butterflies is very welcome, may I add a word of caution to those carrying out their own breeding programmes for release into the wild? More, in this case, is not necessarily better. The introduction of new insects can wipe out unique local variations. Also, an increased number of caterpillars may lead to an increased number of predators, in which case not only will the new insects be taken but more than normal amounts from the indigenous population.

These and other problems can often be avoided if the breeder confers with local conservation groups. The local knowledge about the breeding colonies, sites, etc. that they can provide is invaluable, as I am sure Mr Ward is aware.

I am glad that he is encouraging his colleagues to take an interest in his hobby. Since they seem to be responding so positively, one might hope that we shall soon see some new AES members!

Yours faithfully
J. Campbell

(Editor's comment: This is a very complex question which, I feel, assuming someone would be willing to write it, would take an entire issue of the *Bulletin* to argue through in detail, there being numerous pros and cons on both sides. Very briefly, what about the millions of insects which annually *migrate* into this country. They can be said to be the equivalent of released insects. Millions of insects, parasites and predators, are already being released by commercial concerns as for instance the Forestry Commission and Growers of Tomatoes in order to control other insects. Anyone who throws out infested products such as Church roof beams and old furniture containing Deathwatch beetles; a packet of forgotten cornflakes into which *Ptinus* has moved; an old carpet from the attic found by *Tinea pellionella*, is also releasing insects into the wild and it seems to me that anyone who releases butterflies does tend to get picked upon out of all proportion to the very few of this order which are actually released in relation to all the others.

Against release, of course, is, as Mr Campbell says, the wiping out of local variation and the possible increase of predators attracted by an unexpected free food source. However, if the insects being released are already reasonably common neither of these objections is likely to apply, but it is certainly true that for rare and local species, confined perhaps to a habitat on only a few acres, then one must be very careful indeed. Another aspect of the situation is that one also needs to differentiate between the release of a species already occurring and the release of a species not already present in an attempt to establish a new colony. Whether or not this should be done is a very controversial subject and has led one individual in the past to annihilate a colony established with much effort by a fellow entomologist.

The release of bred butterflies into the wild has a very long-established precedent and was certainly practised before the war. If it is to be banned, then so too should the release by farmers and gardeners of that deadly butterfly killer, *Bacillus thuringiensis*.)

Long-suffering Vegetarian Lodger: "Don't trouble to cook the caterpillars in future, Mrs Gedge. I never eat them."

THE FOODPLANTS OF COSTA RICAN SATURNIIDS AND SPHINGIDS

by Prof. Daniel H. Jansen

INTRODUCTION *(by Brian Gardiner)*

While we have had no end of books published about butterflies, with the notable exception of Bernard d'Abrera's *Sphingidae Mundi* rather less has appeared concerning moths and, in the books generally, even less about the early stages. This is a pity, for the life-histories of many species have been published but this information is spread over several hundred Magazines, Journals or Bulletins in a variety of languages and while we might expect the authors of otherwise definitive books to garner up this information, it would be both time-consuming and expensive for the amateur breeder of lepidoptera to seek them all out. In view of the enormous popularity and much more ready availability of many tropical species today any list of lepidoptera and their known foodplants cannot be anything but welcome.

Dr Daniel H. Jansen, Professor of Biology in the University of Pennsylvania, has for many years been studying the Santa Rosa National Park, Guanacaste, Costa Rica, with particular emphasis on its larger moths and has published a number of papers on various aspects both of the park and of its moths in various journals. As many readers are no doubt aware, many of the insects at present available in Europe come from Costa Rica and one firm even conducts entomological collecting trips in the Country. The Park is about the only area of 'Dry' (no rain for six months of the year) tropical forest remaining in Central America and it is Dr Jansen's aim to extend and preserve it. A splendid account of the complexities and ambiguities of the forest, together with his efforts to convince those in authority that it is essential to save the forest was shown on the BBC's Natural World programme in November last year.

With Dr Jansen's permission, therefore, we are pleased to reprint his list of the larger moths and all their known natural foodplants in Costa Rica.

What makes for interesting reading, and which Professor Jansen discusses thoroughly in his papers, is the contrast between the foodplants of the larvae of the Saturnids, which prefer the tops of tall trees, and those of the Sphingids which prefer the lower-growing plants. To emphasise this point we have included the type of plant to show the preference places of the larvae in the foodplant table.

Not of course given included are the foodplants which some of the species are known to accept when in captivity in a temperate zone climate where their natural tropical foodplant is not available, but since the

families to which the foodplants belong are given, this acts as a starting point for the thinking and seeking out of a suitable substitute when the real thing is not even available from the local garden centre, as are so many tropical plants these days. Nevertheless it is known that many tropical species will, when in captivity in a temperate zone, accept readily plant families unknown to them in their feral condition. *Rothschildia* species which feed on Privet (Oleaceae) here, but other plant families in Costa Rica are a good example.

It is also obvious from the list that some species are specific to a single plant while others range over two or three or in some cases almost anything that is put in front of them. The papers published by Dr Jansen from which the following foodplant data is extracted, are illustrated in both colour and black and white, make fascinating reading and are an absolute mine of information about the life-histories, ecology and identification of the families concerned. They should be available through a specialist library service.

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Saturniidae larval hosts in nature in Santa Rosa National Park

Arsenurinae		
Arsenura armida	*Bombacopsis quinatum* (Bombacaceae)	large tree crown
Caio championi	*Bombacopsis quinatum* (Bombacaceae)	large tree crown
Copiopteryx semiramis	*Manilkara chicle* (Sapotaceae)	large tree crown
Dysdaemonia boreas	*Ceiba pentandra* (Bombacaceae)	large tree crown
Tuaea tamerlan	*Bombacopsis quinatum* (Bombacaceae)	large tree crown
Ceratocampinae		
Adeloneivaia isara	*Lysiloma divaricata* (Leguminosae)	large tree crown
	Lysiloma auritum (Leguminosae)	large tree crown
Citheronia bellavista	*Phoradendron quadrangulare* (Loranthaceae)	parasite in crown of large tree
Citheronia lobesis	*Cochlospermum vitifolium* (Cochlospermaceae)	large saplings
	Bursera simaruba (Burseraceae)	large tree crown
	Spondias mombin (Anacardiaceae)	large saplings
	Psidium guajava (Myrtaceae)	shrubby treelet
	Calcyophyllum candidissimum (Rubiaceae)	large tree crown
	Phoradendron quadrangulare (Loranthaceae)	parasite in crown of large tree
Eacles imperialis	*Cochlospermum vitifolium* (Cochlospermaceae)	large saplings and large tree crown
	Bursera tomentosa (Burseraceae)	large tree crown
	Astronium graveolens (Anacardiaceae)	large tree crown
	Cedrela odorata (Meliaceae)	large tree crown
Othorene purpurascens	*Manilkara chicle* (Sapotaceae)	large tree crown
Othorene verana	*Quercus oleoides* (Fagaceae)	large tree crown
Ptiloscola dargei	*Acacia tenuifolia* (Leguminosae)	saplings and large vine crown
Schausiella santarosensis	*Hymenaea courbaril* (Leguminosae)	large tree crown

Syssphinx colla	*Pithecellobium saman* (Leguminosae)	large tree crown
Syssphinx mexicana	*Acacia collinsii* (Leguminosae)	sapling to adult treelet crown
	Acacia cornigera (Leguminosae)	sapling to adult treelet crown
Syssphinx molina	*Pithecellobium saman* (Leguminosae)	large tree crown
	Cassia grandis (Leguminosae)	large tree crown
	Albizzia adinocephala (Leguminosae)	large tree crown
Syssphinx quadrilineata	*Acacia collinsii* (Leguminosae)	laboratory
Hemileucinae		
Automeris io	*Crescentia alata* (Bignoniaceae)	large tree crown
	Mimosa pigra (Leguminosae)	shrub
	Cassia biflora (Leguminosae)	shrub
	Rhynchosia reticulata (Leguminosae)	herbaceous vine
	Gliricidia sepium (Leguminosae)	sapling
Automeris rubrescens	*Inga vera* (Leguminosae)	sapling
	Rourea glabra (Connaraceae)	scandent shrub
	Guazuma ulmifolia (Sterculiaceae)	large tree crown
	Cassia biflora (Leguminosae)	shrub
	Quercus oleoides (Fagaceae)	sapling
	Cordia alliodora (Boraginaceae)	sapling
	Lonchocarpus minimiflorus (Leguminosae)	sapling
	Calcycophyllum candidissimum (Rubiaceae)	large tree crown
	DHJ 12175 (Bignoniaceae)	sapling vine
	Zuelania guidonia (Flacourtiaceae)	large tree crown
	Crescentia alata (Bignoniaceae)	large tree crown
	Cassia grandis (Leguminosae)	large tree crown
Automeris zugana	*Annona purpurea* (Annonaceae)	large tree crown
	Lonchocarpus costaricensis (Leguminosae)	large tree crown
	Quercus oleoides (Fagaceae)	large tree crown
	Cydista heterophylla (Bignoniaceae)	large woody vine
	Calycophyllum candidissimum (Rubiaceae)	sapling to large tree crown
	Hymenaea courbaril (Leguminosae)	sapling
	Solanum hazenii (Solanaceae)	large herb
	Lantana camara (Verbenaceae)	large herb/shrub
	Lonchocarpus eriocarinalis (Leguminosae)	large tree crown
	Centrosema pubescens (Leguminosae)	herb vine
	Cassia hayesiana (Leguminosae)	shrub/treelet
	Inga vera (Leguminosae)	sapling
	Serjania atrolineata (Sapindaceae)	large vine
Dirphia avia	*Hymenaea courbaril* (Leguminosae)	large tree crown
	Cedrela odorata (Meliaceae)	large tree crown
Hylesia dalina	*Casearia arguta* (Flacourtiaceae)	treelet
	Malvaviscus arboreus (Malvaceae)	shrub
Hylesia lineata	*Tabebuia rosea* (Bignoniaceae)	sapling
	Bombacopsis quinatum (Bombacaceae)	large tree crown
	Cordia alliodora (Boraginaceae)	treelet
	Hirtella racemosa (Chrysobalanaceae)	treelet
	Muntingia calabura (Elaeocarpaceae)	treelet
	Casearia arguta (Flacourtiaceae)	treelet
	Casearia sylvestris (Flacourtiaceae)	treelet
	Casearia corymbosa (Flacourtiaceae)	treelet
	Zuelania guidonia (Flacourtiaceae)	large tree crown
	Acacia tenuifolia (Leguminosae)	large vine crown
	Cassia biflora (Leguminosae)	shrub
	Diphysa robinioides (Leguminosae)	sapling
	Enterolobium cyclocarpum (Leguminosae)	large tree crown
	Hymenaea courbaril (Leguminosae)	sapling
	Inga vera (Leguminosae)	treelet
	Lonchocarpus minimiflorus (Leguminosae)	treelet
	Lonchocarpus costaricensis (Leguminosae)	sapling
	Lysiloma auritum (Leguminosae)	large tree crown
	Machaerium kegelii (Leguminosae)	sapling large vine
	Mimosa pigra (Leguminosae)	shrub
	Myrospermum frutescens (Leguminosae)	treelet
	Pithecellobium lanceolatum (Leguminosae)	treelet
	Hyptis pectinata (Labiatae)	large herb
	Malvaviscus arboreus (Malvaceae)	shrub
	Banisteriopsis muricata (Malpighiaceae)	low vine
	Byrsonima crassifolia (Malpighiaceae)	treelet

	Stigmaphyllon ellipticum (Malpighiaceae)	low vine
	Psidium guineense (Myrtaceae)	shrub
	Ouratea lucens (Ochnaceae)	shrub
	Gouania polygama (Rhamnaceae)	low vine
	Calycophyllum candidissimum (Rubiaceae)	sapling
	Chomelia spinosa (Rubiaceae)	treelet
	Guettarda macrosperma (Rubiaceae)	treelet
	Xanthoxylum setulosum (Rutaceae)	sapling
	Allophyllus occidentalis (Sapindaceae)	treelet
	Cupania guatemalensis (Sapindaceae)	treelet
	Paullinia cururu (Sapindaceae)	low vine
	Serjania schiedeana (Sapindaceae)	low vine
	Urvillea ulmacea (Sapindaceae)	low vine
	Byttneria aculeata (Sterculiaceae)	shrub
	Byttneria catalpaefolia (Sterculiaceae)	low vine
	Guazuma ulmifolia (Sterculiaceae)	medium tree
	Luehea speciosa (Tiliaceae)	sapling
	Lantana camara (Verbenaceae)	shrub
	Erythroxylum havanense (Erythroxylaceae)	shrub
	Calliandra emarginata (Leguminosae)	shrub
Periphoba arcaei	*Eugenia salamensis* (Myrtaceae)	medium tree crown
	Cassia biflora (Leguminosae)	shrub
	Guazuma ulmifolia (Sterculiaceae)	large tree crown
	Lysiloma auritum (Leguminosae)	large tree crown
	Spondias mombin (Anacardiaceae)	large tree crown
	Rourea glabra (Connaraceae)	scandent shrub
	Annona purpurea (Annonaceae)	treelet crown
	Calycophyllum candidissimum (Rubiaceae)	large tree crown
	Bombacopsis quinatum (Bombacaceae)	large tree crown
	Cassia alata (Leguminosae)	large tree crown
	Inga vera (Leguminosae)	medium tree crown
	Ardisia revoluta (Myrsinaceae)	treelet
	Astronium graveolens (Anacardiaceae)	sapling
	Hymenaea courbaril (Leguminosae)	sapling
	Quercus oleoides (Fabaceae)	large tree crown
	Miconia argentea (Melastomataceae)	sapling
Saturniinae		
Copaxa moinieri	*Ocotea veraguensis* (Lauraceae)	saplings and lower branches of treelet
Rothschildia erycina	*Exostema mexicanum* (Rubiaceae)	large tree crown
	Coutarea hexandra (Rubiaceae)	treelet crown
Rothschildia lebeau	*Exostema mexicanum* (Rubiaceae)	large tree crown
	Spondias mombin (Anacardiaceae)	large tree crown
	Spondias purpurea (Anacardiaceae)	treelet
	Casearia corymbosa (Flacourtiaceae)	treelet
	Zuelania guidonia (Flacourtiaceae)	large tree crown
	Xanthoxylum setulosum (Rutaceae)	large tree crown

Sphingidae larval hosts in Santa Rosa National Park

Aellopos clavipes	*Randia karstenii* (Rubiaceae)	sapling to treelet
Aellopos fadus	*Genipa americana* (Rubiaceae)	sapling to large tree
	Alibertia edulis (Rubiaceae)	shrub
Aellopos titan	*Randia karstenii* (Rubiaceae)	sapling to treelet
	Randia subcordata (Rubiaceae)	sapling to treelet
Agrius cingulatus	*Merremia umbellata* (Convolvulaceae)	herb vine
	DHJ 12071 (Convolvulaceae)	herb vine
Aleuron carinata	*Doliocarpus dentatus* (Dilleniaceae)	low perennial vine
Aleuron iphis	*Tetracera volubilis* (Dilleniaceae)	low perennial vine
Amplypterus gannascus	*Ocotea veraguensis* (Lauraceae)	sapling to treelet
Amplypterus ypsilon	*Ocotea veraguensis* (Lauraceae)	sapling to treelet
Callionima falcifera	*Stemmadenia obovata* (Apocynaceae)	sapling to treelet
Cautethia spuria	*Exostema mexicanum* (Rubiaceae)	sapling to large tree
	Coutarea hexandra (Rubiaceae)	treelet
Cautethia yucatana	*Exostema mexicanum* (Rubiaceae)	treelet
Cocytius duponchel	*Annona purpurea* (Annonaceae)	sapling to treelet
	Annona reticulata (Annonaceae)	sapling to treelet
Enyo ocypete	*Tetracera volubilis* (Dilleniaceae)	low perennial vine

	Ciccus rhombifolia (Vitaceae)	herb vine
Erinnyis ello	*Sebastiana confusa* (Euphorbiaceae)	sapling to treelet
	Sapium thelocarpum (Euphorbiaceae)	sapling
	Manilkara chicle (Sapotaceae)	large tree
Erinnyis lassauxii	*Sarcostemma glauca* (Asclepiadaceae)	low vine
Erinnyis oenotrus	*Forsteronia spicata* (Apocynaceae)	low perennial vine
Eumorpha anchemola	*Cissus rhombifolia* (Vitaceae)	low perennial vine
	Cissus sicyoides (Vitaceae)	low perennial vine
Eumorpha satellitia	*Cissus rhombifolia* (Vitaceae)	low perennial vine
	Cissus sicyoides (Vitaceae)	low perennial vine
Eupyrrhoglossum sagra	*Chomelia spinosa* (Rubiaceae)	sapling to treelet
	Guettarda macrosperma (Rubiaceae)	sapling to treelet
Isognathus rimosus	*Plumeria rubra* (Apocynaceae)	large tree
Manduca barnesi	*Godmania aesculifolia* (Bignoniaceae)	sapling
Manduca corallina	*Cordia alliodora* (Boraginaceae)	sapling to large tree
Manduca dilucida	*Sapranthus palanga* (Annonaceae)	sapling to treelet
	Annona reticulata (Annonaceae)	sapling to treelet
Manduca florestan	*Pithecoctinium crucigerum* (Bignoniaceae)	low perennial vine
	Cydista heterophylla (Bignoniaceae)	low perennial vine
	Tabebuia ochracea (Bignoniaceae)	sapling
	Callichlamys latifolia (Bignoniaceae)	low perennial vine
	Arrabidaea chica (Bignoniaceae)	low perennial vine
	Cornutia grandifolia (Verbenaceae)	shrub
	Ceratophytum tetragonolobum (Bignoniaceae)	low perennial vine
	Pleonotoma variabilis (Bignoniaceae)	low perennial vine
	Stachytarpheta frantzii (Verbenaceae)	shrub
Manduca lefeburei	*Casearia sylvestris* (Flacourtiaceae)	sapling to treelet
	Casearia corymbosa (Flacourtiaceae)	sapling to treelet
Manduca muscosa	*Verbesina gigantea* (Compositae)	giant herb
	Lantana camara (Verbenaceae)	shrub
	Lasianthaea fruticosa (Compositae)	shrub
	Baltimora recta (Compositae)	herb
	Melanthera aspera (Compositae)	herb
	Wedelia calycina (Compositae)	herb
Manduca occulta	*Solanum ochraceo-ferrugineum* (Solanaceae)	herb
	Solanum hazenii (Solanaceae)	herb
	Solanum accrescens (Solanaceae)	herb
	Cestrum DHJ 12029 (Solanaceae)	shrub
Manduca rustica	*Lantana camara* (Verbenaceae)	shrub
	Stachytarpheta frantzii (Verbenaceae)	shrub
	Cordia panamensis (Boraginaceae)	sapling
	Pithecoctenium crucigerum (Bignoniaceae)	low perennial vine
	Amphilophium paniculatum (Bignoniaceae)	low perennial vine
	Merremia umbellata (Convolvulaceae)	herb vine
	DHJ 12071 (Convolvulaceae)	herb vine
	Hyptis verticillata (Labiatae)	herb
Manduca sexta	*Capsicum annum* (Solanaceae)	herb
	Lycopersicon esculentum (Solanaceae)	herb
Neococytius cluentius	*Piper marginatum* (Piperaceae)	shrub
Nyceryx coffeae	*Calcycophyllum candidissimum* (Rubiaceae)	sapling to large tree
Pachygonia drucei	*Doliocarpus dentatus* (Dilleniaceae)	low perennial vine
Pachylia ficus	*Ficus insipida* (Moraceae)	sapling to large tree
	Ficus cotinifolia (Moraceae)	sapling to large tree
	Ficus obtusifolia (Moraceae)	sapling to large tree
	Ficus ovalis (Moraceae)	sapling to large tree
	Brosimum alicastrum (Moraceae)	sapling
	Chlorophora tinctoria (Moraceae)	sapling to large tree
	Castilla elastica (Moraceae)	sapling
Pachylia syces	*Ficus ovalis* (Moraceae)	large tree
Pachylioides resumens	*Forsteronia spicata* (Apocynaceae)	low perennial vine
Perigonia lusca	*Calcophyllum candidissimum* (Rubiaceae)	sapling to large tree
	Guettarda macrosperma (Rubiaceae)	sapling to treelet
Protambulyx strigilis	*Astronium graveolens* (Anacardiaceae)	sapling to large tree
	Spondias mombin (Anacardiaceae)	sapling to large tree
Pseudosphinx tetrio	*Plumeria rubra* (Apocynaceae)	large tree
Sphinx merops	*Lantana camara* (Verbenaceae)	shrub
	Hyptis pectinata (Labiatae)	herb

Unzela pronoe	*Tetracera volubilis* (Dilleniaceae)	low perennial vine
Xylophanes anubus	*Psychotria nervosa* (Rubiaceae)	shrub
	Psychotria horizontalis (Rubiaceae)	shrub/herb
Xylophanes ceratomioides	*Hamelia patens* (Rubiaceae)	shrub
Xylophanes chiron	*Psychotria pubescens* (Rubiaceae)	shrub
	Psychotria horizontalis (Rubiaceae)	shrub
	Faramea occidentalis (Rubiaceae)	sapling
Xylophanes juanita	*Psychotria pubescens* (Rubiaceae)	shrub
	Psychotria horizontalis (Rubiaceae)	shrub/herb
	Psychotria nervosa (Rubiaceae)	shrub
Xylophanes maculator	*Psychotria horizontalis* (Rubiaceae)	shrub/herb
Xylophanes pluto	*Hamelia patens* (Rubiaceae)	shrub
Xylophanes porcus	*Hamelia patens* (Rubiaceae)	shrub
Xylophanes turbata	*Hamelia patens* (Rubiaceae)	shrub to treelet
	Psychotria mecrodon (Rubiaceae)	shrub/herb
Xylophanes tyndarus	*Faramea occidentalis* (Rubicaeae)	treelet

STAG BEETLES (*LUCANIDAE*) IN BUCKINGHAMSHIRE

by Anthony Wootton (3331)

While I have received several reports of Stag-beetles (*Lucanus cervus*) in the Aylesbury area of Buckinghamshire, I have never seen one here myself. Indeed, I have often felt it ironic that so many interesting insects (and other animals) tend to be seen by just those least likely to be enchanted by them! They also turn up in the most unlikely places. One male stag-beetle was apparently seen strolling unconcernedly over the pavement in Aylesbury's busy Friar's Square a few years ago. Another was, it seems, found by a boy in countryside nearby and taken to a local veterinary surgeon (!) who recommended that it should be buried!

The Lesser stag-beetle (*Dorcus parallelipipedus*), on the other hand, I have found fairly frequently, particularly in the Stone-Hartwell area, some three miles from Aylesbury, usually under the bark of old logs or long-felled trees or beneath decomposing stumps. I discovered a pair of Lesser stags beneath such a stump on July 17th last, in close proximity to a fierce *Myrmica* ants' nest. Our third Lucanid, the little blackish *Sinodendron cylindricum*, is also fairly common here, usually within decomposing wood.

RED UNDERWING AT FERRYBRIDGE

by L. Northern (6586)

I would like to record finding a perfect fresh specimen of the Red underwing (*Catocala nupta*) at Ferrybridge, near Pontyfract, Yorkshire on September 6th 1987 at 4.30am. This is the first one I have ever come across.

LARGE WHITE LARVAE ON HONESTY LEAFAGE

by Anthony Wootton (3331)

On July 1 1987, I was surprised to find at least six almost fully grown caterpillars of the Large white (*Pieris brassicae*) feeding on my neighbour's Honesty (*Lunaria*) leafage. I have, of course, often seen *brassicae* caterpillars on nasturtium (*Tropaeoleum*), as well as *Brassica* cultivars, but never before on *Lunaria*. Have any readers similar experience?

(*Lunaria* is a member of the Cruciferae and I have yet to discover any species of this large family which the Large white will *not* feed on.—Editor.)

ANOTHER LESSER EARWIG

by Anthony Wootton (3331)

How strangely things happen! In my recent note on earwigs (*Bulletin* 46:131-135) I mentioned that my observations of the Lesser earwig (*Labia minor*) had been few and far between. What was my surprise, therefore, on June 30 1987 to have a *dead* specimen flutter down from the sky onto my open newspaper as I sat on my balcony! Had it been nipped and then rejected by a bird, perhaps? The insect was apparently undamaged and the wings retracted though protruding well beyond the ends of the tegmina.

MONARCH NOW ESTABLISHED IN SPAIN

by C. Rankin (8833)

During the last three years I have noticed several Monarch butterflies (*Danaus plexippus*) near to the town of Nerja in Malaga Province, Spain. I have only seen them in autumn and in 1987 one came several times (or perhaps it was several at different times) and settled on a grapefruit tree and a bougainvillea, ignoring nearby *Asclepias*.

Now from my books I see that it is not thought to breed in Spain. If it is indeed breeding there how can I go about finding out?

(Editors note: Certainly in 1979 when Manley and Allcard published their *Field Guide to the butterflies and burnets of Spain*) it was not considered a resident. However, Peter Cribb informs me that it now seems to be well-established there and also in the Algarve. Information concerning Spanish lepidoptera, in which we English also seem to have a great interest, will most likely be found in the Spanish entomological journals such as *Shilap & Graellsia*.)

THE STREAK MOTH IN STAFFORDSHIRE

by Jan Koryszko (6089)

Over the last few years the Streak (*Chesias legatella*) has turned up in some areas of Staffordshire far from its foodplant, broom. A few years ago I saw a possible sighting of this moth on Barlaston Rough Close Common where only a small amount of broom grows and Mr Steve Cooper has recorded a few moths each year on this species at light from Caverswall since 1984. Here broom grows mainly in gardens where the moth may well become established and perhaps also on other plants growing there. In Skinner's book it is stated to have been found in one locality in Hampshire on tree lupin. The only area where I have found it to be quite common is in Parkhill County Park on a sunny autumn afternoon, October 3 1987 when out beating the broom bushes and this turned out to be a new record for the area. This Park is close to Barlaston Common and to Caverswall, so they could have migrated in from there. Other localities are at Leek and Moddershall, the latter many years ago, but in other parts of Staffordshire it is common wherever broom has been established for a long time. It is my belief that the species is extending its range in the County.

THE SPIDER

by E. F. Laurence

Fate is a spider
Endlessly spinning
We who defied her
Voice so winning,
And they who so recklessly
Flew to her call,
Are flies, one and all.
We buzz and we hum
But we come.
Her web is like silver
Bright in the sun.

Blinded our flying
Nearer and nearer
Why do we not fear her?
We are caught, we are dying,
Her task is done.
There is no surprise
In her little cold eyes
As she fastens upon us,
One by one.
Fate is a spider
Endlessly spinning.

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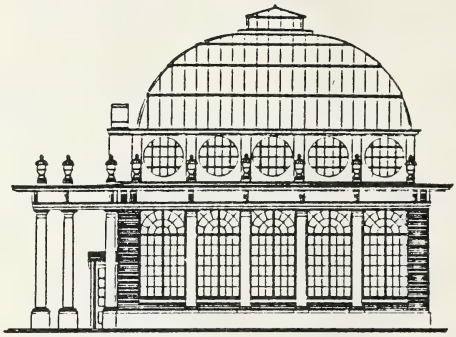

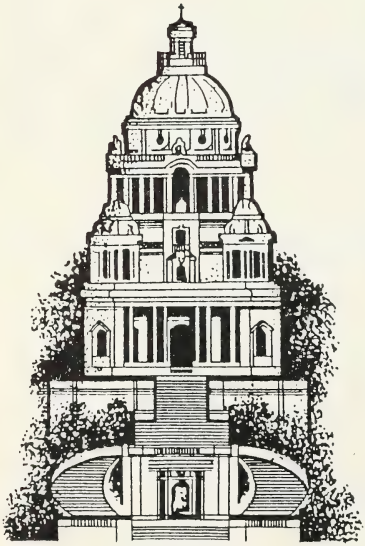

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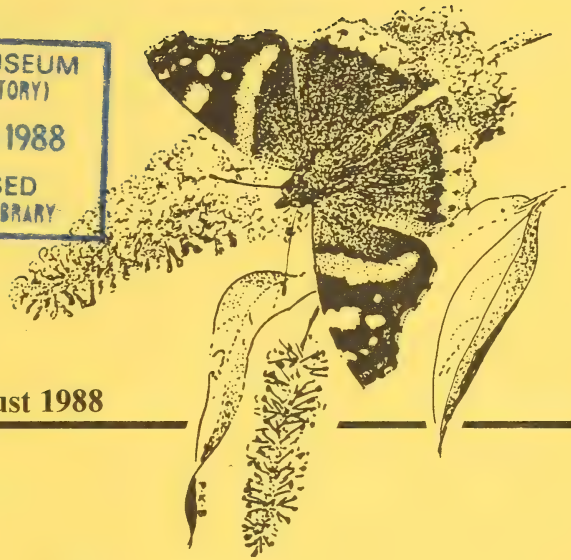

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EDITOR
BRIAN O.C. GARDINER, F.L.S.

The Amateur Entomologists' Society

Founded in 1935

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Hon. General Secretary:	C. C. PENNEY	109 Waveney Drive, Springfield, Chelmsford, Essex CM1 5QA.
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Hon. Bulletin Editor:	B. O. C. GARDINER	64 Montague Road, Cambridge CB4 1BX.
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AES BULLETIN

No. 360

THE ADULT AMATEUR IN AMERICAN ENTOMOLOGY

A GLIMPSE BEHIND THE STEREOTYPES *

by Janice R. Matthews

(175 Landor Drive, Athens, Georgia 30606, U.S.A.)

INTRODUCTION

What image do the words "amateur entomologist" bring to your mind? For most Americans, the answer would be a child, perhaps a 10-year old boy with a butterfly net. Unlike their counterparts in Great Britain and parts of Europe, many people in the United States are not even aware that adult amateurs exist outside of cartoon features. Even those who acknowledge their presence are apt to view them as rare eccentric relics of a past age and/or comical misfits living in a world of their own.

How much truth do these stereoptyes contain? Suppose I were to ask you to describe an adult amateur entomologist. What would be this person's sex? Age? Personality type? How much science would the person probably know? What would his or her general interests probably be? How would you check the accuracy of your impressions? No one seems to know much about these folk, although the first step in any discussion of amateurs should be to know who they are.

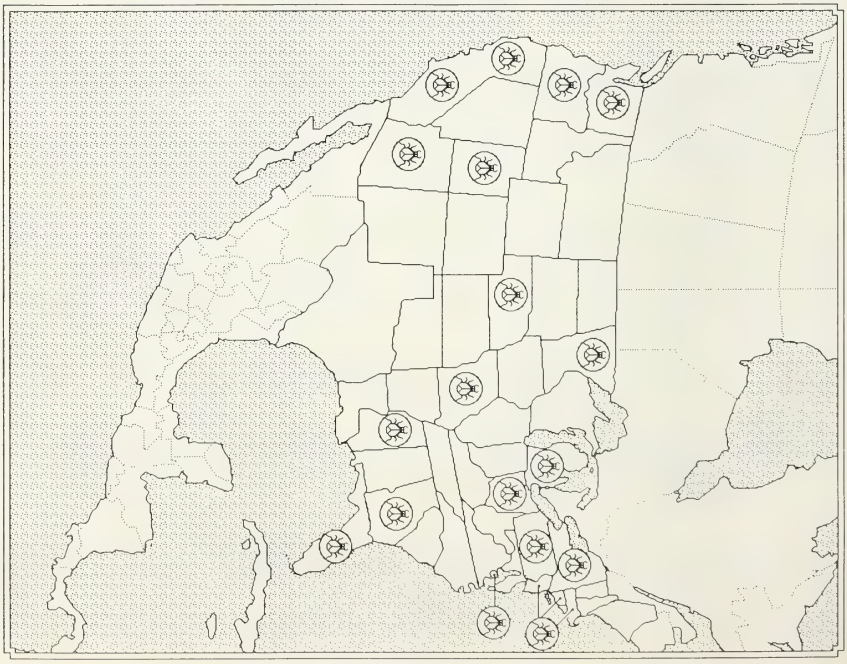
When I was asked to talk about amateur entomologists at an informal conference at last year's annual meeting of the Entomological Society of America (Matthews, 1988a), it seemed like a perfect time to begin to

*Slightly modified from an article appearing in the spring 1988 issue of the *Young Entomologists' Society Quarterly*, and appearing here with their permission. For further information about that organisation, contact Mr Gary Dunn, Y.E.S. Director, c/o Department of Entomology, Michigan State University, East Lansing, MI 48824-1115, U.S.A.

answer such questions. By focussing on adult experiences, we might learn more about the reasons why some people become interested in entomology, why they continue to make this area of natural history an adult avocation, and how those of us with such an interest could share it most effectively.

Because people's experiences are inextricably linked to their culture and surroundings, it seemed best to begin by concentrating solely upon amateurs in the United States. With the help of Dr Karen Strickler at Michigan State University, I contacted seven American entomological societies whose membership includes a number of amateurs — the Cambridge (Mass.) Entomological Club, Xerces Society, Lepidopterist Society, Butterfly Lovers International, Amateur Entomologists' Society, Oregon Entomological Society, and the Young Entomologists' Society. Amateurs in these societies were encouraged to write and share their experiences.

One of these groups proved an especially helpful resource (Matthews, 1988b). Despite its name and the fact that it is a lineal descendent of the Teen International Entomology Group, the Young Entomologists' Society welcomes members of any age. Its membership currently includes amateurs and professionals from throughout the world, and members may opt to be listed in a Directory through which they can correspond



with or exchange specimens with other members. The 1987 Member Directory includes 69 people who identified themselves as adult amateurs residing in the United States. To each, I wrote a personal letter which included these questions:

1. When did you first become interested in entomology?
2. How does this interest find expression in your life now?
3. How does it relate, if at all, to what you do for employment?
4. To what degree do you share this interest with other scientists or non-scientists?
5. What other things do you feel I should be sure to mention when talking about this subject to an audience that will be made up almost completely of professionals and students intending to become professionals?

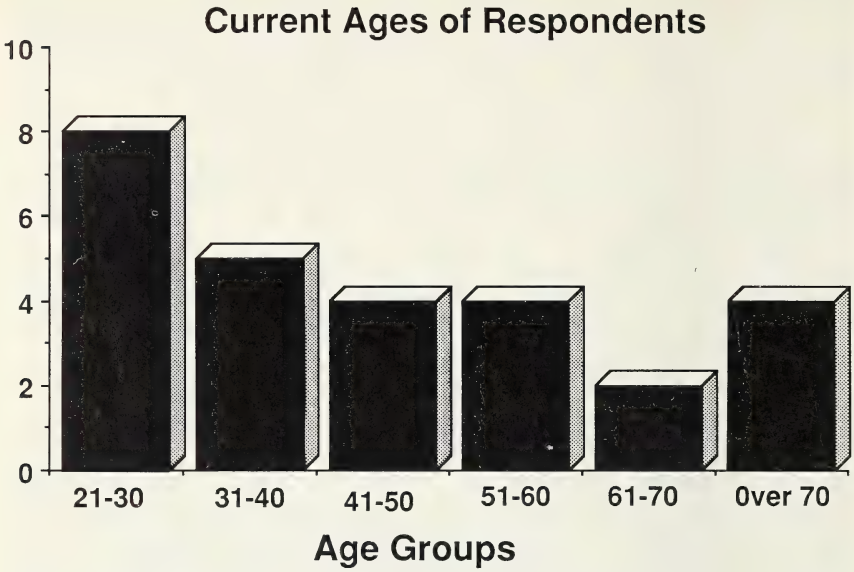
Very soon I received 35 letters from all over the United States (Fig. 1). The extent to which they were representative of all American amateur entomologists is unknown, of course, but these individuals do provide the first available profile of this important group. Most published accounts of amateur entomology, entertaining and insightful as they may be, are reminiscences of single individuals who have maintained a life-long interest in insects. Are their experiences typical? It will take further studies on both sides of the Atlantic before we can begin to know the answer. Nonetheless, from the number of people who wrote, and the length and detail of most of their letters, it was clear that my questions had touched a few delicate nerves. It was also clear that some commonly held stereotypes about amateur entomologists need some conspicuous revamping.

WHO IS THE ADULT AMATEUR ENTOMOLOGIST IN AMERICA TODAY?

The Y.E.S. members responding to the survey were distributed fairly across all age groups (Fig. 2). Slightly higher numbers of individuals in the 21 - 30 age group are explained by the inclusion of college students who considered themselves amateurs at this time, whether or not they eventually planned a paid entomological career.

Approximately one of every three correspondents was a woman. According to 1987 Y.E.S. membership lists, one of four adult Y.E.S. members is female, so it appears that women were slightly over-represented in the survey, perhaps because they were more apt to respond to my letter.

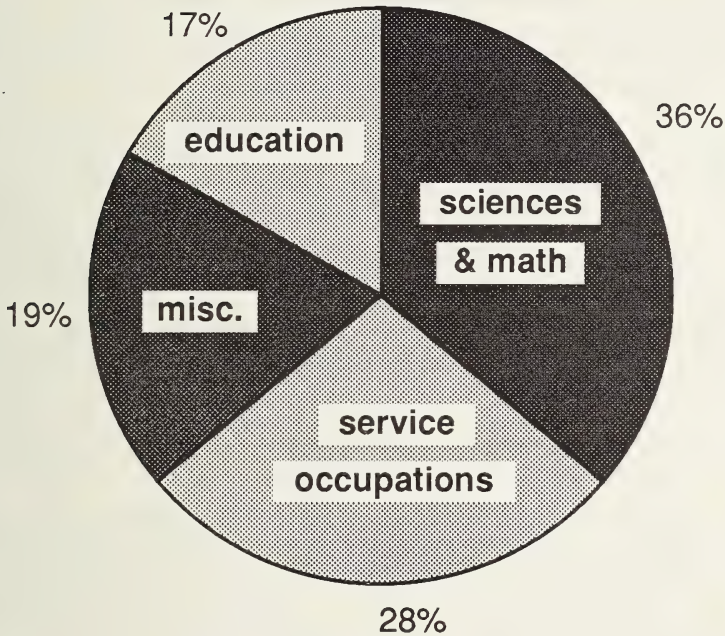
One has no way of knowing the extent to which Y.E.S. accurately mirrors the sex distribution of amateur entomologists nationwide. Nonetheless, it is still clear that the proportion of women among amateur entomologists in the Unites States is several times greater than the proportion of women Ph.D. level professional entomologists (Wrensch,



1987). Despite increases in the last decade, the number of women is still small, not because women are in any way less endowed with the skills that make a good scientist but because a variety of socialisation processes have operated to steer women away from the study of science as a basis for their life's work. Attention to these processes is important if the numbers of women in professional entomology is to increase (Strickler, 1987). However, researchers should make a conscientious effort to separate interests in science from interests in a science career. The numbers of women pursuing amateur interests not only in entomology but throughout natural history make it clear that women are making decisions on these two issues independently.

Four out of five respondents became interested when they were children, some remembering firmly established interests when as young as four or five years old. One out of every five however, remembered no particular interest in science until well into adulthood. Significantly, almost no one reported an interest which began as a teenager. (Very recently, I received a single letter from an adult who became involved in entomology during his high school years as a result of an unusually inspiring teacher.) The teenage period appears to have been a difficult one even for highly committed amateurs. A full quarter of the respondents who had been interested as children reported ignoring entomology during their teenage years. In addition, a number of others mentions that they had "gone underground" at this time, hiding their interest or disclosing it only to a few extremely close friends.

Primary Employment of Respondents



The background and current employment of most of the amateurs were far more similar to those of the professional entomologist than common stereotypes would have one believe (Fig. 3). One-third of the respondents were employed in sciences and mathematics. These folk often had a scientific background of a strength equal to many professional entomologists, but in a related field. Several had published in entomology or other biological areas. Another 17% were employed in education. These included occupations such as public and private school teachers, park naturalists, nature centre docents, and agricultural youth group leaders. Whether or not their formal background included much entomology, their current knowledge of the subject was sufficiently impressive to form part of their day-to-day duties. The rest were in occupations in which the biological sciences did not play a central role.

WHAT INFORMATION WOULD AMATEURS LIKE TO SHARE WITH PROFESSIONALS?

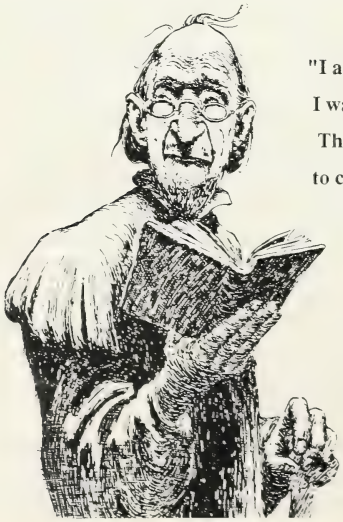
Asked this question, over half of the respondents said — tell the professionals to learn how to relate to adult amateurs! Most reported experiencing a mixed reception from the world of professional entomology. Their

perceptions were that many professionals were ill at ease with adult amateurs. Less commonly, some professionals were cool or hostile. Perhaps a few amateurs charitably suggested, professionals were better at dealing with children's interests than with adults. As one amateur wryly noted, a 10-year old boy with a butterfly net may simply be less threatening to a professional than an adult who does work a lot like your own, but doesn't have to receive a paycheck to do it!

This wasn't all that the amateurs wanted to share, of course. Several had more than one suggestion, including both appreciation for help received and a desire to help professionals in some way in return. However, the second most commonly expressed desire from amateurs was a wish that paid entomologists would join them in their efforts to share entomology with others. Almost half of those answering this question implored professionals to make more of an effort to communicate positively with the world. They particularly stressed increasing involvement with children, adult amateurs, and those working on environmental issues.

HOW MIGHT AMATEUR-PROFESSIONAL RELATIONSHIPS BE IMPROVED?

In a thought-provoking book entitled *Science Anxiety*, physics professor Jeffry Mallow (1981) notes that many professionals treat science as if it were an elite subject for an elite population. Mallow proposes that the scientist who sees himself as a member of an elite club either consciously or unconsiously may send a powerful negative message (Fig. 4). Among young people, this scientific machismo is likely to produce either science



"I am smarter than you.
I was born smarter than you.
There is nothing you can do
to comprehend science as well as I do..."

anxiety or downright avoidance of science. Based on the responses I received, I would predict that adults are more apt to practice simple avoidance, but otherwise their reaction is much the same!

How might a professional scientist develop a better relationship with amateurs? In a special Science Anxiety Clinic established at Loyola University (Mallow, 1981), psychologists and scientists found that students showed a strong positive response when the teacher's attitude reflected a more positive, welcoming message (Fig. 5). This latter is, of course, the way most amateurs feel, and no doubt is one of the reasons they are often such effective communicators one-on-one with other members of the general public.

WHAT KEEPS AN AMATEUR INTEREST IN ENTOMOLOGY INTO ADULTHOOD?

Even in this day of pre-packaged entertainment, most young children continue to feel very positive towards natural history. Yet as a nation, the United States is experiencing a significant decline in public support of science, and science educators are somewhat pessimistic about the extent to which our schools are capable of reversing this trend. Science received little attention in the average American elementary school. Fourteen years ago, a study (Conant, 1974) found that young American public school students received instruction in science, on the average, for not more than one or two minutes per day. There is little evidence that this situation has changed much.

During the teenage years, negative pressures from peers are compounded by the fact that many youngsters experience difficulty during their first formal science experiences, in courses taken when they are eleven or twelve years old as part of the curriculum in middle or junior high school. National reports have concluded that most science programmes for adolescents are irrevelant for large numbers of students at that age and maturity level (Hurd, 1978). In fact, a number of large-scale surveys suggest that the science curriculum in American schools may even work against a continuing interest in science.

Can we look to the professional scientist to solve this problem? Probably not. Even if we were to find that most professionals were comfortable sending a supportive message to a child, it is clear that most are not interacting much with interested children. So if not the professional educators and not the professional scientists, then who will bring science to the public? Probably the most striking finding of this survey was the extent to which amateurs are involved in precisely this task. In addition to the fact that more than half of the respondents were employed in science and/or education, all but two reported additional unpaid volunteer interactions with the public. These included activities ranging from helping youth with individual insect projects, to presenting

school and club programmes, to serving as trail guides at parks and nature centres.

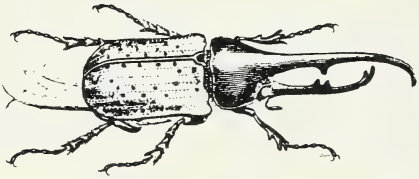
"Here is science.

It is something I have learned to do.

You can learn it too,

because you are not very

different from me."



Judging from the small proportion who listed sharing with professionals among their many activities, one would have to conclude that the amateur entomologist in America is much more visible to the public than he or she is to the professional. Thus, ironically, professionals are largely unaware of the extent to which amateurs are serving as their public relations firm — and in the process, out of personal joy, cultivating the public support that indirectly if not directly keeps the professional employed.

DOES AMATEUR CONTACT REALLY MAKE A DIFFERENCE?

At least among the committed bunch of amateur entomologists who answered my letters, the answer is clear. If one wishes to help a child build a continuing interest in science, one cannot passively hope for interaction with a professional or support from juvenile peers — not one of the respondents reported that their own interest had been nurtured in this way. Rather, one after another stressed the importance of the meaningful support which they had received from amateur scientists — either within their own family or among their acquaintances — usually coupled with what they perceived as a rich natural, educational or home

environment. The importance of this is underscored by the fact that although the 1987 letter did not ask who or what had influenced childhood interests, half of all respondents spontaneously mentioned the importance of these individuals in their lives.

This interest and enthusiastic support does not have to rest on any detailed scientific background. John Miller, a political scientist at Northern Illinois University, has extensively researched the subject of science attitudes among the adult population at large, concentrating on a trait which he calls "attentiveness to science" (Miller and Prewitt, 1979; Miller, Suchner and Voelker, 1980). Miller and co-workers have found that this attentiveness in an individual's personality interacts with one's science knowledge in a spiralling manner. The more attentive one is, the more knowledge one absorbs from one's surroundings; the more knowledge one picks up, the more attentive one in turn becomes.

A PLEA TO AMATEURS: CONTINUE TO SHARE THE JOY!

The very word "amateur" is derived from the Latin *amare*, to love. In describing their avocation, the amateurs who wrote uniformly used words like joy, excitement, wonder, delight, thrill, satisfaction, fulfilment . . . and were not reluctant to share these feelings with others. How wonderful for those whose lives these individuals touch! An attitude of joy towards the natural world is caught, not taught! It is a "contagious disease" picked up from other individuals. People respond positively to those who see science as only one of a number of fascinating intellectual pursuits, rather than as the only interesting area of study or the exclusive province of a selected elite. Keep up the good work! On such communication rests the world's hope for a scientifically literate future.

ACKNOWLEDGEMENTS

Grateful thanks go to the amateur entomologists across America who promptly, fully, frankly and joyfully shared their experiences with me. Without their help, this paper could not have been written.

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Fig. 1. Geographic location of those responding to a 1987 letter sent to all adult members of the Young Entomologists' Society residing in the United States.

Fig. 2. Current age of respondents. Although age was not asked, most volunteered this information.

Fig.3. General categories of primary employment for amateur entomologists responding to the letter.

Fig. 4. When a person acts as though he believes this, others go out of their way to avoid him!

Fig. 5. When a person communicates in this way, others feel welcome and want to learn.

EXHIBITORS AT THE 1987 EXHIBITION

by Roy F. McCormick (3375)

R. BARRINGTON (6023) Corfu insects mainly Coleoptera.

G. BECCALONI (8137) British macros, including a possible unique bilateral gynandromorph of *L. camilla* plus other intersting examples of the same species.

C. BETTS (4976) An illustrated display showing differences between social Hymenoptera and the solitary species, plus descriptions of and including a wasp nest. All the British species of social wasp were displayed.

T. CARTER (6178) Various aberrations of British macros.

A. CASSIDY (7385) Lycaenidae and Hesperiidae of Thailand.

M. CASTLE (2490) Photographs of British butterflies and other orders.

J.M. CHALMERS-HUNT (1683) Local or rare Lepidoptera taken or reared in 1987, including *Myrmelozela ochraceella* taken from the Rannoch district.

P.W. CRIBB (2270) Macros from the Pyrenees and Central Spain, including vars. of *Fabriciana chlorodippe, Brenthis ino* and *Lysandra thersites;* also included were F2 and F3 bred generations of *M. parthenoides L. dispar batavus* and *E. aurinia.*

N. GREATOREX-DAVIES (5423) A representative selection of the 140 or so species recorded during a trip to the Pyrenees. Included were specimens of *P. nicias* (Silvery argus) and the Ringlet butterflies *E. gorgone, E. lefebvrei* and *E. hispana.*

R. DYKE (4182) Bred specimens of *P. ochrodactyla* and *T. fimbrialis* (Sussex emerald). Also exhibited were photos of the habitat of *Z. exulans* (Scotch burnet). Geographical variations of *H. perplexa* (Tawny shears) and colour variation of *A. prunaria* form *corylana.*

D. and R. FITTER (7841J and 8526J) Photographs and explanation text including specimens of European Macrolepidoptera.

DES FOX (7831) and SEAN BURKE (7266) Set Irish Macrolepidoptera.

M. HALL (7859) Moths collected from around hotel lights in Freetown, Sierra Leone, in the period Christmas to New year 1986-1987; a detailed acount of relaxing and storage procedures used in the field was also shown.

A. HALSTEAD (6346) Some local or uncommon Coleoptera taken in 1987. Twelve specimens were shown with descriptions of the localities they were found in. Species of note are *Cryptocephalus nitidulus, Soronia punctatassima, Cicones variegata, Amphimallon ochraceus, Metoecus paradoxus* and *Mordella villosa.*

C. HART (3845) Unusual moths seen in the garden at Dungates Lane, Buckland, Surrey. Notable species were *C. ligustri* (Coronet), *D. oo* (Heart moth), *L. suasa* (Dogs tooth), *E. tritici* (White-line dart), *P. fuliginaria* (Waved black) and *E. occulta* (Great brocade).

R. HOPPER (4848) In association with Mid Devon Natural History Society. Various natural history objects.

M. HOUGH (3359) Moths from Brunei.

R.J. JAMES (5005) A series of Spurge hawk moths bred from larvae found during the last week of October 1986 near Chania, Crete; including a female with unbanded hind wings.

B. JAMESON (8690J) Other orders including Giant millepedes, Giant snails and Crickets. These species live in harmony together and eat the same type of vegetable food.

M. JOHNSON (3464J) Fossil Insects and Spiders with explanatory notes on the evolution of Anthropods from mid carboniferous (600 million years ago) to recent.

R. JONES (8355) Close-up photographs of various insects.

G. KNIGHT (8040J) Results of the first three years of light trapping compared with the "Wolverhampton Larger Moth List"; including live specimens of Humming bird hawk moth imago and larvae plus various other species.

J. and T. LAVERY (7469 and 8677) British Macrolepidoptera plus display card showing country watch publication "Illustrated list of butterflies of Ireland".

G.F. LE-PARD (4162) A collection of lepidoptera showing the possible changes in the insect fauna over an area of S.E. heathland interrelated to the known plant changes over the past 15,000 years.

O.T. LEWIS (8132J) Notes on the rearing of the Black-veined white butterfly from the Pyrenees, with photographs of the life cycle and information on how the stock has been kept alive since.

B. MACNULTY (4528) Moths from the Gower Peninsular including *C. multisrigaria* not seen here for 15 years, *S. wauaria* first specimen for 30 years, only one other record, *I. dimidiata* only one other record, *I. trigeminata* only a single record.

D. MANN (8181J) Other Orders.

A. MAWSON (3965) Slides taken by Mr G.A. Woods depicting parts from his

"Life histories of Butterflies and Moths". Shown were *C. croceus* (Clouded yellow), *O. antiqua* (Vapourer), *L. camilla* (White admiral), *S. fagi* (Lobster), and *D. plexippus* (Monarch). Also shown were prints taken from slides.

R. McCORMICK (3375) and C. PENNY (3880) A comparison of the Macro moth species seen in two gardens separated by the City of London. One garden in North Cheam, Surrey, the other at Chelmsford, Essex. Total numbers seen were 308 between the two localities with 50 of these only seen at N. Cheam and 62 unique to Chelmsford, and the number seen in both 196. A few of these were vagrants in both cases and consequently were only seen once.

J. MULVANY (8648) and M.E. CASTLE (2490) Various Mygal spiders and resin encapsulated spider skins, plus photographs of British butterflies and other orders.

S. NASH (7088J) Migrant and Scillies' specimens of British Macrolepidoptera.

D.O. O'KEEFE (8746) Aberrations of Macrolepidoptera from Kent, including *A. prunaria, P. extersaria, C. pudibunda* and *D. aprilina.*

J. PAYNE (5923) Aberrations induced by temperature changes, including *A. urticae* (Small tortoiseshell), *M. jurtina* (Meadow brown), *P. megera* (The Wall), *P. c-album* (Comma), *A. paphia* (Silver-washed fritillary) and *I. io* (Peacock), plus photographs of other species.

A.J. and C.T. PICKLES (5225) Several bred species of macros from various localities plus caught species. Comparisons were made with shown specimens from differing sites. Among those shown were *P. vetulata* from Winchester, *L. zonaria* from West Argyle, *C. lychnitis* from Hampshire and *S. albovenosa* from Norfolk.

R. REVELS (3942) Photographs of British insects and other wildlife subjects.

B. SKINNER (2470) Bred and caught lepidoptera from various localities including a short series of *A. ripae* bred from larvae collected at seven widespread sites. Bred series of *H. luteago barretii* from S. Devon and *D. florida* from Caernarvonshire plus interesting varieties of *T. fluctuosa* from Kent, *P. capucina* from Ross-shire and *M. procellata* from Sussex. Also shown were the migrants *H. armigera* from Caernarvonshire and *D. orichalcea* from Surrey.

P. SOKOLOFF (4456) Bred specimens of *A. rancidella* (Lep.: Gelechiidae). New to Britain in 1985, together with examples of larval feeding patterns, cocoons and pupae. Two generations of *E. alniaria* bred from a melanic female. About 5% of the F2 gen. were melanic, around half of these being black and the other half a brown colour.

I. STACEY (7653) Heavily marked female of *A. adippe* plus type for comparison, and two varieties of *L. dispar batavus.*

ST. IVO SCHOOL. The usual magnificent display of livestock, including Insects, Reptiles and Mammals.

D. STOKES (7630) British butterfly aberrations taken or bred in 1987, specimens shown included *L. corydon* (Chalk hill blue), ab: *fowleri* and minor plus other vars. A pair of *L. dispar batavus* (Large copper) females, showing abnormal upperside spots, and a specimen of *P. icarus* (Common blue) with the orange lunules of the underside replaced with black.

D. TREMBATH (3486) Exotic butterflies from Kenya.

P. WARING (4220) Photographs of *P. castaneae* (Reed leopard) and *S. lineata* (Black-veined moth) with the latter species shown laying eggs on grass and a pair *in cop.* Also shown was a map of a nature reserve for which there are few or no moth records.

D. WEBB (7666) Moths from the Isle of Lundy in the Bristol Channel.

M. WHITE (6003) Drawer containing British Macrolepidoptera.

D. YOUNG (5547) Several species collected at Dungeness and Ham Street, Kent, plus oddments from other localities; notable specimens were *C. dentalis* from Dungeness, *P. secundaria* from Ham Street, *D. fagaria* from Berks/Hants border and *P. plumigera* from Oxfordshire.

The compiler of these notes is not responsible for errors or claims made by the exhibitors. However, a certain amount of effort has been made to be as accurate as possible.

HEALTHY STATE OF THE SCOTCH ARGUS IN SCOTLAND

by E. Pickard (3928)

It was about 1965 that I first discovered the haunts of the Scotch argus (*Erebia aethiops*) at a spot near Dores, Inverness-shire. Here they were flying abundantly at the roadside verges, spilling out from a wood overgrown with bracken and blue moor grass. Over the years I have located them at other places nearer and nearer to my home town of Aberdeen. A favourite haunt of the butterflies is a wooded slope flanking a loch near Dufftown. Here they are usually on the wing during the first week in August when the slightest blink of sun will bring them from their hiding places among the bracken.

Interest waned for a few years, but having started to make a collection of insects on film, I visited Dufftown in 1987 on August 9, wondering how the butterflies were faring in these days of declining species. I was delighted to find on my arrival that the insects had spread from the slope where they were confined previously and were now flying abundantly along the roadside verges. I found that in common with other butterflies they were difficult to stalk in full sun but the moment the sun dipped I was able to crawl to within a few inches of them and take pictures with a standard lens and extension tube.

Finally, while on a weekend camping trip at Alford on August 16 1987 I looked in at what had been a flourishing Ringlet (*Aphantopus hyperantus*) colony three weeks before. Only a couple of tattered Ringlets were still on the wing but I was pleased to find four or five Scotch arguses flying there. This was a new locality of them for me.

DYTISCUS MARGINALIS REARED IN CAPTIVITY

by Alan Winterflood (7739)

On February 6 1987 I visited a local woodland pond in Hertfordshire in order to see what forms of invertebrate life could be obtained there at that time of the year.

My main intention was to add more stock to my fresh water aquarium which up till now had contained some immature damsel nymphs and a couple of *Colymbetes fuscus* water beetles in a separate tank.

I had been sweeping the margins of the pond with a net for about half an hour when I caught a female *Dytiscus marginalis* which had been clinging to the withered growths of yellow flag growing in deep water at the pond's edge.

The large beetle was put in a jam jar and taken home to be placed in an aquarium together with the *Colymbetes*. I also took home a large number of crustaceans, pond snails and damsel nymphs, since a proportion of these would provide ample food for my beetle stock.

The newly-caught *Dytiscus* took a few days to settle down and she would spend a lot of time hiding amongst a thick tangle of water starwort or wedging herself under some stones at the bottom of the tank.

Gradually, the fierce creature became accustomed to her surroundings and she would swim around the tank with effortless ease pushing herself along in the water with great powerful strokes of her hind legs, twisting and turning like a miniature torpedo. Most of her activity was done at night and a torch beam would send her diving for cover at the bottom of the aquarium.

On the evening of February 16 I inspected the beetle tank as usual and discovered a large egg jutting out from a slit in the stem of a water crowfoot plant. I recognised it as the ovum of *marginalis*. During the days that followed, more ova appeared in various parts of the water crowfoot stems which had obviously been laid by the newly-caught female, but I made the fatal mistake of leaving them in the tank and most of them were quickly predated by the other beetles. I was dubious about their fertility in any case.

On March 21 I obtained some frog spawn from the same pond in which I found the female *Dytiscus,* the idea being to use the copious supply of future tadpoles to feed the beetles and other creatures in my two tanks.

On March 29, more *Dytiscus* ova were discovered in the weed stems in my aquarium and this time I cut up the stems containing the ova and placed them in separate jam-jars of water. Only one ova complete with weed stem was placed in each jar of water and the tops of the jars were covered with nylon netting.

The first ovum hatched on the afternoon of April 17 and the larva seemed huge in comparison with the size of its egg. I found several mosquito larvae and put them into the jar of water containing the newly-hatched *Dytiscus* and during the evening it was seen taking its first meal. I observed it devouring the contents of a large mosquito larva before night-fall.

More newly-hatched *Dytiscus* larvae were discovered in the large beetle tank within the next few days and I decided to give top priority to them, removing all other adult beetles and releasing them in the pond where I had obtained them.

On April 23 the oldest *Dytiscus* larva went through its first moult and by the 24th it had begun to consume young tadpoles with a vengeance, the others soon following suit. Moulting occured every few days or so, the size of the larvae increasing enormously between each moult.

By April 29, the largest larva in the aquarium had reached a length of four and a half centimeters. I now had a total of nine larvae, seven of which were in the aquarium and two more in separate jam-jars. I tried feeding them on Gooseberry sawfly larvae, but they did not much care for them, discarding them after a few minutes.

On April 30 I inspected the aquarium during the night and saw a *Dytiscus* larva consuming one of its companions which was the same size as itself. Things were obviously getting very dangerous and so the next morning I removed all excess larvae from the large tank and released them into the pond where I had obtained the female in February.

I was now left with four larvae. This was more than enough but since I had about fifty medium sized tadpoles in the aquarium I thought this would be enough for them until they were ready to pupate, but I was in for a hell of a surprise.

I prepared a pupation box in advance for the *Dytiscus* larvae on May 3. This consisted of a wooden box filled with slightly damp peat to a depth of about ten centimeters. In the damp peat I sank four margarine tubs filled with rain water so that the level of water in the margarine tubs was almost flush with the surrounding peat. A glass cover was placed over the top for observation purposes. The above pupation box was well ventilated with metal mesh on two sides.

The appetites of my four larvae were becoming quite formidable, and by May 8 they had almost finished off my whole stock of tadpoles. A quick visit to the local pond soon furnished me with a few dozen more large ones. The largest larvae had now reached a length of five centimetres.

As a supplement to the tadpole diet I offered them small lumps of mincemeat tied to the end of a piece of cotton. When these were lowered into the aquarium and dangled in front of the larvae they would move

forward and attack them, feeding from them with great enthusiasm.

By May 22, the largest larvae in the aquarium had begun to lose their appetites and spent a lot of time wandering aimlessly around the aquarium. The largest of these was over five and a half centimetres long, the other larvae in the two jam-jars were considerably smaller. The largest larvae were transferred to the pupation box on the above date and placed in the margarine tubs filled with water. Some tadpoles were placed in the tubs beforehand in case they were not quite ready for pupation.

Soon after I put them in the margarine tubs, one crawled out and foraged around on the damp peat. Within several minutes it had started to burrow in order to prepare a cavity in the soil for the purpose of pupating. The other mature larva took a week longer to get ready for pupation and did not seem to want to burrow even though it crawled out of the water of its own accord and wandered around on the surface of the peat for many days. Eventually I laid some clods of grass turf on top of the peat and this was just what it needed. Without any encouragement it started to burrow under the turves a few hours after I had put them there.

I was now left with two mature larvae which had been taken out of their jam-jars and placed in the large aquarium after the removal of the first couple to the pupation box.

By May 30 these larvae seemed almost ready for pupation but I then made the fatal mistake of leaving them in the water too long and disaster struck on June 2 when they were found to have died.

On June 8 I inspected the pupation box in which had been placed the mature larvae a few week previously, and gently lifted the grass turf covering the peat underneath it. I soon found a large cavity near the surface with a *Dytiscus* pupa resting in the bottom of it. Some gentle probing soon revealed the other larva which had not yet pupated in another large cavity very close to the surface of the peat. I replaced the turf with great caution and left the pupae well alone for a few weeks.

On June 24 I moved the pupation box from under a bench in the conservatory and placed it on top of another bench which faced a west window covered with net curtains. The weather conditions during the whole of the pupation period were abominable and the soil temperatures inside the pupation box hardly ever reached more than 21°C. even on a good day.

During the last few weeks of the pupation period, the box containing the two pupae was observed nearly every day because I wanted to be ready to transfer the water beetles as they emerged from the soil into the aquarium. In order to accomplish this, I gently removed the grass turf covering the pupae and with extreme caution removed some of the peat

from around the two pupation sites so that the actual pupae would be exposed to view. In order to protect them from too much light I covered each with small pieces of cardboard making sure that these did not come into contact with the pupae. The pieces of cardboard could now be used as inspection covers thus making observation a lot easier. Margarine tubs filled with water were kept ready in the pupation box should the beetles emerge when I was not there to see them. A watchful eye was kept on the dampness of the peat surrounding the pupae and before any dryness occured it was sprinkled with tepid tap water. No water was ever allowed to come into contact with the pupae.

A few days before the great moment arrived one of the pupae had begun to darken slightly. This darkness was not pronounced and it assumed the appearance of a light ivory blemish which was only evident on the abdominal segments. One of the hind legs of this particular pupa was bent upwards and outwards indicating that the larva must have been restricted in some way and had not managed to produce a perfect pupa. I could tell that this was a female since the front legs of the pupa lacked the sucker discs evident on the other pupa which was in perfect condition and significantly larger.

The great moment arrived on the morning of June 30 when I removed the cardboard covers in the puparium. The small female pupa had hatched and a pale whitish-looking *Dytiscus marginalis* was discovered squatting down in the hollow of its cavity. One of its hind legs was unfortunately distorted and I placed the cardboard cover back over it. It took two days for the newly-emerged female beetle to take on her natural olive brownish coloration and she seemed very reluctant to move for many days after she emerged. Finally, on July 3 I placed her in one of the water filled margarine tubs and she swam around feebly for a while. After much serious thought I decided to release her a day later in the same pond where the mother beetle had been captured.

During all this time, the other large male pupa had begun to darken significantly. At about eleven on July 3 I inspected the pupation box as usual and was surprised to see the remaining pupa undulating rhythmically in its cavity. Instinct told me it would be catastrophic to disturb it and so I gently replaced the cover and left it to its own devices.

Drama arrived the next morning when I again inspected the pupation box. As I gently lifted the piece of cardboard covering the remaining pupa a marvellous sight was revealed to me. Resting in its pupal cavity was a magnificent pale yellow male. A superb specimen in every detail. Its elytra were still slightly transparent and as I examined the surface of them I could just make out the intricately folded hind wings packed away beneath the upper elytra like strips of folded tissue paper.

On July 8 the large beetle made his first move and crawled out of his pupal cavity to rest beside it in the daylight. To be sure, this was a perfect specimen in every detail. The wing cases were now firm and dark, shining olive black with the radiance of polished mahogany, their yellow margins glowing radiantly by contrast, the head and thorax were massive as were the eyes. I touched him gently and he responded by crawling around the puparium inspecting the peat and enquiring about the dryness of his surroundings.

The big *Dytiscus* was now ready for the aquarium and I gently picked him up and placed him on the surface of the water in the newly set-up tank. He seemed very buoyant when first put in and swam around on the surface of the water for over twenty minutes. Eventually, he submerged himself by crawling under a piece of bark placed on the surface of the water in the tank. As he clung to the underside of the bark he released many air bubbles from under his elytra, pushing his abdomen up to the surface if the water every so often to take in more air. After doing this for about ten minutes, he dived to the bottom of the aquarium and clung to some water starwort. During the evening, I dropped a medium sized earthworm into the tank and he was seen after dark suspended under the surface film of the water playing with it.

I left the young male to his own devices for many days but during this time made another trip to the woodand pond where I had found the female in February. After only half an hour I netted a male and female in close proximity to each other. The female was caught first, then the male only a few metres away. They were put into separate jam-jars and taken home to be placed in a vacant aquarium containing a few large tadpoles and some damsel nymphs. I watched them swim around the tank back at home for a while and within the space of a few hours the male had located the female and instantly mated with her.

The mated pair swam around together for many hours, the male on top of the female guiding her around the aquarium with his powerful hind legs. They separated before nightfall.

Up till now, my newly hatched male *Dytiscus* had been kept isolated in a smaller tank and fed every few days on various invertebrate items. I decided to release the wild caught male and keep the mated female as a companion for my own newly hatched male. It was not until July 26 that I decided to put the wild caught female in with my own male which had been reared in captivity from the ova. The male was very docile when I put the female in with him although he did come and inspect her but no mating was observed.

They have lived together now for many months in my tank and so far only one incident occurred which gave me a bit of a shock. On July 8 the food stock in the aquarium was getting rather low. I decided to put only one earthworm in the tank on this particular evening and the female was

the first to find it. I shone a torch in the tank later on during the night and a violent struggle met my eyes.

The male had grabbed hold of the female and was moving all around her as he clung tightly to her with his fore legs. He seemed to be trying to find a weak spot in her exoskeleton to bite. He did not actually bite her in any vulnerable place as far as I could make out but in the end he wrenched the earthworm she had in her jaws and bit it in half. I was lucky he did not damage her and from then on made sure there was always more than one item of food in the aquarium.

All my livestock tanks are covered with tightly fitting hardwood frames. These have nylon mesh fixed across them for ventilation making escape for the inhabitants an impossibility.

I have observed *Dytiscus marginalis* and other water beetles trying to escape from an aquarium during the hours of darkness and what they normally do is to crawl on top of any convenient object, such as a floating weed mass or a piece of wood, etc. and sit quietly for a while. During this time they vibrate their elytra for a few minutes in readiness for taking off and then they launch themselves and usually hit the aquarium cover falling back into the water. Very soon they forget about escape and start swimming around in the water again. Attempts at escaping are much more frequent on a warm night.

Water beetles are moderately easy creatures to keep and their water must be changed when necessary since a lot of decaying food accumulating in their tank will foul up the water very quickly. This procedure is most critical during the summer months as the decay of organic material is much faster at this time of the year. Plenty of weed is necessary to give them security. I normally use silver sand as a base for the tanks and most weed growth is anchored under stones.

I have known a *marginalis* to extract a great pond snail from its shell and they are more likely to eat snails if other food is not available. Although they will eat scraps of raw meat I do not think it is advisable to give it to them very often since it fouls the water up very quickly. Earthworms are an excellent food for most water beetles and half a jar of these in some soil will last for months if used as a supplement with other food.

It seems that the larvae of *marginalis* thrive best on tadpoles from my past experience but I have known a very hungry larva to investigate any disturbance on the water surface such as the vibration from a trapped fly or indeed any other insect. A stick moved around at the top of water will often provoke the same response. These larvae will certainly devour mayflies since my larvae used to eat these often because their tank was quite full of hatching mayfly larvae. I now always keep a separate tank or container of water at hand containing many invertebrate items for the water beetles since I think they thrive best on living food.

SOME OBSERVATIONS ON VARIOUS WATER BEETLES

by Mark Johnson (3464)

During 1986 while visiting a certain wood in the wilds of Surrey, I noted some water beetles. These consisted of a rather magnificent specimen of a sulcated female *Acilius sulcatus,* a pair of a *Rantus* species, another pair of *Hyphydrus ovatus* and an *Agabus* species. A week later I travelled to the river Colne in Buckinghamshire where I caught a fresh, small, and as yet unidentified, water beetle.

This specimen joined the others in my aquarium. This is covered with a hood containing ventilation holes. It also has three plants in it, one of which is an *Elodea* and there is a tray on the bottom connected to an aerator, and this tray is covered with plain and coloured gravel. There are also two pieces of plaster of paris, bought in a pet shop, and made to simulate natural wood. The aerator is on for two hours each day.

I supply food such as Daphnia and Tubifex worms, supplemented with a little corned beef on occasions. After some while I observed that the *Rantus* specimens were mating and they then disappeared, as did the single *Agabus.* Now whether or not the female *Acilius* ate them, I have no idea, for no remains of these three beetles were discovered. But it is interesting and perhaps significant, that neither the two *Hyphydrus,* nor the small beetle from the Colne, were harmed. Although those that disappeared were silt pond species, they seemed to like the conditions when the aerator was on.

I took the opportunity to watch the female *Acilius* and drew her from life in a characteristic resting position. This is illustrated on the opposite page.

PARTHENOGENESIS

In the warm-sunned summer's day
Great green plants
Like spiral stairways
Stretch endlessly skyward
And on every stairs' bend
Sap-sucking clusters of bugs
Are wrapped tight against the turgid stems
To tap the fluid excesses of the earth
And continuously give birth
To themselves!

Chris Bindon

A female of the water beetle *Acilius sulcatus* in a typical resting position. Drawn from life by Mark Johnson.

BOOK REVIEWS

Insect Outbreaks edited by P. Barbosa and J.C. Schultz, 1987. Academic Press, San Diego and London. Hardback. Pp.578. Price £75.

Whatever your entomological interests, there's no avoiding the patterns that are always turning up — in distributions, in life histories, in insect -plant relationships and so on. A first stage is to describe them — but I'd argue it's much more interesting to ask why the patterns are there in the first place. This book is the state of the art on insect outbreaks and *why* they occur, according to an all-star academic cast.

There are all sorts of possible causes of outbreaks. Changes in weather, natural enemies and diseases could each contribute, but time and again it's the food plant that matters most. A paper in this book by Mark Scriber and John Hainze gives some neat examples from the U.S.A.: the Red pine shoot moth, a pyralid, has shifted from being a

generalist feeder on all sorts of pines to being a specialist on the shoots and cones of red pine alone; at the same time large numbers of these trees in plantations have reached a vulnerable age. Combine these two factors and you have an outbreak. The importance of foodplants isn't just limited to pest insects. Take the Tiger swallowtail for example. In the wild it has a wide range of natural foodplants; if it feeds on black cherry or tulip tree it can fit two generations into the year, but its other foodplants force slower growth of the larvae and limit the butterfly to one generation a year. The silkmoth *Callosamia promethea* shows how finely balanced everything is. In captivity the larvae thrive on paper birch when it's given as the foodplant, but, in the wild, adults simply avoid laying on this plant. If the female weren't to "get it wrong" during oviposition, this moth would likely have followed the birch right across Canada. If you think about it, I bet you'll come up with British examples of these phenomena . . . Try asking yourself why.

If you're after something different (and I mean *very* different), the paper by Denis Owen and Richard Wiegert is good value. They look at leaf eating by insects as *advantageous* to the plants in the same way that pruning your apple tree can increase the amount of fruit. It's intriguing. Yet to be honest there isn't much evidence to threaten the more conventional idea of a 140 million year war between plants and insects.

All in all, if you're into insect - plant interactions at university level, this book should be right up your street.

Duncan Reavey

The Far Side Observed (latest in *The Far Side* collection) by Gary Larson. Pp.104, black and white cartoons. Andrews and McMeel, 1987. Paperback. Price £5.95.

Entomological humour must be about the most difficult thing in the world to review. I guess you can say it's worked whether it brings a smile or a groan of despair. Some of the most wonderfully insane humour with a biological slant comes from Gary Larson's *The Far Side* collection, from the USA. There's a fair spread of entomological masterpieces included. I'd describe a few if I could, but it's impossible to do them justice. The best I can do is give a taste of what's on offer from the cartoons included here. The only problem is that I've not yet seen the series in the bookshops. So put them on the shopping list next time one of your friends goes to the States.

Duncan Reavy

(See illustration on page 147.)

A Colour Atlas of Insect Tissues via the Flea by M. Rothschild, Y. Schlein and S. Ito. Wolfe Medical Publications, 1986. Pp.184. Hardback. Price £40.00. ISBN 0 7234 0891 2.

The microscopic appearance of animal tissues is an essential area of

study for students and research workers in the biomedical sciences and, accordingly, there are many illustrated texts available on the subject. Invertebrates have, however, not been well covered compared with vertebrates, and the authors of the present work complain of the resulting difficulties which they encountered in their own early attempts to study insect tissues. They recognise that several good textbooks are already available on insect cytology, histology and physiology, and have avoided duplication of these texts, sometimes to the point where their own text is too thin as a support for their illustrations. Instead they plan to fill the gap which they consider to exist in the provision of photographic source material.

Apart from any technical value which the atlas may have, its wealth of spectacularly large and colourful photo-micrographs would qualify it as a most unusual coffee-table book. Within each of a number of chapters, each dealing with a different part of the insect body, the micrographs progress through successively higher magnifications, ending with high power scanning and transmission electron micrographs. The quality is, with very few exceptions, very good or excellent and the labelling is precise. There is, however, a regrettable lack of scale bars on the light micrographs. Despite the pictorial attractions of the atlas, its price may tend to exclude it from the amateur market, although it will make a fascinating browse for anyone with memories of sixth-form histology.

The value of the atlas will perhaps be very much in the eyes of its various prospective users. It should certainly be valued by all those who study the transmission of insect-borne diseases of mammals and birds. They will become more easily familiar with the appearance of the tissues which harbour pathogenic micro-organisms, and they will also gain an insight into the developmental changes which take place in other tissues as the flea goes through its life cycle and responds physiologically to its vertebrate host.

Viewed outside the field of medical and veterinary entomology, the use of fleas to provide an ostensibly wide coverage of insect tissues is perhaps questionable. Clearly, the authors have special competence — and availability of material — in this speciality, but the general reader might have preferred to see either a wider range of taxa or a less specialised, larger and more easily reared insect.

The authors have added an appendix to cover those tissue types which are not well exemplified by fleas, but the diversity of certain organs and tissues is not adequately mentioned. This is particularly true of the Malpighian tubules, the rectal pads and the proventrucular (gizzard) spines. One insect structure, the peritrophic membrane which lines the mid- and hind-gut, is aberrantly absent in fleas and received no description. Other tissues are better described, especially muscle and the fascinating rubber-like substance (resilin) which helps fleas and other

insects to jump. Flight muscle being absent in fleas, examples from other insects are shown in the appendix. It is, however, unfortunate that the authors' choice of dragonfly flight muscle does not, as they intended, illustrate the 'fibrillar' muscle, typical of most flying insects, but just a highly feveloped form of 'lamellar' muscle, the ordinary form of which occurs in fleas and is shown in the main body of the atlas.

Despite any suggestion that the choice of fleas may have more to do with the authors' interests than with their stated aims, this is a well-produced book which should be seen by all those whose interest in insects extends beyond their superficial appearance.

D. Lonsdale

The butterflies of Hertfordshire by Brian Sawford. Pp.195 including 23 coloured plates and other illustrations. Hardback, 8vo. Castlemead Publications, Ware. Price £15.00.

When travel was both slow and often difficult, books about our butterflies were generalist and covered the whole country; indeed some of them at least went to great pains to tell us that a particular species could also be found in Australia, America or (particularly) Amurland. Exchange was much more rife than it is today, for often to find a particular species, or race, oneself, involved a considerable investment in time and money. Now that these places are only a day's journey away, instead of months, recent butterfly books have concentrated on a single county around which any Victorian could ride a horse, walk, or even cycle, collecting as he went, within one day. This surely must reflect the changing attitudes to our butterflies and how our concern now is not to amass long series in cabinet drawers, but to photograph, record and, above all, try to preserve, those that are local to us.

In many ways this book is similar to *The Butterflies of Suffolk* (reviewed *Bulletin* 45: 204-206) which is not so surprising as both contain some of the same photographs by Brian Sawford. It is however to a slightly larger format and some 60 pages longer. The colour plates are here printed to full page size.

The main text is a detailed discussion of the history, habits, ecology and distribution of the individual species in the county. The text is particularly well written for Mr Sawford has a way with words and writes in a style which holds our interest. He has clearly done his homework and knows his subject being particularly strong on the historical aspect and in taking pains to point out how species can be confused in the field. Indeed the whole book is a mine of information about the habits of the species it covers.

Particularly useful too is the addition of an index of the localities with their tetrad notations, thus enabling anyone interested to go and see (or search for?) and continue to record the appearance of butterflies in any

particular locality. Indeed, as is pointed out in the final chapter on conservation, continued study and recording is important as an adjunct to future conservation. As is usual today an account of the climate, geology and history of recording in Hertfordshire is given. There is also a comprehensive bibliography.

All species (two on each page) are illustrated with colour plates from photographs by the author. These are excellently printed, much better in quality than are the black and white illustrations in fact. The only complaint one might make is the lack of indication of size on the photographs which, since differing enlargements are used, gives a false impression (Adonis blue as large as Camberwell beauty) of size to anyone not already familiar with the butterflies. The whole book is well laid out and bound; also printed in a clear 10-point typeface; a credit to the publishers. It gives a clear and reasoned account of its subject and forms the basis for future work, for our attention is drawn to the danger of extinction that faces seven of the county's species and it is only by keeping an eye on them and pressuring the planners not to allow development of their sites, that losses can be stemmed.

ANO

Hostplants and classification: a review of nymphalid butterflies by P.R. Ackery, *Biological Journal of the Linnean Society* Vol. 33, pp.95-203.

For a number of years now the inter-relationships between plants and their poisons, and the animals which have developed strategies of overcoming the plants' poisons, have been coming under closer and closer scrutiny. This serious study presents a distilled and critical assessment of the available data on the nymphalid butterflies, which, being on the whole large and conspicuous, have attracted notice, and hence data on their life-histories and foodplants abounds, although, as is pointed out in the text, this is not always reliable. While this is primarily a taxonomic work, from what might be considered an unorthodox viewpoint, its utility to us amateur entomologists is in the sheer mass of data presented on their foodplants and to anyone seriously considering breeding members of this family, particularly those from the tropics, I feel this will be an indispensible work. While this is no list of species and known foodplants, the emphasis being on the plant families on which the larvae feed, the clear trends pointed out and the copious references to original data are a great source of information when one is confronted with a nymphalid female which has obligingly laid some ova.

It may come as a surprise to some, raised on books on British butterflies, to learn that the Satyridae are now considered to be but a subfamily, Satyrinae, of the Nymphalidae. Indeed it comes as a surprise that one author at least (Erlich) considers (on good characters, be it said, in both adults and larvae and that both exploit monocotyledons as larval

food) that the dull and dun-coloured satyrs are in close relationship to the brilliant morphos.

Brian Gardiner

An Atlas of Oxfordshire Butterflies. By R. Knight and J.M. Campbell. A4, pp.52, Xeroxed, stapled. Oxford Museums Service Occasional Technical Paper No. 10. 1987. Price £2.00 (plus 35p p&p). Available from County Museum, Woodstock, Oxford OX7 1SN.

In 1982 the Department of Museum Services of Oxfordshire County Council produced *An Atlas of Oxfordshire Butterflies.* It proved so successful that a new edition has been produced, with many more records altering hitherto held ideas about distribution and abundance for many species.

The co-authors are to be congratulated on their efforts in producing a highly informative booklet on the county's many species whose distributions are shown on individual maps based on the now familiar tetrads. What makes the records of particular value is the fact that they are divided into the years before 1960, between 1960 and 1979 and 1980 to 1985. Each map is accompanied by a note about the species concerned.

The publication is a must for all those interested in Oxfordshire's butterflies whether they are residents of the county or not and cannot be recommended too highly.

Terence F. Knight

Oak galls of Essex by J.P. Bowdrey, pp.28, illustrated. Paperback, A4. Essex Biological Records Centre, Colchester, 1987. Price £2.00 (including post) and available from Museum Resources Centre, 14 Ryegate Road, Colchester, Essex CO1 1YG.

For both the entomologist and the botanist the plant galls are a fascinating study. For the former, the identification of the causative insects and their strange life histories, for the botanist the effect the galls have on the plants used as hosts. Oaks, *Quercus robur* and *Q. petraea,* have a wide range of galls which affect catkins, fruit, bark, roots, buds, leaves and twigs and are caused by wasps of the family Cynipidae, by flies (Cecidomyiidae) and by a few of the Hemiptera. Most are identifiable by the shape and structure of the gall. This excellent small publication is a suitable introduction for the beginner and should encourage more of our members to take an interest in galls. Although it deals only with oak galls of one county, it has a general application with good line drawings of the galls with an easy-to-follow key. This is followed by distribution maps associated with further drawings of stages

of the galls. There is a check-list and bibliography. The publication will be of interest to members wherever they live, if they want to know more about those strange excrescences which occur on our oak trees.

PWC

Insects of Eastern Arabia by D.A. Walker and A.R. Pittaway. Ilustrated in colour by A.J. Walker. 1987. 175 pp. McMillan Publishers Ltd. Price unstated.

This is an extremely well-prepared and produced publication dealing with the insects of the Arabian peninsular most likely to be encountered by a visitor to the area. T.B. Larsen has already dealt in some detail with the butterflies of the region and here, in addition to the commoner Lepidoptera, the other orders are included with descriptions of selected representatives, each accompanied by a coloured illustration and a distribution map. The only absentee appears to be the Phasmids. There is quite a comprehensive bibliography and an interesting cameo of the authors' visits to Arabia experienced in the preparation of the book, This is an essential pocket book for the bug-hunter visiting the lands of oil and sheiks.

PWC

ARK DAY: DRESS AS AN INSECT
Sunday September 18

As part of our campaign to protect the world's rainforests, Friends of the Earth will be holding a sponsored walk based on the story of Noah's Ark and the Flood.

We will be building a massive reconstruction of the Ark on Whitestone Pond, Hampstead. The Ark will be the destination of a sponsored walk led by Noah: sponsored walkers will come dressed as animals. Given that the rainforests are home to an estimated 80% of the world's insects it would be particularly appropriate if members of the Amateur Entomologists' Society could come dressed as *insects* or at least with wings and antennae! There can be as many people per costume as you like. As an alternative to being an animal, you can bring an umbrella as a symbol of protection from the deluge.

Coming from the Ark will be the calls of threatened species. Noah and the walkers will begin their migration at the 300 million year old fossilized tree in the forecourt of the Natural History Museum. A shorter walk will begin at London Zoo, for young kids and people in particularly cumbersome costumes, where people will be able to meet the first group as they come through Regent's Park. The two groups will go then together to the Ark on Whitestone Pond, which is London's highest point.

There will be wild entertainment en route and at Whitestone Pond, music and speeches from the Ark's deck. Prizes will be given for the best costumes.

This update of the Noah story will give you the opportunity imaginatively and creatively to express your concern at the way the Earth, in particular the rainforests, are being wantonly laid waste, and to show your especial interest in the fate of the world's insects. Ark Day will be an experiment in campaigning and fundraising for the environment, in which we will be using not only words, but images and symbols directed at the imagination.

The walk will leave the Museum at 1.00pm and the London Zoo at 2.20pm. All those interested in joining in and helping this worthwhile cause may obtain full details and sponsorship forms from Friends of the Earth, 26-28 Underwood Street, London N1 7JQ (telephone 01-490 1555).

THE MONARCH BUTTERFLY

by Gwyn Owen (8718)

Probably the best known, and certainly one of the more spectacular butterflies, is the Monarch. Called variously the Milkweed butterfly and the Wanderer, it is technically *Danaus plexippus*. Its distribution is world wide and though native to North America is found in New Zealand, Australia, Hawaii, southern Europe and England. Closely related species, almost indistinguishable from *plexippus* inhabit the African continent and India. As North America seems to be their place of origin let us deal with that population for our study.

There are two main Monarch populations in North America, the Eastern and plains group, and the West coast group. The Western group has long been known to concentrate in coastal California during the winter but only more recently has it been established that they do in fact migrate up to two thousand miles to Southern British Columbia in some years, their offspring returning to California for the winter. The Eastern population is familiar in Southern Ontario, the Prairies and Eastern United States but only recently has their amazing annual migration and winter roost been discovered in central Mexico. This was the result of a lifetime study by Professor Fred Urquhart of the University of Toronto who carried out, over many years, a programme of tagging and releasing the insects in their summer breeding grounds in Southern Canada, and later in other parts of the world.

To achieve such a feat of travel for such an apparently fragile creature, the Monarch has to be a strong flier. I have personally observed one making headway against a twenty-five mile an hour wind. They also must be long lived, for a butterfly, to endure this trip and after several months of semi-hibernation start to breed and fly back to their summer grounds. The longest lived record of one tagged insect is nine months, though this must be regarded as a rather exceptional case. In general the adult lives about two months depending of the severity of battering from the weather. A sudden sharp cold snap can kill off thousands.

Apart from weather the requirements for survival are an adequate supply of nectar-bearing flowers for the adult and Milkweed (*Asclepias*) for caterpillar food. The female will only breed and lay eggs if Milkweed is available and the larvae will die without this foodplant. Milkweed contains a highly toxic juice that the larva ingests making it, and the subsequent adult butterfly, poisonous to would-be predators. With few exceptions, no birds will attack a Monarch butterfly more than once as they become violently ill. A non-poisonous butterfly, the Viceroy, gains a large measure of predator protection by its imitative colouring and can be distinguished from the Monarch only on close examination.

To breed the Monarch successfully, an environment similar to their native habitat must be provided; that is high light intensity with temperature and humidity in the 70 - 80° range Farenheit and relative; and a supply of *Asclepias* leaves, preferably on a growing plant. A source of nectar must be available either as flowering pot plants or a honey and water solution in a small container that will allow the butterflies to eat without wetting their wings. A small pebble-filled dish kept partly filled with water is also desirable. The winter indoor breeding cage should be not less than four foot long, two foot high and two foot deep. This is sufficient to accommodate a four foot fluorescent light fitting with cool tubes mounted on top and all the necessary requirements inside. A warm basement is ideal for such an arrangement with the cage light turned on for fourteen hours a day. The only other requirement is a small spray bottle for frequent misting of the entire cage and contents.

Mating takes place soon after the adults are introduced to this cage. Be sure there is both a male and a female. The male is identified by the two black dots on the upper hind wings in the black vein nearest the body. The female lacks these marks and tends to be more strongly patterned in black. Egg laying usually starts within twenty four hours of mating and can continue for several hundred eggs. The eggs are laid singly, usually on the underside of a leaf. Some method of birth control is necessary as the food requirements for such numbers would be quite impractical for the home raiser. The simplest and least traumatic is to remove the *Asclepias* plants when ten or twelve eggs are visible, or conversely release the adult butterflies into the open house where they will live quite happily, given warmth and nectar, for a good month. They will tend to concentrate at a window unless a high light is on.

Once the desired number of eggs have been laid and the breeding adults released there is no further need for a high light level or cage screening. Regular misting should be continued and a moderate temperature around 70°F maintained during the day. The eggs will start to hatch in four or five days and at this time the containers of foodplant should be placed on a clean sheet of paper that can be changed every few days. This is not only a sanitary arrangement but also gives a good visual indication of healthy growing caterpillars by the amount of frass produced. This will start to appear in a few days as a very fine dust under the leaves on which the larva is feeding. In the course of two weeks the larva will have to shed its skin five times and grown from 1/10th″ to nearly 2″ in length. It will be consuming vast amounts of foodplant and will start to wander. Very carefully transfer each individual larva to a separate small cage with fresh supplies of leaves, or better still, small branches of *Asclepias* in a covered water container. A pill bottle with a hole drilled in the cap is excellent for the purpose. In a couple of days the now fully-grown larva will leave its foodplant and after a period of

"Good heavens—just *look* at you! You've been down at the Fergusons' porch light, haven't you?"

wandering around the cage, settle on the ceiling where it will spin a silken pad from which it will suspend head down. In the course of the next twenty-four hours it will take on a J shape before finally straightening out again and shedding its final skin to reveal the pale green pupa. Under no conditions should the new pupa be disturbed for at least a day until the case has hardened to a shining green with a gold necklace and four gold spots.

Twelve to fourteen days after pupation there will be a dramatic darkening when the colours and pattern of the final adult wings will show plainly through the now transparent case. A day later the adult will emerge taking about thirty minutes to fully inflate its wings and assume a normal appearance while hanging head up from its now empty shell. Several hours later it will be ready to stand upright on the outside of its cage and shortly after will attempt its first short flight.

In the winter, new adults will live quite happily indoors, provided there is a fairly high light level and a good supply of nectar-bearing house plants or honey substitute provided. Again humidity must be stressed as most house environments are far too dry during the heating season.

There has been much speculation recently about the Monarch butterfly becoming an endangered species. Both Mexico and the State of California have recently brought in legislation to protect the overwintering areas. Breeding this butterfly in captivity during our northern winter could be a factor in ensuring the survival of the species.

There appears to be little interest in nectar food for two days after emergence. After that the demand is high and if natural nectar flowers are not available a suitable substitute is a small feeding station consisting of a narrow glass or plastic tube set in a wooden block and kept filled with a 5/1 water/honey solution. A piece of brightly coloured material fitted on top of the tube will help attract the butterflies and also provide a base for them to stand upon. Mating seems to occur about four hours after emergence and the coupling lasts about six hours, often into the night. Egglaying starts a few hours afterwards.

Table 1. Life-cycle, egg to adult

Stage reached

Day	Stage reached
1	The recently-laid egg is a glistening pearl-white, dome-shaped, .51mm in diameter consisting of delicately patterned arches rising to a slight crater at the top. The base is cemented to the underside of an *Asclepias* leaf.
3	After darkening to an opaque silver for several hours the larva hatches from the top and is 2.5mm long with a black head, a neutral colour, and sometimes eats the eggshell.
4	The larva is actively feeding.
5	It is now 4.75mm long and its pattern of black and white stripes is developing.
6	Now 6.35mm long and the colour bands starting to show.
11	Now 12.5mm long.
13	Nearly 20mm long.
14	Eating voraciously and just over 25mm long.
18	Length now 36mm.
20	Length now 50mm.
21	Leaves foodplant and wanders to find and establish a ceiling pad.
22	Is now hanging suspended from ceiling.
23	Pupates. Final skin shed leaving it a pale green with a gold necklace.
35	The chrysalis darkens to show colour and pattern of eventual adult.
36	Adult emerges.

Table 2. Pupation cycle

Minutes, starting one day after suspension	
0	The yellow stripes pale to green and there is an intermittent chewing action of the jaws on the underside of body.
30	The previously rigid front filaments become limp and hang down.

90	Entire body starts pulsating.
92	The rear filaments now shrivel to a coil.
96	There are intermittent longitudinal convulsions.
98	The larva is now hanging straight down.
99	The skin now splits, starting at the back of the head and a pale green colour emerges. The split continues along the back toward the suspended rear, the skin folding and rolling back to the point of suspension by vigorous wriggling.
102	The skin now drops off, the pupa wriggling vigorously. It is entirely pale green with the exception of a feint white mid-band.
112	The pupa now contracted in length and fattening at the top. Two gold spots can be seen developing near the bottom.
125	Pupa still active and a white line near the top end presages the start of a gold necklace.

Table 3. Emergence cycle.

On day 12 after pupation the first signs of darkening and traces of the wing-markings become visible. Then, count-down in minutes prior to eclosion:—

360	Completely dark with the full pattern of the wings showing clearly.
120	All the gold markings have now disappeared. A white wedge starts to appear on both flanks.
30	Three convulsions can be observed at the upper end.
1	A triangular split at the lower end and the legs start to emerge.
0	The butterfly fully emerged as a crumpled mass of wings and a very fat body.
+1	The butterfly hangs on the empty chrysalis skin and the wings start to inflate and lengthen.
+10	Wings now almost full size but still limp. The body has become much slenderer.
+30	The excess of brown meconium is dropped. The wings now fairly rigid but still require some hours of drying.
+120	The butterfly climbs up from hanging position to top of cage ceiling and there is occasional flexing of the wings.
+240	The emerged butterfly is now ready for short exploratory flight.

INSECT CONSERVATION COMMITTEE

VOLUNTEERS NEEDED!

The Insect Conservation Committee (ICC) urgently requires local representatives to help co-ordinate national activities and to develop regional involvement in conservation matters. It is becoming increasingly important to identify nationwide conservation needs on a more local basis — currently almost impossible for the S.E. based committee. The duties of the local representatives would include:—

— monitoring of current and potential sites of interest;
— organising/co-ordinating local field meetings and other events;
— acting as ICC representative at local exhibitions and other relevant meetings;
— liaising with local conservation bodies and other organisations whose activities affect, or may in future affect, interesting sites.

Although reporting direct to ICC, local representatives may also be working as a part of a local JCCBI scheme or co-operating with its

members. If you would like to help ICC with this increasingly important work and you feel able to commit some time to the above tasks please contact our Habitat Conservation Officer: Dr Clive Betts, 17 Mereway Road, Twickenham, Middlesex TW2 6RF.

A NEW R.E.S. HANDBOOK FOR THE TACHINIDAE (DIPTERA)

Work has just started on a new R.E.S. Handbook for the Tachinidae. The British Museum (Natural History) collection, upon which the work will primarily be based, has an inadequate series of the following species. Any specimens of these which could be borrowed will be invaluable in constructing a usable key.

Actia exoleta (Meigen)
Belida angelicae (Meigen)
Ceranthia lichtwardtiana (Villeneuve)
Germaria ruficeps (Fallen)
Hemimacquartia paradoxa Braur and Bergenstamm
Phebellia nigripalpis (Robineau-Desvoidy)
Siphona mesnili (Andersen)
Gymnosoma nitens (Meigen)
Carcelia intermedia (Herting)
Eurysthaea scutellaris (Robineau-Desvoidy)
Gonia foersteri (Meigen)
Litophasia hyalipennis (Fallen)
Phebellia stulta (Zetterstedt)

Any catalogues of tachinid collections held by other individuals or institutions would be useful. These would enable loans, examinations and/or exchanges of material to be arranged at a future date.

The assistance of collectors is also requested to help expand the host records of the group. Specimens reared from known hosts would be greatly appreciated. All parts of the puparium and the remains of the host should be included along with the locality, date, host plant/habitat and authority for host identification, if available. The adult fly should ideally be kept alive for a day or two to allow its cuticle to harden. Specimens reared from hosts whose identity is uncertain would also be of value, especially if accompanied by the puparium. Identifications will be provided if requested and the specimens returned by any date required. Any fly which has developed as an internal parasite of another insect, excepting the leaf-hoppers and the aculeate Hymenoptera, will almost certainly be a tachinid.

The R.E.S. Handbooks are intended to provide a service for amateur and professional entomologists, and so any comments or suggestions from possible future users of this particular volume are welcomed and should be communicated to Mr Robert Belshaw, Diptera Section, Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD.

THE ENTOMOLOGIST

A Phoenix arises

We are pleased to announce that one of the oldest of entomological journals refuses to lay down its head and die. It could be argued that the first time it apparently died, it had merely gone into hibernation, to emerge after 20 years as a gorgeous butterfly. But after the death of the butterfly? Not at all insect-like, but very definitely like that mythical bird the Phoenix.

For those unaware of its history, *The Entomologist* was founded in 1840 by Edward Newman, ran for a couple of years and then was merged with his other journal *The Zoologist* which continued until 1918. In 1864 *The Entomologist* was resurrected as a separate journal, still under Newman's editorship.

Under various editors and owners it carried on with varying fortune until 1973 when it ceased publication at the end of Vol. 106. From Vol. 2 onwards the covers and publishers binders were always of an orange or red colour, except for a brief few months in 1953 when they became white.

Founded as being a journal for the Amateur Entomologist is was entirely successful when it stuck to these aims, but on several occasions it became too professional or non-amateur orientated and subscribers dropped off so as to jeopodise its continuance. This happened around the turn of the century, again in the 1950s and finally by the 1970s, it had perhaps become too technical and irrelevant for the taste and interest of the average Amateur Entomologist.

The newly-resurrected journal is to continue as Vol. 107 and is under the editorship of Dr H.D. Loxdale assisted by a panel of experts. It is published under the auspices of The Royal Entomological Society.

The first number of the new volume was due to be published last month and as a —

Special Offer to AES Members

The Royal Entomological Society has offered to send a complimentary copy of the first number to any member who sends an A5 stamped addressed envelope to their Mr G.G. Bentley, 41 Queens Gate, London SW7 5HU.

We should like to take this opportunity to wish *The Entomologist* every success, and having seen the titles of some of the proposed papers to be published in it, we are sure that it will continue to be learned and help to advance our science as it did for so many years in the past.

A NEW COUNTY RECORD FOR THE SCARCE UMBER MOTH

Agriopis aurantiaria in County Kerry

by John W. Lavery (7469)

In May 1987 I beat several larvae from a mature oak tree at Urragh wood, Kenmare. The resulting adults, a male and two females, emerged on the 3rd, 7th and 20th December 1987. They were set and are in my collection. This is the first record of this species from Co. Kerry and, to my knowledge, also the first record from Southern Ireland.

AN EARLY CAPTURE OF THE PAINTED LADY IN IRELAND

by John W. Lavery (7469)

On March 1st 1988, while he was searching for hoverflies, my brother Tim captured a near perfect male Painted lady (*Cynthia cardui*) at Milton Bridge, Dingle, Co. Kerry.

A SPIRALLY SEGMENTED DEATHS-HEAD HAWKMOTH

by P.A. Aindow (7152)

Amongst some larvae of the Deaths-head hawkmoth (*Acherontia atropos*) being reared on privet, I noticed one that was unusual. In its final instar it was pale green with the normal seven blue and yellow stripes, but on the ninth segment from the head the stripe was slightly swollen. It started as normal but at the end tapered into the tenth segment without going into its normal 'V' shape.

Thinking that I might have a case of gynandromorphism, I enquired of the Entomology Department of the British Museum (Natural History) and received a reply from Mr D.J. Carter (whom I should like to thank for his help in this matter), to the effect that I had a case of spiral segmentation and that cases of this in a larva were extremely rare.

The larva duly pupated on December 29 last year. It looked normal on the underside but on the upper side, the fifth abdominal segment had a twist down its centre. On February 29 this year a large female eclosed. On her right side the fifth abdominal segment was slightly swollen and she lacks the blue band running down the centre of the abdomen on this segment.

CLOUDED YELLOW AND VESTAL IN DORSET

by Dominic Rey (7920J)

On August 30 last year I took a trip down to Portland Bill in order to look at the blue butterflies that occur there when suddenly a male

Clouded yellow (*Colias croceus*) appeared flying strongly. This was near the Vern Prison. On the same day, on a hillside along the coastal road west of Abbotsbury, I took a faded specimen of the Vestal (*Rhodometra sacraria*) which flew up out of the grass.

DOTTED RUSTICS

by Dominic Rey (7920J)

In my garden in Gloucestershire, especially in July and August last year (1987) Dotted rustic moths (*Rhyacia simulans*) were very common. Since 1983 when I first came across a couple they had occurred sparsely with none seen in 1986.

Numerous in August 1987 when they were accompanied by Silver Ys and Large yellow underwings on the sweet-pea blossoms. A male and two females were tending to the dark side with central fascia. In 1985 I took a pale golden-buff female example flying in the evening.

BEDSTRAW HAWK IN SCOTLAND

by William Young (8495)

On July 30 1987 I received a phone call from my sister, who catches the occasional butterfly and moth for me, to say that she had caught a Bedstraw hawkmoth (*Hyles gallii*) up here in Coatbridge, Lanarkshire. I thought she had probably had an Elephant hawk, but no, she was correct, and it was a Bedstraw, a bit worn, it seemed like a real migrant and I cannot think that anyone would release such a moth in Scotland.

A SHORT NOTE FROM CANADA

by G.M. Owen (8718)

I was much interested in the article on hibernating the Comma butterflies by John Payne (*Bulletin* 46: 239). I believe this species is the same as the Canadian Comma (*Polygonia satyrus*) which is also distributed over the central plains and eastern North America. They are very prolific on Vancouver Island and appear to be at least double brooded. I raise many of them every year from eggs collected in early spring and they are quite free of parasites. Not so, however, with collected larvae where losses from this cause are considerable.

Concerning the article by Chris Young (An Urban Pioneer, *Bulletin* 46: 240-244) I once found a Ceanothus silkmoth (*Hyalophora euryalis*) which seems to be the western version of *cecropia*. This was at the bottom of a low hedge just a few yards from the sea on the Juan de Fuca straits just off the Pacific ocean.

FEBRUARY PEPPERED MOTHS IN NORTHUMBERLAND

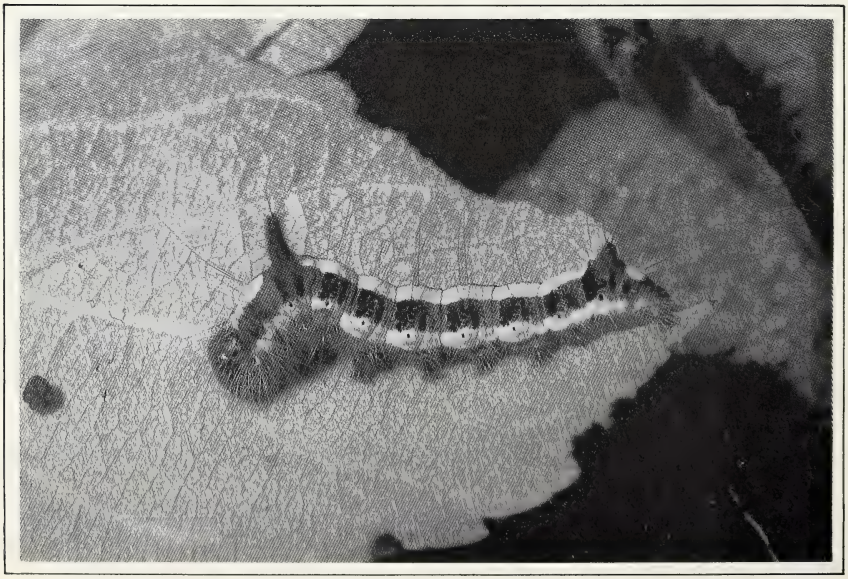
by Michael Davey

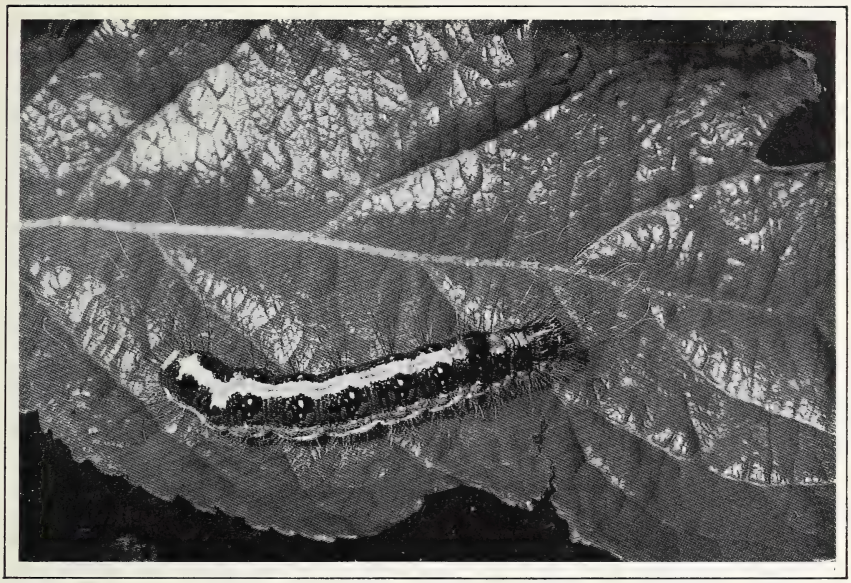
On the morning of February 14 this year I came across eleven perfect and presumably newly-emerged specimens of the Peppered moth (*Biston betularia*) at Brunton, near to Alnwick, Northumberland. Of these eleven, eight were of the normal form, one *carbonaria* and two the intermediate form. Unfortunately I did not secure any of the specimens as I was on a weekend break and certainly not expecting to find such out of season lepidoptera about. This is far too early a date for this species and surely must be a freak occurrence, but I should be very interested to learn if other members have also encountered similar surprises this unusual winter.

ON THE LARVAE OF THE DARK DAGGER MOTH

by John L. Gregory (4116)

In his *Moths of the British Isles,* Vol. 1 page 267 of the 1961 edition, South describes the larva of the *Acronicta tridens* (Dark dagger) as "black, with a broad *reddish* stripe along the back." In Vol. 10, page 136, of *Moths of Great Britain and Ireland* it is described as "dorsum white; dorsal line broad, *orange-red.*"





Bernard Skinner, in his *Colour Identification Guide,* page 120, says that it is "black, with a broad *reddish* stripe along the back, and one on each side; the first is interrupted with white and the other with black."

I have been in correspondence with Dr F.H.N. Smith of Perranporth, Cornwall, about these descriptions and he agrees with me that none of them is correct. Of all the specimens of Dark dagger larvae that I have seen, the broad dorsal stripe is invariably *white* or *whitish*, and *never* red or reddish. Both Dr Smith and I have taken colour photographs of the larvae, on different occasions and in different years. Genitalia examinations of the moths which resulted from these larvae have confirmed the identificatiaon as *A. tridens,* the Dark dagger, and not *A. psi,* the Grey dagger.

If any member can lend me a colour photograph of a *red*-striped Dark dagger larva, I would be very interested to see it.

I would also be very pleased to receive any living *red*-striped larvae (if indeed they exist) of this species for photographing and rearing.

The two illustrations show the main differences between the typical *yellow-striped* larva of *psi* (Fig. 1) and the *white-striped* larva of *tridens* (Fig. 2).

GHOST MOTHS IN MARCH

by Brian Gardiner (225)

Sitting on my shed on March 9 this year was a fine large and clearly freshly emerged male Ghost moth (*Hepialus humuli*), doubtless enticed out by the exceptionally fine and warm weather experienced in Cambridge. As if the one were not enough, a week later, another appeared.

SPECKLED WOOD IN FEBRUARY

by Robert E. Collins (6857)

Whilst walking in the town centre of Newton Abbot in the afternoon of February 11 this year my attention was drawn to a Speckled wood butterfly (Pararge aegeria) lying on the pavement. Although it was dead, it had escaped being trampled upon and I deduced that it had not been there very long. The specimen was in excellent condition and quite complete. I can only assume that it had hatched earlier that day, which was warm and sunny, and had died in the afternoon which had turned out cold and damp.

OBSERVATIONS ON RED ADMIRALS IN SPAIN

by Gareth King (8585)

Following on from my report of early Red admirals (*Vanessa atalanta*) in South-west Cornwall in April 1987 (*Bulletin* 46:159), which suggested the possibility of their having survived the British winter in certain, sheltered spots, I now have evidence that this species not only survives the winter, but must actually breed. These observations, however, refer, not to Britain, but to the Vigo area of North-west Spain.

On February 7 1988 I found four larvae of mixed size on beds of nettles. That one of the larvae was only second instar suggests pairings early in the new year. Now Galicia is similar to Cornwall in certain respects, both areas being awash with warm moist Atlantic air and both supporting various sub-tropical plants. Both areas are also renowned for their mildness, Galicia especially so, where frosts are unknown. This alone would be enough to enable *atalanta* to survive and perhaps Painted ladies (*Cynthia cardui*) as well.

In February Vigo is like Cornwall in May with the Sallows (*Salix spp*) already in leaf. Indeed even single examples of Small white (*Artogeia rapae*) and Speckled wood (*Pararge aegeria*) were seen in the same vicinity as the *atalanta* larvae. That a specimen of the lizard *Lacerta agilis* was also seen sunning itself on a wall suggests that 'winter' as such does not come to this part of Europe, or, if it does, is of such brevity as to be insignificant.

BRIMSTONES IN WORCESTERSHIRE

But where do the larvae feed?

by Peggy Pittkin (8718)

I read with interest of the Brimstone butterfly and its foodplant (*Bulletin* 46: 239-240). I have lived at Nafford, Worcestershire, for the past 27 years and with great regularity the Brimstone has appeared, although never in great numbers. According to the weather it is about at the end of March or beginning of April, with the next brood appearing early in September, although I did not record any in 1987. Either I missed them, or perhaps due to the poor summer there were none about.

I have walked every field, hedge and copse around my home and nowhere is there any sign of its recorded foodplant, buckthorn (*Rhamnus spp*). This has always been a puzzle to me as to where they could be breeding. I intend this year to be watching the dock leaves and also spindle trees, of which there are couple nearby, just in case.

I have a copse, an acre in extent and situated on the river Avon, which contains several willows, ash, and regrowth elms which are now up to 20 feet high. There is an undergrowth of nettles, bramble and hogweed which are cut down every year. There is also alder and elder nearby. I have observed the butterflies flying up from the lower end of the copse to my garden which is situated above it and it is my impression that they do not travel any great distance from the trees. The spot is isolated with the nearest house to mine some half a mile distant.

ANOTHER INTERESTING BOOK "FIND"

by Malcolm Simpson (4859)

In a small bookshop in Leyland, Lancashire, I found a copy of Newman and Leeds' *Text Book of British Butterflies and Moths*. Not, in itself, a rare book, but this copy had once belonged to Mr H.G. Webster who was taken on in 1912 as chief assistant by Mr L.W. Newman at The Butterfly Farm in Bexley, Kent. Mr Webster worked at the Farm for many years and helped to breed lepidoptera as well as making much of the apparatus the Farm supplied to collectors.

Mr Webster used his copy of the book in which to keep breeding notes and hints. A handwritten insertion gives a brief account of the Farm's early activities and according to the notes "At the peak of business 820 sleeves were used in one season." He also states that "About 75% of the species in this book have been bred on the Farm by Mr Newman and his assistants." Obviously Mr Webster was very actively involved in the breeding and he made breeding notes and hints for about 90 different

species of moth on slips of paper which he inserted at the relevant page in the *Text Book*. They are practical notes made between 1913 and 1927.

Another interesting annotation, on the reverse of the title page, reads:—
"May 28th 1953. Mr H.L. Newman told me that Mr H. Leeds has just completed another 30,000 words to this book of which he says Mr H.L. Newman can do what he likes with them. Grand old man is H. Leeds."
Again this annotation is in Mr Webster's hand and the reversal of Mr Newman's initials are his and not mine.

I wonder what did happen to those 30,000 words and also how did this book find its way into a Lancashire bookshop?

EXPENSIVE COCKROACHES

It has been reported in the press that the Council of the London borough of Southwark was ordered by magistrates to pay compensation to a mother of three after some 1100 cockroaches were recovered from her home.

The report stated the amount to be paid was not specified, but the Council could have been on to a good thing, for the current price of 1100 roaches at wholesale rates is £275 and at retail, from some sources of supply at least, some £500. We hope the Council profited from the transaction and in view of the ease with which roaches were clearly breeding in the house it might well have been more profitable as well to have rehoused her and the children and set up a roach breeding unit to keep all the local schools supplied for teaching purposes.

FLOWER-BUGS UNCHARACTERISTIC BEHAVIOUR

by Anthony Wootton (3331)

On July 17th, 1987, a dull, overcast day, after recent rain, I was sitting in my front room when I became aware of a tiny (3-4mm) flower-bug (*Anthocoris nemorum*) exploring my person. It travelled to my hand where, to my astonishment, it proceeded to sink its rostrum into my skin. Thinking the action to be merely an exploratory, mistaken effort, I moved it on, but after travelling another half-inch or so the bug repeated its "attack", causing mild if nevertheless noticeable sharp pain and subseqeuent dull ache and itching.

The bug's attentions did not draw blood although two small raised lumps resulted. Clearly, such behaviour is uncharacteristic, the species being principally a predator on small insects, spiders and mites, but perhaps its human-tasting is not too surprising when we realise that it belongs to the same family (*Cimicidae*) as the notorious bed-bug (*Cimex lectularius*) as well as other species parasitic on birds and bats.

ENTOMOLOGICAL D.I.Y. REARING CAGES

by Peter Anthony Michel

In these days of rising costs the equipment used by both amateur and professional entomologists is frequently outside the scope of their finances. Consequently they have sometimes to devise a method of making inexpensive apparatus in order that the money thus saved can be diverted towards the purchase of more specialized appliances.

In this connection I have found that, insofar as certain insect rearing cages are concerned, three distinct designs can be executed inexpensively, yet at the same time prove as effective as the more expensive models available from dealers.

The first of these is ideally suited to the rearing of mosquitoes and is constructed quite simply from wire coathangers, normally obtained without charge from sympathetic dry-cleaning establishments.

Using a pair of strong pliers, the twisted wire around the hanging device is unwound, and with great care the entire length of wire is straightened as much as possible; the final straightening process being completed by placing one end of the wire on a vice, or other solid surface, and hammering it, while at the same time turning the wire on its own axis until it is perfectly straight.

The resultant length of wire will be in the region of 36 inches. However, in view of the fact that not everyone will have the dexterity to straighten completely both ends, there will certainly be available to them a length exceeding 33 inches.

Using a felt-tipped pen the wire is now marked to give four eight-inch sections plus a one-inch section at the end. The wire is now cut through with the pliers at the point of the first pen mark. Then the pliers are placed so that the second mark is level with its side. Gripping it firmly with the pliers, the wire is now bent over to an angle of 90°. The pliers are moved to the next mark and the procedure repeated for each mark; resulting in a shape as shown in Figure 1.

It will be seen that the projecting one-inch is now capable of being bound to the opposite end by overlapping it and securing it to that end with a small strip of one-inch wide masking or electricians' self-adhesive tape.

The above process is repeated with further hangers until six such squares have been constructed. Four of these are then joined together; again using masking or electricians' tape, to form a cube-like structure as shown in Figure 2.

The remaining two frames are then similarly attached to the top and base of this structure as indicated in Figure 2. The addition of these two

Fig.1.

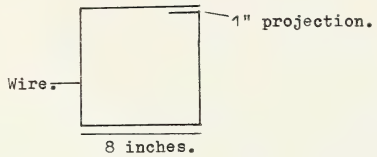


Fig.2.

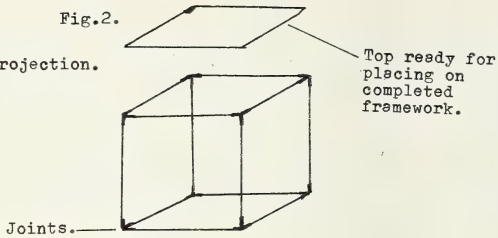


Fig.3.

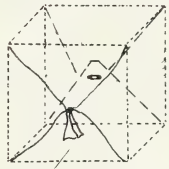


Fig.4.

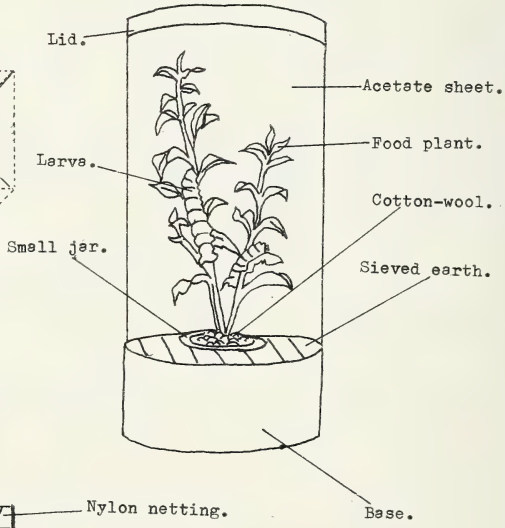
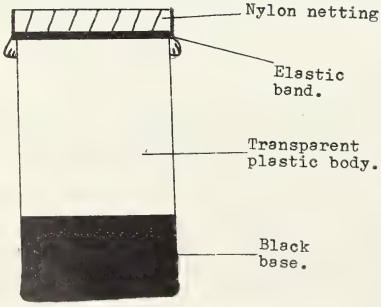


Fig.5.



frames will give a rigidity to the structure, but it is recommended that the cube now be turned on its side, thus permitting the rigidity to be vertical rather than horizontal.

Plain, unpatterned, nylon curtain netting, having a drop of 36 inches can be purchased, often quite cheaply, from a remnants shop, and from this a piece 36 inches by 34 inches is required. This is then folded in half so that an inch in from the free edges on the long side, and the margin of one of the shorter ends may be machined and produce a nylon bag into which the cube-shaped frame can be inserted.

In view of the fact that, to all intents and purposes, a rounded nylon bag has within it a cube frame, an excess of material will exist at the closed end forming roughly two triangular pockets. They are conveniently folded and overlapped toward the centre of the end of the metal cube and secured with a safety pin.

In addition the opening of the bag protrudes for some distance beyond the metal cube. This protrusion is, in fact, a sleeve through which a small plastic vessel containing water and larvae may be introduced into what has now become a rearing cage. After this has been accomplished it is a simple operation to close over the sleeve, as near as possible to the cage, by using a plant-tie or rubber band. See Figure 3.

Eventually the adult insects will emerge, and these may be taken from the cage, simply by inserting the hand, via the sleeve, and catching them in a tube, or with an aspirator.

At this point it is worth noting that disposable plastic cups, small ice-cream cartons etc, are ideal for use as larval vessels.

Virtually any type of round tin can be employed to construct the second form of cage, provided its depth is only about four inches or so. Naturally adequate ventilation is an important factor, and this may be achieved by punching or drilling holes in the tin lid; bearing in mind that all such holes should be made from the inside of the lid to the outside. This will prevent any Lepidopterous or other larvae from injuring themselves on what might otherwise be a roughened interior surface.

The body of the cage is constructed from a sheet of clear acetate the depth of which should not be less than one foot. However, its width will need to be at least half an inch more than that of the circumference of the tin.

The acetate sheet is now bent round to form a cylinder, the ends of which will overlap by half an inch and may be held permanently in place by smearing with 'Locktite' clear glue, or similar adhesive, and pressing firmly together.

Since the resultant cylinder has to fit snugly into the tin base, and have the lid placed on the top, it is as well to ensure that it does so before the

glue has had an opportunity of setting along the entire length of the acetate. See Figure 4.

One is now in a position to fill the base of the cage with sieved earth, for the benefit of those larvae (for example, those of the Sphingidae) which would normally pupate underground, and into this earth should also be centrally placed a small jar containing the larval foodplant.

Naturally the spaces between foodplant and the sides of the jar should be carefully packed with cotton-wool to prevent larval excrement from dropping into the water; being absorbed into the foodplant, and thereby causing the larvae to be poisoned.

Although somewhat restricting in its capacity, an exceedingly useful rearing cage may be made by taking a two-litre "Family Choice" plastic soft drinks bottle, and cutting the curved top away so as to leave the lower portion eight inches in depth. This bottle has a circumference of almost 13 inches and is already fitted with a two-inch deep black plastic base. Consequently one has only to cover the top with a piece of suitably sized nylon netting; held firmly in place with an elastic band to function in exactly the same way as that previously described. See Figure 5.

ODE TO A WATER BEETLE

Under that wide expanse of water,
That is hidden in that far-off quarter,
Your life you see,
Has all the hazards of a bumble bee,

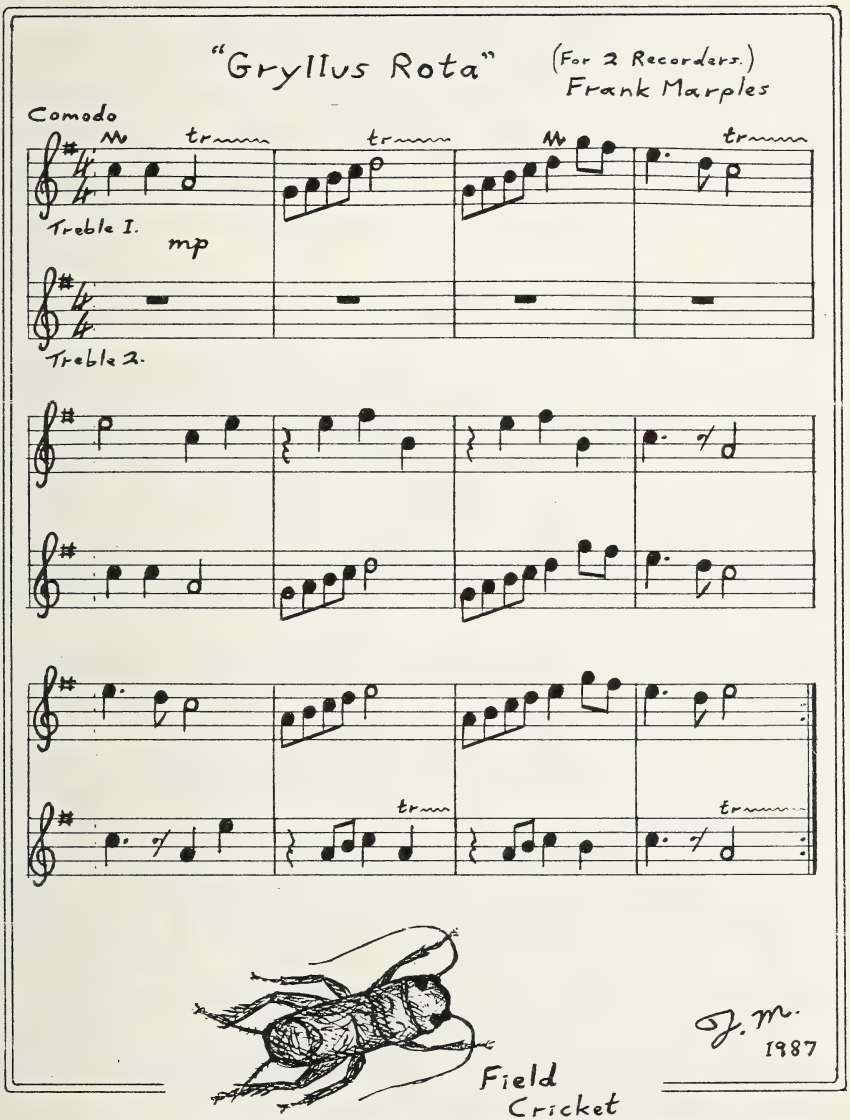
Your enemies do not touch you,
Sore afraid of what you might do,
And let you swim and eat calmly,
And ne'er come near to harm thee.

You remain still when you rest,
And with your mate you do jest,
And with mutual understanding,
Swim and glide over that soft landing.

You know it will always be your home,
And when it is night, and all is still,
Neither of you, in your hearts, will fall ill.
Surrounded by your muddy loam.

And when daylight dawns,
You rise and welcome a new morn,
With neither scoff nor scorn,
But with surety and peace,
That will never cease.

Mark Johnson



THE COURTING SONG OF THE FIELD CRICKET

by Frank Marples (8226)

How sad, that one of our most "musical" insect species should be so rare, and confined only to the southern counties of England!

The nymph of the flightless field cricket (*Gryllus campestris*) over-winters in the soil, and is mature and active by May. Stridulation, a specifically male activity, is effected by wing-against-wing movement.

The identification of individual species of the order Orthoptera, by sound alone, may be an art in itself. How satisfying it would be to wander a sun-dappled lane in the heart of the English summer, and to be able to exclaim, with assurance, "Ah, the courting song of the field cricket!"

ROYAL GEOGRAPHICAL SOCIETY SUPPORT FOR EXPEDITIONS 1988

The Royal Geographical Society (RGS) has been supporting expeditions for almost 160 years and has tried through rigorous screening to maintain high standards for overseas field research. Today 78 expeditions as diverse as Ghana and South Korea have been given the Society's formal approval for 1988.

The Society's primary motive in approving these expeditions is to advance geographical science. The attached list shows the wide range of environments and challenges they will face to achieve their intellectual and adventurous aims.

Financial support totalling over £20,000 is being awarded to 50 projects. This money comes from the Society's own funds and from a number of sponsors, including a major donation from Barclay's Bank in addition to grants from The Geographical Magazine, WEXAS International, RTZ, Rolex and the Goldsmiths' Company which the Society administers.

Widespread concern about the fate of tropical forests is reflected in the number of expeditions investigating the biological resources of this environment, and in particular local uses of plants. The screening panels were particularly impressed by two projects working in the Brazilian Amazon: The Cambridge Amazon Study Group carrying out an ecological mapping project on an island near the mouth of the Amazon, and Para Amazonia, a joint Anglo-Brazilian investigation of forest soils and nutrient cycling in an area being rapidly settled. Project Soma will collect samples of medicinal and economically important plants used by the Orang Kubu people of Central Sumatra.

Several expeditions seek to provide additional information on the status of rare or endangered species in protected areas, and groups from Oxford, Cambridge and the Open University will be visiting Madagascar for this purpose.

It was interesting to note that almost one third of the expeditions who applied to the RGS this year are led by women.

In addition to the expeditions approved by the Society, the RGS is currently organising its own major overseas research initiative with the Linnean Society of London: The Kimberley Research Project 1988 in the King Leopold and Napier Ranges of Western Australia. Work is also continuing on the Maraca Rainforest Project, the largest effort ever organised in Amazonia by any European country, which has just finished its field phase.

For further information please contact Catriona Prebble, on 01-589 5466 ext. 32. April 1988

The following expeditions are of an entomological nature.

PROJECT HERCULES (88)

Dave Clarke, The Invertebrate Section, The Zoological Society of London, Regent's Park, London NW1 4RY.
Areas: St Helena, South Atlantic
Members: 2. Departs: 24 March 1988 for four weeks.

To determine the exact status of, and collect specimens of, the world's largest earwig, *Labidura herculeana*, with the intention of initiating a captive-breeding programme at the London Zoo. Information will also be collected on the status of other endemic invertebrates on the island.

CAMBRIDGE COLUMBUS ZOOLOGICAL EXPEDITION TO VENEZUELA 1988 (25)

Anna Varey, The Croft, Frolesworth Road,Ullesthorpe, Leics LE17 5BY
Area: Paria peninsula, Venezuela
Members: 4. Departs 1 July 1988 for ten weeks.

To carry out a bird census, with particular reference to endemic and rare species, such as the Red Siskin, Scissor-tailed Hummingbird and Venezuelan Flower-piercer. To carry out a survey of dragonfly species and to study the behaviour of species with specialised habitat requirements working in close collaboration with Venezuelan zoologists.

THE CAMBRIDGE ENTOMOLOGICAL EXPEDITION TO NEPAL (40)

Naomi Saville, Gonville and Caius College, Cambridge CB2 1TA
Area: Shivapuri Nature Reserve, N Kathmandu and Namche Bazar, Nepal
Members: 4. Departs 15 September 1988 for 12 weeks.

To study the ecology and distribution of insects in East Nepal, particularly making a collection of bumblebees at sites of different altitudes, studying plant-pollinator interactions with respect to microclimate. Attempts to find the rare dragonfly *Epiophlebia laidlawi* will be made and, if possible, studies of some aspects of its ecology.

THE STUDY OF TWO SUBSPECIES OF DESERT BEETLE IN THE NAMIB DESERT (113)
Heidi Hauffe, New College, Oxford OX1 3BN
Area: Namib Desert, South West Africa
Departs: 25 June 1988 for ten weeks

To make a systematic study of two sub-species of the Desert Beetle genus *Onymacris* found in the Namib Desert. To document the behaviour and ecology of *O. rugatipennis albotesselata* and to determine whether the two 'subspecies' should be reclassified using the more traditional methods of comparative morphology, behaviour and physiology as well as more modern methods of molecular genetics.

LEEDS UNIVERSITY EXPEDITION TO MOUNT CAMEROON 1988 (55)
Craig Roberts, 43 Rands Clough Drive, Worsley, Manchester
Area: Buea, Mount Cameroon, Cameroon
Members: 4. Departs: 13 July 1988 for eight weeks.
To study the biology and ecology of the tropical rain forest insects and other arthropods, with particular reference to the effect of heavy rainfall during the monsoon season on insect behaviour. Pseudoscorpions will be studied in detail as part of a project on the taxonomy, evolution and biogeography of the African pseudoscorpion fauna.

CAMBRIDGE TARANTULA EXPEDITION (26)
Rosemary Smith, 42 Hayes Road, Bromley, Kent BR2 9AA
Area: West of the Sierra Madre Occidental, Mexico
Members: 5. Departs: 1 July 1988 for nine weeks

To discover methods of exploiting wild populations of the red-kneed tarantula, a popular pet, that will allow a maximum sustainable yield that is least damaging to the spiders. To gather base-line data which will serve as the foundation for future, more detailed research into the ecology of this spider.

EDINBURGH UNIVERSITY 1988 BELIZE EXPEDITION (47)
Dr David Munro and Nicholas Landell-Mills, Flat 3, 25 St James Square, Edinburgh EH1 3AY
Area: Belmopan, Belize
Members: 16. Departs: 20 July for seven weeks

To carry out pilot studies in three areas of Central Belize with a view to their designation as protected areas under the National Parks Systems Act 1981, using environmental mapping and a resource inventory. Additional studies will include assessments of: citrus agriculture, sugar cane farming and squatter settlements.

OXFORD UNIVERSITY EXPEDITION TO COSTA RICA 1988 (39)
Graham Reid, 119 Woodsford Square, London W14 8DT
Area: Guanacaste National Park, Guanacaste Province, Costa Rica
Members: 5. Departs: 6 July 1988 for eight weeks

To study the floral biology of bat and hawkmoth-pollinated trees in endangered Tropical Dry Forest habitats and the effectiveness and foraging behaviour of such pollinators. It is hoped that information provided will be useful to Guanacaste National Park managers engaged in regrowing the forest.

UNIVERSITY OF EAST ANGLIA MEXICO TROPICAL FOREST EXPEDITION (91)
Henry Russell, 5 Clarke Road, Norwich, Norfolk
Area: Tuxtla Gutierrez, Chiapas, Mexico
Members: 5. Departs. 30 June 1988 for eleven weeks

To carry out a detailed survey of the various forest types at the reserve La Yerbabuena, providing the basic information for its management and continued conservation by the Natural History Institute, Tuxtla Gutierrez, Chiapas.

NEWCASTLE UPON TYNE UNIVERSITY CORSICA EXPEDITION 1988 (35)
Clair Brunton, 393 Slaters Road, Gosforth, Tyne and Wear NE3 4XJ
Area: Corsica
Members: 3. Departs: 9 July 1988 for eight weeks

To carry out a systematic collection of the island's moth populations to try to establish the numbers of endemic species. To observe the moth *Coenonympha corinna corinna* at selected sites on the island to try to establish if there is an altitude-dependent cline. To investigate behavioural differences within the *Argynnis paphia valesina* polymorphism to discover the possible heterozygous advantage.

CAMBRIDGE MADAGASCAR RAINFOREST EXPEDITION 1988 (22)
Roger Safford, St Catherine's College, Cambridge CB2 1RL
Area: Reserve Naturelle Integrale de Marojejy, NE Madagascar
Members: 5. Departs: 28 July for ten weeks

To produce an inventory of the birds and mammals of the reserve, with subsidiary observations of other faunal groups, especially Swallowtail butterflies. To discover and report on the state of the forest and the degree of deforestation, as well as attitudes to, and uses of, the forest by local people.

MONARCH BUTTERFLIES INVADE NERJA

by C. Rankin (8833)

Further to my observation on this species in the May *Bulletin,* the following account appeared in the English language newspaper *SUR* on April 15 this year. There is now no doubt but that *Danaus plexippus* is now firmly established in southern Spain.

"The streets of Nerja were invaded last Friday (April 8 1988) evening by thousands of butterflies, of the danaus plexippus species, which came to rest on the town's lampposts, particularly the ones in Calle Pintada.

Originally from America, they are now common in the Canary Islands and emigrate from there to England and Ireland at the end of winter.

As they follow the coastline, they have sometimes been seen in Gibraltar, and it is thought that the prevailing winds last week blew them off their path."

INFORMATION REQUIRED ON VLADIMIR NABOKOV:

Author and Entomologist

WANTED: Offprints or reprints of entomological articles and personal letters by the Russian-American writer and entomologist, Vladimir Nabokov. For updating my standard bibliographic work on the author, I need to acquire or examine such papers. I will send a list of his entomological journal appearances to anyone who asks. Contact Michael Juliar, 355 Madison Avenue, Highlands Park, NJ 08904 USA, 201-846-4221.

FRESH INSECT LEGISLATION

The Secretary of State, under the powers given him by the Wildlife and Countryside Act 1981, has made a Variation of Schedules Order 1988. The purpose of this order is to bring into the protection of the Act a number of animals and plants which, on the advice of the Nature Conservancy Council, and taking into consideration other opinions and any objections, are, in his opinion, in danger of extinction.

The following insects are added to Schedule 5 of the Act:—
Violet click beetle (*Limoniscus violaceus*)
New forest cicada (*Cicadetta montana*)
Viper's bugloss moth (*Hadena irregularis*)

One insect, a butterfly, is removed from the list. This is the Chequered skipper (*Carterocephalus palaemon*).

Over 30 plants have been added and amongst the animals are all dolphins, whales, porpoises and the walrus; the pine martin; the wild cat (*Felix silvestris* that is, not your abandoned average moggy living, usually only too successfully, wild); dormouse, medicinal leech; fairy shrimp.

INTERNATIONAL ENTOMOLOGICAL FAIR IN PARIS

We have received notification that the first International Trade Fair of Paris will be held over two days on the 17th and 18th December this year. It is to be held at the Hotel Pullman, 17 Boulevard Saint-Jaques, 75014, Paris.

It will attract collectors from all parts of the world (the organisers say they have over 12000 names on their files) as well as the general public, who are always interested in nature and who are looking for new ideas and Christmas gifts.

The organisers hope our members will attend the fair, either as traders or as visitors.

For traders, two different prices have been decided on, with tables 46 or 92 cms wide and payment may be by instalments. The literature sent us does not, unfortunately but perhaps deliberately, specify either the trade charge or the entry fee. For those requiring accommodation this can be arranged close by at very competitive rates, such as £6.50 per night for a twin-bedded room in the Foyer International d'Accueil de Paris, or (at a specially reduced price) £60 in the Hotel Pullman itself.

The exhibition is to be held in a rectangular room of 500 square metres on the first floor, with four entrances and lifts. Hotel Pullman is a four-star de luxe one, very accessible by bus, metro or rail, and has a large free car park. The event will be well publicised in the French and Foreign press and on radio and television.

Should anyone be interested, details from France Entomologie, 18 Sente des Chataigniers, F.92380 Garche, France.

THE AIDGAP KEYS

The Field Studies Council has started to publish a series of keys under the name of 'AIDGAP', which are intended as aids for identification of particularly difficult groups of animals and plants. Those already published include Seaweeds, Sea spiders, Red seaweeds, Brown seaweeds, Grasses, Diatoms and Slugs. We have not seen any examples, but have had favourable reports from reliable sources that some at least of them are worth having. The following are of entomological interest and are

available from "Field Studies", Nettlecombe Court, Williton, Taunton, Somerset TA4 4HT.

Key to the major groups of Terrestrial invertebrates £3.50.

Key to the major groups of Freshwater invertebrates £3.50.

Bees, ants and wasps: The British Aculeates £2.50.

A key to the families of British Coleoptera and Strepsiptera £2.50.

Keys to the insects of cow dung and adult water beetles are in preparation.

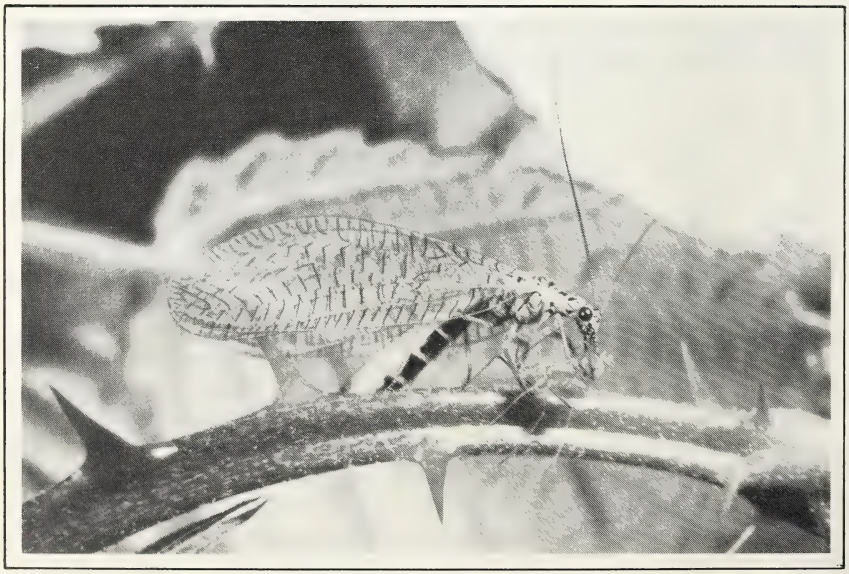
THE JEALOTT'S HILL PHOTOGRAPHIC COMPETITION

by Terence F. Knight

Last year's photographic competition, organised jointly by the AES and Jealott's Hill Research Station at Bracknell in Berkshire, resulted in nearly 40 entries, a record number.

Many of the entries, based on the theme of Insects feeding were of a high standard and the two judges, myself and Sid Painter, had great difficulty in choosing a winner. Eventually, after a great deal of deliberation, we selected R. Barrington's colour print of a lacewing devouring an aphid.

Unfortunately, there did not appear to be any entries from junior members and as a result Mr Barrington received the total prize money of £80, together with the opportunity to visit Jeallot's Hill for a conducted tour.



The competition was the third to be held. Others have been on the themes of Camouflage and Insects in the Garden. This year's theme is Insects and Water. Colour or black and white prints must be sent to me at 46 Swinburne Avenue, Hitchin, Herts SG5 2RL to arrive no later than August 31. There will be prizes of £40 each for the best entry from senior and junior members, in addition to a tour of Jealott's Hill. All the entries will be put on show at the annual exhibition in October.

ORANGE-TIP CATERPILLARS AND LADYSMOCK (*CARDAMINES PRATENSIS*)

Or, an oasis for Orange-tip caterpillars

by Dr N.B. Turnbull

In May 1987 I collected a few Orange-tip eggs, having found an abundance of them laid singly in a large area of Ladysmock. I did not want to dig up any of the plants (it's illegal anyway!) or particularly make repeated returns to this area from my home some two or three miles distant.

I was faced with the dilemma of keeping the foodplant fresh while avoiding a watery death trap for the caterpillars and too close proximity which would encourage their cannibalistic tendencies.

I struck on the idea of using a block of flower arrangers' 'oasis' on a dinner plate with a small amount of water. I put the seed heads with the attached eggs in the oasis making sure the plants didn't touch. Much to my delight the foodplants remained fresh while the caterpillars developed through to the pupa stage. The caterpillars showed no inclination to eat each other and I was spared the normal repeated changing of the caterpillars' foodplant. The caterpillars did, however, leave their oasis shortly before pupating in various parts of the room and I await their emergence in 1988.

CONVOLVULUS HAWK-MOTH IN NORTHAMPTONSHIRE

by Brian Laney

On the evening of Thursday September 17 last year a friend came to my house at Long Buckby and told me that his mother had found a large creature which she had placed inside an ice-cream container. I thought that perhaps she had a Dor beetle, or maybe an Elephant hawk-moth caterpillar, both common enough. Before removing the lid of the container we looked through the base. A large moth was sitting asleep inside and we could see its silhouette on the container's bottom.

My friend's mother said she had never seen anything like it before. I too was puzzled until the lid was removed. A large grey moth with large

black eyes sat in the bottom. I couldn't believe my eyes. It was a Convolvulus hawkmoth (*Agrius convolvuli*), the first I had ever seen and I became very excited. I was informed that it was in fact the dog who had found it. It was barking like mad at something on the grass near to the door and on investigation it proved to be this large moth. Taking it home I hand-fed the moth with sugar/water solution and allowed it loose to fly round the room. The massive beast flew round and round the light and the pink markings on its body were clearly visible as it circled. It was a shame that close scrutiny showed it to be a male, for I was in great hope of eggs, and so on the Saturday I released it into my garden.

HIBERNATION BEHAVIOUR OF FIVE-SPOT BURNET MOTH

by David Williams (8613J)

Having collected several large larvae of the Five-spot burnet moth (*Zygaena trifolii*) on June 15 1985, I discovered that the first two imagines from these had emerged and were mating on July 4. I collected the resultant ova which began to hatch July 16. Not having any bird's-foot trefoil readily to hand I offered them white clover which they readily took and forty of them reached hibernation time.

Almost all of these, about 5mm long, survived hibernation, but unfortunateely I was unable to find any clover until April 17. They appeared to accept this but after a while it became apparent that they were not eating, steadfastly refusing all clover and then trefoil that they were offered. It seemed indeed as if they had not really awakened from hibernation (although they had spent the winter in an unheated shed). By August 1 1986 only ten of them were still alive and amazingly these all hibernated during the 1986/87 winter. I had convinced myself by now that I had not found them food in time enough that spring and so they had just decided to continue in a prolonged hibernation and I made a resolve to feed them as soon as possible after the second winter's hibernation. Two larvae were definitely still alive on March 29 1987 when clover was available. I now moved them to a lighter part of my shed to see if that would help. All in vain, despite trying again with trefoil, and the penultimate larva was found to be dead on June 15 and after a false alarm on June 26, the last died on July 5, just eleven days short of its second year of life. It was 3.5mm long at death. I have not personally come across, or seen anything in the literature, like this and wondered if any other members have had any similar experiences.

(It is stated in Vol 2 of *Moths and Butterflies of Great Britain and Ireland* that most *Zygaena* species are known to at times have multiple diapause, often not feeding in between. Clover does not, however, appear to have been stated as a foodplant for *trifolii*. It is my own experience that this is a notoriously difficult group to rear and I have lost the lot during hibernation in the past, including those left out amongst the clover on my lawn!-Editor.)

CAST SKINS OF INSECTS AS SUBJECTS FOR MICROSCOPIC STUDY:

a simple procedure for making slides

by Geoffrey B. Collins (1036)

The preparation of insect parts for microscopic examination normally involves warming in aqueous sodium or potassium hydroxide to remove unwanted soft tissues, followed by extensive washing, dehydration, change of solvent and final mounting in canada balsam or some similar medium. Such detailed procedure is essential for critical work, or for long-term storage of reference material. Following it through however is not always an easy task, and may indeed be attended by some hazard, particularly for those of us whose kitchen has to double as a laboratory. Handling difficulties apart, there can also be problems in obtaining some of the necessary reagents and materials.

For insects having incomplete metamorphosis (and probably for some that do not) much of interest may be achieved, using less complex procedures, by taking advantage of the empty skins shed during their growth. This is of particular relevance to the study of the development of certain parts, as a series of preparations can be made recording these for each of the stages of one individual reared in captivity. In the course of tracing the increase in the number on antennal segments, and the site of the new intersegmental divisions, through the successive nymphal stages of some of our common grasshoppers, I have had recourse to the following simple technique, which yields semi-permanent preparations quite adequate for low-power (i.e. up to x50) examination and of reasonable quality for use with higher powers.

That portion of the cast skin selected for study is carefully detached with the point of a scalpel or similar instrument. It is then softened by being soaked for some hours in water. Any initial resistance to being wetted may be overcome by the addition of the merest trace of washing-up liquid; in this event the item should be transferred to clean water before further treatment. For many structures, such as antennae or limbs, the cast is a hollow tube and, if necessary, the water should be brought just to the boil two or three times, with cooling in between, so as to dislodge entrapped air-bubbles. Use of hard tap-water may result in the deposition on the skin of minute crystals that become unsightly if the object is examined with high magnification; distilled water is best for this purpose, but filtered rain-water makes a good substitute. The object is then placed on a microscope slide, smaller or more fragile items being conveniently transferred with a child's paint brush. Accompanying water should be kept to the minimum consistent with preventing the re-introduction of air-bubbles. A drop of glycerine is placed on a cover-glass, which is then inverted and lowered gently on to the object. This

prevents the risk of the object's being picked up on the end of the dropper, as may happen if attempts are made to place a drop directly on to it. Slight pressure on the cover-glass may then be applied to flatten the object. After a few hours the glycerine will have permeated the structure which is usually rendered sufficiently transparent for microscopic examination.

If a semi-permanent mount is desired the cover-glass is slid off and the object transferred as before to a clean slide. My practice is to place the slide on a white card on which has been drawn the outline of a slide with spots marking the centre, and the other positions if two or more objects are to be mounted on the same slide. This helps the attainment of a neat and uniform appearance for the final preparations. The mounting medium is glycerine jelly; this may not be too easy to obtain nowadays, but I have achieved good results with the glycerine suppositories sold at most pharmacies for the relief of stubborn constipation. One of these, melted in a test-tube placed in near-boiling water, will provide enough medium for dozens of mounts. As before, lowering a drop of melted jelly on the underside of a cover-glass reduces the risk of displacing the object and permits prior adjustment of the quantity applied. In cold weather it may be necessary to pass the slide rapidly once or twice through the flame of a spirit lamp or gas jet to keep the jelly sufficiently liquid to flow outwards. Only practice will dictate how much should be used; the ideal is for the medium to flow to the edge of the cover-glass but not beyond.

These mounts will certainly last for months, usually long enough for comparison to be made between the individual casts of a series from a single developing nymph, and I suspect that, if carefully stored, they would remain in a satisfactory condition for some years. Should it become necessary at any time to prepare a more permanent mount, the specimen may readily be recovered for more elaborate treatment by placing the slide in hot water, in which the jelly rapidly melts and dissolves. The slide and cover-glass are simultaneously released for subsequent re-use without the need for cleaning with a solvent.

KOMOTINE, GREECE, SEPTEMBER - NOVEMBER 1987

by Gareth King (8585)

Each country has an image — some may call them stereotypes — and Greece is no exception. However, the town to where I was posted temporarily in Northern Greece, probably shattered most notions of what Greece is. Gone were the picture-postcard views of tourist Greece, and instead one was presented with a fairly ordinary town. Ordinary, save for one feature of ethnicity. Half of the population of Komotini was Turkish. Situated in the eastern-most province of Greece, Thrace, about 80 km from the Turkish frontier, in an essentially agricultural region,

only part of Greece since 1920, Komotini was to be my home for three months. Not least of all, I was to be intrigued by the entomological opportunities which would present themselves thus.

My first trip out of the town was, as ever, by bicycle into the nearby Rhothopi mountains, which are Greece's northernmost frontier with Bulgaria. Komotini stands only 8 km from the frontier, which unfortunately one is unable to cross, at least legally. From Komotini to the foot-hills of the Rhothopi, one's eye is met by acres and acres of agricultural land, which in mid-September has been baked dry by the omnipresent heat. Temperatures on average for September reached 36°C. Aside from the fields of cotton and maize, the vegetation was essentially scrub. Including *Robinia, Quercus,* and some *Populus.* Low plants included thistles, brambles, some oleander, but no nettle. Once into the Rhothopi, the vegetation becomes more typically Central European. However, in Central Europe, one does not find Balkan tortoises! It was heartening to find, at least several specimens — realising that the pet trade had not completely decimated the population. I cannot recall the last time I saw so many frogs in England, but here, even in only miniscule stretches of water, were countless edible frogs.

The first Lepidoptera encountered were specimens of *Pandoriana pandora* (Cardinal) on thistle, along with the occasional *Apatura,* unfortunately of indeterminate specific status. *Brintesia circe* (Great banded grayling) was also common, flitting along, until it would characteristically make itself invisible on a tree trunk.

One species, which was very common was *Catocala nupta* (Red underwing). I saw my first specimen on September 14, but would see a specimen every day until October 30, when the day-time temperature was only 8°C. Their flight period was certainly longer than in Britain. I would see specimens at rest on walls during the day, around lights at night, and often in the vicinity of the flat. I would have appreciated the capture of a gravid female, but only males were ever seen. Should I have gone sugaring, females would undoubtedly have presented themselves in large numbers.

Another common species, fairly predictably, was *Macroglossum stellatarum* (Hummingbird hawk). Initially, specimens were seen feeding from the few flowers present at this time of year. However, from October 16 until November 11 when my last moth was seen, individuals, without exception, would be seen hovering around buildings, presumably in search of a hibernation site.

The next weekend, I again cycled up into the Rhothopi, and amongst other things, found myself witness to a most macabre spectacle of a snake devouring a frog, complete with sound effects. I had learnt that *Saturnia pyri* (Great peacock) was common in Greece; however, all I found was one empty cocoon under a bridge. My first *Issoria lathonia*

(Queen of Spain fritillary) was seen on this trip, in the vicinity of a bramble thicket. Subsequent specimens of this desirable butterfly were seen on the way to Maronia, near the coast, but still miles away from a 'typical' Greek beach.

Being an entomologist of the breeding fraternity, I am always on the look-out for larvae. I was out of luck, until I found four *Papilio machaon* (Swallowtail) larvae on some very sad looking fennel during the last weekend in September. These quickly pupated and were joined by several more over the course of the next week. The colour forms of the larvae varied a great deal. Some indeed were practically black. As the range of *Papilio alexanor* (Southern swallowtail) overlaps in southern Greece with *P. machaon,* could it not be possible that some of my finds were of the former rather than the latter?

I cannot pretend to be an expert on the Praying mantids, but my finds relating to these insects suggests that I found another species besides *Mantis religiosa.* Of the three specimens I collected, two produced quite different oothecae.

A cycle ride down to Maronia on October 10 revealed several species in yet another dried out river bed — this time of the Filiuri. The only flowers in any abundance were thistles, which produced *I. lathonia, Heodes virgaureae* (Scarce copper), *Pontia daplidice* (Bath white), *Colias crocea* (Clouded yellow) and *Polyommatus icarus* (Common blue). Beyond Maronia I visited Haralampos on the coast, where flowers of Golden rod produced a few *Cynthia cardui* (Painted lady), *Vanessa atalanta* (Red admiral), *Inachis io* (Peacock) and *C. crocea.* This trip out impressed on me the amount of *Euphorbia* plants seen, I did look for *Hyles euphorbiae* (Spurge hawk) larvae, but found none, finding instead a larva on October 18 crawling across the road, which pupated soon after.

My temporary post came to an end at the end of November, whereupon a visit to the Akropolis on December 1 produced several imagines of *C. cardui* and *Artogeia rapae* (Small white) on nearby ragwort.

BREEDING THE MARSH FRITILLARY (*EUPHYDRYAS AURINIA,* ROTT)

by P.W. Cribb (2270)

I refer to the article which appeared in the August 1987 number of the *Bulletin,* page 143, in respect of the breeding of the Marsh fritillary. I have been breeding the species in captivity now for over thirty years and endorse most of the observations of the writer, apart from one or two statements which appear to me to be misleading.

He states that the larvae start to move in the spring. In the south of England larvae will come up and sun themselves in January, provided the weather is mild and there is some sunshine. They do not start to feed until the end of February and then spasmodically, depending on sunshine and availability of foodplant. He also states that pupation occurs in July. In my experience pupation commences towards the end of May and by mid-June in Middlesex the butterflies have emerged, mated and commenced to lay their eggs. Dates may be later in the north of England and Scotland but here with the larvae kept in natural conditions, this sequence has not varied by much more than ten days, even in the most inclement of spring weather. The eggs darken to a purplish tint about seven days after laying and if this darkening does not occur it means that the eggs are not fertile. This is quite unlike the egg masses of the *Melitaea* and *Mellicta* species which retain their white or yellow colouring until just prior to hatching.

The final comment is in regard to foodplants. There is no evidence at all that *E. aurinia aurinia* will use plantain (*Plantago* spp.) or *Digitalis purpurea* as a foodplant and I have never been able to get British or continental races to eat them. I feel that the error has arisen from wrong identification of the larvae. *E. cynthia* larvae readily eat *Plantago* spp. and the *Mellicta* group will use members of the Scrophulariaceae (including *Digitalis*). On the Continent, the race *E. aurinia beckeri* uses *Lonicera* even where *Succisa pratensis* is also present. These errors in stating foodplants appear to be repetitions of earlier errors and should not be repeated unless substantiated by experience.

FRIDGE TO THE RESCUE

by Alan Winterflood (7739)

The lepidopterist is occasionally confronted with problems when males and females of potential breeding stock do not emerge within a few days of each other.

When a week or more elapses between the emergence of males and females, panic or disaster often results. Unfertilised female lepidoptera will often deposit ova much to our horror, while the males become less viable with passing time or could even die before the females emerge.

In some instances it may not always be convenient during the working week to spend hours watching moths in a flight cage in order to confirm if any pairings have taken place.

Species like *Deilephila elpenor* (Elephant hawk-moth) will only pair for brief periods during the night and therefore cannot be expected to be found in the coupling position when one comes to inspect the flight cage in the morning.

The domestic fridge can however sometimes provide a solution to the problem since I now believe some species like *elpenor* for instance can be kept in suspended animation until a suitable opportunity or day arises to pair them off.

I shall give a classic example.

A male *elpenor* emerged on 8/4/85, and was put into the warmer part of the fridge several hours after it had emerged and dried its wings. The female pupae were well behind schedule and so my chances of breeding any so early in the year were very slim indeed. However, a female did emerge, but not until 16/4. This female was also put into the warmer part of the fridge until 18/4 when both moths were taken out for feeding in a warm room.

The temperature in the part of the fridge where they were kept was only about 4°C and these moths were extremely lethargic when taken out but recovery was rapid and I had them both flying around the room within the hour.

Both moths were kept separate while in the fridge and they remained clinging to strips of paper inside nylon topped jars.

Pairing took place on 19/4 at approximately 11 pm after both moths had spent a day in the warmth of a flight cage which was kept outside during the sunny part of the day. They had been fed on a weak honey solution a few hours beforehand during the evening.

The female provided me with several dozen fertile ova which were mostly laid on the undersides of the leaves of broad-leaved willow herb growing in two pots. Ova were laid nearly every day from 20/4 until 11/5. This female was hand fed on honey solution during most days of the egg laying period.

I would very much like to know if anyone else has done any similar or more dramatic experiments with regard to breeding from newly hatched lepidoptera put in a semi-dormant state at low temperatures for extended periods. If so, it would be very interesting to know the maximum time limits one could achieve since this method could be of great benefit on the rare occasions is would be needed, i.e. when the hatching of males and females has been weeks apart, or more!

(I have kept Large cabbage whites (*Pieris brassicae*) in the fridge at 4°C for up to six weeks and still obtained fertile pairings. Indeed since the total life-cycle can be less than this it is possible to obtain a pairing, obtain a few eggs, rear these through while the parents are in the fridge and then mate parents with offspring.—Editor.)

WILTSHIRE BUTTERFLIES IN 1987

by Mike Fuller (6566)

The year started full of promise following the disappointment of 1986.

April was the hottest month ever in many areas, and May was generally pleasant, resulting in the spring butterflies emerging as much as two weeks earlier than usual in some cases, and some appearing in larger numbers than have been seen for several years. In particular, the Small blue was abundant in its favoured downland habitats, and the Large pearl-bordered fritillary had an exceptionally good season in its few woodland areas. The Comma, Orange tip and Speckled wood were all to be seen in good numbers in many parts of the county, and the Dingy skipper and Adonis blue fared well after last year's dismal showing.

However, the latter is still cause for concern at Bratton Castle where the colony is now restricted to one small area and numbers are about one fifth of their former level of only two years ago. Encouragingly, a few further colonies were discovered in the south of the county, one very large one on a south facing slope of a cutting on the A303 and only a few yards from the carriageway. The Green hairstreak, Marsh fritillary, Brown argus, Grizzled skipper and the usually common Brimstone were all generally scarce and the poor weather in June resulted in nearly all species being rarely seen. This was one of the wettest and dullest Junes on record and as well as curtailing the activities of many of the spring butterflies, appeared to have a severe effect on the larval and pupal stages of some of the summer species.

During the first two glorious hot and sunny weeks of July, the normally common Small skipper, Meadow brown and Marbled white were relatively scarce, and the Large, Small and Green-veined whites and Small tortoiseshell were less evident than normal. On the brighter side however, the Ringlet continued to increase in abundance, and the Dark green fritillaries were again commonly seen on the county's grasslands. The Silver-washed fritillary and White admiral were up to strength, as was the very scarce and local Small pearl-bordered fritillary, but the second half of July, like June, resulted in very few days when butterflies were to be seen.

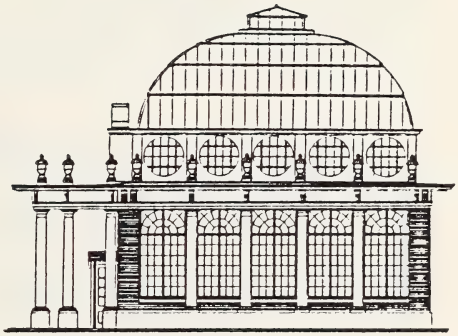
August dawned bright, warm, and generally favourable, and during the first two weeks the regular garden visitors, the Whites, Peacocks, Commas and Small tortoiseshell were all to be seen in reasonable numbers, the Small tortoiseshells becoming particularly abundant as the month progressed, compared with its scarcity the previous year.

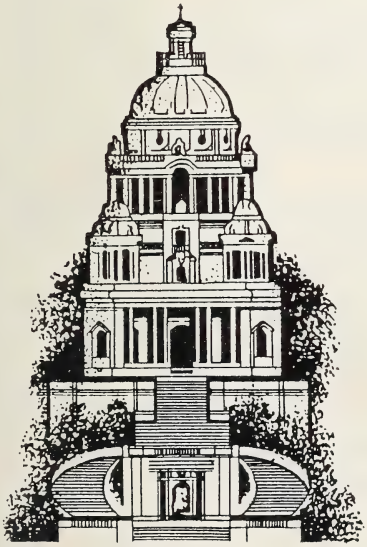
On the downs the Chalkhill blues fared well, and the second brood Common blues and Small coppers were at least evident in contrast to their almost non-existent first broods in the spring. Red admirals appeared regularly at this time, together with second brood Speckled

Williamson Park Lancaster

The Butterfly House

A glorious variety of butterflies — free, flying, feeding and breeding. The Butterfly House is also a nursery, not only for rare and beautiful plants, shrubs and trees, but also for some of the more exotic and rarely seen butterflies and moths.





The Ashton Memorial

1987 Opening Times and Charges
Open daily 11 am to 5 pm until 30 September.
Remainder of the year open Saturday and Sunday from 2 pm until 5pm.
Weekdays by prior booking for parties only.
Memorial ground floor and Life of Lord Ashton Exhibition is free.
Viewing Gallery Adults 20p Child/ Concession 10p.
The Edwardians Adults 80p Child/ Concession 40p.
The Butterfly House Adults £1.50 Child/ Concession 75p.

The Butterfly House, Williamson Park, Lancaster LA1 1UX. Telephone: 0524 33318. G. W. Wheatley FRES Telephone: (0524) 66505

THE AMATEUR ENTOMOLOGISTS' SOCIETY

ANNUAL EXHIBITION, 1988

Saturday, 22nd October

11 a.m. to 5 p.m.

KEMPTON PARK RACECOURSE, STAINES ROAD, SUNBURY, SURREY

MAPS on the reverse of this notice show the location of the hall.

ACCESSIBILITY — The Racecourse is easy to reach by road and rail, and there is adequate free car parking. The M25 is very near and is linked to Kempton Park by the M3, which is less than a mile away. Sunbury Railway Station with trains from Waterloo, is a short walk away. The site is served by two bus routes, Green Line No. 290, and Red bus No. 216. Both these buses stop right outside.

ADMISSION — by Programme at door, 50p.

PARKING — in the free car park **only**. NOT outside the Grandstand. Keep all entrances clear.

EXHIBITORS AND DEALERS ONLY will be admitted between 8 a.m. and 11 a.m.

TROLLEYS are not provided and provision should be made for heavy loads.

ENTOMOLOGICAL DEALERS are attending.

REFRESHMENTS — full facilities are available. All food and drink to be consumed in the Refreshment area.

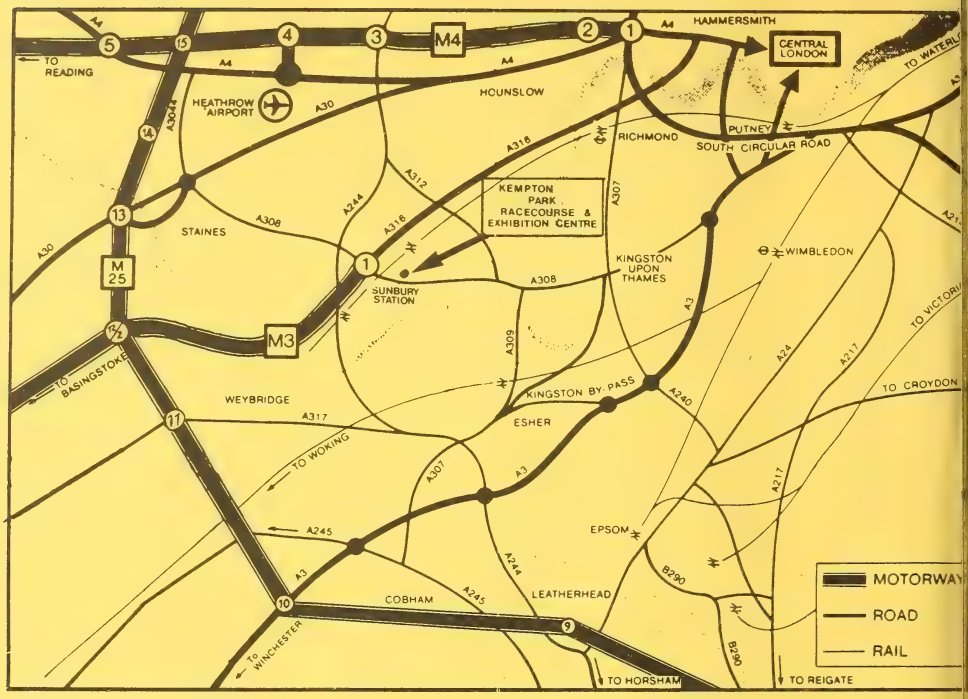
SURPLUS MATERIAL — will be welcome for sale on behalf of the Society's funds.

ANSORGE BEQUEST — Cash prizes and certificates to Junior Members for exhibits at the Exhibition.

LIVESTOCK — It is the duty of both dealers and buyers to ensure that all livestock is kept in containers which are roomy, hygienic and secure against any possible escape.

EXHIBITS which show long series of wild-caught rare or endangered species will not be allowed.

ALL ENQUIRIES — Roy McCormick, 125 Brock's Drive, North Cheam, Sutton, Surrey SM3 9UP.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SOUTH CIRCULAR ROAD
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STAINES
SUNBURY STATION
KINGSTON UPON THAMES
WIMBLEDON
M25
M3
M4
TO BASINGSTOKE
WEYBRIDGE
KINGSTON BY-PASS
ESHER
TO CROYDON
TO WOKING
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LEATHERHEAD
TO WINCHESTER
TO HORSHAM
TO REIGATE
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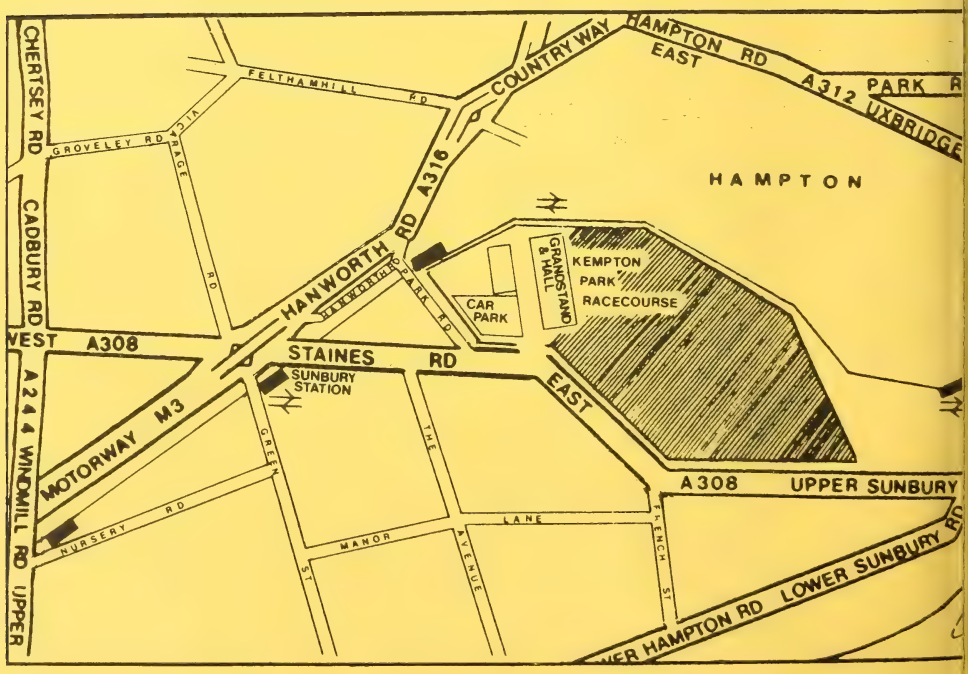
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NURSERY RD
FELTHAMHILL RD
GROVELEY RD
A316
COUNTRY WAY
HAMPTON RD EAST
A312 PARK R
UXBRIDGE
HAMPTON
HANWORTH RD A316
HEATHFIELD PARK RD
CAR PARK
GRANDSTAND & HALL
KEMPTON PARK RACECOURSE
STAINES RD
EAST
SUNBURY STATION
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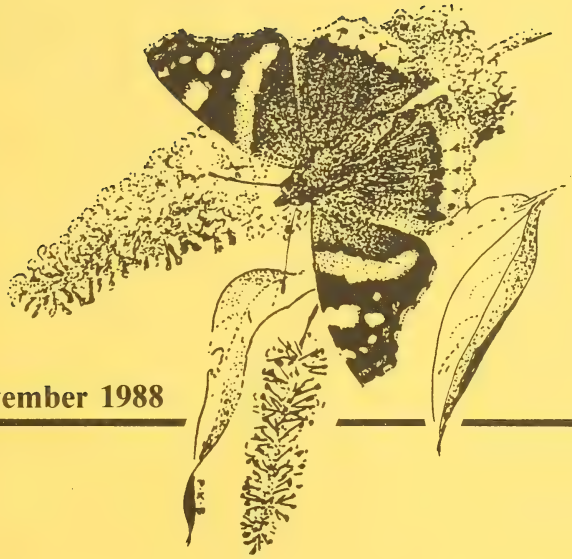
THE MANOR AVENUE
LANE
FRENCH ST
A308 UPPER SUNBURY
LOWER HAMPTON RD LOWER SUNBURY RD



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The Bulletin of the Amateur Entomologists' Society

EDITOR
BRIAN O. C. GARDINER, F.L.S.

The Amateur Entomologists' Society

Founded in 1935

President:	D. LONSDALE	54 Cherry Way, Alton, Hants GU34 2AX.
Hon. General Secretary:	C. C. PENNEY	109 Waveney Drive, Springfield, Chelmsford, Essex CM1 5QA.
Hon. Treasurer:	R. A. FRY	The Hawthorns, Frating Road, Great Bromley, Colchester CO7 7JN.
Registrar:	NANCY CRIBB (Mrs)	355 Hounslow Road, Hanworth, Feltham, Middlesex TW13 5JH.
Hon. Bulletin Editor:	B. O. C. GARDINER	2 Highfield Avenue, Cambridge CB4 2AL.
Hon. General Editor:	P. W. CRIBB	355 Hounslow Road, Hanworth, Feltham, Middlesex TW13 5JH.

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Advertisers:	R. DYKE, 6 Grange Park Avenue, Grange Park, London N21 2LJ.
Exhibition matters:	R. F. McCORMICK, 125 Brocks Drive, North Cheam, Sutton, Surrey.
General enquiries:	C. C. PENNEY, Address as above.
J.C.C.B.I. Representative & Editor of Insect Conservation News:	D. LONSDALE, 54 Cherry Way, Alton, Hants GU34 2AX.
Habitat Conservation Officer:	Dr. C. BETTS, 17 Mereway Road, Twickenham, Middx. TW2 6RF.
Wants and Exchange:	M. COLVIN, 1 Sedgewick Close, Pound Hill, Crawley, Sussex RH10 4BZ.
A.E.S. Exotic Insects Group:	C. J. ESCHBACHER, 38 Frith Road, Bognor Regis, Sussex PO21 5LL.
A.E.S. Insect Behaviour and Ants Study Group:	B. L. WILLIAMSON, 73 Little Brays, Harlow, Essex CM18 6ES.

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AES BULLETIN

No. 361

EDITORIAL

We publish in this issue an account and an appeal by the staff members of the Biological Records Centre drawing attention to the appalling decision by the Natural Environmental Research Council to further cut the Staff of the Records Centre and to consider them as *"An area of lowest priority science."*

A couple of years ago the BRS had to cease marine recording due to lack of resources imposed upon them from on high. One cannot blame the staff, but as a result of this the NERC has to some extent got egg on its face as a consequence of the recent and unexpected mass deaths of seals in the Baltic and North seas. So lacking in resources has it been that charitable voluntary bodies, Greenpeace and Friends of the Earth, have been organising the necessary conferences to discuss the problem; a job where NERC should have been the front runner. But then if one does not take out insurance one only has oneself to blame when disaster strikes, as it has in the North sea.

More controversial and disturbing is the possible political motive in the BRC being regarded as "an area of lowest priority science". The BRC holds records not just of common but also of rare and endangered species. Consider the implications that would have arisen had its records shown the Large blue butterfly to have been present on Folkestone Warren. Such would have been the outcry at its destruction that alternative plans for the disposal of the Channel Tunnel spoil would have had to be made, plans that would have increased the cost and perhaps put the whole thing in jeopardy. Even more so had the records shown the Blue to inhabit the entrance locality. It must be borne in mind that the tunnel project was a purely political decision, bulldozed through by ukase, not planning enquiry, and the very damaging approach roads and rail yards are becoming apparent as the implications of their locations are realised more widely. Better not to know these things, for how

embarrassing for a government to find one of its own departments containing information inimical to its plans. The whole deplorable decision of the NERC is in any case a sure sign of the very very low priority given by our present government towards conservation.

If members consider the number of books that have been published over the past few years they will have noted that nearly all of them bear data, with full acknowledgement, from the Biological Records Centre and this alone proves the significance and importance of the work they have done and shows how useful it is, not just to entomologists, but to all biologists and indeed to any member of the public with an interest in natural history. When funds are limited they are then allocated towards those with the most influence or making the most fuss, while those who keep quiet are ignored and suffer cuts. The NERC has many demands on its funds, some of whose users are vociferous and skilful lobbyists. It is to be hoped that as many members as possible will respond and make their views for the retention of a strong BRC heard.

BIOLOGICAL RECORDS CENTRE

by Paul Harding, Henry Arnold, Brian Eversham and Chris Preston
Biological Records Centre, Institute of Terrestrial Ecology, Monks Wood Experimental Station, Abbotts Ripton, Huntingdon PE17 2LS.

The Natural Environment Research Council (NERC) is facing severe financial difficulties and, as a result, has formally announced that up to 91 staff will have to be made compulsorily redundant.

One of the "areas of lowest priority science" to be identified by NERC, where staff cuts should occur, is the national Biological Records Centre (BRC) at Monks Wood (NERC Press Notice 22/88 dated 13 July 1988). In recent years BRC has lost several permanent posts, but in the latest NERC announcement, one of the four remaining permanent posts in BRC has been under threat. All other staff in BRC are temporary, on short-term contracts or are employed by the Nature Conservancy Council and placed at BRC.

The loss of a further post at BRC will either reduce the efficiency of the remaining staff, as they strive to cover the work of the "redundant" member of staff, or result in the abandonment of an area of work at the Centre. Due to lack of staff, BRC had to withdraw from marine recording in 1986. If BRC is forced to withdraw from another major area of work, for example, botany, invertebrates or vertebrates, the breadth and usefulness of BRC's multi-disciplinary data bank will be further reduced. Such a reduction would leave BRC vulnerable to further emasculation in future years.

For nearly 25 years, the collection and collation of data for BRC has been done by many thousands of biologists and naturalists throughout

the British Isles, all of whom have given their time and expertise voluntarily. BRC has helped foster the developing expertise in natural history in the British Isles and is seen as a model for biological data centres throughout the world.

Data from volunteers are incorporated in the national data bank at BRC, currently at the rate of at least ¼ million records each year. NERC pays nothing to obtain these data; it merely acts, by operating BRC, as a custodian of the national heritage of data on the occurrence of British wildlife. It is impossible to calculate the full economic cost of this voluntary effort and expertise each year, but it is certain that the value must be many times the annual cost, to NERC, of operating BRC.

At a time when environmental awareness and the need for information on the occurrence of British wildlife is increasing, NERC has decided that BRC, a major collator and supplier of such information, is an "area of lowest priority science" and should be subject to a cut in staff. Regrettably, contributors and users should expect an even more limited service from BRC as a result of these decisions. It is still more ironic that such restrictions should be put on BRC at a time when NERC has just provided improved computing facilities which will speed up the retrieval of information. These facilities will also help provide opportunities for the integration of BRC's data with other environment information, thereby broadening the use of the data, both by NERC and by other users.

The immediate prospect of one redundancy at BRC has been lifted thanks to the representations already made by the concerned public. However, it is hoped that NERC can be persuaded that BRC is *not* an "area of lowest priority science", but is a unique national asset to be maintained and encouraged.

We hope that AES members will wish to make comments on the above statement concerning the BRC and that they will make them direct to the Chairman of NERC, and that they will impress upon him that BRC is of the greatest importance to many people and deserves to be far better supported and deserves an infinitely better fate than to be designated "an area of lowest priority science".

The Chairman of NERC, to whom letters should be sent, is Mr H. Fish, Natural Environmental Research Council, Polaris House, North Star Avenue, Swindon, Wilts SN2 1EU.

PETER CROW

It is with great sadness that we have to report the death earlier this year of member Peter Crow (393). Peter was one of our longer standing members, having joined the society back in 1941. We understand that the society is to be a substantial beneficiary under his will.

THE AMATEUR ENTOMOLOGISTS' SOCIETY

ANNUAL REPORTS FOR 1987 OF THE SOCIETY AND ITS ASSOCIATED BODIES

OF THE COUNCIL

Council is pleased to report that 1987 has been another successful year for the Society. Membership as at 31st December stood at 1969 members, comprising 10 Honorary, 45 Life, 41 Affiliated/Exchange, 1755 Senior and 118 Junior Members. The Society enrolled 189 new members but given the loss of members each year there has been a slight reduction in membership compared with the previous year. The high turnover of members creates a particularly heavy administrative load and we are especially grateful to our Registrar, Mrs Cribb, for all her work on our behalf.

Four editions of the Bulletin were published in 1987 under the editorship of Mr B. O. C. Gardiner, containing 244 pages of text and numerous illustrations. During the year, in keeping with the Society's commitment to Conservation, we produced a new publication entitled *Legislation to Conserve Insects in Europe* by Dr N. M. Collins.

The Council met on six occasions during the year at the Central Hall Westminster. The A.G.M. was held at the rooms of the Royal Entomological Society, Kensington. The meeting, chaired by our President, included a fascinating talk by Colin Plant entitled 'Butterflies and other Insects in the London area'.

The Annual Exhibition this year was held for the last time at the Civic Centre, Hounslow and a full report appeared in the August *Bulletin*. The third Jealott's Hill Photographic Competition was held and the winning entries were displayed at the Annual Exhibition. A report with an illustration of the winning entry also appeared in the August issue.

Embroidered Society sweatshirts were produced for the first time and proved very popular and the Society's thanks goes to the Reavey Family for organising it so successfully.

Council records, with much regret, the death of several of our members, including V. Shearer, J. Heath, R. Seacome, D. G. Sevastopulo, F. E. Ransom and F. M. Howard.

C. C. Penney, Honorary Secretary

AMATEUR ENTOMOLOGISTS' SOCIETY

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER 1987

EXPENDITURE

1986 £		1987 £	£
	Bulletin Costs:		
174	Editorial	282	
5328	Printing	5972	
2387	Despatch	2394	
128	Indices	154	
			8802
	Membership Services:		
478	Membership List	1556	
86	Wants/Exchange Lists	158	
			1714
	Administration etc:		
281	Stationery and Notices	401	
153	Postage and Carriage	166	
822	Registrar's Fees	902	
367	Meeting Expenses	578	
25	Study Groups Support	—	
88	Depreciation	57	
213	Insurance	255	
37	Sundry Expenses	50	
			2409
154	Conservation		120
10721			
1954	Surplus Income to General Fund		—
£12675		£13045	

INCOME

1986 £		1987 £	£
	Subscriptions		
7072	Ordinary and Affiliate	7342	
333	Junior	354	
156	Life Membership Fund	168	
			7864
962	**Donations**		919
248	Enrolment Fees		240
	Investment Incomes (Gross):		
517	Dividends		—
1006	National Savings Interest		1153
	Other Income (Net):		
1295	Advertising Revenue	1173	
1020	Annual Exhibition	683	
66	Badges	59	
			1915
			12091
—	Deficit to General Fund		954
£12675		£13045	

STUDY GROUPS' FUND

£		£
942	Balance at 1st January 1987	695
(247)	*Add:* Surplus income for Year/(Deficit)	(873)
£695		(178)

£		£
	Current Assets:	
695	Cash at Bank	(178)
—	Building Society A/c	
£695		(178)

PUBLICATIONS TRADING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER 1987

1986 £		1987 £
	New and Revised Publications	
	Costs:	
38	Editorial	27
4658	Printing	1115
—	Decrease in value of stocks	1284
1909	Selling and Other Expenses	2991
6605		5417
1441	TRADING SURPLUS to Publications Fund	1743
£8046		£7160

1986 £		1987 £
4774	**Sales (Gross):**	7160
3272	Increase in Value of Stocks	—
£8046		£7160

R.A.FRY, Hon. Treasurer
Dip.EE., C.Eng., MIEE

PUBLICATIONS FUND AT 31st DECEMBER 1987

1986 £	1986 £		1987 £	1987 £
28808		Balance at 1st January 1987	31602	
1440		*Add:* Trading Surplus for the Year	1743	
1354		National Savings Bank Interest	1318	
	31602			34663
	6567	Creditors		2864
	£38169			£37527

1986 £	1986 £		1987 £	1987 £
		Investments:		
		National Savings Bank Investment Account		12605
	14087	**Current Assets:**		
18874		Stocks at lower of cost or valuation	17590	
4666		Sundry Debtors	7083	
542		Cash at Bank	249	
	24082			24922
	£38169			£37527

The Report of the Auditors to the Members of The Amateur Entomologists' Society

We have examined the records of the Amateur Entomologists' Society and, in our opinion, the Balance Sheet gives a true and fair view of the state of affairs on 31st December 1987 and of the Income and Expenditure for the year ended on that date.

Robert Watson & Co.
91/92 High Street, Lymington, Hants SO4 9AP.

A. J. PICKLES, F.C.A.

AMATEUR ENTOMOLOGISTS' SOCIETY

BALANCE SHEET AS AT 31st DECEMBER 1987

1986 £	1986 £		1987 £	1987 £
		General Funds:		
10030		Balance at 1st January 1987	11984	
		Add: Surplus income (deficit)		
1954		for year	(954)	
	11984			11030
	3120	Life Membership Fund		3620
	234	Ansorge Award Fund		249
	23316	Hammond Trust Fund		25731
		Creditors:		
2321		Advance Subscriptions	2452	
290		Advance Donations	308	
—		Others	—	
	2611			2760
	£41265			£43390

1986 £	1986 £		1987 £	1987 £
		Fixed Assets:		
1162		Office Equipment at Cost	1162	
876		*Less:* Depreciation to date	933	
	286			229
		Investment at Cost:		
660		£712.24 Treasury 12¾% 1995	660	
1260		£1470.31 Treasury 9½% 1999	1260	
150		109 M&G Charifund Income Units	150	
34393		National Savings Investment Account	39348	
	36463			41418
		Current Assets:		
120		Stocks at Cost	75	
436		Sundry Debtors	434	
		Cash at Bank:		
3910		Current Account	1184	
50		Cash in Hand	50	
	4516			1743
£41265			£43390	

REPORT OF THE TREASURER FOR 1987

Last year was not quite such a good year for the Society, with general fund income down by £584 and expenditure up by £2324. In consequence, the Society recorded a deficit of £954 — the first deficit since 1978. The fall in income was across most sectors with only subscriptions showing a small increase. The increase in expenditure was predictable and mainly due to the decision to publish more pages in the *Bulletin* in 1987 and the additional costs (over £1000) of providing a completely revised membership list.

As a result serious consideration will have to be given to increasing subscription rates in 1989, which, however, if agreed, will be the first since 1981 — an excellent record in view of the level of inflation which has taken place since that time.

The publications Trading Account had a rather better year with the trading surplus up from £1440 to £1743. The publication fund now stands at £34,663 with a reasonable reserve to finance future publications.

I should like to record my thanks again to Tony Pickles of Robert Watson & Co for his valuable assistance in auditing the Society's accounts.

Reg Fry
Honorary Treasurer

REPORT OF THE EXOTIC ENTOMOLOGY GROUP

1987 was a mixed year for EEG, for, on the activity front, it must have been our best year ever, but financially it was a disaster.

We started the year offering £1 discount for membership renewals to offset the lack of Newsletters for 1986, but with increased postal charges and increased printing charges, we finished the year with debts of £330 which will have to be paid out of our 1988 income. Consequently, we have raised the subscription rate, hoping we have not reached the point where increased income is offset against a fall in renewals.

For the first time for three years we managed to produce our promised four Newsletters thanks to the dynamic editorship of Julian Hume. Each addition was devoted to a different group of exotics and contained advice for the beginner and also items for the more experienced breeders.

Our 1987 meeting was arranged by Gareth King and changing the format to something more substantial certainly paid off for a record number of 65 members attended. The venue was the Butterfly House at Syon Park and the meeting started with a tour escorted by David Lees. There was a tremendous response to David's idea of allowing members to take plants in to be used for egg-laying by the *Papilios* flying around the enclosure.

The symposium began at 1 pm with Ulf Carlberg's illuminating talk on Phylogeny and Systematics in Phasmids. Ulf had travelled all the way from Sweden thanks to the generosity of his grant awarding body. Brian Gardiner spoke on Diapause, Its Cause and Prevention; Robert Manvell on Breeding *Hyles euphorbiae*. Andrew Smith and Vince Hull of the British Tarantula Society helped dispel the idea that EEG is dominated by Saturniid enthusiasts. Roy Chuter, who had been operating the slide projector for the other speakers came into his own with his presentation of exotic Lepidoptera in various stages. Finally, Brian Morris gave a talk on Moon Moths concentrating on *Actias* and *Argema*.

It is hoped that future meetings will follow similar lines.

We had a fine display of livestock and foodplants at the AES Exhibition thanks to T. Ashman, R. Chuter, T. Huggins, N. Percival, T. Rouse, K. Stiff, R. Taylor, and M. Varley. Their contributions to Group funds from the sale of livestock made a considerable improvement to our financial state.

Chris Eschbacher
Secretary

REPORT OF THE CONSERVATION COMMITTEE, AND OF THE SOCIETY'S REPRESENTATIVE ON THE JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS

COMMITTEE MEETINGS AND ORGANISATION

Our own committee met twice, in March and November 1987. At the second of these meetings it was agreed that, subject to Council's approval, there should be a separation of the main tasks which have been carried out by the present writer. The post of Habitat Conservation Officer will remain, and Dr Clive Betts was nominated to take over this role. The work of Editor of 'Insect Conservation News' will remain with the present writer, while Mr Clive Eastwood takes up the new title of Exhibition Stand Organiser. Mr Colin Hart, who has ably chaired the committee and represented the Society on the JCCBI for many years, has resigned these positions and has been replaced for the time being by fellow committee member Mr Peter Cribb.

The JCCBI also met twice in 1987, and there were also a number of meetings of its Executive Subcommittee and of Wildlife Link, on which the JCCBI was represented by Dr Paul Whalley. Dr Whalley announced his early retirement to Anglesey, and he will be replaced on 'Link' by his colleague, Mr S. Brooks. A vacancy on the JCCBI was sadly created by the death of Mr John Heath. The post of JCCBI Conservation Officer remained unfilled due to the continuing difficulty of obtaining financial support in addition to the aid already generously offered by the World Wildlife Fund (UK).

LOCAL REPRESENTATION

The JCCBI has approved a scheme (largely an AES initiative) whereby its local representatives will undertake active duties in liaising with individual entomologists and with organisations. To this effect, Dr Whalley has drafted an 'advisory pack' which supplies representatives with instructions on the way to tackle local issues and with useful addresses. Our own committee is initiating a parallel scheme which will be integrated with the JCCBI 'umbrella' as far as possible. The intention is to ensure that most members will eventually know whom to contact about conservation activities, including the organisation of field meetings, in their localities.

SPECIES INTRODUCTIONS

Following the publication of the JCCBI's Code for Insect Re-introductions, Wildlife Link turned its attention to the introduction and re-introduction into Britain of living organisms in general, and commissioned Dr David Stubbs to draft guidelines. His first draft, which was prepared in November 1986, has been discussed by Link at its 1987 meetings. Publication is expected in 1988 and it is hoped that the guidelines will help to gain acceptance of carefully controlled and monitored releasing programmes as one means of species conservation.

INTERNATIONAL CONVENTIONS: BERNE AND CITES

Following a British initiative, pursued mainly by Drs Michael Morris and Mark Collins, a number of invertebrates have been placed on the lists of species whose habitats must receive statutory protection from governments signing the Berne Convention. Among the fifty-one insects are several British species, including the Large Blue butterfly and several Odonata. Sites where these occur will be scheduled as SSSI's, but it is hoped that it will be unnecessary to prohibit their collection under Schedule 5 of the Wildlife and Countryside Act. For two other insect species, one of which — the Stag beetle — is British, trade in wild-caught specimens will be outlawed. On the other hand, trade in birdwing butterflies is to be re-allowed under CITES licence.

BUTTERFLY HOUSES

In view of concerns about the potential positive and negative roles of these establishments in conversation, Dr Mark Collins has prepared a report for JCCBI which makes several very constructive recommendations. It is hoped that these will be discussed at a future seminar. Encouragement is to be given to the formation of a special wing of the National Federation of Zoological Gardens under which houses would be federated. This would help to ensure the maintenance of safe and pleasant conditions for livestock and visitors.

PUBLICATIONS AND DISPLAYS

The British Insects Red Data Book has now been published by NCC at a cost of £10 (see review in the February 1988 AES *Bulletin*). It represents the first source of reference in this area and is the culmination of many consultations of amateur and professional entomologists. NCC hopes to produce updated editions in the future.

AES Pamphlet No. 13 'Legislation to Conserve Insects in Europe' has been published under the authorship of Dr Mark Collins. He has summarised the status quo in the various countries. As far as the formulation of a rationale for legislation is concerned, very little common ground seems to exist between nations. It is hoped that Dr Collins' compendium will provide a basis for discussing ways in which laws can be reviewed in the light of the real needs of conservation and of the individual naturalist.

Insect Conservation News No. 13 was issued in July 1987. This newsletter has now been registered under an ISSN number. It is hoped that the restriction of the present writer's duties to those of ICN Editor will make it easier to restore the frequency of publication to a more reasonable level.

Our committee again produced a conservation stand at the Society's annual exhibition, and it was well received, despite the absence of a concerted theme. With the appointment of a stand organiser, it should be possible to revert to the design of thematic stands, and it is also hoped to produce a small semi-permanent stand for display at local shows.

CONSERVATION FIELD MEETINGS

Our committee organised two meetings, in the Huntingdon area and at Folkestone Warren, Kent. Reports of these are given in ICN. Attendance by AES members has been very poor, and it is hoped that more interest will be generated if the plan for locally-based activities can be implemented. Otherwise, it may prove necessary to discontinue this activity.

SITE CONSERVATION AND SURVEYS

Both JCCBI and our own committee continue to represent entomological views in cases where sites are under threat; details are reported in ICN. It is hoped that the new divisions of labour in our committee and (eventually) the appointment of a JCCBI Conservation Officer will greatly aid this most important of activities.

Another AES initiative in the JCCBI has been to bring about discussions of the means by which amateurs and professionals can be effectively involved in the evaluation of sites. The questions being addressed involve organising and funding surveys, developing criteria for

evaluation (especially the use of indicator species), specimen identification services and the handling of data. The JCCBI could act as a clearing house in some of these areas, and to this effect, the present writer has organised a one-day JCCBI seminar/workshop oon the subject.

OCTOBER STORM DAMAGE

The severe gale damage to trees in south-east England and East Anglia will have several major consequences for insect populations, and we have been particularly concerned about dead wood habitats. Both opportunities and dangers exist, and these have been summarised in a leaflet written by Mr Paul Harding of Monks Wood, ITE, assisted by Keith Alexander of the National Trust, Mr Mark Anderson of the Forestry Commission and the present writer. The F.C. has agreed to publish the leaflet in its 'Research Information Note' series, in keeping with its new responsibilities towards conservation.

David Lonsdale

OBSERVATIONS ON THE GREAT SOUTHERN WHITE, *ASCIA MONUSTE*

by Don MacNamara (5537)

During the summer of 1986 I was fortunate to work for a spell at the London Butterfly House, Syon Park, Brentford - instant jungle no less, where the esoteric skills of gravel-raking, pupae-glueing and other practical jobs were happily mixed with some first-hand observations of butterfly behaviour and of the in-house breeding programme.

Here they all were, in this paradisical place: morphos, metallic, exotic; frail heliconids; gaudy swallowtails; aggressive monarchs whose courtship behaviour could be downright embarrassing; batlike caligos, furtive in dark corners. A bit overwhelming at first.

Despite this wealth of 'exotica' I was drawn, paradoxically, to a busy pierid of mundane appearance (at least as compared to the other splendid creatures), a sort of cross between a Black-veined white and a Large white and about the same size. Numbers of these were methodically searching and egg-laying on *Cleome spinosa* (spider flowers). So prolific were they that amongst the ravaged plants all stages could be seen simultaneously.

A chat with the then curator, Tom Fox, revealed that this was *Ascia monuste* (the Great southern white), a species of the Americas. It was while he was on a study-collecting tour of Ecuador in May of that year —at Tinalandia, that he saw some of these insects laying on plants in his hotel's vegetable patch and brought some livestock to the House. Here was an ideal opportunity to see these butterflies in almost 'natural' conditions.

The style and form of the laying of these insects were variable. Individual females would flit around the narrow *Cleome* leaves, alighting, rising, flying-off, returning — sometimes laying a single egg and quickly away, or settling down and laying a batch. Singles, twos, threes, batches of 20-30 were common, with one, exceptionally, containing 52 ova being recorded.

In general the eggs closely resemble those of *Pieris brassicae* (the Large white) — perhaps a little more greenish-yellow, and fluted. These were gently 'glued' anywhere on the upperside of the leaves, or on the underside near to the tip, or on the stalks and even on the long, narrow seed-pods. The batches, however, were not so 'tight' as the Large white's, the individual ova being a little more spaced.

The behaviour of the females may be described as 'single-minded' and given suitable conditions, *monuste* can be a pest. Walker's manuscript notes, at the Institute of Jamaica, state: 'Towards the end of the year the females spend a distressing amount of their time laying eggs on the cabbages and cauliflowers of your back yard.' (Brown and Heineman 1972). Foodplants are listed as cruciferae, especially *Brassica* and *Cleome,* also *Tropaeoleum,* (Riley 1975). I took an egg-batch home (27 ova) and the resultant larvae fed happily on cultivated cabbage, garden nasturtium and *Alliaria officinalis* (hedge mustard/Jack-by-the-hedge). Their voracity has also been noted by Woolcott, the larvae feeding freely on *Cleome gynandra:* 'When this weed is completely devoured locally by the caterpillars, or weeded-out, they complete their growth on anything else available, in January 1940 on Mona Island the crop being attacked being onions.' (Brown and Heineman 1972). It appears that this radical change from the normal range of foodplants is a response to the need for sustenance at a time of 'population explosion' and prior to migration.

The caterpillars on hatching are very similar to those of *P. brassicae,* light yellow with greenish, greyish or blackish mottling — in the case of *monuste* the mottling is formed into stripes with many small black dots clustered to form minor longitudinal and transverse lines. As they develop the background colour darkens — a suggestion of lilac mixing into the grey — and parallel with the longitudinal dark lines are three yellow lines along the back, with a broken yellow line along each side. The larvae are finely haired. They grow to about 38mm (1½″)long at maturity. In 'captivity', in plastic transparent boxes where I reared mine, their frass gave off the usual nauseous pierid smell of concentrated boiled cabbage (not unlike the old school dinners), which necessitated a thorough clean-out each day with fresh food supplied.

The pupa, typically girdled tightly to its chosen place, is approximately 26mm (1″) long, having a straw colour with a rosy flush. In the Butterfly House they seemed not to be in any particular place,

Fig. 1. *Ascia monuste*. Males left, females right. Photograph by 'Benjy.'

being on the stems, undersides of leaves or at some distance from the food plants in various nooks and crannies. The generally neutral colour seemed to allow individual pupae to 'absorb' or reflect the surrounding colour and light intensity of its selected spot.

Those pupating on the lids and sides of plastic containers, which in turn were within a heated cage with 24 hours of light, were the lightest in colour of all observed. Darkish points, breaking the uniformity, with

two black dorsal spines and a dark patch on the thorax completed the cryptic colouring. The adults emerged in about ten days (at a temperature of 75°f-80°f).

This vigorous species is migratory in the wild, tending to build-up populations by continual-brooding until whatever stimulus triggers-off their inspired wanderings. Mass migrations have often been recorded throughout the Americas, from Florida, Central and South America — and from the West Indies.

Observers suggest that there are three definable races of the Great southern white: the tropical mainland form, (off-white underside hindwings); the West Indian form (yellowish underside hindwings) and the Florida-Cuba-Bahamas strain, with darkly-suffused females. The males generally: upperside white, black peripheral wedge-shaped markings centred on veins, underside white but sometimes with a touch of pale yellow on the hindwings and apex of the forewings. The females generally: pale grey or pale yellowish uppersides with similar undersides.

The Florida-Cuba-Bahamas strain is said to have a grey migratory form of female. (Brown and Heineman 1972). It may well be that the migratory form occurs at maximum build-up, during the high summer period and its colour being a response to the longer day period.

It is interesting to note that the females illustrated here, although from Ecuador (via Syon Park and Hillingdon, Middx) are of a very dark colour (greeny-greyish), much darker than those seen flying at the Butterfly House — but which were reared from ova under 'artificial' conditions of continual 'daylight' — (exposed to a bright 60-watt bulb).

Despite the attraction of the more colourful butterflies, both Tropical and British, as seen at the London Butterfly House, my admiration for the Large white, a magnificent species in its own right, has grown since my brief encounter with its relative, the Great southern white and now when I see *P. brassicae* flying my thoughts sometimes turn to the sunny Americas where, no doubt, *monuste* is wreaking havoc amongst the local vegetation.

My thanks and best wishes to Clive, Tom, David, Peta and the happy band of lads and lasses (not forgetting the ever-youthful Arthur Moppet) at the London Butterfly House for making 1986 a memorable 'Butterfly Year.'

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BOOK ANNOUNCEMENTS

by the Editor

It is unfortunate that, when the Society is sent a book by the publishers for the favour of a review, a rather long time elapses before the review can appear in print. This is due to various causes, not least being the tardiness of some reviewers in getting their copy back to your editor. A book received at about the same time as the proofs of a *Bulletin* issue cannot, in any case, appear before the issue following and this alone entails a time lapse of between four and five months. There are times, however, when one can be quicker off the mark and this occurs when a review, not the actual book, is sent in by a member or when a book is either bought by your editor for his own use or has been sent on approval to a Cambridge Library and passed to him for appraisal. There are many books published, however, which do not fit any of these categories but which do come to your editor's notice and in many cases I feel these are worth while drawing to the attention of members. Those so noticed in the past few months are listed below and of some of them at least we hope to be able to publish more critical reviews in due course.

The Dragonflies of Europe by R. R. Askew. A4, pp291 including 31 coloured plates and over 500 line illustrations and maps. Harley Books, Colchester 1988. Price £49.95.

This is another fine example of quality printing and production from Messrs Harley books and should remain the definitive book on the dragonflies of the area it covers until well into the next century. Unlike other dragonfly books that have appeared recently it contains much information on their biology and, most importantly, keys to the final instar nymphal stages. While the price may seem high, so is the quality and the information contained therein, and one only need bear in mind that the price is the same as has been charged in recent years for second-hand copies of the fifty year old Wayside and Woodland (no colour plates in first edition) dragonfly book by Cynthia Longfield to realise what a bargain it is.

Coventry Ecological Survey 1987 by S. A. Lane and D. E. Warren. Pp135, A4, spiral bound. Coventry Arts and Museums Leisure Services, 1988. Price not stated.

Although not clear from the title, this publication is all about the insects to be found on various sites in and around the city. Useful to those in the area, or who would like to know which insects have been recorded from particular types of habitat.

Butterflies of the British Isles: The Nymphalidae by Michael Easterbrook. Pp24 (eight coloured), other illustrations. A5. Card covered. Shire Publications, Aylesbury 1987. Price £1.25.

Although published last year, commented on in *Bulletin* 46:129 and submitted for a critical review, your editor has still not received one. This booklet is similar to and of equal excellent value for money as the two similar books from the same publisher reviewed earlier. *(Bulletin* 44:209 and 47:60) If my memory serves me correctly it is a useful and well-produced introduction to this group of butterflies with good colour illustrations.

The smaller moths of Staffordshire by R. G. Warren. A5 pp38 card cover. Staffordshire Biological Recording Scheme Publication No. 13, 1988. Available from City Museum and Art Gallery, Hanley, Stoke-on-Trent, Staffs ST1 3DW. Price 50p plus postage. At this price how can anyone interested in the moths of the area not have a copy?

Les Insectes proteges en Europe Bilan & perspectives Opie'' Vol. 24, No. 67, pp.87. A4, card cover.

We hope to include a review of this interesting French publication in a future issue. Also published by the same organisation is *IMAGO* which deals with the rearing of insects. The *OPIE* organisation is a rearing and display establishment which promotes the study of insects by all means possible, including press releases, TV, writing, and co-operation with research and teaching. Their headquarters, where insects are reared and there are displays, and to whom anyone interested should address enquiries, are at Opie, Ile de France, La Miniere, 78 280 Guyancourt, France.

CHE Guides to insects of importance to man: 1. Lepidoptera by J. D. Holloway, J. D. Bradley and D. J. Carter. Edited by C. R. Betts. A4, pp.262, illustrated. C. A. B. International Institute of Entomology, London 1987. Price £14.00 spiral bound, £25.00 hardback (both including post).

Unusual in that *useful* insects are included and not just the pest species which are now listed in so many publications. Another book we hope to review eventually, but having seen a copy we were not at all impressed by the textbook diagram-style illustrations (no help to critical identification) and wonder just whom the book is intended for.

Butterflies and Moths of Derbyshire. Part 3 by F. Harrison and M. J. Sterling. A5 pp.345, Black and white illustrations. Derbyshire Entomological Society, 1988. Price £7.00.

We have already reviewed Part 1 of this work (*Bulletin* 45:87) and this part appears to be of the same standard. Certainly it is well printed and has been submitted for a full review which we hope to publish in due course.

The flow country: the peatlands of Caithness and Sutherland. Published by the Nature Conservancy Council, Northminster House, Peterborough PE1 1UA. Price £13.50.

This is a presentation of the NCC's case for the retention of the Flow Country and the immediate cessation of alien conifer planting. At the time of writing the future is unresolved and half of the still unplanted area remains under threat. The book is a detailed account of the Flow Country and its vegetation. The significance of blanket bog habitat as an ecosystem is discussed and the views of experts from many countries taken into consideration, the view being that it is the largest expanse of such habitat in the world, being a unique and ancient landscape unchanged over the past four millenia.

The surveys of the Flow Country have revealed that the three lochs in the area fall within the top botanically richest freshwater habitats in Britain. What may well come as a surprise to many of us is that it has been determined that one of the effects of afforestation in a water catchment area is to cause acidification. This kind of result was already known from Wales, where the water authorities there had already determined that where the total ground water hardness was less that 12 mg/litre of calcium carbonate, then forest cover in the catchment area should not exceed 10% of the total area, otherwise acidification (without, be it noted, any help from acid rain!) would set in and this of course changes the whole character of the ecosystem. In the Flow Country some areas already exceed this limit of forest cover.

It is gratifying to hear that the Secretary of State for Scotland has agreed to half of the remaining peatland being designated as an SSSI.

In addition to the above book the NCC also publishes a colour booklet *The patterned land* which illustrates many of the features discussed in the book in a simple readable style and which opens up to form a poster showing pool patterns in the Flow Country from the air. Price 85p.

The above prices are post free from the NCC at Peterborough and also available is a free leaflet which deals with some of the most commonly asked queries about the Flow Country.

Keeping Stick Insects by Dorothy Floyd. A5 pp.64, coloured and other illustrations. Price £4.95 (plus 50p postage). Available from "Small Life Supplies", 9 Upton Avenue, Cheadle Hume, Cheshire SK8 7HX.

This is a far more extensive and informative manual about these popular creatures than our own Leaflet No. 30, since the publication of which many more species have become readily available, and it has the benefit of being illustrated in colour. Details are given of the biology of the creatures; practical tips on rearing; the particulars of seven species are

discussed in detail; for school use (stick insects are, after all useful for an "A" level project!) suggested projects are given.

Irish Environmental News. This is a new bimonthly magazine but the contents are not of course confined to insects. It is said to be an excellent magazine for schools, teachers, universities and all individuals interested in learning about their environment and how to participate in its conservations. Vol 1 No. 1 which is of about 52 pages is priced at £2.00 (post free) and available from the publishers, Country Watch, Farnes, Castlemaine, Co. Kerry, Ireland.

The present popularity of spiders, particularly of the large bird-eating kind, has, as might be expected, now brought forth a spate of publications concerning them and, some couple of years ago, the British Tarantula Society was formed to cater for those interested. As Honorary Insects they were admitted to the Royal Entomological Society very many years ago so they surely must also deserve space in our *Bulletin*. I do not recollect offhand the original definition of an insect, but more years ago than I care to remember Sir James Beament (Drapers Professor of Agriculture, University of Cambridge) re-defined them as an animal which had "7 ± 1 legs".

Some new publishers are entering the field in the market for spider books connected with rearing the animals as a hobby. This could be due to the traditional entomological publishers not moving with the times and realising just how much the emphasis in amateur entomology has changed over recent years. Amongst those recently entered the field are Messrs Fitzgerald Publishing, P.O. Box 804, London SE13 5JF who have three items on offer as follows:—

The Tarantula: Classification and identification guide, by Andrew Smith. Illustrated with photos and line diagrams. Price £8.00 (plus 50p post).

This is Messrs Fitzgeralds's most important and substantial item. The book is aimed at both the enthusiastic rearer and the serious amateur. Dealing with the Theraphosidae family of spiders there are detailed descriptions of some 500 species with another 150 getting a mention. Notes on breeding are given together with details about natural distribution, habitat and humidity preferences of species. Also given are methods of sexing and identifying species.

Breeding live food for reptiles and tarantulas, by Ann and Frank Webb. A5. Price £1.50 (plus 50p post).

Those who keep spiders, or snakes, or lizards, must feed them. For that, live food such as locusts or crickets are required. This booklet is about how to breed the food for the animals you are really rearing. It includes brief notes on how to breed locusts, fruit flies, crickets, mealworms, phasmids and cockroaches. I personally, as an experienced breeder of all

these species, though the details were all too brief and would not lead to success by a novice or even by someone with a little rearing experience. Now it is no easy task to keep a colony of locusts all the year round, nor to *safely* rear cockroaches without neighbours becoming upset by escapees. The worst thing about this booklet however is the appalling quality of it. Very poorly printed, bad layout and the text not centred on the pages.

How to keep scorpions by V. W. Williams. A5, illustrated. Price £1.50 (plus 50p post).
This is said to be a unique guide on how to keep these animals with details of the various habitats that are needed and descriptions of the species most likely to be available on the market. Like the previous publication it suffers from poor quality production.

Wall to wall spiders: the fascinating world of Arachnids by Ann Webb. Price £6.99 (plus 60p post) from Imprint Reprographic Services, Unit 13, Watford Enterprise Centre, Green Hill Crescent, Watford, Herts WD1 8XU.
This book is clearly intended for the rearer of these creatures rather than the systematist. It is stated to be the only complete combined informational and field guide to the 32 popular species that are generally available. These 32 species are thoroughly covered.The book, which, by the way, is by the organiser and editress of the British Tarantula Society, also gives a complete guide to the housing, temperature and humidity requirements, feeding and breeding of these named species.

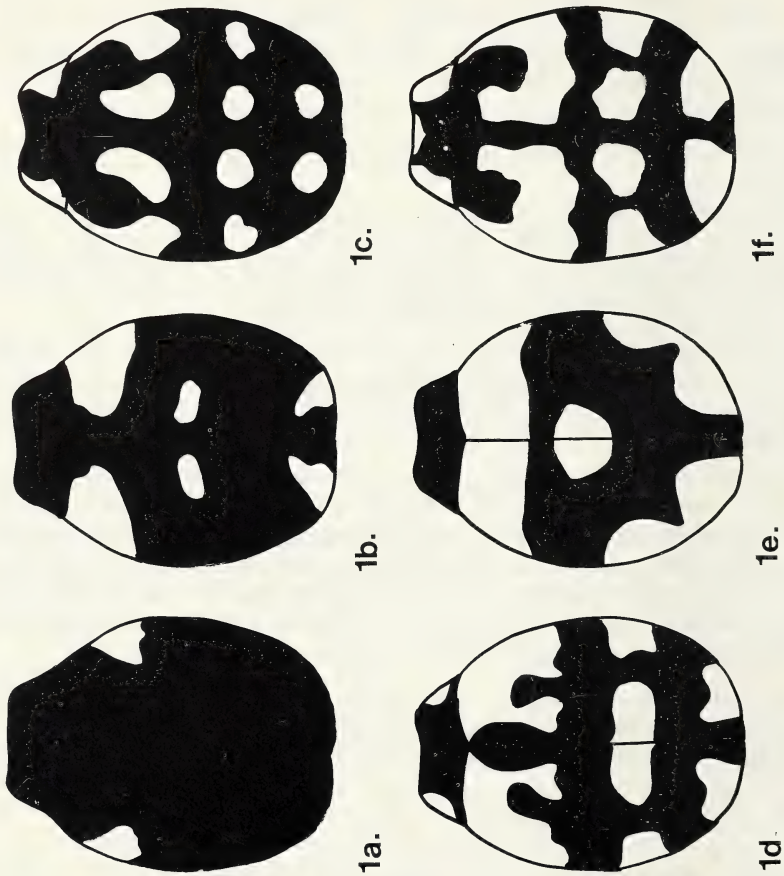
The Aurelian by Moses Harris. 5th edition, 1986. Price now £6.95.
Originally published at £15 and reviewed *Bulletin* 45:198-200, this work is now being remaindered at less than half the original price. At the other end of the price range an original early issue from the Rylands Library fetched some £7,500 at auction.

FIELD OBSERVATIONS OF VARIATION IN BRITISH COCCINELLIDAE

by Helen Marcan (3763)

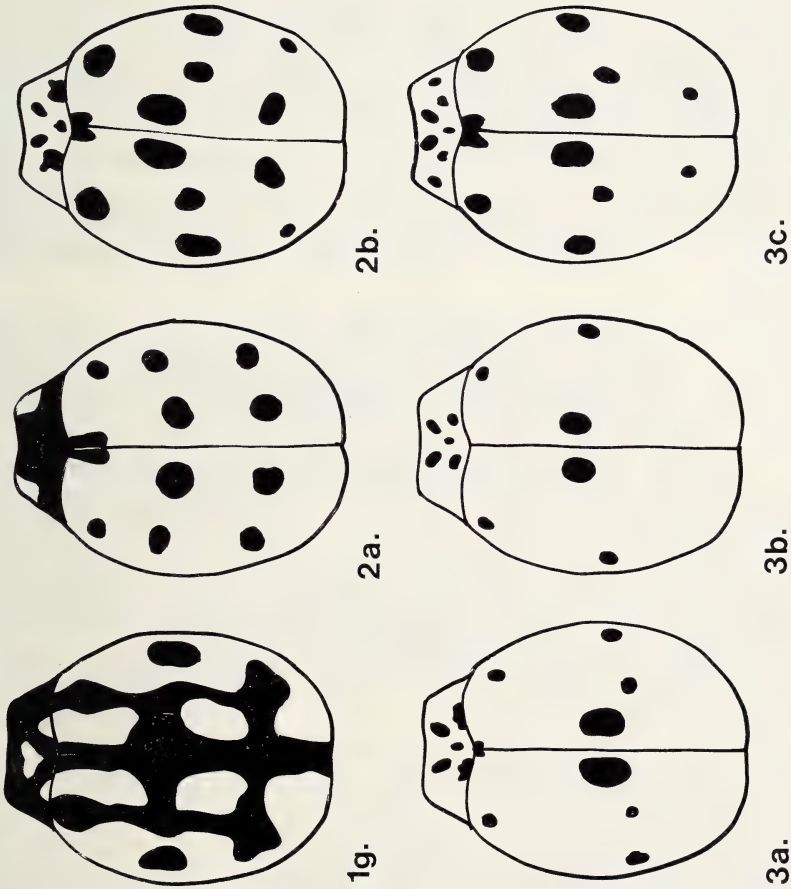
During the summer of 1970 whilst studying for my Biology "A" levels, I observed and recorded a number of interesting variations in elytra patterning in garden ladybirds.

I was unable at the time to continue my observations any further, and I used the data to produce a set of enlarged red and black poster-painted pictures. The pictures decorated my room during my student days at Cambridge University, to the considerable amusement of many of my fellow students at Newnham College.



Figs. 1a -g *Adalia 2-punctata.*

a	f. *sublunata*
b	f. *sexpustulata*
c	f. *decempustulata*
d	f. "strong spotty"
e	f. intermediate *sexpustulata*
f	f. "bedsocks"
g	f. *intermedia*



Figs. 2a, b, 11- and 13-spot ladybirds.
a *Coccinella 11-punctata*
b *C. 13-punctata (?)*

Figs. 3a - c 13-spot variants.

The Cambridge Ladybird Survey organised by Dr M. Majerus was a much later venture of which, up to now, I have taken no part. The recent production of an identification wallcard, based on *Ladybirds* by M.E.N. Majerus and P.W.E. Kearns (1987) was, however, of great interest to me. I should like to describe my earlier field observations here in relation to their identifications, as well as to contribute a few ideas on the origin and possible inter-relationships of the variant patterns recorded.

The area over which I collected was 1 - 2 acres of nursery garden adjacent to arable fields and meadowland at Little Marlow, Buckinghamshire. The habitat contained ornamentals as well as many grasses, weed species and orchard trees which in 1970 were heavily populated by blackfly.

The 2-spot ladybird, *Adalia 2-punctata* was most easily identifiable, although a range of melanic variations occurred in considerable profusion. Indeed some forms were probably evolving there for the very first time! Of the melanic forms, f. *sublunata* and f. *sexpustulata* (Figs. 1a, b) were quite distinctive. Another distinctive spotty melanic form that occurred (Fig. 1c) was identified as being similar to f. *duodecempustulata* but with two of the upper central spots conjoined, thereby making it f. *decempustulata*. The "strong spotty" form and an intermediate *sexpustulata* were also observed (Figs. 1d, e), as well as the so-called "bedsocks" variant (Fig. 1f) decribed for *A. 10-punctata* (see Majerus 1987; Majerus and Kearns 1987), although the typical 10-spot ladybird type was not recorded in 1970 at Little Marlow. Figure 1g represents an intermediate pattern between f. *decempustulata* and the "bedsocks" form.

Besides the 2-spot melanics, there were a lot of spotty orange and black ladybirds that resolved into two main groups: those with 11 spots and those with 13 spots, which can be tentatively identified as *Coccinella 11-punctata* and *13-punctata,* respectively (Figs. 2a, b). The range of variation in the number of spots was considerable (see Figs. 3a, b, c); based on the similarity of spot positioning in these variants to the 13-spotted ladybird (Fig. 2a), it is suggested here that they are forms of the 13-spotted ladybird in which some of the spots are missing. Leman (1919) suggested that such a phemonenon could well occur in *C. 11-punctata,* although the absolute identification of such variants lacking the more usual complement of spots is obviously open to other interpretation. For instance, could the variants with missing spots be actual stages in the evolution of variation in say, the 10-spot ladybird, which was previously unrecorded amongst the ladybird population sampled? An alternative explanation could be that some form of mimetic patterning was in the process of evolving.

Other ladybird species that occurred were *Propylea 14-punctata* (14-spot ladybird), *Calvia 14-guttata* (cream spot ladybird), *Coccinella 7-punctata* (7-spot ladybird), *Psyllobora 22-punctata* (22-spot ladybird) and *Exochromus 4-pustulatus* (pine ladybird).

I should have liked to have been able to return to the field site for further observations on the occurrence and distribution of the variants seen. However, a change in land use has taken place there since the 1970s, as well as the destruction of some mature hedgerows that previously functioned as a valuable reservoir of wildlife. Thus the records described here may reflect the existing agricultural practice rather than being representative of the area as a whole.

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FOODPLANTS OF THE BRITISH GEOMETRIDAE

by Jacqueline Ruffle (5911)

Introduction

In this study I have been comparing descriptions of Geometrid foodplants, concentrating on the first four sub-families of Geometridae. The survey covered various aspects of Geometrid ecology, including:

a. Plant family size and plant chemistry
b. Plant morphology
c. Plant abundance/rarity
d. Plant parts attacked.

Methods

The source of the data used in the survey was the Phytophagous Insects Data Bank, established by Dr Lena Ward of the Institute of Terrestrial Ecology, to draw together the wealth of information that exists, in a wide range of published and unpublished sources, on the foodplants of the British insects. Originally started in 1978, the database now contains over 55,000 insect/plant links and includes information on all Orders from major bibliographical sources. These include over 100 books, 170 journals, 20 private records and two collections in the British Museum (Natural History). The two most comprehensive sources of Geometrid information included on the data bank are Allen (1949) and Noble (1975), but these have been augmented by many reports from other individuals and organisations such as the Ministry of Agriculture, Fisheries and Food.

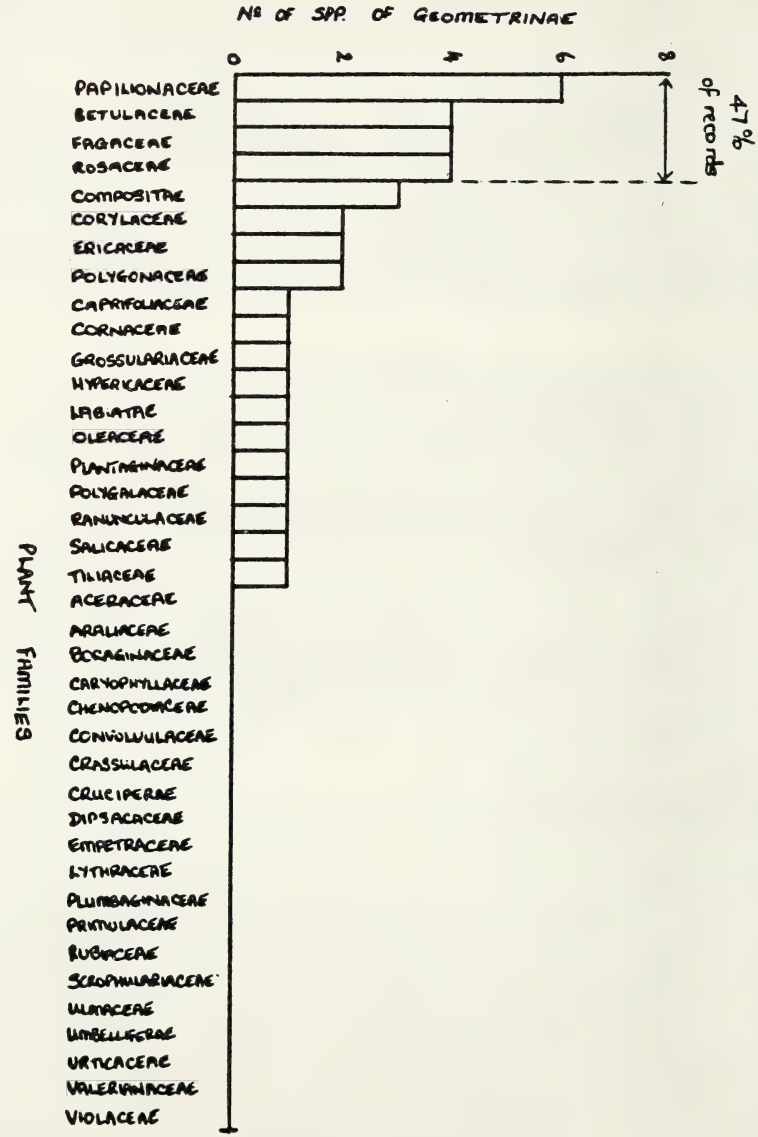

FIGURE 1: Plant families attacked by members of Geometrinae

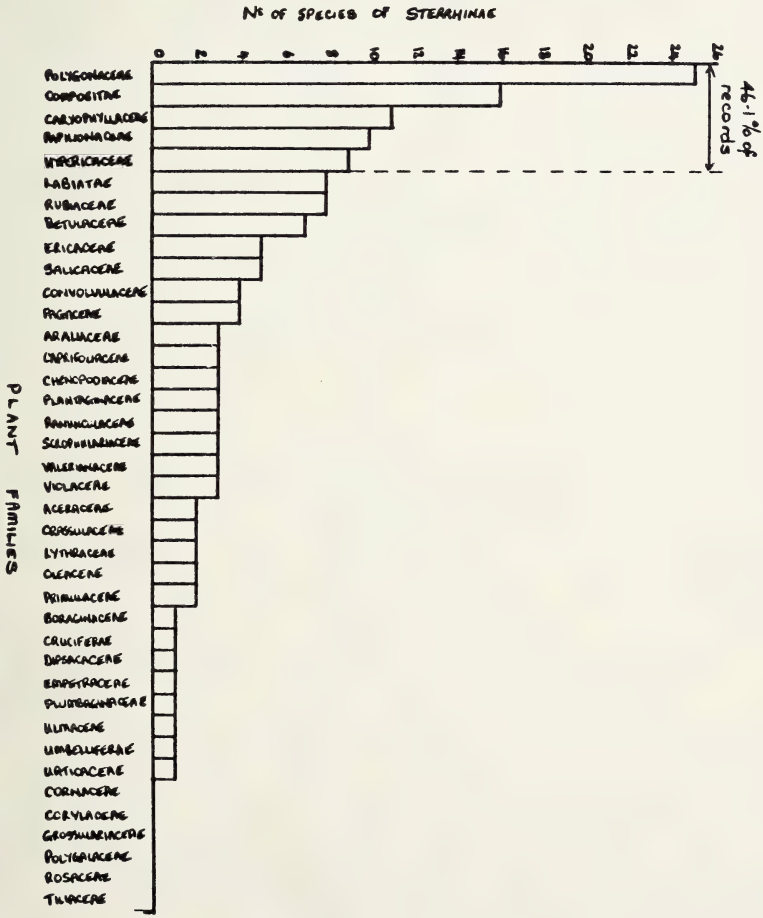

FIGURE 2. Plant families attacked by members of Sterrhinae

The information contained within each record consists of the bibliographical details of the source, the foodplants — and plant parts — reputedly attacked and the broad geographical distribution of the insects. Because the information included follows the original author exactly, there are a number of apparent discrepancies within the data bank, which merely reflect the different experiences or opinions of the various contributors.

The nomenclature used follows Clapham, Tutin and Warburg (2nd edition, 1962) for the plant species, whilst names of Lepidoptera have been updated from those in Kloet and Hincks (1972) to comply with Bradley and Fletcher (1979). The names of the Lepidoptera have also been revised in line with articles appearing in *Antenna*.

Geometrid information

The 292 species of Geometridae found in the U.K. are divided into six subfamilies as follows:

Sub-families of Geometridae	No. of species
Archiearinae	2
Oenochrominae	1
Geometrinae	10
Sterrhinae	39
Larentiinae	159
Ennominae	81
Total	292

Geometridae are distinguished from other moth families as most of their caterpillars have prolegs only on the 6th and 10th abdominal segments. They use these prolegs (or "claspers") to "loop" along twigs, giving the larvae the colloquial name of "loopers". The hind clasper is also employed when they are at rest, when they grasp the twig with it and hold themselves erect, so that they appear to be simply a continuation of the plant. Some species, e.g. *Thetidia smaragdaria* and *Comibaena bajularia,* also cover themselves with twigs and leaves after hatching and moulting. Most Geometridae are nocturnal and rest concealed on their foodplants during the day.

1. *Archiearinae*

This is one of the smallest sub-families of Geometridae, comprised of only two species of moth. Of the four sub-families studied in detail, *Archiearis parthenias* is the only species to eat the flowers of its foodplant, though this feature is much more common among members of the Larentiinae, occurring in just over 35% (56/159) of the group.

Table 1.

Plant genera, families and orders attacked by the two G.B. species of the Archiearinae

Geometrid Species	Plant Order	Plant Family	Plant Genus	Plant Species	Plant Part
A. parthenias	(Fagales	Betulaceae	Betula	pendula	Flowers
	(Fagales	Fagaceae	Quercus	—	Flowers
A. notha	Salicales	Salicaceae	Populus	tremula	Leaves

2. *Oenochrominae*

There is only one species of moth representing this sub-family in the U.K.: *Alsophila aescularia*. It appears to be widely polyphagous, attacking the leaves of deciduous trees and shrubs and it is frequently referred to as a pest of fruit trees, though most research in this area may have been influenced by the economic importance of these trees.

3. *Geometrinae*

Figure 1 shows the nineteen plant families attacked by the ten species of Geometrinae. Just over 47% (18/38) of the foodplant records fall into only four plant families; Papilionaceae, Betulaceae, Fagaceae and Rosaceae. The mean number of plant families attacked is 1.9. When the data was analysed according to plant morphology, along the lines of the survey carried out by Niemela et al. (1982), it was found that half the plants attacked (19/38) were "predominantly trees". The remaining 50% of species were almost equally split between "trees and shrubs" and "herbs and half shrubs".

4. *Sterrhinae*

Although there are officially 37 species within this sub-family in the U.K., the databank contains information on only 36 of them. According to Skinner (1984), the foodplants of the 37th species, *Idaea serpentata,* consist of "various grasses", though he adds that the present status of the species is unknown in this country, details of the foodplants having been taken from continental literature.

As Figure 2 indicates, the remaining 36 species feed on 33 plant families, although just over 46% (71/154) of the plant species belong to just five families; Polygonaceae, Compositae, Caryophyllaceae, Papilionaceae and Hypericaceae. The mean number of plant families attacked is 1.12. The comparison with Niemela's data showed that almost 65% of the diet of Sterrhinae is constituted from the group "herbs and half shrubs".

Results

a. *Plant family size and plant chemistry*

The data on the Geometrinae and Sterrhinae was further analysed to see if there was any correlation between the numbers of larvae which feed on the different plant families and the size of each plant family. An "expected" number of larvae per plant family was deduced by assessing the number of species that might be expected to feed if the ratio "Number of insect : Number of plants" were constant.

In a normal distribution, the expectation would be that 95% of the records would give a standard deviation falling between +2 and −2. The results of this test showed that the actual percentage of larvae in this category was only 65.85 (27/41). Thus, the distribution is far from normal. One factor which may affect this is the chemical composition of the plant tissues:—

Table 2. Frequency of larval records in relation to plant family size

Plant family	Standard deviation	
GROUP A (Secondary plant compounds present)		
Cruciferae	4.05)	
Scrophulariaceae	3.55)	Attacked by fewer
Umbelliferae	2.71)	larvae than expected
Compositae	2.55)	

GROUP B (Secondary plant compounds present in 6/27 families)

This consists of the 27 plant families which are attacked by the number of larvae that one would expect in a normal distribution (Standard deviation: 0⅛2).

GROUP C (Secondary plant compounds absent)		
Corylaceae	−2.48)	
Lythraceae	−2.48)	
Rubiaceae	−2.76)	
Convolvulaceae	−3.13)	
Plantaginaceae	−3.13)	Attacked by more
Oleaceae	−3.35)	larvae than expected
Polygonaceae	−7.15)	
Fagaceae	−7.23)	
Araliaceae	−7.64)	
Betulaceae	−13.73)	

All four plant families falling into Group A ("attacked by fewer larvae than expected") contain secondary plant compounds. These are substances such as glucocides and alkaloids which occur sporadically in plants but do not appear to play any role in plant metabolism. They are frequently associated with a distinctive taste or smell and many of them have toxic properties. These compounds are not present in any of the plant families which appear in Group C ("attacked by more larvae than expected"). Six of the 27 plant families in Group B contain secondary plant compounds. Whilst the numbers of species considered here is obviously too small to make any far-reaching conclusions, it does appear to support theories advancing the effectiveness of plant chemicals as insect deterrents.

b. *Plant life form*

Niemela et al. (1982) suggested that the larger or "more apparent" plants were, the more species of Lepidoptera would be sustained by them. He therefore carried out a survey (in Finland) of plant morphology and its influence on lepidopterous feeding patterns. He divided plants into "trees", "shrubs" and "forbs". When the same approach was adopted with the British Geometridae, the following results were obtained:

Table 3. Distribution of Geometridae on forbs, shrubs and trees

Plant type	Forbs		Shrubs	Trees		
Height (in feet)	<2	>2		<40	<80	>80
Mean No. of larvae/ plant sp.	6.51	5.4	12.6	18.6	21.6	21.0

It will be seen that these broadly agree with Niemela's findings.

c. *Plant abundance/rarity*

Niemela defined "apparency" not only in terms of the size of the plants attacked, but also in terms of their average frequency. He suggested that more common plants should be attacked more often than less common species. To assess whether this applied to Geometridae, the foodplants listed under each species of Geometrinae and Sterrhinae were checked against their frequency according to Perring and Walters (1962). This shows plant distribution by Watsonian vice-counties and denotes species as being "Common", "Medium" or "Rare" on the following basis:

Common species — Recorded from more that 100 vice-counties
Medium species — Recorded from 21 - 100 vice-counties
Rare species — Recorded from not more than 20 vice-counties.

The results were as follows:

Table 4. Plant frequency

Distribution	No. Plant spp.	% Plant spp.
Common	78	81.25
Medium	16	16.66
Rare	2	2.04
Total	96	99.95

Although this does suggest that more common species are more frequently attacked by Geometridae, a degree of caution is required. Since the data on the PIDB has come from a wide variety of sources, it is difficult to know how consistently plants have been identified and, if errors have occurred, they are more likely to be at the "Rare" end of the scale.

d. *Plant parts attacked*

A survey of the frequency with which the different plant parts are attacked, by all members of Geometridae, yielded the following results:

Table 5. Plant parts attacked

Part	*%*
Leaves	67.37
Flowers	17.96
Seeds	10.18
Flower buds	1.79
Vegetative buds	1.79
Stems	0.60
Shoots	0.30
Total	99.99

No members of the Geometridae attack any of the following plant parts:

Microflora Pollen and nectar Roots	Fairly high protein levels
Bark Wood	Low protein levels

The "looping" motion of Geometridae and the manner in which they grasp plant twigs, holding themselves erect as a form of camouflage, suggest that the family has adapted to plant parts offering ease of attachment. The lack of this feature in the first three plant parts above may be the reason why these otherwise useful sources of protein are ignored.

Strong et al. (1984) estimated that the nitrogen content of the seeds was higher than any other part of the plants he tested. Leaves, which commonly form a major part of the diet for many insects, and certainly for Geometridae, are relatively low in both nitrogen and proteins. Several reasons have been forwarded for their supremacy in the league table, including:

(a) Their availability for a much longer season than most other plant parts.
(b) Their importance to insects as a shelter against dessication/predation.
(c) Their superior facilities for attachment.
(d) The critical balance necessary between insects and plants when the reproductive centres of the plants are attacked.

Conclusion

I have tried to outline here a couple of the points which struck me as interesting during the time in which I was working on my paper, namely that data from this, albeit small sample, does appear to agree with ideas relating to the effectiveness of secondary plant compounds as herbivore deterrents and that "apparency" (when defined by plant size) does not appear to be a major determinant of Geometrid feeding though when it is defined by plant frequency, Geometrid data match Niemela's more closely. Given more time and knowledge it would obviously have been possible to take the analyses and conclusions further but none of the work would have been possible without being able to take advantage of the data bank's useful facility as a research tool.

Acknowledgements

I am indebted to both Dr Ward and the Institute of Terrestrial Ecology in Wareham for allowing me access to the Phytophagous Insects Data Bank. I do not pretend to have discovered anything new or unusual and I have, by necessity, had to condense my original work considerably to fit this purpose. I hope that comprehension has not been sacrificed to brevity. Acknowledgements are due to Dr Lena Ward, for raising many interesting avenues to explore and to Mr Malcolm Lee for help with the statistical methods used.

The paper was part of a thesis which was submitted to the University of Kent as part of the requirements for the recently established Diploma in Ecology.

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BOOK REVIEW

Plant Pathology by George N. Agrios, Third Edition, Academic Press (1988), 801pp. Price (Hardback) $45.00 ISBN 09-12-044563-8.

The publication of a third edition of this textbook may testify to its usefulness. Agrios writes in a straightforward and readable style and he manages, in one volume, to cover all the generalities and many of the details of a subject which nowadays embraces several specialities, any one of which is an ample basis for a separate textbook. Plant pathology is, however, a cohesive enough subject to fit within a single text, and indeed needs to be presented in such form both to students and to research workers who need information outside their specialities.

Plant pathology "goes together" with entomology as the scientific basis of plant protection, but this alone is little reason for the amateur entomologist to develop an interest in the subject. Unlike entomology, it exists almost exclusively as an academic subject, although the natural history of certain plant diseases has distinct possibilities as as subject for the amateur. Perhaps the closest link that the amateur naturalist is likely to have with plant pathology is through mycology, since a very large proportion of plant diseases is caused by fungi, albeit micro-fungi in most cases.

In view of our current concern about conservation, it is good to see that the author draws attention to the need to minimise pesticide usage, and covers many of the areas of modern plant pathology which can achieve this aim through a better understanding of the biology of plant diseases and of their causal agents. Indeed, direct chemical control methods only occupy a modest proportion of the chapter on the principles of control. On the other hand, Agrios has to admit that "the desirability of using fewer and safer pesticides . . . is counteracted by the

increasing demand of consumers over the last several decades for high-quality produce, especially fruits and vegetables free of (sic) any kind of blemishes caused by diseases or insects.''

Like other plant pathology textbooks, this one has a number of chapters dealing with general principles, followed by a systematic coverage of specific diseases caused by different agents. In this arrangement, the book is very well organised, and the indexing is extremely thorough. Some of the entries in the index could, however, be improved by the use of bold type to indicate the more important textual inclusions of the subject. The general chapters serve not only to introduce the plant pathology to the relative novice, but also to cover some subjects in sufficient detail to improve the knowledge of more experienced readers. The section on the chemical weapons of pathogens is an example of this. Some topics fare less well, though, and the important subject of latent infections receives little mention.

The series of chapters on specific diseases covers a good range of examples, and the detailed descriptions seem to be more accurate than those given in some other textbooks. It is, however, inevitable in a general textbook that some descriptions will not meet with the full approval of specialists in those areas. For example the section on Dutch elm disease does not mention the very important work on different races of the causal fungus and without which we would not have known why the disease became so severe in Europe in recent decades. All the kinds of organisms which cause plant disease are covered in the descriptive chapters, and there is also a useful chapter on environmentally-caused disorders. The complexity of interactions between abiotic stress factors and biotic diseases is also emphasised, with special reference to the widely publicised phenomenon of forest decline or ''Waldsterben''.

The main reason for producing a third edition of this book was the need to keep abreast of a rapidly developing subject, and this is well reflected in the inclusion of a final chapter on biotechnology, which has several important applications in plant pathology. For the student who needs an up-to-date text, this is well worth possessing, and parts of it should be of interest to anyone with a keen interest in biology. DL

NEW COUNTY RECORDS

ENGLAND

Berkshire, Gorling, 14.xi.1961, per R. Edwards; Devon, 1 male, 1 female from cat Yealmpton, 15.x.1958, W.B.Hornby; Guernsey, 1 male from human, 3.i.1971, A. Dale; Huntingdonshire, 1 female indoors, Stibbington, 8.viii.1954; Jersey, 4 male 23 female from dog, 11.ii.1981, D. Laffoley; Lincolnshire 3 male 4 female from cat, Barrowby, 11.ix.1987, K. Buckley; Monmouthshire, 4 male 14 female from cat,

Monmouth, 9.xi.1960, P. N. Humphreys; Northamptonshire, 1 male 1 female indoors, viii.1968, V. M. Clarke; Nottinghamshire, 1 female from female human, Sutton-in-Ashfield, Mrs K. Beniston; Rutland, 1 male from cat, Barrowden, viii.1952, J. K. Bates; Scillies, 5 female from cat, St. Agnes, 27.vi.1961, J. Harper; Shropshire, 1 female from cat, Much Wenlock, x.1950, K. G. V. Smith; Staffordshire, 3 male, St. Matthews Hospital, Lichfield, 18.viii.1976, per Leicester City Mus.; Warwickshire, from cat, Birmingham, 3.viii.1943, K. G. V. Smith; Wiltshire, 1 female, from cat, Devizes, 23.i.88; Worcestershire, 1 female indoors, Little Comberton, 7.viii.1983, P. F. Whitehead.

WALES

Carmarthenshire, 4 males 2 females from female cat, Bynee, 26.xi.1969, W. D. Williams; Denbighshire, many females in linen cupboard in hospital, Denbigh, 5.xi.1973, Mrs M. J. Morgan; Flint, 2 male 2 female from cats, Buckley, 10.i.88, Richard Sayer; Pembrokeshire, 1 male 1 female from dog, Haverfordwest, 3.i.1984, J. Comont.

SCOTLAND

Argyllshire, 1 female from cat, Glen Fechan, 19.xi.1972, R. W. Marriott; Ayrshire, 1 male from cat, Mauchline, ix.1979, Dr R. Tuchener; Banffshire, 1 female from dog, Aberlour, 26.xi.1973, D. Hanson; Dunbartonshire, 3 males 6 female from female cat, Dunbarton, 21.xi.1969, W. Beswick, Fifeshire, female, Glen Rothies, 1969, per R. C. Pelham-Clinton; Lanarkshire, 6 male 36 female from bedding of cat, Crookston, 19.x.1969, J. Dearg; West Lothian, 2 male 8 female from dog and carpets, Winchburgh, viii.1984, H. Conner; Wigtownshire, 1 female from cat, High Minniwick, Bargrennan, v.1979, Dr R. Tichener.

NEW HOST RECORD

Buckinghamshire, 1 male from hedgehog, High Wycombe, 1960, per D. G. Lambert.

I have no records from the following counties:
ENGLAND: Cumberland, Derby, Westmorland.
WALES: Anglesey, Brecknock, Radnor.
SCOTLAND: Angus, Berwick, Bute and Arran, Clackmannon, Caithness, Dumfries, East Lothian, Inverness, Kincardine, Kinross, Kirkcudbright, Moray, Nairn, Orkneys, Peebles, Perth, Renfrew, Ross and Cromarty, Roxburgh, Selkirk, Sutherland, Stirling, Zetland.
IRELAND: Armagh, Carlow, Cavn, Clare, Donegal, Down, Fermanagh, Galway, Kerry, Kildare, Kilkenny, Leitrim, Lewix, Limerick, Londonderry, Longford, Louth, Mayo, Meath, Monoghan, Offaly, Roscommon, Sligo, Tipperary, Tyrone, Waterford, Westmeath, Wexford, Wicklow.

I must express my thanks to the many correspondents who have sent specimens for examination and to Paul Harding and his colleagues at Monks Wood for their help in producing the maps which will illustrate this series of papers.

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A RARE SPOTLESS ABERRATION OF THE GATEKEEPER

by Mark A. Hope (8139)

While holidaying in Suffolk on 5th August 1987, my friend and fellow-entomologist Mr James Clark was fortunate to capture a male Gatekeeper (*Pyronia tithonus*) which lacked not only the typical apical eyespot with two white pupils on the fore-wing but also the characteristic small eyespot feebly pupilled at the anal angle.

Realising that such an aberration would probably be rare, Dr David Carter of tbe Department of Entomology of the British Museum (Natural History) was consulted and he confirmed this surmise.

Dr Carter writes:

"The 'blind' form of *tithonus* that you describe is almost certainly referable to ab. *obsoletissima* Leeds. This form lacks eyespots on both fore- and hind-wings. Leeds figures a female underside in his paper in *The Proceedings of the South London Entomologial and Natural History Society for 1948-49.*

We have two male examples in the National Collection, although one looks slightly crippled. There were no examples in the Robert Watson Collection — this is evidently an extremely rare form. The Leeds specimen is quite possibly in the collection of the British Entomological and Natural History Society."

Leeds named many aberrations of *tithonus*, although the tendency was almost invariably towards additional eyespots rather than loss or reduction of spotting.

Dr George Thomson, author of *The Butterflies of Scotland*, has pointed out the fact that the absence of spotting on both hind- and fore-wings almost certainly indicates that spotting on both wings is linked to the same gene.

Mr Clark and I have made several enquiries to likely sources in order to try to find if other similar specimens of ab. *obsoletissima* exist in collections anywhere and to try to determine just how rare this aberration is — so far, however, besides the specimen illustrated, the

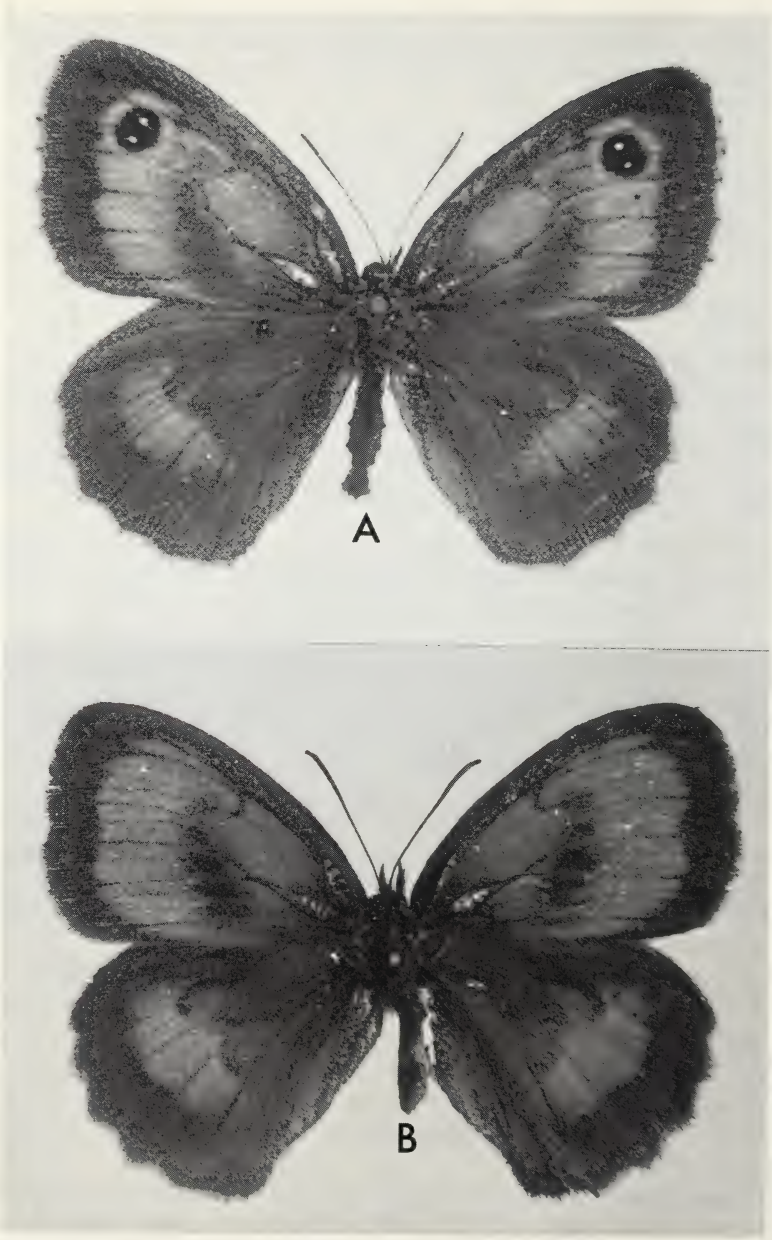

Fig. 1. *Pyronia tithonus* Uppersides: A. Normal; B. ab. *obsoletissima*.

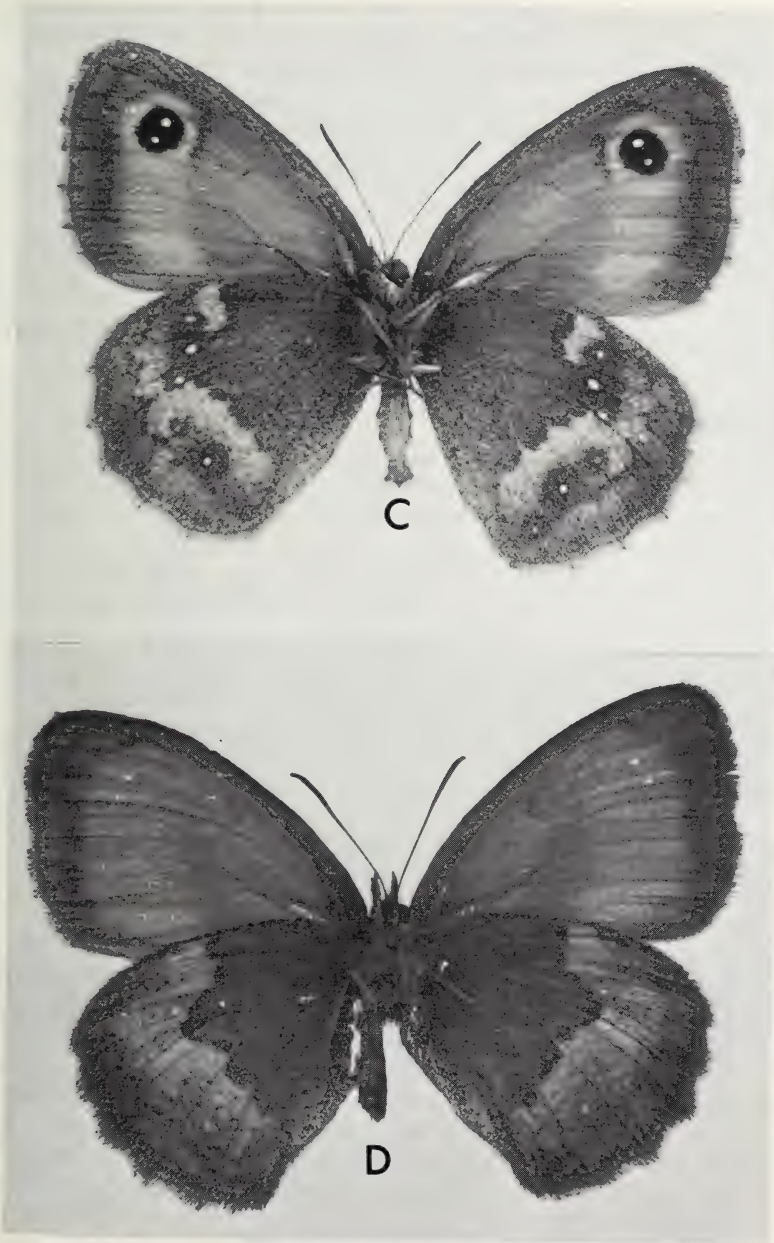

Fig. 2. *Pyronia tithonus* Undersides: C. Normal; D. ab. *obsoletissima*.

only other specimens traced have been the two already alluded to in the National Collection of the British Museum (Natural History) and the original female specimen on which Leeds' description was based.

I would be pleased to hear from any readers who may possess a similar specimen in their collection or know of any others in existence.

The following plates show ab. *obsoletissima* (upperside and underside) compared with a normal specimen.

® Editorial Note: In his paper Leeds mentions but does not figure *obsoletissima* as an aberration of the Gatekeeper. He does, however, give coloured figures of the undersides of this aberration in a male Meadow brown (*Maniola jurtina*) and a female Small heath (*Coenonympha pamphilus*. 3/8

ANTHONY WOOTTON

Members will be saddened to learn of the untimely death earlier this year of Anthony Wootton, from whose pen a number of articles have only recently appeared in our pages and he will not now see those still on hand in print.

Anthony was an all-round naturalist with an especial interest in invertebrates and the author of a number of books, *Insects are animals too*, being one that springs to mind. For over ten years he edited the British Naturalists' Association journal *Countryside* where his skilful editing, book reviews and answers to queries considerably enhanced the reputation and circulation of that journal. He will also be remembered for his survey on the glowworm and will be sadly missed by both entomologists and naturalists.

THE SOCIETY'S EMBLEM

by Maitland Emmet (1379)

Members of the AES may not know how appropriate the Brimstone butterfly is as the Society's emblem. Let me explain by working backwards. The British Museum came into being in 1753, being based on the collections of Sir Hans Sloane which he in part bequeathed and in part sold to the nation. Sir Hans Sloane's museum in turn grew out of the collections made by James Petiver, FRS, which Sloane purchased after Petiver's death in 1718. Petiver, a distinguished apothecary and naturalist, was the father of British entomology. He made an extensive collection, mainly of zoological and botanical specimens, culled from all over the world. In 1695 he began publishing illustrated lists of the contents of his museum under the title *Musei Petiveriani centuria prima*, further "centuries" following annually. Each "century" consisted of ten

plates with supporting text, and each plate showed ten assorted natural history specimens.

They were numbered consecutively, those of British origin being prefixed by the letter "A" for Anglia. The entry A1 is the Brimstone butterfly, under that very name. So it may be argued that this butterfly is the senior exhibit of the whole of the British Museum and its subsequent satellites such as the Natural History Museum. Petiver knew the two sexes of the Brimstone, for he had found a pair *in copula* on the 29th April 1695 Old Style (10th May by the present calendar), but he got the sexes the wrong way round, supposing the paler of the two to be the male.

John Ray's *Historia Insectorum*, published in 1710 five years after Ray's death, is commonly supposed to be the starting point of modern British entomology, but his friend Petiver had already described, figured and in most cases named all but three of the British butterflies included by Ray. Petiver was the first author to use vernacular names, so "Brimstone" may also claim to be the earliest English name for a British butterfly. The Brimstone is the harbinger of spring, so often the first butterfly we see in the early months of the year. What species could be more appropriate as the starting point of the British Museum, modern British entomology and the AES!

THE BRITISH DRAGONFLY SOCIETY

Despite the extraordinary antiquity of dragonflies, their undoubted beauty and their unusual life history, it is a strange fact that they have, until recently, gone almost unnoticed by the public.

Dragonflies are among the most ancient living creatures. Fossil records, clearly recognisable as dragonflies, date back almost 300 million years and thus predate pterodactyls by 100 million years and birds by some 150 million. It would be tragic if, after surviving so long, it should be our generation that sees the decline of these beautiful insects.

Britain today has 38 breeding species. In the Channel Islands there are four more and Northern Ireland boasts another. We have two species that are fairly common summer visitors and several more that are recorded as rare vagrants. *But*, in the last 30 years, three species have become extinct in Britain. Dragonflies breed in water and, in order to protect them, it is necessary to conserve their habitats. In 1983, the British Dragonfly Society was formed with the following aims:

"To promote and encourage the study of dragonflies and their natural habitats, especially in the United Kingdom."

Our membership has been growing steadily and now numbers over 500. While it is unlikely we shall ever be in a position to purchase land, we are becoming recognised as advisers to already established bodies such as RSPB, County Wildlife Trusts and FWAG and we hope, before long, to raise sufficient funds to help such organisations in dragonfly conservation.

The Society's *Journal* is published twice yearly and members also receive two newsletters a year. During the summer we organise field outings and in October we hold a well-attended Indoor Meeting. The annual subscription is £5.50 and covers a household. We welcome new members and I will be pleased to answer any enquiries. Mrs R. S. Silsby, 1 Haydn Avenue, Purley, Surrey CR2 4AG. Tel: 01-668 5859.

MALAGASY TROPIC

Members who attend any of the Entomological Fairs (including our own Annual Exhibition) will be aware of the material on offer. It is therefore a pleasant surprise to come across a firm that offers something different which we do not see at the Fairs. The above firm appears to be one such. Although based in France they have an Insect Farm in Madagascar, a country from which material has not been readily available in the past.

In particular they offer a very wide selection of the beetles of the area, including some species alive. Also available live are the famous "most beautiful moth in the world", *Urania riphaeus* as well as the rare invertebrate *Glomeris* and some Saturnids I have not seen on the market for many a year. It is perhaps not generally realised that *riphaeus* can be easily reared and, like Small tortoiseshells, subjecting the pupae to extremes of temperature can produce the most spectacular varieties in this already spectacular moth. The firm's address is: Malagasy Tropic, B.P.6 F-34822 Teyran Cedex France.

THE NEW HANDBOOK ON THE TACHINIDAE

Work is now under way on this new RES handbook for the Tachinidae. The British Museum (Natural History) collection, upon which the work will primarily be based, has an inadequate series of the following species. Any specimens of these which could be borrowed will be invaluable in constructing a usable key.

Actia exoleta (Meigen)
Belida angelicae (Meigen)
Ceranthia lichwardtiana (Villeneuve)
Germaria ruficeps (Fallen)
Hemimacquartia paradoxa (Braur and Bergenstamm)
Phebellia nigripalpis (Robineau-Desvoidy)
Gymnosoma nitens (Meigen)
Carcelia intermedia (Herting)
Eurysthaea scutellaris (Robineau-Desvoidy)
Gonia foersteri (Meigen)
Litophasia hyalipennis (Fallen)
Phebellia stulta (Zetterstedt)
Siphona mesnili (Andersen)

Any catalogues of tachinid collections held by other individuals or institutions would be useful. These would enable loans, examinations and/or exchanges of material to be arranged at a future date.

I shall continue to require the assistance of collectors up until the time the manuscript is at the printers and shall be obliged for all relevant information to be sent to me, Robert Belshaw, Diptera Section, Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD.

ATTRACTIONS OF FROSTED GLASS

by A. Grayson (8621)

I was interested to read Jan Koryszko's remarks about moths being attracted to frosted glass in his bathroom window (*Bulletin* 46: 24). When I was young and lived at my parents' house, we had a back door that contained three glass panels of frosted glass. From time to time these were accidentally broken and the three panels ended up being different patterns of frosted glass. Moths and other insects were always more attracted to one of the patterns than the other two, so I concluded that not only was frosted glass more attractive to moths than normal clear glass, but that some patterns were more attractive than others.

SOME RARITIES AND NEW RECORDS FROM YORKSHIRE

by A. Grayson (8621)

During the autumn of 1986 I was lucky enough to observe two insects whose occurrence in North Yorkshire is not really to be expected. The first was a Comma butterfly (*Polygonia c-album*) near Wass and the second a Stag beetle (*Lucanus cervus*) near Ampleforth. I duly informed Brian Eversham of the Biological Records Centre who informed me that, with the exception of one record from Keswick in 1960, all past records of the Stag beetle have been south of Yorkshire.

A Camberwell beauty (*Nymphalis antiopa*) was seen by Miss M. A. Fox in her garden at Swindon, near to Malton, in late 1987. In the same year I took a specimen of the hoverfly *Platycheirus immarginatus* near Kirkdale. This species has only previously been recorded from three sites in the vice-county of North-east Yorkshire and was in the company of many other common species of hoverfly, such as *Helophilus pendulus, Volucella pellucens, Eristalis tenax, E. pertinax* and *Rhingia campestris.*

In North Yorkshire I usually notice Red Admirals (*Vanessa atalanta*) in ones and twos from late May until October. This year, however, up to the time of writing, June 13, I have yet to see any but have recorded eight Painted ladies (*Cynthia cardui*) and this is the first time I have seen any of these in these parts since 1976. For the record my 1988 sightings were two near Pickering on May 16; one near Pockley on May 16; one near Hovingham on June 1; two at Wharram Piercy on June 5; one in Rosedale on June 10 and one near North Grimston also on June 10.

I am presently engaged in collecting butterfly records for North-east Yorkshire (vice-county 62), especially from the Wolds and the Tabular hills. Even old records, of common, rare or migrant species would be helpful and if any members have any from this area I should be obliged to hear from them.

NEW PROPOSED BUTTERFLY FARM IN CO DURHAM

by C. Crosby (8546)

It has been reported in *The Northern Echo* that two Durham Councillors, one of whom is an acknowledged expert on butterflies, have plans to open a butterfly house in our region, within twenty miles of Newton Aycliffe.

This has to be good news for us in the north in particular, for apart from the one near Edinburgh all the existing butterfly houses seem to be in the south. According to the report in the *Echo,* it will initially create jobs for six people and is expected to create 20 new jobs within five years. The plans are for a 100 ft by 60 ft glass structure containing a tropical environment complete with decorative streams and waterfalls. There will also be a shop, refreshment stall, patio area etc. to cater for the large numbers of expected visitors. One of the Councillors, who is to be managing director of the enterprise, stated, "It can be one of the biggest tourist attractions in Co. Durham. The potential is massive. At the moment we are looking for sponsors — major firms who want to become involved. We are confident the venture will prove sucessful."

INTERNATIONAL CONGRESS "FUTURE OF BUTTERFLIES IN EUROPE: Strategies for Survival"

Wageningen, The Netherlands, April 1989.

An international congress on the conservation of butterflies in Europe will be held in Wageningen, The Netherlands, from 12 to 15 April 1989.

Requests for further details should be directed to the Congress Building, International Agricultural Centre, P.O.Box 88, 6700 AB Wageningen, The Netherlands.

ENTOQUIZ

by Brian Wurzell (3718)

The puzzle below was originally tried out on the Urban Spaces Scheme. (This is an educational organisation at the Polytechnic of North London.) They could not crack it, so clearly it is a job for AES members.

Should you be a cryptic crossword buff, then you have the advantage, for that is the kind of reasoning it's going to take. All the answers are names or phrases very familiar in our subject. Six or seven are the names of well-known lepidoptera; ten or eleven are other insect groups which are abundantly represented throughout Great Britain; one more has eight legs and a couple are general entomological terms.

Good Hunting! Answers in the next issue!

CLUES

1. A question of metal .....
2. Apartheid for the wicked .....
3. Real edgy on a hot rock .....
4. Little Penny Bright .....
5. This relative runs without you .....
6. Sups on all paws .....
7. Princess must rest awhile .....
8. Ignite this one? .....
9. Even a modest plant might be capital .....
10. Or all to pay .....
11. Sure doubtful time, baby .....
12. Spot the fair sex .....
13. Hop leaf .....
14. So sadly to drink .....
15. Ecological fishing, perhaps .....
16. How's that for a low standard? .....
17. Our boss needs a shave, mate! .....
18. But can we live so long that's the point .....
19. Curtains! — the net result .....
20. It's all over now .....

PAINTED LADIES ON SCOTTISH MOUNTAIN

by William Young (8495)

On Monday June 13 this year, while hill walking with my brother and friends on the Campsie Fells, eight miles north of Glasgow, we ascended Lecket hill and at 1792 feet a strongly flying butterfly attracted our attention. At first we thought it to be a worn Small tortoiseshell, but as we walked on another flew past and after a chase I caught it and it turned out to be a Painted lady (*Cynthia cardui*), but in a very worn condition. As we progressed upwards there were two more, a courting pair, and when we reached the top of Meikle Bin, the highest point at 1870 feet, there was another Painted lady resting on worn stones on the ground. I was amazed to see these butterflies up at this height as there were no flowers for them to feed at, only stubbles of grass kept short by the sheep. This was the first time for many years that I have come across this species.

IN VITRO FERTILISATION OF INSECTS: A REVIEW OF THE LITERATURE AND A REPORT ON SOME CURRENT WORK IN BUTTERFLIES AND MOTHS

by Cyril A. Clarke (1569), Frieda M. M. Clarke (3512), Winifred Cross, Alison C. L. Gill (8600) & Helen L. Tasker

Department of Genetics and Microbiology, University of Liverpocl, P.O. Box 147, Liverpool L69 3BX.

INTRODUCTION

Since *in vitro* fertilisation in Man has become a standard procedure (Edwards, 1981) it seemed to one of us (C.A.C.) that it ought to be possible to carry it out in butterflies and moths. If successful it would have great research potential and also be of use to butterfly farms. At present it quite often happens that a wild caught tropical female arrives by air mail in a debilitated condition. She does not lay, though she is almost certain to have been mated, and when she dies it is well known that only one fertile egg can be squeezed out, the rest lying infertile in her abdomen. If she is killed it seems common sense that if one opened up the abdomen and rapidly smeared the eggs with sperm taken from the receptaculum seminis fertilisation might take place. However, this approach has failed in many hands, and our next step was to investigate the matter further by designing it as a research project for an Honours B.Sc. student (H.L.T.), helped by a research assistant (A.C.L.G.) and a research technician (W.C.), during the spring and summer of 1988, and this paper reports our findings.

SEARCH OF LITERATURE

(a) *Hymenoptera, Diptera* and *Orthoptera*

Barratt (1919) is frequently referred to as having succeeded with *in vitro* fertilisation of drone eggs in the honey bee, *Apis mellifera*, but we had great difficulty in obtaining his paper, finally tracing it via a review article on artificial insemination in bees (Laidlaw 1987). Barratt's experiments are of extreme interest. He first ruled out the suggestion that queen bees laid only fertilised eggs, and that in the case of eggs deposited in drone cells the fertilising element was removed by the workers. He disproved this by isolating drone eggs as soon as they were laid, feeding the ensuing larvae himself and not allowing any worker bee to touch them — and drones were produced. This showed that drones were haploid being derived from unfertilised eggs, and Barratt next decided to try to fertilise such eggs *in vitro*. He did this using sperm obtained from pure Punic (dark coloured) drones, applied to eggs from a pure golden Italian queen, this enabling him to recognise any hybrid offspring. He

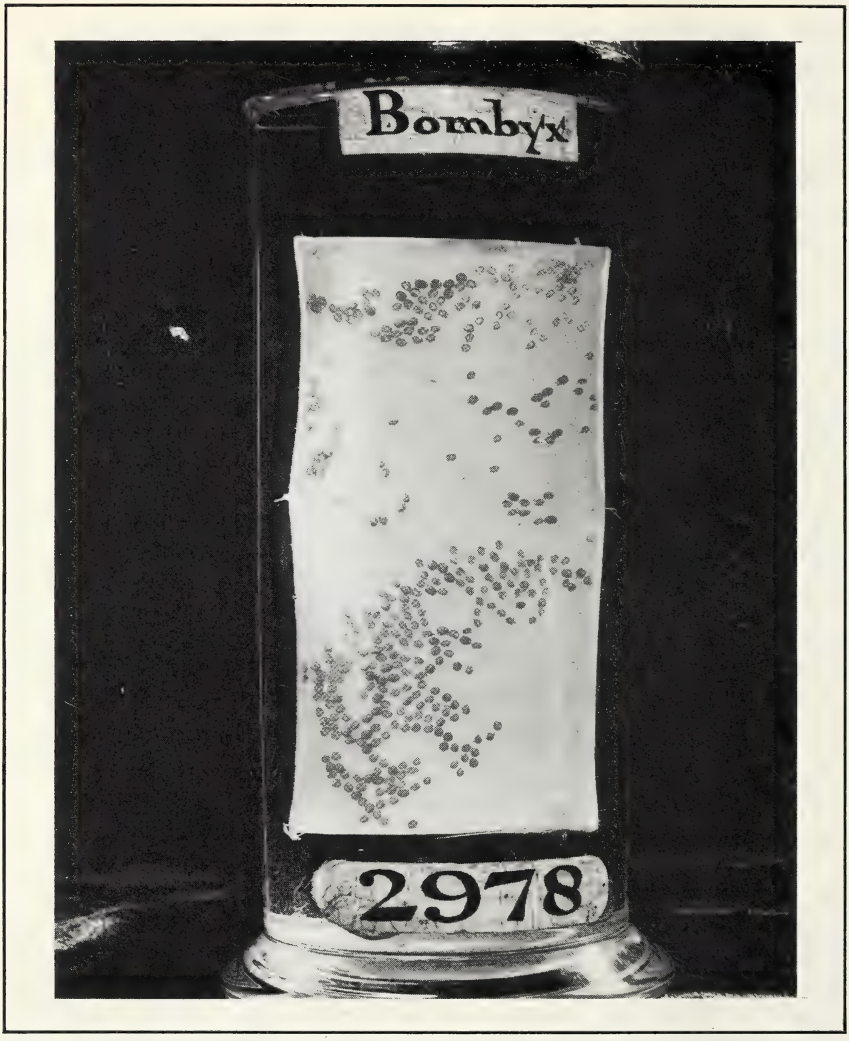

Fig. 1. Eggs from *B. mori* used in Hunter's experiments (1792). Hatched eggs are in the top right hand corner. Reproduced by kind permission of the President and Council of the Royal College of Surgeons of England.

writes: ". . . Pure Punic drones, just arriving in the hive after a flight, were squeezed over the eggs in the hope that a spermatozoon would enter the micropyle of the egg and thus fertilise it. . . . Drones returning from flight were selected because the air sac being distended the expulsion of the male sperm was facilitated." The eggs treated were isolated and the

ensuing larvae fed (as before) by Barratt, and from them diploid workers and queens resulted, all "showing unmistakable evidence of Punic blood." Barratt had triumphed.

Others were less successful, Khmara (1977) thinking that his own failure was due to a membrane forming on the surface of the sperm, the result of dessication.

Earlier Reinhardt (1960) (who does not mention Barratt) had dipped haploid eggs into sperm diluted in Ringer solution, and observed that in some cases the nucleus of the egg fused with that of the spermatazoon, but he does not report any larval hatchings.

Leopold and Degrugillier (1973) showed that in the housefly there is evidence of the involvement of a female accessory secretion in the penetration of the egg by the sperm. Thus removal of the paired sex accesory glands inhibited penetration of the egg by the sperm, but the copulation of females without these glands appeared to be unaffected. These housefly results indicated that either the sperm were "activated" or the permeability of the egg membrane was altered by the secretion of the accessory glands, before fertilisation occurs (see also Degrugillier, 1985).

The mechanism of fertilisation in insects was also referred to by Degrugillier (1988) at the XVIIIth International Congress of Entomology in Vancouver. He pointed out that the process is a rapid event involving the precise placement of gametes so that sperm entry of the egg can occur. Various modifications of the female reproductive tract, as well as the structural properties of the egg itself, have evolved in order to ensure success. Nevertheless, taking all this knowledge into consideration, including adding the secretion of the accessory glands, he reported a failure of *in vitro* fertilisation in *Drosophila.*

McFarlane and McFarlane (1988) had more success with the house cricket *Acheta domesticus.* Eggs from a mated female and the contents of the spermatheca were incubated together in a watch glass in insect Ringer for up to one hour and the Ringer then replaced by distilled water. Subsequent development of the eggs was followed over a period of days and 59% of them showed evidence of fertilisation, but only reaching the four day stage. As the control, eggs from a virgin female were incubated in a hypotonic solution without sperm and 5% showed similar development — i.e. parthenogenesis occasionally occurs in the cricket.

A point of great interest is that the McFarlanes found, using fluorescent microscopy, that sperm penetration was not restricted to the micropyle, and using incandescent light, the sperm cells could be demonstrated within the chorion.

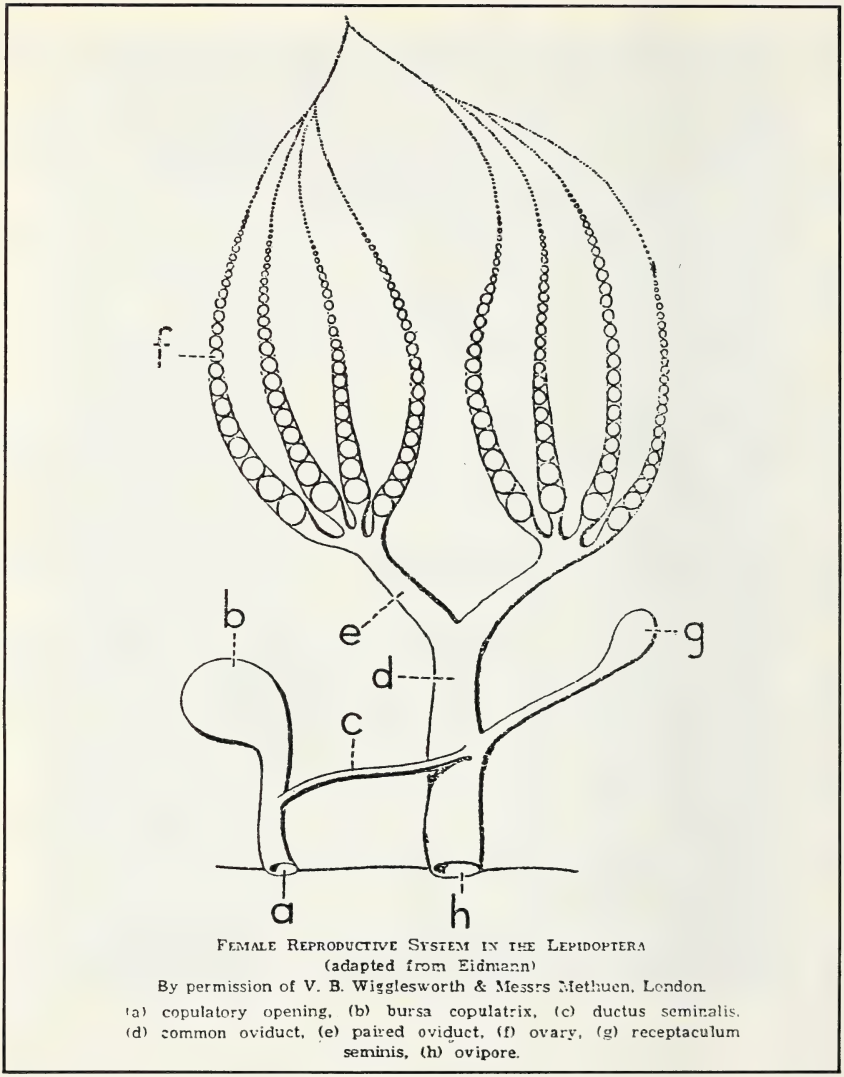

Fig. 2. Female reproductive system in the Lepidoptera (adapted from Eidmann). By kind permission of V.B.Wigglesworth & Messrs Methuen, London.
(a) copulatory opening, (b) bursa copulatrix, (c) ductus seminalis, (d) common oviduct, (e) paired oviduct, (f) ovary, (g) receptaculum seminis, (h) ovipore. (See also Clarke & Sheppard, *Entomologist*, August 1962.)

At insemination one or more spermatophores are introduced into the bursa copulatrix where, after a few hours, the membrane dissolves and tbe spermatozoa make their way

(either through muscular cotractions of the passages or by chemical stimuli) through the ductus seminalis into the common oviduct and thence by another fine duct into the receptaculum seminis. The bursa is completely emptied of spermatozoa in 1-3 days. Fertilisation occurs immediately before the egg is laid; a few spermatozoa leave the receptaculum and after reaching the oviduct enter the micropyle of the egg where one of the spermatozoa fertilises the nucleus. In the Lepidoptera, the sperm may remain alive in the receptaculum for many months, the store not being exhausted even after egg-laying is complete.

(b) *Lepidoptera*

Hunter (1792) allowed an unmated female silk-moth to lay, and then opened up males which were ready for copulation, collected their semen with a "-hair pencil" and covered the ova with it as soon as they passed out of the vagina. In the ensuing season, eight of these eggs hatched at the same time as others naturally impregnated. In a second experiment Hunter also took an unmated female and let her lay, but this time he obtained the semen not from a dissected male, but from a female which had been mated, having "dissected out that bag which I supposed to be the receptacle for the male semen." Again "wetting a camel hair pencil with the matter" he covered the ova as soon as they passed out of the vagina. These ova also hatched the following season, at the same time as those naturally impregnated. We have seen Hunter's experimental material in the Hunterian Museum at the Royal College of Surgeons in London — eggs and dissected moths — and Fig. 1 shows a photograph of the eggs he used.

Further experiments by Hunter are described in posthumous papers arranged and revised with notes by Richard Owen (Hunter 1861) but though very interesting they do not add appreciably to the original paper.

A French paper by Jacques Stockel (1973) was mentioned to us by Dr Julian Shepherd, of the Department of Biological Sciences, State University of New York, Binghampton. It relates to the physiology of the female reproductive system of the Angoumis grain moth, *Sitotroga cerealella*. There is much detail dealing with sperm activation and how the egg is fertilised. In the English summary there is no mention of *in vitro* fertilisation in the sense dealt with in our paper, but there is a short section in the paper on *in vitro* testing of sperm and the factors which make for or against fertilisation of the egg.

A point of interest is that if the female is not mated no infertile ova are laid, the eggs being reabsorbed.

There follows an account of our current work, all undertaken before we knew about Hunter's paper, and the question why he succeeded with

IVF whereas we and others have failed remains at present unsolved, though we discuss possibilities.

CURRENT INVESTIGATIONS (mostly carried out by H.L.T. and W.C.)

Material

The butterfly species used were *Hypolimnas bolina* (all females mated in the wild); *Papilio demodocus* (some hand mated and some virgin); *P. polytes, P. dardanus, P. phorcas* and *P. machaon* (all hand mated). The moths were *Biston strataria* (seen to mate normally in captivity) and *Biston betularia* (virgin). The total number of females used was about 40.

For hand mating techniques see Clarke (1952), Clarke and Sheppard (1956).

Methods

Dissection

The insects were killed by compression of the thorax. Mated and unmated females were then dissected in order to remove any unfertilised eggs from the ovaries, or the spermatophore from the bursa copulatrix, or any sperm found in the receptaculum seminis. This was done under Ringer's solution to allow the structures to float freely without any osmotic damage. The bursa copulatrix is conspicuous because of a dark row of spines, the signum, on the pale body of the bursa. The oviduct can be traced from the bursa (Fig. 2) and when that is removed the ovaries can be seen. The receptaculum seminis is difficult to locate but can be traced from the bursa copulatrix and the oviduct. When males were needed (for unmated females) sperm was taken from the testis.

Many of the butterflies were found to contain no eggs and some only immature ones — i.e. soft and with no hard chorion. If an immature egg was removed from the female it collapsed after a very short time, probably due to loss of water as there was no chorion present to prevent dessication.

Brushing on of sperm

Unfertilised eggs dissected out of a female were lined up and stuck on a coverslip with the micropyle facing upwards, using double-sided sticky tape. The sperm, which was taken from the testis of the male, the spermatophore or the receptaculum seminis of the female, was diluted with either Ringer's solution or the T6 buffer (see appendix) and was brushed over the micropyle of the eggs. The coverslips were then left on moist tissue paper in a petri dish at 37°C.

Fig. 3. *Microinjection of butterfly eggs.*
P. demodocus egg being injected with a needle filled with sperm collected from the spermatophore and diluted with Ringer's solution. A small amount of cytoplasm can be seen escaping from the egg at the point where the needle has entered. This photograph was taken down a light microscope under a magnification of X40.
E = butterfly egg. N = needle.

Microinjecting

Here sperm were introduced into the micropyle of the eggs using a technique developed for injecting DNA into the pole cells of the embryos of mosquitoes for gene manipulation (A. C. Morris personal communication, and see Morris 1988). Before injection the butterfly eggs were again aligned on sticky tape but this time the micropyles were facing the side so that they could be pierced by the microinjection needle (Fig. 3). This was filled with a solution of sperm from one of the three organs

described earlier, diluted with one of the two buffer solutions. The sperm was then injected through the micropyle under pressure. The eggs were left on moist tissue paper on a petri dish at 37°C.

Sometimes also the eggs were injected with sperm simply by hand pressure using a fine capillary tube.

Controls were set up in case parthenogenesis was involved. These eggs were arranged as above but pierced by an empty needle and left under the same conditions as the treated eggs.

Test tube method

Here eggs from the female were mixed together with the testis of the male in a small quantity of Ringer's solution.

"Spermatophore" method (A.C.L.G.)

Two or three eggs were dissected out of a (just) dead female, and the spermatophore cut out and opened. The eggs were inserted into the spermatophore which was put into a very small test tube with a little Ringer's solution.

"Moribund female" technique (C.A.C.)

This method was tried to ensure speed. The abdomen of a moribund female *P. dardanus meriones* was opened (she was then killed at once). Six eggs were removed into Ringer's solution into which immediately the abdominal contents of a killed male *meriones* were added. After one hour gravity had separated the eggs from the general debris.

Results

Brushing on of sperm

In none of the combinations of sperm with or without the buffer did any of the eggs show any sign of fertility. They remained their original yellow colour for about two days after which they began to collapse. One important point however, was established, namely that in one mated killed female the egg about to be laid was fertile *before* being squeezed through the ovipore — that is, the act of laying does not seem to play a part in fertilisation.

Microinjecting

Most of the eggs that were injected turned brown after about 24 hours (as they do when they are fertile) but after a few days they collapsed and DNA staining showed no embryonic tissue. We think the brown coloration was the result of damage to the chorion of the egg. The control eggs and also those injected by hand pressure behaved similarly.

Test tube method

There was no sign of fertility in any of the eggs.

"Spermatophore" method

Here again there was no sign of fertility.

"Moribund female" technique

There was never any sign of fertility in the eggs.

DISCUSSION AND CONCLUSIONS

As has been stated, when our work was carried out we were not aware of the John Hunter reference nor of the details of Barratt's experiments, and we therefore thought in terms of more sophisticated equipment. Now that we know about the earlier papers, both of which describe what seem like good scientific procedures, we feel that a simpler rather than a more complicated approach is indicated; for example, speed of action (as mentioned by Degrugillier 1988) and thus prevention of dessication, may be a critical factor. We plan first of all, both in Liverpool and at the Institute of Zoology in London, to repeat Hunter's work with *Bombyx mori* and other silk moths — though this would not fulfil our ultimate aim of fertilising unlaid eggs. If the Hunter technique proves successful the reason may be that his females were alive and there was no time for dessication of the eggs and sperm, and the same was the case in Barratt's bees. In our work however, the opening of the abdomen will probably have resulted in very speedy death of the eggs.

Although complete failure of IVF in the Lepidoptera is the conclusion from our own work, yet we feel that the matter is likely soon to be solved, and the hope is that one of us (C.A.C.), as a past President of the Royal College of Physicians, can then draw level with a President of the Royal College of Surgeons of 200 years ago.

APPENDIX

Buffer Solutions

Two different solutions were used in which the sperm were diluted.

1. An insect Ringer's solution.
2. T6 culture medium, which is used primarily as a culture medium for sperm in human IVF, which is prepared as follows:

Stock A: To approximately 500 ml water in a 1 litre flask add 5.991g NaCl, 0.111g KCl, 0.101g $MgCl_2$ $6H_2O$, 0.054g Na_2HPO4, 1.048g D-Glucose, 0.054g Na Pyruvate, 0.063g Pen.G., 0.005g Pen Red, 4.872

ml Na Lactate. To approximately 100ml water add 0.274g $CaCl_2$ $2H_2O$. Add this solution to main stock.

Stock B: To 100ml water add 2.101g $NaHCO_3$. For 1 litre T6 medium add 900ml Stock A and 100ml Stock B. To this T6 medium was added 10% by volume either human or bovine serum and was left to equilibriate overnight at 37°C.

Stocks A and B were provided by Oxford University IVF Unit.

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Since writing this article, we have tried out the Hunter technique on the silkmoth *Cricula andrei* but without success. The treated eggs failed to hatch, as did the controls, but eggs laid by a naturally paired female hatched normally.

In the insect house of the Institute of Zoology at the London Zoo, the geneticist Patricia Croft has also used the Hunter technique on *Bombyx mori*, again probably without success (most eggs have collapsed), though to parallel the Hunter experiment the eggs will need to overwinter.

CHRYSOPA CARNEA

by Frank Marples (8226)

Chrysopa carnea,
  With bright golden eye,
How dainty a creature—
  How gracious, to fly
O'er garden and meadow,
  O'er wayside and stream—
Chrysopa carnea,
  The spirit redeem!

So pale through the winter,
  So green in the sun,
Chrysopa carnea,
  In vision, begun
Upon course metamorphic—
  Egg, pupa, in place—
Upon course skirting meadow,
  A whir of pure lace.

No gentle predation,
  Through realms leafy, dark,
No mercy for aphid
  On blade, stem or bark,
And yet how so beauteous,
  This spirit on high—
Chrysopa carnea,
  How wondrous a fly!

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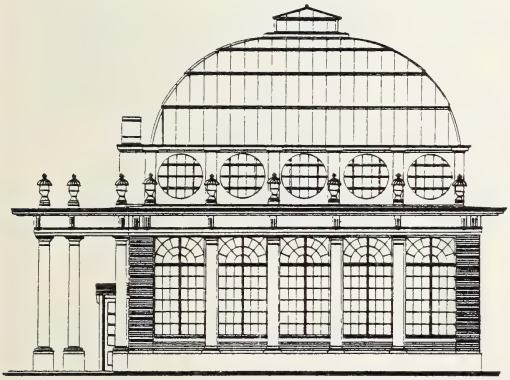

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