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THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

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The Amateur Entomologists' Society
355 Hounslow Road, Hanworth, Feltham, Middlesex

GENERAL INDEX

INSECT RECORDS OF SPECIAL NOTE

CONTRIBUTORS

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THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

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The Amateur Entomologists' Society

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AES BULLETIN No. 318

EDITORIAL

Lateness. We apologise to all that the Bulletin does not usually appear until after the month whose imprint it bears. This is due to many causes, but primarily it is the time it takes between sending the manuscript off to our printers and the despatch of the issues by post. This time is about four months. It can at times be less, but this will depend very much what other work our printer may have in hand; we may have to take our place in the queue. An accident or illness may also cause delay. One answer, you may think, would be to change printers. This is not so. Our present printers make a very good job of the Bulletin, without needing close directions and at a very reasonable cost indeed. If we did change, on the promise, and it would only be a promise, not a binding contract, to produce quickly after receipt of manuscript, then we should have at least double our subscription rate! A four month production schedule does of course make it almost impossible to get topical hot news items in. There have been occasions when your editor has held back for a week or two to enable him to get something in—either because it has always appeared in the past in that month or else he thought it deserved early publication. It has now been decided to sacrifice topicality in favour of punctuality, and every effort by all concerned is going to be made in 1978 to get our quarterly issue out in the first week of the month of imprint. I write this in the second week of September; I hope it will be read the first week of February. Meanwhile we have one consolation; some contemporary magazines are, or have been, running up to a year or more behind their due publication dates. So far our Bulletin has only been a month behind.

EXPLORERS

The furry moth explores the night
The fish discovers cities drowned,
And moles and worms and ants explore
The many cupboards underground.

The soaring lark explores the sky,
And gulls explore the stormy seas,
The busy squirrel rummages
Among the attics of the trees.

James Reeves

THIS YEAR'S EXHIBITION

For this year's exhibition the Society has booked the Hampton Exhibition hall and the Avon lecture room of the Wembley Conference Centre. This is of course easy of access by both road, rail and bus. It will finally give us the space which past experience has shown we need. There will be ample room for both traders and exhibitors and there are ample catering facilities. The date, the only one available, will be later than in the past, October 21st. We most sincerely hope that not only will as many members as possible attend, but that they will make it a really bumper affair and bring exhibits with them. The cost is considerable. Unlike last year when, for safety and other reasons, the number of traders, both professional and amateur, had to be restricted, there will be space for all and we hope to see many old familiar stalls back in business as well as more exhibits than in the past. It also seems likely that our opening and closing times will be later than previously, which will make for a more leisurely affair. Further details will be announced in the next issue.

PUBLIC REACTION

I suppose we entomologists should be reconciled to the general public's reaction to insects (apart from the superficially attractive butterflies and certain moths). Commonly, it is one of disgust, coupled with unreasoning fear, or at best indifference, but mainly the former. Nevertheless, one is continually being surprised at the ignorance people display of the simplest facts about our most numerous animals. The other day, for example, I happened to be travelling on the top of a bus from Stone to Aylesbury when a large black and yellow Bumble Bee (*Bombus* sp.) was discerned "bumbling" about between the front window and the floor. Two young girls who happened to be sitting there immediately exclaimed "Wasp!", reacting with evident nervousness. Their cry was wordlessly echoed by a woman seated just in front of me. "This gentleman says it's a bee", she offered doubtfully, but since her reassurance seemed unlikely to save the bumble from being stamped underfoot I hastened to rescue it and transfer it outside via a window. I imagine that if they and a good many others unversed in basic entomology were to have had a fine *Scaeva pyrastri* (L.) (hover-fly) settle on their hand—as happened to me whilst sitting in the local reference library recently—they would have gone into hysterics!

Even if we accept there is some slight reason for nervousness with regard to insects like these, the popular feeling for other quite *obviously* innocuous insects is often little better, as was brought home to me whilst walking through my village some weeks ago. Having found a fine Buff-tip moth (*Phalera bucephala* L.) lying on the footpath, I showed it to a young woman of my acquaintance who happend to be

walking close behind. Foolishly expecting her admiration of this splendid example of *crypsis*— it had assumed the characteristic twig-like posture when on my hand—I was astonished when she drew back with an expression of the deepest disgust, uttering an involuntary "Ugh!"

Why, I wonder, are insects regarded with such totally illogical distaste when other animals, like birds and mammals, are apparently "acceptable"?

Anthony Wootton (3331)

A FEW THOUGHTS ON EXTINCTION, RARITY AND CONSERVATION

The two related concepts of 'rarity' and 'extinction' figure prominently in the more emotive literature concerned with the preservation of the contemporary British flora and fauna. The two terms are rarely, if ever, objectively defined and I doubt whether they are capable of formal definition. These are two terms capable of many interpretations, as variable in their implications as is *Apamea secalis* L. in its appearance!

Consider, for example, the much discussed 'extinction' in Britain of the Black-veined white butterfly or the imminent 'extinction' of the Large blue butterfly in our islands. Are these two insects really as 'extinct' as the proverbial Dodo or in immediate danger of becoming so? Of course not—they are alive and well and living in Europe! This then, is an example of local extinction where species have only disappeared from these islands—a distinction given little prominence in current literature. The disappearance of the English race of the Large copper butterfly, however, is a different matter. *Lycaena dispar dispar* Haw. has gone forever and has ceased to exist as a distinct living organism on the face of this planet. This then is a case of absolute extinction—a concept which in my opinion exemplifies the preferable interpretation of the word 'extinction'.

Are 'local' or 'absolute extinction' phenomena to be thought of as 'good' or 'bad'? The current trend is to prevent, at all costs, such loss of species, regardless of the cause of the loss, in the name of conservation. Amoral judgement based on the social environment of the individual, is introduced here. The general view at the present is that it is a 'bad thing' to lose species. Is this approach acceptable on objective, scientific grounds? I suspect not. Species preservation, as practised today, may be thought of as 'fossilisation' rather than 'conservation'. If the reader will bear with me I will attempt to justify this open declaration of heresy at the risk of being burned at the entomological stake!

At the present day the Small mountain ringlet and Scotch argus butterflies are extinct insects in the London area. Some nine or ten

thousand years ago they probably flew commonly over the park-tundra vegetation on the site of the present Metropolis! Until recently I was concerned with research into the climatic changes of the Quaternary period based at Birmingham University. Here, fossil Coleoptera from dated horizons in suitable Quaternary deposits were used to provide a picture of the prevailing environmental conditions at the time. (See Coope et al. 1971; Osborne 1972). I was astonished to discover the rate at which insect populations changed their ranges in response to a fluctuating thermal environment. Species of present day Alpine or Southern European distribution came and went from Britain in rapid response to a Quaternary climate alternating between cold periglacial conditions and warm interglacials and interstadials. In more recent periods beetles can be shown to have responded quickly to the effects of man on vegetation. The general picture that emerges is one of constantly and rapidly changing species distributions. There is no reason to suppose that the climatic changes of the Quaternary period have ceased. Consequently, insect distributions cannot be regarded as the static phenomena implied by the contemporary distribution maps. Present day distribution maps of insect species must be regarded as an artificial concept proposed at some arbitrarily chosen instant of time. Present day distributions are not dictates as to the area that 'should' be occupied by a particular insect. When regarded detached from the historical framework, present day distributions are virtually meaningless. Such distributions must be considered as part of a constantly changing system.

Violent changes of climate have affected these islands in the last few million years. During the Tertiary period these islands were covered by a sub-tropical vegetation similar in species composition to that of present day Malayan Islands (*vide* Pennington 1969). Unfortunately, Lepidoptera do not preserve well as fossils, but it is reasonable to assume the existence in Britain during the Tertiary period of a Lepidopterous fauna compatible with the tropical vegetation. It amuses me to imagine a Late-Tertiary butterfly conservationist jumping up and down upon his inevitable camera as the last British specimen of the genus *Ornithoptera* or *Troides* is netted by some ardent collector of the period. No doubt the collector would be blamed for the 'extinction' of the genus in the British Isles, whilst the effect of the first Quarternary glacier, lurking over the northern horizon is completely ignored!

Both forms of extinction are, I believe, simply alternative aspects of the varied biological responses to changing environmental conditions. The 'environmental conditions' should be regarded as including the effects of human activity. Indeed, to many people amongst whose number I count myself, the effect of man on plant and animal populations is of paramount importance and interest.

Much of the present day diversity of the British insect fauna is

due, in my opinion, to clearance of woodlands for agriculture which began in Neolithic times and continues to the present. When, in the past, most of the British Isles were wooded, such lepidoptera as the grass-feeding Noctuidae and Satyridae or the nettle-feeding Nymphalidae would have been restricted to localities where unstable ground such as coastal cliffs or river banks allowed the development of a favourable non-arboreal flora. The creation of widespread areas of diverse flora due to the spread of agriculture allowed an increase in the numbers of these insects. Extend such human activities to include insect collecting and the extinction of *L. dispar dispar* becomes a response to changing environmental conditions in the form of the development of insect collecting. (For the details of this activity see Allan 1943 p. 7-23). I regard, therefore, the disappearance of this butterfly as 'interesting' but neither as a 'good thing' nor a 'bad thing'. The disappearance of *L. dispar dispar* is to me a facinating chapter in the development of the science of Entomology in this country involving, as it does, the interaction of agricultural practice, scientific development, biogeography and changing social and economic values and conditions. The emotional response only serves to cloud the issue.

I have now introduced the two concepts of 'rarity' and 'abundance' into this discussion. These two terms are widely used, especially so in entomological circles, but their meanings are often vague and ill-defined. What is meant, exactly, by the term 'a rare species'? In late June 1977 I was collecting insects high up in the Langdale Pikes of the Lake District. At one locality the Small mountain ringlet was present in far larger numbers than the only other butterfly present, the Small heath. In describing that locality, I would be justified in referring to the former as 'common' and the latter as 'rare'. This is an opposite description to that which could be made for the British Isles as a whole! Is rarity, therefore, a geographical concept? In part rarity is a geographical concept in that it is only a crude measurement of an aspect of species distribution, which, in turn, is a geographical concept. Neither rarity nor distribution or range as geographical concepts can be viewed apart from a historical context. Time and environmental change are the chief factors giving rise to 'rarity' or 'commoness' as biological principles as I will attempt to show.

There is a tendency to regard certain species as intrinsically 'rare' throughout their range simply because they are of irregular occurrence within the British Isles. The classic example of a species so considered is that of the Osprey, a bird 'common' enough in Europe, Asia and North America and only 'rare' at Loch Garten in Scotland! But the public of these islands have been convinced that this is a 'rare bird' which must be protected, apparently at all costs! Entomologists are interesting in their response to this social, as opposed to biological, form of rarity. Who else would pay large sums of money for a specimen

of the Queen of Spain fritillary or the Death's head hawkmoth because the specimen had crossed the English Channel, when abroad hundreds of identical specimens could be obtained for a fraction of the price paid for the "British" specimen? This dubious, but interesting aspect of English entomology has led to economic exploitation in the past. (Read of the adventures of the Kentish Buccaneers in Allen, 1943!)

Is it correct, in an objective scientific sense, to attempt to preserve in these Islands, populations of insects which, for whatever reason, we regard as 'rare'? I think not and regret that 'fossilisation' once again becomes the rule at the expense of conservation in the true sense.

The British Isles form part of the western boundary of the continent of Eurasia. Consequently our flora and fauna must be regarded as being composed of species on the edge of their range. A brief look at distribution maps or text books reveals that most of the insects present in the British Isles also occur throughout parts of Eurasia, a situation summed up by Richard South so many times in the phrase "range extends to Amurland and Japan" (South 1961). Our insect fauna is, therefore, made up of the more adaptable species from a larger Eurasian suite of species, physiologically adapted to function best under a continental climatic régime. Most British insects may be regarded as continental species at the edge of their range. Only adaptability allows these species to survive under the maritime climatic régime of warm winters and cool summers in the British Isles which contrasts so strongly with the cold winters and hot summers of the continental interior of Eurasia. The boundary of the range of a species is not a constant system because it is on the edge of the range that environmental changes most greatly affect the species. The British Isles are just such a 'boundary area'.

I suspect that the present absence from Britain of such continental Lepidoptera as the Gypsy moth, the Reed tussock, the Three-humped prominent and the Black-veined white butterfly has a climatic explanation. All four species existed, for the most part, in the south eastern part of England, which, interestingly, is the area of England with a climatic régime approaching that of the Continent! The change in insect distributions due to climatic instability is a fascinating subject. However climatic instability alone cannot explan fully recent changes within the British Lepidoptera.

The movement of species to and from Britain in response to climatic change is complicated by the presence of the English Channel. Up to a period some 9,000 years ago, the Channel area and parts of the North Sea were dry land. The movement of species between Britain and mainland Europe was unimpeded. However the water from the melting glaciers resulted in a rise in sea level and a consequent severing of the 'land-bridge' between Britain and Europe. As a result many organisms which were extending their range northwards in the wake

of retreating glaciers found their access to Britain barred. Species now common in the Low Countries and North West France are absent from Britain. For examples of interest to myself I shall quote the Fire Salamander, Alpine Newt and Green Toad. The English Channel still acts today to prevent the return in reasonable numbers, of species of Lepidoptera recently lost. To most sedentary butterflies and moths, the Channel represents a major barrier. If left in the wild state, then we must accept the fact that many of our dwindling insect populations are going to disappear and fail to reappear. If the reason for the loss is climatic, then there is absolutely nothing that we can do about it. It would be madness to attempt anything. Any attempts to fossilise, rather than conserve, insect populations is morally unacceptable and technically impossible.

Contrary to the popular impression nurtured by many 'conservationists' not all the recent changes in our insect fauna have resulted in the loss of species. In a paper by Heath (1974) it is suggested that no less than twenty-one species of Lepidoptera colonised Britain between 1921 and 1960. In the same paper, Heath lists twenty-seven species recorded in Britain as vagrants or adventives, mainly between 1940 and 1965. (This list does *not* include the regular migrants such as the Painted Lady, Clouded yellows and Convolvulus hawkmoth.) Heath attributes these additions to the British fauna to a period of climatic amelioration recorded between 1921 and 1960. The second of Heath's lists interests me. The species recorded there provide a view of Nature's experiments in the spread of species. Although conditions between 1921 and 1960 in Britain were not suitable for their permanent establishment, these species form a reservoir of future possible additions to our fauna. However, conditions were suitable for the establishment of the twenty-one species listed by Heath. Even in these days of heavy human land-use, it is pleasing to see insect populations reacting to climatic change in the ways in which they always have. It is even more pleasing to see that they are succeeding without any help from the 'conservationists'!

Rarity, then, is not a recognisable criterion for deciding upon the status of species. Rare species may be on their way out or on their way in as was the Golden plusia at the turn of the century. 'Rare' species may also react to climatic change without involving movement from the Continent. The increased British range of the White admiral or Comma butterflies illustrate this point. Both insects suddenly increased their range in England in response to the climatic amelioration mentioned above. I hope that the present concentration of effort in the preservation of arbitrarily chosen 'rare' species will eventually give way to new attitude in which the British insect fauna is regarded as a whole and as part of a much larger and constantly changing system.

I intend to discuss the 'conservation' of British insects in a later paper. In the present work I will only consider one aspect of present

day conservation—that of introduction of insects from abroad. Conservation methods fall into two main divisions. The first adopts a *laissez-faire* attitude which assumes that organisms will overcome the pressures due to human activity through their own adaptability. The second, and apparently more acceptable school of thought, involves the management of the organisms themselves and those parts of their environment which are manageable in areas set aside for the preservation of certain arbitrarily selected organisms. In my opinion, a useful technique for the management of insect populations is the introduction of specimens from abroad, either for the strengthening of British populations or as new species to these islands. However, this technique is still not a widespread practice and the question of introduction from abroad still remains one capable of dividing the entomological world right down the middle!

Why has the entomological world been so slow to accept the introduction of species from Europe to increase the diversity of the British fauna? It cannot be due to a desire to preserve the 'natural balance' in these islands as this balance ceased to exist some 5,000 years ago with the advent of Neolithic agriculture. Except for a few acres of Pine forest in Scotland, the entire biological landscape of the British Isles has resulted from a long history of human activity. The British landscape is artificial, so why not create an artificial insect fauna within it? To suggest that present day insect distributions reflect a 'natural pattern' is to ignore five thousand years of intense, fascinating interaction between man, land and time.

The effects of introduced animals upon those already present in Britain is often used as an argument against introduction. However, this arguments falls flat in the face of evidence from those species that have a long history resulting from deliberate planned introduction. Does the presence in England of the Fallow deer, the Sika deer, the Edible doormouse, the Rabbit, the Marsh frog, the Bitterling, the Capercaillie or the Little owl detract or add to the diversity or viability of our fauna? Have they exterminated 'native' species by some insidious form of competition? Even the notorious Grey squirrel is not as black as painted. The Red squirrel was in decline before the Grey was introduced and there exists no real evidence of competition between them. Which is preferable—Grey squirrels in our city parks and gardens or no squirrels at all? That is the choice that entomologists may soon have to make in the case of such species as the Large blue, Swallowtail and Wood white butterflies.

I am not suggesting a massive, uncontrolled introduction into this country of every species of insect in Europe *thought* to be capable of existing here. Such indescriminate activities have led to the situation that now exists in Britain with the Coypu or the Mink. There are, though, a number of species which could be introduced. Amongst the

Lepidoptera, successful introductions have been made of the Dutch large copper and the European Map butterflies. The latter, however, suffered an unfortunate fate at its locality in the Forest of Dean at the hands of a person whose views upon insect racial purity closely resembled those of a recent Teutonic dictator upon his own species. It is not a philosophy I would care to see developed in any branch of human activity. It seems that the Pine hawkmoth was 'artificially' introduced into these islands. It has now been accepted as part of the English fauna as time is a great healer. It is a beautiful moth and would anyone now attempt its extermination on the grounds of not being a true 'British' insect? The Jersey tiger reflects a similar situation. There are many butterflies and moths in Europe and North America which could probably exist in the wild in these islands. A few experiments in controlled breeding and release would not be amiss!

Very few introduced insect species can be expected to succeed. Numerous attempts to re-establish the Camberwell beauty and Black-veined white butterflies and Gypsy moth as breeding insects in England have failed. Environmental factors exert a great effect on all insect species and until we understand these more fully, any attempt at species introduction must remain a largely hit-and-miss affair. However, the introduction of European specimens of the Large blue or the Swallow-tail may genetically revitalise our dwindling populations. The choice is between a sad memory of lost British subspecies or viable thriving populations of two lovely butterflies.

There are no formal conclusions to be drawn from this discussion. It was intended to provide a basis for further debate in the hope that entomologists in Britain will begin to question a few of the more widely accepted views on the future of our insect fauna. The accepted view of 'conservation' or 'fossilisation' as I prefer to call it, has become a socially determined norm. Too many people have rushed to the 'conservation' banner without considering, albeit at the risk of social ostracisation, the objective realities involved in the situation. A whole gamut of factors has lead to this. Codes for insect collecting, emotive Natural History films, newspaper stories and pleas for restraint in collecting repeated *ad-nauseam* in books and journals all add to the massive pressure of the 'conservationist lobby'. It is only by taking up a contrary position to this movement that discussion of the future of our insect fauna can be stimulated. I hope that I have achieved this, in my opinion, most desirable of ends.

M. D. Bryan, B.Sc., F.R.E.S.

REFERENCES

ALLEN, P. B. M. (1943). Talking of Moths, Watkins and Doncaster.

COOPE, G. R., MORGAN, A. and OSBORNE, P. J. (1971). Fossil Coleoptera as indicators of climatic fluctuations during the last Glaciation in Britain. Palaeogr. Palaeoclimat. Palaeoecol. (Amsterdam) *10* 87-107.

COOPE, G. R. (1970B). Interpretations of Quaternary Insect Fossils. A. Rev. Ent. *15* 97-120.

HEATH, J. (1974). A Century of Change in the Lepidoptera *in* the Changing Flora and Fauna of Britain, Ed. Hawksworth. Academic Press.
OSBORNE, P. J. (1972). Insect Faunas of Late Devensian and Flandrian Age from Church Stretton, Shropshire. Phil. Trans. R. Soc. Lond *B263* 327-367.
SOUTH, R. (1961). The Moths of the British Isles. Series I and II. Warne, London.

AN EXPERIENCE WITH ITALIAN CAMBERWELL BEAUTY LARVAE

Whilst in North Italy on a field trip in 1977, I was lucky enough to encounter livestock of *Nymphalis antiopa* L. The location was the small alpine town of Chiesa (1000 m) equidistant between Sondrio in Italy and St. Moritz in Switzerland.

On the 1st of July I went down to Chiesa from the alpine village of Caspaggio where I was staying, to investigate the banks of the River Oivi. The river proved to be typically alpine, shrunken in summer weather, leaving large boulders and stones with small islands uncovered, covered with small sallow, aspen and buddleia bushes (not yet in flower). On a sallow bush I observed a number of leaves missing from the terminal shoot. Suspecting Buff-tip larvae to be the culprit I investigated further. On one of the terminal leaves I encountered approximately ninety second instar larvae which were basically brown in colour and this did not make their identification immediately obvious. Further observation revealed the ring of transparent empty egg shells arranged in a manner similar to that of the Lackey moth (*Malacosoma neustria* L.) approximately 30 cms from the terminal leaf and the skeletal remains of sallow leaves indicating their movements over the last two weeks.

The larvae grew very rapidly and by the end of the week at Caspaggio they had achieved their 3rd instar and the characteristic adult colouration.

On moving on to Lake Como, the larvae were too big and numerous to be housed in the available plastic boxes and so were sleeved outside. The problem was finding a suitable sallow bush on which to deposit my larvae. Finally after a couple of hours of frustration I found one on some waste ground behind a layby on the lakeside main road at Cadenabbia.

The 3″ long steely grey/blue larvae with red markings along their backs grow at a fantastic pace in the heat of the Italian sun, consuming vast quantities of sallow in the process. Just on the point of pupation the larvae quite fully grown on my last day of the holiday, I went to collect the larvae just prior to catching the coach for the journey to Milan airport.

Disaster! No sign of the sleeves! Some nearby workmen directed me to the overlooking house and through a translation of the owners' message, through my hotel's receptionist, I heard the sorry tale.

Someone had obviously informed the authorities of the presence of suspicious large green sleeves on the waste ground! The special police arrived and no doubt having wandered around the bush for half an hour decided, I quote, they were "dangerous" and promptly burnt my sleeves and the unfortunate Camberwell beauty larvae!

My opinion of this action was reasonably obvious.

On arriving home I was saved by the cavalry in the form of a generous offer by a fellow entomologist, R. J. Holder, of 24 3rd instar larvae from stock he had collected in Ontario, Canada, recently!

Chris Orpin (5736)

METAMORPHOSIS

At one time or another, everyone of us must have pondered a little about the wonderful forces that shape a butterfly. The occurence of metamorphosis is a common event among entomologists, but this only seems to make us regard it as a matter of fact.

When the caterpillar sheds his final skin, hormones are activated, and most of his internal organs become liquid. Out of this 'soup', one of nature's most beautiful creations is formed; a fact confirmed by looking at a butterfly with a lens. You see the tiny scales, arranged perfectly in place, colours unmatched by man, and a breathtaking symmetry.

Below are the outlines on the main points of the process of metamorphosis. One of the mechanisms, the most basic of them all, is the DNA macromolecule, discovered in 1953. The other main mechanism was discovered in 1939, but unrecognized and unbelieved until 1964. Bioplasma or the 'Kirlian aura' is yet to be investigated more thoroughly, and its exact nature is as yet vaguely known.

Nature's information bank—the DNA macromolecule

A hundred years ago we still had clean rivers. There were still salmon in the Rhine at Basle. From the fish's sperm cells the German chemist Friedrich Miescher isolated substances of an acid nature, and since they were mainly found in the nuclei, they were named *nucleic acids*. These first natural nucleic acids were left standing about on shelves for decades with no one taking much interest in them. Most scientists did not even know their name, and no one guessed that they would prove to be the key substance of living matter.

The 'big bang' occured in 1953 when in a neck-to-neck race, the American James D. Watson and the Englishman Francis C. Crick, working at Cambridge University just managed to beat Linus Pauling's U.S. research team by a hair's breadth. They were the first to display a model of the structure of deoxyribonucleic acid (better known by its initials as DNA.)

Then the events snowballed. Further discoveries followed, until

after a long period of disbelief, Biochemists and most of the scientific world, accepted the answer to the mystery of life.

Here is a brief summary of the DNA macromolecule and its staggering importance in every role of life—including that of entomology.

The molecule of DNA has a structure like a rope-ladder which is twisted around itself. The two spiralling ropes of this ladder consist of phosphate groups and special sugar molecules; together they form a double helix. The rungs of the ladder are each made of two components stuck together. We shall shortly see that the constituents of the rings are the crucial elements of the structure. There are not twenty or so different ones as with amino acids, the building stores of protein, but only four of them; and instead of being acids they are nitrogen-containing organic bases. We must at least memorize their initials. They are A (adenine), C (cytosine), G (guanine) and T (thymine). These four bases fulfil the role of keys, only A being capable of linking with T, and only G with C.

The DNA macromolecule (i.e., very large molecule), is nothing less than an information bank containing complete plans for the building and maintenance of the living organism, from 500,000 items of information for a bacterium, to 5,000 million items for a human being.

It does not matter how many symbols make up a code. The Morse code has only two symbols, a dot and a dash. Since each letter comprises up to six of these symbols, every word and puctuation mark can be easily translated into morse. The symbols of the genetic code consist of the four organic bases (A, C, G, and T). Each unit of information consists of a triplet, three consecutive symbols. Thus the genetic code consists of 4^3=sixty-four triplets. Twenty of these triplets would really suffice to establish the programme for all protein molecules which are defined by the sequence of the twenty amino acids. But research has established that a given amino acid can be 'spelled' in several different ways and that such subtle differences are probably chemically meaningful. In addition there are codes for 'stop' which cause the termination of a given protein chain. It is thus likely that all sixty-four triplets have some function or another not yet fully determined.

Each living organism has its own particular DNA molecule. To be more specific, DNA is found in the nucleus of every one of the millions of cells which make up an animal. This means that starting with the division of the fertilized egg cell and in every subsequent cell division, DNA must reproduce itself.

For this DNA duplication process there is no moulding or determining mechanism since DNA itself represents the highest control substance. Thus, unlike any other organic substance, the specific DNA of a given organism is inherent and cannot be built up from basic units without DNA to begin with. But the manner in which the duplication of DNA takes place is really amazingly simple.

As we have seen each rung of the rope-ladder consists of two units joined together. The whole rope ladder begins to open at the joints like a zip-fastener thus creating two half rope ladders. But each base can only pair with one other specific base, namely A with T, and G with C. Within the nucleus are free building stones called *nucleotides*, which collect along the open joints of each half of the zip in the 'right' order and each of the two halves of the ladder are reconstituted as two new identical double DNA molecules.

But how does information stored in the nucleus manage to get where it is needed—to the *ribosomes*? (These are minute *organelles* or sub-cellular particles whose main function is the building up of new cellular material. They are scattered in their thousands throughout the cell's cytoplasm.) We know that it is here that the protein molecules necessary for living processes are synthesized. Again the mechanism is magnificently orderly. The DNA in its role of information storehouse remains unaltered. It now serves as a kind of nucleic acid, called *ribonucleic acid* or better, RNA. Unlike DNA, RNA is found throughout the cell, and not just mainly in the nucleus.

RNA contains a different kind of sugar from the one found in DNA. Also one of the four bases is uracil (U), which replaces thymine (T). A third difference is that RNA most frequently takes the form of a single rather than a paired strand. It was found that DNA not only duplicates itself but also forms a template for RNA formation during which U, instead of T pairs up with A.

What happens is: the constituents of RNA arrange themselves to form a positive print of the DNA negative formed by partial unzipping of a double strand. But depending on the information required only a small section of the giant DNA molecule is copied at any one time. The RNA thus produced in the nucleus is sometimes called *messenger RNA*, since it carries a copy of the information into the cytoplasm to the ribosomes, on the surface of which it lines itself up like a punched tape. Another kind of RNA found in the cytoplasm and called *transfer RNA*, hooks up with the appropriate amino acids floating freely in the cytoplasm. Like postmen who match the address on a letter to just one house number along a row of houses, each transfer RNA positions a specific amino acid opposite a given base on the messenger RNA template.

The amino acids get snapped together in a chain at the same time that the transfer RNSs are 'unhooked' from the atomic coupling that has allowed them to tow the amino acids in position. The transfer RNAs now return to the cytoplasm, free again to link up with amino acids and to repeat the process of transport on to RNA messenger ribbons located on the same or other ribosomes.

It has been found that each transfer RNA is about 77 bases (or

nucleotides) long. It consists of a double helix with suitable 'hooks' for amino—acid attachment at one end. At the other end of the helix, the transfer RNA attaches to the messenger RNA template via a three-base group complementary to the triplet on the messenger ribbon. The net effect is that animo acids become positioned into a particular sequence determined by the sequence set up on the messenger RNA by the DNA in the nucleus. Thus all proteins can be said to be formed in accordance with directions carried on the DNA master macromolecule.

For much of the time the biggest part of the mass of the information in the living animal, contained in the DNA programme store, cannot be got at—that is, it is blocked. DNA's double spiral is not only twisted very tightly but is shut off from the outside by special protein molecules called *histones*. These inhibiting substances, or *repressors*, free only small sectors at any one time in accordance with the needs of the organism, (hatching from egg; ecdysis; development from imaginal buds; formation of pupal skin.) In these zones the cords become untwisted and extrude *puffs* (visible under a microscope) from which information can be copied and transferred by means of messenger RNA production.

Thus DNA is the perfect archive, storing every item of information needed at any one time (and probably many items never used). It also serves as a timetable for translating information into action. This is the only way in which we can explain how larvae know when to shed their skin, to hatch (especially when the eggs hibernate), when to pupate, etc.

But it is not enough to think of living processes in terms of information flowing in one direction only—from the nucleus outwards. DNA and its repressors must also be able to receive information. It is certain that feedback mechanisms operate between environmental influences and the releasing or inhibiting of the information they provoke. Here then is the explanation of seasonal changes, behaviour patterns, protective camouflage, warning colouration, mimicry. These were the mutations most successful in protecting the organism during that particular time (seasonal changes), or during that particular stage (difference in skins of the same caterpillar in different instars), against predators (eye-spots and the hairs in certain lycaenids' hind-wings).

Mimicry too can be explained in this way. The model is distasteful, and thus has warning coloration. But the mimics, through mutation, found that similar coloration produced a very good defense, even though they are 'good for eating'. The DNA with that specific colour arrangement is thus able to reproduce.

Evolution is still taking place, I note many instances, reported in the AES Bulletins, and the EEG Bulletin, of larvae that were different from their normal brothers. This is just another experiment on Nature's

part, to 'see' if the new mutation is better or worse than the 'old model'.

Thus every living organism is, in a manner of speaking, evolution's latest prototype, best adapted to conditions then prevailing. Sometimes one particular DNA combination produces the best design for that particular environment. The shark for instance hasn't changed for millions of years. Why? simply because it is the best design there can be, no mutations can out-survive it.

Bioplasma and metamorphosis

When the caterpillar sheds its final skin and becomes a pupa, great changes take place inside to enable the caterpillar to form the adult butterfly. The digestive organs, nerve ganglia, and vital organs are only slightly altered, but the rest of the caterpillar, which is usually accumulated food material from its larval stage is dissolved into a fluid from which the wings, hair, proboscis, etc. will emerge.

These develop from small groups of cells—known as imaginal buds. These cells start to divide (DNA at work!) and small groups of cells accumulate and gradually assume adult characteristics. It is this role which the insects' bioplasma serves—but first a word about this term which I doubt many readers will be familiar with.

In 1939 the electrician Semyon Kirlian was called to a University laboratory to repair an instrument used in electro-therapy. He noticed that when a patient received treatment with the machine, there was a tiny flash of light between the electrodes. He tried to take photographs with this light and discovered that it was possible to do this without a camera by inserting a plate directly between the high-frequency spark and his hand. On being developed, the photographic plate produced a glowing image of his outstretched fingers. Other living objects also made pictures studded with dots and flares, but with inert objects there was no image at all. Kirlian built his own machine to generate high-frequency electrical fields with an oscillation of two hundred thousand sparks per second between two electrodes. He also designed an optical viewer (now the subject of fourteen Soviet patents) to make it possible to watch the process directly without films or emulsion.

Every living thing placed in the high-frequency discharge produces these patterns. A whole hand can look like the Milky way, sparkling and twinkling against a glowing background of gold and blue. A freshly picked leaf shines with an internal light that streams throughout its pores in beams that gradually flick out one by one as it dies. Similar plants produce similar images, but they are drastically changed when one of the leaves is diseased. Similar changes are evident for humans, the mood and health of the person being reflected on the plate. Kirlian says, "In living things, we see the signals of the inner state of the organism reflected in the brightness, dimness and colour of the flares.

The inner life activities of the human hieroglyphs. We've created an apparatus to write the hieroglyphs, but to read them we're going to need help."

For twenty-five years Kirlian and his wife battled to perfect their apparatus. A constant stream of visitors came to see the results. All went away impressed, and the bibliography on the Kirlian process grew to massive proportions, but nothing happened until 1964, when suddenly the doors of 'orthodox' science opened to them. They were set up in their own laboratory with the latest equipment, and research projects began on Kirlian-designed machines in a dozen other centres. Revolutionary discoveries abound.

Occult beliefs say that there is an 'astral' body identical to our own physical bodies. The Kirlian effect shows that they may be right. In Moscow a Kirlian machine has been used to take pictures of an intact leaf, then a third of the leaf is cut away and then further pictures taken. For a short while after part of the leaf has been removed, an image of that part persists as a "ghost", making up a complete sparkling outline of the original whole leaf.

This suggests that there is some sort of energy matrix in all living things and that it has a shape like that of the organism but relatively independent of it. Incredible? Maybe, but in Russia they're taking it very seriously. At the Kirov State University, in Alma-Ata a group of biophysicists and biochemists are trying to study this energy body with the aid of an electron microscope. They claim that it is "some sort of elementary plasma-like constellation made of ionized particles. It is not a chaotic system, but a whole unified organism in itself." They call it "Bioglogical Plasma body".

A plasma is a gas that has been so completely ionized that all the electrons have been stripped off the nuclei of its atoms. This occurs in a thermonuclear reaction when the temperature is raised to three hundred million degrees celsius (°C) and the gas particles accelerate to speeds great enough to produce fusion. But there is no evidence that anything like this can happen at body temperature. This does not mean that it is impossible; it just means that this whole branch of physics is so new that no-one exactly knows what a plasma is or what it can really do. One interesting fact that *is* known is that the only thing that will contain its energy effectively is a magnetic field—and all living things possess one to a certain degree!

Your may be asking—thanks for the interesting facts but how does metamorphosis fit into this? Be patient, all this leads up to it.

Since this 'Bioplasma' exists only beside living things, it is therefore produced by them. And what is the key to everything that lives?—the DNA macromolecule. And what organizational function does this serve in butterflies? (He's got to the butterflies at last, they'll be saying right now).

To answer that we must look at the sponge (not the bathroom type!) The sponges mainly are complex loosely organized animals. The cells in their bodies have different functions. There are the collar cells which live in cavities and wave whips to create the currents of water that flow through the animal's pores to bring it food and oxygen; there are sex cells, which produce eggs and sperm; there are cells which build supporting skeletons of such superb geodetic design that they served as inspiration for aircraft designers. Some sponges grow to several feet in diameter, and yet, if you cut them up and squeeze the pieces through a silk cloth to separate every cell from its neighbour, this gruel soon gets together and reorganizes itself — and the complete sponge reappears like a phoenix out of the gruel to get back into business again. A persistent plasma body would provide a perfect template for such ultra-complex regeneration.

Although no Kirlian studies have been made on metamorphosis, it is highly possible that the role of the bioplasma body in metamorphosis is as follows. In the first stage, that of the egg, the bioplasma changes with the structure of the developing caterpillar inside the eggs, and during succesive instars. But during the last instar, I suspect that the DNA, using its amazing timetable for stages of development changes the bioplasma structure of the caterpillar into that of a pupa just before hatching,—a bioplasmic structure independent of the caterpillar—yet different because of the crucial stage of the final instar. The internal pupal skin probably forms to the bioplasmic template, then after pupation the new types of cells, scales of insects, etc, formed by the imaginal buds, all are organized *inside* the pupa within these invisible guidelines.

Incredible? Certainly! And further research using revolutionary new methods may as yet amaze us, for science never sleeps. And the tranquil backwaters of entomology may yet be shaken by some as yet unimaginable discovery, again and again, as we learn about the powers that shape the humble Cabbage white to the most exotic birdwing.

C. J. Aquilina (5732 J)

REFERENCES

Goodden, R. C. (1971). *Butterflies,* Hamlyn, London.
Munck, E. (1974). *The New Biology,* Collins, London.
Watson, L. (1973). *Supernature,* Hodder & Staughton, London.

INSECTS AND IVY

Late Summer and early Autumn usually herald the end of the "active" entomological year; most larvae are reared to pupation or are ready for hibernation, flowers have largely disappeared and with them the nectar-seeking insects such as buterflies and bees and most AES

members are I suppose eagerly awaiting the exhibition to conclude the entomological year before settling down for the Winter, rearranging collections, setting papered insects, or sorting photographs.

In this perhaps lax period there are still a few plants worth investigating and principal amongst them is ivy, *Hedera helix* L. At the time of the year the ivy comes into bloom, its flowers, green and rather insignificant, borne in little rounded clusters about the size of a golf ball (comprising about 30 flowers), the clusters being supported often singly, on a flowering branch the leaves of which are pointed but lacking the five-lobed shape that typifies ivy.

It has long been known that the flowers are very attractive to some insects (Grigson), mainly wasps (Hymenoptera, Vespidae) and hoverflies (Diptera, Syrphidae). The attraction probably lies in a sweet substance secreted over the surface of the flowers; it is certainly so in the case of the wasps.

In my garden, which lies close to Epping Forest (Essex), there is a wall which for about 10 years has had ivy growing on it and this year (1977) it has flowered rather spectacularly, the mass of bloom attracting the attention of between four and five hundred insects (at a conservative estimate) over an area of about three square yards, mostly as already stated wasps and hoverflies.

In the case of the wasps late summer sees the production of males and females (queens) in the nests; the fertile females will overwinter to produce next year's nests, the males they have mated with soon die, whilst the myriads of workers (often many hundreds in one nest) which have tended the larvae leave the nest at this time of the year and fly around until they are cut down by the Autumn frosts. Thus they become "pests" at this time, feeding from fermenting fruits and becoming troublesome when they invade kitchens in their quest for sweet substances such as jam and marmalade and often drowning in orange squash bottles that have inadvertently been left open.

On this particular ivy the wasps accounted for about half the total number of insects seen and were all the common wasp, *Vespula vulgaris* L., whose short tongue seems well suited to gathering the sweet substances from the ivy flowers.

I watched the buzz of activity for about an hour on the 18th September, a warm clear sunny afternoon, and during that time I noted two of the wasps, probably from nests still rearing larvae, attack (1) a bluebottle, *Calliphora* sp. and (2) a hoverfly, *Eristalis tenax* L.; in the first instance the wasp flew down from the ivy with its victim and on reaching the ground proceeded to sting it, probably between the weaker sclerite joints on the under side of the thorax and at the same time further immobilised the struggling fly by biting its left wing off—having thus precluded any possibility of escape the wasp bit the fly's head off and then flew off with it presumably to the nest.

In the second case another wasp had caught the hoverfly and was again flying down to the ground but its track was halted by the web of a garden spider. The spider came out of hiding as soon as it felt the web vibrate but perhaps on finding that one of the instigators was a rather large and active insect it did not bother to attempt a capture and went back into hiding; the wasp thus escaped but left the hoverfly entangled in the web, perhaps it had been partially immobilised by the wasp and unable to escape, though the spider still did not tackle this easy prey.

It is interesting to note that 3 or 4 spiders had made their webs, on the ivy bush, more than on, say, holly bush of comparable size, perhaps evolution has favoured species that make their webs on a plant which attracts so much easily available prey.

With the two wasps mentioned I feel that it was this abundance of prey that attracted them, rather than the sweet secretion as in the case of the workers released from duty, because while workers are rearing larvae they very rarely visit flowers, they obtain their sugar requirements from a substance secreted by the larvae they are rearing and which is over and above the larval requirements.

I also noted that the pubescence of the wasps was liberally sprinkled with pollen, thus indicating that they are probably important pollinators of this plant.

The vast numbers of Diptera feeding on the flowers included some interesting species mainly Syrphidae, but also noted were members of the Calliphoridae, and a few greenbottles *Lucilia caesar* L.

Of the Syrphidae the largest proportion was the very variable *Eristalis tenax* L. (the adult of the rat-tailed maggot) this is understandable as it is a species which hibernates as an adult and they are probably one of the last flies to be seen in the year being recorded in Essex on 24th December (Payne). These hoverflies were feeding not only from the sweet substance but also more commonly on pollen, feeding being somewhat facilitated by a pad-like labellum. I also noted that when feeding the *E. tenax* would hold and manipulate the anthers with the first pair of legs.

A single specimen of the common Pellucid hoverfly *Volucella pellucens* L. was noted, though this is understandable as it is generally a summer species and one that is instantly recognised by its unmistakeable opaque white and black abdomen.

Perhaps most interesting of all were four *Volucella zonaria,* Poda Britain's largest and most striking hoverfly (see Fig. 1). This species was first recorded in the county of Essex in 1950, though even up to 1974 its breeding status was not known (Payne) however last year I saw it relatively commonly feeding (maximum nine specimens) from creeping thistle *Cirsium arvense* L. at a locality less than two miles from where I live, and now seeing these four feeding in my garden

possibly indicate that it is breeding, though one should not preclude migration from the continent where this species undoubtedly originates.

V. zonaria, along with a few other hoverflies has larvae which scavenge in the nests of social Hymenoptera. *V. zonaria* larvae have been found scavenging in the nests of wasps and less often those of the hornet *Vespa crabo* L. The *V. zonaria* I regard as quite an entomological find.

Other hoverflies seen included the common *Syrphus ribesii* and *Episyrphus balteatus,* De Geer; the former a species whose larvae rather usefully predate aphids (Hemiptera, Aphididae) but much commoner than these species was *Myiatropa florea* L., not normally a garden species and perhaps rather late in the year to find it in such numbers. Two other unidentified hoverflies were noted.

Other insects attracted to the flowers included about a dozen ladybirds *Cocinella-7-Punctata* L., a single bee *Bombus agrorum* Fabr. was observed among the hundreds of other insects, collecting pollen, evidenced by the large pollen masses on the hind tibiae, though it did inspect the surface of a few flowers with its tongue.

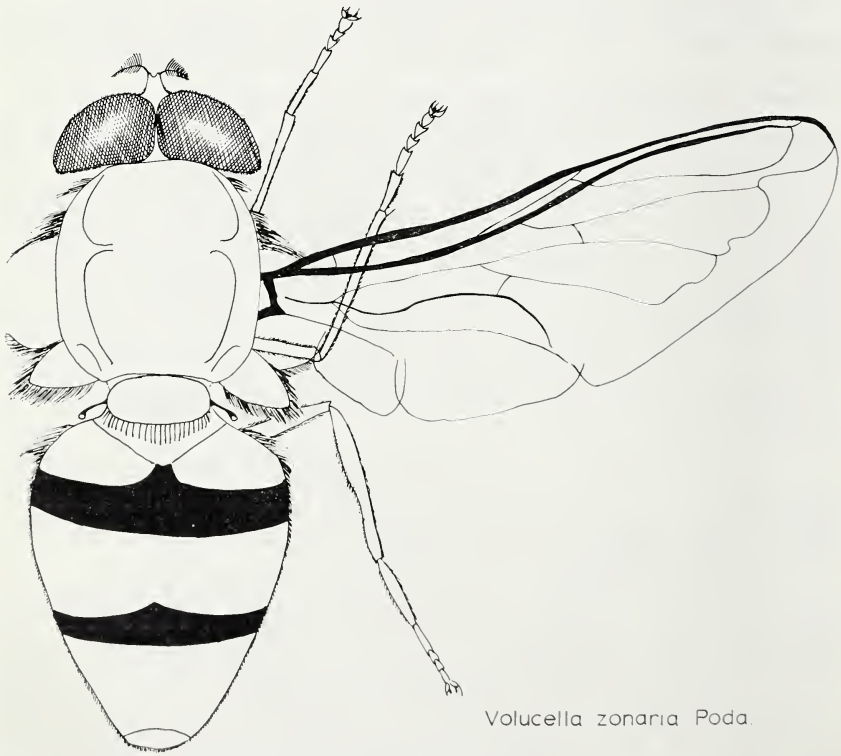

Fig. 1. *Volucella zonaria,* Poda. (×5¼) M. Hanson del.

A single yellow underwing moth *Noctua pronuba* L. was seen resting on the foliage but otherwise there was apparently little attraction to the moths; finally two Hymenoptera of the sub-order Apocrita were noted; unfortunately their full indentification was not possible.

Thus ivy can provide some interesting observations and quite often some unusual specimens at a time of year when the insects are generally becoming less abundant and thus filling a gap in the entomologist's year.

M. Hanson (4637)

REFERENCES

CHINERY, M. (1973). Guide to the Insects of British and Northern Europe. Collins, London.

GRIGSON, C. The Englishmans Flora.

PAYNE, A. (1974). Hoverflies in Essex. Essex Field Club. *33*.

SOME COMMENTS ON SEX-LIMITED INHERITANCE IN THE CLOUDED YELLOW BUTTERFLY

I was stimulated by Mr. K. Porter's account of "Genetics for Lepidoptera Breeding" (*AES Bulletin,* November 1976), but I feel that a few comments are necessary regarding his conclusions of the sex-limited expression of the Clouded Yellow butterfly (*Colias croceus/ crocea* Geoffroy).

There would appear to be some confusion between the terms sex-limited expression and sex-linked expression.

Characters which are associated in inheritance with sex are of two distinct types. Firstly, sex-limited inheritance, such as that found in *Colias,* and secondly sex-linked inheritance. Sex-linked inheritance can only be due to the gene concerned being located in the heterosomes.

In *Colias,* we appear to have one-sex polymorphism in the female. This produces unequal viability of the genotypes and a genetically determined habit difference (Remington 1954). The pale form of female is caused by an autosomal gene, which is ineffective in the male, even when homozygous (Hovanitz 1944). Because of the autosomal nature of this effect, we cannot regard it as sex-linkage. The gene does not have any expression, except in the presence of the female sex factors, hence the almost total absence of pale coloured males. The few recorded examples of light coloured males in *Colias* species represent a distinct and rare abnormality, not a polymorphism.

Perhaps I can end with a purely hypothetical problem which emphasizes to some extent the points I have been making. Part of my inspiration comes from a recent question in the Cambridge Colleges Examination:

Problem.

Two pale yellow butterflies, one male and one female, were observed in captivity. The yellow colour of one faded to pure white

4 days later and in the other case 14 days after the first faded.

The pair were mated and the offspring were 49% males and 51% females. Of these offspring, 24% had deep yellow wings, 51% had pale yellow wings and 25% had white wings. The number of each colour was divided equally among the males and females.

The colour of the wings in all the males faded between the 28th and 30th day after metamorphosis to the imago. The same phenomenon occurred in half the females, and the remainder retained their colour indefinitely.

What can be deducted from these results and what are the parental genotypes?

Answer.

Will be found in Notes and Observations section of Bulletin!

John Winchester (3863)

REFERENCES

REMINGTON, C. L. (1954). The genetics of *Colias*. Advanc. Genet., 6, 403-50.

HOVANITZ, W. (1944). The distribution of gene frequencies in wild populations of *Colias*. Genetics, 29, 31-60.

BOOK REVIEWS

THE BUTTERFLIES OF NORTH AMERICA, by William H. Howe pp XIII 633; 97 cold plates. Crown quarto. Doubleday and Co. New York 1975. Price $39.95 (£25.00).

It is threequarters of a century since W. J. Holland first produced his famous Butterfly Book which subsequently ran to edition after edition. This book in its turn should last at least until the mid twenty-first century. It is of the same large format as its predecessor and about twice the length. Unlike it however it is a compilation; the coordinated effort of some twenty already known American Entomologists. Quite substantial sections are by the Editor himself. All the illustrations are from the brush of William Howe. How long it has taken him to produce well over two thousand such illustrations we know not, but the patience and skill put into them is self-evident and in most of the plates the background toning has been adjusted to clarify the wing margin outline and general colour of the butterflies shown. Taken as a whole, they are not only excellent in conception and design but also well printed.

The placing of the appropriate captions verso with the plates on the righthand page also leads to ready clarity.

The book opens with a substantial introduction dealing with general classification, biology, collecting techniques, and similar matters. This has clearly been written with modern ideas and research to hand. The book concludes with a useful glossary, bibliography and extensive index.

In between is the solid meat treating of the butterflies family by family. The typographical layout in the use of bold italic and for new sub-species bold capitals, is consistent and the reading matter under each species easy to follow. Basically we have opening remarks on the genus followed by a brief description of each species in it. For such a widespread area as the United States there are of course numerous subspecies to be mentioned as well. After the species (or subspecies) description are brief notes on the early stages and distribution. With the exception of the introductory chapter no attempt has been made to illustrate any of the early stages. On the whole the amount of information given of the early stages reflects the interest (or lack of it) in the author of that particular chapter.

As might be expected in a multi-author book the treatment is a bit uneven. For instance *Colias, Phoebis,* and *Eurema* have been treated to the tri-nomial system, as advocated by Michener but the majority of genera are not so treated. Some, but not all, authors have added vernacular names. We think it is a pity that far more of these have not been included, even though in some cases it would have been necessary to have added several! or even invented some.

There are no keys and neither are the separation of difficult and closely allied species adequate. But this is not the point. This is not and neither does it pretend to be, definitive taxonomic work. It is a textbook for the general collector and as such it fulfils its purpose admirably. Not only is it well illustrated but all the essential facts are distilled into a readable form.

The book is well bound, American style, in a two-tone cloth cover and has delightful endpapers. To all American Lepidopterists it is a must and will be of inestimable value to all with an interest in, or desire for information on, North American butterflies.

BOCG.

FREDERICK WILLIAM FROHAWK, A MEMOIR, by his daughter Valezina Bolingbroke. pp. 16 E. W. Classey Ltd. Faringdon, 1977. Price £1.00.

Anecdotes and biographical facts about famous Entomologists are always welcome, what a pity it is that this one is so short. It is really a summary of random recollections by his daughter, and for the money, has been very poorly produced. One of the advantages of printing as developed by Guttenberg and Caxton in the fifteenth century, was the absolute alignment of both margins of the print on a page. Why has this simple procedure been abandoned by the mad rush of "modern" technology! Quite frankly a good typist could have done better than the slovenly mess we have here on the right-hand margin. The three photographs reproduced would have benefitted enormously in clarity if they had been printed on a gloss paper. The colour reproduction being on

the thick paper cover is likely to be spoilt and is very similar to Frohawks natural history drawings for schools.

This little item would, I am sure, have been welcomed by the Editors of any of our entomological periodicals where it would have been better produced and, from past track records, been subsequently available as a reprint for a fraction of its present high cost.

M.J.C.

NOTES AND OBSERVATIONS

MILKWEED BUTTERFLIES in HERTS.—Subsequent to giving a talk on moths to the Chesham and District Natural History Society on July 11th last, I was informed by a boy who had been in the audience that his father had seen a group of no less than six *Danaus plexippus* L. (Milkweed butterfly) on Berkhamsted golf course, apparently some time the previous July. Being somewhat overwhelmed by enquiries from all quarters, and in a hurry to get away, I did not unfortunately obtain further details or note the informant's name and address, but if the latter happens to be an AES member and recognises himself from my reference (I gained the impression he came from the High Wycombe area or went to school there) I feel sure the Bulletin's editor would like to know more of the circumstances of the sighting. Perhaps indeed there were other members in the area who saw the butterflies. Anyway, I thought the observation worthy of record.—Anthony Wootton (3331)

ANSWER TO COLIAS PROBLEM.—Put here for the benefit of those who wished to work out the answer for themselves!—See preceeding article.

The gene for fading (F) is dominant to persistance of colour (f). They are carried on the X chromosome and are therefore sex-linked. The female heterosomes are XY and the male XX. Colour (A) is an autosomal gene, which exhibits incomplete dominance: the heterozygous condition ($\frac{A}{a}$) produces pale yellow. The parental genotypes are therefore:

$\frac{A}{a}$ X Y for the female and $\frac{A}{a}$ X X for the male.
F f

SWALLOWTAIL DISAPPOINTED—On Sunday 11th, at Golden Bay, Malta, I observed a Swallowtail *Papilio machaon* L. in a somewhat futile search for food. When I first saw it, it was bumping against the gaily coloured swimsuit of a female tourist. Then, disappointed, it went over to an elderly female tourist who was sleeping on a deck chair. She was likewise wearing a gaily-coloured swimsuit with a floral design.

After some undecided fluttering above the unsuspecting host, it settled down and with a quivering, almost flapping motion of its wings tried to refresh itself. It was too far away to see if its proboscis was actually uncurled, but I am sure that it was trying to feed from the swimsuit. I have noticed identical flapping of the wings with feeding Swallowtails, but I have never seen this with resting Swallowtails. This Summer was a very dry one, and there was a scarcity of water. I also failed to notice any flowers during a walk around the vicinity in search for plants. This lack of nourishment almost certainly forced our friend to try his luck with the gaily-coloured swimsuit!—C. J. Aquilina (5732 J)

ANDORRA AN ENTOMOLOGICAL PARADISE—Our member Dr. Patrick Roche reports that not only is the Principality of Andorra relatively unworked, entomologically speaking, but that it has a very rich and interesting insect fauna. In an area only the size of the Isle of Wight, Dr. Roche has succeeded in discovering at least one third of the entire European butterflies. Very little has as yet been published about it and there is, as yet, no local Society or even Museum. Dr. Roche is hoping to correct this state of affairs and he would be most willing to meet and help all entomologists who would like to visit the area. He would also be grateful of any Andorran records that members might already have. Your Editor's son, who stayed there a couple of summers ago, reports that it is a delightful country with marvellous scenery and some good hills to climb. He also found it very cheap compared to France or Spain! Dr. Roche hopes that members visiting Andorra will regard themselves as part of a team working for a complete survey of Andorran insects and is very happy to act as general "Recorder". Meanwhile he will be very pleased to hear from intending visitors and give what help he can with administration problems. His address is "Casa Nuri Jordana, 303a, Sant Julià de Lòria, Principality of Andorra".

SPURGE HAWK IN MIDDLESEX—I took a schoolboy, Garry Bean, to the 1976 AES exhibition and this whetted his interest in insects and he has been operating an M.V. trap in his garden this summer. On the evening of the 20th August, before the trap was in operation, and just at dusk he observed a large moth hovering in the garden and was able to net it. It was a perfect female Spurge Hawk, *Celerio euphorbiae* L. This is a most unusual capture and may be the first record for this county, the garden being in Feltham near to the large disused marshalling yard which is rich in insect and plant life.—P. W. Cribb (2270)

MIGRATION OF PAINTED LADY—On the morning of the 31st August, 1977 I was out early at about 7 a.m. walking over part of

Hounslow Heath, Middlesex. The grass was still thick with dew. As I walked I disturbed several Painted Ladies, *Vanessa cardui* L., which were resting on open areas of ground bare of grass. The number and distribution of them indicated that they were part of a migration resting for the night. Later the same day I visited the same area and saw none and assume that they had moved on.—P. W. Cribb (2270)

VAST MIGRATION OF HOVER FLIES—On the 11th and 12th of August I was on the Downs in Sussex at the new nature reserve at Ditchling Beacon. During the daytime I observed a continuous stream of small Hover Flies flying across the Beacon coming from the south (the sea). The stream was wide as a visit to Wilmington Down on the 13th was met with a similar invasion. One could see several hundred insects in the air at a time, often like a swarm of bees. On my return home to Middlesex at the end of the week I found hundreds of the same species on my Buddleia and Garden mint flowers. I do not know whether the migration continued northwards as those in my garden were about for several days. The species involved were small *Syrphus* sp., the greater part being *Sphaerophorira scripta* L.—P. W. Cribb (2270)

MORE PUBLIC REACTION—While on holiday this year we were appalled to read in a morning paper a letter from Lord Selkirk which was a good indication of the ignorance of the general public, at all levels, over insects. Upon identifying a *Vespa crabro* L., he had located the nest and an obliging, but equally ignorant neighbour "kindly" came and destroyed it! Later, back from holiday, we heard on Television of the destruction of fifteen or so further nests in East Anglia. Credit to the Beebe, they then brought on their Resident Naturalist, Ted Ellis, who gave an explicit and very well-reasoned account of the innocuousness of the Hornet, especially in relation to its relatives the wasps! Hornets are not common insects in this country, two drought years appear to have suited them and it is not so many years ago that doubts were being expressed about their survival. It is nice to know they have been on the increase, for of course they also do a lot of 'good' to the general public in other ways—Brian O. C. Gardiner (225)

LIME HAWK VARIETY—In the last week I have had several Lime hawks (*Mimas tiliae* L.) emerge. The last one of these was a female whose colouration was rather peculiar. The clothing hairs on the thorax and body were a light green. The wings were of creamy colour with dark brown islets of colour on the fore wings and a border of brown on the trailing edges of the hind wings. This specimen was bred from eggs which were given to me by a member of the EEG. The other moths which emerged were of normal hue.—M. Shakespeare (5939J)

CROSSWORD SOLUTION—Here is the solution to our November issue crossword puzzle: *Across:* 7. Ichneumonidae, 8. Thrip, 10. Oil, 11. Elm, 12. Iso, 13. Nepid, 14. Louse, 16. Urania, 17. Gall, 19. Arge, 20. Urodela, 21. Nits, 23, Neo, 24. Asilid. *Down:* 1. Cicindelinae, 2. Chitinous, 3. Neuroptera, 4. Entomophagous, 5. Adelid, 6. Cercopid, 7. Pediculus, 15. Kite, 17. Gene, 18. Sand, 22. Io.

A RARE FIND IN STAFFORDSHIRE—While doing survey work for the British Butterfly Conservation Society, on Rough Close Common, Staffs, on a very hot afternoon, June 24, 1976, I was watching Large skippers — (*Ochlodes venata* L.) darting about and Small heaths (*Coenonympha pamphilus* L.), when I saw a strange looking butterfly flying with them, very dark in colour. It looked like a day flying moth, then it settled on the ground and I put my hat over it, put it in a jar. When I got it home I saw it was a Small Copper, but very dark. I looked it up in South's Butterflies of the British Isles and it looked like *Lycacna phlaeas* var *Schmidtii*! I put it in the killing jar. Then I sent it to Mr. R. G. Warren, a well known Staffordshire Entomologist who is working on an Atlas of the Staffordshire Lepidoptera. After a few days Mr. Warren informed me that it was indeed var *Schmidtii* and further that this was only the third ever captured, the other two being between 1890 and 1920. These are now lost trace of. He congratulated me on my capture, which is now in his collection. I hope other members in Staffordshire keep an eye open in case it turns up again, and if so let me know or any other variation of it.—Jan Koryszko (6089)

The WHITE-LETTER HAIRSTREAK (STRYMONIDIA W-ALBUM) —It would be most interesting to hear from members who have experience of the above species, regarding the following points:—

(1) Elm disease. My somewhat limited examples suggest that the species deserts the chosen tree immediately the disease symptoms begin to appear, even if the greater part of the foliage seems healthy.

(2) Three west country sites with good colonies in 1976 have suffered a catastrophic drop in numbers for 1977. Is this experience wide spread? Why, one wonders, do these fluctuations occur when, for example, the Purple hairstreak on adjacent sites is enjoying a second year of abundance.

(3) The Swallowtail and the Black hairstreak are notorious for their moods of activity, seeming to sit tight on some apparently ideal days. I gain the impression that *W-album* is similarly disposed. Do members agree?

(4) As a warning to the casual observer who records hairstreak activity high up on a wych-elm as a colony of *W-album*, such a tree was found to be attracting many purple hairstreaks in preference to the

nearby oaks. Life can be confusing, for in 1976, hairstreaks on a midland oaktree turned out to be Black hairstreaks!

I would appreciate hearing from members on the above points and in due course a summary of any views and experiences gratefully received, will be published.—A. Archer-Lock (5787), 4 Glenwood Road, Mannamead, Plymouth, Devon, PL3 5NH.

DESULTORY INSECT OBSERVATIONS IN BUCKINGHAMSHIRE, 1977—I am not a particularly assiduous recorder, but the following records extracted from my diary in recent months may be of interest to readers.

March 7: Large ichneumon-fly with white centred antennae (presumed to be *Perispudus fascialis*) hybernating beneath an old tree root in former orchard. *May 2:* Asparagus beetle (*Crioceris asparagi* L.) on the wall of my upstairs flat at Stone, on warm sunny afternoon. *June 21:* Fine female Cinnabar moth (*Callimorpha jacobaeae* L.) on steps leading up to my flat in early evening: not attracted to light. *June 25: Malachius bipustulatus* L. beetle on grass seed-head amind dense grassy vegetation by a hedge at Stone. (Does any reader know of any research that has been done on the nature of the brilliant scarlet bladders this beetle extrudes, by the way?). *June 26:* Forewings of at least two female Ghost moths (*Hepialus humuli* L.), presumably discarded by bats, on stairs leading up to my flat. *July 4:* Green Lacewing (*Chrysopa* sp.), just emerged from the pupa (8 p.m.) beneath eaves of roof of stairs to flat. *July 20:* Female Buff-tip moth (*Phalera bucephala* L.) on pavement between road and hedge with fields beyond. *July 28:* First-instar larva of Grey dagger moth (*Apatele psi* L.) on species of cherry in Aylesbury Vale Park. Many nymphal *Deraecoris ruber* L. bugs in association with greenfly on nettles near to Grand Union Canal in Aylesbury. *July 30:* Species of black and yellow banded Mason-wasp (presumably *Odynerus* sp.) near door of flat and later indoors. *August 10:* Blackfly (*Aphis fabae* Scop.) concentrated along leaf veins of my broad beans, as well as on stems. Many *Syrphus ribesii* (hover-fly) probing the surfaces of the leaves. *August 11:* Fine female *Meconema thalassinum* De Geer (Oak Bush-cricket) on underside of sycamore leaf at edge of woodland in Stone (noted while waiting for a bus!). *Scaeva pyrastri* L. (hover-fly) settled on hand whilst near window in reference section of Aylesbury County Library!—Anthony Wootton (3331)

RABBITS AND THE LARGE BLUE—The July issue of the journal of the Fauna Preservation Society, Oryx, reports on the latest findings of Dr. Jeremy Thomas at the Institute of Terrestrial Ecology. Dr Thomas has been studying the decline of the Large Blue buterfly. *Maculinea arion* which is now protected under the Conservation of wild Creatures and Wild Plants Act 1975. He attributes the decline mainly to the

disease myxomatosis which severely depleted the rabbit populations. The link is a small brown ant *Myrmica sabuletti,* which carries the butterfly's larva from its birthplace, the thyme flower, and allows it to feed on ant grubs, hybernate and pupate. But the ant only occurs on arid slopes where the grass is shorter than three centimetres. If the grass is higher, two other species of small brown ant take over. It was originally thought that the thyme flower was the essential ingredient of the butterfly's life cycle and no attention was paid to the grass height. This raises a historical question—is the Large Blue an exotic species, which only appeared after the introduction of the rabbit by the Normans? Or did deer keep the grass short in prehistoric England? (From *habitat,* Vol. 13, No. 8).

THE COMMUNITY NATURE CENTRE—We have received a further publication by the National Audubon Society of America, describing the idea of a Nature Centre and how it can be created. The Audubon Society own and manage six nature centres, which serve as models for communities everywhere. The booklet describes the concept of a nature centre as designed to create an awareness of the 'ties that bind' people to the natural world. It is well illustrated with black and white photographs and is available from the Council for Nature at £1.30 including postage.

SORBY MAPPING SCHEMES—The journal of the Sorby Natural History Society, the Sorby Record contains results of two mapping schemes—mammals and dragonflies. Twenty three mammals have been recorded and there is a distribution map and explanatory note for each. The survey includes many interesting observations, for example half the hedgehogs that were recorded were road casualties, showing just how much effect the motor car is having on the population. Studies of the brown and mountain hares show that the latter is on the increase and actually taking over the brown hare in some places. The survey also records the presence of a breeding colony of Bennett's Wallaby in the Peak District.

The dragonfly survey notes where each species has occurred with the aim of providing a foundation for future fieldwork. The common habitat of each is recorded. Other surveys are to be published in the next few years. The next issue of the Sorby Record will contain surveys of amphibians and butterflies. Copies of The Sorby Record are available from the Editor, David Whitely and should be of particular interest to those coming to the 1978 Natural History Societies meeting to be hosted by the Sorby Natural History Society. The price is 60p plus 12p postage and the address is 'Glis' 730 Eccleshall Road, Sheffield S11 8TB. The journal is No. 14, 1976 and also contains articles on the Crossbill population of Wyming Brook, the Camberwell Beauty in Sheffield and the woodlice of Rotherham. (From Habitat, Vol. 3, No. 8).

DESICCATION OF WOODLOUSE—On July 27, 1977, I found two dead, dry woodlice (*Porcellio scaber* Latreille), one near the door to my upstairs flat, the other on the carpet of my front room. Each was found to be full of tiny white young (dead of course) on being broken open. Obviously the adults had died through lack of moisture, but why had they climbed up to my flat and not sought refuge deep in the soil or beneath litter? Perhaps other readers have made similar observations of woodlouse desiccation?—Anthony Wootton (3331)

A SECOND STRING
Orthoptera and Dictyoptera

INTRODUCTION

Until recently our thirty-three species of native or long naturalised crickets, grasshoppers and cockroaches could not have been called popular insects. Before the technique of freeze-drying had been devised they almost invariably made poor specimens for the show-piece cabinet. They generally faded and all to soon shrivelled into brownish mummies. For this reason Orthoptera did not figure much in popular books or papers on insects and except in the works of Burr and Lucas were usually dismissed with a few almost standardised passages, more or less repeated from one account to another. Until the middle of this century the interests of youthful entomologists were nearly always lured away early by the many, if not always accurate, books on Lepidoptera, into a whole-hearted enthusiasm for moths and butterflies.

The tragically early death of E. J. Clarke may well have deprived potential Orthopterists of the immediate post-war, pre-television, do-it-yourself era, of a second Lucas to arouse interest in these neglected insects—just at a time when there was still much old pasture, marsh or waste land extant as result of the pre-war agricultural depression and wartime neglect. Had there been even a handful of dedicated field recorders working on grasshoppers in the late 1940's it is certain that a far better picture of the true distribution of Orthoptera in Britain could have been obtained that can be possible today when so much suitable natural or semi-natural habitat has been ploughed-up, drained, afforested or built over. Today the fragmentation of suitable habitats has resulted in some enigmatical distribution patterns.

However, since the early 1950's there has undoubtedly been a marked increase in the study of Orthoptera and Dictyoptera by both professional and amateur workers. Perhaps one of the most important factors in stimulating the new interest was the camera. During the 1950's the single lens reflex camera became part of the normal equipment of field naturalists and it was soon obvious that bush-crickets and grasshoppers provided good sport for colour photographers. Then, in the autumn of 1965 came what might be regarded as the "break-through",—Warne

published D. R. Ragge's *Grasshoppers, Crickets and Cockroaches of the British Isles* in their excellent Wayside and Woodland series. Furthermore the book was supplemented with a long-playing record which dealt adequately with the "calls" (stridulation) of most native species capable of audible stridulation. The present-day enthusiast has thus very reliable reference data available.

At research level, 1954 saw the publication of studies on the biology and population dynamics of British Grasshoppers by O. W. Richards and N. Waloff in Vol. 7 Anti-Locust Bulletin. In the early 1970's V. K. Brown's work on cockroaches and J. C. Hartley's and A. C. Warne's on egg development of Western European bush-crickets opened up a

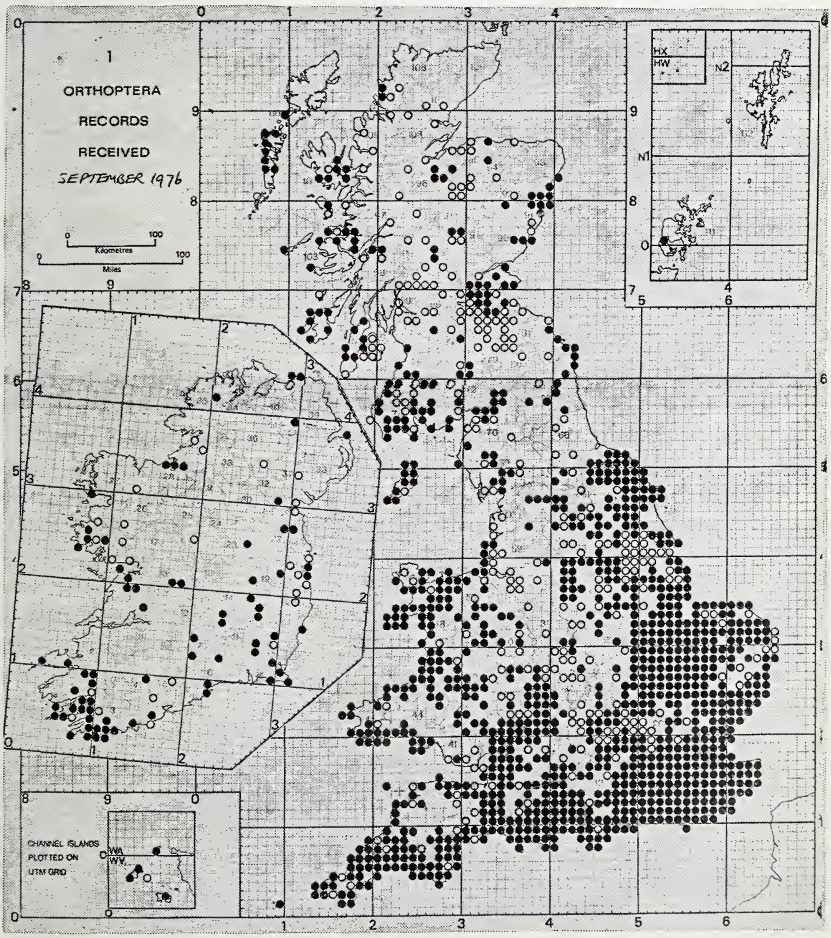

Fig. 1. Map showing Orthoptera records received. Open circles pre-1960; black circles up to 1976.

new concept of the life cycles of our native examples of these groups. Today quite a number of post-graduate studies appear to be underway so that by the end of the decade these orders are likely to prove a well studied group.

In 1971 the Biological Records Centre of what is now The Institute of Terrestrial Ecology at Monks Wood, Huntingdon, started a national 10km. square mapping scheme for Orthoptera and Dictyoptera. Prior to the launching of the scheme several County-based lists of orthoptera had already been published. In fact many original lists were produced for the Victoria County Histories (and these unfortunately are still sometimes used as if applicable today). Most of the pre 1970 County-based records were collected by D. K. McE. Kevan and published in a series of papers between 1952 and 1961, but a far more interesting picture of distributions has already emerged from the above-mentioned 10 km. survey, monitored by M. J. Skelton from Monk's Wood until 1976. By this time there were records covering nearly one thousand squares. (See Map 1 for coverage to September 1976). The survey is now monitored by E. C. M. Hoes from 5 Grinstead Avenue, Lancing, Sussex.

It is in this particular field of recording of distribution that the amateur entomologist can be of inestimable help. Many records to date comprise nothing more than chance finds of one or two species. Only a handful of recorders have as yet undertaken thorough investigations. The chances of making important discoveries about Orthoptera distribution in under-worked squares are still very great indeed. Many unworked or under-worked 10 km. squares are to be found (south to north) in West Cornwall, North Devon, West Midland, The Pennines, central Wales, most of Ireland, the Lake District, South-east Scotland and almost the entire Highland zone of Scotland. It is true that only perhaps three or four species exist in the most favoured of squares in the Highland zone, but a list of say four species of orthopterons from a well surveyed square in Sutherland would be of equivalent interest to a square south of the Thames with twelve to fifteen species. Almost completely unworked areas of potentially exceptional interest, may, we think, be anticipated in West Cornwall, North Devon, The Burren of Galway and the vicinity of Morcambe Bay in Lancashire/Cumbria.

In the field nearly all our Orthoptera and Dictoyoptera are comparatively easily located and with a little practice identified, especially those with distinctive "songs", which to the experienced ear are immediately diagnostic. Most grasshoppers and their kind occur in colonies—thus the discovery of one or two specimens is often sufficient for an acceptable record. Strays and accidentals are rare.

As our native species are sedentary and easily located and studied they might also be used to reveal details about habitats that are suitable for many other types of organisms: in short they may prove to be ideal

indicator species. It does seem therefore a good time to ask readers to offer their services to the mapping of native orthoptera. Being easily identified in the field and of considerable aesthetic appeal they should make a useful and engaging second string particularly for Lepidopterists, who are the most likely group of entomologists to be inclined to cover less worked areas in detail and to have some spare time during daylight hours.

RECOGNITION IN THE FIELD

(a) *Reference. Grasshoppers, Crickets and Cockroaches of the British Isles* by D. R. Ragge (1965) in Warne's Wayside and Woodland series is preferable to *The Oxford Book of Insects* (1968) pub. by Oxford University Press as the Orthoptera and Dictyoptera illustrations there are a little misleading in the writer's opinion.

(b) *Size.* Mere statement of length is not too helpful—relative body-bulk is an important field in both adult and nymphal stages. It is easier to categorise into three size groups Large, Medium and Small. Thus: Large—Adults well over 2.5 cm. in length and clearly out-sized amongst the usual run of native insects. Nymph always conspicuously bulky—for example, even the first instar Great-green and Wart-biter bush-cricket nymphs are "bluebottle" sized. In the Medium and Small categories early nymphal stages are what might be referred to as ant-sized and adults 1.2-2.5 cm.—Medium less than 1.2 cm.—Small.

(c) *Identification.* Except for Great green, Wart-biter, Speckled bush-cricket and Mole-cricket which are unmistakable at all stages, use only adults for positive records in the field.

(d) *Separation of the families.* (i) Bush-crickets: long-antenna, highly articulated, *rounded* bodies and four tarsal segments to each foot. Females have blade-like ovipositors.

(ii) Grasshoppers: These with the bush-crickets are the two groups most likely to be seen in the field without special search and grasshoppers can be identified by their rounded but less obviously articulated bodies, obviously shorter and rather thicker antennae. They have three tarsal segments. Ovipositors not immediately obvious.

(iii) True Crickets: Long antenna as Bush-crickets but bodies *flattened* like cockroaches. Females have needle-like ovipositors. There are only three tarsal segments.

(iv) Ground-hoppers: Essentially resemble grasshoppers but are all small. Also adult in Spring when grasshoppers are still unhatched or tiny nymphs. A fundamentally distinct feature of groundhoppers, important when they are adult or in advanced nymphal stage in autumn before hibernation is the thoracic shield which extends from the thorax back over the body to cover the abdomen. From above it looks like a Norman shield except that it has a prominent ridge running lengthwise down the centre.

(v) Cockroaches: Flattened like crickets but the third pair of legs are not obviously thickened as in the other families—nevertheless cockroaches can leap as well as scuttle.

(vi) Stridulation: Scalip crickets, the cockroaches and groundhoppers do not stridulate. Our other crickets, bush-crickets all stridulate in some way, and in those marked * the stridulation of the adult male is an important field point.

(e) *Maturity.* Bush-crickets and Grasshoppers mature in Britain from about mid-June and may be found in the adult stage until well into autumn or even early winter, depending upon species and season. The Wood cricket follows this pattern, although its life cycle is different. Field and Mole crickets mature in early summer although the latter may survive through the following summer and winter as an adult. Groundhoppers mature in late summer and hibernate as final instar nymphs and in either case are mature in spring and early summer. Our native cockroaches are mature from about late May and persist until late summer. House cricket (in the cosy comfort of rubbish-tips or buildings) has two maturity peaks when the males chirp—in late summer and again around Christmas time.

(f) *Life cycles.* Outside the scope of these notes but to simplify the situation all our species except the Mole-cricket are "annuals" completing their nymphal and adult stages within a year but whereas the Grasshoppers, the Cone-heads and the Grey bush-cricket hatch from eggs which were laid in the previous year, most, if not all, of the other bush-crickets have a prolonged cycle. These hatch in Spring or early summer from eggs that have remained dormant through the entire preceeding year. These eggs were laid in the autumn before; thus eggs of say Dark bush-cricket laid in September 1974 would produce nymphs in May 1976. The tiny lesser cockroach has a similar annual cycle to that of grasshoppers but the other two native species have two year cycles like that of the Wood Cricket, so that both half grown nymphs (and occasionally senile adults) of one generation hibernate at the time the next, but not descendant generation is passing the winter in the egg stage. Groundhoppers, field and mole crickets hibernate as well developed nymphs and the latter also as adults about to enter a second year.

(g) *Adult colouration.* Much variation, especially in Grasshoppers.

(i) Overall light brown to black: Ground-hoppers, Cockroaches, Crickets, Mole cricket, grey, dark, bog and Roesel's bush-crickets and less common form of long-wing cone-head; and very rare form of short-winged cone-head, wart-biter bush-cricket; rufous and heath grasshopper and a proportion of most populations of meadow, stripe-winged, lesser marsh, and large marsh grasshoppers and a high proportion of populations of mottled and common field grasshoppers.

(ii) Green and brown: A very high proportion of bog and long-winged

cone-head bush-crickets and all great green and almost all short-winged cone-head and wart-biter bush-crickets and a proportion of populations of stripe-winged, meadow and lesser mottled grasshoppers.

(iii) Overall green: Oak and speckled bush-crickets and proportions of populations of common green, meadow and lesser marsh and very rarely field grasshoppers.

(iv) Purple or crimson: Occasional striking looking specimens of female large marsh, common green and refous grasshoppers and both sexes but mainly females of stripe-winged, field, meadow and mottled grasshoppers.

Note. Field and mottled grasshoppers are so varied that hardly any two individuals bear identical markings, but field grasshoppers with green legs and abdomen (but brown tegminae) are noteworthy varieties.

(h) *Wings.* The speckled and dark-crickets and females of common dusky and lesser cockroaches appear to be virtually wingless at first glance. The females of meadow grasshopper and both sexes of Roesel's and bog bush-crickets and short-winged cone-head bush-cricket appear to be "half-winged" at first glance; while the male meadow grasshoppers, wood crickets and gravid, egg-filled females of all grasshoppers species have short looking wings with the abdomen extending well beyond. The common ground-hopper is wingless but the thoracic shield hides the fact. All our flightless grasshoppers and bush-crickets produce occasional fully-winged free flying individuals which look quite different from typical specimens.

THE BUSH CRICKETS (TETTIGONIIDAE

1. Oak Bush-cricket

(Meconema thalassinum) (De Geer)

General Distribution (post 1960): England and Wales. North to Yorks (Ribston Park, Knaresborough) but very local north of Cotswolds and Cambs.

Where Common: S. Devon; New Forest; sandstone country in Weald; downland woods and plantations in S.E.; more locally common Cotswolds and Cambridgeshire.

Habitats: Broad-leaved wood or scrub, especially oak, but also limes, willows, elms, sycamore etc. Also older thickets and rough unkept hedges. Reed beds where associated with sallow scrub.

Recognition in Field: Medium. A beautiful and fragile looking insect suggesting a large green lacewing. Anal cerci curve inwards to touch at tips in male. In daytime usually flat against underside of leaf and may be dislodged by sharp beating but holds on tenaciously. At night flutters into lighted windows and comes to light traps: This is consequently a very obvious species for lepidopterists working light traps. It does not have a readily detectable stridulation and many records of the oak bush-cricket are of specimens attracted to light.

Anticipated New Recent Records: Ireland: there are old records from Kerry etc.; comprehensive light trapping there might well produce up to date records. Cumbria: as for Ireland. Scotland: less likely but reasonable to anticipate there may be small colonies, for example in the Oak wood habitats around Loch Lomond or in the entomologically rich Spey Valley district.

2. Great Green Bush-cricket
(Tettigonia viridissima L.)

Present General Distribution: England north to Cotswolds, Hunts and Norfolk. Wales: Gower and Pembroke coast only. Very local inland in England.

Where common: South coast of Cornwall (including Scillies), Devon; Dorset; Isle of Wight and Kent, especially around Dover. Also large inland colony by main (Great Northern) railway line in Hunts. The insect is exceptionally common in parts of the Isle of Wight and in and around Ventnor seems to be of almost Southern European abundance.

Habitats: Rough vegetation (scrub; coarse grass, nettles; thistles (or reeds) even in exposed, but always very sunny and warm localities over dry or marshy ground.

Recognition in Field: Large. Despite its size and imposing appearance this very big leaf-green and brown-cricket is secretive and easily overlooked, but the loud and far-crying stridulation of the male is unmistakable and at night, to those who have not lost the ability to hear high pitched sounds, really impressive, especially around such towns as Dover, Wareham and Ventnor. Eyes are *green* at all stages of development.

Anticipated New Records: As the stridulation of the males readily reveals the presence of even small colonies—where there may only be a few adults, it seems unlikely that this species has been recently overlooked in its old known haunts on the Cumbrian coast or in the warm Melbourne area of Derbyshire, where more intensive market gardening has doubtless destroyed the colonies. Likewise fen reclamation has undoubtedly destroyed most of its East Anglian habitat. In any case it still has strong colonies in most districts where it has long been known and the chances of finding it in completely new localities are small, unless it occurs in Ireland. Its presence in the Scilly Isles suggests that it was a comparatively early arrival here after the glaciers retreated so that it is not unreasonable to suppose it also reached Ireland.

3. Wart-biter Bush-cricket
(Decticus verrucivorus (L.))

General Distribution: Isolated colonies now known from Kent, Sussex, Dorset and Wiltshire.

Where Common: Very locally in the Wiltshire and one of the E.

Sussex colonies. Otherwise the known colonies are small and seem to produce only a few adults each year, or even, perhaps each alternate year, since thanks to the researches of J. C. Hartley and A. C. Warne it is now clear that the eggs of this and most of our other Tettigoniids require two winters before hatching.

Habitats: Coarse downland turf, especially tussocks of coarse grass such as Tor-grass (*Brachypodium pinnatum* (L.)) in Kent, Sussex and Wiltshire and heathland in Dorset and (if still present) the New Forest.

Recognition in the Field: This comparatively thick-set, brown-spotted bush-cricket has a distinctly frog-like appearance but its excellent camouflage and its capacity to leap for dense ground-cover at the slightest vibration makes it very difficult to locate. In addition the clicking stridulation of the males is not as loud as the size of the insect suggests and is easily missed by the untrained ear, being distinctly directional and readily lost in the general song of grasshoppers and the rustle of the wind in the coarse vegetation it inhabits. Eyes are *brown* at all stages of development. Note that young nymphs of both Great green and Wart-biter often provide best means of locating colonies as they are readily "walked up" from cover in June (unlike the adults later in summer).

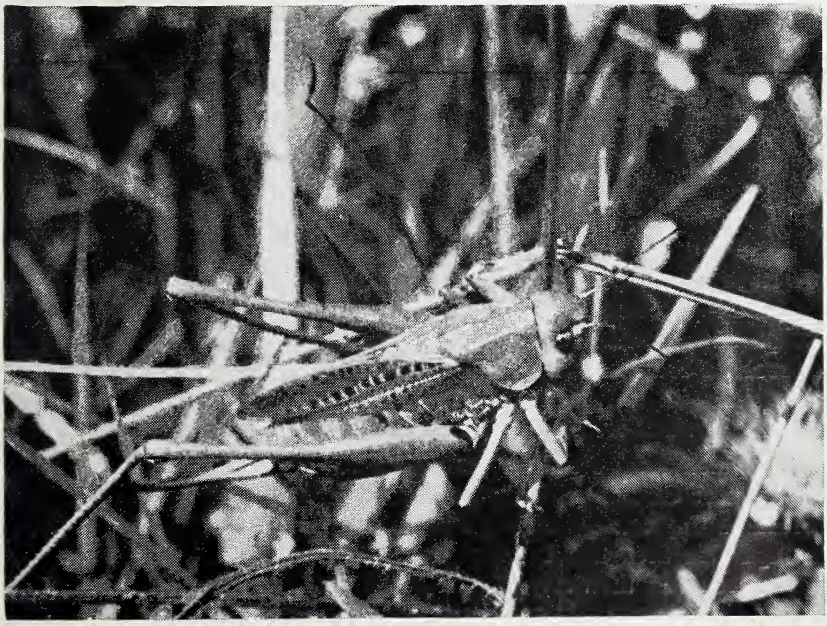

Fig. 2. Female Wart-biter Bush-cricket: Sussex downland locality (Photo by E. C. M. Haes).

Anticipated New Records: (a) On heathland—as it is difficult to locate, there seems no reason to suppose the Wart-biter has become extinct in the New Forest area. There must still be many pockets of suitable habitat here; the last record was a single specimen, found at the end of the last century. The old Goodwin's Croft site has been searched extensively, but as the insect was last seen there in the beginning of the nineteenth century the chance of rediscovery is small. Elsewhere, such as in the valley of the Ober Water, the chances still seem to be good enough to justify special search. (b) On downland—likewise the apportunity for discovering new colonies seems fairly good. There seems no reason why it should not be refound in the Ventnor area of the Isle of Wight where it was discovered in 1951 by Col. F. C. Fraser and indeed on any hot, sun-trapping coomb of the southern chalklands, since the Wiltshire colony found by J. L. Mason in 1971 is over 100 km. from any previously known colony and virtually at the far end of the chalk "massive". Salisbury Plain is now an obvious locality in which to anticipate the species. Farther west the climate is probably too moist for the species.

4. Grey Bush-cricket
(Platycleis albopunctata falcata (Zett.) syn. *P. denticulata* (Panz))

Present General Distribution: Strictly littoral. Along the Channel coast from Bryher in the Scillies to the dunes by the Sandwich golf links, but scarcely any distance inland except to Lydd at Dungeness. Also a few isolated colonies on North coasts of Cornwall and Devon as well as in Steepholm and on Gower, Pembroke and Llewyn peninsulas on Welsh coast.

Where common: In many of its South coast colonies.

Habitat: Coarse grass or scrub on sand dunes, shingle ridges or south facing cliffs. Not in salt-marsh.

Recognition in Field: Medium sized. When adult from above looks like an all-brown half-sized wart-biter, but its more colourful nymphs with prominent white margins and the sides of the pronotum could be misrecorded for the much more local Roesel's bush-cricket, especially in the penultimate instars. Grey bush-cricket is the only native species to fly readily. The scratchy stridulation is faint and easily missed.

Anticipated New Records: Could be re-found on Essex coast (old site was near Clacton) and could well occur on warm dune areas around Morcambe Bay and possibly on south facing cliffs on Galloway coast, although this area has been quite well investigated recently. As the species occurs in the Scilly Isles it could well have been in the vicinity of the British Isles early enough to have reached south or west Ireland before Ireland became separated and might reasonably be anticipated on the Kerry coast or the Wicklow and dunes.

5. Roesel's Bush-cricket
(Metroptera roeselii (Hagenbach))

Present General Distribution: Rather remarkable; widespread around and inland from the Thames estuary with isolated colonies on the North Downs and to well within boundaries of London (Dartford marshes and Laurel Farm, Totteridge). The species then turns up in quite isolated coastal colonies far from this obvious centre of distribution: Spurn Head (Yorks); Needs Ore Point (Hants); the Dovey Estuary in mid Wales and very recently (1976) in Cork Harbour—the only current record of a bush-cricket in Ireland.

Where Common: Parts of Thames estuary, for example, Isle of Sheppy; also common at Needs Ore Point but except for an introduced colony near Lymington apparently absent from the rest of the south coast of England.

Habitat: Rough grass or reed beds often by brackish water. A characteristic insect of wasteland and derelict pasture.

Recognition in Field: Medium sized. Normally wings abbreviated, although there is a very rare macropterous form. The entire edge of the pronotum has a white margin and most importantly there are two small yellowish patches on the sides of the abdomen above the hind legs. Basically the colour is chocolate brown. The stridulation requires sharp ears as it is high pitched, but very distinctive: G. R. Else has likened it to the continuous crackle of an electrical discharge.

Anticipated New Records: The recent findings of the species by the Dovey Estuary in Wales and Cork Harbour in Ireland means that Roesel's Bush-cricket should be worth searching for in rough grassland by any less built-up estuaries around the Devonian peninsula and up both sides of the Irish Sea at least as far north as Morecambe Bay on the Solway. Because of climate it is less probable it will be found north of the Humber on the East Coast of England; on the other hand further downland—or even some Cotswold localities might be expected.

6. Bog Bush-cricket
(M. brachyptera (L.))

Present General Distribution: Widespread in heathy areas south of the Thames but surprisingly absent from Kent, where its obvious niche on Hothfield Common near Ashford, is filled by the Short-winged Conehead (see 9). North of the Thames it is very local but there are good colonies near Norwich, York and on the southern edge of the Lake District as well as in Shropshire and Wales.

Where Common: Common in most of its major colonies, for although the insect is totally absent in Britain from non-heathy localities it may occur in abundance within them. It is exceptionally numerous and widespread in the New Forest, Berkshire, Surrey, E. Devon, and

Dorset, and also numerous in its two surviving localities in Yorkshire.

Habitat: Acid heathland—especially where wet and boggy. Also in heathy woodland as along the sandstone hills across the Weald from Blackdown to Leith Hill as well as in the Tamar Valley along the Devon, Cornwall border. It does not appear to occur on cooler, high altitude moorland, despite what Professor W. H. Pearsall implies in his book "Mountains and Moorlands" (Collins 1950) and is thus absent from the moorland bogs of Bodmin and Dartmoor, the Pennines and the North Yorkshire Moors.

Recognition in Field: Usually present in such numbers it is almost certain to be flushed when its pale green tummy contrasts sharply with the chocolate brown, or brown and dark green "upperworks". Wings even more abbreviated than in last species but a rare macropterous, free-flying form does occur. The two colour forms occur in about equal numbers. Stridulation a faint but urgent scratching or pattering sound rather like a slightly speeded up version of that of Grey Bush-cricket (4).

Anticipated New Records: There are many places in Cornwall and North Devon where the insect is very likely to be found. It may also be anticipated in its old colonies in the north such as Wan Fell in what is now Cumbria while there is much suitable looking territory for it around Carlisle. It is not unreasonable to hope that it may also be found in really warm low-level boggy localities in Scotland and perhaps even Ireland.

7. Dark Bush-cricket
(Pholidoptera griseoaptera (De Geer))

General Distribution: Probably by far the most numerous although not the most widespread of native Bush-crickets, this species is a familiar insect over much of southern England but becomes scarce north of Herefordshire and East Anglia. There are scattered colonies known in North Wales and isolated colonies in the Isle of Man and on the Galloway coast. On the East Coast the colony near Robin Hood's Bay has not been re-found despite recent search.

Where Common: In many localities in E. Anglia, the West Midlands and Cotswolds and especially widespread and common south of the Thames and in the Devonian Peninsula (except on high ground).

Habitats: Rough vegetation, preferably in moist localities. An ideal site is an unkempt hedge or bramble thicket by a damp ditch. "Devon lanes" also provide good habitat, but the dark bush-cricket is not normally an inhabitant of really marshy country or open heathland where the short-winged cone-head and bog bush-cricket are respectively the characteristic representatives of the family.

Recognition in Field: Medium. The "Chipping" chorus of the males, especially after dark is the most obvious give-away of the insects' presence as the wingless, rather spidery-looking adults are secretive although the females may often be disturbed in long grass around the thickets where the males are chirping. Although they are bright canary yellow on the underside, when adult both sexes are otherwise of slightly varying shades of dark brown. The ant-sized, nearly black pale-backed, first to third instar nymphs are much more often seen in early summer than the adults in late summer. Adults may linger as late as November or even the first week in December in mild areas.

Anticipated New Records: Further colonies may be anticipated in S.W. Scotland and it would be reasonable to expect the species to occur in sheltered sites around Morecambe Bay. There are no recent records from Cumbria. There are also very few records from (Orthoptera-wise) unexplored N. Devon or the far West of Cornwall. It should be widespread in these districts.

8. Long-winged Cone-head
(Conocephalus discolor (Thunberg))

General Distribution: Very restricted; from the vicinity of Lulworth Cove in Dorset east to Windover Hill and Friston Forest near Eastbourne in Sussex. There are these distinct centres of distribution: Dorset coast; Isle of Wight— where it was first recorded in Britain and is still locally common on the Duver at St. Helens and in an extended zone, now broken up by town development, from The Solent to the Seven Sisters with pockets on or even across the Downs at Botley Wood (Hants) and Amberley Mount (Sussex). There are about twenty known colonies.

Where Common: There are many small colonies and a few really large ones and numbers seem to fluctuate annually, but the species is usually common at Chapman's Pool in Dorset; The Duver, St. Helens, Isle of Wight; Waste land around Portsmouth; one part of Arundel Park, and in the Lullington area near Eastbourne. Two very large colonies at Pagham and Telscombe Cliffs in Sussex have been virtually destroyed by building since 1975.

Habitat: Rough, ungrazed grass and low scrub in really hot, sheltered localities, sometimes close to tidal water, but also on dry south facing downland coombs and in larger, sunny plantation rides (Botley Wood and Friston Forest). Occasionally in taller streamside vegetation, the normal habitat of the next species, but certainly not restricted to moist habitats.

Recognition in Field: Medium. Fragile-looking, very active green insects with (as adults) dull brown full length wings and excessively long antennae. Ovipositors of advanced nymphs and adults almost straight.

A small proportion of nymphs and adults in most colonies are overall dull-brown (dying grass colour) and there is also usually a small proportion of extra-macropterous adults, at least in larger colonies, which fly readily. This insect slips through coarse grass without much disturbance—unlike grasshoppers which jump heavily, and is thus easily overlooked but the green nymphs with their bold black backs are usually more easily detected; however it is impossible in the field to separate the nymphs of our two cone-heads. Stridulation is a faint, crackling buzz—diagnostic once learned, but not easy to pick up.

Anticipated New Records: This comparatively large and distinctive insect remained unrecognised as British until 1936, and its widespread presence in Sussex was undetected until 1946. It may well, in consequence have been completely overlooked elsewhere and may thus be anticipated in other hot dry places, perhaps as far inland as Wiltshire, in view of the recent discovery of the certainly equally warmth-demanding wart-biter there. It should also be re-found in its old sites in the Isle of Wight although the Blackgang Chine area is perhaps now too commercialised to be really worth a search. It has been reported from Open Pits on Dungeness and it would be most satisfactory if it could be re-found there in its only known Kentish station. Unused plots in otherwise built-up areas are, incidentally worth searching as the species is able to persist even when there is only half an acre or so of rough vegetation.

9. Short-winged Cone-head
Conocephalus dorsalis (Latreille))

General Distribution: England and Wales, locally numerous north to Anglesey and the Humber. Widespread on or near coast and inland in association with many river systems.

Where Common: In most of its coastal colonies including the two most northern just mentioned, generally less numerous at inland sites, but on the whole, where the species occurs it occurs in good numbers.

Habitat: (a) Coastal—in the sea couch-grass (*Agropyron pungens*) zone of salt marshes, or in coarse vegetation on stable coastal dunes. Not on cliffs except in association with its characteristic inland habitat. (b) Reed beds and associated tussocky swamp vegetation by ponds or along uncleared river banks. Never far from waterside vegetation, unlike the last species.

Recognition in Field: Medium. Very similar in general appearance and behaviour to the last species but fore-wings much shorter than abdomen and of a bright almost chestnut brown. Ovipositer markedly upcurved. In the field the nymphs of our two cone-heads are practically identical. In the last few years quite large numbers of var. *burrii* with fully devel-

oped fore and hind wings have been found in the larger colonies. These may be distinguished quite easily from *C. discolor* by the bright not dull brown of the fore wings and in the females by the upcurve not almost straight ovipositor. These long-winged, short-winged cone-heads fly readily. Stridulation a faint *rising* and *falling* buzz, but the sound is easily missed.

Anticipated New Records: There is a fascinating article by J. C. Hartley and A. C. Warne in the *Entomologist's Gazette,* Vol. 26: 127-132, in which the authors report how they found that the eggs of *C. dorsalis* can withstand immersion in salt water for days and thus may reach our shores from the Continent, so that the species may be anticipated on our coasts as far west as S. E. Ireland. In view of the recent discovery in Ireland of Roesel's bush-cricket, which may perhaps be transported in the same way, it would certainly seem well worth a special search for this species around the south and east coast of Ireland. Inland in England and Wales, many new colonies in marshy localities have been found in the last ten years, suggesting that the species is usually overlooked unless a special survey is made. It should be anticipated in W. Cornwall and N. Devon as well as Ireland, where it yet remains unrecorded. It may also reasonably be expected to turn up along the Lancashire and Cumbrian Coast where wet dune slacks and esturine dyke systems are numerous and visually suitable.

10. Speckled Bush-cricket
(Leptophyes punctatissima (Bosc))

General Distibution: This familiar insect seems to be the most widespread of our native bush-crickets and the one most often reported by the "layman" because of its frequency in older, shrubby gardens. It is known from many parts of England and Wales; S.W. Scotland and isolated places in Ireland, although not recorded recently from that country.

Where Common: Nowhere does this fairly inactive wingless insect appear in great numbers as do, for example, the *Metrioptera* and *Conocephalus* species, but it is certainly very frequent in parts of southern England.

Habitat: Rough, especially scrubby vegetation, particularly on Wood Sage (*Teucrium scorodonium*), Honeysuckle (*Lonicera periclymenum*) and brambles (*Rubus* spp.) as well as other coarse growing perennials or deciduous shrubs, but very rarely in grass or high up on trees and certainly absent from short turf and open heathland.

Recognition in Field: Medium. Unmistakable even as a young nymph, when incidentally it is probably most easily seen (May-June). The black speckling is especially noticeable on the nymphs. As a wingless adult this bush-cricket has an uncanny way of disappearing against its background; even though on the upper side of a leaf, it takes a sharp eye

to focus on the static insect. The broad ovipositor is unlike that of any other native species. It is active mainly at night when those with good hearing may discern the slightly slurred "click" at several second intervals of the males, but the stridulation is so faint as to be of negligible value as a field guide.

Anticipated New Records: This species could turn up almost anywhere. Its occasional appearance in isolated places, as for example on the Isle of Man and possibly in Ireland, where only isolated specimens seem to have been recorded may be because the insect has been carried —probably in the egg stage, on garden shrubs distributed from the big shrub specialist nurseries in Surrey, Berkshire or Hampshire, where the species is certainly plentiful. While on the subject of possible new localities for the speckled bush-cricket it seems also worth speculating, as have previous writers, on the status of its close but fully winged relative, *Phaneroptera falcata* (Poda) in Britain, Ragge (1965) was certainly not prepared to accept that the two or possibly three specimens found in the wild here justified its inclusion as a British insect, although Burr (1936) suggested otherwise. It is odd that no other specimens have come to light and the only two certain ones were from near Sennan Cove at the extreme tip of Cornwall, at the end of the last century. It was around this period too that several unexpected butterflies were found in odd parts of the Country and one wonders if these insects were simply the result of deliberate attempts to introduce new species—a trait in vogue in natural history circles at that time: One only has to think of the successfully introduced Little owl or Grey squirrel as examples.

E. C. M. Haes (5849)

to be continued

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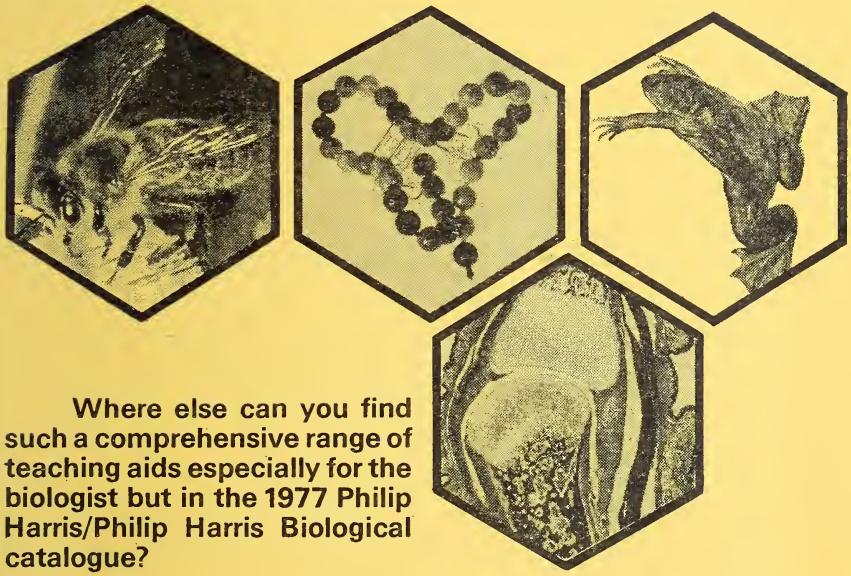

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AES BULLETIN No. 139

EDITORIAL

Spring should now be more than with us and the Entomological season well under way. Longer articles for the Bulletin are coming in well, but your editor would still like to receive interesting short notes, particularly of migrants, rarities and new locality records. Any photograph illustrating some unusual aspect of entomology would also be welcome. There is no need for illustrations to be confined to longer articles. If of sufficient interest a caption only may well be sufficient. A good quality 10 x 8 gloss print is preferred but good black and white prints can be made by our printer from colour transparencies provided they are of good colour balance.

ADMISSION FEE TO EXHIBITION

For this years exhibition, to be held at Wembley, your Council have decided, strongly supported by the results of the recent questionnaire on the subject, to charge an admission fee to all attending with the exception of those who are exhibiting. The admission charge will be 20p.

MAYFLY

To the sun their insect wings unfold,
Waft on the breeze, or sink in clouds of gold;
Transparent forms too fine for mortal sight,
Their fluid bodies half dissolved in light.

Arabella Buckley

ANNUAL EXHIBITION, 1st OCTOBER, 1977

We were fortunate to hold our Exhibition, for the second year, at the University College School, Hampstead, London The fine setting, excellent facilities and especially the whole-hearted co-operation of Mr. John Hubbard, a Senior member of the School Staff, combined to ensure a memorable occasion. When reviewing our first visit in 1976, it was appreciated that a few changes were desirable and our Organiser, Mr. B. Skinner, is to be congratulated on effecting the necessary improvements.

Exhibits were most interesting, and varied. Obviously many of the authors had undertaken a great deal of preparatory work but these were mainly the 'Faithful Few' who regularly support us. A Society with over 1400 Members, many of whom were present, should be able to stage more than 45 Exhibits. Small personal items would be very welcome but there were very few of them.

The success of the Exhibition over the years has brought in its train, the problem of overcrowding. We have outgrown all the post-war venues and the numerous requests for larger premises, are reasonable. The trouble is that large halls are scarce and very expensive. On an experimental basis, the Council has negotiated for the hire of the Wembley Conference Centre for our 1978 Exhibition. Members, Dealers and Visitors will be able to judge the new accommodation and it is hoped that they will inform the Council as to whether they think that the AES Annual Exhibition fits into these modern and sophisticated surroundings.

It was pleasant to hear the favourable comments on the success and smooth running of what is our main social occasion and this was due largely to the enthusiasm of a relatively small band of workers. The Council thank the Organiser, Bernard Skinner, General Factotum, Peter Cribb, Signwriter, Eric Bradford, Enquiries, Stephen Cribb, Publications, David Keen, Exhibits Control, Colin Hart, and all the other unnamed helpers. For many years, the Catering Service has been a feature of the 'Day' and 1977 was no exception. We are all indebted to Joan Hilliard and her splendid team of ladies helped, in keeping with the times, by several gentlemen.

The positioning and recording of exhibits has presented some difficulties in the past and a new system was tried this year. On arriving, Exhibitors were handed a slip showing their allotted space and asked to return to the Marshall, a concise summary of their entry. The following summary has been compiled from the slips including the fine projects of Robin James and John Walters who were awarded the Junior prizes.

AES CONSERVATION GROUP. 'Conservation in Action'. Example of field activities, (meetings and task work), emphasising the amateur's

role in the practical protection of habitats. Contributors were E. S. Bradford (3068), P. W. Cribb (2270), C. Hart (3845) and D. Lonsdale (4137).

AES EXOTIC INSECTS GROUP. A major display showing the scope of this large Group. It included set and living specimens of exotic Silkmoths ranging from the smallest species to the giant Atlas silkmoth with a wing span up to nine inches: Also mantids and spiders. Many of the species were being bred in this Country and surplus stock was available.

A special feature was the cine film showing the life history of several species.

ALLEN, A. A. DR. (5788) Detailed notes and examples of the two major superfamilies of the Parasitic Hymenoptera, Ichneumonoidea and Chalcidoidea. Of particular interest were the diagrams illustrating the differences in venation between the Chalcids, Braconids and Ichneumonids and the life histories of typical species.

BATTEN, A. K. (5094) Insects of various orders, mainly Coleoptera, collected in Morocco in 1977.

BETTS, B. H. (5918) Set and living scorpions including *Enscorpus italicus*, which has established itself in an English locality.

BRETHERTON, R. F. (4320) Representative species of Rhopalocera from the French Massif Centrale, 6/15 July, 1977 with 20 species taken in the same period in 1966, which was a much earlier season. Also the Large Chequered Skipper, *Carterocephalus morpheus* Pall., from the Forêts de Vierzon and Rambouillet, 16/17 July, 1977.

CRIBB, P. W. (2270) Some of the 110 species of butterflies noted on the AES Manned Expedition to the Massif Centrale of France from 6/15 July, 1977. A full report will be published in a future Bulletin.

Bred examples of ssp. *britannicus* and the Japanese ssp. *hippocrates* of the Swallowtail, *P. machaon* L. and the Large tortoiseshell, *N. polychloros* Kluk., from S. France. Ssp. *batavus* of the Large copper, *L. dispar* Ober., from Holland and series of Marsh, Heath and Glanville fritillaries, *E. aurinia* Scud., *M. cinxia* Fab. and *M. athalia* Fab., which have been continuously bred for many years.

DYSON, R. C. (91) A selection of Rhopalocera taken mainly in the Massif Centrale of France, 5/17 July, 1977. 45 typical species that occur in this habitat were shewn.

ELLINGTON, C. DR. An Electronic Insect which demonstrates the motions of insect wings, in flight.

ELSE, G. R. (3881) Local and rare Aculeate Hymenoptera collected in Hampshire, I.O.W. and Lancashire during 1977. Included were 12

species of Solitary wasps, and 6 species of Solitary bees. 10 species of local parasitic diptera from Hampshire and Wiltshire and a rare dipteron, *X. maculata* Meigen. associated with relict deciduous woodland.

EMMET, A. M., O.B.E. (1379) Microlepidoptera from the County of Essex collected for the preparation of a new County List to be published by the Essex Naturalists' Trust and the Essex Field Club. Included were 17 species new to the County and 21 which had not been taken for many years, some for not a century. Of special interest were, *Pubicalvaria piceaella* Kearfott, an accidentally introduced North American species and the fourth British example.

Two Nepticulidae from Kent, *Stigmella repentiella* Wolff, added to the British List in 1976 and *Stigmella aceris* Frey., the only British specimens apart from one bred from the New Forest in 1914 and misidentified.

FALK, S. (6031 J) Three paintings in gouache including *V. zonaria* Poda. and *V. inanis* L., two of the largest Hover flies occuring in Britain.
Ferry, R. S. (207) A selection of insects from Yugoslavia, Elba, Ibiza, Majorca, Paxos and Rhodes. Also Sardinian grasshoppers.

GARDINER, B. O. C. (225) Larvae of *Euplöe core* feeding on artificial diet with the chrysalis which is silver on diet instead of the normal gold. Live specimens of *Dipetalogaster maximus,* the world's largest bloodsucking bug and *Poekilocerus pictus,* an Indian grasshopper.

GARDINER, C. J. (5249) Invertebrates imported from Rajasthan, India with 'Anokhi' ladies' clothes. Attractive paintings on silk spun from the cocoons of the Atlas moth, *Attacus atlas* L.

GREY, M. (5971) Moths bred in 1977 including *Xylena vetusta* Hubn., Red Sword-grass and *T. luctuosa* Schiff. Four-spotted. Also a specimen of *Apamea exulis* ssp. *assimilis,* the Exile, taken at light.

HADLEY, M. (5315) and PARSONS, M. (5434). A selective exhibit of macrolepidoptera from the Château de Parson-Sens (Yonne), France, July 17th to August 20th, 1977. Also other insect orders noted during this period.

HARMAN, T. W. (5925) Local moths bred and taken in 1977 including the Scallop shell, *R. undulata* L., False Mocha, *C. porata* L. and the Festoon, *A. avellana* L. Also aberrations of some common butterflies and moths.

HEATH, G. L. (4409) A comprehensive collection of live Praying Mantids from various parts of the world.

HEATH, J. (3882) A survey of the distribution of the Goat moth, *C. cossus* L. The species appeared to be declining but more information was required.

HILLIARD, R. D. (99) Larvae of 9 common British moths obtained easily by tapping the branches of Oaks in the daytime, at the end of September.

Representative collection of British Pyralid moths, sub-families, Phycitinae, Endotrichinae, Pyralinae and Pyraustinae.

HODGE, P. J. (5335) Some rare and local coleoptera collected in South East England.

JAMES, R. J. (5005 J) The distribution of the Hairstreaks (genera *Callophrys, Thecla* and *Strymon*), in Worcestershire with notes and examples of the overwintering stages.

Series of tropical butterflies bred this year with notes on breeding and some livestock.

Specimens of the Colorado beetle, *L. decemlineata* Say. with notes and photographs.

Live specimens of Great Green Bush Cricket, *T. viridissima* L., the largest British species, with notes. *Awarded First Junior Prize.*

JEFFERY, C. W. (5041) A very dark form of the Silver spotted skipper, *H. comma* Fab. The upperside spots are reduced and the ground colour, dark brown, almost black. Taken in 1977.

McCLENAGHAN, A. P. (5645 J) A type collection of lepidoptera taken in Castlerock, N. Ireland, during the summer of 1977.

McCORMICK, T. A case of British lepidoptera showing the insects obtained and the skill in setting for the first year's collecting.

MESSENGER, J. S. 87 photographs of the genus *Erebia,* the Mountain ringlet butterfly, taken in the Massif Centrale of France in August, 1977. Numerous species occur in the hills and mountains of Central Europe where they are the dominant genus.

ORPIN, C. (5736) Canadian butterflies from S.W. Ontario collected by Ralph Holder from June 22nd to July 12th, 1977 and set and displayed by the Exhibitor.

PENNEY C. C. (3880) and McCORMICK, R. F. (3375). A selection of local moths caught and bred in 1977. These included Mathew's wainscot, *L. favicolor* Barr. Light crimson underwing, *C. promissa* Schiff. and Rosy wave, *S. emutaria* Hubn.

PICKLES, C. T., MRS. (5225) Some interesting larvae currently being bred. Of special interest were Ashworth's rustic, *X. ashworthii* Doubl., Wormwood shark, *C. absinthii* L., the Cupressus pug, *E. phoeniciata* Ramb. and the Festoon, *A. avellana* L. It appears that *E. phoeniciata,* a continental species, is now well established on the South Coast of Britain.

PLATTS, J. (4300) A selection of Noctuid moths bred from wild

larvae from the South West Coast of England. Notes on their natural foodplants and other details.

REVELS, R. (3942) The results of breeding aberrations of the Chalk-hill blue butterfly, *L. coridon* Poda. over 8 years. Some extreme forms of ab. *semisyngrapha* and ab. *fowleri* were shown, with two further aberrations.

Butterfly aberrations captured in 1977, *L. coridon,* (Chalk-hill blue) *C. tullia* ab. lanceolata, (Large heath), *A. adippe* Fab., High brown fritillary and *H. semele* Fab., Grayling. Results of breeding *H. semele* ab. holonops. The F1 generation were all types, but the aberration turned up in the F2 generation.

Colour photographs of several butterflly aberrations.

RIX, P. (5845) A survey of the moths of the unique Brecklands area of Eastern England with type species and notes. Resulting from the extensive planting of conifers and the road programme, local rarities such as Spotted sulphur, *E. trabealis* Scop., Viper's bugloss, *A. irregularis* Hufn. and Barberry carpet *P. berberata* Schiff. have almost died out. A small compensation is that Pine feeders, notably the Pine hawk-moth *H. pinastri* L., are now common. Many predominantly coastal species such as the Light feathered rustic *A. denticulatus* Haw. abound as do the Netted pug, *E. venosata* Fab. and other Campion feeders.

Some historic and recent local species and varieties of moths including four generations of the Portland ribbon wave, *S. degeneraria* Hubn. all bred in 1 year. Also extreme forms of the Gipsy, *L. dispar* L. due probably to inbred stock.

ST. IVO ENTOMOLOGY SOCIETY. A Comprehensive exhibition of livestock from many orders shown by Henry Berman and his very capable pupils. The special Junior Exhibit provided by Keith Miller, Steven Thomas, Graham Christie and Grahame Richards covered the classification of the Orthoptera and Phasmida with descriptions of selected species, morphology and life histories, large line drawings and photographs. Notes on breeding and handling techniques of Phasmida. Live specimens of Stick Insects and Cockroaches.

SKINNER, B. F. (2470) Series of moths, Ingrailed Clay *D. mendica orkneyénsis* Byrsynski-Salz, Barred red *E. fasciaria* L., green form and the Shuttle-shaped dart *A. puta* L., melanic, from special localities. Variable series of the Lesser yellow underwing *E. comes* Hubn., genus *Gortyna,* Rosy rustic *G. micacea* Esp. etc. and species of the genus *Hydraecia,* the Ear moths, which are best separated by their genitalia.

SMITH, M. (5866 J) 24 species of Bumble bees from Britain, Europe and America. Photographs, species list and preliminary distribution

maps for the British species. Solitary bees, *Apoidea* sp., Solitary wasps, *Pepsis* sp. from U.S.A. and Scolid wasps from Malta.

SOKOLOFF, P. A. (4456) A selection of cocoons and cases made by the larvae of lepidoptera, covering most of the major families. Examples range from the large cocoon of the female Emperor moth *S. pavonia* L. to the minute one of the Nepticulid *Stigmella suberivora* Stainton. Resultant moths were shewn. Aquatic bugs, including the Water spider, *Argyonet aquatica* and the predatory bugs, *Ranatra linearis* L. and *Nepa cinerea* L.

History of weevils, *Callosdruchus chinensis* infesting leguminous seeds.

Bed bugs, *Cimex lectularius,* L., from Croydon, Surrey.

STUBBS, A. Diptera recording scheme. Aim is to establish the distribution in Britain of the 5000 plus resident species of the True Flies. Specialists in this Order are needed for many areas.

TOUBE, D. (5940) Living mantids from Tunisia and France. Ova, pupae and imagines of some Silkmoths.

UNIVERSITY COLLEGE SCHOOL. Mr. R. L. Jenks, head of Biology, assisted by senior pupils, showed livestock, apparatus and results of current work. Of special interest were the demonstrations of preparing slides of living microscopic creatures.

WALKER, A. and WALKER, R. Larvae of the Indian silk moth, *A. roylei* Moore with description of the various stages.

WALTERS, J. (5904 J) Line drawing of the life history of the Black-streaked Pug, *E. phoeniceata* Ramb., live specimens and detailed Diary. As previously recorded, *E. phoeniceata* is now resident in Southern England on Cupressus. *Awarded second Junior Prize.*

WARNER, D. C. (5297) Bred series of 3 moths, The Hebrew character, *O. gothica* L., Pink-barred sallow, *C. lutea* Strom. and the Sallow, *C. icteritia* Hufn. from Central Essex and Callendar, Scotland to illustrate variation. Also Red sword-grass moths *X. vetusta* Hubn. bred from ova obtained near Aviemore, Scotland.

WILLMOTT, K. J. (3822) Colour prints of rare and local British butterflies, photographed in their natural habitats. Included were Queen of Spain fritillary, *I. lathonia* L. and Small copper *L. phlaeas* var. *schmidtii.*

ZOOLOGICAL SOCIETY OF LONDON. A fine selection of livestock from the London Zoo including insects and many other Orders. Of particular interest were a large bug from Malaya, *Heteropteryx dilutata* and a giant spider from S.E. Asia, *Eurecama herculeana.*

R. D. Hilliard (99)

THE FIELD STUDIES COUNCIL

The Field Studies Council is an organisation devoted to the purpose of helping people of all ages—from sixth formers at school to those in retirement—to understand more about our environment by arranging short courses in many aspects of the countryside. The subjects to be studied are varied; they include plant and animal ecology, entomology, geography, geology, environmental studies, wild flowers and conservation. There are also courses for painters and photographers. The resident teaching staff are all graduates and there are visiting specialists for some of the courses.

Many of the Centres have been converted from country houses where accommodation is simple but comfortable. Single rooms or cubicles can usually be provided for adults, when requested, but there are many more double rooms. Communal meals are taken at refectory tables and packed lunches are provided to allow for a full day's work in the field, when this is planned. Some of the centres arrange family courses, to enable people of all ages to get together to find out more about the environment and, in these weeks, special arrangements can be made for baby-sitting in the evenings.

Many courses are of particular interest to entomologists and there are on the Council's staff several tutors who are specialists in this field. Bugs, Beetles, Butterflies, Moths; Flies, Midges and Gnats can all be studied. Spiders and Pseudoscorpions too—a list of such subjects appears in the February issue. A photography course at Preston Montford Field Centre, for a week-end from 4-6 August, would also be worth considering, as there will be particular emphasis on insects, flowers and fruits on 'Photographing Nature in Close-up'. For details of all Centres please write to the Information Office, Field Studies Council (AEF), Preston Montford, Montford Bridge, Shrewsbury SY4 1HW.

NEWS AND EVENTS

LULLINGSTONE SILK FARM SAVED — This famous and only British silk producer has been threatened with closure due to the falling in of the lease on its premises. For over forty years all Royal occasions have had British Lullingstone silk used in their ceremonial robes. We are very pleased to announce that at the eleventh hour a solution to the problem has been found and in future the farm will be transferred to the grounds and premises of Worldwide Butterflies Ltd. The farm will use the old premises vacated by Worldwide consequent upon their move 'down to the end of the garden' into beautiful and historic Compton House. — Editor.

MANY THANKS — The Secretary would like to express his thanks to the one third of the membership who took the trouble to return the

questionnaire about the future of our annual exhibition. The results have proved most useful and a summary thereof will be published in the Bulletin in due course. — Paul Sokoloff.

CROSSWORD APOLOGY — The Editor offers his apologies to the compiler, Martin Smith, and to all members, for the unfortunate mistake of printing the *wrong block* for the clues given in the AES Crossword at the end of the November last Bulletin. He has not yet discovered just how this came about.

OPPORTUNITY KNOCKS — Between October 1978 and October 1980 the Scientific Exploration Society proposes to mount a series of expeditions under the general title Operation Drake. The basis of the operation will be a round-the-world trip by a schooner, carrying a group of 24 young people who will spend several months on board before flying home and handing over to a new group. On the voyage the ship will stop for 3 or 4 months at a time at Panama, Sulawesi, Papua New Guinea and Sudan, to help scientists carry out research programmes. Some of this work will be entomological, and there will be a need for a small number of dedicated entomologists to take an important part in the running of the entomological projects. The work in the first three countries visited will be centred on the tropical rain forest and the work, in the forest canopy, will be both interesting and demanding.

Anyone interested should apply, in the first instance, to me, giving particulars and stating interests and experience. — Dr. S. L. Sutton, Department of Pure and Applied Zoology, Leeds LS2 9JT.

TELEOPTERA — RIP—1977 saw the formation of this scheme for breeders of Sphingidae and Saturniidae (see *Bull. amat. Ent. Soc.* Vol. 36 No. 314 P.19). Andrew Sykes reports as follows:

"Although there were sufficient subscribers to the scheme from Sussex in the south to Merseyside in the north, the main problem seemed to be the great variety of species that Entomologists are breeding: by far the most popular species is *Actias selene* Hubn. Another problem concerns the timing of emergences; I have had calls reporting emergences of individual species spread over three or four months. In view of these facts success has only been minimal and it is therefore necessary to close the service in 1978."

NEW ENTOMOLOGICAL SOCIETY On the initiative of a group of Portuguese entomologists who have been meeting in Lisbon since 1975, the first Portuguese Entomological Society ("Sociedade Portuguesa de Entomologia") has been formed and started its activities in January, 1978. This society, at present comprising 130 members both amateur and professional, intends to publish a regular bulletin in which papers dealing mainly with the Portuguese entomofauna will be published.

The Society will sponsor the first Portuguese Congress of Entomology, planned to be held in Ponta Delgada (Azores) in 1979.

Any further particulars, including membership applications, may be obtained from: the Secretary, S.P.EN., Torre i, 9th Dto., Oeiras, Portugal. — J. A. Quartau (5470)

INSECT POLLINATORS — The Botanical Society of the British Isles recently held a conference on the Pollination of Flowers by Insects. One point which emerged from this was that for many plant species there is a dearth of knowledge about visiting insects and pollinators. Members of the Society were asked to contribute field observations and a forthcoming issue of BSBI News will contain a list of plant species for which notes on insect visitors would be of particular importance. The Honorary General Secretary in BSBI News No. 16 makes a request that photographers who see an insect alighting on the flower as they are about to take a plant portrait, should take a quick photograph rather than waiting for the insect to fly off; it may prove useful evidence. BSBI, c/o British Museum (Natural History), Cromwell Road, London SW7 5BD. — Habitat.

FARMING COUNTRY PARKS — Cattle, sheep, deer and horses should be used in preference to machines to control the grass and heathland in country parks; so concludes a report from the Countryside Commission. The report, 'The Management of Grassland and Heathland in Country Parks', was prepared for the Commission by the Institute of Terrestrial Ecology and brings together present knowledge on the subject and areas for future research. Grazing animals are a natural part of the countryside and will keep growth at suitable levels, allowing an attractive range of wild plant to grow. Large expanses of mown grass are more in keeping with town parks. The report, price £2.50, can be obtained from the Countryside Commission, John Dower House, Crescent Place, Cheltenham, Gloucester GL50 3RA — Habitat.

A NEW BRITISH BEETLE — Several wood-boring beetles from North America and continental Europe reach Britain in imported timber. Merseyside, with its wide timber trade, is the source of several fairly regular arrivals. Mr. Eric Hardy, a regional representative of the Council for Nature observed an unusual Cerambycid, or "longhorn" beetle alive in a suburban Liverpool lane this August. It was taken to Liverpool Museum where Dr. Ian Wallace eventually located a similar specimen amongst an insect collection from New Zealand; *Prionoplus reticularis*, the New Zealand Pine-borer. The specimen was sent to the British Museum where its identity was confirmed. Mr. Hardy and Dr. Wallace are trying to find other examples of this beetle in Britain, as they could possibly establish in pine plantations. The beetle is light brown, $1\frac{1}{2}$ inches long with long antennae swept back to the rear. The long unusually soft elytra are patterned in rectangular lines. Superficially it

might look like a large, light brown cockroach to a non-entomologist. Anyone finding such a beetle should not kill it, but send it in a small container with a little moist cotton wool to avoid shaking it about to Mr. Eric Hardy, 47 Woodsorrel Road, Liverpool 15. — Habitat.

NATURE CONSERVATION AND PLANNING — The Department of the Environment and the Welsh Office have issued a joint circular to Local Authorities dated 4 November, 1977, which emphasises the need for nature conservation factors to be taken into full account, when formulating local and structure plans and considering individual planning applications. The opening paragraph of the Circular states:

"The increasing pressures on land, for example from development and recreation, often compete and conflict with the aim of conserving the remaining relatively natural elements of the environment in Britain. At the same time, there is an increasing public awareness of the need for nature conservation, and of the contribution that the animals, plants and land forms of this country make to the quality of man's environment. The Secretaries of State wish to foster this awareness of the role and importance of nature conservation and are particularly concerned that the need to conserve the nation's natural heritage should be fully taken into account when planning decisions are taken."

The role of the Nature Conservancy Council as advisor on conservation matters is stressed. Particular mention is made of National Nature Reserves, Sites of Special Scientific Interest and Local Nature Reserves. Local Authorities' attention is also drawn to the Nature Conservation Review, the comprehensive survey of biological sites in Britain, produced by the Nature Conservancy Council and the Natural Environment Research Council. The role of the voluntary conservation movement is also noted, not only as owners of nature reserves but also as advisers on management plans for reserves. The Circular asks Local Authorities to ensure that where they own or hold land for any purpose, their own management practices should take nature conservation considerations fully into account. Also that detrimental effects of human activity on wildlife and physical features are minimised when they take action in both urban and rural areas. The Circular (No. 108/77 for the Department of the Environment and No. 150/77 for the Welsh Office) is available from HMSO, 49 High Holborn, London WC1V 6HB and other Government Bookshops, priced 25p. — Habitat.

SAVING SMALL WOODS — The Countryside Commission have sponsored a study to look at ways of saving small woods and copses. If these areas are to survive they need proper management, including thinning and replanting, or the encouragement of natural re-growth. The Dartington Amenity Research Trust will carry out the study, which will firstly identify the landscape, timber, wildlife and game value of the woods. The study will also find out whether farmers are concerned

about them and what part they can play in small wood conservation. The report is due in April 1978. — Habitat.

LETTERS OF CHARLES DARWIN — A comprehensive edition of letters of Charles Darwin is being prepared under sponsorship to be arranged in chronological order with full texts and annotations and will include letters both to and from Charles Darwin. This edition can only be made definitive through the generous co-operation of possessors of smaller lots of Darwin's scattered correspondence. Will those with knowledge of Darwiniana please contact Dr. S. Smith and Dr. D. Kohn, Darwin Archive, Cambridge University Library, Cambridge CB3 9DR.

UNWANTED INSECTS RAPIDLY INCREASING — There have recently been a number of articles about, and, in December last year, a very interesting BBC television programme on, two insect species which are steadily increasing and more and more making their unwelcome presence felt. These are no less than fleas, and body lice. Dr. Maunders of the London School of Hygiene and Tropical Medicine considers there is now a greater danger of an outbreak of bubonic plague in this country than at any time this century. Both its carriers, the rat and the flea, have become resistant to previous control measures.

The cat flea in particular has become very prevalent and is now more frequently found on humans. It shows a very marked preference for ladies over gentlemen. Both it and the louse have now become a middle and upper class parasite rather than (as was previously thought) a slum dweller. Could it be that central heating and fitted carpets suit these two? Cleanliness certainly does.

As a result of infestations, factories and hospital operating theatres have had to be temporarily closed. It is also a sobering thought that some threequarters of a million school children are now infested with head lice.

Clearly the situation needs watching and investigating. Why is it that insects such as these can adapt themselves so readily to take advantage of modern society with a high "standard of living" while harmless butterflies get fewer and fewer each year — Editor.

CARING FOR THE COUNTRYSIDE — The Country Landowners' Association and the National Farmers' Union have issued a joint statement on conservation and farming entitled "Caring for the Countryside".

The main advice is that farmers should always consider the effect upon the countryside when planning operations. The leaflet was drawn up with advice from the Countryside Commission and the Nature Conservancy Council and sets out guidelines for improving the conservation value of their land. For example, it states "wherever practicable and appropriate, retain and conserve" open water, areas of marsh, deciduous woodland and lowland heath, permanent pasture, other trees, hedges and

pasture and historic features. At a press conference, the Chairman of the NFU said "the conflict between efficient farming and conservation is more apparent than real". He stressed that there are already many farmers who can demonstrate practical examples of how conservation and farming are combined and that the joint statement is to reinforce this and to encourage other farmers. He added that "farmers would be willing to play their part but they would look to Government to ensure that clear advice, practical assistance and financial support would be available to maintain the countryside in the interests of the nation".

The statement has been welcomed by the NCC, Department of the Environment and the Countryside Commission as a recognition of the farming community's wider responsibilities and as yet another move towards greater co-operation by all the interests concerned with the countryside. — Habitat.

HOW TO GET A GIRL — "He loves Creepie Crawlies for his hobby is entomology! Bachelor, supervisor, 35, 6 footer" — Advert by marriage bureaux in personal column of local paper.

NOTES AND OBSERVATIONS

SCARCE PROMINENT IN CUMBRIA — I note from the latest edition of South's "Moths of the British Isles", that the Scarce prominent (*Odontosia carmelita* Esp.) is found in several localities in Southern England, but more northerly has only been recorded at Keswick, Brampton and Windermere in Cumbria. I am pleased to add Coniston as an extension of its range in Cumbria. I captured a specimen there on May 20th last year. — A. J. Gillery (3653).

CARABID ENTHUSIAST—I am an Italian Entomologist with a specific interest in Coleoptera of the family carabidae. I should very much like to correspond with AES members with a similar interest. — Dott. Busi Corrado, Via Berretta Rossa No. 68, 40. 100 Bologna, Italy.

TIGERMOTHS OF HAYLING ISLAND — *Phragmatobia fuliginosa* (L.) is a very common species on Hayling in most years, but does vary.

The larvae are easily found feeding on low-growing plants in the Sinah Common area of the island. During July and August (and in early years also June) the imagines will readily come to light.

Arctia caja (L.) is abundant most years, both in the larva and imago stages. The larvae will feed on anything in captivity, but feed mainly on coarse grass in the wild, on the island.

The imagines come readily to light in July and August.

All of the imagines I have caught at my light trap on Hayling in 1977 seemed to be much smaller than any of a dozen individuals I caught at light in Panxworth, Norfolk.

Arctia villica (L.) larvae can be found in ones and twos in the sandhills of Sinah Common on hot days sunning themselves.

The imagines are not all that common at light but the numbers coming vary largely from year to year.

The imagines are caught at light in June or July.

Paraxia dominula (L.) is the least common of the species I have come across, although by no means rare, and almost certainly breeds on the island. — David Chitty (5899 J).

NOTES ON BREEDING ACTIAS SELENE (Hubner) — The best way I have found of breeding the larvae is with a small 15 watt lamp suspended above their container. This means, however, that the foodplant will dry out quickly, but this can be avoided by soaking the leaves of the foodplant in water before putting them in the container.

The pupae can be kept in an airing cupboard until they are about to hatch. It should be remembered, however, that the pupation period is not long. — David Chitty (5899 J).

SILVER-SPOTTED SKIPPER IN SOUTH OXON — I am pleased to announce that during late August and early September last year *Hesperia comma* L. appeared to be quite common on steep slopes with short turf in the Chilterns just south of Watlington, Oxon.

This species was flying alongside fresh Small skipper (*Thymelicus sylvestris* Poda) and Meadow brown (*Maniola jurtina* L.) which were later in the month than usual due to the late season. — David Rees (5510 J).

PROVENCAL BUTTERFLIES — Some corrections — Several slight errors crept into the account of "Provencal butterflies — April" in last August's issue. (*Bull. amat. Ent. Soc.* 36:123-131). The corrections are as follows:

On page 124 line four from top of page was omitted. It should have been "campsite on the western outskirts of Paris. On emerging from the tents".

On page 129, under *Clossiana dia* replace "8 km south of Vidaubon 11" with "New Grasse Road, Draguignan 17".

On page 131, under *Tomare ballus,* add date "17".

COLLECTING AND TRADING RESTRICTIONS — We understood that moves are afoot, sponsored by the Joint Committee for the Conservation of British Insects, to bring in legislation to restrict the collection, exchange and sale of certain butterflies. These are to include European races of *Parnassius,* especially *apollo,* and the Far Eastern members of the genus *Ornithoptera* — The magnificent Birdwings. We do wonder if all this legislation does not in fact do more harm than good and, in its sheer multiplicity and complexity, brings itself into disrepute. Besides, does not restriction enhance the value?

What too in the future is to be the position of the large-scale breeder? Will he too be legislated against thus ensuring that protected species become even scarcer? While the subject is complex, we should like to hear members' views on such proposed legislation. — Editor.

THE URTICATING PROPERTIES OF EUROPEAN LYMANTRIIDAE. — I cannot help feeling that Mr. Hadley's coupling of urticating power with gregariousness is entirely coincidental (1977, *Bull. Amat. Ent. Soc.*, 36:94-97).

In my experience, and I have bred 27 species of Indian and 46 of African Lymantriidae, it is not the long visible hairs that cause the irritation but the minute, pointed spicules that are concentrated in small, velvety-looking patches on many Lymantriid larvae. Incidentally, I seem to remember complaints about the irritation caused by larvae of *Orgyia antiqua* in letters to the daily press when there was a plague of this species in London some years ago. The function of the long hairs appears to be to deter attacks by lizards and birds, which get a mouthful of hair instead of a succulent larva. They also increase the apparent size of the larva, thus deflecting the predator's aim.

The same applies to the Lasiocampidae, of which I have bred 10 Indian and 44 African species, the urticating spicules in many species being concentrated in two transverse, eversible dorsal folds situated on the 2nd and 3rd thoracic somites, as well as being scattered over the body among the long, and more apparent, hairs.

Thaumetopoea processionea L. is not, of course, a Lymantriid, but a Thaumetopoeid. The only species of this family that I have bred is *Anaphe reticulata* Wlk., which is highly gregarious and very hairy, but not irritant so far as I am concerned. — D. G. Sevastopulo, F.R.E.S.

SUCCESSFUL REARING OF *AGRIUS CONVOLVULI* L. — With reference to Mr. Bibbings' note under this heading (1977, *Bull. Amat. Ent. Soc.*, 36:74-78), not only are the ova disproportionately small for the size of the moth, but they are also of a far bluer green than the eggs of most Sphingidae.

South's report that the more usual form of the larva of this species is bright apple green refers, I think, to full grown larvae found in the field. This is because the brown form usually feeds at night and hides itself by day under clods of earth. In captivity, a very occasional larva, reared by itself under particularly bright lighting conditions, may be green, but the vast majority, and all those reared in batches, will be of the dark form in the final instar. Bell & Scott (*Fauna of British India*, Moths, v) give good coloured figures of several dark forms. Bunn (1968, *Ent. Rec.*, 80:13) gives an instar by instar description of larvae reared from ova laid by a female caught at Preston, Lancs.

I am of the opinion that the dark form is produced by overcrowding and lack of bright light, unlike the dark form of larva of *Acherontia*

atropos (and also *Coelonia mauritii* Btlr., an African species), which appear to be genetic in origin as I have never produced a dark larva in overcrowded broods of either species, and there are no intergrades, whereas dark larvae of *convolvuli* vary considerably. Incidentally the dark larval form of *atropos* also feeds at night, concealing itself by day, and larvae can sometimes be found climbing the trunks of the trees on which they feed shortly before dusk, descending to the ground again round about dawn.

An interesting point, invisible to Mr. Bibbings as his larvae were allowed to pupate undisturbed in their cells, is that the jug-handle-like proboscis sheath develops after the last larval skin has been shed, first appearing as two small blobs on the ventral side of the head, which expand (? grow, ? develop) and join together to form the sheath. A possible nice sequence for the photographer — D. G. Sevastopulo, F.R.E.S.

A LATE SOUTHERN AESHNA — In local copse woodland, near a small dew pond, not far from Reading, I found, on 20th November last, a female *Aeshna cyanea* Müller. This seems to me to be excessively late in the year to find such large bodied insects particularly after a week of cold weather including two nights with frost (17/11 and 18/11). The dragon-fly was torpid when found but after a few minutes the warmth of the hand was apparently sufficient to induce flight. This raises the question which other members may be able to answer for me as to what natural agency is most likely to terminate the life of this insect. Since it has not, apparently, succumbed to cold is it shortage of food which is most likely to kill it? Given sufficient food might it be possible to keep dragon-flies through the winter in captivity? Dragon-flies are not insects which I normally take more than a passing interest in, but I must admit that this year there seem to have been greater numbers about and one cannot but take pleasure in seeing such fine creatures. — J. H. F. Notton (5459).

LATE RED ADMIRAL — On 26th December, 1977, I was surprised to come across a Red Admiral (*Vanessa atalanta* L.) flying around and settling on an old flint wall at Polesden Lacy, Bookham, Surrey. The time was 1.30 p.m. and the weather was warm and sunny. — Alan P. Waters (2615)

OBSERVATIONS ON THE LIFE OF *LEUCOZONA LUCORUM* L. — Coe states that the early stages of this insect are apparently unknown so I was very happy to be so fortunate as to observe a specimen of *lucorum* on May 27th, 1977 depositing only on those leaves of Red Campion which were liberally covered by Aphids. It was extremely interesting to me to note that when the female left an infested leaf she went to great pains to find another leaf covered by

Aphids. The location was within 100 yards of the bungalow on the Plas Tan-y-Bwlch Estate.

I have for a long time been of the opinion that the nymph of *lucorum* was an aphid feeder, but this was the first occasion on which I had seen a female depositing although I have spent a lot of time observing *lucorum*. In my opinion the insect could feed up as a nymph on different species of Aphids on other suitable plants too, as it occurs for a short while in more than one brood in many different types of environment. — P. N. Crow (393).

DEATHSHEAD IN DEVON — I would like to report the taking of a near perfect specimen of a female *Manduca atropos* L. on the pavement of Babbacombe Down Road in Torquay at 10.30 in the morning on the 23rd October, 1976. It was placed in my heated breeding cage and fed on honey but did not lay and was killed and set after surviving for over a week. It will be placed in the Torquay Museum's collection. — W. H. Crossland (3945).

DURHAM AREA MEMBERS WELCOME — The Darlington and Teesdale Naturalists Field Club has kindly invited AES members to attend any of their weekly meetings which are held at the Darlington College of Education. Field meetings are held in summer. Details from Les Woodhouse, 342 Yarm Road, Darlington, Co. Durham, DL1 1XL and your editor feels sure a stamped addressed envelope would be appreciated!

CABBAGE PESTS STILL WANTED — Dr. Christopher Payne, Glasshouse Crops Research Institute, Littlehampton, Sussex, is still working hard on these pests of cabbage crops, *Pieris brassicae* L., *P. rapae* L., *Memestra brassicae* L. and *Plutella xylostella* L. He would be grateful to receive any diseased larvae members may come across including those of the non-pest *P. napi* L. and to hear of any serious outbreaks causing extensive damage.

DEATHSHEAD REARED ON ARTIFICIAL DIET — I would like to report the successful rearing of *Manduca atropos* L. on the artificial diet as is used for rearing the related *Manduca sexta* Johan. in large numbers. The Stock came from Ray Adams in the Canary Islands. The two first instar larvae that had survived the journey were put onto the diet and eventually turned into two male moths of usual size and colour. — Brian O. C. Gardiner (225).

ADVENTURE WITH SPANISH QUEEN IN SURREY

The main objective of a days outing to the Surrey downs for myself and Mr. J. M. Tucker was to observe female *Argynnis aglaja* L. ovi-

positing amongst the Hairy Violets which abound on this chalk downland. We both had hopes of obtaining a few eggs in order to attempt to rear this species. My colleague had had far more luck than me in this direction, one female he was observing laying eggs on violets that already had several present, some of which, laid a few days previous had already undergone the colour change, unique to this fritillary. However, I was undeterred and relentlessly persued a likely looking female, which was heading towards the top of the chalk slope. My colleague was towards the bottom of the slope, on his hands and knees intent on watching a female *aglaja* doing the preliminary crawling and searching before ovipositing. I had succeeded in finding a fruitful female and on route to the top of the slope she diligently deposited a single ovum which I managed to retrieve, before continuing to chase her to the very top of the slope. It was here that I momentarily lost her until I saw what I thought to be this same female flip up from the undergrowth, and disappear around and into a bushy area. On quickly following I came across a good growth of the chalk flower Marjoram, upon which and flitting gently from flower to flower was a butterfly that I was unable to identify. I became filled with instant excitement, my face felt hot and glowing, for I knew that I was looking upon something very much out of the ordinary. A close inspection and I had confirmed identification. All my excitement then culimated in one enormous bellow to my colleague some distance away "Queen of Spain".

Although that cry must have been difficult to believe, he came with some speed, as such a shout had demanded, to be just as thrilled as I was, to see *Argynnis lathonia* L. feeding avidly from Marjoram, growing on Surrey soil. My camera was at the bottom of the slope some fifty, sixty yards away (I believe one should always be ready) but I had no need to worry for as it proved *lathonia* was going nowhere. I scampered down to retrieve my camera, whilst my friend who had his camera at the ready had the pleasant task of keeping his eyes on the insect. Photography was very difficult because despite good sunshine a considerable wind was blowing, making *lathonia* unstable on the Marjoram flower-heads to say the least. It was also extremely active in the hot sun and rarely showed its topside, feeding with closed wings, and with those magnificent silver pieces glinting as they angled into the sun. I took a dozen still photographs and a sequence of 8 mm. Movie film and have some pleasing results as a reward. After we had spent perhaps three-quarters of an hour with our *lathonia* and completed the photographic session to our satisfaction, we managed to pull ourselves away leaving the handsome, rare visitor to our shores to continue its Marjoram feast, of which it was so intent on.

A week later on the 19th July I decided to re-visit the area, and just about a quarter of a mile before I reached the field where I had found *lathonia* on the 12th, there was another good patch of Marjoram, with

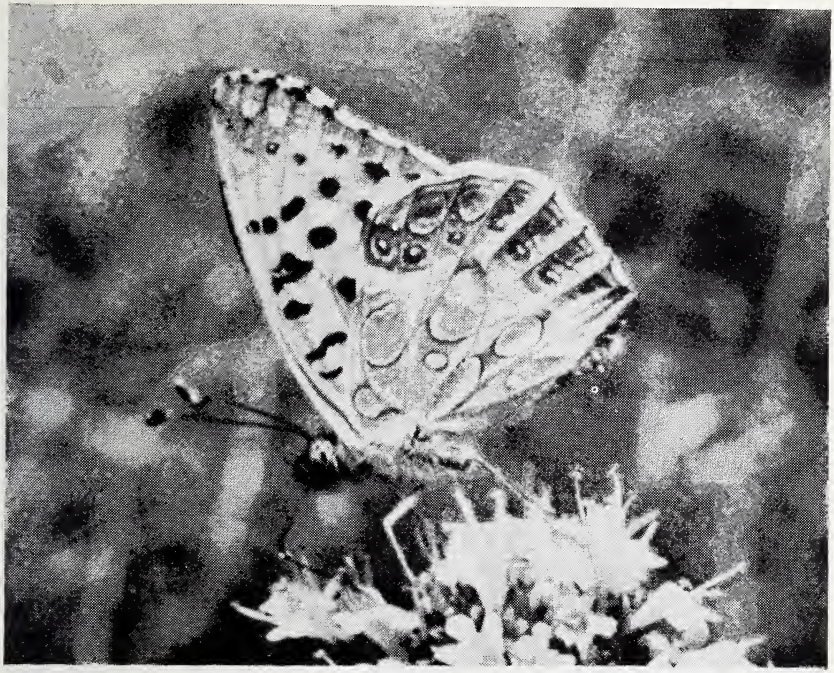
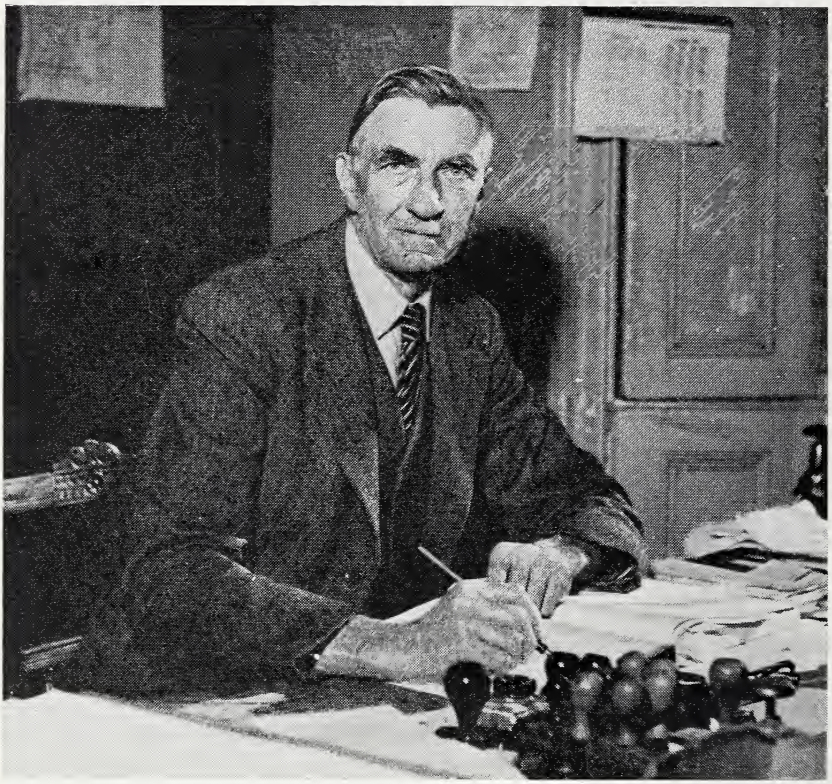


Fig. A. The Surrey Queen of Spain (Photo by K. J. Willmott).

once again the Queen of Spain feasting upon it. I recognised it as the same specimen, a male and this was later to be confirmed by photographs taken on the 12th and 19th which showed a kink in the left antenna. This second occasion in the presence of Royalty, was different in that the weather was more mixed, the sun occassionally going behind cloud, whereas on the 12th it was virtually continuous. This was to my advantage for when the sun disappeared *lathonia* would cease feeding on the Marjoram and bask with wings outspread on bare soil or flattened grass. This enabled me to photograph successfully its topside to go with transparencies in my collection of its glorious underside. Also on this second occasion I saw this male visit two different flowers staying but briefly before returning to its undoubted favourite, Marjoram. These other flowers were a Thistle and a Knapweed.

On the first encounter with *lathonia,* the specimen was in immaculate condition, looking virtually fresh out of its pupa, but a week later it had some slight rubbing on it, but its wings were perfectly intact, with no pieces missing from them. The origin of this specimen must remain a mystery, was it indeed a migrant in such mint condition on the 12th July? or perhaps born here from a May immigrant, even born on those Surrey downs. I shall never forget the Queen of Spain and my regard of such a valuable photographic record. K. J. Willmott (3822)



OUR FOUNDER, LEONARD TESCH. Due to a combination of circumstances confirmation of the decease of our founder some years ago only recently came to the notice of the Society. Through the kindness of Mrs. Tesch we are able to publish his portrait in a typical working pose and to his widow and family we extend our sympathy.

WESTERN IRELAND — JUNE 1977

For several years we had talked of going to the West of Ireland to see if any of the hills were suitable for the Small mountain ringlet (*Erebia epiphron Knoch.*), and if so to see if we could locate a colony, if indeed one still exists. At last in June 1977 we were able to set out, and on June 18th arrived at a cottage we had rented near Clifton in Co. Connemara.

Taken as a whole, Ireland offers a remarkable variety of habitats, with the rolling green landscape of Co. Cork at one extreme and the bleak hills of Kerry and Mayo at the other. It is the latter type of scenery that provided the background for a very interesting and enjoyable fortnight.

The far West of Ireland holds many surprises for the visiting entomologist and the results of a visit to this area are described here. Our aim as already stated, was to seek the Mountain ringlet in the hills of Connemara and Mayo, and try and verify the records of the late 1800's. Baynes "Revised Catalogue of Irish Macrolepidoptera" gives a brief summary of the existing records:

> "The history of this butterfly in Ireland is well known, the only three records being Croagh Patrick, Co. Mayo, June 1854 (Birchall), a single specimen near Lough Gill, Co. Sligo, 1895 (Canon R. M'Clean) and Nephin, Co. Mayo (Kane's supplementary list 1901)."

Baynes considered that some gradual ameloration of climate had caused the species to die out, and went further to suggest the Nephin Beg area may hold a colony. (Baynes 1964). The importance of the Irish records of *E. epiphron* stem from a suggestion that the three existing specimens resemble the alpine form *aetherius*, if correct this would shed new light on the present theories of the origin of the Irish fauna. The three specimens mentioned are to be found in the National Collection and The National Museum of Ireland (one and two respectively). The fact remains that there was once a natural population of *E. epiphron* in Ireland, and it may still exist in suitable localities today.

Our investigations were confined to the hills of Connemara and South Mayo, including most of the old localities mentioned by Baynes. The initial selection parameter for searching these hills was altitude, using the Irish Ordnance Survey maps (1:126,720), as in its English and Scottish localities this species is not found below 1800 ft. (550 metres). We arrived in Connemara on the 18th of June, meaning to survey the ground and judge which areas would be worthwhile visiting in the flight period. Much of the ground was totally unsuitable, especially the bare rock and scree of the Twelve Pins range. In our experience, based upon first hand knowledge of English and Scottish colonies, the following ranges appeared suitable:

Bencullagh and Muckanaght (L 75 53) I.O.S. grid ref.
Part of the Twelve Pins range, but having a grassy, sloping ridge going S.W., including suitable ground.

Garraun (L 77 61)
Perhaps the most likely of all the localities looked at, with an extensive East facing corrie and grassy slopes leading up to the summit and surrounds.

Unamed ridge (L 85 60 to L 89 78)
Suitable ground occurs along this ridge and large tracts of *Nardus* and *Festuca* grasslands cover the tops.

Mweelrea Mountains (L 80 78)
This large mountain has a large corrie facing East and has substantial area of grassland at the correct altitude, the summit rises from sea level to 2,688 ft. (820 metres).

Ben Gorm (L 86 65)
Suitably boggy hollows are to be found on the East of the summit, not unlike the well known Langdale colony in Cumbria.

Sheefrey Hills (L 85 70)
This range of hills is a mere 6 miles South of the classic locality of Croagh Patrick, and is probably the most likely site for a present day colony, being an area of substantial size and near one of the original colonies.

Other regions were investigated but appeared totally unsuitable, even the Croagh Patrick locality now appears to be largely heather and bracken, and, as such is not really suitable.

As the emergence time approached (24th-27th of June), the weather, which had been perfect, changed for the remainder of our stay, the hills were enveloped in mist and drizzle, giving us no chance whatsoever to find the butterfly before we had to leave on July 2nd. However the ground we had looked over has given us sufficient encouragement to plan another visit to this area. The weather is always a gamble, particularly in the case of this insect which is a real "solarphilic" species and needs sunshine to prompt it into crawling up the grasses.

During our fortnight in this region we also took the opportunity to collect around Connemara and Mayo, finding several interesting species away from the hills. On the 19th of June we found *Coenonympha tullia* Mull. to be widely distributed on all the peat "mosses" which envelope all low lying inland areas. The form of *C. tullia* closely resembles the form found in the Scottish Western Isles, several females were coaxed into ovipositing in order to breed out some fresh specimens of the form and attempt cross breeding with other forms, the larvae are, at the present time, feeding well on potted *Poa annua*. Flying alongside *C. tullia* was its cogeneric relation *C. pamphilus* L., the Irish form being somewhat larger, in our opinion, and the under-fore eye-spot larger and more conspicuous than its English counterpart.

The coastal regions consist largely of rough meadowland in small walled enclosures these being used for hay later in the year by the 'locals'. This terrain supports a rich and varied insect fauna, with many species of wild flowers, indeed some areas were literally orchid fields. One of the more memorable species was *Cerura vinula,* the Puss moth, whose larvae were to be found on every small sallow bush encountered, a pair in 'cop' being found beside a 3rd instar larva! In sheltered hollows and flowery banks was found the single brooded form of *Polyommatus icarus* Rott., with the females being heavily suffused with blue and in general resembling the single brooded form found on the Cumbrian sandhills and in Scotland. A rather unexpected find was *Cupido minimus* Fuss., quite fresh on June 21st, their presence being relateable to the calcareous sandy soils of the coast. This race of *C. minimus* differs from the English form in that its spatial distribution is one of thin scattering, as opposed to the colonial habit of the English specimens in general. Almost every flower head of Kidney Vetch (*Anthyllis vulneraria* L.) had an ovum of *C. minimus* laid upon it, this being a measure of their wide ranging distribution. Flying alongside the above species were *Lasiommata megera* L. *Pieris napi* L., *Anthocharis cardamines* L., *Lycaena phlaeas* L. and *Aglais urticae* L.

Across the fields were seen large 'buzzing' insects clumsily flying around, on capture these turned out to be the metallic green chafer beetle *Cetonia aurata* L., possibly associated with the wild Briar that grew in the corners of the fields. The frail stone walls surrounding the fields provided an interesting habitat for such species as Ruby tailed wasps (*Chrysis* sp.) with their beautiful metallic ruby-red abdomen and blue-green thorax. This small wasp was using small cracks and holes along the wall as nesting sites, and could be watched working its way along the wall investigating all crevices. Only too abundant were the large Tabanid flies, but before chasing them away, (or smearing over your arm!) look at their eyes, these huge faceted organs are delicately banded in blue and orange contrasting bands, these changing hue as the angle of light varies. These colourful facets fade with death and are believed to help the fly to resolve objects in its field of vision, rather like the optical filters used by photographers.

Along the coast at Cleegan (L 60 58), we stumbled across our first *Maniola jurtina* L., freshly emerged on the 25th June and flying alongside fresh specimens of *Aphantopus hyperanthus* L., a walk along the coast at this point revealed a colony of *Hipparchia semele* L., well out on the early date mentioned above. Also in the same area a small fritillary was seen, evaded capture, but appeared to be *Boloria selene* Den. & Sch. unfortunately this does not appear on the Irish list, it may conceivably have been a small specimen or *Argynnis aglaia* L., but no other individuals of this were seen. Perhaps this area of Ireland may contain hitherto unrecorded species and is certainly worth further investigation.

Further inland at Maam (L 96 54), the wooded banks of the River Bealanabrack produced two specimens of *Pararge aegeria* L., these being paler in colour than their English counterparts. The same species was found in abundance in a wood near Tully (L 82 78), these specimens having just recently emerged. In an effort to track down the yellow form of *P. napi* L. we placed several females on plants of Cuckoo flower (*Cardamine pratensis*), and were amply rewarded in their laying well over 200 ova. To date the partial summer brood has emerged with no real yellow ones being present. This Irish form is strikingly larger than the English and has a deep yellow underside.

As regards other livestock we found several dozen ova of *Smerinthus ocellata* L. on an unidentified Willow bush, which have been reared through and pupated successfully.

In conclusion it would seem that the relatively Entomologically unexplored parts of Western Ireland are well worth a visit by the more adventurous entomologist. At the same time he would be doing great service towards our understanding of the distribution of many of our common species.

Keith Porter (4505)
Ross Young (4480)

REFERENCE

BAYNES, E. S. A. 1964. A revised catalogue of Irish Macrolepidoptera. E. W. Classey Ltd. Middlesex.

COLLECTING EXPERIENCES IN THE VAL DE ARAN

On the first of August, 1977 after two weeks travelling through a miserable and very rainy France we arrived at the Val de Aran, just over the border into Spain, only to find that we had just missed a snow-storm.

We (my family and myself) knew where we were going to camp because of a previous visit to the same vicinity in 1976.

On arriving at our chosen spot at about 1500 metres; about a mile up the valley from a small village called Arties, near Viella, we pitched the tent and then I began to survey the lepidoptera flying in the warm sun.

Immediately I discovered that all the butterflies were about three to four weeks late in flight, no doubt due to the terrible weather of the previous months. This meant that the butterflies were either species that I had been unable to find the previous year, or that they were in a much fresher condition than on my previous visit.

All around in the flowery meadows flew *Aporia crataegi* L. in large quantities. Amongst them was *Pieris napi* L. and *Erebia manto* ssp. *constans* Eiffinger, an all dark brown subspecies with occasional markings on the underside, especially in the females; *Colias croceus*

Geoffrey, *C. australis* Verity and many fritillaries, e.g. *Melitea* sp. *Boloria* sp. *Argynnis lathonia* L. and *A. adippe* D. & S. There was also *Melanargia galathea* L. in great profusion with *Lasiommata megera* L. and *L. maera* L. easily found basking in the sun on the boulders nearby in the course of an old river bed. There were also a few *Coenoympha arcania* L., *C. pamphilus* L., *Maniola jurtina* L. and *Pyronia tithonus* L. flying.

The next day was very warm and I walked higher up the valley with net in hand but was disappointed to see fewer species than I had hoped after last years experience.

Many of the commoner nymphalids were noticeably absent, for instance *Inachis io* L. In August, *Vanessa atalanta* L. 1976 had been extremely abundant—resting on the flower heads of the large purple thistles, but this year I saw only one specimen: the thistle flower heads hadn't opened yet—again due to the bad weather and to the destructive behaviour of a certain large species of yellowish weevil beetle.

The Burnets were in great profusion, resting on the knapweed flower heads. There were four species present although I haven't correctly identified these yet, as this genus is extremely large and difficult: a six spotted species (possibly *Zygaena hippocrepidus* Hübner), a five spotted species (possibly *Z. filipendulae* L. or perhaps *Z. lonicerae* Schevan) and a species with the spots merged together (*Z. purpuralis* Brunnich) and another similar species (possibly *Z. nevadensis* Rambur) were present.

I also found one other species much higher up, at about 1800 metres which was *Z. carniolica* ssp. *sagarraiane* Reiss and Tremewan. This species I found on a small mountain I climbed one day, later on in the holiday. To reach the top I had to clamber up through some damp and gloomy coniferous woods but when I came out on the steep slippery grass covered top in the sun, it had been well worth it. On the verge of the wood I saw my first crested tit within four foot of me.

Here were flying *Parnassius appollo* L., burnets, Erebias and all the previous species in great abundance, while *Ascalaphus libelluloides* Schaef buzzed up and down the mountain side catching insects.

For the next week I just made short walks, not finding much except the attractive marbled skipper *Carcharodus lavatherae* Esper and a few blues, of which the Mazarine, *Cyaniris semiargus* was the most exciting.

During this time, I searched for Coleoptera and I found some particularly beautiful leaf beetles — *Chyrsochloa gloriosa* F. and *C. collucens* Dan.

Cetonoia aurata L. (Rose chafer) and many species of Longhorn were very common on the flowers of the family Umbeliferae.

Around this time I searched for the beautiful Salamander (*Salamandra salamandra* ssp. *terestris*) a richly marked yellow and black amphibian,

which I had discovered in small quantities the previous year. In the very cold streams I found the Pyrenean Mountain Salamander and Rainbow Trout.

After two weeks, two other butterfly collectors from Barcelona joined us, having collected in the Val de Aran area for ten years or more, they had a great knowledge of the area's lepidoptera and coleoptera.

As they had been expecting to meet us they gave me a pair of the silkmoth *Graellsia isabellae* Grote, a fantastically beautiful light-green moth with long tails and a wing span of 3½ inches; they also gave me a pair of *Zerynthia rumina* L. and a pair of *Parnassius mnemosyne* L. all these butterflies and moths being unobtainable at that time of the year in the Val de Aràn.

Our friends had a battered 2cv which was far cheaper to run than our Land Rover, and therefore we all started making excursions to higher habitats. At about 1800 metres *P. apollo* was present in reasonably large quantities, as were *E. epiphron* ssp. *fauveaui* de Lesse, *E. triaria* de Prurmer; *E. pronioe* Esper and *E. neoridas* Boisduval. Continually, we searched for *Pontia* (*Synchloë*) *callidice* Hübner and the rarer Blues.

My friend was a particular authority on *Aricia nicias* Meigen a local lycaenid and had just had the subspecies of the area named after his wife—ssp. *judithi*. He took me to some high semi-wooded areas where we found this species just emerging. We only found males, until the following day, when we returned and caught one female.

In the following weeks, this species became very common in certain areas.

Wherever we went we found the beautiful Orange copper:—*Heodes vigaureae* L. In many specimens there was a dot on the forewing of the male and striations on the female, which looked very similar to the subspecies *montanus* from the Alps.

We also discovered *Palaeochrysophanus hippothoë* L. which could only be distinguished in the field from *H. virgaureae* by its fast flight. I caught only one specimen which was badly damaged.

We also went further down the valley in search of *Apatura iris* and *A. illia*, but I caught neither, although my friend did, but I caught two specimens of *Araschnia levana* f. *prorsa*. (Map Butterfly).

Each evening we would set up a normal light and a mercury vapour strip-light, run from a generator.

Hundreds of unidentifiable Spanish noctuids arrived, so did two species of hawk moth — *Laothoe populi* L. and *Deilephila porcellus* L. There were many *Arctia caja* L. and other unidentifiable members of the same family with different forms of red and black speckling. There were also a few Lasiocampids present.

On the last day we met another friend and with the aid of his jeep climbed to over 3000 metres up the mountain sides. Here I caught

the only *Pontia callidice* Hübner (Peak White) of the party; we also caught the rarer blues—*Agriades glandon* de Prunner, *A. pyrenaeicus* Boisduval and *Polyommatus eros* Oschenheimer.

On the last night after being rained out whilst 'mothing', we returned at 4 o'clock in the morning and found the roads covered with Salamanders. We counted fifty.

The next day, we started our journey back through France and immediately hit the bad rainy weather; even so I succeeded in catching a pair of female *Minois dryas* Scopoli in freshly emerged condition, in the region of Lot in S.W. central France.

We caught the ferry home from Le Havre with a very fine collection of Pyrenean butterflies and coleoptera (including a fine specimen of *Aromia moschata* L. I had found while just leaving the Pyrenees.) some Salamanders and a fine big toad called 'Fred', plus the Pyrenean Mountain Salamanders.

Kurt D. Jackson (6134 J)

THE 'VERY RARE BEAST'

In August 1976 I received a letter from my contact in Mexico, with ova of what he called 'a very rare beast',—*namely Metosamia godmani* Druce. According to him, this is a species found only very rarely anywhere, and then only in small numbers. The amazing thing about this species is the size of the ova, which are considerably greater than those of the Giant Atlas moth (*Attacus atlas* L.) So I thought that perhaps this might be a really 'giant' species'. Anyway the ova, which were a pale brownish colour, soon hatched, and began feeding on oak much to my relief. During the early stages the larvae were a yellowish colour, with black dots, and a very large brown head. By the time they were grown to about half size, the larvae had changed to a lovely green, but still keeping the brown head, and they now had what I called anyway, a lot of 'camels humps' all along the back of the larvae, with short hairs sticking out of them. (Not stinging ones however!) Up to this stage, the larvae did very well indeed, almost all surviving out of a batch of 34 ova, but sadly . . . they then suddenly started dying off very quickly, until all I had left was one quite large larva. Strangely, this one larva survived quite a long time after all the others had 'gone', but eventually, this last surviving very rare beast, my very last chance of seeing what the adult moth looks like—died. So for the time being anyway, I still have no idea what the moth looks like, though my contact said he would send me a wing of a damaged specimen.

With a lot of luck, I may possibly get further ova at some time in the future, and have another go, perhaps with a bit more success!

Wesley Caswell (3133)

THE HISTORY OF ARGYNNIS LATHONIA IN BRITAIN

The first ever record of the Queen of Spain fritillary in Britain was in 1710 when (quoted by J. W. Tutt, 1896) the entomologist Ray stated that Petiver took it in Cambridge. According to T. G. Howarth, (1973) this first specimen was captured by William Vernon at Gamlingay in Cambridgeshire, although originally South (1906) did not name the captor, but still supplied the accurate locality. William Vernon was also the captor of the first British Bath white in 1702, again in Cambridgeshire, indeed this species was originally called Vernons Half Mourner, after its original discoverer. It was James Petiver who wrote the first book on British Butterflies entitled 'Papilionum Britanniae Icones' describing some eighty species. The first *lathonia* in the Cambridge locality is stated to have been taken during the month of May. For sixty-five years from this first ever *lathonia* record up until 1775, this butterfly was called the Lesser Silver-Spotted Fritillary. A rather obscure name of Riga Fritillary is mentioned as an old name in the recent South re-print by T. G. Howarth. However in 1775 Moses Harris gave it the present day English name of the Queen of Spain Fritillary. Seventeen years prior to this Linnaeus gave the species the generic and specific name of *Issoria lathonia* in the year 1758 when he had identified 192 different species of Rhopalocera. The generic name *Issoria* is still used in preference to *Argynnis* by some authors (Higgins and Riley, 1970), although the similarity in appearance and habits of its early stages to the Argynnids *adippe, aglaja* perhaps support the *Argynnis* side, though the unusual shape of *lathonia* forewings could perhaps isolate it as *Issoria.* There seems to be a gap of eighty-five years before the next record of *lathonia* comes to notice, although the species is mentioned as being not uncommon in the days of Petiver and Cambridgeshire specimens during the month of May seem to suggest that earlier unrecorded migration took place, but lack of August and September records (which are to prove the more common data subsequently is unusual. In 1795 one is recorded in a garden during August at Borough in London.

The year 1818 sounds as if it could have been the record year for *lathonia,* but unfortunately accurate data is lacking, so it must just go down as an exceptionally good year. The entomologist Stephens makes reference to the occurrence of *lathonia* in this year and records a great influx in the South Eastern Counties. He himself saw several specimens in Hertford, where it was recorded as being 'in plenty'. whatever interpretation one can make of that. F. W. Frohawk in his unique works also makes reference to this year, of there being large numbers in Southern England, but as this was before his time, the information must have been passed down to him. As well as Hertford being recorded in the great 1818 year Halvergate, Norfolk, Battersea Fields, Dover, Birchwood, Kent and Colchester are recorded. At Halvergate during

the month of August and Birchwood is given as August, September.

Another gap of twenty-six years occurs now with the next record coming in September of 1844 when two were noted, one at least being found near Newmarket near to its old Cambridgeshire locality. Two years later in 1846 the first of a considerable batch of records from Dover, Kent begin to emerge, and surely there must have been further *lathonia* from the Dover neighbourhood prior to this date. In this particular year three were recorded from Dover and two from Norwich, both notably East coast locations. The year 1850 begins a milestone in the recording of migrant butterflies, not only the Queen of Spain, but all the other rare and occasional migrants. A. G. F. Cockbill began collecting information from varied unknown sources from the year 1850 up until 1932 when the Insect Immigration Committee continued recording in detail. A single specimen was captured in 1850, with half a dozen the year after, but no locality information can be traced. In 1852 two were recorded from Swanage in Dorset and this proves to be one of very few instances from the county of Dorset, a further one coming to notice sixty-nine years later. The next eight years according to the excellent tables in C. B. Williams New Naturalist Series book 'Insect Migration' produced a further thirty-five specimens with 1857 being the highlighted year with seventeen recorded. In 1859 out of eight recorded, seven of the records came from Lavenham in Norfolk. Here we also find the first flower recorded in association with *lathonia,* evidently a specimen being found sitting (no feeding mentioned) on the blossom of dandelion in a small barren piece of pasture land.

Now comes the interesting and unique instance of a larva being found, suspended for pupation at Sudbury, Suffolk in 1862 and which was evidently recorded in the journal 'Zoologist' and also doubted by several eminent entomologists, as obviously a record of this nature would be. To find a larva suspended for pupation, especially if *lathonia* prepares itself for this stage as do other closely allied species, in concealment, would be a considerable achievement. Indeed C. B. Williams does not record this instance in his tables, leaving the year 1862 a blank, and stating in the text of his book that there is practically no evidence of any breeding having occurred in this country. A statement which I feel loses ground as the further history of *lathonia* unfolds.

The first of only two records for Ireland is now accounted for, with a gap of nearly a century in between. The occurrence of *lathonia* in Ireland in 1864 at Muckross in Killarney, evidently near a limestone quarry in a lane leading from Muckross to Mangerton, led Edward Newman, who records this instance in detail and with much enthusiasm, into concluding that there was no doubt that *lathonia* occurred in the Killarney district in a perfectly wild state, the date of its appearance on the wing being uncertain due to the constant humidity of the atmos-

phere in this area. The Muckross *lathonia* was taken on 10th August, and obviously a specimen being taken so distant from the majority of Eastern or South Eastern counties records, gave Newman the opinion that *lathonia* could be added to our list of indigenous species. No further records appear from the Killarney district or indeed from South West Ireland at all until sixty-nine years later. Another 1864 record comes from Ramsgate, Kent on 17th September, five weeks after the distant Irish record. A total of three for this year are recorded in C. B. Williams' tables, so there appears to be another specimen without details.

In 1865 thirteen are recorded in C. B. Williams' tables, for one I can find a Norwich data, and a further, more detailed one, from Braintree, Essex on 19th September. Newman records five Isle of Wight records for this year, a very fresh specimen in a garden at Sandown on 20th October and four at Ventnor on the 21st and 24th October and rather surprisingly two on the late date of 4th November, evidently along the same line of cliff at Ventnor as the previous two records. Single specimen records followed without data, until the year 1868, which fell short of being *lathonia's* greatest year in Britain by only four records, being comparable to 1818 the previous good year for *lathonia* fifty years earlier. Forty-six are on record for 1868, thirty of which have data, one of which has the second recorded flower in association with *lathonia* and also a record from the furthest North the species has been seen in Britain, Yorkshire. It is interesting to note that all records seem to be in the months August and September, with October being an interesting but not too surprising exception. The county of Kent is by far the best represented, with records from Surrey first being noted during this exceptional year. 1868 data is as follows: Darenth Wood 16th August; Gravesend 2nd September, clover (presumably Red Clover (*Trifolium pratense*) in accordance of my 1976 observations of *lathonia*); Ramsgate 2nd August; Two Margate September; Thirteen near Canterbury; Walmer; Three Dover; Deal October; Folkestone 7th September (probably the Warren area); Near Gravesend late September; Ipswich, in a clover field, August; Stowmarkey August; Aldeburgh, in a clover field, 3rd September; Mickleham, Croydon, August; Scarborough, September. There is variance here in C. B. Williams work on Insect Migration, stating in his written text forty-five records for 1868 and in his invaluable tables in the appendix, from information collected by G. F. Cockbill, giving one more record at forty-six. This shows the difficulty in accurate recording, which occurs again and is an important factor as lathonias history continues. Only four further records are in evidence up until the great lathonia year of 1872 when fifty specimens are on record, the highest annual number to date, with the possible exclusion of the year 1818, where insufficient data is available, but descriptive terminology of the species as being 'in plenty' is perhaps an exaggeration, but one which must leave the

student of the subject uncertain as to the astuteness of aurelians of past days.

The great *lathonia* year of 1872 produced more fodder for the belief that the Queen of Spain has actually produced British born specimens, for on 7th September near Canterbury in Kent, was found a freshly emerged specimen with its wings still in a limp condition and improperly expanded for flight, surely and undoubted example of a specimen born on British soil from an immigrant which must have reached our shores approximately July 17th-19th, this assumption according to F. W. Frohawk's figures, which he gives in his 1934 complete volume on British Butterflies, states the life span of *lathonia* from egg to the emergence of the adult, as being some fifty days. In July of this same year the Rev. A. H. Snowden remarkably found a pair *in cop* near Dover, making the situation more complex. It is very important to note here that during this great year of 1872 *both* broods of *lathonia* were abundant in the Channel Islands. Relating this information to the above outstanding occurrences in Kent, could both broods have occurred very sparingly in British localities from a fairly good mid-May to early June migration? No earlier records can be found for 1872, the majority being late Summer or Autumn, suggesting in fact no early immigration, which one would have thought in such a good year would have surely been noted. However there is still much food for thought here. In Bernard Acworths book 'Butterfly Miracles and Mysteries' 1947, he makes reference to this exceptional year, which it is important to note here, was not only exceptional in *lathonia's* case, but other infamous rare migrants appeared in inexplicable numbers, particularly the Camberwell Beauty, of which four hundred and thirty-six were recorded, also the Bath White was thirty-five strong, yet both the more frequent migrants, Clouded Yellow and Painted Lady were unusually scarce that year. Acworth states that the majority of the rare migrants were found in the Autumn and the cause common to all these occurrences was an exceptional Easterly wind after the maturing of the Autumn broods. Is Acworth speculating here, seventy-five years prior to the publication of his book, or did he have access to some form of meteorological records for the Autumn of this year?

The majority of the 1872 records are from Kent, but another unique and unusual record comes from Felixstowe, Suffolk, where a specimen was found dead on the shore on July 26th, supporting the theory of a mid-July migration in this year, thus producing September adults. This again is adhering to Frohawk's fifty day egg to adult figures. The origin of this seemingly confirmed immigrant to our shores (almost anyway) with the position of Felixstowe on the British coast in mind, seems to be very likely Holland, where *lathonia* is a resident species along the North Sea coast, yet scarce inland where it is thought to be a migrant from South and East.

Fifteen specimens were recorded in 1874, two years after its relative abundance in Britain, but no data seems obtainable from these specimens. It has come to note, through the pages of P. B. M. Allan's 'Talking of Moths' 1943, that during the late 1860's certain Mr. George Parry of Church Street, Canterbury, Kent began to be acclaimed as a lepidopterist and dealer, specialising in fraudulent accounts of, among other species, *Argynnis lathonia* in Britain, in order to increase the value of set specimens labelled 'England', as opposed to those relatively valueless ones captured on the continent. Of the 1868 records for *lathonia,* of which there are forty-six, thirteen can now be considered fraudulent, being found in Canterbury. These were reported in 'The Entomologist' then edited by Edward Newman, but later reports were declined, Mr. Newman feeling that thirteen was going a little too far. However, Mr. Parry was determined to have these thirteen *lathonia* given British Nationality and went to the extreme of obtaining three affidavits testifying them as genuine British examples. These were signed by a Canon, a landowner and a certain Mr. Edney, who was evidently of doubtful character. These fraudulent records for *lathonia* in 1868 leave a new total of reasonably reliable records to thirty-three.

In the great *lathonia* year of 1872 Parry was quick to take advantage of such an opportunity, obviously with such a good year for the butterfly his accounts would be more readily accepted. On August 4th of this year he claims four taken on Swarling Downs, on Vipers Bugloss (a late date for that flower?) exidently in poor weather, with drizzle, so he supposedly found them resting, as they certainly only feed in sunshine. In the September of this year Parry was out once again, claiming two on Swarling Downs on the sixth and a day later eight, one of which was a supposed female. He seemingly went to great lengths to prove these captures and sent living specimens to varied lepidopterists of the day including Mr. Stevens, Mr. Woods and the Rev. H. Burney. It is a pity here that the 1872 records of *lathonia* being found freshly emerged from its pupa, wings still limp, seems to have been contrived by Mr. Parry, so must now be discounted. These facts now make the record fifty total for *lathonia* down to thirty-six making 1945 possibly the best year by just one. P. B. M. Allan also suggests that during August and September of 1872, of some twenty-five specimens reported from the South Coast many were reported twice.

Mr Parry also became infamous for reporting the Continental *Argynnis niobe* twenty miles from Canterbury and resident, even sending Newman and Henry Doubleday live specimens as 'proof'. In 1874 when fifteen *lathonia* are on record, all of these apparently appeared in Canterbury, nowhere on the coast or elsewhere inland. Parry now seemed to have an assistant, a Mr. Wincheap, and this gentleman sent five living specimens to Edward Newman, claiming they were captured in a field near Broadstairs, Kent. Mr. Wigan was also an associate of

Parry during his scheme with *niobe*. Parry claimed a further ten, with the profitable Swarling Downs again figuring in September of 1874. All fifteen records for this year are fraudulent leaving 1874 a blank for *lathonia*. Two years after this Edward Newman died and hopefully from then on the escapades of George Parry and Mr. Wigan ended. A detailed account on this situation can be found in the seventh chapter of P. B. M. Allans book 'Talking of Moths' and is entitled 'The Kentish Buccanners'.

Only 7 specimens are recorded between 1874 and 1880 in which year J. W. Tutt tells us of eighteen specimens, recorded by a Mr. Sydney Webb, one under the total of nineteen on record in the tables of C. B. Williams Insect Migration. 1882 is the next year with a reasonable migration having occurred, with exactly half the record number of captures being found, thus twenty-five, and all data is from the neighbourhood of Dover, Kent. The most interesting fact to emerge here, and one which again adds enormously to facts pointing towards British bred specimens, was the finding of a specimen with crippled wings on 14th September. This specimen was more than likely unable to cross the Channel, although to be fair to this record, the amount the specimen was crippled is unknown, and as it seems to have been captured, and presumably dispatched and stored in a collection, it could have possibly been only slightly malformed, and reasonably fit to represent a cabinet specimen, therefore capable of sustained flight? However this is theoretical, and perhaps this does appear to have emerged from a pupa on British soil, the September date adding to these thoughts?

J. W. Tutt expands on this Dover visitation when he explains how he saw twenty specimens in the collection of just one collector, who had purchased these, at ten and fifteen shillings apiece, and there were others who had bartered for *lathonia* from so-called professional collectors, who seemed to abound in this favourable district, and profitable one for them. It does seem that more than the twenty-five recorded, were taken on the East Kent coast in 1882 and in a recent butterfly collection of H. J. Turner of Bournemouth, which was catalogued for sale at his death in July 1975, there was a specimen of *lathonia* dated this year as a male from Folkestone, where probably more examples were taken.

The Dover area again figured very markedly the next year, 1883, but yet again the majority of records were from September, lack of May records suggesting that none of the 1882 Dover specimens produced an early brood the following year. If *lathonia* could survive the winter in this country, from September laid eggs (presumably overwintering in the larval stage as do *euphrosyne* and *selene*, both vioet feeders) this would have been the optimum year to have recorded this event on the East Kent coast. Perhaps digressing somewhat, but it is of interest

here, that Higgins and Riley (1970) state that *lathonia* is capable of hibernating as an egg, larva or pupa, according to local conditions, a statement I feel very sceptical about, for judging by the habit of other closely related species, this statement seems to have little scientific foundation. In 1883 came the second instance of a pair being found *in cop* on a Thistle, September 22nd at Dover, the same locality as the first paired couple were found in July of the great 1872 year. A mated female in July or September, particularly the former, would surely lay eggs in the vicinity, though perhaps a late September mated specimen would attempt migration from British shores with her eggs, although temperatures at this time of year are still probably suited for adult *lathonia* activity. The females found *in cop* on these two occasions were surely British born, as female butterflies on emergence are usually quickly mated, in some cases (*Colias australis,* Austria 1973) I have seen the females wings still limp, and yet *in cop.* Would an unmated female really attempt a journey across the Channel anticipating fertilisation on arrival? Yet more evidence supporting the theory of *lathonia* actually having bred in this country, thus denied by C. B. Williams.

As far as aberration in this species is concerned, to find *lathonia* itself in this country is some achievement, yet we have an aberration recorded from Dover, though data is uncertain, Frohawk and Tutt's information differing slightly, though perhaps it is conceivable to think that two different aberrations were taken in the years 1882 and 1883 J. W. Tutt describes one from the Dover visitation previously described in 1882, as having the black spots near the middle and base of the wing enlarged and joined. Frohawk's description is of one taken September 21st 1883 with the central markings enlarged and confluent. Frohawk also records only eleven specimens from this year, whilst C. B. Williams tables note sixteen. *A. lathonia* does seem to be a fairly variable species on the continent, as are most Fritillaries, and extreme specimens appear to have occurred from time to time. It seems also prone to pathological variety (deformation of the scales on the wings) which give the insect patches of white coloration, similar to that sometimes found in specimens of *Argynnis paphia,* L.

In 1884 after all the Dover activity of the previous two years, only three are on record (two in C. B. Williams tables) only one with an insufficient data of Kent, with possibilities of Dover again. A year later only a single specimen with insufficient Kent data again can be found, though C. B. Williams lists one other. No more seem to be on record up until 1892 and this leaves us with interesting figures of between one hundred and forty and one hundred and fifty examples of *lathonia* recorded in the twenty year period from 1870 to 1890 which is inclusive of its greatest year ever, 1872 when a third of this total was accounted for. In 1892 after *lathonia's* evident absence for six

years, two are tabulated by C. B. Williams and one I can find a Brighton data for.

In 1860 W. S. Coleman published a book on British Butterflies which interestingly lists innumerable localities where *lathonia* had been recorded, several new ones emerging. These localities are: Brighton, Shoreham, Eastbourne, Dover, Margate, Ashford, Chatham, Exeter, Bristol, Marleston near Norwich, Colchester, Lavenham (seven in 1859), Peterborough, Ramsgate and Ventnor. Now followed a very lean period for records of *lathonia* from 1895, when four without trace of any data were recorded, until 1945 when another good year occurred. During this lean period however when ones, twos and sometimes threes were recorded on occasions, some data is available. In 1898 one at Clifton in July and a year later one at Christchurch in August. Another record in 1901 for Poole and an unusual *June* record for 1910 in the Warren, Folkestone, Kent. In 1921 two with data have been located; C. B. Williams tabulates three. One for Dorchester, Dorset in July of that year and a Mr. A. H. Wood records a male near Crundale in Kent on August 7th. This being one of the infrequent occasions the sex of the specimen has been recorded. Determination of the sex in this species is not too critical, particularly when displayed in a cabinet and therefore accessible. Females are much more boldly marked in black than the male and the female forewings are not quite so pronounced "Painted Lady" shape as in the male. Some idea on how poor was this spell of thirty years for *lathonia* can be made, discounting the 1921 records, between the years 1890 and 1920 less than twenty specimens are on record.

Up to 1933 there are just over thirty records with little data on any being available. 1934 gives us the first real data from a Surrey locality, that of a specimen being taken on September 30th at Upper Brigg Farm, Warlingham, Surrey. The next year worthy of any note was surely 1945, when thirty-seven were recorded. This year was not only exceptional, but as in 1872 other rare migrants reached unprecedented numbers. The Bath White had a record number of six hundred and fifty examples whereas the previous best recorded was thirty-five in *lathonia's* best year of 1872. The Long-tailed Blue also recorded its highest number ever with thirty-one being counted. Three examples of the Short-tailed Blue were also recorded. Perhaps some of the best evidence yet of *lathonia* having bred in this country comes from an acount from this year of twenty-five specimens being observed concentrated in a small area at Portreath, Cornwall, suggestive of specimens that had emerged in this location, although precise data as to the month seems sadly lacking. One must compare this instance with the Dover one of 1882 where again specimens seem to have been confined to a relatively small area. Only two were recorded in 1946 despite the Portreath concentration, another example of *lathonias* incapabilty of overwintering in any of its stages in Britain?

Hugh Newman (1953) gives an account of *lathonia* in the Channel Island of Sark and is accompanied by a note on a young fellow at the Bluecoat School, Christs Hospital, Horsham, Sussex, who secured two specimens which had evidently just emerged near the school rugger field. In 1960 the second record for Ireland comes in with one noted on the 30th August near Cappagh, Co. Waterford, South Eastern Ireland. The history of *lathonia* now begins to fade, Baron De Worms in his publication on the Butterflies of London and its Surroundings, states that it had been seen annually up to 1950 and Edmund Sandars in his Oxford Pocketbook suggests two or three specimens each year. In the period between 1833 and 1958 approximately four hundred *lathonia* are recorded as British examples. It is doubtful whether the figure has topped the five hundred mark and present day data seems to be lacking. Worldwide Butterflies Ltd., in a 1975 catalogue offering mainly extreme aberrations from a large British Butterfly collection which they had purchased, had five British *lathonia* for sale at £6 each, interestingly all of which were males.

K. J. Willmott (3822)

REFERENCES

Acworth, B. (1947). Butterfly Miracles and Mysteries. London. Eyre & Spottiswood Ltd.
Coleman, W. S. (1880). British Butterflies. London. George Routledge & Sons, Ltd.
Frohawk, F. W., (1934). The complete book of British butterflies. London. Ward, Lock & Co.
Higgins, L. G. & Riley, N. D., (1970). Butterflies of Britain and Europe. London. W. Collins & Son Ltd.
Howarth, T. G. (1973). South's British Butterflies. London. Fred Warne & Co.
Newman, E. (1889). Natural History of British Butterflies and Moths. London.
Newman, L. H. (1967). Living with Butterflies. London.
South, R. (1906). The Butterflies of the British Isles. London. Frederick Warne & Co. Ltd.
Sandars, F. (1939). A Butterfly book for the pocket. London.
Tutt, J. W. (1896). British Butterflies. London. Swann Sonnenschein & Co.
Williams, C. B. (1958). Insect Migration. London. W. Collins & Son Ltd.

BOOK REVIEWS

THE LIFE OF BEETLES by Glyn Evans. Published by George Allen & Unwin Ltd. 1977. 232 pp. 1 plate. 59 figs. Paperback. Price £2.95.

This book was first published in 1975 and now appears in paperback form. For the student of the Coleoptera it is an excellent introduction stimulating an interest in this vast Order of insects. Chapters deal with the characteristics of beetles, an outline of their classification and structures; life histories and reproduction; foods and feeding habits; habitats; populations and their activities and cycles; a chapter on beetles and Man and a final one on evolution. The text is very readable

and suitable for the novice as well as those more conversant with the order. There is an appendix which includes a dichotomous key to beetle families and their larval forms, a glossary of terms, suggestions for further reading and a biblography. An omission is any reference to A Coleopterist's Handbook. The book is full of interesting information and in this new form is a price which should enable it to grace the book cases of all amateur entomologists with catholic tastes.

P.W.C.

THE DRAGONFLIES OF GREAT BRITAIN & IRELAND by C. O. Hammond, pp. 115, Curwen Press, London (1977), price £9.75.

This volume comes from the same stable as 'The Butterflies and Moths of Great Britain and Ireland', that much-heralded series, most of which has yet to eclose from a protracted pupal stage. Cyril Hammond, the author, is already known for his contribution to Warnes' excellent 'Flies of the British Isles'.

This pedigree does not, in my view, however, merit the comment in her foreword by the celebrated Odonatologist Miss Cynthia Longfield, that it is "the Dragonfly book of the century"—with all deference to her own judgement, and indeed, modesty. That is not to say it is a bad book. The plates are excellent, showing every British species in full colour and at larger than life-size, though excluding much of the wings of most species. Salient parts of these are shown were markings or venation are necessary for determination. Also included are the now almost obligatory B.R.C. distribution maps. These are conveniently placed both on the same page as the species they refer to, and, in a larger format, all together near the end of the book. It is suggested that these be used for filling in ones' own records. One hopes that more entomologists, with access to this book, will follow this suggestion and contribute to the B.R.C. by sending in any such records for this still under-recorded group. One small caveat: the order of the large maps does not correspond to the sequence in which the species are arranged in the book, nor are there page references with the maps to help one locate the species they refer to.

The notes to species are brief and concise, confining themselves largely to characteristics useful for identification. Also included are short comments covering "Flight and Habitat", and "Status and Distribution".

The keys are useful and extend from the suborders down to generic level, from whence the plates and decriptions must be used. The late A. E. Gardner's 1954 key to the nymphal stages is also included, in lieu of a more comprehensive guide which would have been produced but for the author's untimely death.

The introduction is adequate but I feel the author could have used

more of his undoubted knowledge to bring together a greater amount of information, for instance on breeding or the ecology of Dragonflies.

One feature I deplore is the use of newly-contrived "completely English" English names such as Emerald Damselfly and Azure Hawker, to replace those originated by Miss Longfield—in this case, Emerald Lestes and Blue Aeshna respectively. It seems to me to be a disservice to entomology to add to the multiplicity of vernacular names (thereby compounding one of their great disadvantages), particularly where those already in use provided an ideal stepping-stone for beginners to progress to Latin names by virtue of their partly Latin form. The authors stated intention of helping beginners might have been better served by including a guide to pronunciation of Latin names, à la Miss Longfield. Having incorporated two sets of English names, the author proceeds to omit them from the Index, though including common names for plants.

Commendable features include a table of flight-periods, check-list, and the guide to external structure.

Having made a number of criticisms, it remains an inescapable truth that this is an invaluable guide to identification and an essential tool for those interested in the Odonata. It is also very attractively produced, and I would certainly not dissuade anyone whose pocket is deep enough from buying it.

C.J.G.

THE NATURAL HISTORY OF SELBORNE: The Gilbert White Museum Edition. Shepheard-Walwyn (Publishers). Price £9.95.

This is not a new book, it was first published in 1789 by Gilbert White's brother in Fleet Street and has since been re-published many times. The Gilbert White Museum Edition has however, the advantage of superb illustrations by Frederick Marns. The publishers, Shepheard-Walwyn, commissioned the artist to produce illustrations for the book, of sites in Selborne parish which were relevant to the letters. There are thus ten pencil sketches, in remarkable detail, of The Wakes, the view from The Hanger amongst others. In addition to these illustrations there are engravings of British birds by Thomas Bewick. In reviewing a book such as The Natural History of Selborne, one can say little about the text, which has proved itself to be of immense interest over the last two hundred years; the letters are a fascinating account of Gilbert White's observations. One can only compare this edition with those that came before and the layout and illustrations make this book a pleasure to read.

The illustrations proved so popular when the originals were seen that a portfolio has been produced containing prints of four of the drawings. The price for this is £9.95.

Habitat

THE FAMILY NATURALIST by Michael Chinery. Macdonald and Jane's, 1977. There is much in this book for £6.95; too much. Natural history includes aquatic life, birds, mammals, insects and other small animals, trees, herbaceous plants, rocks and minerals, and things to do with farms—with a chapter on each. The book begins with a lesson on how to draw, and how to read the weather; and there is a "technical section" on binoculars, photography and recording. It is, in two respects, a hotchpotch. It is packed with fascinating and useful snippets, and more-or-less intriguing things to do, ranging from making a wormery to making a wooden whistle. However it seems to have been compiled on the basis of what will condense to a two-page spread. Graphically, it is a strange mixture, with a "1950's children's encyclopaedia" style predominating. It will undoubtedly stimulate many children, and the dominance of illustrations over words makes it very easy to browse. It may not lead a child to a fuller appreciation of natural history; and if it does, it will not enable the rest of the family to answer the myriad questions. Parents who are already keen naturalists are unlikely to need it; and it will be more valuable for showing others that there are many more things for their children—and them—to do than they thought. The many small experiments suggested will make it very stimulating in the junior school.

Habitat

INVERTEBRATES OF STREAMS AND RIVERS: A KEY TO IDENTIFICATION, by Michael Quigley. Arnold 1977. £2.95.

Some 75 families of aquatic animals are here represented in 84 pages. Thus, in most cases only one or two species are included, and illustrated by simple, effective line-drawings. If you want to know that your bug is *Sigara* and not *Corixa,* or whether you have a Leptocerid or an Odontocerid caddis larva, the keys should be of use to you. As David Bellamy writes in his statutary foreword "here is a nice book". Where he writes that it is a very welcome addition to the literature, I am inclined to be a little less eulogistic, and to remember that it costs £2.95.

Habitat

THE LIFE THAT LIVES ON MAN by M. L. A. Andrews. Faber, 1976; 183 pp hardback. £4.95.

This book will probably upset many armchair naturalists. Some will rush to the mirror, to check for mites in their eyebrows; some will spoil soap and water (in vain . . .),trying to remove yeasts from their hair; some will scratch, and cast repeated glances at the dog by their feet. The true naturalist, of course, will be intrigued but not alarmed: he has already been sucked by flea, fly and tick, and is used to being grown upon. This is a lively book, the outcome of a television venture,

and is well illustrated with drawings and stereoscans. It is also a serious book: for besides pointing to the obvious disease and vector organisms, it carries the message that we must "learn to live with our ecology". We are covered with life for a reason. By getting rid of our guests, as one bacteriologist has said recently, "we are quietly and innocently killing lots of patients".

Habitat

THE NATURE TRAIL BOOK OF PONDS & STREAMS by Sue Swallow. Usborne Publishing, price: hardback £1.95, paperback 95p.

The sixth in the popular Usborne series for children, this book looks at common birds, mammals, plants, fish and insects found in or near freshwater ponds and streams. Observation or practical projects are included in the book to encourage children to go out and see for themselves. Profusely illustrated in colour, the book would be a good addition to any child's book-case.

Habitat

LETTER TO THE EDITOR

Dear Sir,

I have followed the nicely balanced arguments on the question of collecting for, I suppose, something approaching six years. These have been presented under many guises varying from the rights of the individual, to pseudo scientific reasoning that no damage has been or is likely to be done to our insect population.

The inescapable facts are:

(a) In this day and age collecting sets a very poor example and is inconsistant with the demands that so called nature lovers make for the protection of the environment.

(2) It is unnecessary for amateurs to amass drawers of dead insects other than for their own purely selfish needs. No new insects are likely to be discovered and even if one accepts the remote possibility of something new coming to light it is far too great a price to pay.

(3) There are alternatives. Bird watchers no longer find it necessary to kill the subjects of their pleasure or collect their eggs, so why cannot insect lovers use their eyes or cameras?

Mark my words, we will eventually be prevented from carrying out these selfish and insensitive acts and it will be the consequence of legislation. If you do not believe me then put this letter somewhere you can find it in say fifteen years time!

Yours sincerely,

Hugh Clarke (3910)

A SECOND STRING

Orthoptera and Dictyoptera

(Continued from page 44)

CRICKETS (GRYLLIDAE)

11. Field Cricket

(Gryllus campestris L.)

General Distribution: As a British insect this engaging cricket seems now to be confined to two colonies in W. Sussex. Attempts are being made—with due cognisance of the Nature Conservancy and approval of the relevant County Trusts, to establish or re-establish the native strain of the species in other areas; but if any readers knows of field cricket colonies outside W. Sussex please tell me, it really is important that any such unrecorded colonies are known in the interests of the national survey of orthoptera and the conservation of the native strain of the species.

Where Common: In the two colonies mentioned and then only over very small areas. The great colonies at Selborne, now under mature beech trees; Fawley (now under the refinery) and in W. Surrey (now swamped by birch and scrub) are gone.

Habitat: Here at the edge of its natural range the field cricket seems to need a very exact habitat—comprising a light soil (chalk or sand) into which it may burrow to over-winter; full exposure to sun—particularly morning sun; a warm site sheltered from prevailing cold winds and, most importantly. short grass. When rabbits died off with myxomytosis in 1954-55, much suitable terrain, especially in W. Surrey disappeared under scrub.

Recognition in Field: Medium. Unmistakable. The burrow entrance is highly distinctive, with its neat porch, sunning platform and dung-heap. The burrow opens more or less horizontally and the entrance is screened by an overhang from directly above. The stridulation of the male in late May-July is only likely to be confused with that of house crickets, which may be present in large rubbish tips out of doors. A chorus of ringing chirps from hot grassy slopes or perhaps adjacent edges of cropped fields where the ground is disturbed will certainly indicate a field cricket colony. Adults are black with a pale brown "bar" across the base of the fore wings.

Anticipated New Records: It is possible it may still exist in some old pasture in W. Surrey. It was found in Surrey in 1964. There are unfrequented, military occupied areas on the Wiltshire chalk which might hold colonies, although this is rather a forlorn hope. It is clear that although the species was widespread in Britain, up to early in this century it was always restricted to a few or perhaps only a single, if sometimes large colony in any area and was not present as a matter of course as it is around fields and along road-sides in Southern Europe.

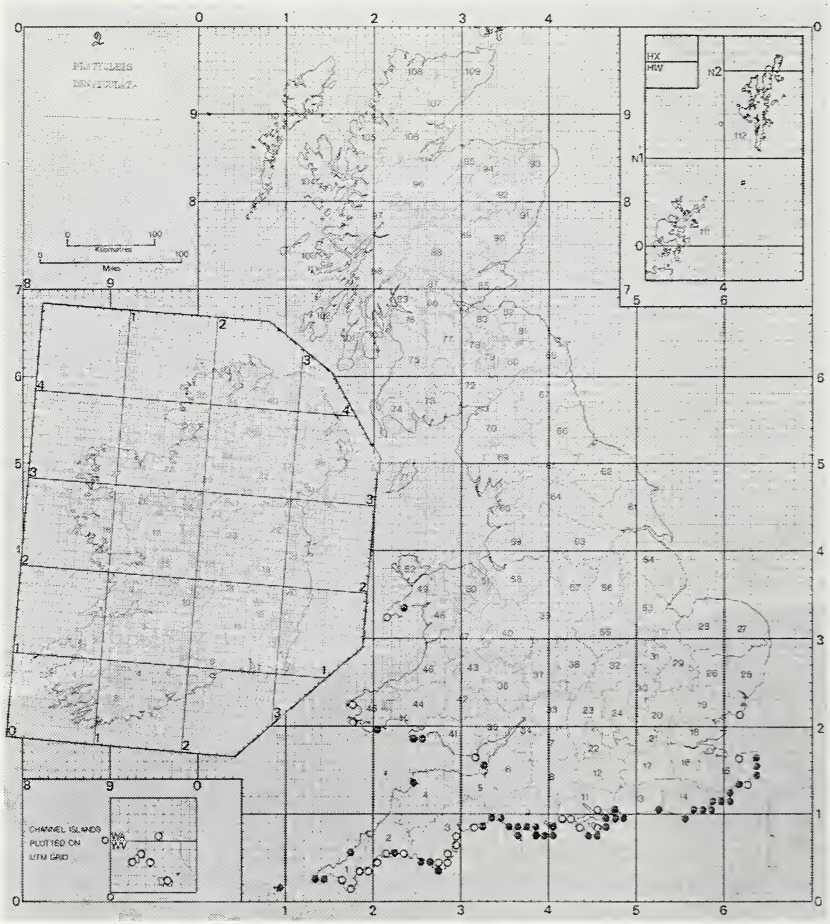


Fig. 4. Map 2: distribution of Grey Bush-cricket (species No. 4).

12. House Cricket
(Acheta domesticus L.)

General Distribution: At present so thoroughly established in large outdoor rubbish tips as well as in modern continuously heated industrial buildings that it must be mentioned here along with the truly native species. In the hot summers of 1973, '75 and '76 house crickets became well distributed in hedgerows and road drains and the males could be heard chirping in many districts—often being carried by dustcarts and other vehicles or even on very hot nights, flying considerable distances from their parent tips.

Recognition in Field: Medium. The pale brown nymphs are immediately apparent during warmer months when old cans and polystyrene sheets are turned over on the edge of tips, but the main feature is the splendid sound of hundreds of chirping males. This sound reaches a peak in late summer and again to a lesser extent about Christmas time, with varying numbers of individuals chirping in between these peaks.

13. Scaly Cricket
(Mogoplistes squamiger (Fischer))

General Distribution: Remarkable; this strange little insect is known only from the east end of Chesil Beach on the west side of the causeway to Portland in Dorset. Here a colony of apparently parthenogentic females persists many hundreds of kilometres north of its main centre of distribution around the Mediterranean. Only a few individuals have been found in the Dorset colony at any one time, which, together with the fact that only females have so far been found does suggest a relict colony adapted to a tiny area, rather than accidental introduction from the adjacent naval base during the last war. A casual introduction to a suitable environment might have been expected to flourish and then decline rather than persist from the late 1940's until the present time. In addition, one would expect males as these are present in other known localities.

Habitat: Under stones and debris and in crevices in broken concrete around a sheltered shore line of the lagoon.

Recognition in the Field: Small. In appearance, and behaviour, this matt black scale-covered creature seems to be rather more like a cockroach than our other native crickets. It seems to be nocturnal, so the colony should be studied at night—incidentally with great care and no collecting. If this really is a relict colony it is of greatest ecological significance and should be disturbed as little as possible. The species is completely wingless and the males cannot therefore stridulate.

Anticipated New Records: The Scaly Cricket may occur in the few other visually suitable localities in the warmest parts of Britain; and may be anticipated at least in other places along the coast of East and West Fleet behind the Chesil Beach. Males found 1977! (D. R. Ragge, pers. comm.)

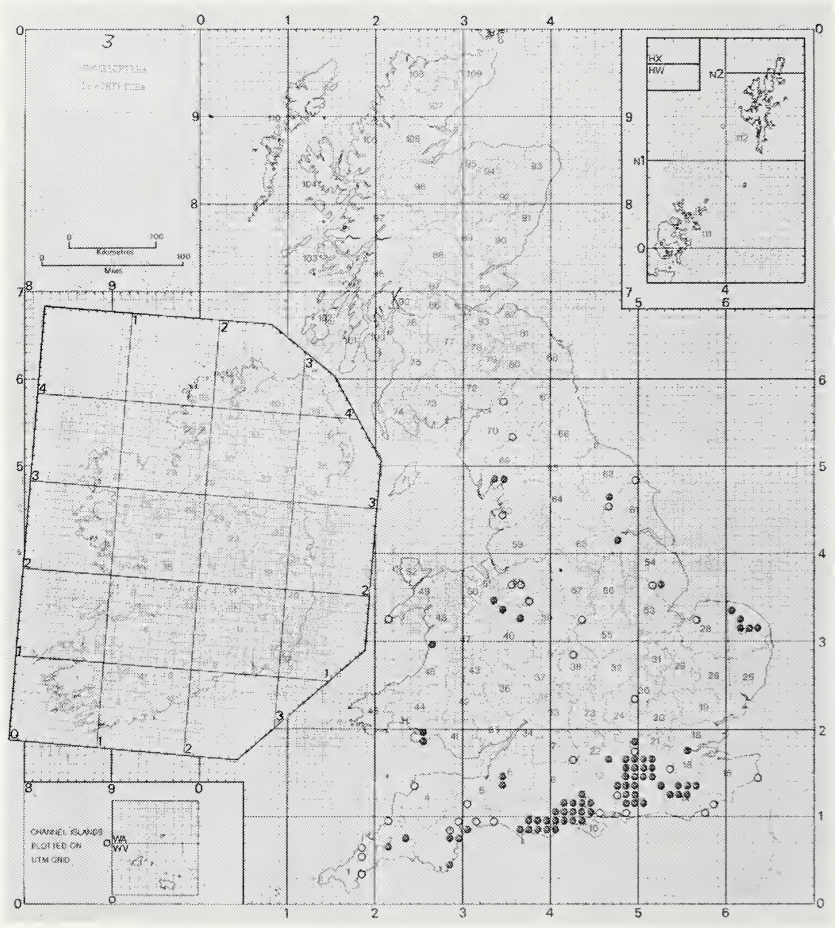


Fig. 5. Map 3: Distribution of Bog Bush-cricket (species No. 6).

14. Wood Cricket
(Nemobius sylvestris (Bosc))

General Distribution: Also remarkable. As is well known this charming little cricket is locally abundant in many parts of the New Forest, but apparently absent from equally suitable looking territory in the Wareham area of Dorset, and indeed from that county, and yet present in several places in E. Devon. There are also two colonies in the Isle of Wight; Parkhurst Forest and on a wooded cliff top between Foreland (Bembridge) and Culver Cliff. A further recently discovered colony is near Wisley Gardens in Surrey. There is also an old (doubtful) record from Derbyshire. Even discounting the last old record, the distribution of the Wood Cricket in Britain is distinctly unnatural. More than that, a popular entomological writer of his day, the Rev. Wood, writing in *Insects at Home* (1871) recorded the insect as very rare "known from a gravel pit near Lyndhurst". A century ago that would seem to have been the only known colony in Britain. In addition its European distribution is southerly and there seem to be few places where it occurs in N. France or the Low Countries. All this does suggest that the wood cricket was probably introduced here with imported trees from the Continent in the last century and has thrived where conditions suited it. The Wisley colony however seems to be of recent origin—perhaps on azaleas from Exbury.

Habitat: In deep accumulations of leaves especially of oak and holly litter, where half grown nymphs are able to hibernate. In summer the adults and current season's nymphs spread out under bracken and heather or even into more open ground. In the New Forest the wood cricket does not seem able to thrive except around the associated oaks and hollies. The acres of bracken litter or stands of conifers and beech only seem to support colonies where oak and, or, holly are also present. On the cliff top colony in the Isle of Wight the cricket is under oaks but also seems to be well established in the deep fissures formed by the continuous land-slips even over the face of the shallow cliff line. In some places, as around Waterditch, just east of Christchurch, wood crickets are numerous in sandy roadside banks, but these are topped with scrubby oaks and holly. (See Map 4).

Recognition in the Field: Small. Where numerous can easily be seen by turning over leaves of holly and oak. The brown mottled adults and tiny paler nymphs skip and run for cover in all directions. From early July the beautiful purring call of the cricket readily reveals the presence of colonies. The accumulative sound has something of the call of a distant night jar although the stridulation of each individual singer only carries a few yards. It may be heard throughout the day and well into the night.

Anticipated New Records: Presumably the wood cricket can only survive in Britain in warm woodlands. Chance introduction on imported

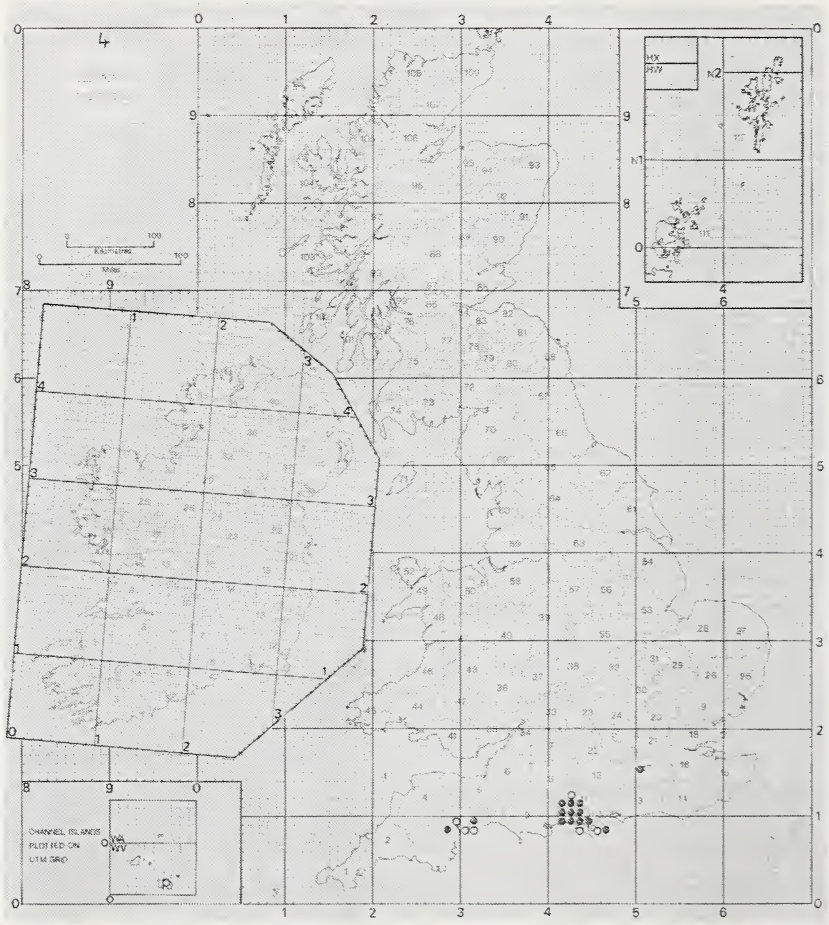


Fig. 6. Map 4: distribution of Wood cricket (species No. 14).

broad-leaved forest trees is now slight as there are Forestry Commission regulations prohibiting the importation of oaks and similar species from districts where the species is present. The most likely records of new colonies would be in warm places where large consignments of shrubs from nurseries in the New Forest area had been planted. Colonies might well exist in S. Ireland.

MOLE CRICKETS (GRYLLOTALPIDAE)

15. Mole Cricket
(Gryllotalpa gryllotalpa (L.))

General Description: Although never generally distributed the mole cricket was once well established in many wet areas such as the fens of East Anglia. There are old singleton records from Lough Neagh in Ulster and the Clyde area of Scotland while large colonies existed in parts of England. Incidentally the Rev. Wood (1871) refers to the species being present in dry sandy soil near Besselsleigh near Oxford, but all other records seem to be from wet peat, sand or even clay. Since the turn of the century, probably as result of extensive drainage, there seems to have been a great decline and by the 1950's Mole Crickets were in evidence only in the sandy county of W. Surrey, where however, there have been no recent records. In the last ten years mole crickets have been re-found on a private estate within the boundaries of the New Forest; near Southampton and in Cheshire, while it seems from a sighting in 1976 (coupled with an earlier one in 1964) that there is also a colony near Uckfield in E. Sussex.

Habitat: Wet land in warm localities; the insect seeming to become numerous where there are heaps of recently dug soil in such places; otherwise the crickets appear to be sparse in numbers.

Recognition in the Field: Large. Unmistakable, but seldom seen unless trapped in a butt, squashed on a road or pavement or dug up in a garden or allotment. The mole cricket is both subterranean and nocturnal. Both sexes stridulate and the call of the male is a very distinctive and attractive purring sound, much louder than that of the wood cricket and muffled, as it is produced within the burrow entrance. However, the song is rarely heard here.

Anticipated New Records: As the mole cricket flies in hot summer at night it may spread into new sites in localities where it is present, but single specimens in towns are more likely to have arrived with vegetables imported from southern Europe. In addition, so many once suitable areas have been drained so that there is progressively less and less habitat available in this country. The cricket may still be anticipated in Surrey as well as in its old haunts by the Hampshire Avon; while the recent Cheshire record suggests that the species hangs on in what is left of the old mosses near Manchester. It may also be that here at the

northern edge of its range tiny colonies of parthenogenetic females persist. These of course could not be located by sound as the female's stridulation is unobtrusive. No one has investigated whether or not the mole cricket can reproduce parthenogenetically and it is not an easy species to rear artificially, but it is a theory that some reader may care to test. It would explain the way the insect turns up in widely separated districts after long intervals. If true, then mole crickets could be anticipated in many warmer places where natural wetland habitat survives.

GRASSHOPPERS (ACRIDIDAE)

Some of the individual species of native grasshoppers are not easy to identify without practice as colour patterns are not a reliable guide, but all our examples have distinctive stidulation—a valuable guide in the field, well demonstrated on the record recommended.

16. Large Marsh Grasshopper
(Stethophyma grossum (L.))

General Distribution: Swampy localities in mild districts and thus very liable to suffer from extensive drainage of virgin wet lands. This splendid insect still has strong colonies in the wettest parts of the New Forest and the Wareham heathlands to the west, as well as in S.W. Ireland and Mayo where it is the country's largest orthopteron. Colonies still survive in the Somerset marshlands around the foot of the Polden Hills, but the species apparently become rare if not extinct in the Norfolk Broads. It has certainly vanished from Cambridgeshire while the E. Cornwall record appears to have been based on doubtful evidence.

Where Common: Very locally in the New Forest; near Wareham and in S.W. Ireland.

Habitat: Virtually confined to really quaky bogland with plenty of bog myrtle but only in warm localities and thus absent from much otherwise suitable looking terrain in northern Britain.

Recognition in Field: Males medium, females large. When disturbed flies readily on broad silvery hind wings and is then very distinctive, but once it lands and "clamps" down its dull green, dark brown and light yellow stripes provide excellent camouflage. The tibia (thigh) of the hind leg is bright scarlet, but this is concealed in a resting specimen. The colour of the male is constant but females seem to vary from a lovely rich purple, through the "freshly painted" look of the typical male to a rather dull dark grey-brown—but always there is a bright yellow stripe lengthwise along the fore-wing and scarlet on the hind legs. The stridulation of the male once learnt is unmistakable—a strange, slow sharp ticking, suggesting perhaps bubbles bursting in succession or someone clipping a hedge at a slow, measured rate.

Anticipated New Records: It is to be hoped our largest grasshopper will soon be refound in the Norfolk Broads (the Ant was its main station) and there seems no reason why it should not occur in swampland at low altitude in Cornwall or even in Wales and Cumbria, where conditions are not too dissimilar from S.W. Ireland. It is not an obtrusive insect, in spite of its size and usually requires special search unless, as on Wilverley Bog, it is numerous.

17. Stripe-winged Grasshopper
(Stenobothrus lineatus (Panzer))

General Distribution: An insect of hot, dry grassland, the stripe-winged grasshopper is generally common on the chalk of southern England and the limestone of the Cotswolds but is very local in the Chilterns although quite widespread in Breckland. There are isolated colonies in Devon and Cornwall and quite extensive colonies on dry, sandy ground in Berkshire, Surrey and the Dorset heathlands. It also occurs sparsly in the New Forest. It has not been recorded north of a line from the Wash to the Severn (See Map 5).

Where Common: Locally in the above mentioned localities.

Habitat: Dry grassy places on chalk, limestone, serpentine or sand, in warm localities.

Recognition in the Field: Medium. Red on abdomen and distinctive stridulation readily separates this from the much more widespread but visually similar common green grasshopper (19). The stridulation of the male is a pulsating, metallic sound quite unlike that of any other British grasshopper.

Anticipated New Records: So far there are no records of the stripe-winged grasshopper from the Mendips, or the central chalk ridge of the Isle of Wight—although it is common on the chalk at Ventnor. Records from both these localities may certainly be anticipated, as well as perhaps the Gower Peninsula and further isolated colonies in the Devonian peninsula.

18. Lesser Mottled Grasshopper
S. stigmaticus (Rambur))

General Description: So far known only from the east side of the Langness peninsula, south of Ronaldsway airport in the Isle of Man. Its status in Britain has been discussed in detail by Ragge (1963, 1965).

Where Common: Apparently quite numerous in its only known British station.

Habitat: Heathery, grassy terrain with exposed rock.

Recognition in the Field: Males small, females medium. British specimens are apparently noteworthy for their small size compared with specimens from France and elsewhere where the insect is widespread.

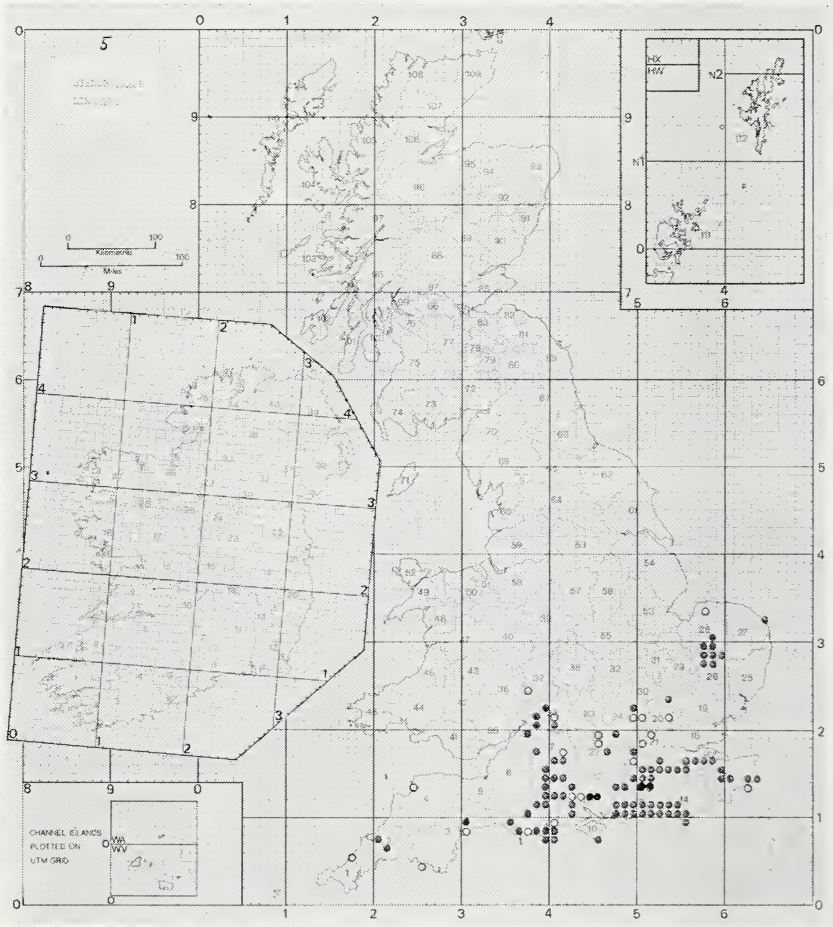


Fig. 7. Map 5: distribution of Stripe-winged grasshopper (species No. 17).

The stridulation of the male is rather like that of the meadow grasshopper, which is absent from the Isle of Man. The antennae of the male also become progressively thickened towards the tips but are not markedly clubbed as in the mottled grasshopper. Females of this species may be told from similar sized mottled grasshoppers females by the only slight incurvatures (seen from above) of the pronotum: it is markedly incurved in the commoner species.

Anticipated New Records: If present in England this rather unobtrusive insect could be readily overlooked amongst large populations of meadow grasshoppers as the stridulation is similar. Any very small, but fully winged and therefore adult grasshoppers (but see groundhoppers) should be checked most carefully. It would be very surprising if there was a single colony in the whole of the British Isles. Its consistantly small size on the Langness peninsula suggests that this is a relict and not accidentally introduced colony. Ragge considers that it might well occur in Ireland where the possibly more successful meadow grasshopper is apparently completely absent. Its discovery in a new British locality would be an entomologically quite exciting event.

19. Common Green Grasshopper
(Omocestus viridulus (L.))

General Distribution: Our most widespread grasshopper: this species occurs in coarse rather than short grass and is often numerous by streamsides. It is also our only mountain grasshopper occuring well up into the hills even in the far north where most other species are restricted to lower altitude if not to the coast. I have found it stridulating merrily at nearly a thousand metres on Ben Lawers in Perthshire. It is recorded throughout the British Isles except some of the Outer Hebrides and Shetland, but has not been found recently in Orkney or the Outer Hebrides. The species also seems to be absent or very scarce from the driest parts of the country such as Cambridgeshire and the vicinity of the Wash; the Thames estuary, the coastal plain of West Sussex and Dungeness.

Where Common: In many localities, even in parts of the Highlands; here usually by a stream valley.

Habitat: Almost anywhere where there is lush ground vegetation, but not common in close dry turf: thus on downland will occupy the summits and the hot but lush bottoms of the coombs and be rather scarce or even rare on the steep south facing slopes.

Recognition in the Field: Medium. The males have conspicuous dark brown sides to the fore wings and may be otherwise green or straw-brown. They resemble the stripe-winged grasshopper except that there is no red colouration on the abdomen, while the stridulation is quite different—it is that familiar rapid and continuous ticking, one of the typical sounds of a warm summer day. This resonant stridulation

may be heard as early as the last days of May in the south in a really hot summer like that of 1976. It is invariably the first to mature as well as the loudest of our grasshoppers. The bulky females usually lack the dark sides to the fore wings and may be green, pale brown or occasionally a rich purple. In some forms they look much like the female stripe-winged but lack the prominent little spur on the side of each blade of the ovipositer which is a good distinguishing feature of that species.

Anticipated New Records: This common insect will doubtless be found in many of the as yet unworked squares. It would be particularly satisfactory to rediscover the grasshopper in the Outer Hebrides and the Orkneys where the records are old. The stridulation of the male is so distinctive that misindentification is unlikely since the next species, our only kind with a similar "call" is totally different in appearance, with brilliant red on the abdomen when fully mature.

20. Woodland Grasshopper
(O. rufipes (Zetterstedt))

General Distribution: Much more restricted than was formerly thought and in fact known only from southern England with two main centres of population; the New Forest and W. Sussex—W. Surrey—E. Hampshire. There are more widely scattered colonies in E. Sussex Kent and the Devonian peninsula. Like the Wood cricket it is surprisingly scarce in the insect rich Wareham area, although present in Cranbourne Chase and the Blandford area. In addition it has also been found 1975-76 by road verges near Alston in Hants. close to old plantations. It has recently also been re-discovered in Essex, but it is rare in the Chilterns and not recently recorded from the Cotswolds. From the known pattern of distribution it might be reasoned that the woodland grasshopper, like the wood cricket, has perhaps been introduced. Against this its present habitat requirements rather indicate that it is a local species, originally centred on scrubby southern heathland in Britain, which has benefitted from afforestation in the warmer parts of the country and spread into the niche provided by periodic clear felling and the provision of access rides.

Where common: Around plantations and adjacent moist heathland in the New Forest, Sussex and Surrey.

Habitat: Plantation rides, clear felled areas and moist, scrubby heathland but not open moorland. Occurs in rides between stands of conifers as well as broad-leaved trees. Commonest over lighter soils but present on clay.

Recognition in Field: Medium. The purring call of the male is similar to, but to the practiced ear, distinct from that of the common green grasshopper which often occurs with it in woodland areas. In appearance there is no excuse however for confusing adult specimens of our two Omoces-

tus. In both sexes of the woodland grasshopper the palps by the mouth have chalk white tips; those of the common green are brownish. The only other native species with white-tipped palps is the otherwise quite distinct rufous grasshopper (25). In addition male woodland grasshoppers are rather unusual amongst British species in having a fixed colour scheme: they are very dark brown—almost black above, while the abdomen in mature specimens is boldly banded in white and tipped with scarlet: a most colourful effect when seen in close-up. The much larger females are either decked out similarly but less brightly than the males or the forewings, head and pronotum may be an attractive dark green instead of dark brown. This green variant is not found in the males, and is of a rather different shade from the greens often assumed by several other species. There is no excuse for mis-identifying fully adult woodland grasshoppers.

Anticipated New Records: New finds or re-discoveries may be anticipated in heathy (not moorland) areas in the S.W. There is an old record for the Gower area of S. Wales and its re-discovery in the Cotswolds would also be important. Farther afield, there might be suitable habitat in warmer parts of central Wales and Cumbria or even S.W. Ireland.

The Four *Chorthippus* species in Britain comprise one very local, one localised and two very common species, which however are readily told apart from each other. The ridges and incurving on the dorsal side of the pronotum are important for recognition in this genus.

21. Meadow Grasshopper
(Chorthippus parallelus (Zetterstedt)

General Distribution: Probably the most numerous and certainly one of the most familiar grasshoppers in England. The meadow grasshopper is also widespread in Wales and Scotland, but usually remains at lower altitudes than the common green. It is however apparently completely absent from the Isle of Man and Ireland, although present as near to Ireland as the Kintyre peninsula and Islay.

*Where Common: G*enerally the commonest grasshopper present in places where it occurs.

Habitat: The secret of its success seems to lie in its capacity to thrive in a wide range of habitats, from swampy ground and woodland rides to dry downland and dunes. Only the common green amongst our species seems to have such a wide tolerance of different habitats and this species is not able to thrive in really swampy or at the other extreme really dry, almost arid terrain on which the meadow grasshopper seems able to exist.

Recognition in the Field: Medium. Our only non-flying species: the females are like outsized nymphs, while the males have reduced although not so obviously abbreviated forewings. A rare form (f. *explicatus*)

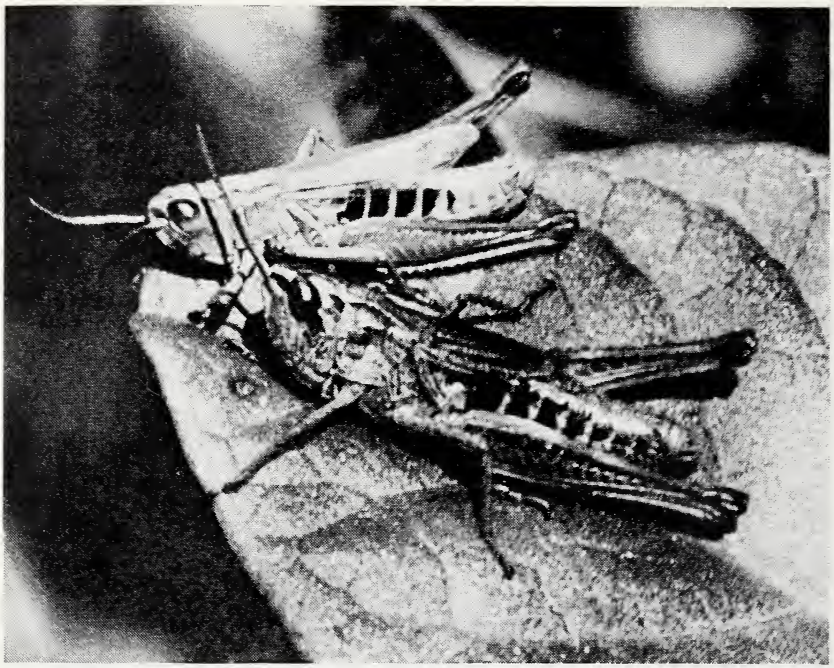


Fig. 3. Meadow Grasshopper (The male is behind), our only flightless species. (Photo by E. C. M. Haes)

has fully developed functional wings and this form is easily confused with lesser marsh grasshopper, except that the two species have quite different chirps. That of the meadow grasshopper is rather like a short, dry chuckle or chattering. Colour is very variable but usually a mixture of green and brown, while females are occasionally bright dark pink and most striking in appearance. The females are nearly twice the size of the males. In this species the sides of the pronotum are slightly incurved (see Fig. 3).

Anticipated New Records: The Meadow Grasshopper doubtless remains to be found in much of Scotland and N. England as yet unexplored for Orthoptera and since so little of Ireland has yet been covered may still be anticipated there—perhaps in that wonderland of natural history, the Burren district, where the pearl-bordered fritillary butterfly remained so long undetected.

22. Field Grasshopper
(*C. brunneus* (Thunberg))

The often mentioned *C. bicolor* of most popular works.

General Distribution: Common to abundant in many warmer areas and the species most likely to be seen in built up areas. It flies more

readily than any other native grasshopper and even makes local migrations. It is found in all parts of Britain but in Scotland and N. England seems to be largely confined to coastal sand dunes or railway embankments and is very localised in the north.

Where Common: In many localities but especially on hot dry downland slopes or south facing railway embankments, old quarries and such like places.

Habitat: Hot dry places where the ground warms up well seems ideal for this common British insect. Where the grass become lusher or the aspect cooler its numbers rapidly give way to populations of common green and meadow grasshoppers, but it can obviously flourish in places where there are few other comparatively large and conspicuous insects, for example on thinly vegetated rock faces and shingle beaches.

Recognition in the Field: Medium. Generally a brownish, stripey grasshopper which flies very readily and is thus easily noticed. The females are sometimes almost into the category "large" and are our largest grasshoppers next to the female large marsh; males are much smaller. Their short, brisk chirp—often antiphonally in chorus is a familiar sound of the summer and autumn, for this species sometimes persists well into November and even early December in warm areas. The underside of both sexes is very hairy and the pronotum is sharply indented towards the head giving a "thin-necked" look.

Anticipated New Records: In hot dry places almost anywhere not yet explored for Orthoptera, even on small offshore islands (it is the only grasshopper recorded in the Scillies, where it is very common).

23. Heath Grasshopper
(C. Vagans von Eversman)

General Distribution: Overlooked as a British species until the 1930's. Although widespread and common in much of N.W. Europe it seems here to be confined to the warm heathland of Hampshire and Dorset and has so far been recorded only from the western edge of the New Forest and the Wareham area with a few colonies now isolated by building, such as Holt Heath and one part of Canford Heath, between these two main centres. So far only found on dry heathland in Britain where it is known to feed on heather shoots and hence can thrive where there is usually only a few tufts of mainly stunted purple moor grass or red fescue.

Where Common: In most years, near Burley and in the Wareham area.

Habitat: Drier Heathland with much heather, sparse grass and usually much exposed flint or pebble. Usually on south facing slopes.

Recognition in the Field: Medium. The British form varies little in colour and both sexes have two pale bars across the upper part of

the hind legs that act as a good first indicator in the field. Another good visual guide is the "long-headed" look seen from above caused by a deep indentation of the pronotum just to the rear of the mid sulcus. This acts as a good quick distinction from female mottled grasshoppers (26), which also differ from visually rather similar male heath grasshoppers in having rounded "cheeks" and quite bulging eyes when viewed from above, whereas the latter have the typically flat sided, rather long "Chorthippus" heads with the eyes almost flush to the head when viewed from above. The stridulation of the male heath grasshopper is like a louder rather slowed-down version of that of the meadow grasshopper, producing a "quacking duck" effect. Females rather resemble brown females of the field grasshopper but the two species rarely seem to occur together since the latter appears to avoid actual heathland although often common on adjacent grassy verges and railway embankments.

Anticipated New Records: It seems reasonable to anticipate the insect in places like Woolmer Forest and the West Surrey heaths and perhaps even on what is left of Breckland, but preliminary search in West Surrey by David Baldock has not so far resulted in its discovery. It is possibly a relict species from the drier pre-Atlantic phase of post-glacial Britain which has been able to survive only as an isolated population adapted to dry heathland.

24. Lesser Marsh Grasshopper
(C. albomarginatus (De Geer))

General Distribution: Very interesting indeed: a clearly overlooked species until Michael Skelton made a survey of the Orthoptera in the Fens. The lesser marsh grasshopper has a distribution very similar to that of the short-winged cone-head bush-cricket; presumably its egg pods can survive immersion for prolonged periods, thus enabling species to fill the "grasshopper-niche" in low-lying regularly flooded districts which are at least partly denied to other grasshoppers in consequence. Lesser marsh grasshopper is now known to be very widespread in E. Anglia and the commonest grasshopper of the Fenland region from the Wash to Cambridge. It is also locally common on dunes and the drier backs of salt marshes from the Humber estuary to Dorset and also in the valley of the Severn. In southern England the insect is also a common species on the sites of old water meadows in most of the less "developed" river valley with many now isolated inland colonies by ponds and similar places. There are also scattered colonies in northern and western Ireland but no recent records from Wales or any at all from Scotland, while only a very few sites are known for the grasshopper in the Devonian peninsula.

Where Common: Wherever it occurs this species is usually numerous and often the most abundant grasshopper.

Habitat: Sea couch grass zone of salt marshes and adjacent pastures; well vegetated sand dunes; old pasture land in flood plains and by rivers and older lakes inland.

Recognition in the Field: Medium. A rather plain looking grasshopper, usually pale brown or green and with virtually parallel sided sides to the pronotum. The chirp of the male is a rather slow, wavering sound and the courtship song a very distinctive sequence of louder and softer buzzings; while often the courting male will be surrounded by a circle of inward facing males as well as females—a fascinating sight, but a careful approach is necessary as the group will scatter at the slightest disturbance.

Anticipated New Records: Should be re-discovered in N. Wales and along the Lancashire and Cumbrian coasts. Further stations around the Irish coast and in the Devonian peninsula also to be anticipated. The northern Irish colony also suggests the grasshopper ought to be present in S.W. or W. Scotland although as yet unrecorded from Scotland.

25. Rufous Grasshopper
(Gomphocerippus rufus (L.))

General Distribution: In England this interesting woodland grasshopper is an insect of hot dry rough grassland sheltered by beech trees and scrub. It is often found with the woodland grasshopper where the two species occur over or near limey soils. Its three main localities are the North Downs; western and of the South Downs (West of the Arun) and the Cotswolds. There are a few widely scattered colonies in the West Country, the best of which is on the landslip area near Lyme Regis. It occurs in at least one sandstone locality in Surrey (D. Baldock pers comm, 1976). It is unknown from Wales, Ireland or Scotland and indeed north of the Cotswolds.

Where Common: Locally in its three main centres of distribution: good places to see it—and to witness its delightful courtship display in late summer—are Arundel Park in Sussex; the Boxhill area in Surrey and the Nailsworth area in Gloucestershire.

Habitat: Rough, taller, but not particularly lush grass in hot places usually with a good carpet of fallen beech leaves, under which it shelters in bad weather. Like the field grasshopper it is a rather later maturing species which may persist until December.

Recognition in the Field: Medium. The prominently white-tipped antennae of this distinctly chunky-looking grasshopper are diagnostic amongst our British species. The antennae of the males are very conspicuous and distinctly clubbed like those of a butterfly. They are used in the courtship dance. Courting males may be traced by the "whizz" and "click" of the courtship song. The normal song is a curious

whizzing which suggests a little clockwork toy running. The usual colour is dark brown with a touch of red on the abdomen while the palps are whitish. Females are occasionally deep brownish purple.

Anticipated New Records: Further records may be anticipated in the West Country and the once strong Folkestone Warren colony ought to be checked as there are no recent records from Kent east of the Stour. There are only one or two records for the great chalk massive of Wiltshire and none for the Chilterns in both of which places at least scattered colonies can be expected.

26. Mottled Grasshopper
(Myrmeleotattix maculatus (Thunberg))

General Distribution: Like the field grasshopper and common green, this colourful little insect is widespread in the British Isles, although necessarily localised because of its need for dry, almost bare ground. It is especially numerous on coastal sand dunes, even in the Outer Hebrides and also occurs at altitude in the hills and mountains (e.g. Dartmoor, North York Moors and Inverness) where there is porous, gravelly or sandy terrain.

Where Common: Locally in many places even in the Far North.

Habitat: Very short turf and bare ground, almost always with lichens present. Occurs on moors as well as heathland, downland and coastal dunes or shingle beaches.

Recognition in the Field: Male small, female medium. The small male has cycle handle bar antennae which are raised and lowered in a courtship "dance". The female's head when viewed from above seems to have rounded bulging "cheeks" and very prominent eyes. The pronotum is very sharply indented at the centre and the pronotum itself is short so that seen from above it is easy to imagine a letter X on the back of the thorax. This species is extremely variable in colour. scarcely two individuals being identical. The colour schemes, which suggest dazzle-painted camouflage comprise combinations of brown, black, reddish, green and white, but the green, when present is only on the head and thorax. This is an early maturing insect often adult in early June and gone by late August. The stridulation of the male is a series of rising buzzings which start quietly get louder, stop suddenly and then start again after an interval: unmistakable but not very loud and easily missed.

Anticipated New Records: Anywhere where the terrain is suitable as yet unexplored for Othoptera. Colonies however may only occupy a few square metres, and are thus easily missed.

GROUND-HOPPERS (TETRIGIDAE)

These unobtrusive little insects are easily missed. They are about in spring and early summer or in late summer before hibernation as advanced nymphs or adults. They are small and do not stridulate. They are very strange when viewed closely as the pronotum extends backwards to cover the abdomen. Three species are recorded for Britain, only one at all widespread. They are moss and algae feeders.

27. Common Ground-hopper
Tetrix undulata (Sowerby))

General Distribution: Very much as mottled grasshopper and often in the same situation but also in woodland rides and in damp mossy places on wet heathland, where the mottled grasshopper is normally absent. Recently found in the Scillies; one of the four native orthopterons (with great green and grey bush-crickets and field grasshopper) present in that ecologically remote and relatively long isolated fragment of the British Isles.

Where Common: Rarely very numerous but generally quite common where recorded.

Habitat: Wet or dry mossy localities: woodland rides, old pasture. heathland, downland—especially in old quarries and sand dunes, and sea cliffs often where there are springs or moist places.

Recognition in the Field: Small. Very high arched ridge to pronotum which ends at or near tip of abdomen. Wings normally vestigial. Sometimes jumps into and dives under water but less frequently than the next species.

Anticipated New Records: As mottled grasshopper.

28. Slender Ground-hopper
(T. subulata (L.))

General Distribution: Widespread by lakes, ponds and in river valleys, from Lincolnshire to S. Wales and in the West of Ireland.

Where Common: Never abundant in the way that certain grasshopper or bush-crickets may be but usually numerous where there are extensive areas of suitable habitat, with often tiny colonies where the habitat is limited: much as the mottled grasshopper is in its own very different habitats.

Habitat: Very much the same as required by the short-winged cone-head in its inland habitats: marshy ground with bare muddy places between thick vegetation. On the coast only where such habitat is present on sea cliffs. Not a species of sand dune or salt marsh; nor

of wet heathland where it niche is sometimes filled by the common ground-hopper which otherwise normally prefers drier ground.

Recognition in the Field: Small to barely medium: typically slim and elongated with shallow ridge to protect pronotum. There is a variety with the pronotum only to the tip of the abdomen but this may be distinguished from the common ground-hopper by the relatively low, flatish ridge to the pronotum: also it flies as well as the normal form. See Ceperos ground-hopper (29) for visible distinguishing features between these two flying species. The slender ground hopper frequently jumps into and dives below water even when not disturbed.

Anticipated New Records: Should be found elsewhere in Ireland and in S.W. England where most of its colonies have been found only recently. Should also be re-found in Lincolnshire and may be anticipated in the vicinity of the Humber and the milder parts of Lancashire and Cumbria, where the terrain often looks very suitable.

29. Cepero's Ground-hopper
(T. ceperoi (Bolivar))

General Distribution: Only recognised as British in the last forty years. Easily confused with the last species. Nearly all known colonies are by fresh water or on wet ground by or near the S. Coast of England (Kent to Cornwall) and S. Wales (Gower and Swansea area).

Habitat: Wet ground but particularly on wet seepages on cliff faces. The clay landslips of the S. Coast of the Isle of Wight seem particularly suitable. There is also an isolated area of distribution around the periphery of Dungeness especially on the south edge of Walland Marsh.

Recognition in the Field: Very like the last species in appearance and behaviour. When viewed from above the practiced eye will note that the head of the ground-hopper is almost parallel sided so that the eyes appear parallel with the sides of the head. In the slender ground-hopper these are divergent so that the eys are relatively wider apart. There are also other constant morphological differences but a low power microscope is really needed to resolve these. In the field Cepero's ground-hopper is often much more colourfully marked than the other two species—its patterns recalling the brown or grey based variants of those of the mottled grasshoppers.

Anticipated New Records: The S. Devon coast and perhaps elsewhere in S. Wales. There is so far no evidence to suggest it occurs in Ireland or farther north in Britain.

E. C. M. Haes (5849)

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RECENT ADDITIONS TO THE A.E.S. LIST

INSECT PHOTOGRAPHY FOR THE AMATEUR by Peter Lindsley. 60 pages. Text illustrated with line drawings and photographs. A comprehensive guide to the equipment and methods used in the photography of insects, written in simple terms. There is a glossary and a very comprehensive bibliography. Insect photography is now of practical assistance to the field entomologist and this new publication makes its use possible to the beginner while including information of assistance to those already using the camera as a means of collecting. Price £2.00 plus postage.

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This replaces an earlier Leaflet (No. 12) and deals with both Dragonflies and Damselflies. Habitats, life-histories, collecting, setting and preserving specimens, breeding and experimental studies are dealt with and there is a loose insert check list of all the British species of Odonata with revised scientific names and the common English names. Price £1.60 plus postage.

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Leaflet No. 33, 16pp, 16 figs. (2nd edition). Price 60p.

Expertly written by J. Heath, who indicates the equipment needed and the theory and general operation of Light Traps. Also a list of equipment suppliers.

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For 1978 only, the Annual Exhibition will be held on

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A detailed map, showing how to get to the Wembley Conference Centre, will be included in the August 1978 Bulletin.

All enquiries should be made to the Organiser:

B. F. SKINNER,

5 Rawlins Close, South Croydon, London, CR2 8JS.

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AUGUST 1978

THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

WORLD LIST ABBREVIATION:
BULL AMAT ENT SOC

EDITOR:
BRIAN GARDINER FLS FRES

The Amateur Entomologists' Society

(Founded in 1935)

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AES BULLETIN No. 320

ANNUAL REPORTS FOR 1977
OF THE COUNCIL

The Council is once again pleased to report that the Society has continued to prosper. 1977 has seen an unprecedented increase in membership. On 31st December, 1977 the Society had 1521 members, comprising 6 Honorary, 8 Life, 30 Affiliated, 343 Junior and 1134 Ordinary members. There were 313 new members, 13 reinstatements and 173 losses due to death or non-payment of subscription, representing a net gain of 153 members. The proportion of Junior/ordinary members has remained constant at 22.5%.

Looking back to the Councils report for 1967, the pertinent phrase reads: "...the membership of the Society rose to 750...". Although it is encouraging to reflect upon the benefits of an increasing awareness of our insect fauna, changes in membership of this magnitude are not without their attendant problems. Administration becomes more complex and the amount of paperwork grows. The Society is run entirely by volunteers working in their spare time, and it is unlikely that they can sustain any further increase in their workload.

Four issues of the Bulletin were published during 1971 under the Editorship of Mr. B. O. C. Gardiner, containing a record 200 pages of text. Council intends to continue the policy of including half-tone illustrations in the Bulletin, and of publishing two "standard" and two "large" issues each year, the latter policy being to maximise the dubious benefits of the postal tariff systems.

Two important publications were launched during 1977 — a new handbook entitled "Insect Photography for the Amateur" by Mr. Peter Lindsley, and leaflet No. 12 "Collecting and Studying Dragonflies" completely revised by Mr. David Keen. A supplement to the 1976 membership list was published in August. Sales of publications continued at a high level, and the Council would once again like to record its thanks to Mr. Christie for his work as the Society's publications agent.

The Council met on six occasions during the year. The Annual General Meeting was held at Caxton Hall in March, and presided over by Mr. B. A. Cooper, who also gave a fascinating talk entitled "The Mating of Honeybees". The Annual Exhibition was once again held at University College School. Although less crowded than in 1976, its popularity still exceeds its capacity. Two Junior prizes were awarded, and a full report on the Exhibition appeared in the May Bulletin. In

an attempt to solve the problems created by the Annual Exhibition the Council decided on a much larger venue for 1978. The views of our members were also sought by way of a questionnaire. The response was very encouraging, and the results of the survey appear separately in this Bulletin.

The specialist study groups continue to function. The Exotic Entomology Group has a record membership of 221. The group provided extensive demonstrations and illustrated talks at the Exhibition. Four newsletters were also produced. The Conservation Group has a membership of 50, and has organised four field trips. The Insect Behaviour Group has 20 members, and has also produced a newsletter. It is unfortunate that the membership of the latter two groups is so low, as they deserve the support of the membership.

Council acknowledges a generous bequest by the late Sir Eric Ansorge. The income from this bequest will be used to fund an annual prize, to be known as the "Ansorge Award", for the best junior exhibitors at the exhibition. Mr. J. Roche and Mr. R. Uffen retired from Council. Both have made substantial contributions to the running of the Society, and Council extends its warmest thanks to them.

The Council reports, with much regret, the deaths of several members: Three founder members of the Society, Messrs. G. V. Day, T. H. Fox and L. G. F. Waddington, and also Messrs. J. Baxter, D. W. H. Ffennell, A. Rollings, G. E. Simmons and W. A. Taylor.

Paul Sokoloff,
Hon. General Secretary.

OF THE TREASURER

The Society's Accounts for the year ended 31st December, 1977 show that our finances have survived the last year in good shape, although the future outlook is not so reassuring. The Income and Expenditure Account produced a surplus of £263, almost identical to the surplus in 1976, and this has augmented the General Fund reserves to a figure of £2861. The Publications Trading Account recorded another substantial trading profit of exactly £1000 and the Publications Fund reserves now stand at £6106, represented largely by stocks of publications or liquid assets waiting to be invested in new handbooks and leaflets The Study Groups enjoyed a year of mixed financial fortunes but overall the Study Groups Fund balance rose by £79 to £217, which was represented by cash balances held by the three Groups in various savings accounts.

Little needs to be said in detail about our Income and Expenditure Account. We incurred no exceptional expenditure and every category of income contributed more than in 1976 except for bank deposit interest, which reflected the steep drop in interest rates during the year. It is interesting to note that the increase in total income and in total

INCOME AND EXPENDITURE ACCOUNT
for Year ended 31st December, 1977

EXPENDITURE			INCOME		
1976 £		1977 £	*1976* £		1977 £
	Bulletin Costs:			Subscriptions:	
35	Editorial	28		Ordinary and	
1578	Printing	1784	*1968*	Affiliated	2138
547	Despatch	662	*336*	Junior	325
—	Indices	78		Life Membership	
2160		2552	*2*	Fund	12
	Membership Services:		*2324*		2475
337	Membership List ...	120	*338*	Donations	376
20	Wants/Exchange Lists	28		Investment Income (gross):	
357		148	*144*	Dividends etc. ...	169
	Administration:		*121*	Bank Deposit Interest	59
165	Stationery and Notices	180	*265*		223
101	Postage and Carriage	108		Other (net) Income:	
40	Meetings Expenses ...	92	*160*	Advertising Revenue	170
40	Study Groups support	25	*95*	Annual Exhibition ...	162
17	Depreciation ...	15	*28*	Badges and Tie Pins	56
25	Insurance	23	*9*	Profit on Typewriter	—
53	Sundry Expenses ...	61	*292*		388
441		504			
2958		3204			
261	Surplus Income to General Fund ...	263			
3219		£3467	*3219*		£3467

PUBLICATIONS TRADING ACCOUNT
for Year ended 31st December, 1977

	New and Revised Publications Costs:		*1547*	Gross Sales	2552
11	Editorial	6		Increase in value of Stocks at lower cost or	
1562	Printing	1268	*1180*	valuation	660
1573		1274			
	Selling and Other				
515	Expenses	938			
2088		2212			
639	Trading Surplus to Publication Fund ...	1000			
2727		3212	*2727*		3212

BALANCE SHEET AT 31st DECEMBER, 1977
GENERAL FUND

1976			1977	
£	£		£	£
		Balance of Fund: 1st January, 1977	2598	
	2337	Add: Surplus income for year	263	
	261			2861
2598				
45		**Life Membership Fund** ...		305
—		**Ansorge Award Fund** ...		100
		Creditors:		
	700	Advance Subscriptions ...	997	
	107	Advance Donations ...	717	
	49	Other	66	
856				1234
3499				4500

1976			1977	
£	£		£	£
		Fixed Assets:		
	390	Office Equipment, at cost	390	
	235	Less: Depreciation to date	250	
155				140
		Investments: at cost:		
	984	£1066.78 Treasury 9% Convertible 1980 ...	984	
	500	£561.07 Treasury 8½% 1980/82	500	
	40	£255.48 Treasury 12¾% 1995	240	
	—	£43.88 Treasury 9½% 1999	40	
	—	72 M & G Charifund income units	100	
	—	Thurrock Council 10% loan bond	500	
1524				2364
		Current Assets:		
	68	Stocks, at cost	148	
	143	Sundry Debtors	453	
	50	Income Tax Recoverable ...	58	
		Cash at Bank:		
	1000	Deposit	500	
	559	Current	837	
1820				1996
3499				4500

PUBLICATIONS FUND

		Balance of Fund: 1st January,			
4267		1977	5031		
		Add: Trading Surplus for			
639		year	1000		
125		Bank deposit interest ...	75		
5031				6106	
517		**Creditors**		869	
5548				6975	

		Investment:		
	—	Nat. Savings Investment Account		2000
		Current Assest:		
3258		Stocks, at lower of cost or valuation	3917	
799		Sundry Debtors	991	
		Cash at Bank:		
1200		Deposit	—	
291		Current	67	
5548				4975
5548				6975

STUDY GROUPS FUND

		Balance of Fund: 1st January,			
112		1977	138		
		Add: Surplus income for			
26		year	79		
138				217	
30		**Creditors:**		43	
168				260	
9215				11735	

		Current Assset:		
	—	Debtors	10	
168		Cash at Bank	250	
168				260
168				260
9215				11735

B. O. C. GARDINER, *President*
N. H. COOKE, *Hon. Treasurer*

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 1977 and of the Income and Expenditure for the year ended on that date.

L. G. WHITING, F.C.A.
A. C. WOOD, F.C.A.
Honorary Auditors.

22nd March, 1978.

expenditure was identical at 8% (rather less than the national inflation rate) and that the Society spent nearly threequarters of its general income on the production and despatch of Bulletins and only 15% on administration.

The Publications Trading Account for 1977 reflects once again the dramatic financial impact brought about by the recent improvement and extensions to our range of Handbooks. Sales of these titles contributed over £2000 of the 1977 sales turnover of £2552 which itself was over £1000 higher than in 1976. It is clear that by investing substantially in a few well-produced titles having a wide appeal to entomologists we can not only continue to supply slow-moving leaflets and pamphlets to the specialist but also hopefully keep the Society's publications programme self-supporting.

On the capital side, our Balance Sheet shows several changes during 1977. The Life Membership Fund balance of £305 represents the invested composition fees of seven life members, compared to only one in 1976. A new feature is the Ansorge Award Fund which was set up in 1977 following a most generous legacy of £100 from the late Sir Eric Ansorge and represents the investment of this sum in M and G "Charifund" units; I am pleased to inform members that Lady Ansorge has recently increased the capital value of this Fund by the generous gift of a further £50. Elsewhere on the Balance Sheet our investments show a switch of short-term cash away from bank deposit accounts, in the case of the General Fund in favour of a one-year local authority loan and in the case of the Publications Fund into a National Savings Investment Account, in order to maximise the return on surplus funds.

In spite of our generally satisfactory current financial health, I regret that this Report must close with a warning that members must be prepared for a probable increase in subscription rates as from 1979. The coming year will probably be a difficult one with heavy commitments in the form of another completely new Membership List and an Annual Exhibition which is involving a substantial outlay that may not entirely be recovered. More worrying is the certainty (already evident in 1977) that subscription revenue will fail to cover the cost of producing Bulletins alone, at a time when our current administrative system can no longer cope with our membership and will require a substantial amount of money to pay for much needed assistance, either human or mechanical. We are fortunate to raise some £600 a year in members' donations, investment income and other revenue but more is needed than this. Council has already decided that from 1979 new members will pay an enrolment fee of 50p; what is still needed is a more realistic contribution from existing members which will enable the Society to carry on providing what is evidently an increasingly popular service for entomologists.

N. H. Cooke,
Honorary Treasurer.

OF THE SOCIETY'S REPRESENTATIVE ON THE JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS

The Committee met twice in 1977 in London and I attended both meetings. Regrettably there is very little news to relate concerning the status of endangered British insects and rather too much on matters of administration.

Of our rare lepidoptera, the Large Blue butterfly is now officially regarded as close to extinction, although unofficially it is still reported to hold out in secret localities in the West Country. In the fens, the Swallowtail butterfly seems to be maintaining a precarious presence at Wicken after its reintroduction there in 1976. Further reports from the Essex Trust for Nature Conservation suggest that the Essex Emerald moth cannot be found at a single site, which renders it likely to become the next insect to be fully protected under the Conservation of Wild Plants and Creatures Act 1975 unless it is located soon by field entomologists with knowledge of this insect and its habitat. Elsewhere, the Committee has applied to the Manpower Services Commission for the appointment of three people at the Institute of Terrestrial Ecology, Furzebrook under the Job Creation Scheme to carry out surveys on the status of several very locally distributed butterflies including the Large Tortoiseshell, Marsh Fritillary, Adonis Blue, Silver-Spotted and Lulworth Skippers, and possibly the Silver-Studded Blue and the White-letter Hairstreak.

The Committee has received no reports of specific insect habitats being endangered during 1977 and virtually no new information on recent surveys. There has been complete silence from the county correspondents and on the important subject of introductions the Committee has only heard of Mr. Wheeler's attempt to establish the Kentish Glory moth in Surrey (with the approval of the County Trust) and some strange and unconfirmed reports that Japanese stock of certain common lepidoptera had been released in an Oxfordshire wood. However, on an international level the Committee did hear two informative talks on worldwide insect conservation; Dr. Pyle gave an address on the recent establishment and aims of the Lepidoptera Specialist Group of the Survival Service Commission of the I.U.C.N.; Mr. Whalley explained the provisions of the Washington Agreement on international trade in plant and animal species in so far as they had been implemented in Britain by the Endangered Species (Import and Export) Act 1976 which affects entomologists in that it now regulates the international trade into and out of Britain in all Birdwing butterflies (i.e. *Ornithoptera, Trogonoptera* and *Troides* species) and certain European races of *Parnassius apollo,* under a licensing system operational in all countries which are signatories to the Agreement.

Regarding the Forestry Commission, the Committee has not sought to amend in any way the attitude of the Commission towards entomolo-

gists expressed in its Press Notice "Insect Collecting and Access to Forestry Commission Land" released in July and reproduced in full in the November 1977 AES Bulletin. In view of my own protracted correspondence with the Commission on this subject as your JCCBI representative I can only advise all AES members to take careful note of this Notice.

As your representative, I have come to share the concern expressed by members of the A.E.S. Conservation Committee and others that over the last few years the JCCBI has become a platform for the official conservation organizations, far removed from the main body of British entomologists (many of them A.E.S. members) who indeed appear to be largely unaware of its existence or purpose. I am therefore very pleased to report that at the end of 1977 the JCCBI has made a start to redress the balance and set up a five-man working party, on which I have been active on your behalf, to revise its terms of reference and administration and to draw up an action programme for the next ten years. If our proposals are accepted the JCCBI will, amongst other things, have explicit objectives which recognise the need for active assistance and advice from all entomologists at every level and a clearly stated policy as to what it sees as the main threats to rare and local British insects today and the role played by collectors; high priority will be given to publicizing the work of the Committee, especially among the entomological societies, and to improving the function of the county correspondents. I do not think it is too fanciful to suggest that without a rejuvenated and responsive JCCBI the British entomological movement will suffer through the lack of a central body with the authority and support to speak at the highest level on its behalf to prevent the destruction or mismanagement of important habitats and to curb the worst effects of excessive legislation and the actions of increasingly influential public landowners where these are against the interests of insect conservation or serious entomologists.

I will gladly discuss any points arising from this Report, or the operation of the JCCBI as a whole, with any interested members and I should like to thank my colleagues on the A.E.S. Conservation Committee for their support and advice over the last year.

N. H. Cooke (3266).

OF THE EXOTIC ENTOMOLOGY GROUP

The year finished with 221 members — another record! These comprised 167 AES members, and 54 subscribers. Four newsletters were produced giving a wide range of information on Exotic Insects.

The second EEG meeting took place in May and was very well attended, in spite of a clash with the FA Cup Final. The group put on an excellent display at the AES exhibition, and about 20 new members were enrolled. The main event of the exhibition was the EEG,

and a slide show was given by Brian Morris as an introduction to entomology. This was followed by a talk by Gary King on methods of rearing silkmoths. Wesley Caswell and Jim Brady then gave a talk entitled "Rarer Saturniids" and this was illustrated with slides. Finally, Phil Holmes gave a talk about "Foodplants for Saturniids".

C. J. Eschbacher.

OF THE CONSERVATION GROUP

In the year since my last report the Group's activities have continued along the lines now familiar to members of the Society: field meetings, local fieldwork undertaken by individual members, exchange of information, participation in the Society's Exhibition and planning of policy by our Committee.

Our Committee still consists of the six members who made it up last year and who have dual membership of the AES Conservation Committee. It met in September 1977 and will have met again on the day after the Society's A.G.M. One of the most important matters currently being discussed by the Committees is our relationship with the Joint Committee for the Conservation of British Insects which should be soon put on a new and improved footing through the efforts of our Representative, Nicholas Cooke. An item of concern which we recently raised at a JCCBI meeting is the indiscriminate use of insect electrocution traps. Other bodies with which we have kept in touch include the Nature Conservancy Council who recently sent us a copy of their report on a survey of Odonata in Southern England. A number of AES members were participants in the survey. We are exchanging bulletins with the Botanical Society of the British Isles and we were represented by Mr. T. C. Dunn at their 1977 conference on plant/insect relations. He presented our suggestion that means should be set up whereby the amateur insect conservationist and the professional research worker can co-operate, but conservation was evidently not much in the minds of most participants.

Membership of the Group is currently between forty and fifty (March 1978) with recruitment roughly equal to lapsed membership and resignations. Most members continue to pay well over the minimum subscription of 35p, although with a fund at the end of 1977 totalling £77.96 there was a small account deficit. This was mainly due to the timing of certain in-payments and out-payments and to the absence of a grant from the Society.

Our publications have again failed to include any additions to the series of special articles which it is hoped may form the basis for an insect conservation handbook. We only produced one Bulletin, although another is now in preparation. A long planned liaison with F. Warne & Co. in the shape of an insect poster has been attained, although I understand that the end product will not deal with conservation. We have continued to purchase and circulate copies of "Habitat Digest".

Individual members continue to study their local sites of interest and these activities are described in the Group Bulletin. They range from the organisation of practical conservation work together with local societies to attempts to convince local authorities that 'wasteland' sites are of ecological interest. It still remains a matter of concern that many good conservationists are not so good when it comes to keeping us informed on local activities.

Group members have been able to get together in the field as in previous years. Three of our 1977 meetings have been reported in the Group Bulletin; those at Thursley Common and Merrist Wood in Surrey and Tenantry Down in Sussex. We went to Thursley Common to observe recovery, if any, of plants and insects following the fire of 1976, and it was encouraging to see that small pockets of the bog had escaped the flames. On the burnt areas regeneration of *Erica* was beginning, while along the rides some of the burnt birch saplings were shooting from the base. At Merrist Wood and Tenantry Down Mr. C. Hart carried out moth trapping and at the latter site we were able to find fairly extensive areas of horseshoe vetch, *Hippocrepis comosa.* We had not found these in 1976 due to the lateness of that earlier meeting. At Ranmore Common we were led by Mr. P. Holdaway who was concerned about the possible effects on the wildlife of the suggested A25 bypass which would run at the foot of the scarp. It appeared, however, that the land likely to be directly affected is already largely agricultural and that the ecologically rich slopes higher up should be above the worst of the pollution. The effect on amenity is a different matter. Information on our 1978 meetings should be available through our own bulletin and the Society's W. & E. list.

As in every year since 1968 we produced a stand at the Society's Annual Exhibition. Our theme was 'Conservation in Action' and we drew on our own activities to provide an illustration of the role of entomologists in conservation.

The underlying theme of this report is one of moderate progress rather than outstanding success. The Group has existed for over ten years in more or less its present form and we have achieved far less than the cause of insect conservation has deserved. I feel that entomologists are no better and no worse than other kinds of naturalists where support for conservation is concerned. (I refer to practical work and not to fund raising.) We are fewer in number than, say, ornithologists, however, and even a small compensation for this lack of strength will demand much more practical involvement in conservation than at present. Massive, money generating membership is not for us and so the payment of staff and acquisition of land are not possible. Instead, physical effort and co-operation with local conservation bodies must be our aim.

D. Lonsdale (4137).

THE A.E.S. EXHIBITION QUESTIONNAIRE

In November 1977, all A.E.S. members were sent a questionnaire in an attempt to gain a comprehensive 'consumer report' on our Annual Exhibition. A remarkable total of 488 forms were returned, together with 102 letters from members who wished to expand their views on the exhibition or to ask questions. Of these 102 letters, 101 contained helpful comments and suggestions, and one was threatening (and anonymous!). I would like to express my thanks to all the members who responded so well to this questionnaire, and whilst it has not been possible to reply individually to all correspondents, I will attempt to answer or clarify some of the matters raised.

The table summarises the responses to the various questions. Of the 488 replies, 468 were selected for analysis, the remainder having too little information to be of value. For clarity, the figures in the 'percentage of total' column have been rounded to the nearest whole number. As

Question and Answer		number of replies	percentage of total
1. **Are you a regular visitor to the exhibition?**	YES	342	73
	NO	126	27
2. **Are you a Junior or Senior member?**	JUNIOR	62	13
	SENIOR	406	87
3. **Which items do you enjoy seeing at the exhibition?**			
MEMBERS EXHIBITS		421	90
BOOKS & APPARATUS DEALERS		404	86
LIVESTOCK DEALERS		330	70
DEAD-INSECT DEALERS		184	39
DEMONSTRATIONS, FILMS, etc.		266	57
4. **If we had to REDUCE the size of the exhibition, which would you prefer?**			
LESS ROOM FOR EXHIBITS		142	30
LESS ROOM FOR DEALERS		286	61
NO EXHIBITS		8	2
NO DEALERS		28	6
(NONE OF THESE) *		(65)	(14)
5. **If we moved to larger premises, would you be prepared to pay an admission fee (probably 25p or less) to help with the extra cost?**	YES	460	98
	NO	8	2

* this question was not on the sheet, but was added by 65 members.

more than one response was possible for questions 3 and 4, the total percentages for each group exceed 100. The most interesting response was from one member who ticked both 'No exhibits' and 'No dealers' in question 4! In order to check for bias, respondents were divided into four categories — Junior and Senior members, and then regular visitors and non-regular visitors. The response of each category to question 3 was then compared, and the results analysed. There was no statistically significant difference between the sets of responses. I will leave members to draw their own conclusions from the results, but it would appear that the 'mix' of the present exhibition is generally acceptable.

In order to clarify some of the points raised in the letters, I will make some general observations: the organisation of the exhibition, as with all the other aspects of the A.E.S., is carried out by a small group of members who constitute the Officers and Council of the Society. All the work is carried out in their spare time, and there is no remuneration attached to any of the duties. I make these points solely to clear up misunderstandings which are apparent in some of the letters. Practical considerations mean that members of Council must live in the same general area. At the present time this means within an hour or so travelling from London. To organise an exhibition of any size requires frequent visits, meetings etc. and therefore to organise Regional exhibitions would be an impossible task. The extensive publications activities of the A.E.S., combined with only modest resources means that exhibitions have to be largely self-financing. Considerable sums can be involved, and dealers *do* contribute to the costs, as do members via purchases at the 'surplus' table, and refreshments. Small admission fees will also be required in future to offset ever-increasing costs.

The timing of the exhibition is governed largely by availability of help (i.e. not in the holiday season), and availability of premises. Council fully appreciate the problems of livestock in relation to the exhibition, and would normally aim for September as an ideal date. It is, however, not always possible to book up at the time we would most like.

The final area of comment is dealers and trading, perhaps the most controversial aspect of our exhibition. The questionnaire shows that the majority of members feel dealers are an important part of the event, so the only points for discussion are related to the quality and quantity of our traders. Many members have suggested that trading be restricted to the 'established' dealer, and yet others suggest that all dealers, established or otherwise, who trade in papered 'exotics' be excluded. It is difficult to know where (and if) to draw the line, but one is tempted to rely on 'market forces' to exert their control — there is no obligation to buy, or even look! Should ordinary members be allowed to trade? In the past, members have considerably abused the facility for open trading and the Council regretfully decided that some restrictions must be applied to trading. Small quantities of material *can* still

be sold via the 'surplus' table, although the Society requires that some of the profits be donated to the Society. Table space can be purchased for members who have larger stocks to dispose of, and material can be sold for the benefit of the Study Groups. Control of quantity is perhaps the most difficult area of all. The Society subscribes to all the recognised Codes for collecting and conservation, and would expect the material offered by dealers to reflect the spirit of these Codes. The Council finds trade in items such as the 'novelty hornets' (collected in the New Forest) offered for sale in 1977 both repugnant and unethical. The members themselves can exert the most effective control over the sale of sub-standard or inappropriate material — don't buy it!

Council is well aware that the task of pleasing all our 1500 or so members is somewhat difficult. Entomology is a lively subject, and all shades of opinions are encompassed. Controversial issues are best resolved by informed discussion and debate, and I am sure that this will not be the last word on the subject. I am quite willing to answer any queries, or receive suggestions from members. Please help to keep down costs by enclosing an S.A.E. with any enquiry.

Paul Sokoloff (4456),
Hon. Secretary.

NOTES AND OBSERVATIONS

SOME NOTES ON THE GREY DAGGER IN SCOTLAND — The Grey Dagger, *Apatele psi* L., is a widespread species and I have found it to be very abundant near my home in the Easterhouse area of Glasgow and in the Coatbridge area wherever there are hawthorn hedges. I have found the eggs of the species laid singly on the underside of the leaves and last year I found them as early as May 27th. Others found later in July hatched out and I raised the larvae on fresh hawthorn leaves in small glass tubes. When they pupated this was done amongst the dead leaves or amongst pieces of lichen which I had placed into the tubes, which the larvae first spun together. It is easy to tell when the larvae are about to pupate as the yellow stripe along the back becomes creamy white. In the wild I have found a larva about to pupate in a dead branch into which it had bored its way.

Finding the eggs is fairly simple. I bend over likely branches and hold them so that each leaf can be looked at on the underside. When an egg is found it is best to detach the whole leaf and place in an air-tight tin. When first laid the egg is a pale watery colour but as it approaches the time to hatch it becomes yellow and more obvious than when first laid. The best months in my area for searching are June and July. From those collected I have not had any parasites to date.

The moth is fairly widespread in Scotland it would seem as I have taken it in Arbroath where it was feeding on Elm, Port Seton in East

Lothian and Glen Rosa in the Isle of Arran. I wonder whether it is a southern species which has spread northwards or whether the reverse is the case. — F. McCann (6291).

LAST AND FIRST — In my garden at Wistow near Huntingdon, the last butterfly seen in 1977 was a Red Admiral on Sunday the 6th November.The first of 1978 was a small Tortoiseshell on Monday 27th February. Both days were cold but with sunny spells. — M. S. L. Simpson (4859).

BUTTERFLY INVASION — As reported in the Moscow News, Saturday, October 1st, 1977.

The people in Marlinsk, a town in Siberia witnessed a rare event this summer. One morning they saw that all the streets in the vicinity of the railway station square were all white, but it was not snow; everything was smothered with butterflies. They completely covered the walls of buildings. Butterflies had laid eggs on the walls. An examination showed that this was a species of butterfly harmless to crops.

It is hard to say whether this unusual accumulation of butterflies was the result of their migration from other regions of the country. These butterflies had been seen there before too, but only in very small numbers. — J. A. W. Harris (5477).

MASS SIGHTING OF GEOMETER LARVAE — In the Nantmor Valley of North Wales, in June 1977, many ash, birch, oak and hazel trees were completely defoliated. Closer inspection revealed why. The bare branches and twigs were literally covered with writhing masses of Geometer larvae, thousands and thousands of them! I shook a couple of branches and was showered with larvae, and a hundred or so joined the several hundred that were already on the ground looking for food. Most of the larvae were $1\frac{1}{2}$ inches long, and there were several different species, ranging in colour from yellowish green, through brown and grey to almost black. A stream ran beneath the trees, and a lot of larvae had fallen into it and drowned. In the space of 10 minutes I collected about 50 of the larvae just by tapping the branches and catching them as they fell. Over the next few days I discovered that many of the larvae I had collected were parasitized, so unfortunately, a lot of the many thousands must also have been. Still, they were certainly a breathtaking sight, as they climbed over each other in their hurry to find food. The kind of thing every lepidopterist dreams of seeing, but seldom does! — H. Perham (6106)

EARLY RED ADMIRAL — On the 9th January, 1978, I saw a Red Admiral, *Vanessa atalanta* L. in the city of Ashford in Kent. It was a sunny day, but cold. — H. Perham (6106).

MORE SCOTTISH RED ADMIRALS — I was interested to read in the November 1977 Bulletin the article about Red Admirals in Scotland and would like to report that during the summer of 1976 I saw eight Red Admirals on budleias in our garden near Aberdeen. — Jeremy Bartlett (6251).

RECORDING INSECTS IN THE BRISTOL AREA — The Entomological Section of the Bristol Naturalists Society has commenced a survey in their area — this being the two Watsonian Vice-counties 6 and 34 — roughly South Gloucester and North Somerset. The recording system is being based on that of the Biological Records Centre, data being sent to the centre at Monks Wood. Eventually a local regional centre will be set up at the City Museum, Bristol where all local records will be stored and collated.

Records of all orders from entomologists collecting in the area (including 1977's) will be welcomed. They can be sent to me at 51 Ashcombe Park Road, Weston-super-Mare, Avon, and will be passed on to the appropriate recorders. — K. H. Poole (133).

STAMP OUT CATERPILLARS — BY ORDER OF THE COUNCIL — If you happen to be in Brussels and hear the dustmen shouting' Bring out your dead', don't worry.

They are not after the bodies of solid citizens stricken by the plague, but those of little furry caterpillars.

Then again, if you see householders, hotel and office workers on their knees peering into corners through magnifying glasses, like Sherlock Holmes, don't think the whole city has gone bonkers.

They will be looking for caterpillars' eggs and nests. Under a startling new by-law passed in five minutes dead at a special meeting of the Brussels City Council, citizens of the Belgian capital can now be jailed for from one to seven days and/or face a fine if they fail to destroy caterpillars, their eggs and nests.

The reason? Reports by health experts have shown that some species of caterpillars have irritating furs which cause human skin complaints.

The one snag is that the by-law contains no guidance about what arms should be taken up by the caterpillar hunters — do they have to use fly swats, lethal gases, or egg-slicers and pickling jars? — From Eric Kennedy in Brussels.

Newspaper cuting from the 'DAILY MAIL' which may interest members of the Society sent us by Simon Ellis.
(Reprinted by kind permission of the Editor of the Daily Mail)

METAMORPHOSIS, A COMMENT — With reference to Miss Aquilina's article "Metamorphosis" published in the February Bulletin, I would like to commend the authoress on her synopsis of the theory of the structure and functions of nucleic acids in relation to insect

metabolism. I deplore, however, her recommendation that insect metamorphosis is dependent on a concept as illusory as that of the "Biological Plasma Body".

Kirlian photography is a technique highly regarded by the popular and parascientific press, but one which is open to criticism. Colour effects observed in Kirlian photography have been shown by reliable workers to be reproducible in experiments on carefully constructed inorganic systems. It has been demonstrated that phenomena which Soviet workers attempted to explain using the theory of the Biological Plasma Body can also be attributed to inconsistent experimental technique.

Care needs to be taken in extending such theories to provide explanations for natural processes which are gradually being elucidated by conventional researches.

I would recommend Miss Aquilina to read a paper written by W. A. Tiller, published in the Journal of Applied Physics, July 1973, in the hope that she might thereafter adopt a more critical approach in her journalism — David Harris (6255).

HIBERNATING RED ADMIRAL? — At Newton Ferrers, near Plymouth I watched a Red Admiral (*Vanessa atalanta* L.) feeding from crocus and *Erica carnea* on March 4th this year. Its 'dusty' state suggested that it had successfully hibernated alongside perhaps a Peacock (*Inachis io* L.) and Small tortoishell (*Aglais urticae* L.) which were present with it in the same sheltered garden on this warm and sunny day — E. C. M. Haes (5849).

THE BITER BIT — Recently I was rearing some African praying mantids and in their penultimate instar they were being fed adult Desert Locusts. One of these was left, starving, over the weekend during which a mantid chose to moult to an adult. While it was still soft and helpless the hungry locust had its revenge for the loss of its siblings. It ate about half the mantid! — Brian O. C. Gardiner (225).

SHEFFIELD NATURAL HISTORY — Butterflies, millipedes, beetles, in bottles and amphibia all feature in the Sorby Record (No. 15 1977), the journal of the Sorby Natural History Society, Sheffield. 1 Km distribution maps for butterflies and amphibia for the area are included (as mentioned in *Habitat*, Vol. 13, No. 8, 1977). The records indicate that there are twenty-two species of butterfly within twenty miles of the city centre and another eight species have been seen on sporadic occasions.

In the review of amphibian fauna in Sheffield, the author, Derek Whitely, looks at the habitat available such as fish ponds, dew ponds, reservoirs, canals and garden ponds. Distribution maps are then given for the common toad, common frog, great crested newt, palmate newt and smooth newt. Some comparisons between the toad and frog are then given.

Articles on millipedes in South Yorkshire and the species of beetle found in discarded bottles then follow. The Sorby Record, which will be of interest to other societies doing similar surveys, is 60p (plus 15p postage) from Derek Whitely, 730 Ecclesall Road, Sheffield S11 8TB. — Habitat.

FLY TRAPPING — An expert on blowflies at the British Museum (Natural History) recently promoted a National Fish Skin Week with the idea of running a national survey on the types of flies found on decaying fish. Participants were encouraged to place three day old fish skins as bait in various traps in different areas. The traps were then looked at three hours later and all visiting flies captured, killed and mounted. The resulting collections were then forwarded to the Natural History Museum for analysis. The Bedfordshire Natural History Society exploits in this survey are interestingly written up in their newsletter (No. 29 — January 1978). It is hoped the survey will show interesting results in relation to habitat and geology. — Habitat.

GREEN LANE SURVEY — The Hertfordshire and Middlesex Trust for Nature Conservation are undertaking a survey of the 'green lanes' remaining in Hertfordshire. The aim of the survey is to record the exact locations and routes of green lanes still existing within the county and to assess their condition — the ultimate object being to preserve the best of them for wildlife and public amenity. Green lanes are described as being either roadway used as a public path; a bridleway or a footpath. They are often relic roads which were never surfaced for modern vehicles. Local authorities have recently undertaken a revision of the law to clarify whether each should be open to wheeled traffic, horses and cycles or just pedestrians. For the purposes of the survey, a green lane is defined as any unsurfaced track which has a clearly defined boundary (usually a ditch and hedge) along at least one and usually both sides, and which has a public right of way.

Green lanes are often sites of unusual species, stemming from their antiquity and undisturbed nature. Many are now under threat from encroachment by neighbouring landowners, re-designation as roadways (which would infer a statutory duty to maintain the lane in a fit state for wheeled vehicles) drainage and pollution as well as over-use by motorcycles and under-use, so they become overgrown. The help of the public is needed to fill in survey forms regarding any green lanes they may know. Copies of the questionnaire can be obtained from D. Shirley, Conservation Officer, Herts and Middlesex Trust, Offley Place, Great Offley, Herts if a stamped adressed envelope is forwarded. The envelope should be marked Green Lane Survey.

Green lanes, important sanctuaries for wildlife, must also be found in other counties and perhaps similar surveys will be undertaken. — Habitat.

SUCCESSEFUL BREEDING OF DEATHSHEAD HAWKMOTH

In November 1977 larvae of *Acherontia atropos* L. in various stages of growth were collected in the wild in Tenerife and brought back by air to England. To ensure as healthy a stock as possible, we find it wise to feed to pupation any collected larvae on the foodplant on which each larva has been found, so sufficient supplies of these foodplants were also brought back, packed in plastic bags to preserve freshness, and kept stored in a refrigerator, to be used as required.

Careful notes have been made daily from the time when the larvae were found in Tenerife, with dates (and times when possible) of pupations, emergences and pairings. As eggs were laid they were collected daily and kept in small plastic containers, each labelled with the date and the number of eggs for that day. Details of hatchings of larvae, instars and pupations have also been accurately recorded. The work involved was greatly facilitated by the ease with which it was possible to differentiate between the two females as the younger Female B had a small but very distinctive transparent patch on her right forewing. Identification of the eggs was also very easy, the older Female A laid eggs which were small and a very vivid green in colour, whereas those of Female B were larger and of a lighter creamier green.

Pupation of the larvae brought back from Tenerife took place between 28th November and 12th December, 1977. One larva and one pupa were found to be parasitized, a single parasitic larva emerging from the torpid *atropos* larva, and about fifteen small parasitic larvae from the *atropos* pupa. Another pupa, the larva of which had been extremely slow when feeding, failed to develop. The only stock we had available for possible breeding consisted of three pupae and one newly emerged female moth which escaped from the emergence cage and could not be found. From the three pupae we obtained two males and one female, then by good fortune we found that the missing female had crawled between a curtain and the lining, so now with two females we had two chances of success in breeding. The insects were hand fed every day, individually, on honey from a piece of honeycomb kindly provided by Peter Cribb, and after each feed the proboscis was dipped in a small teaspoonful of water, which the moths very often drank. Daily feeding by this method was continued throughout their entire life span.

All four moths were transferred to a black soft nylon netting cage aproximately $1\frac{1}{4}$ metres square and $1\frac{1}{4}$ metres high. Every available food plant we had was placed on the base of the cage. There was one very immature potato plant, some tomato plants, pots of the winter cherry (all *Solanum* species), and sprigs of winter jasmine in early leaf. In case the moths wanted to go foraging for food on their own volition a piece of honeycomb was also put in, but this was never touched at all. Temperature was maintained at between 70 and 80 degrees Fahrenheit, humidity varied between 50% and 60%.

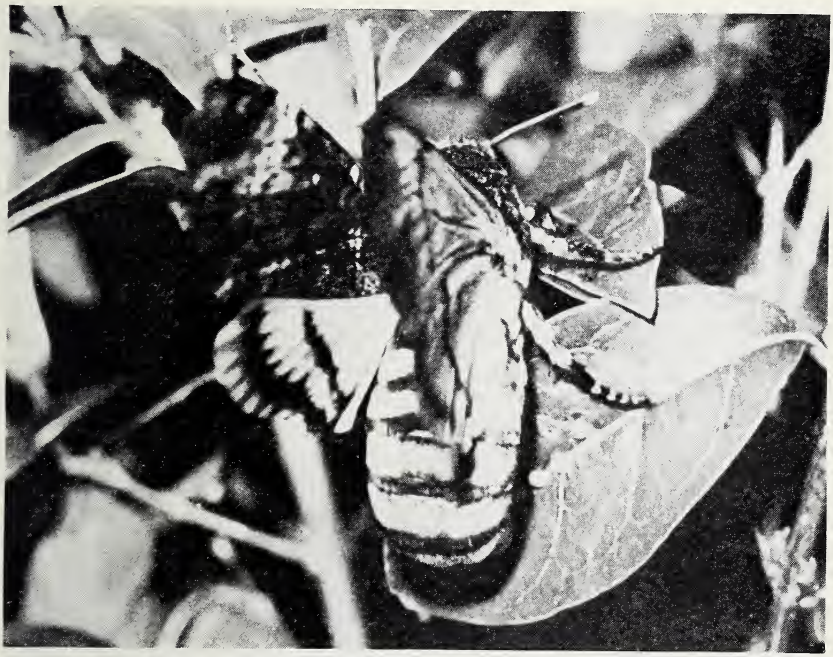


Fig. 1. Deathshead in act of laying on Privet.

Although pairings had been observed we hardly dared to hope for eggs to be laid, but when this actually happened we realised that at last we had been fortunate enough to break through the barrier of *atropos'* eggs being laid in captivity. There was now a distinct possibility of larvae being obtained, so we had to face up to the problem of providing food plants in mid-winter. We had that one small potato plant, some rather straggling tomato plants and a few pots of *Solanum capicastrum* (the winter cherry). We knew that neither the potato nor the tomato plants would go very far as food and we were doubtful about the wisdom of using the winter cherry plants as these had most likely been grown in commercial greenhouses and would no doubt have been sprayed with insecticides during cultivation, but in the absence of any other plants there seemed to be no alternative but to risk trouble from insecticides. Then Peter Cribb referred us to the AES Bulletin of May 1976 in which there was an article by Mr. D. G. Sevastopulo on Foodplants, and among those for the *atropos* he included *Ligustrum* species, of which our cultivated hedge privet is a member. Also, in his book on Larval Foodplants, Mr. P. B. M. Allan mentions, almost as an afterthought . . . "Privet and various other shrubs . . . .".

Now privet is a plant which can be obtained in healthy abundance in a normal English winter, so when the first larva did hatch out it was offered tiny bits of all the available foodplants species we had, including

a sprig of privet. It wandered from one plant to another and then to our great relief it settled down to the tip of a new bud of privet. The other bits of foodplant were removed very hastily before the larva had time to change its mind, and from then on only privet was provided. All the larvae thrived extremely well on the privet, they grew to full size, in fact they were as large as, if not larger than, any *atropos* larvae we have had in the past. With plenty of privet available we were able to provide fresh food every day, all leaves from the previous day being removed. Each larva was kept separately on privet cuttings standing in small individual glass containers, labelled for identification, so making for easy record keeping. The stock was kept meticulously clean, the extra time and care involved being worthwhile as casualties were very small. Two newly hatched larvae refused to accept the privet, a third, which had been reluctant to eat failed to make its first skin change. The only other casualty was a larva in its third instar which developed a puncture mark after having been given fresh food. The cause was a mystery, but a spider was later found on the privet, so it is possible that the larva had been bitten by the spider!

When a fully grown larva began to change colour and showed the usual signs of wanting to 'go down" it was transferred to a plastic container lined with white tissue toilet paper (margarine tubs are very useful for this purpose), the lid closed tightly down and the container kept in the dark in a cardboard box so as to stimulate lighting conditions underground. The lid of the container was removed at regular intervals to allow a change of air, and the tissues replaced when they became saturated with the excess moisture shed by the larva. After the larva had settled into the torpid stage the lid was just placed lightly on top of the container and could be carefully lifted off without causing any disturbance. We have used this method instead of the usual peat or soil procedure for many years now and have not had any failures in pupation. There is also the added advantage of being able to record exact dates of pupation without the risk of any damage to the pupae.

For two or three days after emergence the moths rebelled against being handled to give them food, but after the first few atempts to hand-feed them they became tame and fed readily after the proboscis was placed in the honey. None of them was seen to feed voluntarily although honey and honeycomb was always available, so in our opinion persistence in hand-feeding is essential for successful breeding in captivity.

Here are some facts which may be of interest:

Female A: Pupated 2nd December, emerged 7th January, first mating 12th January, first egg laid 16th January, last egg 17th February, total of 155 eggs laid over a period of 33 days. (The first two larvae pupated two days before the last egg was laid.) Died 19th February, life span 44 days.

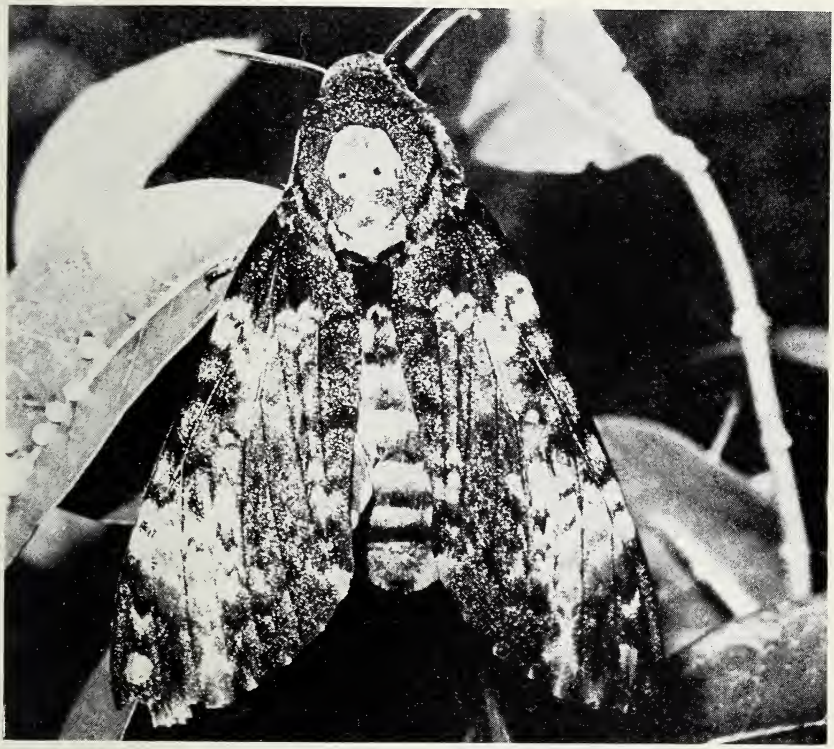


Fig. 2. Deathshead alongside her 10 eggs.

Female B: Pupated 4th December, emerged 11th January, first mating 14th January, first egg laid 20th January, last egg 19th February, total of 190 eggs laid over a period of 31 days. (She had laid 122 eggs before the first larva hatched out. The last egg she laid, No. 190, hatched out successfully and pupated in due course.) Died 21st February, life span 42 days.

All eggs were laid on the nylon netting of the cage, three only laid on the roof, the rest were distributed at random all over the sides. The foodplants provided were completely ignored, so after the first few days they were removed, which gave much greater flying space. Both females flew for long periods before laying a single egg, then went on flying before laying again, so that eggs were laid over a considerable length of time. The peak date for laying was simultaneous, although there was a difference of four days in their ages, and the elder female had begun to lay four days earlier than the younger female.

The two males had life spans of 16 days and 26 days respectively.

The following is an extract from the records kept to date:

11th January, 1978	The four moths placed in the black nylon netting cage.
12th - 21st January	Eight pairings witnessed, durations varying from one hour to eleven hours. Female A (emerged 7th January) mated on 12th, 13th, 15th, 16th, 17th and 21st January. Female B (emerged 11th January) mated on 14th and 18th January.
16th January	Female A laid three eggs between 23.00 hours and 23.45 hours. (Snow was falling heavily outside!). By 19th January she had laid 15 more eggs.
20th January	Female B laid her first egg, early evening, different in colour and size from Female A eggs.
21st January	First larva hatched out from first egg laid by Female A on 16th January.
22nd January	Three more larvae from Female A eggs.
23rd January	Larva observed to be having great difficulty in breaking through shell, eventually succeeded but died shortly afterwards. Another larva could be seen fully formed but failed to hatch.
28th Jan. - 5th Feb.	Only 3 more larvae hatched out from Female A eggs.
8th February	Last larva to hatch successfully from Female A egg. By this time she had laid a total of 58 eggs, about 50% contained larvae fully formed but did not hatch. The next of the eggs showed no signs of development.
20th Jan. - 3rd Feb.	Female B had laid a total of 85 eggs, no development.
4th February	Peak night for laying by both females, 26 eggs from Female A, 37 from Female B.
9th February	No further development in any of Female A eggs, but Female B eggs now developing.
11th February	First larva hatched out from Female B egg, laid on peak laying date February 4th.
12th - 15th Feb.	22 larvae from Female B eggs. Same situation as with earlier Female A eggs, about 50% of eggs developed but larvae failed to hatch, rest of eggs showed no signs of development.
16th February	First two pupations of larvae from Female A eggs.
17th Feb. - 7th March	Five remaining larvae from Female A pupated.
7th March	First pupa from Female B larva.
9th - 24th March	Remaining 22 Female B larvae successfully pupated.

Fig. 3. Deathshead larvae on Privet. (The original colour photo clearly shows the two distinct colour variations.)

21st March — Perfect male insect emerged from Female A pupa (from 1st egg laid 16th January, hatched 21st January, pupated 16th February). This completed the first life cycle of *atropos* bred in captivity.

The position to date (11th April, 1978), is that more insects have emerged, matings have been obtained, eggs laid, and second generation larvae are now beginning to hatch out. A striking difference between the females reared from the wild larvae and those which had been bred through their complete life-cycle in captivity is the manner in which eggs are now being laid. Earlier in this article I described how the original females flew for some time before laying a single egg, then repeated the process before laying again, and all eggs were laid on the nylon netting sides of the cage. When the present females began laying, a pot of privet cuttings was placed on the base of the cage, and at least 75% of the eggs now being laid are on the leaves and stems of the privet, with very little space of time between laying. In one instance we watched a female deposit ten eggs in rapid succession on a single leaf.

The cages we are using vary in size, and we have had matings, and eggs being laid, in a cage as small as 60 cm x 45 cm x 45 cm. They are all made of nylon netting and supported by metal frames, the larger made of Dexion, the smallest from old pieces of Meccano sets. A full

description of this type of cage is given by Mr. Brian O. C. Gardiner in his article on Collapsible Cages in the *Entomologist's Gazette,* (Vol. 25, 1974). We take great care to eliminate as far as possible all acute angles by rounding off corners etc., and this precaution has meant that the insects suffer very little wing damage, even after some weeks in captivity.

The use of privet as a food-plant appears to have been remarkably successful. Larvae and pupae were above average in size, and the insects now emerging are very strong and appear to us to be as big as, if not bigger than, any we have seen over many years. The latest female to emerge has a wing span of 14 cm.

Margaret Beer (3596A).

(Figs. 1-3 are from colour transparencies taken by Margaret Beer)

CAGES AND CLOTHES PEGS

For a number of years I have been using a very fast and simple method of making sleeves and cages. To sleeve, simply encircle a branch with a piece of material such as curtain netting and seal by folding the edges together several times, and then pegging every few inches along the fold. Enormous sleeves can be made or dismantled in a minute or two. To obtain access to your insects simply unpeg near to those you wish to examine or extract and reach in with your arm. This method is excellent for short-term feeders and also with overwintering larvae such as *Aporia crataegi* L.

To make a simple disease free cage for larvae, get a suitably sized cardboard box. Put newspaper in the bottom and stand a vase of foodplant therein. Put larvae in and then place a piece of curtain netting over the top. Secure with upright pegs every two inches making sure there are Two pegs in each corner. To obtain access to occupants simply unpeg about half the top and fold the netting back over. This is an especially good method for rearing Vanessids as they usually pupate hanging from the curtain netting. If any of the pupae need to be sent anywhere, simply cut out a section of netting which contains the pupae you require. The recipient can then suspend the piece of netting up in his own cage. With the pegging method, when the cage has finished its purpose, the box can be burnt or discarded, and the pegs used again on a new box. Diseases are not given the chance to establish themselves in any cage. Cardboard boxes are free, and easily obtained from grocery stores, especially supermarkets. Since using this method I've had no diseased larvae. 'Windows' of netting can be glued into the sides of a box for extra ventilation.

Over the years I've built up a large stock of pegs and if they are occasionally cleaned and linseed oiled, will last for a long time. Curtain netting is expensive, so visit jumble sales.

Alan P. Waters (2615)

LARVAE OF AUTOMERIS — 3 — BOUCARDI

On the 16th July, 1977, I received 20 4th instar *Automeris boucardi* Druce larvae which were feeding on oak. They came originally from the Chiapas area of Mexico. The larvae were reared at room temperature in a wooden frame netting cage. The following is a description from one larvae:

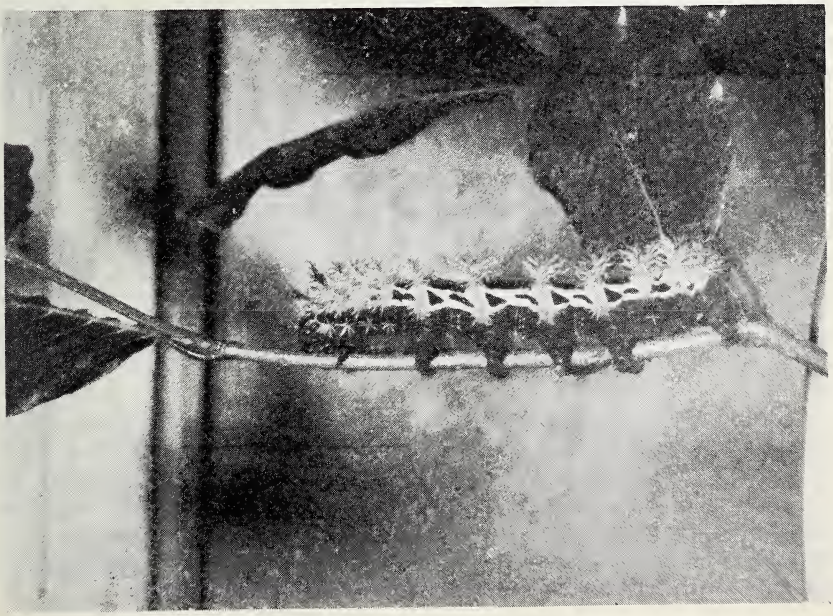
Body black with two navy white lines running through the spiracles which were red and white. The dorsal surface of the body has alternate red and white lines, edged with black. The setae are red, the ones nearest the head and rear of the body are red with black tips. The elaspers, pro-legs and true legs are reddish-brown as is the head. The setae are sometimes yellow and on younger larvae were black.

The larvae also accepted beech and fed during both night and day.

When disturbed they bend back the first few segments, though no fluids is emitted from the mouth. The larvae are gregarious and are very active.

The sting is very painful with large white blotches where I was stung and the pain lasts about an hour, though the blotches persist for long after.

Most of the larvae entered the final instar on the 21st July and attained a length of ten cm. Much foliage was eaten during the final instar. A bowl of moss was placed in the cage, soon after they entered the final instar, in preparation for pupation.



One larva was seen to evacuate its gut on the 1st August and it spun its cocoon between the angle of the cage down amongst the moss. The cocoon is about three cm in length and brown and soft. Before pupation the dorsal surface of the body becomes pink and the larva becomes very active. The other cocoons were spun either amongst the leaves, on the frame of the cage or amongst the moss.

Out of all twenty larvae, only one perished and all nineteen cocoons are awaiting next spring.

Gary King (5654 J).

BOOK REVIEWS

THE BRITISH BUTTERFLIES: THEIR ORIGIN AND ESTABLISHMENT. By R. L. H. Dennis, pp XVIII; 318, 8vo. E. W. Classey Ltd., Faringdon, 1977 Price £10.00.

Meat, solid lean meat. Thus may this book be described, with the figures and tables consolidating the concentrate rather than opening it up. Not a book for the browser nor for the feint-hearted. It cannot be dipped into and digested in odd moments but requires prolonged concentrated effort to read and assimilate.

Mr. Dennis has clearly read widely in a variety of disciplines, assimilated that which he has read, correlated the interacting factors into a framework and, clearly with enormous energy and determination, enclosed this scholarly book. Without Mr. Dennis' obvious grasp of the subject and background reading, many of us are going to require the use of a dictionary in order to follow some of his arguments. The Entomological terms are by and large intelligible, but then we come into the terms used in Palaentology, Geography, Stratigraphy, Ecology. How many of our readers know offhand the precise meaning of Weichselian maximum, negative eustacy; Allerod and Ipswichian species. A glossary of these more esoteric terms would have added greatly to the average Entomologist's ease in understanding this book. Such a glossary would have been of much greater use than the existing butterfly foodplant list and check list of species. Not only could these have been easily condensed into one list but both are readily available elsewhere. Additionally the checklists fails in its purpose as it does not give the key to the vital trinomial system so extensively (but very neccessarily) used in the text.

Some thirty years ago both E. B. Ford and B. P. Beirne discussed at length the origin of the British Butterflies. In those years since then very many new facts have come to light which have undermined the premises of Ford and Beirne. Dennis has taken these into account and concluded that all the British Butterflies are comparatively recent arrivals — none having been here for more than 13000 years. Most of them indeed he considers have only arrived since the last glacial period,

an argument amply supported by present day evidence, as is also the new premise that genetic drift to form new species can take place in a tenth of the time previously postulated.

This is a thought provoking book and is a logical extension of Entomological science from the pretty, the descriptive taxonomic; the life history and physiological. In view of the lack (due to their fragility) of physical fossil remains, some of the past history of Lepidoptera must remain conjectural in spite of the validity of comparisons with other groups containing fossils. A digestion of the facts and reasonings contained in this book should lead collectors, taxonomists and conservationists to re-examine material in a different light and draw attention to lacunae.

It is a pity that in line with modern publishing techniques this book leaves something to be desired. It is printed on a hard deadwhite paper, trying on the eyes in certain light and not lying flat when opened. Typographical errors however appeared to be few and far between. Perhaps at £10 we cannot expect better production these days, sad to say. Nevertheless a book well worth having.

S.C.

GENITALIAS DE LOS ROPALOCEROS DE ALAVA y su entorno Iberico, by Fidel Fernandez-Rubio. Parte II; Libytheidae, Nymphalidae, Danaidae. Obtainable from the Consejo de Culture, Diputacion Foral de Alava, Vitoria, Spain.

This is the second of the series on the genitalia (male) of the butterflies of the Alava region and the Spanish mainland, the previous one being on the Lycaenidae. The publication consists of a series of plates approximately $6\frac{1}{2}$ ins. x $4\frac{1}{2}$ ins. depicting the dissected male armatures greatly enlarged. The work has the shortcomings of the previous one in that no attempt is made to label any of the parts and while in most cases this is no problem to the student, several of the plates are confusing. Only two plates have indications of special features useful in identification; Nos. 38 and 39 have the tip of the aedeagus ringed indicating the clear difference between that of *Mellicta athalia* and *M. deione*, two species which are often confused in the field and in the cabinet. A little more care in presentation would have made this series a valuable contribution to the classification of the European butterflies.

P.W.C.

HENRY DOUBLEDAY — THE EPPING NATURALIST, by Robert Mays, F.R.E.S. Printed by Precision Press, 15 High Street, Marlow, Bucks, 1978. 118 pp, 4 plates. Price £4.20.

I enjoyed reading this book. My interest in the lepidoptera spans half a century but the name Doubleday meant little more to me than that of an old collector who discovered inadvertently the art of 'sugaring

for moths' and after whom the melanic form of the Peppered moth was formerly named. Vaguely, I assumed, that the authority 'Doubl.' for the latin names of certain moths referred to him. These were the least of his achievements.

Coming from a strict Quaker stock, Henry was the elder son of an Epping grocer and after receiving the standard education at the local Friends School, entered the small family business. From thence his whole life centred on the surrounding forest with its abundance of wild life. He travelled rarely save for occasional visits to localities in Eastern Britain and one short visit to Paris. The book unfolds the fascinating story of how this unassuming naturalist, living in a quiet backwood, corresponded with and guided the elite of the British and Continental en tomologists. Many considered him the leading lepidopterist of his generation, 1806 to 1875.

The leading scientific journals of the period contain numerous reports and observations from his pen and the authors of many of the entomological books acknowledge the extensive assistance received from him. However, he published only one major work. This was the SYNONYMIC LIST OF BRITISH LEPIDOPTERA, issued in parts from 1847 to 1850 with revisions up to 1873. It included all the known British lepidoptera, in all some 2,100 species. Much of the nomenclature was new and this was to be the standard reference for many generations of collectors.

The author describes also in detail, the other interest of Henry Doubleday's younger days, ornithology. With his usual thoroughness, he kept records of all the Epping birds and a typical exercise was the account over 18 consecutive years of 25 common migrants. This was the age when the Lords of the Manor were enclosing common land. The Forest lost 3000 acres, half of its sum total and the fight to retrieve this land culminating with the successful passing of the Epping Forest Act in 1878, makes fine reading.

The volume is well produced in bold type and with distinctive end covers. There is an extensive bibliography and notes comprising 204 items. For easy reference, I prefer the notes to appear in the body of the text but I assume, in this case, the large number would upset the lay-out. The price of £4.20 appears reasonable for what I consider would be an attractive addition to the library of any lepidopterist or historian.

R.D.H.

OUR ANNUAL SHOW — MARKET OR MUSEUM?

We amateur entomologist enthusiasts may often take refuge within our precious hobby, hiding therein from the harsh conflicts of the human world beyond. But how we bring all our humanity right into our cosy insect dens nevertheless! We neatly exchanged the all-too-familiar everyday public conflicts for our own special six-legged brand

instead. Here we meet the splitters versus the lumpers, the butterfly nets versus the cameras, along with all the hot literary and vocal controversies constantly waged (and, no doubt, often richly enjoyed!) by the many vigorous exponents of each. And now, in recent years, as though exquisitely evolved by Darwinian adaptation to our shrinking annual school-hall habitats, we are fast developing a new species of human entomological battleground altogether. Beautifully crystallised in Paul Sokoloff's questionnaire circulated to us in December, we now have brought right into the limelight the long-simmering war of the dealers versus the exhibitors!

Well, before I stir up either "armed camp" into an eloquent tirade of shattering eloquence against me (whew! — ever tried to sail over a volcano in a paper raft?), may I immediately placate anyone's already provoked feelings by stating very sincerely that I personally feel that both are equally essential and exciting ingredients to our show. If war must be waged, let us arrange that both "camps" should be equal winners, and let us also battle in the same healthy, sporting, atmosphere in which any amateur competition ought to be conducted.

But, sadly, I feel that this is not an attitude shared by all. Each year, our available accommodation (i.e. table space) is inadequate for both "camps" to "spread their wings" fully at the same time. If we are bound by this situation, then some restrictions are obviously necessary, but are they being fairly and equally applied to each "camp"? Are not the particular prejudices of those in authority likely to determine which "camp" is actually favoured for space allocation? Are some of us not guilty of secret or even openly-expressed hostility towards the opposite "camp", such that we feel its presence is virtually a blemish upon an otherwise pure representation of our own chosen preferences? I think we are, and while no-one has the right to set out to change our personal views, I would be sorry if these were applied too dictatorially by those with the power to do so. For that would be a form of propaganda that we should all discredit the "camp" which just happens to be displeasing to an author or organiser. Let's be as democratic as we can. Oh, yes, we're all still very human when we bury ourselves in our beloved bugs!

Now, two suggestions for exhibition improvements have already been made by people at various times, and I would just like to bring them together here with my own views why both appear to have considerable advantages over our arrangements to date. How practical they might be I have no idea, but a suggestion has to be the starting point of constructive discussion. The first suggestion, made by Paul Sokoloff, is that we should pay an entrance fee of up to 25p. The second was not mentioned on his questionnaire, but has vaguely been in the wind from time to time, namely that we should have two annual exhibitions, in fairly quick succession, each autumn, a Dealer's Exhibition solely to

enrich our collections and/or our money-boxes, followed by a later Members' Exhibition solely to enrich our social contacts and our scientific knowledge. Both these suggestions receive my unqualified enthusiasm. Both would seem to be in the interest of the majority, and would seem to facilitate the best representation of each "camp", both of which are very popular and necessary. As far as a modest entrance fee is concerned, I feel sure that, for most of us, this would be an extremely small proportion of our total public or private travelling costs of actually getting to the venue itself from all over Britain. Furthermore, it seems very reasonable to pay a small sum for an afternoon's entertainments and amenities every bit as enthralling to us as is, for example, the expensive Chelsea Flower Show to the keen gardener. And, if two shows were seriously considered, one strictly for each "camp", then, yes, both should charge an equal entrance fee to help finance them. Each "camp" would then have double table space available, and less of a human crush. Visitors could come more relaxed in the knowledge that they could really enjoy and thoroughly make use of the very different types of amenities offered one day at a time. We would remove a situation whereby the more prejudiced among us are wont to screw up a disparaging nose at what is going on at the other end of the hall! This minority of our colleagues would simply turn up at the show that suited them. But I bet that most of us would make every effort to attend both events. I know I certainly should.

After all, in the few intensive hours available to us, how many of us can get round everything really adequately in our present situation, AND meet all those friends and colleagues we can never see any other time; who, in some cases, we may never have seen before anyway? And now we talk of a larger hall, for yet more people to circulate within, for yet more things to see and do, but, as individuals, still fallibly human, do we really have the personal capacity, each of us, to cram more physical effort into those very few hours, or to squeeze more material or spiritual benefit out of them?

Brian Wurzell (3718)

AUTUMN COLLECTING IN EASTBOURNE IN 1977

Although the year 1977 was well below average in terms of numbers of species, this situation was remedied by an exceptional autumn.

The first species noted was the Feathered ranunculus *Eumichtis lichenea* Hubn., upon the 11th of September. By the time the last specimen had been taken on the 21st of October, over a hundred specimens had been recorded. Later, on the 25th of September I visited Holywell near the sea and the cliffs where I took a Deep Brown Dart *Aporophyla lutulenta* Schiff. Upon the same night I took a Feathered Brindle *A. australis* Boisd., a species that has only previously been

recorded by Mr. S. Pooles. Later upon the 15th October I was very lucky to catch a Black Rustic *A. lunula* Stroem., at the Seafront. As this is the only recording for this species since the 1950's, it is likely that the moth was an immigrant from the continent. Collecting again in the same locality on the 16th I took six Dark Swordgrass *Agrotis ipsilon* Hufn., in the company of Mr. M. Hadley which is further evidence of a migration from abroad. This is in strong contrast to the sum total of only four *A. ipsilon* that were taken during the rest of the year. Upon the 19th of October perhaps the most exciting capture of the year was taken at Ivy blossom. A single male specimen of the Scarce Bordered Straw, *Heliothis armigera* Hubn. Another moth that is seldom encountered in the area and was also taken at the same locality was the Barred Sallow *Tiliacea aurago* Schiff. This is a species which readily deposits ova in captivity and these were subsequently reared. Another interesting species that seems to be increasing its range in the area is Blair's Shoulder Knot *Lithophane leuateri* Boisd, and has been taken several time this autumn.

Several other species were taken this year that are normally uncommon in the area. These were the Dark Chestnut *Conistra ligula* Esp., the Yellow Line Quaker *Agrochola macilenta* Hubn., Red Line Quaker *A. lota* Clerk., Green Brindled Crescent *Allophyes oxycanthae* L., Feathered Thorn *Colotois pennaria* L., Satellite *Eupsilia transversa* Hufn., and the Tawny Pinion *Lithophane semibrunnea* Haw. Of course, any collecting account would be incomplete without its story of the one that got away. Whilst collecting on the 7th of September a large Hawkmoth rose from a bush in front of me, I was so surprised to see a Hawkmoth that I forgot the net in my hand!

M. Parsons (5983 J).

THE 'GREEN' AND 'BLUE' SPINED AUTOMERIS

In June 1976 I received amongst other things from my contact in Central America, ova of two species of *Automeris* moth, which proved very interesting to rear, though unfortunately I can give no name to either of them as they were both from wild-caught adults in Mexico. The first species was what I called the 'green' *Automeris,* because the larvae were a beautiful rich green. These on hatching from the ova were a dull brownish yellow colour, and they quickly started feeding on oak — my favourite 'first' foodplant to try all new species on. However, by the time the larvae were 3rd instar, and upwards, they were the most beautiful green colour, with a broad white band on each side (see Fig. 4). The spines though quite long and very numerous, did of course sting, not so bad as some species I've reared! I only received six ova of this species, all of which I'm pleased to say survived to the pupul stage, but have not yet emerged.

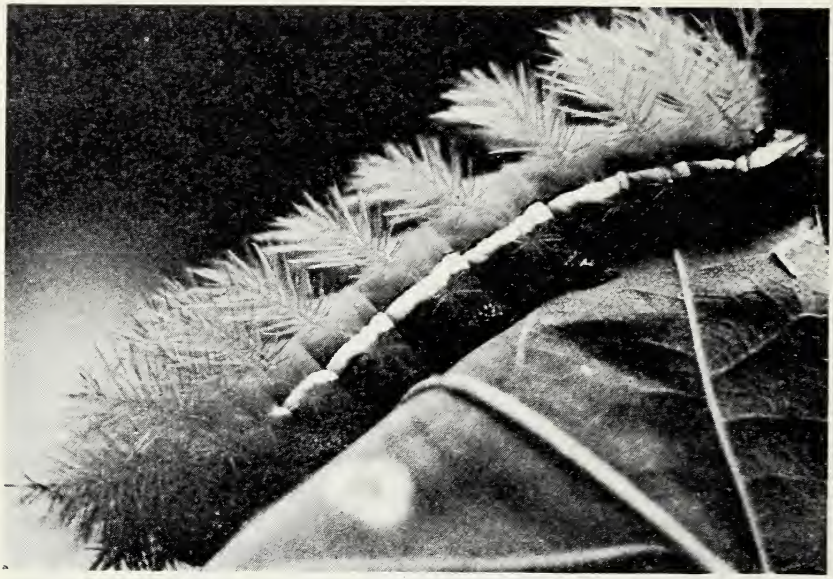


Fig. 4. The Green Automeris (Photo by W. Caswell).

Fig. 5. The Blue-spined Automeris (Photo by W. Caswell).

The 'blue' spined *Automeris* was even more interesting. The larvae, like those of the 'green' species' were a dull yellow on hatching, and these larvae were very gregarious indeed, covering the whole side of a leaf in thousands of tiny spines! These also took readily to oak, and as they grew, they turned to a beautiful shade of yellow, with a yellow head. The biggest change was from the 4th instar on, when they changed to a lovely pale bluish colour, though in various kinds of light, they seemed to differ in colour, sometimes more green, while at other times they were almost a purple colour. The 5th instar was the most beautiful of all, when the larvae reached a very large size for *Automeris* species, and were the most lovely species I have seen for a long time, eating huge amounts of oak, and with long and dense spines, which stung quite severely though the sting did not last very long (Fig. 5).

The adult moths began emerging in late autumn, rather to my annoyance, as I would have preferred them to wait until spring 1977.

Sadly however, even though I had plenty of both sexes out at the same time, even emerging the same days, they failed to pair in any conditions, even hanging them outside in the wind all night in a large net cage.

Wesley Caswell (3133).

VARIATIONS ON ELYTRA

I wonder just how many of you amateur Entomologists (or should I say, Coleopterists), have ever bothered to take a closer look at the colour-composition of tropical beetles? What I mean is to say is, do you know that the colour of many beetles is due to a structure far more complex than just multi coloured pigmentation?

I first began collecting beetles in Brazil 14 years ago and it wasn't until 1975 that I decided to investigate and study some of them, just out of sheer curiosity. All I had at that time was an old (but very good) Watson microscope with only x100 magnification available. Using a scalpel I carefully scraped the chitinous surface of several specimens; the details of which are listed below:

Specimen I was the "Diamond beetle", *Entimus imperialis* from Brazil. A triangular-shaped weevil, whose surface clearly resembles a jewel-encrusted garment. On a microscope slide the "scrapings" revealed that the colour of the specimen consisted of blue, green, pink and gold scales. These scales were very similar to the scales on the Lepidoptera.

The second beetle was also a weevil. It's colour, white with a V-shaped brown band on the head extending down the thorax. This time the matt, white colour was due to rod-shaped projections.

The third, another weevil, *Lamprocyphus elegans* was seen to consist of blue-violet scales but so neatly arranged that the pattern resembled the tissue of either plant or animals.

Other observations showed that colour patterns were made-up of hairs and in another instance they looked like "little pads of felt or velvet".

It was like entering another world!

All together I examined 25 specimens from 5 major families; the Cerambycidae (Longhorns), the Curculionidae (Weevils), the Scarabaeidae and Carabidae (Dung & Ground beetles), and the Chrysomelidae (Leaf-beetles). A short while ago, I managed to borrow a binocular microscope. This enabled me to view specimens far more easily than before and once again I was fascinated. Unfortunately the instrument had to be returned after a day so my observations were postponed until such time as I have managed to obtain my own!

John Nelmes (6310)

A NEW ABBERATION OF ERYNNIS TAGES L. ERYNNIS TAGES AB PALLIDA FULVUS, AB. NOVO

It is a well known belief that good fortune often comes to the novice in all sorts of pastimes — the golfer who gets a hole in one on his first round, or the person who wins the pools in the second week and, sure enough, Lepidopterists must receive their share of 'beginner's luck'. Here is an example.

My brother, Martyn, and myself, have only been seriously interested in lepidoptera since the end of July 1976 (although I have had some involvement for the past ten years) and whilst collecting at a locality near Wild Park in Brighton on May 28th 1976, we came across an abberation of the Dingy skipper (*Erynnis tages*) that has since been shown to be exceedingly scarce. The specimen differs from normal specimens of *tages* in that the ground colour of the upper side is very much paler than usual, being a lighter shade of that of the underside of a normal *tages* but more fulvous. It has been identified as male since it contains androconia in a fold of wing on the costal margin. The antennae are the same colour as the upper side of the wings. The underside contains very few markings except for some very indistinct creamy spots on the outer margins. The underside fringe is a lighter shade of the ground colour. Fig. 6 depicts this new abberation.

We took our specimen to Mr. David Carter at the British Museum (Natural History), where, on comparison with the National Collection, it became apparent that there is only one other of the same form — a rather poor specimen captured in 1903 which has not yet been named. My brother has suggested *ab. pallida fulvus* which Mr. Carter has agreed is an appropriate name.

We hope that this article will prove to be encouragement for those beginers who feel despondent after the appalling summer of 1977.

Kevin Eaves (6120)
Martyn Eaves

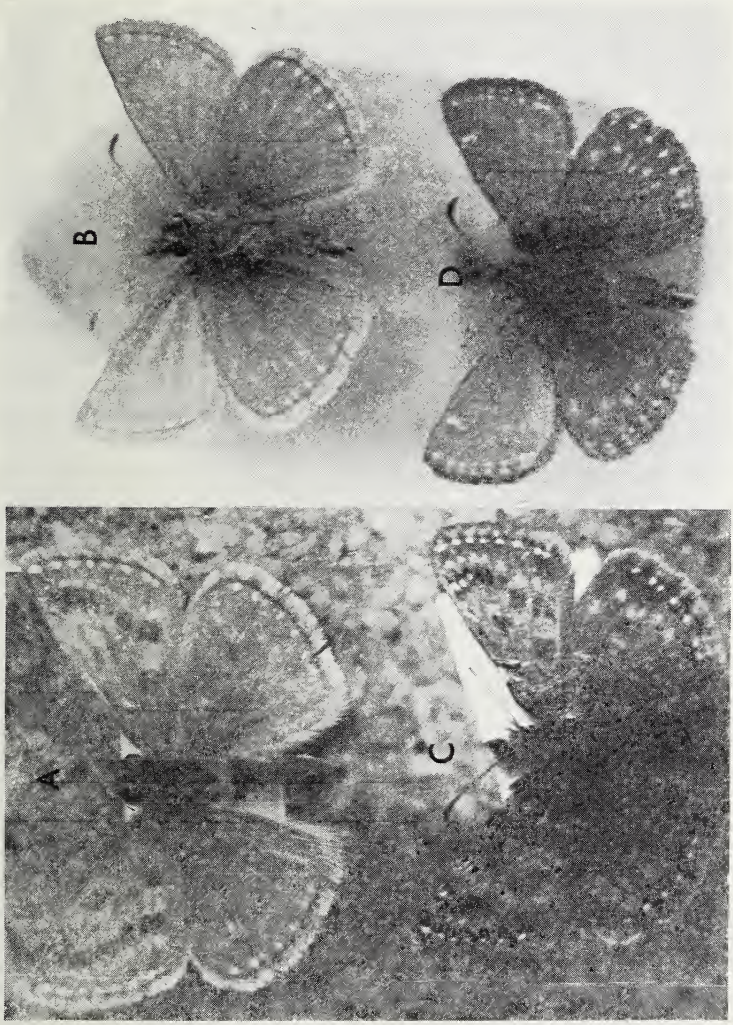


Fig. 6. *E. tages ab pallida fulvus*. A. Upperside. B. Underside.
C, D. Upper and underside of type specimen for comparison.

A CALENDAR YEAR

Winter, for the butterfly enthusiast, is a bleak period! Perhaps a search here and there for overwintering stages, but little more than a patient waiting for Spring. As 1977 dawned, the thought struck me — could one actually see not only a butterfly free and wild in each month of the year, but a different species for each month?!

A failure for January does of course knock the whole idea on the head before it even starts. It was therefore with some dismay that the first month was drawing to a close without any success. On a day of sunny intervals in North Cornwall, I happened to look over a garden gate. It was the 28th of January, in the middle of the day. Fluttering around a rock face in the feeble sunlight, a Peacock then alightened on a moist patch of rock to drink for several minutes. She then basked for a further period before flying a few feet to a drain pipe into which she slowly crawled. On one or two subsequent occasions in similar conditions, the site was watched, but no movement observed.

February too, proved a "cliff hanger". It was not until the 25th, after a morning of brief sunny intervals, that I chanced to look outside the manor office door at Padstow, just as the sun finally vanished behind heavy cloud. A Small Tortoiseshell fluttered against the ivy clad wall; a specimen so worn that only a trace of colouring remained. However, Small Tortoiseshell it was, and February had its notch!

As if to compensate for the difficulties of the first two months, March produced a day of pure Spring on the 2nd. Although there was no time actually to search for butterflies on my country rounds, no less than fifteen were seen. Along a short length of hedge, with no obvious nooks for hibernation, four Peacocks basked. The other butterflies included three Small Tortoiseshells, more Peacocks, and a single each of the Comma and Brimstone. The latter two offered a valuable choice of species for the month, supplemented by a Small White, strong on the wing, on the 17th.

April produced a Red Admiral feeding high up on pussy willow catkins in Plymbridge Wood, during the middle of the day on the 2nd; and on the fifteenth of the month, while watching the first freshly emerged Speckled Wood at Padstow, a Holly Blue passed by within a yard, on this sunny morning.

The next five months from May to September obviously caused no problems, but the selection of species illustrating the late season may be of interest:

May 29th. Chequered Skipper, Glencoe. First newly emerged ♂
June 24th. Swallowtail. Newly emerged and one of the first. Broads. ♀.
July 11th. White Admiral. Heathfield, Devon.
August 11th. Silver Spotted Skipper. Just emerging, Hampshire.

September 11th. Brown Hairstreak. Reasonably fresh and laying. Dartmoor.

The month of October started well, for by the 7th of that month, at least nine species had been observed, including all three of the Whites, Commonblue, and Small Copper. No Wall Browns could be found, but Speckled Woods at all stages of condition were plentiful. Peacocks, which had been numerous, appeared to vanish as from mid September, but contrary to those who maintain the Small Tortoiseshell to be an early hibernator, the latter was widespread in abundance.

The relative abundance of fresh Speckled Woods and Small Coppers made matters look hopeful for November. Both the Small Tortoiseshell and the Peacock had been "expanded" as single observations at the beginning of the year, so the Speckled Wood offered the best bet for November, keeping the Red Admiral in reserve for December. Several promising haunts were noted before the writer departed for hospital, followed by the restrictions of convalescence! October weather continued benevolently with relatively mild temperatures and some sunny days, but November started furiously with rain laden gales. Visits to the more accessible sites during sunny glimpses left it quite clear that the Speckled Woods were over.

The violent weather abated for a day on November 4th, offering plenty of sun. The City allotment garden hedges, laden with ivy bushes, yielded a basking Comma at 9.45 a.m. The butterfly then took several short flights before vying with the numerous wasps and bluebottles for the nectar of the global blossoms. By 11.00 a.m. we had seen Red Admirals into double figures. Would any survive the meteorological trials until December, or indeed wish to remain — the shelter in the deep bosom of the ivy bushes should certainly help.

The number of Red Admirals rapidly dwindled to two seen on the 12th, one of which, a large female was in the best area noted on the 4th, and the only one to be seen thereafter. We nicknamed her Amy, and kept her under surveillance throughout the remainder of the month, during which she endured gales, hail, torrential rain, and frosts. She was easily recognisable by a round worn patch in the centre of the right fore wing; and her sunlight base was a Hebe bush still bearing pale mauve trumpets. In the meantime, a Small Tortoiseshell was seen flying and basking on November 15th, in a day of bitter wind and squally showers; Peacocks on the 8th and 25th; and Red Admirals at Padstow on 18th and 25th, the former specimen being extremely torn. Both fed on Red Valerian.

A fortnight of December passed with no trace of good weather, but on the 15th, three Red Admirals, one Brimstone, and one Comma were seen, and a victory won!

A. Archer-Lock (5787).

LETTER TO THE EDITOR

Dear Sir,

I was most interested to read the article by M. D. Bryan (A few thoughts on extinction, rarity and conservation, A.E.S. Bulletin, 37, 3-9) and agree whole heartedly with most of his views on the changes in the distribution and status of our British fauna. I must take issue with his advocacy of introductions, however.

My objection to introductions is not based on a desire to preserve the "natural balance" of our fauna for I am well aware of how important man-made changes in land use have been. Neither am I objecting on the grounds that the introduced species may "damage" our native fauna in some way (presumably through direct competition, the introduction of disease or parasites or the introduction of unsuitable genetic material) although it must be said that such damage could easily occur in some cases. We require much more knowledge than we have at present before we can be reasonably sure that our introductions would *not* cause some harm.

My real objection concerns the effect such introductions would have on various studies on the British Lepidoptera, for example on the distribution of the native species, their rates of dispersal and recolonisation and their genetic constitution and how this varies between populations both here and abroad. Thanks to studies of this sort Mr. Bryan was able to write his article and base it on reasonable knowledge. If we introduced other species it would be impossible to continue these studies effectively (even if all introductions were meticulously recorded), except in groups of species too drab to attract the introducers.

My belief is that we know too little about the ecological requirements of all but a tiny handful of species to make more than a guess about whether any introductions might survive. Furthermore the 21 species which colonised Britain between 1921 and 1960 are testimony to the considerably under-rated powers of dispersal of Lepidoptera and suggest that if suitable areas became available then they would soon be colonised without our help. This leads me to my view that the correct approach in conservation is habitat preservation, reconstitution and even construction. Of course, even this is anathema to the 'leave it all to Mother Nature' school of thought but I believe that it is necessary to conserve a range of habitats, some of which, like chalk grassland, require active management. If we left it all to nature we would end up with a smaller variety of climax communities.

I do not believe in the 'species conservation' approach except in exceptional circumstances. Sometimes a rare species captures the public imagination and this helps increase public concern for conservation generally (e.g. the Osprey) and sometimes a species is sufficiently important or attractive in its own right to deserve help (e.g. the Otter) but generally species conservation seems to lead to the 'fossilisation" atti-

tude which Mr. Bryan laments. Perhaps if we can do without introductions we can eventually learn enough about the ecology of sufficient species to enable us to make a better attempt at habitat conservation and I think that if we do then most species will recolonise on their own behalf.

M. R. Young (3759).

INFREQUENT TRAP VISITORS: TWO'S COMPANY?

Having recently emerged from the cloistered existence of university life, I have had a chance to sort through some old moth trap records, which has turned up an interesting phenomenon. After blowing off the dust I have examined some work that I started at university but was forced to lay aside when exams loomed near. From six years' data I have constructed 180 tables, each of which give a full account of the times of appearance and abundance of a single species of moth. These capture tables allow an immediate appraisal of the patterns of appearance of each species every year.

The task of extracting relevant data and condensing it into 180 tables might appear rather daunting; a clerical task of extended tedium. Happily I was saved from this through access to a computer. A stack of computer cards and a simple program set things in motion, and in seconds rather than weeks I was presented with a complete set of neatly presented tables.

At first, as I leafed through the pages of computer output, I dismissed the tables showing records of infrequently caught species; there were so few sightings that the beginnings and ends of the flight seasons could not be accurately determined. In glancing at these tables, however, I noticed a phenomenon that prompted recollections of casual field observations. When an unusual species did appear in the trap it was often represented not by a single specimen, but by two or three. Looking through all the tables for species that were only captured on perhaps a couple of nights each year, I found that this pattern was repeated too often to be merely the result of chance.

My records of the Small Quaker, *Orthosia cruda* Schiff., are a typical example of such a pattern. This moth was only caught on three occasions during the period from 1969 to 1974. The captures on these dates were as follows:

22nd April 1971 — 2
17th March 1972 — 3
18th March 1974 — 1

No *cruda* at all were seen on any other nights during the period of study, and though trapping was not carried out every night, there were more than seventy occasions on which the moth might have been expected to be caught.

I well remember another example of an isolated group appearance, when on the 8th July 1970 I trapped three Leopard moths, *Zeuzera pyrina* L. This appearance was the only one of the year, and what is more none were caught in the previous year, and only one in the following year.

Looking through the tables and picking out the infrequent visitors, I find that the "twos and threes" phenomenon can be attributed to a host of species:

Leopard Moth, *Zeuzera pyrina* L.; Oak Hook-tip, *Drepana binaria* Hufn.; Pebble Hook-tip, *Drepana falcataria* L.; Red Twin-spot Carpet, *Xanthoroe spadicearia* Schiff.; Blue-bordered Carpet, *Plemyria rubiginata* Schiff.; Small Rivulet, *Perizoma alchemillata* L.; Clouded Border, *Lomaspilis marginata* L.; Lunar Marbled Brown, *Drymonia ruficornis* Hufn.; Small Quaker, *Orthosia cruda* Schiff.; Lunar Underwing, *Omphaloscelis lunosa* Haw.; Orange Sallow, *Xanthia citrago* L.; Poplar Grey, *Acronicta megacephala* Schiff.; The Sycamore, *Acronicta aceris* L.; The Miller, *Acronicta leporina* L.; Flounced Rustic, *Luperina testacea* Schiff.; Ear Moth, *Amphipoea oculea* L.; Bordered Sallow, *Pyrrhia umbra* Hufn.; Scarce Silver-lines, *Bena prasinana* L.; Golden Plusia, *Polychrysia moneta* Fab.; The Snout, *Hypena proboscidalis* L., and others.

Why should these occasional visitors to an urban garden in Surrey arrive in small groups of two or three so often? Not all infrequently observed species conform to this pattern of appearance, many are characterised by a very uniformed rate of capture. I would suggest that the difference between species caught as occasional individuals, and species captured as occasional small groups reflects a difference in geographical origin between these two categories of species. One would expect local species that are present in very small numbers to be trapped infrequently, and usually only single moths would visit the trap. On the other hand species that are resident outside the local area would only be caught if they had made short migratory or exploratory flights. Migration appears to be controlled by an environmental cue, and is not the result of an inexplicable spontaneous decision made by certain individuals to leave home ground. Thus it is reasonable to suppose that moths migrate in waves, with large numbers being affected by a stimulus common to all of them. Therefore on nights when flight activity is high and the moths' travels are far-ranging, one would expect to catch small groups of moths of species that are resident just outside the local area. On nights when conditions do not stimulate such activity, one would not normally expect to see any specimens of non-resident moths.

By examination of the pattern of appearance, applying the theory laid out above, it is possible to separate those species that are resident but uncommon from those that are non-resident (though they may be common outside the local area). However, it must be remembered that

long-distance migrants, making international rather than relatively local flights, are likely to appear only as single specimens in the trap. They will have become separated during the course of their long flights. These migrants are not likely to arrive in small groups on a single night, though they may turn up in fair numbers over a period of several days or weeks.

Many of the species listed above have only appeared in my trap on nights of exceptionally high temperature. Their appearance does not tie up with windy weather, which might be expected to blow a large number of moths off-course from their home ground. It is known that high temperatures increase the level of flight activity, and perhaps it is under these conditions that moths make flights that range unusually far from home.

How far these short-range migrations or exploratory flights extend is a matter for speculation. For some of the listed species I know of no immediate supply of foodplant. For example, the nearest woodland (which might house colonies of the Scarce Silver-lines, *Bena prasinana* L., or the Lunar Marbled Brown, *Drymonia ruficornis* Hufn.) is over 300 metres from the site of the trap. It would be fascinating to know the average nightly flight range of some of our commoner species of moths, but I know of no studies on this subject. Studies of some American butterflies suggest that they travel back and forth along a regular daily run, and this supports anecdotal observations made of some British butterflies be many entomologists.

Further work clearly needs to be done before more definite conclusions can be drawn. I would be glad to hear from anyone with any relevant comments, observations or records.

Anthony T. Short (5205).

RHOPALOCERA OF THE NEW FOREST DURING JULY 1977

After a good season for butterflies in 1976 I decided that it would be in my interest to visit the New Forest for a week in July 1977 (9th-16th). I hastily booked myself up in a small boarding house and awaited the arrival of the collecting permit from the Forestry Commission.

After a rigorous trip down from Edinburgh I was eager to start collecting but the weather was not kind. However there were some sunny periods and in the Brickiln enclosure I managed to observe some Large Skippers, a male Silver Studded Blue, a male Silver Washed Fritillary which soared down from the trees and flapped along ten feet above the path, and an abundance of Meadow browns which occurred everywhere during my holiday. But although the weather was bad I realised that my fears of being too early for many of the July species were true.

But the next day my hopes were as high as ever and I contacted two fellow members whom I had previously written to in my desire for

information on the area's butterflies and they kindly drove me to the Parkground enclosure where I encountered several new species, the first of which were a pair of tattered Speckled Woods, which were all that remained of the late Spring brood. The Large Skipper was again common and a few Small Skippers also put in an appearance. There were also some small Pearl Bordered Fritillaries joined by a few Silver Washed Fritillaries. I also encountered a few Small Heaths in one of the forest clearings and it was here also that I sighted my first White Admiral, where it daintily skimmed back and forth over the bramble blossom. Then we moved on to Pennington moor near Brockenhurst where we encountered a female Silver Studded Blue, Small Heaths, some Small Pearl Bordered Fritillaries and Large and Small Skippers.

On the eleventh I decided once again to try the Brickiln enclosure where I was lucky to find two White Admirals, two Purple Hairstreaks, 2 male Silver Studded Blues flying with the Small and Large Skippers and a few Silver Washed Fritillaries. I was just examining a Silver Studded Blue when I noticed what I thought was a Large White in the distance but when caught it proved to be a female Brimstone which was tattered and probably full of eggs so I released her and moved on.

The twelfth saw me exploring a large area of Heathland known as White Moor near Lyndhurst. The area was carpeted with male Silver Studded Blues while the females were hard to come by. Also present were a sprinkling of Large Skippers and Small Heaths. I also visited this area on the 13th but nothing else turned up.

The next day at the Parkground enclosure a few Ringlets had just emerged and were flying with the Small Heaths, while the Large and Small Skippers were everywhere 'buzzing' the sparse population of Silver Washed Fritillaries.

I returned to this area again on the last day of my visit and more Ringlets were present along with the other usual species. I also found a Red Admiral or should I say it found me. It sped out from the trees and landed on my head for a brief moment before sprinting off again. Then I decided to make my way to the Pondhead enclosure where I witnessed the first Gatekeepers of the summer along with a couple of Purple Hairstreaks and a solitary White Admiral which jousted with a couple of male Silver Washed Fritillaries. It was here where I saw my first Grizzled Skipper which was in extremely good condition considering it was a late specimen of the spring brood. I also found my first female Silver Washed Fritillary at that locality. It was hovering over a wooded path attended by a male of the same species.

Although it was a bad year, the weather stayed relatively good and I thoroughly enjoyed my holiday and look forward to visiting the area again in a few years time. I would like to thank two fellow members who showed me their generosity and interest by showing me round the forest in their own free time, Mr. J. S. Hall and Mr. D. A. Le Pard —

thank you both very much. May I also add that on the 19th September in 1976 a Camberwell Beauty was found feeding on the Buddleia in my garden in Dunbar.

P. G. Fairbairn (5570).

A LIST OF THE FOOD PLANTS OF EAST AFRICAN MACROLEPIDOPTERA

(Continued from Volume 36 page 50)

PART 3 — BOTANICAL LIST (ALPHABETICALLY ARRANGED)

ACANTHACEAE

Acanthus — *Spilosoma sulphurea* (Arctiidae) : *Coelonia mauritii, Dovania poecila* (Sphingidae) : *Ozarba rosescens* (Noctuidae).

Asystasia — *Hypolimnus misippus, Salamis temora, S. parhassus, S. anacardii, Precis chorimene, P. stygia, P. natalica, P. terea, P. sophia, P. westermanni, P. clelia, P. cebrene, P. limnoria* (Nymphalidae) : *Eretis djaelaelae, E. lugens* (Hesperiidae) : *Ozarba perplexa* (Noctuidae) : *Scopula ochroleucaria* (Geometridae).

Barleria — *Acraea zetes* (Acraeidae) : *Catacroptera cloanthe, Precis chorimene, P. stygia, P. natalica, P. terea, P. sophia, P. westermanni, P. clelia, P. cebrene, P. limnoria* (Nymphalidae) : *Eretis lugens* Hesperiidae) : *Bombycopsis indecora* (Lasiocampidae) : *Hypena obsitalis* (Noctuidae) : *Scopula ochroleucaria* (Geometridae).

Hygrophila — *Precis orithya* (Nymphalidae).

Hypoestes — *Bombycopsis conspersa* (Lasiocampidae).

Isoglossa — *Salamis parhassus, S. anacardii* (Nymphalidae).

Justicia — *Hypolimnas misippus, Salamis temora, S. parhassus, S. anacardii, Catacroptera cloanthe, Precis chorimene, P. Stygia, P. natalica, P. terea, P. sophia, P. westermanni, P. clelia, P. debrene, P. limnoria* (Nymphalidae) : *Sarangesa motozi* (Hesperiidae) : *Teracotona euprepia* (Arctiidae) : *Bombycopsis indecora* (Lasiocampidae) : *Chloridea obsoleta* (Noctuidae).

Mimulopsis — *Salamis temora, S. parhassus, S. anacardii* (Nymphalidae).

Paulowilhelmia — *Salamis temora, Precis chorimene, P. stygia, P. natalica, P. terea, P. sophia, P. westermanni, P. clelia, P. cebrene, P. limnoria* (Nymphalidae).

Ruellia — *Precis chorimene, P. stygia, P. natalica, P. terea, P. sophia, P. westermanni, P. clelia, P. cebrene, P. limnoria* (Nymphalidae).

Thunbergia — *Jacksonia striata* (Lymantriidae) : *Calesia zambesita, Rhanidophora cinctigutta, R. albigutta, R. odontophora, R. ridens* (Noctuidae) : *Filodes costivitralis* (Pyralidae).

AGAVACEAE

Agave — *Phytometra limbirena* (Noctuidae).

AIZOACEAE

Mesembryanthemum — *Leptomyrina lara* (Lycaenidae).

AMARANTACEAE

Amaranthus — *Zizeeria knysna* (Lycaenidae) : *Hymenia recurvalis* (Pyralidae).

Celosia — *Ilattia octo* (Noctuidae).

AMARYLLIDACEAE

Allium — *Orgyia basalis* (Lymantriidae) : *Euxoa longidentigera, Cirphis loreyi* (Noctuidae).

Amaryllis — *Diaphone lampra* (Noctuidae).

Crinum — *Brithys pancratti, Diaphone eumela* (Noctuidae).

Haemanthus — *Brithys pancratti* (Noctuidae).

Hippeastrum — *Spilosoma lineata* (Arctiidae) : *Brithys pancrattii, Diaphone eumela* (Noctuidae).

Hymenocallis — *Lycophotia ablactalis* (Noctuidae).

Zephyranthes — *Brithys pancratii* (Noctuidae).

AMPELLIDACEAE

Ampelopsis — *Euchloron megaera, Hippotion eson, Theretra capensis* (Sphingidae) : *Trimetopia aetheraria* (Geometridae).

Cissus — *Charidea homochroa, Saliunca styx, Astyloneura cupreitincta* (Zygaenidae) : *Coelonia mauritii, Hippotion osiris, H. celerio, H. roseipennis, H. rosae, Theretra capensis, Centroctena imitans* (Sphingidae).

Vitis — *Bematistes poggei, B. tellus, Acraea insignis, A. anemosa, A. oncaea, A. natalica, A. asboloplintha* (Acraeidae) : *Saliunca chalconota* (Zygaenidae) : *Euchloron megaera, Celerio lineata, Hippotion osiris, H. celerio, H. eson, Theretra capensis, T. jugurtha* (Sphingidae): *Trimetopia aetheraria, Melinoessa croesaria* (Geometridae): *Sylepta ovialis* (Pyralidae).

ANACARDIACEAE

Anacardium — *Porthesia producta, Euproctis fasciata* (Lymantriidae) : *Nudaurelia dione* (Saturniidae) : *Spodoptera littoralis, Chloridea obsoleta, Eutelia amatrix, E. symphonica, Pacidara venustissima, Anua tirhaca* (Noctuidae) : *Ascotis reciprocaria* (Geometridae) : *Sylepta balteata* (Pyralidae).

Harpephyllum — *Anthene definita* (Lycaenidae).

Lannea — *Eucraera decora* (Lasiocampidae).

Mangifera — *Anthene definita, A. liodes* (Lycaenidae) : *Nadiasa diplocyma, Pachypasa subfascia, Gonometa nysa* (Lasiocampidae) : *Bunaeopsis jeffereyi, Nudaurelia walbergi, N. staudingeri, N. zambesina, Lobobunaea jamesoni, Imbrasia eblis* (Saturniidae) : *Batocnema africana, Deilaphila nerii* (Sphingidae).

Ozoroa — *Polymona rufifemur* (Lymantriidae) : *Nudaurelia zambesina, Cirina forda* (Saturniidae) : *Clania cervina* (Psychidae) : *Phlegetonia catephioides, Anua tirhaca* (Noctuidae) : *Comibaena leucospilata, Prasinocyma pictifimbria* (Geometridae).

Pistacia — *Eutelia adulatrix, Anua tirhaca* (Noctuidae).

Pseudospondias — *Papilio demodocus, P. almansor* (Papilionidae).
Rhus — *Belenois raffrayi* (Pieridae) : *Charaxes varanes, Euphaedra uganda* (Nymphalidae) : ? *Alaena subrubra, Sprindasis apelles, Anthene definita* (Lycaenidae) : *Eagris sabadius, Achleros mackenii* (Hesperiidae) : *Euproctis fasciata, Lymantria modesta* (Lymantriidae) : *Bunaeopsis jeffereyi, Nudaurelia emini* (Saturniidae) : *Eutelia adulatrix, E. amatrix, Phlegatonia catephioides, Anua tirhaca* (Noctuidae) : *Sylepta balteata* (Pyralidae).
Schinus — ? *Amphicallia solai* (Arctiidae) *Orgyia mixta* (Lymantriidae) : *Leipoxais compsotes* (Lasiocampidae) : *Bunaea alcinoe, Nudaurelia krucki, N. wahlbergi, N. zambesina, N. tyrrhea, Usta terpsichore* (Saturniidae) : *Eutelia discistriga, E. adulatrix, E. amatrix, Phlegatonia catephioides, Anua tirhaca* (Noctuidae) : *Hemerophila obtusata, Parascotis hyrax* (Geometridae).
Sclerocarya — *Lymantria modesta* (Lymantriidae) : *Trichopisthia monteiroi* (Lasiocampidae) : *Argema mimosae, Usta terpsichore* (Saturniidae) *Batocnema africana, Polyptichus falcatus* (Sphingidae).
Sorindeira — *Charaxes pollux* (Nymphalidae).
Spondias — *Rhadinopasa hornimanni* (Sphingidae) : *Latoia vivda, Narosana agbaja, Casphalia extranea* (Limacodidae) : *Eutelia discistriga* (Noctuidae).

ANONACEAE

Annona — *Papilio antheus, P. leonidas, P. pylades, P. policenes, P. philonoe, P. sisenna, P. porthaon, P. colonna, P. kirbyi* (Papilionidae) : *Charaxes lucretius* (Nymphalidae) : *Abantis paradisea* (Hesperiidae) : *Euproctis fasciata* (Lymantriidae) : *Phiala atomaria* (Eupterotidae) : *Xanthopan morgani* (Sphingidae) : *Niphadolepis alianta* (Limacodidae) : *Simplicia inflexalis* (Noctuidae) : *Racotis squalida* (Geometridae).
Artobotrys — *Papilio antheus, P. policenes* (Papilionidae).
Monodora — *Eucraera koellikerii* (Lasiocampidae).
Popowia — *Papilio leonidas* (Papilionidae) : *Racotis zebrina* (Geometridae).
Uvaria — *Papilio antheus, P. leonidas, P. pylades, P. policenes, P. philonoe, P. sisenna, P. porthaon, P. colonna, P. kirbyi* (Papilionidae) : *Xanthopan morgani* (Sphingidae) : *Focidina semifimbria, Ugia amaponda* (Noctuidae) : *Anisodes lyciscaria, Racotis zebrina* (Geometridae).

APOCYNACEAE

Acokanthera — *Nudaurelia krucki, Lobobunaea saturnus* (Saturniidae) : *Deilephila nerii* (Sphingidae).
Adenium — *Deilephila nerii* (Sphingidae).
Alstonia — *Margaronia bonjongalis* (Pyralidae).
Carissa — *Cirina forda* (Saturniidae) : *Lophostethus demolini, Deilephila nerii, Nephele vau, N. argentifera, N. comma, N. accentifera*

(Sphingidae) : *Anua tirhaca* (Noctuidae) : *Paragathia albimarginata, Rhodesia alboviridata* (Geometridae).
Conopharyngia — *Deilephila nerii* (Sphingidae) : *Margaronia sericea* (Pyralidae).
Diplohynchus — *Nephele comma* (Sphingidae).
Ervatamia — *Deilephila nerii* (Sphingidae).
Funtumia — *Nephele discifera, N. aequivalens* (Sphingidae) : *Margaronia ocellata* (Pyralidae).
Holarrhena — *Deilephila nerii* (Sphingidae).
Landolphia — *Papilio antheus, P. leonidas, P. policenes* (Papilionidae) : *Euryphene sophus* (Nymphalidae) : *Rhodogastria fuscivena* (Arctiidae) : *Leipoxais peraffinis* (Lasiocampidae) : *Nephele funebris, N. bipartita, N. argentifera* (Sphingidae).
Nerium — *Porthesia producta* (Lymantriidae) : *Nudaurelia zambesina* (Saturniidae), *Deilephila nerii* (Sphingidae) : *Ascotis reciprocaria* (Geometridae) : *Margaronia bicolor* (Pyralidae).
Picralima — *Deilephila nerii* (Sphingidae) : *Margaronia arachnealis* (Pyralidae).
Plumeria — *Porthesia producta* (Lymantriidae).
Rauwolfia — *Deilephila nerii* (Sphingidae).
Taberneamontana — *Deilephila nerii* (Sphingidae) : *Margaronia sericea* (Pyralidae).
Thevetia)
Vinca) — *Deilephila nerii* (Sphingidae).
Voacanga — *Sarothroceras pallida* (Arctiidae) : *Deilephila nerii* (Sphingidae).

ARALIACEAE
Cussonia)
Panax) — *Bunaea alcinoe* (Saturniidae).

ARAUCARIACEAE
Agathia — *Leipoxais rufobrunnea* (Lasiocampidae).
Araucaria — *Euproctis fasciata* (Lymantriidae).

AROIDEAE
Amorphophallus — *Hippotion eson* (Sphingidae) : *Hespagarista echione* (Agaristidae).
Anchomanes — *Hippotion osiris, H. celerio, H. eson, H. balsaminae* (Sphingidae).
Aum — *Hippotion celerio, H. eson, Theretra montieronis* (Sphingidae).
Caladium — *Hippotion celerio, H. eson* (Sphingidae) : *Hespagarista echione* (Agaristidae).
Colocasia — *Hippotion eson* (Sphingidae) : *Hesparagarista echione* (Agaristidae).
Cryptocoryne — *Hippotion celerio* (Sphingidae).

Gonatopus — *Hespagarista echion* (Agaristidae).
Richardia — *Basiothia medea, Hippotion osiris, H. eson, Theretra monteironis* (Sphingidae).

ASCLEPIADACEAE
Asclepias)
Calotropis) — *Danaus chrysippus* (Danaidae) : *Pyrausia incoloralis* (Pyralidae).
Caralluma)
Ceropegia) — *Danaus chrysippus* (Danaidae).
Cryptolepis — *Danaus formosa* (Danaidae).
Cryptostegia — *Nephele accentifera* (Sphingidae).
Cynanachum — *Danaus chrysippus, Amauris ansorgei, A. niavius, A. ochlea, A. echeria, A. albimaculata, A. lobengula, A. oscarus* (Danaidae) : *Coeliades chalybe* (Hesperiidae).
Daemia — *Danaus limniace* (Danaidae).
Gomphocarpus — *Danaus chrysippus* (Danaidae) : *Catacroptera cloanthe* (Nymphalidae).
Gymnora — *Amauris ansorgei, A. niavius, A. ochlea, A. echeria, A. albimaculata, A. lobengula, A. oscarus* (Danaidae).
Hoya — *Danaus limniace* (Danaidae).
Huernia)
Kanahia) — *Danaus chrysippus* (Danaidae).
Marsdenia — *Amauris ansorgei, A. niavius, A. ochlea, A. echeria, A. albimaculata, A. lobengula, A. oscarus* (Danaidae) : *Coeliades forestan, C. anchises, C. pisistratus, C. keithloa* (Hesperiidae).
Pentarrhinum — ? *Danaus chrysippus* (Danaidae).
Pergularia — *Danaus limniace, D. chrysippus* (Danaidae).
Periploca — *Danaus chrysippus, D. formosa* (Danaidae).
Schizoglossum — *Danaus chrysippus* (Danaidae).
Secamone — *Danaus chrysippus, D. formosa, Amauris ansorgei, A. niavius, A. ochlea, A. echeria, A. albimaculata, A. lobengula, A. oscarus* (Danaidae).
Stapelia — *Danaus chrysippus* (Danaidae).
Tylophora — *Amauris ansorgei, A. niavius, A. ochlea, A. echeria, A. albimaculata, A. lobengula, A. oscarus* (Danaidae).

BALSAMINACEAE
Impatiens — *Basiothea aureata, Hippotion osiris, H. celerio, H. eson, H. balsaminae* (Sphingidae).

BASSELACEAE
Basella — *Euproctis molundiana* (Lymantriidae).

BEGONIACEAE
Begonia — *Bracharoa quadripunctata* (Lymantriidae).

BIGNONIACEAE

Bignonia — *Spilosoma investigatorum* (Arctiidae) : *Acherontia atropos, Coelonia mauritii* (Sphingidae).

Fernandoa — *Cymothoe coranus* (Nymphalidae) : *Mazuca strigicincta, Hyblaea euryzona* (Noctuidae).

Kigelia — *Cymothoe coranus, Asterope boisduvali* (Nymphalidae) : *Mussidia nigrivenella, M. fiorii, Zebronia phenice, Udea ablactalis* (Pyralidae).

Podranea — *Acherontia atropos* (Sphingidae).

Markhamia — *Euproctis molundiana* (Lymantriidae) : *Pachypasa subfascia, Pseudometa castanea* (Lasiocampidae) : *Phiala atomaria* (Eupterotitae) : *Coelonia mauritii, Macropoliana natelensis, Andriasa contraria* (Sphingidae) : *Peratodonta olivaceae* (Notodontidae) : *Latoia chapmanni, L. hexamitobalia, L. vivida, L. urda, L. viridicosta* (Limacodidae) : *Salagena atridisca* (Metarbelidae) : *Lycophotia ablactalis, Mazuca strigicincta, Hyblaea puera, N. euryzona* (Noctuidae) : *Comibaena leucospilata* (Geometridae) : *Polygrammodes junctilinealis, Zebronia phenice, Pyrausta fulvilinealis* (Pyralidae).

Millingtonia — *Acherontia atropos, Goelonia mauritii* (Sphingidae).

Newbouldia — *Argyrostagma niobe* (Lymantriidae) : *Herse convolvuli, Andriasa contraria* (Sphingidae).

Spathodea — *Holocera smilax* (Saturniidae) : *Acherontia atropos, Coelonia mauritii, Macropoliana natalensis, Andriasa contraria, Cephonodes hylas, Hippotion osiris* (Sphingidae) : *Zebronia phenice* (Pyralidae).

Steriospermum — *Pachypasa subfascia* (Lasiocampidae) : *Zebronia phenice* (Pyralidae).

Tecoma — *Acherontia atropos, Coelonia mauritii* (Sphingidae) : *Udea ablactalis* (Pyralidae).

Tecomaria — *Acherontia atropos, Coelonia mauritii* (Sphingidae).

BOMBACACEAE

Adonsonia — *Lophostethus demolini* (Sphingidae).

Bombax — *Charaxes tiridates* (Nymphalidae) : *Pachypasa subfascia* (Lasiocampidae) : *Anomis flava* (Noctuidae).

Ochroma — *Olapa tavetensis* (Lymantriidae) : *Sylepta derogata* (Pyralidae).

BORAGINACEAE

Anchusa — *Vanessa cardui* (Nymphalidae) : *Cyclyrius crawshayi* (Lycaenidae).

Cordia — *Creatonotus vittata* (Arctiidae) : *Coelonia mauritii, Polyptychoides grayi* (Sphingidae) : *Trilochana phaedrostoma, Idiopogon uranopla* (Aegeriidae) : *Cetola pulchra, Callyna figurans, Achaea catocaloides* (Noctuidae) : *Mussidia fiorii* (Pyralidae).

Cyanoglossum — *Vanessa cardui* (Nymphalidae) : *Cyclyrius crawshayi* (Lycaenidae).
Echium — *Vanessa cardui* (Nymphalidae).
Heliotropium — *Amata cuprizonata* (Syntomidae) : *Utetheisa pulchella* Arctiidae).
Myosotis — *Utetheisa pulchella* (Arctiidae).
Vaupelia — *Amata phoenicea* (Syntomidae) : *Utetheisa pulchella* (Arctiidae).

BURSERACEAE

Aucoumea — *Nudaurelia dione* (Saturniidae).
Canarium — *Euproctis molundians* (Lymantriidae) : *Nadiasa ocinops,*
Canarium — *Euproctis molundiana* (Lymantriidae) : *Nadiasa ocinops,* (Saturniidae) : *Scrancia modesta* (Notodontidae) : *Eutelia discistriga* (Noctuidae) : *Sylepta balteata* (Pyralidae).
Commiphora — *Usta terpsichore* (Saturniidae).

CAESALPINIACEAE

Acrocarpus — *Pachypasa subfascia* (Lasiocampidae) : *Manatha micromera* (Psychidae) : *Xyleutes nebulosa* (Cossidae) : *Ascotis selenaria* (Geometridae).
Afzelia — *Charaxes protoclea, C. jasius, C. castor, C. violetta, C. bohemani, C. cithaeron, C. etesipe* (Nymphalidae) : *Anthene larydas* (Lycaenidae) : *Eutelia subrubens, Marcipa pyramidalis* (Noctuidae).
Baphia — *Charaxes cithaeron* (Nymphalidae) : *Virachola diocles* (Lycaenidae).
Bauhinia — *Charaxes jasius, C. castor* (Nymphalidae) : *Virachola diocles* (Lycaenidae) : *Dasychira georgiana* (Lymantriidae) : *Micraphe lateritia* (Limacodidae).
Berlinia — *Imbrasia epimenthea, Goodia kuntzei* (Saturniidae) : *Hadraphe aprica* (Limacodidae).
Brachystegia — *Charaxes jasius, C. violetta, C. bohemani, C. achaemenes, C. guderiana, C. blanda* (Nymphalidae) : *Deloneura sheppardi, Virachola dariaves, Spindasis homeyeri, Axiocerses styx* (Lycaenidae) : *Acada biseriatus, Andronymus neander* (Hesperiidae) : *Dasychira rocana* (Lymantriidae) : *Diopalpus congregarius* (Lasiocampidae) : *Cinabra hyperbius, Imbrasia epimethea, I. macrothyris, Athletes semialba, Micragone ansorgei* (Saturniidae) : *Macropoliana natalensis, Neopolyptychus compar* (Sphingidae) : *Scalmicauda griseomaculata* (Notodontidae).
Caesalpinia — *Virachola odana* (Lycaenidae) : *Xyleutes nebulosa* (Cossidae) : *Lacera alope* (Noctuidae).
Cassia — *Colias electo, Catopsilia florella, Eurema brigitta, E. hecabe, E. desjardinsi* (Pieridae) : *Acraea wigginsi, A. ventura* (Acraeidae) : *Charaxes castor, C. etesipe* (Nymphalidae) : *Spilosoma lutescens* (Arctiidae) : *Porthesia producta* (Lymantriidae) : *Nadiasa nyassa-*

num, Dolmannia purpurascens (Lasiocampidae) : *Athletes semialba* (Saturniidae) : *Trachyptena nigromaculata* (Limacodidae) : *Clania cervina* (Psychidae) : *Xyleutes crassus, X. capensis, X. nebulosa* (Cossidae) : *Magusa versicolora, Ericeia inangulata* (Noctuidae) : *Ascotis selenaria* (Geometridae) : *Trachylepidea fructicassiella* (Pyralidae).

Copaifera — *Charaxes jasius* (Nymphalidae) : *Nudaurelia belina* Saturniidae).

Cynometra — *Anaphe infracta* (Thaumetopoeidae).

Delonix — *Euproctis rubricosta* (Lymantriidae) : *Pachypasa subfascia* (Lasiocampidae) : *Nudaurelia zambesina* (Saturniidae) : *Acanthopsyche reimeri* (Psychidae) : *Colocleora simulatrix, Tephrina catalaunaria* (Geometridae).

Erythrophloeum — *Cirina forda* (Saturniidae) : *Melisomimas metallica* (Metarbelidae).

Julbernardia — *Charaxes lasti* (Nymphalidae) . *Argyrostagma niobe* 'Lymantriidae) : *Neopolyptychus serrator* (Sphingidae) : *Ascotis reciprocaria, Racotis divisaria* (Geometridae).

Macrolobium — *Charaxes lasti* (Nymphalidae) : *Andronymus caesar* (Hesperiidae) : *Orgyia basalis* (Lymantriidae) : *Platysphinx constrigilis, Nephele comma, N. aequivalens* (Sphingidae) : *Baria elsa, Zinara nervosa* (Limacodidae).

Tamarindus — *Charaxes viola* (Nymphalidae) : *Imbrasia deyrollei* (Saturniidae).

CANELLACEAE

Warburgia — *Papilio nobilis* (Papilionidae) : *Cirina forda* (Saturniidae).

CANNACEAE

Canna — *Spilosoma lutescens* (Arctiidae) : *Lymantriades obliqualinea* (Lymantriidae) : *Nudaurelia dione* (Saturniidae) : *Phytometra acuta* (Noctuidae).

CAPPARIDACEAE

Boscia — *Appias epaphia, A. sabina, Anapheis gidica, A. creona, Pinacopteryx eriphia, Colotis hetaera, C. regina, C. ione, C. C. elgonensis, C. antevippe, C. evenina, C. aurigeneus, C. pallene, C. venosus, C. halimede, C. celimene, C. pleione, C. eris, C. vesta, C. auxo, C. aucharis, C. danae, C. evagore* (Pieridae).

Cadaba — *Pinacopteryx eriphia, Colotis hildebrandti, C. auxo, C. eucharis, C. danae, C. evagore* (Pieridae).

Capparis — *Appias epaphia, A. lasti, Belenois zochalia, B. margaritaceae, B. victoria, B. calypso, B. subeida, B. solilucis, Anapheis gidica, A. creona, A. aurota, Dixeia pigea, D. doxo, D. orbona, D. spilleri, Pinacopteryx eriphia, Colotis hetaera, C. regina, C. ione, C. elgonensis, C. antevippe, C. evenina, C. aurigeneus, C. pallene, C. venosus, C. halimede, C. celimene, C. pleione, C. eris,*

C. vesta, C. auxo, C. eucharis, C. danae, C. evagore, Eronia cleodora, E. leda (Pieridae) : *Dysodia lutescens* (Thyrididae) : *Crocidolomia binotalis* (Pieridae).

Cleome — *Anapheis creona* (Pieridae) : *Chloridea obsoleta* (Noctuidae).

Gynandropsis — *Crocidolomia binotalis, Nellula undalis* (Pyralidae).

Maerua — *Appias epaphia, A. lasti, Belenois zochalia, B. margaritacea, B. victoria, B. calypso, B. subeida, B. solilucis, B. thysa, Anapheis gidica, A. creona, A. aurota, Pinacopteryx eriphia, Colotis hetaera, C. regina, C. ione, C. elgonensis, C. antevippe, C. evenina, C. aurigeneus, C. pallene, C. venosus, C. halimede, C. celimene, C. pleione, C. eris, C. vesta, C. auxo, C. eucharis, C. danae, C. evippe, C. evagore* (Pieridae) : *Lymantria modesta* (Lymantriidae) : *Lechriolepis leucostigma, Leipoxais compsotes, Schausina clementsi* (Lasiocampidae) : *Thaumetopoea apologetica* (Thaumetopoeidae) : *Dysodia fumida* (Thyrididae) : *Anua tirhaca* (Noctuidae) : *Lophorrachia rubricorpus, Protosteira spectabilis, Xylopteryx arcuata* (Geometridae).

Ritchiea — *Appias epaphia, A. sabina, Belenois zochalia, B. margaritacea, B. victoria, B. calypso, B. subeida, B. solilucis, B. thysa, Colotis hetaera, C. regina, C. ione, C. elgonensis, C. antevippe, C. evenina, C. aurigeneus, C. pallene, C. venosus, C. halimede, C. celimene, C. pleione, C. eris, C. vesta, C. auxo, C. eucharis, C. danae, C. evagore, Nepheronia argia* (Pieridae) : *Dysodia lutescens* (Thyrididae).

CAPRIFOLIACEAE

Lonicera — *Buneae alcinoe* (Saturniidae).

CARICACEAE

Carica — *Balacra testacea* (Syntomidae) : *Spilosoma investigatorum* (Arctiidae).

CARYOPHYLLACEAE

Arenaria — *Chloridea peltigera* (Noctuidae).

Dianthus — *Epitoxis albicincta* (Syntomidae) : *Lacipa quadripunctata, Euproctis florida* (Lymantriidae) : *Chloridea obsoleta* (Noctuidae).

Silene — *Scopula bigeminata* (Geometridae).

CASUARINACEAE

Casuarina — *Euproctis fasciata, Orgia mixta, Argyrostagma niobe* (Lymantriidae) : *Cirina forda* (Saturniidae).

CELASTRACEAE

Celastrus — *Euexia peronopus* (Geometridae).

Gymnosporia — *Charaxes jasius, C. castor, Phalanta phalanta* (Nymphalidae) *Leipoxais compsotes* (Lasiocampidae) : *Aphilopota nubilata, Xylopteryx arcuata* (Geometridae).

Maytenus — *Phalanta columbina, P. phalanta* (Nymphalidae) : *Epizygaena xanthosoma* (Zygaenidae) : *Nadiasa diplocyma* (Lasiocampidae) : *Omphalucha extorris, Xylopteryx interposita, Semiothisa feraliata* (Geometridae).

CERATOPHYLLACEAE

Ceratophyllus — *Eublemma rufimixta* (Noctuidae) : *Dattinia perstrigata* (Pyralidae).

CHENOPODIACEAE

Beta — *Hippotion celerio* (Sphingidae) : *Ilattia octo* (Noctuidae).

Chenopodium — *Ilattia octo, Phytometra ni* (Noctuidae) : *Hymenia recurvalis* (Pyralidae).

CISTACEAE

Cistus — *Anua tirhaca, Grammodes geometrica* (Noctuidae).

COMBRETACEAE

Combretum — *Hamanumida daedalus, Neptis saclava* (Nymphalidae) : *Virachola dinochares, Hypolycaena pachalica, Anthene lunulata, A. liodes* (Lycaenidae) : *Coeliades forestan, C. keithloa, Parosmodes morantii* (Hesperiidae) : *Euproctis molundiana, Hemerophanes libyra* (Lymantriidae) : *Chrysopsyche imparilis, Trabala charon, Rhinobombyx cuneata* (Lasiocampidae) : *Nudaurelia guenzii, ? Pseudaphelia apollinaris, Holocera angulata* (Saturniidae) : *Desmeocraera pergrisea* (Notodontidae) : *Ctenolita pyrosomoides* (Limacodidae) : *Clania cervina* (Psychidae) : *Eulophonotus myrmeleon* (Cossidae) : *Bryophilopsis tarachoides, Risoba lunata, Maurillia phaea, Dermaleipa nubilata* (Noctuidae) : *Ascotis reciprocaria, Racotis divisaria, Petovia dichroria* (Geometridae).

Quisqualis — *Aterica galene, Neptis saclava* (Nymphalidae) : *Virachola dinochares, V. antalus* (Lycaenidae) : *Coeliades forestan, Parosmodes morantii* (Hesperiidae) : *Nola major* (Arctiidae) : *Euproctis nessa, E. discipuncta, Dasychira tessmanni, Hemerophanes enos, H. libyra* (Lymantriidae) : *Chrysopsyche mirifica,* Lechriolepis *nigrivenis, L. jacksoni, Trabala lambourni, T. aethiopica, Philotherma rennei, Leipoxais peraffinis* (Lasiocampidae) : *Latoia* vivida (Limacodidae) : *Clania cervina, Psyche vuilloti* (Psychidae) : *Dermaleipa nubilata, Anua tirhaca, A. mejanesi, A. tettensis, A. reducta* (Noctuidae) : *Chloridea albicristulata, Ascotis reciprocaria* (Geometridae).

Terminalia — *Coeliades forestan, Parosmodes morantii* (Hesperiidae) : *Roeselia infuscata* (Arctiidae) : *Euproctis rubricosta, Dasychira rocana* (Lymantriidae) : *Chrysopsyche imparilis, Laeliopsis punctuligera* (Lasiocampidae) : *Nudaurelia belina, N. dione* (Saturniidae) : *Amyops gigas* (Notodontidae) : *Ctenolita anacompa, Baria elsa, Miresa melanosticta* (Limacodidae) : *Clania cervina* (Psychidae).

COMMELINACEAE

Commelina — *Acraea encedon* (Acraeidae) : *Metarctia flaviciliata* (Syntomidae) : *Spilosoma maculosa, S. investigatorum, S. lucida, S. atridorsia, S. lutescens, S. jacksoni, Teracotona euprepia, T. rhodophaea* (Arctiidae) : *Abrostola triopis, Phytometra ni* (Noctuidae).

COMPOSITAE

Arctium)
Arctotis) — *Vanessa cardui* (Nymphalidae).

Artemisia — *Vanessa cardui* (Nymphalidae) : *Phytometra transfixa* (Noctuidae).

Aspilia — *Stilpnotia parva, Dasychira danva, Mylantria xanthospila* (Lymantriidae) : *Neomocena syrtis* (Limacodidae).

Aster — *Metarctia inconspicua, M. invaria, M. haematica* (Syntomidae) : *Spilosoma maculosa, S. investigatorum, S. lucida, S. jacksoni, S. lineata, S. sublutea, Teracotona suprepia* (Artiidae).

Berkheya — *Hypolimnas dubia* (Nymphalidae).

Bidens — *Amata alicia, Metarctia flavivena* (Syntomidae) : *Spilosoma maculosa, S. lutescens, S. screabilis, Teracotona euprepia, Nyctemera leuconoe* (Arctiidae) : *Hadena fuscirufa, Phytometra limbirena* (Noctuidae).

Carduus — *Vanessa cardui* (Nymphalidae).

Centaurea — *Nadiasa distinguendum* (Lasiocampidae).

Chrysanthemum — *Vanessa cardui* (Nymphalidae) : *Bombycopsis indecora, B. nigrovittata* (Lasiocampidae) : *Agrotis segetum, Chloridea obsoleta* (Noctuidae).

Cineraria — *Metarctia flaviciliata* (Syntomidae) : *Perigea capensis, Phytometra accentifera, P. limbirema* (Noctuidae) : *Pilocrocis laralis* (Pyralidae).

Cirsium — *Vanessa cardui* (Nymphalidae).

Coreopsis — *Perigea capensis, Phytometra orichalcea* (Noctuidae).

Cosmos — *Amata phoenicea, Apisa canescens* (Syntomidae) : *Spilosoma investigatorum, S. lucida, S. lineata* (Arctiidae).

Crassocephalum — *Nyctemera leuconoe* (Arctiidae) : *Dasychira gloveri* (Lymantriidae).

Cynara — *Vanessa cardui* (Nymphalidae) : *Nyctemera leuconoe* (Arctiidae) : *Ludia orinoptena* (Saturniidae) : *Perigea capensis* (Noctuidae).

Dahlia — *Amata alicia, Metractia flavivena* (Syntomidae) : *Spilosoma investigatorum* (Arctiidae) : *Coelonia mauritii* (Sphingidae).

Erigeron — *Acraea rahira* (Acraeidae).

Erlangea — *Porthesia lyona* (Lymantriidae) : *Ludia orinoptena* (Saturniidae).

Filago — *Vanessa cardui* (Nymphalidae).

Galinsoga — *Spilosoma investigatorum, S. jacksoni* (Arctiidae) : *Hadena fusciruſa* (Noctuidae) : *Xanthorrhoe exorista* (Geometridae).

Gerbera — *Monda bicolor* (Psychidae).

Gnaphalium — *Vanessa cardui* (Nymphalidae).

Gynura — *Odontestra albivitta, Phytometra lunata* (Noctuidae).

Helianthus — *Porthesia dewitzi* (Lymantriidae) : *Herse convolvuli* (Sphingidae) : *Spodoptera littoralis, Chloridea obsoleta, Eublemma ornatula* (Noctuidae).

Heliochrysum — *Vanessa cardui* (Nymphalidae).

Lactuca — *Spilosoma sublutea* (Arctiidae) : *Chloridea obsoleta, Phytometra limbirena, P. ni* (Noctuidae).

Laggera — *Vanessa cardui* (Nymphalidae) : *Philotherma rennei, Bombycopsis indecora* (Lasiocampidae) : *Ludia orinoptena* (Saturniidae) : *Perigea capensis* (Noctuidae) : *Epigynipterux ansorgei* (Geometridae).

Madia — *Vanessa cardui* (Nymphalidae).

Microglossa — *Bombycopsis indecora* (Lasiocampidae) : *Ludia delegorguei* (Saturniidae) : *Cucullia perstriata, Eublemma apicipuncta, Phytometra phocea* (Noctuidae).

Pentzia — *Vanessa cardui* (Nymphalidae).

Psiadia — *Eupithecia psiadiata* (Geometridae).

Pyrethrum — *Chloridea peltigera* (Noctuidae).

Senecio — *Vanessa cardui* (Nymphalidae) : *Metarctia lateritia* (Syntomidae) : *Spilosoma maculosa, S. sulphurea, Amsacta flavicosta, Rhodogastria pannosa, R. leucoptera, Secusio doriae, Nyctemera restricta, N. apicalis, N. itokina, N. leuconoe* (Arctiidae) : *Bombycopsis nigrovittata* (Lasiocampidae) : *Ludia delegorguei* (Saturniidae).

Sonchus — *Vanessa cardui* (Nymphalidae) : *Metarctia flavivena, Balacra flavimacula* (Syntomidae) : *Spilosoma maculosa* (Arctiidae).

Stobaea — *Vanessa cardui* (Nymphalidae).

Tarchonanthus — *Ludia hansali* (Saturniidae).

Vernonia — *Acraea braesia* (Acraeidae) : *Creatonotus vittata, Nyctemera leuconoe* (Arctiidae) : *Lacipa melanosticta, Orgyia basalis* (Lymantriidae) : *Bombycopsis indecora, B. nigrovittata* (Lasiocampidae) : *Ludia dentata, L. arguta* (Saturniidae) : *Basiothea charis* (Sphingidae) : *Acanthopsyche sierricola* (Psychidae) : *Empusada argentivitta, Dermaleipa parallelipipeda* (Noctuidae) : *Prasinocyma nigrimacula* (Geometridae) : *Margaronia aniferalis* (Pyralidae).

Wedelia — *Stilpnotia parva* (Lymantriidae).

Zinnia — *Trichaeta pterophorino, Metarctia inconspicua, M. invaria* (Syntomidae) : *Spilosoma investigatorum, S. lucida, S. jacksoni, S. lineata, Teracotona euprepia* (Arctiidae) : *Chlorissa albicristulata* (Geometridae).

CONNARACEAE

Agelaea — *Virachola vansomereni* (Lycaenidae).
Byrsocarpus — *Coeliades keithloa, Gorgyra diva* (Hesperiidae).

CONVOLVULACEAE

Convolvulus — *Aphnaeus eriksoni* (Lycaenidae) : *Herse convolvuli, Coelonia mauritti, Hippotion celerio* (Sphingidae).

Ipomoea — *Acraea acerata* (Acraeidae) : *Amata tomasina, Metarctia inconspicua, N. rubripuncta, Euchromia interrupta, E. formosa, E. amoena* (Syntomidae) : *Spilosoma punctulata, S. maculosa, S. scioana, S. investigatorum, Maenas bivittata, Amsacta flavi-costa* (Arctiidae) : *Cropera testacea, Porthesia lyona, P. dewitzi, Euproctis nessa* (Lymantriidae) : *Philotherma sordida, Bombycopsis indecora* (Lasiocampidae) : *Herse convolvuli, Acherontia atropos, Coelonia mauritii, Hippotion osiris, H. balsaminae, Centroctena rutherfordi* (Sphingidae) : *Paryphanta fimbriata, Latoia vivida* (Limacodidae) : *Tipulamima pyrostoma, Aegeria aericincta* (Aegeriidae) : *Spodoptera littoralis, Athetis pigra, Eublemma apicimacula, Achaea catella, A. catocaloides, Phytometra acuta, P. orichalcea, Melanephia tristis,* ? *Calpe emarginata,* ? *Plusiodonta commoda* (Noctuidae) *Prasinocyma neglecta, Scopula ochroleucaria, Hemerophila simulatrix, Ascotis reciprocaria, Coenina aurivena, Xenimpia erosa, Hyalornis docta* (Geometridae) : *Ercta ornatalis* (Pyralidae).

Metaporana — *Palla ussheri, P. violinitens* (Nymphalidae).

Stictocardia — *Metarotia inconspicua, Euchromia interrupta* (Syntomidae) : *Herse convolvuli* (Sphingigdae) : *Eublemma apicimacula* (Noctuidae) : *Coenina aurivena* (Geometridae).

CRASSULACEAE

Crassula — *Leptomyrina lara, Anthene definita* (Lycaenidae).
Cotyledon)
Echeveria) — *Leptomyrina lara* (Lycaenidae).
Kalanchoe — *Leptomyrina hirundo, L. lara, Anthene livida, A. definita* (Lycaenidae).

CRUCIFERAE

Alyssum — *Pontia helice* (Pieridae).
Brassica — *Belenois zochalia, Pontia helice* (Pieridae) : *Agrotis segetum, Spodoptera littoralis, Syngrapha circumflexa, Phytometra ni, P. orichaloea, P. signata* (Noctuidae) : *Crocidolomia binotalis, Hellula undalis* (Pyralidae).
Camelina — *Temnora fumosa* (Sphingidae).
Crambe — *Phytometra acuta* (Noctuidae).
Erucastrum — *Pontia helice, P. glauconome* (Pieridae).
Lepideum — *Pontia helice* (Pieridae).
Nasturtium — *Crocidolomia binotalis* (Pyralidae).

Raphanus — *Euxoa longidentifera* (Noctuidae).
Sisymbrium — *Pontia helice* (Pieridae).

CUCURBITACEAE
Cucumis — *Margonia indica* (Pyralidae).
Cucurbita — *Spodoptera littoralis* (Noctuidae) : *Margaronia indica* Pyralidae).
Melothria)
Momordica)
Lagenaria) — *Margaronia indica* (Pyralidae).
Sechium — ? *Anomis flava* (Noctuidae).

CUPRESSACEAE
Cupressus — *Heterogyna flavescens, Orgia mixta, O. hopkinsi* (Lymantriidae) : *Nadiasa concavum, Pachypasa subfascia, Gonometa podocarpi* (Lasiocampidae) : *Clania cervina, Eumenta rougeoti, Acanthopsyche junodi* (Psychidae) : *Spodoptera littoralis,* ? *Ariathisa semiluna, Phytometra orichalcea* (Noctuidae) : *Buzura abruptaria, B. edwardsi, Colocleora expansa, C. divisaria, Ascotis selenaria, Cleora rothkirchi, C. dargei, C. pavlitzkiae, C. scobina, Xanthisthisa tarsispina* (Geometridae).
Juniperus — *Gonometa podocarpi* (Lasiocampidae) : *Nudaurelia rhodina* (Saturniidae).

CYPERACEAE
Carex — *Rigema ornata* (Notodontidae).
Cyperus — *Laelia xyleutes, L. figlina* (Lymantriidae) : *Nadiasa butiti, Pachypasa papyri, Pseudometa castanea* (Lasiocampidae) : *Rigema wordeni* (Notodontidae) : *Procus ambigua* (Noctuidae) : *Eldana saccharina* (Pyralidae).
Mariscus — *Laelia fracta* (Lymantriidae).

DILLENIACEAE
Dillenia — *Spodoptera littoralis* (Noctuidae).

DIOSCOREACEAE
Dioscorea — *Tagiades flesus* (Hesperiidae) : *Rhenea mediata* (Notodontidae).

DIPSACASEAE
Scabiosa — *Precis ceryne* (Nymphalidae).

DIPTEROCARPACEAE
Monotes — *Argema kuhnei* (Saturniidae).

EBENACEAE
Euclea — *Nudaurelia oubie, N. cytherea* (Saturniidae).
Diospyros — *Bunaea alcinoe* (Saturniidae) : *Hypocala deflorata, H. moorei, H. rostrata* (Noctuidae) : *Racotis divisaria* (Geometridae).

ERYTHROXYLACEAE

Erythroxylum — *Rhodogastria bubo, R. atrivena* (Arctiidae).

EUPHORBIACEAE

Acalypha — *Neptis saclava,, N. kariakoffi, N. melicerta* (Nymphalidae) : *Aphnaeus propinquus, A. orcas* (Lycaenidae) : *Spilosoma sublutea* (Arctiidae) : *Stilpnotia albissima* (Lymantriidae) : *Ctenocompa hilda* (Limacodidae) : *Attonda alboguttata* (Noctuidae) : *Ascotis reciprocaria* (Geometridae).

Alchornea — *Neptis rogersi, N. nyssiades, N. nemetes, N. melicerta* (Nymphalidae) : *Porthesia lyona, Euproctis fasciata, E. utilis, E. onii, E. geminata, E. molundiana, Dasychira pulcherrima, Orgyia basalis, O. Mixta, O. vetusta, Argyrostagma niobe* (Lymantriidae) : *Chrysopsiche mirifica, Lechriolepis nigrivenis* (Lasiocampidae) : *Lobobunaea christyi* (Saturniidae) : *Pseudoclanis postica, Platysphinx constrigilis* (Sphingidae) : *Cosuma rugosa, Baria elsa, Paryphanta fimbriata, Zinara ploetzi, Z. nervosa, Z. recurvata, Neothosea aurifrons, Stroteroides nigrisignata, Hyphorma subterminalis, Latoiola albipuncta, Neomoncena syrtis, Prolatoia perileuca, Cochlidion cretacea* (Limacodidae) : *Achaea catocaloides* (Noctuidae).

Aleurites — *Nudaurelia dione* (Saturniidae).

Bridelia — *Acraea perenna* (Acraeidae) : *Phylaria heritsia* (Lycaenidae) : *Rhodogastria bubo* (Arctiidae) : *Euproctis utilis, E. hargreavesi, E. molundiana, E. turificator, Dasychira georgiana, D. bonaberiensis, D. compsa* (Lymantriidae) : *Diapalpus congegarius* (Lasiocampidae) : *Nudaurelia eminii* (Saturniidae) : *Acanthospinx gussfeldti* (Sphingidae) : *Anaphe infracta* (Thaumetopoeidae) : *Narosa africana* (Limacodidae) : *Plagiosella clathrata* (Thyrididae) : *Sacada nicopoea* (Pyralidae).

Croton — *Charaxes candiope, C. jasius, C. etesipe* (Nymphalidae) : *Rhodogastria bubo* (Arctiidae) : *Epiphora mythimnia, Nudaurelia guenzii* (Saturniidae) : *Amyna punctum* (Noctuidae) : *Cambogia* grataria (Geometridae).

Dalechampia — *Byblia ilithyia, B. acheloia, Neptidopsis fulgurata, Eurytela dryope, E. hiarbas* (Nymphalidae).

Drypetes — *Appias sabina, A. lasti, A. sylvia* (Pieridae) : *Charaxes nandina* (Nymphalidae) : *Coeliades libeon, Gorgyra bibulus* (Hesperiidae).

Erythrococca — *Anthene indefinita* (Lycaenidae).

Euphorbia — *Zizeeria knysna* (Lycaenidae) : *Sabalia jacksoni* (Eupterotidae) : *Achaea catella* (Noctuidae) : *Eucrostes albicornaria* (Geometridae).

Excoecaria — *Asterope boisduvali, A. natalensis* (Nymphalidae).

Flueggia — *Charaxes brutus, C. pollux* (Nymphalidae).

Hevea — *Mylothris yulei* (Pieridae).

Jatropha — *Nudaurelia dione* (Saturniidae .

Macaranga — *Asterope occidentalium, A. moranti, A. garega, A. boisduvali, A. natalensis* (Nymphalidae) : *Stilpnotia ogavensis, Dasychira achatina* (Lymantriidae).

Manihot — *Amata alicia* (Syntomidae) : *Spilosoma oligosticta, Creatonotus vittata* (Arctiidae) : *Orgyia basalis* (Lymantriidae) : *Pachypasa payri* (Lasiocampidae) : *Nudaurelia dione* (Saturniidae) : *Ctenocompa hilda* (Limacodidae) : *Spodoptera littoralis* (Noctuidae) : *Hemerophila simulatrix* (Geometridae).

Neoboutonia — *Lechriolepis nigrivenis* (Lasiocampidae) : *Epiphora vacuna* (Saturniidae) : *Selepa transvalica* (Noctuidae) : *Herculia tenuis* (Pyralidae).

Phyllanthus — *Appias sabina, A. lasti, A. sylvia* (Pieridae) : *Charaxes etesipe* (Nymphalidae) : *Paryphanta bisecta* (Limacodidae) : *Parallelia angularis, P. palpalis, P. algira* (Noctuidae) : *Petovia dichroaria, Cancellalata subumbrata, Chloroclystis mokensis, C. grisea* (Geometridae).

Ricinus — *Colias electo* (Pieridae) : *Charaxes etesipe, Neptis saclava, Eurytela dryope, E. hiarbas* (Nymphalidae) : *Spilosoma investigatorum* (Arctiidae) : *Cropera sudanica, Porthesia producta, P. lyona, Euproctis fasciata, E. mediosquammosa, E. rubricosta, E. torrida, Dasychira georgiana, Orgyia basalis, O. mixta* (Lymantriidae) : *Nadiasa diplocyma, N. concavum, Pachypasa honrathi* (Lasiocampidae) : *Nudaurelia dione, N. walbergi* (Saturniidae) : *Coelonia mauritii* (Sphingidae) : *Micraphe lateritia, Latoia trapezoides L. vivida, Omacena convergens* (Limacodidae) : *Xyleutes capensis* (Cossidae) : *Spodoptera littoralis, Achaea mercatoria, A. catella, A. catocaloides, A. obvia, A. finita, Parallelia algira* (Noctuidae) : *Paraptychodes tenuis, Thalassodes digress Prasinocyma vermicularia, P. simiaria, P. tandi, P. neglecta, Colocleora simulatrix, Ascotis selenaria, A. reciprocaria, Cleora rothkirchi, Coenina aurivena, Xenimpia erosa, Epigynopteryx flavedinaria* (Geometridae) : *Zebronia phenice, Maruca testulalis* (Pyralidae).

Sapium — *Asterope occidentalium, A. moranti, A. garega, A. trimeni, A. natalensis* (Nymphalidae) : *Spilosoma aurantiaca* (Arctiidae) : *Euproctis molundiana, Dasychira azelota* (Lymantriidae : *Nadiasa splendens, N. graberi, N. singulare, N. cuneatum, N. basale, N. livida, Pachypasa papyri, Leipoxais fuscofasciata* (Lasiocampidae) : *Bunaea alcinoe, Lobobunaea phaedusa, L. laurae, Imbrasia deyrollei, Holocera smilax, H. angulata* (Saturniidae) : *Scrancia accipiter* (Notodontidae) : *Latoia viridissima, L. brunnea* (Limacodidae) : *Clania cervina* (Psychidae) : *Tolna sypnoides, Achaea faber* (Noctuidae).

Securinega — *Asura obliterata* (Arctiidae) : *Euproctis molundiana* (Lymantriidae) : *Epipagis olesialis* (Pyralidae).

Spirostachys — *Audeoudia haltica* (Pyalidae).
Tragia — *Charaxes castor, C. etesipe, Byblia ilithyia, B. acheloia, Eurytela dryope, E. hiarbas* (Nymphalidae) : *Radara subcupralis* (Noctuidae).

FAGACEAE
Quercus — *Grammodes stolida* (Noctuidae).

FLACOURTIACEAE
Aberia — *Phalanta phalantha* (Nymphalidae).
Dovyalis — *Cymothoe herminia, Phalanta columbina, P. phalantha* (Nymphalidae) : *Orgyia basalis* (Lymantriidae) : *Leipoxais compsotes* (Lasiocampidae) : *Cerura marshalli* (Notodontidae).
Flacourtia — *Phalanta phalantha* (Nymphalidae) : *Omphalucha extorris* (Geometridae).
Hydnocarpus — *Acraea zetes* (Acraeidae).
Oncoba — *Acraea oncaea* (Acraeidae).
Rawsonia — *Acraea cerasa* (Acraeidae) : *Cymothoe herminia, C. coranus, C. caenis, Lachnoptera ayresi, L. iole* (Nymphalidae).
Scolopia — *Phalanta columbina* (Nymphalidae).

GERANIACEAE
Geranium — *Cacyreaus lingeus, C. palemon* (Lycaenidae): *Coeliades forestan* (Hesperiidae) : *Dasychira georgiana, Orgyia basalis, O. mixta* (Lymantriidae) : *Phytometra acuta* (Noctuidae) : *Ascotis selenaria, Cleora rothkirchi* (Geometridae) : *Sylepta balteata* (Pyralidae).
Pelargonium — *Cacyreus palemon* (Lycaenidae) : *Chloridea obsolete, Anua tirhaca, Achaea faber, Phytometra orichalcea* (Noctuidae).

GRAMINEAE
Andropogon — *Pelopidas mathias* (Hesperiidae).
Arundinaria — *Charaxes boueti* (Nymphalidae).
Bambusa — ? *Colotis eris* (Pieridae) : *Melanitis leda* (Satyridae) : ? *Herse convolvuli*, ? *Deilephila nerii* (Sphingidae).
Brachiaria — *Marasmia trapezalis* (Pyralidae).
Cleistachne — *Aroa discalis* (Lymantriidae).
Cynodon — *Epitoxis albicincta* (Syntomidae) : *Psara phaeopteralis* (Pyralidae).
Digitaria — *Melanitis leda* (Satyridae) : *Cropera testacea* (Lymantriidae) : *Spodoptera exempta* (Noctuidae).
Eleusine — *Porthesia products, P. lyona, P. dewitzi, Lacipa quadripunctata, Euproctis impuncta* (Lymantriidae) : *Spodoptera exempta, Sesamia calamistis, Chloridea obsolete* (Noctuidae).
Hordeum — *Amata cuprizonata* (Syntomidae).
Hyparrhenia — *Lacipa argyroleuca, Psalis pennatula* (Lymantriidae) : *Phiala abyssinica* (Eupterotidae) : *Spodoptera exempta, Senta bertha* (Noctuidae).

Imperata — *Chondrolepis niveicornis* (Hesperiidae) : *Cropera testacea* Lymantriidae) : *Marasmia trapezalis* (Pyralidae).

Miscanthidium — *Pseudometa castanea* (Lasiocampidae) : *Janomima mariana* (Eupterotidae).

Oryza — *Euxoa longidentifera, Sesamia calamistis, Achaea catocaloides* (Noctuidae) : *Mariarpha separatella* (Pyralidae).

Oxytenanthera — *Charaxes baueti* (Nymphalidae).

Panicum — *Melanitis leda* (Satyridae) : *Baoris fatuellus, B. lugens* (Hesperiidae) : *Cropera testacea, Euproctis impuncta, Aroa interrogationis, Laelia fracta* (Lymantriidae) : *Cirphis loreyi, Busseola fusca, B. segeta, Eublemma brachygonia* (Noctuidae) : *Gymnocelis tenera* (Geometridae) : *Chilo zonellus, Chilotraea argyrolepia, Marasmia trapezalis* (Pyralidae).

Paspalum — *Marasmia trapezalis* (Pyralidae).

Pennisetum — ? *Charaxes candiope* (Nymphalidae) : *Melanitis leda* (Satyridae) : *Baoris fatuellus, B. lugens* (Hesperiidae) : *Metarctia flaviciliata* (Sytnomidae) : *Cropera testacea, Crorema fuscinotata, Psalis pennatula* (Lymantriidae) : *Olyra reducta, Nadiasa butiti, Pseudometa castanea, Diapalpus congregarius* (Lasiocampidae) : *Rigema ornata* (Notodontidae) : *Phragmatoecia pallens* (Cossidae) : *Cirphis insulicola, C. pyrastis, Busseola fusca, B. phaia, B. segeta, Sesamia calamistis, S. poephaga, Chloridea obsoleta, Abrostola triopis* (Noctuidae) : *Chilo zonellus, Chilotraea argyrolepia, Marasmia trapezalis* (Pyralidae).

Saccharum — *Pelopidas gemella* (Hesperridae) : *Psalis pennatula* (Lymantriidae) : *Busseola fusca, Sesamia calamistis* (Noctuidae) : *Eldana saccharina* (Pyralidae).

Setaria — *Ctenocompa hilda* (Limacodidae) : *Marasmia trapezalis* (Pyralidae).

Sorghum — *Charaxes jasius, C. castor, C. bohemani* (Nymphalidae) : *Anthene definita* (Lycaenidae) : *Astyloneura meridionalis* (Zygaenidae) : *Celama fovifera* (Arctidae) : *Hippotion celerio* (Sphingidae) : *Cirphis loreyi, Spodoptera exempta, Busseola fusca, B. sorghicida, Sesamia calamistis, S. poephaga, Chloridea obsoleta, Eublemma brachygonia, Westermannia argyroplaga* (Noctuidae) : *Gymnocelis teneris* (Geomatridae) : *Chilo zonellus, Chilotraea argyrolepis, Marasmia trapezalis* (Pyralidae).

Sporobolus — *Euproctisc impuncta* (Lymantriidae).

Triticum — *Pelopidas gemella* (Hesperiidae) : *Psalis pennatula* (Lymantriidae) : *Marasmia trapezalis* (Pyralidae).

Vossia — *Sesamia botanephaga* (Noctuidae).

Zea — *Acraea acerata* (Acraeidae) : *Melanitis leda* (Satyridae) : *Pelopidas mathias, P. borbonica, P. gemella* (Nesperiidae) : *Metarctia inconspicua* (Syntomidae) : *Celama fovifera, Spilosoma maculosa, S. screabilis*]*Arctiidae*[: *Porthesia producta* (Lymantriidae) :

Hippotion celerio (Sphingidae) : *Phalera lydenburgi* (Notodontidae) : *Latoia vivida* (Limacodidae) : *Euxoa longidentifera, E. cymograpta, Agrotis ypsilon, A. spinifera, A. segetum, Polia inferior, Cirphis loreyi, Spodoptera littoralis, S. triturata, S. exigua, S. exempta, Busseola fusca, Sesamia calamistis, S. cretica, S. poephaga, Chloridea obsoleta, Lophoruza semiscripta, Eublemma brachygonia, Grammodes geometrica, Phytometra acuta* (Noctuidae) : *Chilo zonellus, Chilotraea argyrolepis, Marasmia trapezalis, M. venilialis, Eldana saccharina* (Pyralidae).

Grasses generally (including Pasture grasses) — *Acraea anemosa* (Acraeidae) *Melanitis leda, Gnophodes parmeno, G. minchini, Mycalesis miriam, M. safitza, M. dubia, M. campina, M. anynana, M. saussurei, Menotesia perspicua, Physcaenura leda, Neocoenyra duplex, N. bera, Ypthima asterope, Y. albida* (Satyridae) ? *Alaena amazoula,* ? *A. nyassae* (Lycaenidae) : *Metisella willemi, M. metis, Lepella lepeletier, Zenonia zeno, Z. crassa, Pelopidas mathias, P. borbonica, P. gemella, Baoris fatuellus, B. lugens, Gegenes pumilio, G. hottentota, G. niso* (Hesperiidae) : *Amata chrysozona, Epitoxis albicincta, Thyretes negus, Metarctia flavicincta, M. rufescens* (Syntomidae) : *Spilosoma screabilis, Estigmene scita, E. tenuistrigata, E. multivittata, Creatonotus leucanioides* (Arctiidae) : *Cropera testacea, C. phaeophlebia, Lacipa argyroleuca, Aroa discalis, Laelia eutricha, L. fracta, L. subrosea, Psalis pennatula, Mylantria xanthospila* (Lymantriidae) : *Chilena marshalli, Olyra sublineata* (Lasiocampidae) : *Decachorda aspersa* (Saturniidae) : *Leucophlebia afra* (Sphingidae) : *Phalera lydenburgi, Antheua tricolor, Rigema ornata* (Notodontidae) : *Gymnelema leucopasta* (Cossidae) : *Agrotis spinifera, Polia consanguis, Cirphis loreyi, C. nebulosa, C. prominens, C. tincta, C. atrimacula, Mythimna phaea, Borolia torrentium, Procus ambigua, Spodoptera triturata, S. exigua, S. exempta, S. cilium, Ethiopica micra, Achaea atrimacula, A. catella, A. catocaloides, Mocis repanda, M. frugalis, Marca proclinata* (Noctuidae) : *Margaronia indica* (Pyralidae).

GUTTIFERAE

Garcinia — *Charaxes eudoxus* (Nymphalidae).

HIPPOCRATACEAE

Hippocratea — *Nepheronia thalassina, N. argia* (Pieridae) : *Charaxes cithaeron* (Nymphalidae).

HYPERICACEAE

Harungana — *Euproctis affinis* (Lymantriidae) : *Bactylocera lucina* (Brahmaeidae) : *Temnora livida* (Sphingidae) : *Parastichtis nigricostata, Selepa docilis* (Noctuidae) : *Xenostega fallax* (Geometridae).

Hypericum — *Eurema brigitta, E. hecabe* (Pieridae).
Psorospermum — *Nudaurelia emini* (Saturniidae).
Vismia — *Cymothoe coranus, Lachnoptera ayresi, L. iole* (Nymphalidae).

ICACINACEAE
Apodytes — *Deilephila nerii, Temnora zantus* (Sphingidae).

LABIATAE
Calamintha — *Cacyreaus lingeus* (Lycaenidae) : *Chloridea obsoleta* (Noctuidae).
Coleus — *Precis octavia, P. tugela* (Nymphalidae) : *Cacyreus lingeus* (Lycaenidae) : *Coelonia mauritii* (Sphingidae) : *Plusiopalpa adrasta* (Noctuidae).
Englas — *Precis orithyia, P. octavia, P. tugela* (Nymphalidae).
Hoslundia — *Ludia orinoptena* (Saturniidae) : *Acherontia atropos* (Sphingidae) : *Hemerophila simulatrix* (Geometridae) : *Philocrocis Pterygodia* (Pyralidae).
Iboza — *Precis octavia* (Nymphalidae) : *Ludia orinoptena* (Saturniidae).
Lavendula — *Cacyreus lingeus* (Lycaenidae).
Leonotis — *Bombycopsis indecora* (Lasiocampidae).
Leucas — *Temnora pseudopylas, T. pylades* (Sphingidae).
Mentha — *Syngamia abruptalis* (Pyralidae).
Nepeta — *Prolatoia perileuca* (Limacodidae).
Ocimum — *Acraea encedon* (Acraeidae) : *Lepidopchrysops dolorosa* (Lycaenidae) : *Cetola pulchra,* ? *Plusiodonta commoda* (Noctuidae) : *Syngamia abruptalis, Pilocrocis pteryodia* (Pyralidae).
Plectranthus — *Precis octavia, P. tugela* (Nymphalidae).
Pogostemon — *Acherontia atropos* (Sphingidae).
Pycnostachys — *Precis octavia, P. tugela* (Nymphalidae) : *Coelonia mauritii* (Sphingidae).
Salvia — *Cacyreus lingeus, Lepidochrysops parsimon* (Lycaenidae) : *Acherontia atropos, Coelonia mauritii* (Sphingidae) : *Pilocrocis pteryodia* (Pyralidae).
Tinnea — *Hemerophila obtusata* (Geometridae).

LAURACEAE
Cinnamomum — *Asura sagenaria* (Arctiidae) : *Leipoxais rufobrunna* (Lasiocampidae).
Cryptocaria — *Charaxes xiphares* (Nymphalidae).
Persea — *Pachypasa subfascia* (Lasiocampidae).
Tylestemon — *Papilio hesperus* (Popilionidae).

LECYTHIDACEAE
Barringtonia — *Nudaurelia zambesina* (Saturniidae) : *Latoia latistriga* (Limacodidae) : *Clania cervina* (Psychidae).

LICHENS

The records are confusing, Van Someren states 'all known records' for the following Liptenine genera: *Alaena, Baliochila, Cnodontes, Telipna, Pentila, Mimacraea, Teriomima, Iridana, Deloneura, Hewitsonia.* Nevertheless both Pinhey and Le Pelley record other food-plants for *Alaena subrubra, A. amazoula, A. nyassae, Teriomima aslauga, Deloneura sheppardi* and *D. ochr ascens,* these possibly refer to the plant on which the lichen was growing. Definite records for Lichens exist for the following species: *Pentila munata, Telipna consanguis, Mimacraea kraussei, Teriomima aslauga, Newitsonia kirbyi* (Lycaenidae) : *Siccia cretata, Asura atricraspeda* (Arctiidae) : *Eublemmistis chlorozona* (Noctuidae).

LILLIACEAE

Albuca — *Diaphone lampra* (Noctuidae).
Aloe — *Celerio lineata* (Sphingidae).
Anthericum — *Diaphone lampra* (Noctuidae).
Asparagus — *Phiala arresta* (Eupterotidae) : *Eublemma snelleni, E. postrufa* (Noctuidae).
Bulbine — *Celerio lineata* (Sphingidae).
Dracaena — *Artitropa erinnys, A. comus, A. milleri* (Hesperiidae) : *Rhodogastria carneola, R. fennia* (Arctiidae) : *Eublemma rufimixta* Noctuidae).
Gloriosa — *Spilosoma lineata* (Arctiidae) : *Lacipa quadripunctata, Euproctis florida* (Lymantriidae) : *Latoia vivida* (Limacodidae) : *Polytelodes florifera* (Noctuidae).
Lilium — *Brithys pancratii* (Noctuidae).
Ornithogallum — *Spilosoma rattrayi* (Arctiidae) : *Brithys pancratti, Diaphone eumela* (Noctuidae).

LINACEAE

Hugonia — *Charaxes lucretius, C. numenes, C. tiridates, C. zingha* (Nymphalidae).
Linum — *Polia fuscirufa, Phytometra orichalcea* (Noctuidae).

LOGANIACEAE

Buddleia — *Coelonia mauritii* (Sphingidae) : *Pagyda salvalis* (Pyralidae).
Lachnopylis — *Coelonia mauritii* (Sphingidae).
Strychnos — *Temnora zantus, T. natalis, Atemnora westermanni, Leucostrophus hirundo* (Sphingidae).

LORANTHACEAE

Loranthus — *Mylothris chloris, M. yulei, M. sagala, M. ruandana, M. tirikensis, M. poppea, M. somereni, M. sulphuriea, M. ochracea, M. similis* (Pieridae) : *Virachola jacksoni, Hypolycaena philippus, Stugeta bowkeri, S. carpenteri, S. mimetica, Argiolaus silas, A. parasilanaus, A. ituriensis, A. crawshayi, Epamera iasis, E. bansana,*

E. sidus, E. aemulus, E. arborifera, E. tajoracus, E. mimosae, Pseudoiolaus poultoni, Aphniolaus pallene, Aphnaeus hutchinsomi (Lycaenidae) : *Mimopacha gerstaekeri* (Lasiocampidae) : ? *Pseudoclanis postica* (Sphingidae) : *Achaea dasybasis* (Noctuidae) : *Paraptychodes tenuis* (Geometridae).

Viscum — *Mylothris chloris* (Pieridae) : *Mimopacha gerstaekeri* (Lasiocampidae).

LYTHRACEAE

Lagerstroemia — *Porthesia lyona, P. dewitzi, Euproctis fasciata, E. coniorta, E. geminata, Orgyia mixta, O. hopkinsi, Argyrostagma niobe* (Lymantriidae) : *Narosa africana, Latoia karschi, L. latistriga, Neomoncena syrtis, Niphadolepis alianta* (Limacodidae) : *Clania cervina* (Psychidae).

Nessaea)
Rotala) — *Acraea rangatana* (Acraeidae).

MAGNOLIACEAE

Michelia — *Xanthopan morgani* (Sphingidae) : *Racotis squalida* (Geometridae).

MALIPHIGIACEAE

Acridocarpus — *Coeliades sejuncta, C. pisistratus, C. keithloa, Acleros mackenii* (Nesperiidae) : *Paraptychodes tenuis* (Geomitridae).

Sphedamnocarpus — *Papilio pylades* (Papilionidae).

MALVACEAE

Abutilon — *Gomalia elma* (Hesperiidae) : *Xyleutes capensis* (Cossidae) : *Tarache antica , Hoplotarache semialba, Earias biplaga, E. insulana, Acontia malvae, Leocyma discophora* (Noctuidae).

Althaea — *Vanessa cardui* (Nymphalidae) : *Spialia spio* (Nesperiidae) : *Earias insulana, Anomis flava* (Noctuidae) : *Sylepta derogata* (Pyralidae).

Azanza — *Olapa nigribasis* (Lymantriidae) : *Eulymnia pulcherrima, Acontia graellsii, Pteroncyta fasciata* (Noctuidae).

Chorisia — *Anomis flava* (Noctuidae).

Gossypioides — *Diparopsis gossypioides, Tarache nitidula, Thyatirina achatina* (Noctuidae) : *Sylepta derogata* (Pyralidae).

Gossypium — ? *Colias electo* (Pieridae) : *Acraea insignis* (Acraeidae) : *Coeliades forestan* (Hesperiidae) : *Balacra rattrayi* (Syntomidae) : *Spilosoma oligosticta, S. investigatorum, S. atridorsia, Amsacta, flavicosta, flavizonata* (Arctiidae) : *Porthesia producta, P. dewitzi, Lacipa quadripunctata, Euproctis fasciata, E. chrysophaea, E. nessa, E. florida, E. rubricosta Dasychira georgiana, Orgyia basalis, O. vetusta* (Lymantriidae) : *Chrysopsyche imparilis, Rombycopsis indecora, Nadiasa butiti, N. carinatum, N. misanum, N. diplocyma,*

Diapalpus congregarius (Lasiocampidae) : *Acherontia atropos, Nippotion celerio* (Sphingidae) : *Latoia vivida* (Limacodidae) : *Salagena atridiscata* (Metarbelidae) : *Euxoa longidentifera, E. cymograpta, Agrotis segetum, Diparopsis castanea, Spodoptera littoralis, S. exigua, Sesamia calamistis, Chloridea obsoleta, Eublemma ragusana, Tarache apatelia, Pardasena, virgulana, Earias biplaga, E. citrina, E. insulana, Acontia graellsii, Phytometra acuta, P. limbirena, P. orichalcea, Anomis flava* (Noctuidae) : *Nemerophila simulatrix* (Geometridae) : *Polygrammodes hirtusalis, Sylepta derogata, Margaronia indica* (Pyralidae).

Hibiscus — ? *Acraea uvui,* ? *A. bonasia,* ? *A. cabira, A. eponina* (Acraeidae) : *Charaxes jasius, C. tiridates* (Nymphalidae) : *Abantis paradisea, A. meru, Spialia diomus, S. spiho, S. mafa* (Hesperiidae) : *Lacipa quadripunctata, Orgyia vetusta* (Lymantriidae) : *Lophostethus demolini* (Sphingidae) : *Clania cervina* (Psychidae) : *Aegeria citrura* (Aegeriidae) : *Metarbela album* (Metarbelidae) : *Xyleutes capensis* (Cossidae) : *Spodoptera littoralis, Chloridea obsoleta, Adisura atkinsoni, Earias biplaga, E. insulana, Acontia graellsii, A. malvae, Leocyma camilla, Audea endophaea, Anomis sabulifera, A. leucosema, A. leonina, A. endochlora, A. simulatrix, A. flava* (Noctuidae) : *Coenina aurivena* (Geometridae) : *Dichocrocis surusalis, Sylepta derogata* (Pyralidae).

Lavatera — *Acontia graellsii, A. malvae* (Noctuidae).

Malva — *Vanessa cardui* (Nymphalidae) : *Acontia malvae* (Noctuidae).

Pavonia — *Netrobalane canopus, Spialia spio* (Hesperiidae).

Sida — *Spialia sataspes, S. kituina, S. diomus, S. spio, S. mafa* (Hesperiidae) : *Earias cupreoviridis, Tarache zelleri, Anomis flava* (Noctuidae).

Thespesia — *Polyptychus baxteri, Likoma apicalis* (Sphingidae).

Urena — *Lacipa quadripunctata, Euproctis hargreavesi* (Lymantriidae) : *Rufoclanis rosea* (Sphingidae) : *Earias biplaga* (Noctuidae).

Wissadula — *Acontia albago* (Noctuidae).

MARANTACEAE

Marantochloa — *Euryphene carshena* (Nymphalidae) : *Osmodes adosus* (Hesperiidae) : *Dasychira longistriata, D. orgyioides* (Lymantriidae).

MELASTOMACEAE

Byssotis — *Herse convolvuli* (Sphingidae).

Tibouchina — *Nola major* (Arctiidae).

MELIACEAE

Ekebergia — *Charaxes brutus* (Nymphalidae) : *Buneae alcinoe* (Saturniidae).

Entandrophragma — *Aganais speciosa* (Arctiidae) : *Phytometra orichalcea* (Noctuidae) : *Cleora dargei* (Geometridae) : *Hypsipilla robusta* (Pyralidae).

Khaya — *Bunaea alcinoe, Nudaurelia dione, N. guenzii* (Saturniidae) : *Hypsipilla robusta, Mussidia albipartalis* (Pyralidae).
Lovoa — *Hypsipilla robusta* (Pyralidae).
Melia — *Charaxes brutus* (Nymphalidae).
Pteaeroxylon — *Papilio demodocus* (Papilionidae).
Swietenia — *Hypsipilla robusta, Mussiddia albipartalis* (Pyralidae).
Trichilia — *Charaxes brutus* (Nymphalidae) : *Pselaphelia flavivitta* (Saturniidae).
Turraea — *Charaxes brutus* (Nymphalidae) : *Pseudaphelia apollinaris* Saturniidae) : *Chlorissa albicristulata* (Geometridae).

MELIANTHACEAE

Bersama — *Charaxes acuminatus, C. phoebus, C. ansorgei, C. brutus, C. pollux, Catuna orithea* (Nymphalidae) : *Anthene definita* (Lycaenidae) : *Nola steniphona* (Arctiidae).

MENISPERMACEAE

Cissampelos — *Selepa transvalica, Lacera alope, Calpe emarginata, C. triobliqua, C. provocans, Plusiodonta wahlbergi, P. natalensis, P. commoda* (Noctuidae).
Cocculus)
Menispermum)
Tinospora) — *Argadesa materna, Ophideres fullonica* (Noctuidae)

MIMOSACEAE

Acacia — *Eurema brigitta* (Pieridae) : *Charaxes cithaeron, C. baumanni, C. zoolina, C. paphianus, C. lichas, C. anticlea, C. jahlusa* (Nymphalidae) : ? *Deloneura cohrascens, Virachola livia, V. diocles, V. antalus, V. dohertyi, V. suk, Aphnaeus hutchinsoni, Spindasis nyassae, S. banyoana, S. tavetensis, S. victoriae, Axiocerses harpax, A. amanga, Anthene amarah, A. otacilla, A. pitmani, A. nigeriae, A. larydas, A. definita, Uranothauma falkensteini, U. nubifer,* ? *Castalius melaena,* ? *C. calice, Azanus natalensis, A. jesous, Eicochrysops mahallakoaena, Chilades kedonga* (Lycaenidae) : *Spilosoma lutescens* (Arctiidae) : *Euproctis fasciata, E. torrida, Laelia hemippa, Dasychira georgiana, Orgyia mixta, O. vetusta, Argyrostagma niobe* (Lymantriidae) : *Chilena bettoni, C. pelodes, Bombycopsis indecora, Nadiasa sodalium, N. cuneatum, N. distinguendum, Gonometa fulvida, G. postica, G. drucei, Anadiasa affinis, A. griseata, Pseudometa andersoni, P. canescens, Diapalupus congregarious* (Lasiocampidae) : *Phiala pustulata* (Eupterotidae) : *Nudaurelia cytherea, N. walbergi, N. tyrrhea, Imbrasia epimethea, I. deyrollei, Gynanisa maia, Athletes steindachneri* (Saturniidae) : *Desmeocdaera varia* (Notodontidae) : *Coenobasis albiramosa* (Limacodidae) : *Clania cervina, Eumeta rougeoti, Acanthopsyche junodi, Psyche aethiops, P. vuilloti* (Psychidae) : *Melisomima metallica* (Metarbeli-

dae) : *Audea fatilega, Ulotrichopus primulina, Achaea catocaloides, A. thermopera, Pericyma mendax, Sphingomorpha chlorea* (Noctuidae) : *Psasinocyma nereis, Omphacodes pulchrifimbria, Chlorerythra rubriplaga, Traminda acuta, Racotis proximaria, Tephrina deerraria, Semiothsa turbulentata, S. elata, S. brongusaria, S. trinotata, S. fulvimargo, S. subcurvaria, Zamarada ochrata, Lomographa aridata* (Geometridae).

Albizzia — *Eurema brigitta, E. hecabe* (Pieridae) : *Charaxes cithaeron, C. eupale, C. subornatus, C. aubyni, C. cedreatis, C. contrarius, C. dilutus, C. etheocles, C. berkeleyi, C. viola, C. ethalion, Neptis laeta* (Nymphalidae) : *Anthene definita, A. larydas, A. lunulata, Phylaria cyara, Uranothauma falkensteini, U. nubifer, U. delatorum, U. vansomereni* (Lycaenidae) : *Fresna nyassae* (Hesperridae) : Dasychira *ila, Orgyia basalis* (Lymantriidae) : *Bombycopsis indecora, Nadiasa basale, Grammodora nigrolineata* (Lasiocampidae) : *Nudaurelia staudingeri, N. nictitans* (Saturniidae) : *Peratodonta heterogyna* (Notodontidae) : *Salagena atridisca* (Metarbelidae) : *Aegeria leptomorpha* (Aegeriidae) : *Polydesma umbricola, Bamra delicata* (Noctuidae) : *Traminda obversata, Buzura abruptaria, Racotis proximaria, Semiothisa rectistriaria* (Geometridae) : *Sacada albizziae* (Pyralidae).

Burkeana — *Sphingomorpha chlorea* (Noctuidae).

Dichrostachys — *Eurema hecabe* (Pieridae) : *Anthene amarah, A. otacilia, A. pitmani, A. nigeriae, A. larydas, Castalius isis* (Lycaenidae) : *Beralade bistrigata* (Lasiocampidae) : *Traminda vividaria* (Geometridae).

Entada — *Eurema hecabe* (Pieridae) : *Charaxes castor, C. etesipe, C. viola, C. zoolina* (Nymphalidae) : *Aphnaeus hutchinsoni, Spindasis nyasse, Anthene princeps, A. crawshayi, A. lunulata* (Lycaenidae) : *Spilosoma lutescens, S. screabilis* (Arctiidae) : *Euproctis fasciata* (Lymantriidae) : *Cyligramma latona* (Noctuidae).

Newtonia — *Imbrasia truncata* (Saturniidae).

Parkia — *Eurema hecabe* (Pieridae) : *Charaxes ethalion* (Nymphalidae) : *Nudaurelia arata* (Saturniidae).

Piptadenia — *Charaxes ethalion* (Nymphalidae) : *Nudaurelia arata* (Saturniidae) : *Melisomima metallica* (Metarbelidae).

Pterolobium — *Charaxes baumanni* (Nymphalidae).

Samanea — *Euproctis rubricosta* (Lymantriidae) : *Imbrasia epimethea, Holocera angulata* (Saturniidae) : *Melisomima metallica* (Metarbelidae) : *Raparna imparata* (Noctuidae).

MONIMIACEAE

Xymalos — *Papilia dardanus* (Papilionidae).

MORACEAE

Antiaris — *Pseudoneptis coenobita* (Nymphalidae) : *Aganais speciosa* (Arctiidae) : *Margaronia incomposita* (Pyralidae).

Chlorophora — *Rhodogastria atrivena* (Arctiidae) : *Nudaurelia dione* (Saturniidae) : *Pseudoclanis postica* (Sphingidae) : *Ascotis selenaria* (Geometridae) : *Margaronia sycima* (Pyralidae).

Ficus — *Acraea pharsalus* (Acraeidae) : *Pseudoneptis coenobita, Cyrestis camilla* (Nymphalidae) : *Myrina dermaptera, M. ficedula, M. sharpei, M. silenus* (Lycaenidae) : *Aganais speciosa, Spilosoma lutescens, Rhodogastria bubo* (Arctiidae) : *Naroma signifera, N. varipes, Dasychira goodii, D. extorta, D. thysanoessa, Argyrostagma niobe* (Lymantriidae) : *Pachypasa subfascia, Pseudometa castanea, Gastroplakaeis toroensis, Diapalpus congregarius* (Lasiocampidae) : *Ocinara signicosta, O. fuscocervina, O. ficicola* (Bombycidae) : *Nudaurelia dione, Nolocera angulata* (Saturniidae) : *Pseudoclanis postica, Lophostethus demolini, Nephele accentifera* (Sphingidae) : *Latoia albipuncta, L. viridicosta* (Limacodidae) : *Eutelia malanga, Bareia oculigera, Amblyprora acholi, A. magnifica, Schalidometra variegata, Mecodina apicia* (Noctuidae) : *Ascotis reciprocaria* (Geometridae) : *Lamoria impella, Obtusipalpis fusipartalis, Mussidia nigrivenella, Polygrammodes hirtusalis, Botyodes asialis, Margaronia stolalis, M. argyraspides, M. sycina, Pempelia virescens* (Pyralidae).

Mirianthus — *Acraea pentapolis, A. vesperalis* (Acraeidae).

Morus — *Acraea oreas* (Acraeidae) : *Balacra testacea* (Syntomidae) : *Spilosoma investigatorum, S. lucida, S. atridorsia, S. lutescens, S. lineata, S. sublutea,* ? *Nyctemera leuconce* (Arctiidae) : *Euproctis haregreavesi* (Lymantriidae) : *Ocinara signicosta* (Bombycidae) : *Nudaurelia dione* (Saturniidae) : *Pseudoclanis postica, Leptoclanis pulchra, Polyptychus coryndoni* (Sphingidae).

Musanga — *Acraea pentapolis* (Acraeidae) : *Latoia karschi* (Limacodidae).

MORINGACEAE

Moringa — *Crocidolomia binotalis* (Pyralidae).

MUSACEAE

Musa — *Spilosoma rattrayi, Rhodogastria bubo* (Arctiidae) : *Porthesia producta* (Lymantriidae) : *Leipoxais peraffinis* (Lasiocampidae) : *Latoia viridissima* (Limacodidae) : *Diaphone eumela, Achaea catocaloides, Phytometra acuta* (Noctuidae).

MYRSINACEAE

Myrica — *Anthene liodes* (Lycaenidae).

D. G. Sevastopulo

(To be continued)

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Now the British Entomological & N.H. Society

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THE AMATEUR ENTOMOLOGISTS' SOCIETY

ANNUAL EXHIBITION 1978

SATURDAY 21st OCTOBER

11-0 a.m to 6-0 p.m.

WEMBLEY CONFERENCE CENTRE, LONDON

MAPS on the reverse of this notice show the location and layout of Wembley Conference Centre including the position of the venue, Hampton Room, and the hoist from unloading bay.

EXHIBITORS AND DEALERS ONLY will be admitted before 11-00 a.m. Please label exhibits with name and membership number, where applicable.

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ADMISSION FEE is 20p except for Exhibitors who will be admitted free.

PARKING in the Conference Centre car parks costs 50p. There is limited free parking in the adjacent streets.

SURPLUS MATERIAL will be welcome for sale on behalf of the Society's funds.

ENTOMOLOGICAL DEALERS will be in attendance.

REFRESHMENTS will be available from the various bars at restaurant prices.

TRANSPORT

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83, 92 and 182 come to Empire Pool.
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297 comes to Wembley Park Station.
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DORKING
WORTHING
REDHILL
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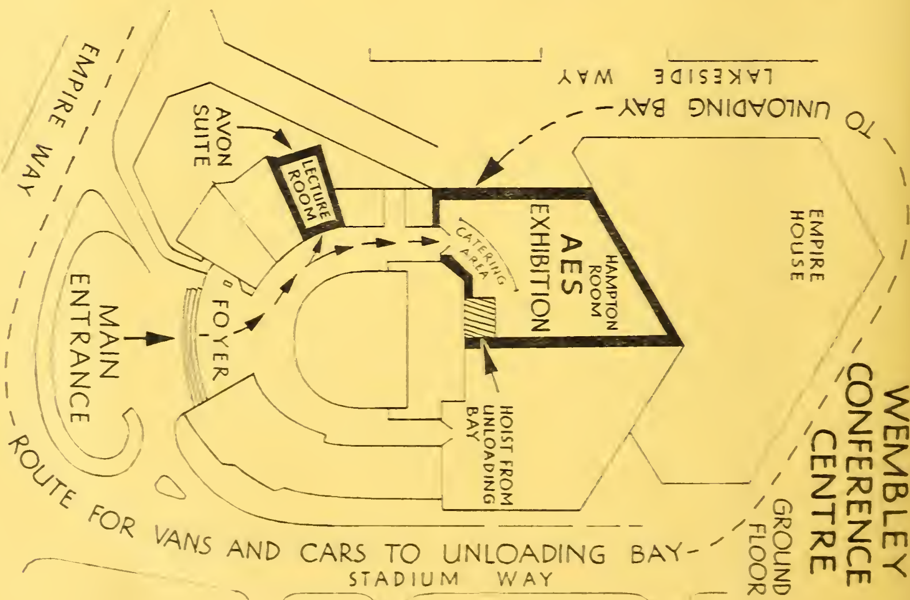
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FOYER
MAIN ENTRANCE
ROUTE FOR VANS AND CARS TO UNLOADING BAY
STADIUM WAY

VOL. 37 NO. 321

NOVEMBER 1978

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WORLD LIST ABBREVIATION:
BULL AMAT ENT SOC

EDITOR:
BRIAN GARDINER FLS FRES

The Amateur Entomologists' Society

(Founded in 1935)

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AES
BULLETIN
No. 321

EDITORIAL

By the time this issue of the bulletin appears the success of Wembley as a venue for our annual exhibition will be known. 1979 however is going to present a problem as not only is Wembley unavailable, but no other large premises appear to be obtainable in the London area. This really is an indictment of our planning authorities as it is quite clear there is a demand for such premises.

The continued growth of our Society has also created administrative problems and in order to overcome these Council has appointed a Registrar who will be responsible for the day to day running of the Society. We hope and intend that this will ensure that not only are our records kept up to date but correspondence from members will be dealt with much more expeditiously than has sometimes been the case in the past. Members perhaps need to be reminded that all Council work is entirely voluntary and it is not possible at times to reply promptly to the dozens of letters that some Council members receive.

We welcome Wendy Keene to the duties of Registrar and it is with very much regret that we lose our exceptionally able Treasurer, Nicholas Cooke, consequent upon his move to Scotland. We heartily congratulate Nick however on his appointment as Director for Scotland of the British Trust for Conservation Volunteers and wish him every success in his new job.

METAMORPHIC

Child of the sun! pursue thy rapturous flight,
Mingling with her thou lov'st in fields of light,
And where the flowers of paradise unfold,
Quaff fragrant nectar from their cups of gold,
There shall thy wings, rich as an evening sky,
Expand and shut with silent ecstasy.
Yet wert thou once a worm — a thing that crept
On the bare earth, then wrought a tomb, and slept.
And such is man! — soon from his cell of clay
To burst a seraph in the blaze of day.

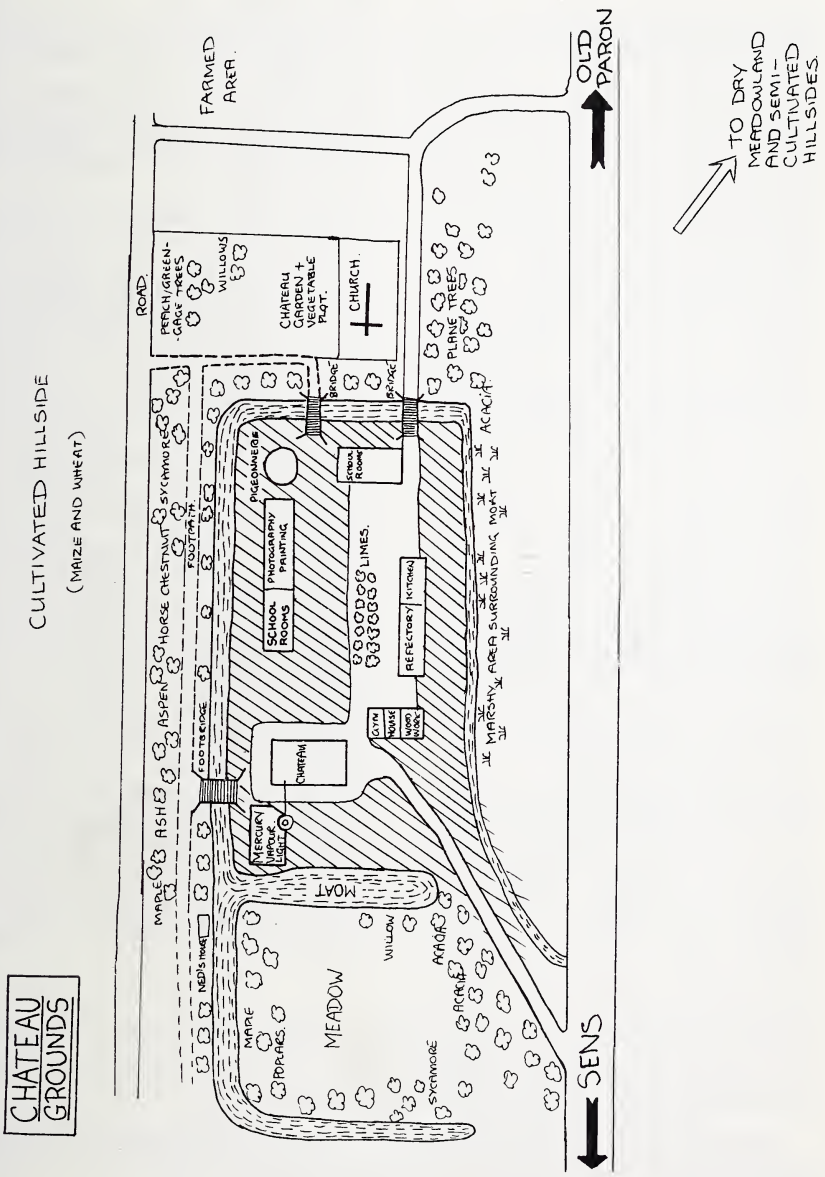
Kate R. Lovell
(From an Egyptian papyrus)

THE LEPIDOPTERA OF THE CHATEAU DE PARON

Introduction and Nightflyers

Paron is a small village just outside Sens, which as can be seen from the map is south of Paris. Little attention has been paid entomologically to this rather homogeneous of lands. Its attitude is of a characteristic French village, quiet and undemanding. The Chateau is set in beautiful grounds with many different trees, Poplar, Willow, Maple, Lime, Ash, fruit trees and Pines. We arrived in the company of Dr. Gudgeon and the other members of the party with the primary object of our trip being to redecorate the 'Ecole Theodore de Beze' to which the Chateau belonged. In between working upon the school we managed to set up a Robinson trap in front of the Chateau and Part I of the records deals with our nocturnal efforts. Part II records the few species of diurnal lepidoptera that we found. The trap was run continuously from the 19th of July, 1977 until the 24th of July. Trapping was recommenced upon the 1st August until the 17th. A total of 23 nights resulted in low numbers of lepidoptera, but large numbers of species. In the time available we collected 780 specimens from a total number of lepidoptera probably exceeding 3000. Of these we recorded 152 species, quite a good number for such a limited sample area.

Acontia luctuosa Schiff.	3	Cleora rhomboidaria Schiff.	14
Agrotis exclamationis Linn.	30	Cleorodes lichenaria Hufn.	1
Agrotis ipsilon Hufn.	33	Clostera curtula Linn.	11
Agrotis segetum Schiff	10	Colocasia coryli Linn.	3
Alcis repandata Linn.	2	Cosmia affinis Linn.	6
Amathes c-nigrum Linn.	30	Cosmia diffinis Linn.	2
Amathes xanthographa Schiff.	12	Cosmia pyralina Schiff.	3
Amphipyra pyramidea Linn.	21	Cosmia trapezina Linn.	88
Amphipyra tragopoginis Clerk	32	Cosymbia annulata Schulze	1
Anagoga pulveraria Linn.	1	Cosymbia porata Linn.	1
Apamea lithoxylaea Schiff	2	Cosymbia punctaria Linn.	5
Apamea monoglypha Hufn.	28	Craniophora ligustrii Schiff.	3
Apamea secalis Linn.	89	Crocallis elinguaria Linn.	5
Apamea ypsillon Schiff.	1	Cryphia algae Fab.	3
Apatele psi Linn.	20	Deilinia exanthemata Scop.	1
Apatele megacephala Schiff.	1	Deuteronomos erosaria Schiff.	1
Apatele rumicis Linn.	15	Deuteronomos fuscantaria Steph.	2
Apoda avellana Linn.	6+	Diarsia sannio Linn.	1
Arctia caja Linn.	4	Diataraxia oleracea Linn	40
Axylia putris Linn	2	Discestra trifolii Hufn.	80
Biston betularia Linn.	2	Drepana falcataria Linn.	2
Calothysanis amata Linn.	3	Dypterygia scabriuscala Linn.	1
Campaea margarita Linn.	1	Ectropis biundulata de Vill.	1
Caradrina ambigua Schiff.	26	Ectropis crepuscularia Schiff.	1
Caradrina blanda Schiff.	26	Ectypa glyphica Linn.	1
Caradrina clavipalpis Scop.	1	Ematurga atomaria Linn.	1
Catocala nupta Linn.	3	Ennomos quercinaria Hufn.	12
Catocala sponsa Linn.	2	Epirrhoe alternata Mull.	6
Chiasmia clathrata Linn.	2	Eremobia ochroleuca Schiff.	4
Cilix glaucata Scop.	1	Euplagia quadripunctaria Poda.	4



Euphyia bilineata Linn.	2	Euschesis comes Hubn.	41
Eupithecia centaureata Schiff.	3	Euschesis interjecta Hubn.	10
Eupithecia icterata de Vill.	1	Euschesis janthina Schiff.	90
Eupithecia succenturiata Linn.	1	Euxoa nigricana Linn.	1
Euproctis chrysorrhoea Linn.	32	Euxoa tritici Linn.	54
Euproctis similis Feussl.	3	Gortyra micacea Esp.	1

Habrosyne Derasa Linn.	1	Noctua plecta Linn.	34
Hadena bicolorata Hufn.	2	Noctua pronuba Linn.	652
Hadena bicruris Hufn.	6	Notodonta dromedarius Linn.	4
Hadena rivularia Fab.	4	Notodonta ziczac Linn.	2
Harpyia bicuspis Borkh.	1	Ochrostigma melagona Borkh.	2
Harpyia bifida Brahm	1	Odonestis pruni Linn.	3
Harpyia furcula Clerk.	6	Opisthograptis luteolata Linn.	20
Heliothis scutuosa Schiff.	1	Ortholitha bipunctaria Schiff.	1
Hemistola chrysoprasaria Esp.	1	Orgyia antiqua Linn.	1
Hepialus lupulina Linn.	1	Paidia murina Hubn.	3
Horisme vitalbata Schiff.	6	Pheosia tremula Clerk.	25
Hydriomena furcta Thunb.	2	Phlogophora meticulosa Linn.	3
Hyloicus pinastri Linn.	1	Phragmatobia fuliginosa Linn.	11
Hypena proboscidalis Linn.	2	Plagodis dolabraria Linn.	1
Lampra fimbriata Schreber.	129	Plusia chrysitis Linn.	12
Laothoe populi Linn.	18	Plusia confusa Steph.	1
Lasiocampa quercus Linn.	10+	Plusia gamma Linn.	108
Leucania albipuncta Schiff.	55	Procus literosa Haw.	3
Leucania l-album Linn.	2	Pterostoma palpina Clerk.	3
Leucania impura Hubn.	1	Rhodostrophia vibicaria Clerk	1
Leucania pallens Linn.	12	Scoliipteryx libatrix Linn.	1
Ligdia adustata Schiff.	3	Scopula rubiginata Hufn.	1
Lithosia complana Linn.	2	Selenia lunaria Schiff.	13
Lithosia lurideola Zinck.	28	Semiothisa alternata Schiff.	2
Lithosia pallenfrons Zinck.	1	Semiothisa notata Linn.	7
Lomaspilis marginata Linn.	1	Smerinthus ocellata Linn.	1
Lophopteryx capucina Linn.	1	Sterrha aversata Linn.	44
Lophopteryx cucullina Schiff.	2	Sterrha degeneraria Hubn.	1
Lupulina testacea Schiff.	1	Sterrha emarginata Linn.	1
Lyncometra ocellata Linn.	1	Sterrha interjectaria Boisd.	14
Lygephila pastinum Treit.	1	Sterrha serpentata Hufn.	3
Lygris prunata Linn.	1	Sterrha vulpinaria H. & S.	6
Lymantria dispar Linn.	7	Tethea or Schiff.	1
Lymantria monacha Linn.	2	Thalera fimbrialis Scop.	1
Malacosoma neustri Linn.	55	Thalpophila matura Hufn.	30
Mamestra brassicae Linn.	36	Thyatira batis Linn.	3
Menophra abruptaria Thunb.	2	Tyria jacobaeae Linn.	2
Mimas tiliae Linn.	1	Unca triplasia Linn.	5
Miselia suasa Schiff.	2	Zenobia subtusa Schiff.	2
Mormo maura Linn.	1	Zeuzera pyrina Linn.	6

Acknowledgements

A big thank you to Dr. J. A. Gudgeon and his wife without whom the trip would not have been possible. Also, the Ecole Theodore de Beze, Paron, Sens which acted as my venue magnificently.

Mention must also be made of the Amateur Entomologist's Society and the British Entomological and Natural History Society whose annual exhibitions made possible the display of the insects collected.

Mark Hadley

The Dayflying Lepidoptera

Papilio machaon gorganus Linn.	Uncommon on waste land in the hills
Pieris rapae Linn.	Abundant
Pieris napi Linn.	Common
Gonepteryx rhamni Linn.	Not uncommon
Colias hyale Linn.	Twice only, these were found in the hills
Colias croceus Fourc.	Uncommon
Leptidea sinapis Linn.	Rare, found in one wooded lane only
Melanargia galathea Linn.	Very common in hilly areas
Pararge aegeria Linn.	Very common in wooded areas
Pararge megaera Linn.	Common
Maniola jurtina Linn.	Common in meadows
Maniola tithonus Linn.	Abundant
Coenoympha pamphilus Linn.	Not uncommon on higher ground
Vanessa cardui Linn.	Very common everywhere
Vanessa atlanta Linn.	Common
Aglais urticae Linn.	Once!
Nymphalis io Linn.	Common
Nymphalis polychloros Linn.	Common
Polygonia c-album Linn.	Twice on buddleia
Celastrina argiolus Linn.	Very common in wooded areas
Polyommatus icarus Rott.	Common
Aricia agestis Linn.	Not uncommon on higher ground
Thymelicus sylvestris Poda.	Common, especially on higher ground
Thymelicus lineola Ochs.	Flies with T. sylvestris but in smaller numbers
Ochlodes venata Brem. et Grey	Not uncommon
Carcharodus alceae Esper	Once on waste ground
Orgyia antiqua Linn.	Once
Arctornis l-nigrum Mull.	One dead speciman found
Lymantria dispar Linn.	Uncommon, found only in one lane
Plusia gamma Linn.	Very common
Acontia luctuosa Schiff.	Common in meadows
Zygaena filipendulae Linn.	Uncommon
Ectypa glyphica Linn.	Common in meadows
Lasiocampa quercus Linn.	Males found commonly flying in afternoon sun
Callimorpha jacobae Linn.	Larvae abundant on ragwort, adult found rarely
Euplagia quadripunctaria Poda.	Common, this species is now being reared
Euphyia bilineata Linn.	Occasionally found by day
Epirrhoe alternata Mull.	Uncommon in wooded areas
Ematurga atomaria Linn.	Uncommon on waste land
Chiasmia clathrata Linn.	Not uncommonly on waste land

M. Parsons

REFERENCES

Atlas des Lepidoptères de France, Belgique, Suisse, Italie du Nord. Claude Herbulot. 1971.

Butterflies of Britain and Europe L. G. Higgins and N. D. Riley. 1973.

The Moths of the British Isles. R. South. 1961.

BOOK REVIEWS

BENINGFIELDS BUTTERFLIES by Gordon Beningfield; text by Robert Goodden. pp 96. A4. Chatto & Windus, London. Price £7.95.

This book combines elements of the resurgence of Butterfly art in the past few years with a conservation consciousness, also of rather recent origin.

The paintings of the butterflies themselves are exquisite, in some cases, dare I say it, perfect, rivalling those of Frohawk 50 years ago. The plants in the background are also beautifully observed, though the lines are softer, deliberately subservient to the butterflies. They are however much more of an artistic than an entomological exercise, created as an arena, a showcase, for the insects rather than a detailed observation. In some instances, such as those depicting *C. rubi* and *M. aglaia/C. pamphilus,* they are almost surrealistic in effect.

The artist accompanies each plate with brief notes on the composition of the painting. There is also an accompanying longer piece, with notes on the species portrayed, by Robert Goodden, concentrating on the habits and habitat of each species.

The plates and text are interspersed with faint sketches which are usually, but not always, those upon which the plates are based, and these are, to my mind, rather superfluous. The introduction, also by Robert Goodden, is adequate but rather disjointed, "Plugging" the British Butterfly Conservation Society, predictably lauding conservation and lambasting collecting. (Contrasting ironically with Beningfield's admission "I use cabinet specimens... for colour and size").

On balance I feel that this is a book more for the artist or bibliophile than the entomologist, since it is neither comprehensive nor definitive in its approach; nonetheless the plates remain undeniably beautiful.

C.J.G.

BRITISH BUTTERFLIES: A FIELD GUIDE by Robert Goodden. pp. 144; 112 coloured illustrations. Square 8vo. David & Charles, Newton Abbot, 1978 Price £4.50.

Here at last is the true successor to "South" in the correct format and attractively produced at a most reasonable price. It is put out in a most attractive coloured paper cover and the end papers depict all the British butterflies for ready identification, at a reduced size.

The book consists essentially of a page of text followed by a page containing from one to three coloured photographs. Taken as a whole these are excellent, but, as is so often the case, the exposure on the highly reflective "Whites" is wrong giving them a very washed out look. All the photographs are of live specimens in a natural setting, a pleasant change in a book of this type.

The text is arranged in a standard format of habitat, foodplants, notes of interest and life cycle. There is in addition a distribution map

taken, with due acknowledgement, from the Biological Records Centre and a very useful histogrammic table giving the times of appearance of the various stages.

The text is concise and informative, but it should be pointed out that the author has confined himself strictly to British distribution and mentions only foodplants on which the larvae are normally found in the wild. This is of course because the foreign distribution, the origin of, and alternative foodplants for, our British butterflies have been more than adequately covered in a series of recent books, and would consequently be out of place in this present book and have lengthened both the book and its price had they been included.

There are a number of mis-prints which of course identify the present printing of the book as "first edition, first issue". Notable is the transposition of the ♂ and ♀ signs on the end paper/legend key. A subheading is omitted on p. 13 which leaves a number of Nymphalidae listed under hibernating Pieridae.

I also feel that the four pages tabulating alphametrically the life cycles of all the species confusing and in any case it is merely a rearrangement in one place of the much clearer histogrammic tables for each species.

The above and the continued deplorable habit of publishers to bleed some of their illustrations to the edges, are but minor imperfections in an otherwise excellent and reasonably priced book of interest and use to Naturalists as well as Entomologists.

B.O.C.G.

FRUIT BEETLE ISSUE — No. 16 of the Bulletin de la Societe Sciences Nat consists of three articles on Cetoniid beetles with a colour plate illustrating 79 species of the genus *Pachnoda*. This genus in fact has proved to contain some of the more useful beetles to rear in the laboratory. All three articles are by J. Rigout and deal with the extraction and preparation of the beetles' adeagus for identification purposes; some instructions for the formation of a collection, with the appropriate remark that it is regrettable that good amateur collections of Cetoniids are at present few and far between. This publication is designed for the amateur and consists of 14 pages of A4 size; typewritten, xerox style reproduction; stapled. At FF.20.00 it is rather dear but clearly indispensable to the serious collector of *Pachnoda* and of interest to all Cetoniid enthusiasts.

WILD LIFE IN HOUSE AND HOME by Henri Mourier and Ove Winding. Published by Collins (1975) at £3.95 hardback.

With this guide to the animals that share our homes, beds and food, Collins have provided an intriguing and useful addition to their excellent series. An amazing spectrum of animals is represented, from the insects that inhabit our own bodies to the birds that hold their debates on the roof. Most are well illustrated, although some of the colour printing is

off-putting. Wildlife does not include plant life but some of the more insistent fungi eating your timber is included. This is not a systematic book: animals are referred to under several heads, which makes for constant checking in the index. It is, however, a book that many inquisitive families — urban and rural — will find useful. It is not one for the fastidious.

MURLOUGH NATIONAL NATURE RESERVE, Scientific Report 1977. Edited by R. Nairn. Published by the National Trust, Murlough NNR, Dundrum, Newcastle, Co. Down, Northern Ireland. Price 50p (plus 15p postage).

In the foreword to this booklet, the editor states that there is a lack of readily available scientific information on most of the NNR's which are the best surviving examples of the various types of natural habitat in Northern Ireland. The report provides a regular system for writing up and recording scientific information on the reserve and the authors hope it will act as a stimulus to further work by scientists from universities and elsewhere on NNRs. The report gives weather conditions for the year and reports the research that has been undertaken. Coastal vegetation, sea buckthorn, non-marine mollusca, isopods and flies are all included in the report.

PEAK PARK CONFERENCES

The Reports of a number of conferences held at the Peak National Park Study Centre are now available from the Principal, Peak National Park Study Centre, Losehill Hall, Castleton, Derbyshire S30 2WB. They are as follows:

Land Management for Farming, Conservation and Recreation, February 1977, £1.50.

Interpretation in Nature Reserves, May 1977, £1.50.

Planning and Management in European Natureparke, Parcs Naturels and National Parks, September 1977, £1.50.

Water Recreation and Interpretation, December 1977, £1.00.

Ex habitat

A NEW WALL CHART OF INSECTS. — Many years ago the prospectus of the Society took the form of a folded chart upon which was set out the family tree of the Class Hexapoda or the Insects, giving brief details of each order and sub-order. This was a most useful reference sheet and since it went out of print there have been many requests for a new one to be introduced. Through the good offices of Messrs. Frederick Warne Ltd. this hope is now to be realised. The new chart will be in the form of an illustrated wall chart showing the orders and sub-orders in their currently accepted relationship with each other, each group being liberally illustrated with examples of the insects within the group. The General Editor of the Society has co-

operated with the firm in the production and it is hoped that not only will it adorn the wall of each member's 'bug room' but it will prove of considerable help to County Trusts, Natural history societies, Field Centres and the Biology departments of schools and colleges. The size will be the standard wall chart size of 215 x 305 mm. and the cost will be 70p plus V.A.T. It is anticipated that publication will be in October in time for the chart to be on sale at our Exhibition on the 21st October. Warne's stall will be selling them. The illustrations used on the chart are those which will appear in the new Warne's pocket book on the insects shortly to be published under the title "The Observer's Book of Insects of the British Isles".

P.W.C.

NOTES AND OBSERVATIONS

CYNIPIDAE (HYMENOPTERA) — INFORMATION WANTED — I am undertaking a long term study of the members of the above family which cause galls to appear on various species of Oak (*Quercus*) in the United Kingdom. Included in this will be their distribution, based on the 10 km. square system as used by the Institute of Terrestrial Ecology (formerly the Biological Records Centre) and which is no doubt familiar to many readers. It would greatly assist me in this part of the study if members could send me any records they may have access to regarding this group. In addition any specimens found can be forwarded to me at the following address: 127 Dunedin Road, Birmingham B44 5LP. With the specimen, if possible and the following data: Date found; Species of oak and height of the tree; locality; full grid reference; altitude; Position of tree, i.e. isolated, in wood, in hedgerow etc. I will do my utmost to acknowledge all material received. — P. R. Shirley (5621)

THE SANDWELL VALLEY: A UNIQUE HABITAT — I would like to draw the attention of members, particularly those in the Midlands, to an area of open countryside which comes to within five miles of Birmingham City centre. It is known as the Sandwell Valley and consists of about 1,700 acres of land used for farming, sport and recreational activities. The major part of the Valley lies in the Metropolitan Borough of Sandwell, with some being contained within Birmingham and Walsall. The habitat varies but includes small pools and lakes both natural and man-made, woods, open fields, golf courses and riverside meadows.

The uniqueness of the Valley stems from the fact that on three sides, to the east, west and south it is surrounded by the industrial conurbation of the West Midlands whilst on the north side it is connected to open country. It forms, as it were, a 'lung' reaching deep into the heart of the black country. In addition, situated as it is in the middle of the

country the range of species to be found there is very wide, some being at the northern extremity of their range and some at the southern.

Members of a local natural history society formed four years ago have identified nearly three hundred species of insects already, mainly Diptera.

It will be appreciated that an area such as this is under tremendous pressure and in constant danger of being eroded away by new building, change of use etc. For this reason specialists in any groups of insects are needed to add to the knowledge and, therefore, the conservation value of the Valley. Particularly needed are people able to assess the Lepidoptera, Hymenoptera, Orthoptera, Hemiptera and Trichoptera of the site.

Wildlife in urban areas has been sadly neglected for the sake of that in more exotic locations, but here is a real opportunity for keen entomologists to give practical help and advice right on their own doorstep. Anyone interested can contact me on 021 360 9785. — P. R. Shirley (5621)

UNUSUAL OVIPOSITION CHOICE BY BRIMSTONE BUTTERFLY — On the twentieth of May this year, a female Brimstone (*Gonepteryx rhamni* (L.) was seen to deposit a considerable number of eggs on the garden plant known as Russian Vine (*Polygonum baldschuanicum*). This is a foreign plant to our country but it could be said to resemble the normal foodplant of the Brimstone which is Buckthorn (*Rhamnus cathartica*) or Alder buckthorn (*Rhamnus frangula alnus*). Whether the butterfly was simply fooled by the resemblance or whether this plant provides an alternative food source is an interesting question. However, in this case no mature larvae seem to have appeared but this may be explained by the presence of large numbers of ants which may have removed the larvae as they hatched. It would be interesting to hear of any similar observations by other members. — B. H. Barnett (5839)

CINNABAR TAKES TO THE TRAINS — On 10th June 1978 while sitting in a train at Southampton I noticed a Cinnabar moth (*T. jacobae*) clinging to the supporting wall of the opposite platform and holding its wings erect. It had presumably pupated in the ballast of the railway track, and having emerged that morning was drying its wings. Some withered and oily remains of ragwort could be seen lying on the rails and there were other plants growing nearby. — I. L. Brydon (5881)

A FEW EXTRA THOUGHTS ON EXTINCTION, RARITY and CONSERVATION — Mr. Bryan has done us immensely proud. Truly, we have here a very rare subspecies of uniquely erudite AES member endemic to the Birmingham area. We feel that he should be carefully preserved, but that no attempt should be made, on this occasion. to introduce fresh genetic stock from the Continent to revitalise the colony.

Nevertheless, it is sincerely hoped that our British climatic and social conditions will both remain favourable for his survival, otherwise this single distribution dot will be detached from its historical framework and so become virtually meaningless. The Quinternary Period will doubtless reveal all in true perspective, either a viable thriving population or a sad memory.

Yet I mustn't reveal the slightest quiver of emotion, for that would only serve to cloud the issue. Mr. Bryan's disappearance would be "interesting", but neither "a good thing" nor "a bad thing". Any attempts to fossilize rather than conserve him would be morally unacceptable and technically impossible. So while he still thrives among us, let us thoroughly enjoy, appreciate, and respect his very exceptional insight into the secret Teutonic uprisings in the Forest of Dean, and the soon-to-be nostalgic Large Blue(mers) in Cornwall.

Quite frankly, although I certainly don't go the whole hog in sympathising with every detail of his learned arguments, I must say I haven't read a paper more full of good solid conservation commonsense in many years! — Brian Wurzell (3718)

NEWS ITEMS FROM HABITAT

OLD MEADOWS SURVEY EXTENDS

The Nature Conservancy Council has now extended its survey of old meadows into the counties of Kent, Surrey and Sussex. Funded through the Job Creation Programme, the survey aims to locate all old meadows in the counties that have not been ploughed, reseeded or treated with fertilisers and herbicides. A good site will often have over a hundred wild plants and thus provide an excellent habitat for birds and insects. Characteristic of meadows in these counties are bugle, common knapweed, meadow saxifrage, cowslip, cuckoo flower, meadow sweet, oxeye daisy, pepper saxifrage and yellow rattle. Any assistance from naturalists and farmers will be welcomed by the Meadow Survey Team, Nature Conservancy Council, Church Street, Wye, Ashford, Kent, TN25 5BW.

CONSERVATION AND COMMERCE

The Hertfordshire and Middlesex Trust for Nature Conservation, the British Trust for Conservation Volunteers and Debenhams the Department Store Group have combined to undertake a one week project at Broad Colney Lakes, London Colney. Debenhams are providing nine volunteers from the London area under the leadership of three BTCV members to fell and clear dead elms and other trees, and construct paths and a footbridge. The work is part of a comprehensive scheme to develop the flooded gravel pits as a nature reserve where the public can observe wildlife. The project is the first of twelve such conservation tasks throughout the country organised by Debenhams and the BTCV.

LEPIDOPTERA

The Herefordshire and Radnorshire Nature Trust in their newsletter, *The Flycatcher,* No. 29, April 1978, report on an appraisal of the effects on Herefordshire Lepidoptera of the hot summers of 1975 and 1976. It is summarised as follows: "A marked reduction of nettle growth has affected those butterfly species which feed on it, notably Small Tortoiseshell and Peacock and less severely, the Comma. Some recovery in the plant in 1977 has led to an improvement in numbers of Small Tortoiseshell. The Ringlet has been present in smaller numbers than usual. By contrast some species' populations have increased quite dramatically especially the Silver Washed Fritillary and White Admiral in their few proven breeding sites." The report also notes that Marbled and Common Blue have been seen in large numbers. Although it is difficult to generalise the author of the report, Dr. Harper, concludes that those species dependent on nettle feeding will have suffered a temporary drop in numbers while others have actually benefited from the warm summers.

BADGEWORTH NATURE RESERVE

The Society for the Promotion of Nature Conservation lease the smallest official Nature Reserve in Britain to the Gloucester Trust for Nature Conservation. Badgeworth Nature Reserve was acquired to conserve a unique wetland habitat, one of only two remaining sites of the rare buttercup *Ranunculus ophioglossifolius Vill.* The handbook to the reserve describes the site, history, nature of the plant and management and can be obtained from The Honorary Secretary, Badgeworth NR Management Committee, 64 All Saints' Road, Cheltenham, Glos. GL5 2HA (price 63p including postage).

ITALIAN ALPS — JULY 1977

Jeremy Bishop and I went to Northern Italy on a two centre holiday for the first two weeks of July 1977. We spent the first week at Caspoggio, situated high in the Italian Alps, and the second week at Cadenabbia on the shores of Lake Como.

Caspoggio, itself, lies in the lower Engadine just south of the Bernina Mountains, the highest being Piz Bernina (4049 m.). This area is not as well known as the Swiss resort of St. Moritz on the northern side of the Bernina Mountains.

The Village of Caspoggio is at an altitude of 1150 m. with a larger town, Chiesa, situated slightly lower down the valley at 950 m. The scenery is very impressive; the valley is V shaped and has a little area of meadowland. The mountains rise steeply up from the River Oivi to heights of 2000 m. and above.

Fortunately during our stay the weather was fine with only the first one and a half days being cloudy; a considerable improvement on the Austrian trip the year before! (N. F. Gossling. Vol. 36 pp. 185-196)

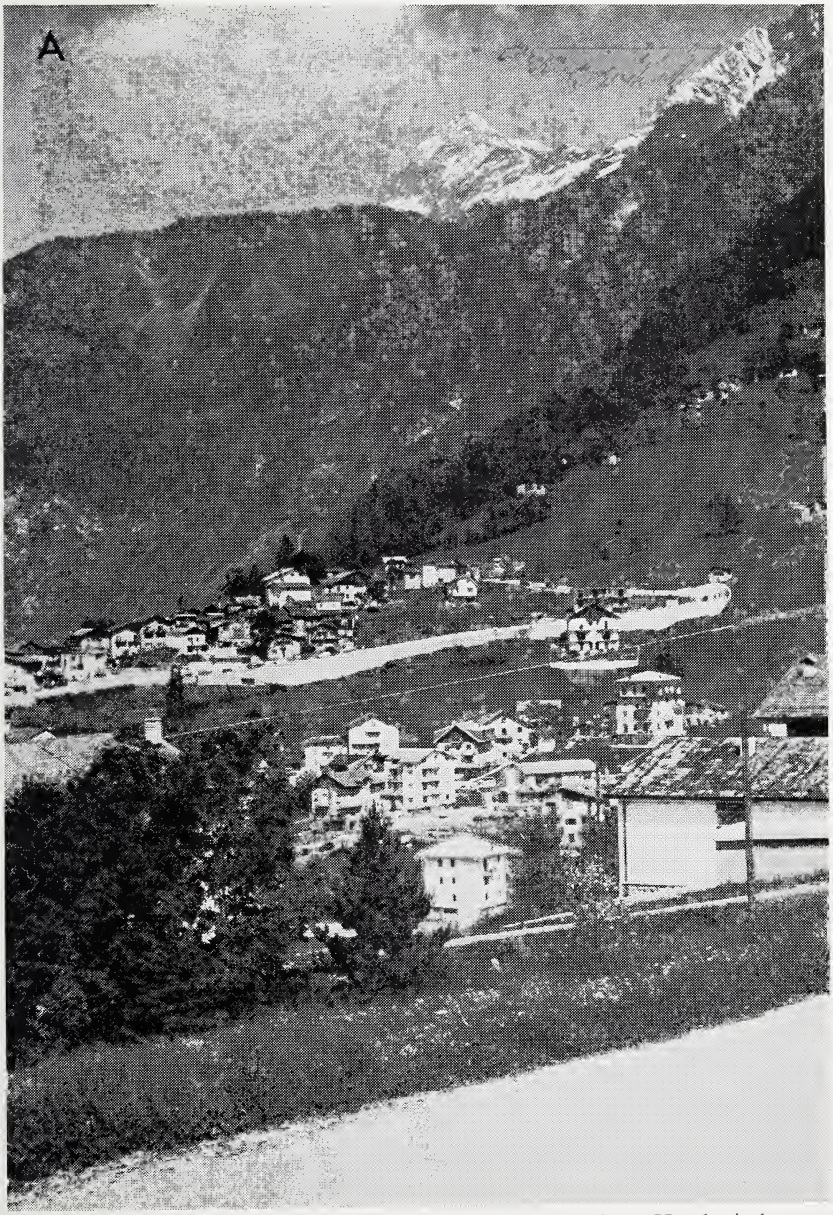


Fig. A. General view of Caspoggio taken by Chris Orpin from Hotel window.

Restricted by the poor weather we spent the first day around Caspoggio, investigating the hillsides and looking for butterflies resting on the flowerheads. This method had proved rewarding in Austria, but here it proved useless as the butterfly density was nowhere near as

high. However, we found second instar larvae of the Painted Lady (*Vanessa cardui* L.) the Red Admiral (*Vanessa atalanta* L.), and the Small Tortoiseshell (*Aglais urticae* L.).

The next day proved to be more successful as the weather improved to give a few sunny intervals in the morning. We walked down to Chiesa where extensive slate quarrying had given rise to a slate processing factory. The factory was on the banks of the river, and nearby three or four acres of waste ground were found.

The stony terrain produced typical waste ground flora; plenty of brambles and various species of Leguminosae. The high water table near the river gave rise to sallow (*Salix caprea*) and hornbeam (*Carpinus betulus*) bushes. Buddleia shrubs were abundant and growing profusely in this environment; unfortunately these plants were only showing flower buds. I found larvae of the Camberwell Beauty (*Nymphalis antiopa* L.) and Buff Tip (*Phalera bucephala* L.). A number of species of Lycaenidae were found in this area; most common were worn Silver-studded Blues (*Plebejus argus argus* L. — probably transitional to *P.a. aegidon* Meisner), with some of the females showing a blue basal flush (*f. aegon* Schiff.), freshly emerged *Lycaeides idas* L. (*f. alpinus Berce.*), Mazarine Blues (*Cyaniris semiargus* Rot.), Common Blues (*Polyommatus icarus* Rot.), and worn Small Blues (*Cupido minimus* Fuessly). were also found but in smaller numbers. Small Heaths (*Coenonympha pamphilus* L.) were everywhere with a few freshly emerged Large Wall Browns (*Lasiommata maera* L.) flying around the rocks and bramble bushes. On a flowery bank both the Large and Small White (*Pieris brassicae* L. and *P. rapae* L.), could be seen together with an isolated male Clouded Yellow (*Colias crocea* Geoffroy.)) flying up and down.

Later in the afternoon we found two new species, a freshly emerged male Large Skipper (*Ochlodes venatus* Brem and Grey.) sunning itself, and a Queen of Spain Fritillary, (*Issoria lathonia* L.) resting on damp sand in a dried up water course of the river.

The following day proved to be very sunny and the ideal opportunity to investigate the second area of interest, the south facing slope of Monte Motte (2,340 m.). Luckily down at Chiesa a cable car went every three hours up to an altitude of aproximately 2000 m. At this height very little was observed among the heather, stunted pines and scree slopes. The Green Hairstreak (*Callophrys rubi* L.) was abundant in sheltered pockets, and we sighted what appeared to be an isolated Mountain Clouded Yellow (*Colias phicomone* Esper). The latter species could not be identified with any accuracy, as we saw it covering the rough terrain at a great speed, easily eluding capture. We had hoped to see some of the exciting high alpine species, but we were obviously too early for them.

We descended via a rough path across a small, rough Alpine meadow. Grizzled and Dingy Skippers flew up and down the path. At 1960 m.

the path led into pine woodland with small grassy clearings. We found only two species between this altitude and 1800 m.; the Northern Wall Brown (*Lasiommata petropolitana* Fab.), and the Northern Eggar (*Lassiocampa quercus* ssp. *callunae* Palm.). The latter species was very impressive to watch as the males flew at breakneck speed, zig-zagging across the glades and out of sight, obviously trying to find females.

As we continued down the path to an altitude of 1750 m., the small glades became populated with Almond Eyed Ringlets (*Erebia alberganus* de Prunner), both males and females, but not in large numbers. Two other species were also found — small numbers of male Woodland Ringlets (*Erebia medusa* Schiff.) and *C. euphrosyne* L. (*f. fingal* Herbst.).

At 1700 m. the path opened out into a small area of meadowland. Almost typically it was quite damp, and consequently I was not surprised to find *Pieris napi bryoniae* Huebner. and the Purple-edged Copper (*Palaeochrysophanus hippothoe eurydame* Hoff.). The most common species was the Woodland Ringlet (*E. medusa* Schiff.) found along the edge of the meadow, and often seen in small groups on the paths, presumably attracted to the moisture. Alpine Heaths (*Coenonympha gardetta* de Prunner) were just appearing on the wing with only males present. We did not stay very long in this locality as time was short, and we hoped to study the lower altitudes in reasonable light.

The path led down into pinewood land but considerably more open in nature with Aspen (*Populus tremula*) and Hazel scrub (*Corylus avellana*) and other deciduous trees steadily replacing the conifers.

Along the path the small flowery banks produced a variety of insect life: Heath Fritillaries (*Mellicta athalia athalia* Rot.), *C. minimus, C. euphrosyne* L. (normal form) and *Clossiana selene* L. were common. At 1350 m. I found an isolated worn Chequered Blue (*Scolitantides orion* Pallas), a new species to me, resting on the leaves of a hazel bush. I caught some very large Pearly Heaths (*Coenonympha arcania arcania* L.). I was surprised to see how much this species resembled the Gatekeeper (*Pyronia tithonus* L.) in its behavioural habits. Other species seen were *V. cardui, V. atalanta, E. tages* and a single freshly emerged Marbled White (*Melanargia galathea* L.).

The third area of interest in the valley was the north-west facing slope of Motta di Caspoggio. This area was more gradually sloped and consequently had more meadowland available. It was noticeable that due to the slightly cooler climate in this locality most of the species found here could be found at about 100 m. higher on the southern facing slope of M. Motta. Unfortunately the meadowland produced smaller numbers of butterflies than I had hoped for. This could have been due to a number of factors: —

Firstly, due to slightly cooler temperatures many species might not have emerged yet.

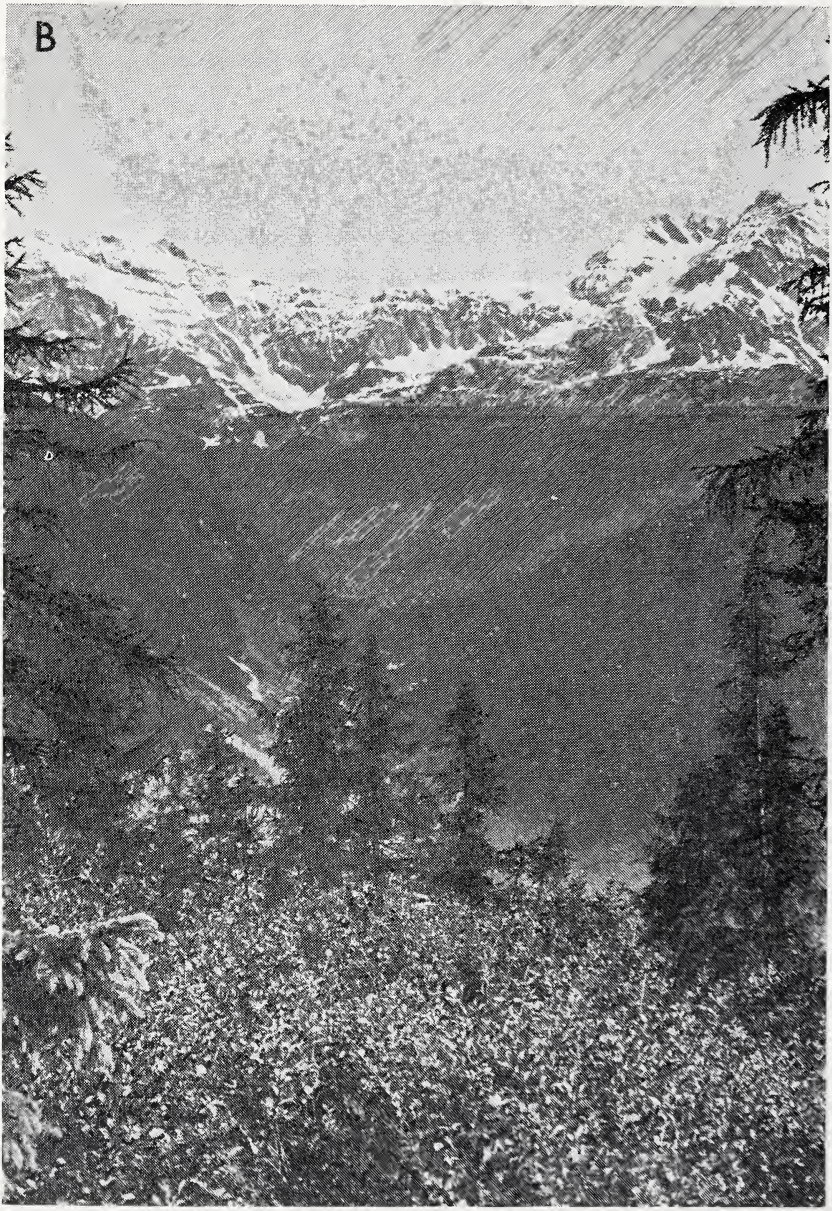


Fig. B. View from chairlift along the V-shaped valley of Caspoggio.

Secondly, due to the dampness of the meadows here and elsewhere in the valley, there could be a consequent reduction in the variety of food plants available.

Lastly, the meadows were cut far more systematically and there

seemed to be very few undisturbed areas.

Despite these factors we found quite a few interesting species.

A chair lift from Caspoggio gave us excellent access to an area at approximately 1700 m., Between this altitude and 1550 m. *P. malvae* and *E. tages* were common, as well as *C. selene* and *C. euphrosyne f. fingal.* These species were all found flying up and down the edges of a closely cropped ski-run bordered by stunted elm trees and pine forest.

At 1500 m. the habitat changed and we came across a damp meadowland frequently encountered in the valley. Orange Tips (*Anthocharis cardamines* L.) were common, an indication of how early the season was here. Other species found in this area were *C. pamphilus, C. gardetta, P. malvae, E. tages* and Swallowtails (*Papilio machaon gorganus* Fruhst.). I found also small numbers of *E. alberganus* and a single freshly emerged Olive Skipper (*Pyrgus serratulae* Rambur).

Just above the meadow at the base of a steep bank I found a small area of marshy land, where amongst *C. euphrosyne f. fingal and C. selene* I found a very dark specimen of *M. athalia;* the first no doubt of a colony. *P. machaon* glided around a small rocky outcrop in the meadow, occasionally flying off across the meadow at speed. *V. cardui* and a few *L. megera* basked on the rocks, mopping up the radiant heat. In the dampest part of the meadow I found a few freshly emerged male *P. h. eurydame* flying with their copper-red wings flashing in the sunlight.

As we descended down the path we caught a few specimens of the Mountain Argus (*Aricia allous montensis* Verity), the Geranium Argus (*Eumedonia eumedon* Esper.) and male Mazarine Blues (*C. semiargus* Rot.).

At 1400 m. the meadow was bordered once more by aspen trees (*P. tremula*) and pine, the two small fritillary species, *C. euphrosyne* and *C. selene,* flew up and down. At this altitude the nominate form of *C. euphrosyne* was found rather than the high altitude form *fingal.* We saw a large Poplar Admiral (*Limenitis populi* L.) flying at speed on the edge of some aspen trees for a moment, only to climb up into the branches and out of sight. A species to be more often seen than caught! *E. medusa* were common and a few *P. n. bryoniae* and the Bergers Clouded Yellow (*Colias australias* Verity.) were seen.

At 1380 m. I found a small colony of the Clouded Apollo (*Parnassius mnemosyne* L.), but here as elsewhere in the valley the species must have been on the wing for a time, because many were very worn. However, to see the bold distinctive gliding motion of this species along the contours of the hillside is an enjoyable sight. This was one of the most common species encountered in some of the meadows on the roadsides between Caspoggio and Chiesa with as many as twenty specimens to be seen on the wing at any given time.

In conclusion, I think that a return trip in mid-July may prove more successful as most of the specimens caught were male indicating that their season had only just begun. However, the local people had informed me that the valley had had the highest snowfall in over fifty years earlier that year, so this may not have been a normal year as such. The major objection to the area by some could be the steep relief of the valley and the lack of well marked paths, so common in Swiss and Austrian mountain areas. In total thirty species of Rhopalocera were recorded during our stay. For our second week we moved on to Lake Como and our experiences there will be detailed in a later article.

Chris Orpin (5736)

REFERENCE

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

MIMICRY IN NYMPHAL DARK BUSH CRICKET

In late May of 1978 I observed a striking likeness between second instar nymphs of the Dark Bush-cricket, *Pholidoptera griscaoptera* and the males of a ground-dwelling species of spider, which Mr. P. D. Hillyard at the BMNH kindly identified for me as the Lycosid Wolf-spider *Paradosa lugubris*. This effect struck me most forcibly when I saw individuals of both species basking on a foxglove leaf in a woodland ride in East Sussex. I believe the bush-cricket is a mimic of the spider, which is locally much the more numerous of the two and is of course a predator whereas the bush cricket is mainly vegetarian. The likeness is based on similar size, similar dark brown coloration, the possession by both species of a cream-coloured and sharply-defined dorsal stripe (which however becomes slightly diffuse towards the rear in the spiders), and lastly the shape of the head/prosoma; in both species the "forehead" is prominent and rather acutely-angled when viewed laterally or dorso-laterally.

An argument against this effect is that both species possess their dorsal stripe as camouflage on the woodland floor. A multitude of animals do seem to be striped in order to be seen less easily, but the young bush-cricket spends much of its time basking on green leaves, where it is very easy to see, and the spiders are frequently darker than their background of leaf-litter and bare soil.

For a possible explanation of the mimcry a little biological information on the bush-cricket is needed. Most of our Tettigoniidae including *Pholidoptera*, have eggs which require about 20 months to develop (Hartly and Warne, 1972). *Pholidoptera* females lay their eggs in bark, rotten wood, or "other suitable crevices" (Ragge, 1965). The nymphs prefer to live at heights of less than about 1.5 m above the ground. Putting all this together, the vegetation in coppiced woodland or in

scrub areas inhabited by *Pholidoptera* anywhere in lowland Britain is very likely to have grown unsuitable to the emerging nymph in the time since the adult laid its eggs. This is not true where man intervenes by maintaining hedgerows but this was not going on when the species was evolving! The nymph therefore would have to make a journey on the ground, to find a suitable place to feed and develop, and on this journey its mimicry of *Pardosa lugubris* could well prevent that species from preying upon it. Alternatively it may mimic the spider to be protected from predators such as birds, to whom the spider may be distasteful, or insects or other arthropods which consider the spider too dangerous to consider as a food-item.

Clearly, more work is needed to confirm this phenomenon. I would like to hear from readers who may have noticed it in their area. Other bush-crickets have nymphs with dorsal stripes; most must be cryptic, but in Roesel's Bush-cricket (*Metrioptera roeselii*) the nymphal coloration is not cryptic, and a visit to this species' colonies in late spring, to look at the spiders there, may be worthwhile.

Robert Cumming (6130)

REFERENCE

HARTLEY, J. C. and WARNE, A. C., 1972 — The Developmental Biology of the Egg Stage of W. European Tettigoniidae (Orthoptera). *J. Zool. Lond.* 168: 267-298, 1 fig.

RAGGE, D. R., 1965 — Grasshoppers, Crickets and Cockroaches of the British Isles. Warne: London.

THE PASHA WITH FOUR TAILS

In Vol. 26 pp. 127-129 of the AES Bulletin (1967) I described the life cycle of the Mediterranean butterfly, *Charaxes jasius* L. specimens of which I bred from a few larvae sent to me from Portugal by Mr. F. Carvalo in 1966. I had the opportunity to repeat this experiment again at the end of 1977 through the kind assistance of our Spanish member, Senor J. M. Font Bustos of Castellon. He sent me four ova by post which arrived on the 14th November. One egg had been crushed but the three others hatched on arrival. Senor Bustos warned me that any attempt to raise them outside would be fatal as they would not survive frost. In its colonisation of Europe the control of its movement northwards is probably the incidence of winter frosts as much as the range of *Arbutus unedo,* its foodplant. In the circumstances I kept the larvae in the kitchen at a temperature around 70° F with night temperatures being much lower and when cooking was proceeding, much higher. My *Arbutus* in the garden is now a flourishing bush about ten feet high and even more in diameter so foodplant was no problem. By Christmas the larvae had pupated and the first butterfly emerged on New Year's Eve, 47 days after pupation, much faster than my previous experience when the period was nearly 3 months at about 60° F. A few days before

Christmas a young lady student who had been working in the Castellon area brought me a further batch of larvae from Sr. Bustos. These were in various stages of growth and had travelled safely in a shoe box with a liberal supply of cut foliage. I bred these through in the same way and they pupated over a period until the end of February. Two of the larvae were submitted to a much lower temperature and these ceased

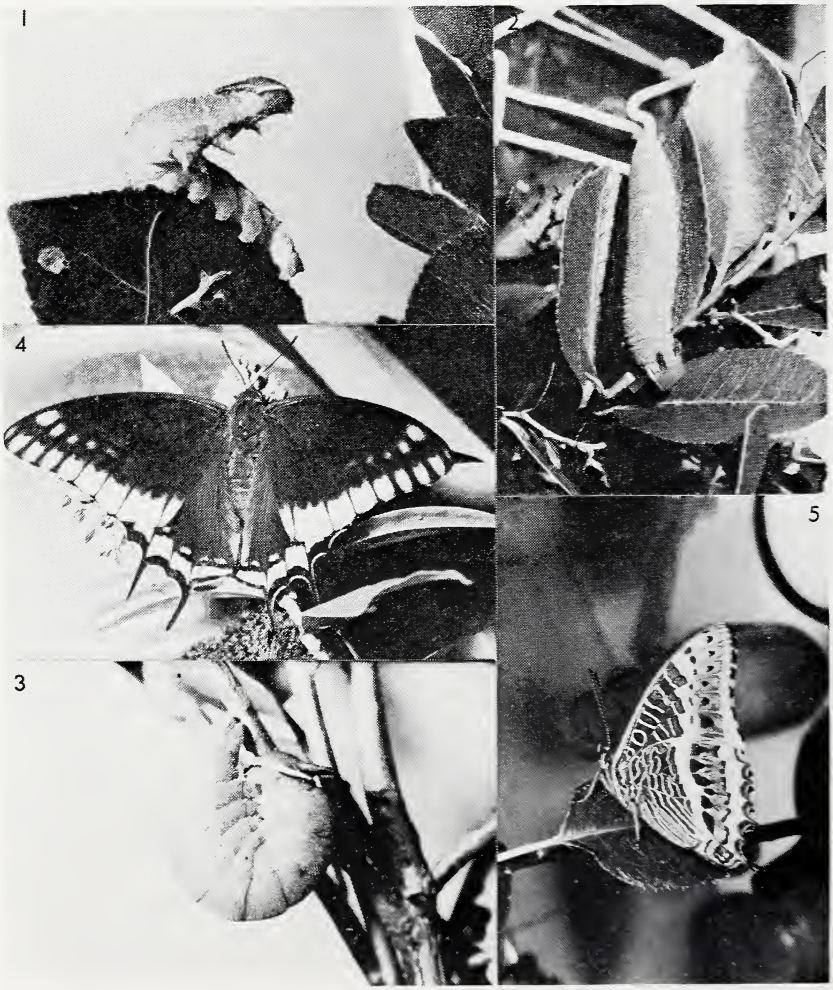


Fig. 1. Larva in search of a new leaf.
Fig. 2. Larva — full fed.
Fig. 3. Ready to pupate (hangs like this for two to three days).
Fig. 4. Female imagine at rest on Hebe.
Fig. 5. Male — underside.

to feed over a period of two weeks while at the low temperature, not moving from their resting pads. Returned to the higher temperature they immediately started to feed again and produced butterflies towards the end of March. It would seem that at depressed temperatures the larvae go into a state of suspended animation, equating to a form of hibernation.

During feeding the larvae were regularly sprayed with water at room temperature and only two were lost. One fell in the act of pupating and damaged itself and the other in the pupal stage turned black and appeared to have been attacked by some disease.

I tried hand pairing with some of the imagines and while the males were co-operative and their claspers easily manipulated, the females were totally unresponsive. I kept them alive for some three weeks, feeding them daily on honey water. They became quite tame and extended their probosces as soon as handled. I was not able to give them much space for flying and this may have inhibited mating.

P. W. Cribb (2270)

A VISIT TO THE WYRE FOREST, AUGUST 1977

We set off from Birmingham at about 9 a.m. on the 12th August 1977 on what was to prove a very warm and sunny day, arriving at the Hawksbatch area of the Wyre Forest just before 10. Some time was spent visiting nesting sites of the Wood Ant (*Formica rufa* L.), which was everywhere abundant, before moving to another part of the forest to view the only Robber Ant (*F. sanguinea* L.) nest site in the Midlands Both species of ants were very active as may be imagined on such a fine day. Other species of ants seen were *F. fusca* L. and *Acanthomyops flavus* Fab. During the middle of the morning we also found an isolated specimen of Pyralid moth (*Pyrausta purpuralis* L.) resting, or basking, in short grass on one of the forest rides.

Members of the Odonata were very active both Anisoptera and Zygoptera being seen. A specimen of *Sympetrum striolatum* Charp was taken.

Later in the morning we moved into Cleobury Woods and spent the rest of the day photographing insects visiting a thistle patch near a small stream in a clearing. This habitat provided one of the most diverse and abundant insect populations I have ever seen.

The Coleoptera present included two species, so far unidentified, of the Cerambycidae (Longhorn Beetles) which were very active and readily took flight. Surprisingly only one member of the Cantharidae (Soldier beetles) was seen all day.

There were many Hymenoptera visiting the thistle flowers, principally *Bombus* sp. but also several different species of the Ichneumonidae as well as solitary bees and wasps.

As far as Diptera were concerned members of the Syrphidae (Hover flies) were much in evidence. Those seen included *Syrphus ribesii* L., *S. baltaetus, Syritta pipiens* L., *Volucella pellucens* L., *Chrysotoxum bicinotum* L., *Eristalis tenax* L. and *E. Intricaria* L. Two Conopidae (Bee parasites) were present, *Conops quadrifiascatus* De Geer and *Physocephala rufipes* Fab. The very common Tachinid *Eriothrix rufomaculatus* De Geer was encountered several times. Time off was taken from the thistle patch for refreshment and to visit a nearby farm known to be a Tabanid (horse-fly) habitat. A blank was drawn there but *Chrysops caecutiens* L. was taken on the thistles when we returned.

The most spectacular insects were of course the Lepidoptera. They included the following:

Pararge aegeria L. (Speckled wood) several seen, *Pararge megera* L. (Wall brown) one seen, *Maniola tithonus* L. (Gatekeeper), a number of individuals present, *Argynnis paphia* L. (Silver-washed fritillary), numerous examples about all day varying from freshly emerged specimens to very tatty and faded ones. *Aglais urticae* L. (Small tortoiseshell), the most numerous of all, the population mainly composed of fresh individuals. *Inachis io* L. (Peacock), several seen including some really magnificent freshly-emerged males and females. *Pieris brassicae* L. (Large white), one only, *Pieris napi* L. (Green veined white) two seen at different times of the day, *Gonepteryx rhamni* L. (Brimstone) three separate sightings, possibly of the same individual, *Thymelicus sylvestris* Poda (Small skipper), several seen.

It was noticeable that up to 1 a.m. the Syrphids outnumbered the Bees but after that time the position was reversed.

This was the first time that I had visited the Wyre and it certainly proved to be a most interesting introduction. The area is obviously very rich in insects and worthy of much more investigation.

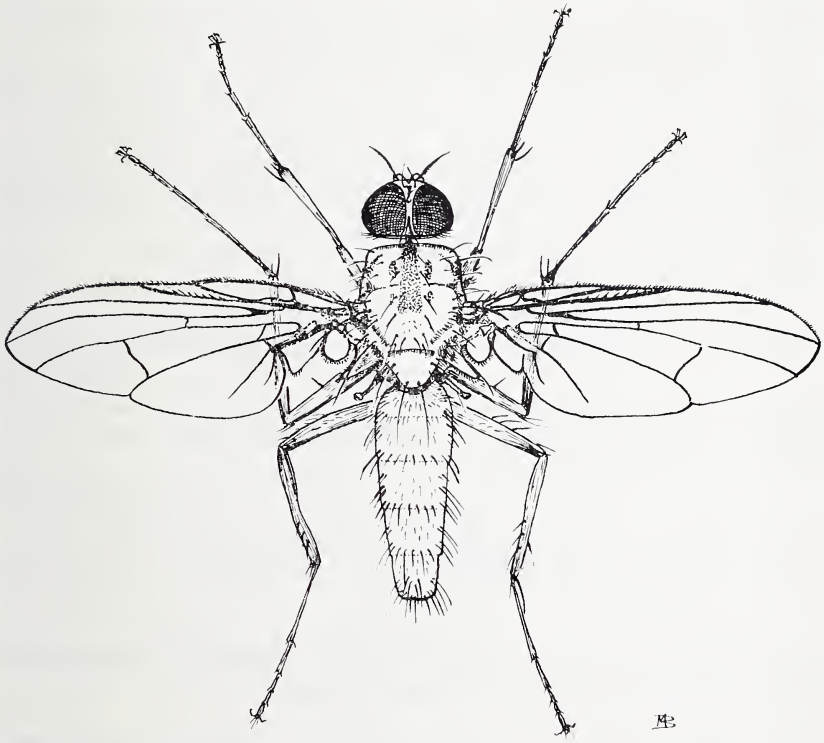
P. R. Shirley (5621)

NOTES ON DIPTERA BRED FROM THE REMAINS OF A NEST OF VESPULA VULGARIS (COMMON WASP)

PROCEDURE: A nest of *Vespula vuglaris* discovered during the summer of 1976 in the Sandwell Valley, West Bromwich, was excavated in September of that year, when all wasp activity therein was believed to have ended.

It was discovered that the nest structure had collapsed and that the mass of detritus was in a heap at the bottom of the hole. Several larvae were observed in the medium, one of these was extracted and photographed. It was about 15 mm. in length, greyish brown in colour and covered with numerous fleshy corrugations.

The detritus was then placed in a commercial plant propagator and



Achanthiptera rohrelliformis, male

put into an outbuilding in order that any other flies could be bred out. Unfortunately the experiment was not properly supervised during May and June 1977 owing to domestic upheavals. When observation was restarted a number of flies were seen to have emerged and died. The contents of the propagator were then carefully examined and all pupae and adult flies removed. Despite the damaged state of the majority of specimens species were identified, the table below showing the results.

Species	*Total No. of pupae*	*Hatched*	*Not hatched*	*Adults found*	*M.*	*F.*	*Missing*
Achanthiptera rohrelliformis	6	5	1	4	3	1	1
Fannia vesparia	38	32	6	23	10	13	9
Volucella pellucens	13	10	3	9	5	4	1
Totals	57	47	10	36	18	18	11

OBSERVATIONS:

(a) Three species developed in the detritus.

(b) The first two species mentioned above are members of the family

Muscidae, as is the common House Fly, *Musca domestica*. The third is a member of the Syrphidae, the hover flies.

(c) All three are previously recorded as having been bred from nests of *Vespula vulgaris* and it is possible that they are specific to these.

(d) The pupae are of interest in that those of *V. pellucens* and *F. vesparia* are tough, opaque and spinose whilst those of *A. rohrelliformis* are smooth, transparent and fairly fragile.

The emergence of the adult flies could have been difficult because some of the material seems to set into a tough and fairly sticky 'mud' on losing moisture and this may affect emergence form the pupae in some cases. It is probably that under normal conditions this moisture loss would not occur to the extent that it did in this experiment and that this factor would not, therefore, be important. In the wild invasion of the disused nest by mice etc. would probably be a much more critical factor in deciding the fate of larvae and pupae.

M. Bloxham

REFERENCES

D'ASSIS FONSECA, E. C. M., Handbooks for the Identification of British Insects, Vol. X, Part 4. Royal Entomological Society, London 1968.
VERRALL, G. H. British Flies, Vol. 8, 1901.

EVERSMAN'S RUSTIC, OCHROPLEURA FENNICA (TAUSCHER) (LEP. NOCTUIDAE) IN NOTTINGHAMSHIRE

At the end of July 1972 I began to operate my home-made M.V. trap again for the first time in 12 years. I was living at Mapperley, Nottingham (SK 594435). The trap was operated in my garden — about 0.5 km from the nearest 'open' countryside.

As I was virtually 'starting from scratch' again I had many 'new' species to identify. On August 9th, I found 1 specimen which I could not identify from my ancient copy of 'South'. The 1961 edition was subsequently studied and the nearest I could find, judging from the shape of the wings and some of the markings, was the illustration of the Eversmann's Rustic (now *Ochropleura fennica*). I dismissed this almost immediately, especially as a friend suggested that it could be a variety of the Turnip. I was not convinced by this and placed the specimen in a drawer with the other Noctuids.

In March 1978, I was able to show the above specimen to Mrs. Joan Nicklin from the Rothamsted Insect Survey. She took the specimen back to Rothamsted where she identified it as *Ochropleura fennica*. This was later confirmed by the Department of Entomology at the British Museum. Mrs. Nicklin has taken the trouble of finding the relevent references to *O. fennica* for me and it would appear that the above specimen was in fact either the *second* or the *third* to be caught in this country.

The other records are as follows:

1850 Derbyshire (Doubleday — in South 1961)

'Mid August' 1972 Shepperton, Middlesex (cf Durden, Ent. Gaz. 25:51)

20th August 1977 Aberdeen (cf Marsden & Young Ent. Rec. 90:84)

I would like to express my thanks to Mrs. Nicklin, who has obviously gone to a lot of trouble to confirm the identity of this specimen, and to the 'experts' at the Natural History Museum in London. It will, of course, be donated to the National Collection in due course.

M. E. Marchant (2598)

JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS

The Insect Protection Committee of the Royal Entomological Society was founded as long ago as 1926 and, despite limited resources, did much good work, especially in conservation of the Large Blue and Large Copper butterflies. In recent years, however, it has been recognised that a more widely-based committee would be appropriate to the needs of insect conservation, and the Joint Committee for the Conservation of British Insects was formed in 1968. A number of entomological societies are represented on the Committee, and there are regional representatives as well as observers from official organisations.

In 1972, the Committee published a Code for Insect Collecting, which has had a wide circulation both in this country and abroad. Lists of endangered species were later published by the Committee in the entomological journals, and at present it is actively associated with the projected publication of a Red Data Book of endangered British insects. The principles of the Code have been generally welcomed, and it is most encouraging to note the interest shown by schools and colleges. The Committee takes special pleasure in corresponding with the children — and their teachers — on entomological topics.

One of the Committee's main aims is, of course, the conservation of endangered insects and their habitats. With assistance from the World Wildlife Fund, it has been able to organise surveys of the Chequered Skipper butterfly and the Adonis Blue butterfly, and of the sites of the rarer dragonflies; it is also associated with conservation of the spider *Dolomedes plantarius,* and with the work of the Large Blue Committee.

The Committee attaches great importance to the excellent work being done by the County Trusts and other local natural history bodies and hopes that, by providing a forum for discussion and by advising on entomological matters, it may prove a useful ally. With this in mind, a network of "county correspondents" has been set up to provide a quick two-way channel of communication between the Committee and local entomologists. The Committee is most grateful to the County Trusts

for their help in setting up this network and to the correspondents for the useful information which they have already provided: on threats to species and habitats; on introductions to the counties; and on the effects of the weather of 1976/77 on the insect fauna. Conservation of insect populations can best be effected with the support, encouragement and guidance of the whole entomological community, and the Committee looks forward to continued close co-operation. 31st May, 1978. M. G. Morris, Secretary to the Committee, c/o Royal Entomological Society, 41 Queen's Gate, London SW7 5HU.

ARE YOU CONVERTED? IF NOT, READ ON . . .

Perhaps one of the most frustrating aspects of working with a collection of Lepidoptera is that the vital data on the insect labels is too often obscured. The simplest and sometimes only way of getting at this information is to open up the drawer and either remove or pivot the labels on the pin. This of course results in unnecessary handling of the specimen with all the associated risk of damage, loss or mixing up of labels, and should always be avoided if at all possible.

After working for a while at Glasgow Museum, and amalgamating the collections of British Lepidoptera, it became obvious that the English style of low setting was, to say the least, not very suitable, and the Continental style of high setting would have to be adopted for all new material collected by our staff. Our specimens (ideally!) have a minimum of three labels — data, registration and determination, thus it is plain to see the space below the English mounted specimen is very inadequate.

Initial attempts to purchase a stock of Continental height setting boards were frustrated, and when a few eventually arrived I was rather disappointed over their quality (being used to the high class Watkins and Doncaster product, alas only made in English height). So, a compromise was called for, and the notes below describe the method I used to convert the good quality Watkins and Doncaster English height setting board into a good quality one of Continental height.

Many readers may have already converted their existing setting boards, or have purchased ready made items from the various European entomological suppliers. However, for those contemplating the change, the following notes may be of help. The job is very simple and requires only the very basic of do-it-yourself tools.

The most important measurement to work to is the distance of 25 mm from the top surface of the boards to the point where the pin stops — (measurement A in Fig. 2) — *not from the top to bottom of the board.*

Procedure — This can be followed with or without the covering paper on the board, if care is taken and hands kept clean, immediate repapering is not necessary after conversion.

1. Fit the board upside down in a vice, protecting the sides from the vice jaws with strips of cardboard or something similar. Do not overtighten, remember the board is mainly cork and this will easily compress. Mark the position of the groove on the base and saw through *to* the cork. Remove from the vice and carefully cut the cork with a sharp knife (a Stanley knife or scalpel).

You should now have the two sides and "groove" separate. Sand the cut surfaces either with a power sander, or by hand after an initial and very careful planing (remember the compressed cork abrades rather than slicing cleaning). If care has been taken with the saw cut only sanding will be needed.

2. Cut four strips of $\frac{1}{8}$" thick hardboard the same width as each cut side, and one strip of 5-ply as wide as the new board — the new groove may be made any desired width. Assemble two hardboard strips, one cork side and the base board without glue, and check that the top surface is 25 mm above the top of the base board. If not it can be adjusted. If too high, by sanding the new base board, if too low, by inserting for example strips of postcard under the corked section. If satisfied that the height is correct on both sides — at least equal on both sides! proceed. (I have used an accepted error of about $\frac{1}{3}$ mm over the 25 mm).

Fig.1

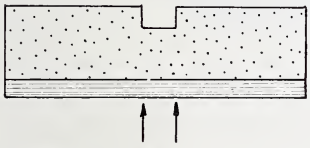
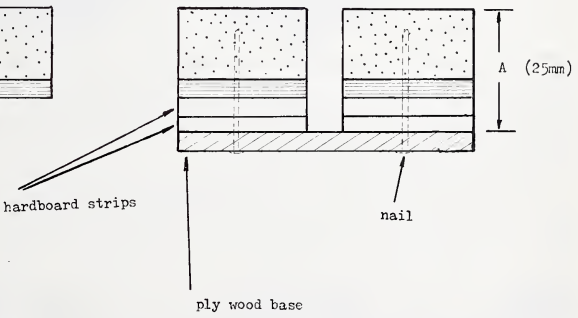


Fig.2



3. Apply woodworking glue to one half of the base board, and put on one hardboard side strip, apply glue to this and place the other hardboard strip in place, finally apply glue to this and put the corked setting board side in place. Make sure all strips are flush, especially on the groove side. Hold vertically in a vice, with the top three inches above the jaws (again not overtightening and using cardboard to protect cork from the jaws) and hammer a nail into the board from the base — make sure the nail used is long enough to penetrate the cork to about $\frac{1}{2}$ - $\frac{2}{3}$ its depth; not so long that it goes through the entire board. Remove from the vice, recheck the alignment of the various layers, and repeat at the opposite end. Remove from vice and hammer a third nail into the middle.

4. Treat the other side in a similar manner, but take great care to keep the groove of the desired width evenly open along its entire length. Remove excess glue and place under a medium weight for a few hours until the glue has set.

5. Cut a strip of Plastazote a little wider than the groove and push into place (Expanded polystyrene or even pith may be substituted, or of course the strip of cork sawn out from the "groove" of the original board). I have found it best to leave the new groove just a bit deeper than square, but the depth may be made to personal taste very easily.

Assuming the paper is clean, or the board has been newly repapered, it is now ready for use. The acquisition of a pinning stage (those offered by Watkins and Doncaster are extremely good and being made of metal, will last a life-time) will be advantageous. The deepest hole being 25 mm, the simplicity of pinning is obvious.

The advantages of high mounting are many and one has only to work with a collection of high mounted, and with one of low mounted (English) Lepidoptera to be convinced. Apart from the obvious ease of reading the labels without risking damage to the specimen, smaller moths (not necessarily "micros") or apterous females may be staged on polyporus resulting in a collection of uniform height, again aiding ease of study — each specimen being within hand lens focus from outside the cabinet drawer. The increase in space below the insect enables dissected genitalia whether on a slide, or gummed to a card, to be kept with the specimen. Bred specimens can easily carry their pupal cases under the adult, again gummed to a card. Safer handling results as the pin is manipulated at the base, *below* the insect (this after all is why entomological forceps are curved).

However, for all its advantages, doubtless Lepidopterists can think up a number of disadvantages. The most obvious being the length of the Continental pin. Should anyone decide to adopt high mounting, do make certain beforehand that your existing cabinet drawers and store-boxes are deep enough to accomodate high mounted insects. If not then a compromise may be reached by adapting the setting boards to an even height which is the maximum for the cabinet drawers in use. (Perhaps this last point will inflame some lepidopterists,... it was merely a thought).

J. Cooter (3290)

QUIZ: DUSKING BY SILHOUETTE

How often have you wandered down a woodland ride at dusk and seen the silhouette of a moth dart across your path against the evening sky? And how often have you been able to identify the fleeting outline that has successfully challenged the speed of your net? Here is a light-hearted test, giving you the chance to find out just how well you would do in a twilight identity parade, though I don't seriously suggest for a moment that if you can label these drawings you could identify wings beating dozens of times a second. Just as a good fighter pilot would recognise the silhouettes of every type of aircraft in the skies, perhaps a good entomologist should at least know the basic groups of moths in outline.

Below are our five commonest hawkmoths, set out in random order and all drawn to the same size, just to make things that little bit more difficult. Can you sort them out?

If that was easy, try this second mixed bunch of moths — it should present a few more problems. No scale to help you here either, and the less distinctive ones should really sort the men from the boys. Several different families are represented, and here's a clue; none of them are clearwings! (more helpfully, the antennae should help you sort some out).

Answers in next issue [Editor]

Anthony T. Short (5205)

A LIST OF THE FOOD PLANTS OF EAST AFRICAN MACROLEPIDOPTERA

PART 3 — BOTANICAL LIST (ALPHABETICALLY ARRANGED)

(Continued from page 147)

MYRSINAGEAE

Maesa — *Abisara neavei* (Erycinidae) : *Orgyia basalis* (Lymantriidae) : *Bombycopsis indecora, Pachypasa papyri, Leipoxais peraffinis* (Lasiocampidae) : *Nudaurelia dione, Holocera angulata* (Saturnidae) : *Pingasa abyssinaria* (Geometridae).

MYRTACEAE

Eucalyptus — *Euproctis molundiana, Dasychira georgiana, Orgyia basalis, Argyrostagma niobe* (Lymantriidae) : *Lechriolepis nigrivenis, Bombycopsis bipars, Nadiasa cuneatum, Pachypasa subfascia, P. papyri* (Lasiocampidae) : *Bunaea alcinoe, Nudarelia conradsi, N. dione, N. krucki, N. guenzii, Lobobunaea phaedusa, Urota sinope, Athletes ethra* (Saturniidae) : *Desmeocraera varia* (Notodontidae) : *Latoia chapmanni* (Limacodidae) : *Eumeta rougeoti, Acanthopsyche junodi* (Psychidae) : *Euxoa longidentifera, Spodoptera littoralis, Chloridea obsoleta, Anua purpurascens, Achaea catella, A. faber, Phytometra limbirena* (Noctuidae) : *Nycterosea obstipata, Colocleora divisaria, Ascotis selenaria, A. reciprocaria, Cleora nigrisparsalis, C. herbuloti, C. dargei, C. scobina, C. rothkirchi, Luxiaria curvivena* (Geometridae) : *Merculia tenuis, Sylepta balteata* (Pyralidae).

Eugenia — *Charaxes druceanus* (Nymphalidae).

Leptospermum — *Achaea catocaloides, A. faber* (Noctuidae).

Psidium — *Virachola dinochares, Euchrysops malanthan* (Lycaenidae) : *Euproctis molundiana* (Lymantriidae) : *Pachypasa subfascia* (Lasiocampidae) : *Bunaea alcinoe, Nudaurelia walbergi, N. emini, Lobobunaea phaedusa* (Saturniidae) : *Desmeocraera varia, D. confluens,* (Notodontidae) : *Ctenocampa hilda* (Limacodidae) : *Achaea faber* (Noctuidae) : *Pingasa ruginaria, Pigiopsis convergens* (Geometridae).

Syzigium — *Charaxes protoclea, C. lacteitinctus, C. druceanus, C. eudoxus* (Nymphalidae) : *Virachola dinochares* (Lycaenidae) : *Dasychira azelota, Orgyia basalis* (Lymantriidae) : *Lechriolepis jacksoni* (Lasiocampidae) : *Anaphe venata* (Thaumetopoeidae) : *Micraphe lateritia, Latoia latistriga, L. albipuncta* (Limacodidae) : *Delta phoenicraspis, Maxera atripunctata* (Noctuidae).

NYCTAGINACEAE

Boerhavia — *Spilosoma investigatorum, S. lucida, S. lutescens, S. jacksoni* (Arctiidae) : *Celerio lineata, Hippotion celerio* (Sphingidae) : *Spodoptera littoralis* (Noctuidae).

Bougainvillea — *Disclisioprocta natalata* (Geometridae).

OCHNACEA

Ochna — *Melanocera sufferti* (Saturniidae) : *Latoia latistriga* (Limacodidae) : *Stenopterygia subcurva* (Noctuidae).

OLACACEAE

Ximenia — *Hypolycoena philippus, Stugeta bowkeri, Axiocerses amanga* (Lycaenidae).

OLEACEAE

Jasminum — *Holocera smilax* (Saturniidae) : *Acherontia atropos, Coelonia mauritii.* ? *Deilephila nerii* (Sphingidae) : *Somatina virginalis, Problepsis digammata* (Geometridae) : *Margaronia unionalis* (Pyralidae).

Ligustrum — *Acherontia atropos* (Sphingidae).

Olea — *Acherontia atropos, Macropoliana natalensis, M. oheffernani* (Sphingidae) : *Craniophora paragrapha* (Noctuidae) : *Prasinocyma anadyomene* (Geometridae).

Schrebera — *Acherontia atropos* (Sphingidae).

ONAGRACEAE

Fuchsia — *Hippotion osiris, H. eson* (Sphingidae).

Jussiaea — *Hippotion balsaminae* (Sphingidae).

ORCHIDACEAE

Aerangis — *Theretra orpheus* (Sphingidae).

Anagraecum — *Spilosoma lineata* (Arctiidae).

Polystachya — *Theretra orpheus* (Sphingidae).

OXALIDACEAE

Oxalis — *Zizeeria knysna, Zizula hylax, Actizera stellata, A. lucida* (Lycaenidae).

PALMAE

Borassus — *Gretna carmen, Gamia bucholzi, G. shelleyi* (Hesperiidae).

Cocos — *Euryphene mardania* (Nymphalidae) : *Zophopetes cerymica, Gamia shelleyi* (Hesperiidae) : *Latoia viridissima* (Limacodidae).

Hyphaene — *Euryphene chriemhilda* (Nymphalidae) : *Nudaurelia anna* (Saturniidae).

Phoenix — *Gretna carmen, Zophopetes dysmephila, Gamia bucholdzi, Gamia bucholzi, G. shelleyi* (Hesperiidae).

Raphia — *Gretna carmen, Zophopetes dysmephila, Z. cerymica, Gamia bucholzi, G. shelleyi* (Hesperiidae).

PAPILIONACEAE

Aeschynomene — *Eurema hecabe* (Pieridae) : *Acraea anacreon* (Acraeidae).

Alysicarpus — *Euproctis gemmata* (Lymantriidae) : *Nadiasa butiti* (Lasiocampidae) : *Diastemina simplex* (Notodontidae).

Arachis — *Spilosoma investigatorum, Estigmene unipuncta* (Arctiidae) : *Herse convolvulii* (Sphingidae) : *Latoia vivida* (Limacodidae) : *Spodoptera littoralis, Phytometra acuta, P. limbirena* (Noctuidae)

: *Ascotis reciprocaria* (Geometridae) : *Lamprosema indicata, Maruca testulalis* (Pyralidae).

Argyrolobium — *Vanessa cardui* (Nymphalidae) : *Actizera lucida* (Lycaenidae).

Burkea — *Syntarucus telicanus* (Lycaenidae).

Cajanus — *Virachola antalus, Limpides boeticus, Euchrysops malathana* (Lycaenidae) : ? *Naroma signifera, Porthesia producta, P. dewitzi, Euproctis hargreavesi, Bracharoa quadripunctata, Dasychira plagiata, D. georgiana, Orgyia basalis* (Lymantriidae) : *Bombycopsis indecora* (Lasiocampidae) : *Nudaurelia dione, N. guenzii* (Saturniidae) : *Diastemina simplex* (Notodontidae) : *Chloridea obsoleta, Pardasena virgulana* (Noctuidae) : *Prasinocyma pictifimbria, Hemerophila simulatrix* (Geometridae) : *Etiella zinckenella, Maruca testulalis* (Pyralidae).

Calpurnia — *Achaea indeterminata* (Noctuidae).

Canavalia — *Virachola odana, V. antalus, Lampides boeticus, Euchrysops malathana* (Lycaenidae) : *Coeliades forestan* (Hesperiidae) : *Spilosoma rattrayi* (Arctiidae) : *Diastemina simplex* Notodontidae) : *Maruca testulalis* (Pyralidae).

Cicer — *Chloridea obsoleta* (Noctuidae).

Colutea — *Lampides boeticus* (Lycaenidae).

Craibia — *Charaxes cithaeron, C. nandina, C. pythodorus* (Nymphalidae) : *Platysphinx stigmatica* (Sphingidae).

Crotalaria — *Virachola antalus, Syntarucus telicanus, Lampides boeticus, Actizera lucida* (Lycaenidae) : *Coeliades forestan* (Hesperiidae) : *Creatonotus leucanioides, Argina cribraria, A. amanda, Amphicallia pactolicus, A. tigris, A. solai* (Arctiidae) : *Clania carvina* (Psychidae) : *Chloridea obsoleta* (Noctuidae) : *Etiella zinckenelle* (Pyralidae).

Cytisus — *Argyrostagma niobe* (Lymantriidae).

Dalbergia — *Charaxes etesipe, C. blanda* (Nymphalidae) : *Phytometra orichalcea, Raparna imparata* (Noctuidae).

Desmodium — *Diastemina simplex* (Notodontidae) : *Mocis undata* (Noctuidae).

Dolichos — *Vanessa cardui* (Nymphalidae) : *Virachola antalus* (Lycaenidae) : *Herse convolvuli* (Sphingidae).

Eriosema — *Precis octavia* (Nymphalidae : *Euchrysops barkeri, Cupidopsis cissus, C. iobates* (Lycaenidae) : *Nudaurelia licharbas, N. guenzii* (Saturniidae) : *Leptoclanis pulchra* (Sphingidae) : *Prasinocyma pictifimbria* (Geometridae).

Erythrina — *Charaxes castor, C. numenes* (Nymphalidae) : *Spilosoma atridorsia, Rhodogastria bubo* (Arctiidae) : *Pteredoa monosticta, Euproctis haregreavesi, Laelia straminea, Dasychira plagiata, D. georgiana, Argyrostagma niobe* (Lymantriidae) : *Pachypasa subfascia* (Lasiocampidae) : *Bunaea alcinoe, Nudaurelia dione, Urota*

sinope (Saturniidae) : *Falcatula falcata* (Sphingidae) : *Sizalisca graminosa*, *Alenophalera variegata, A. duplicata* (Notodontidae) : *Agathodes musivalis, Terastia meticulosalis* (Pyralidae).

Flemingia — *Pardasena virgulana* (Noctuidae).

mahallakoaena, Freyeria trochilus (Lycaenidae) : *Coeliades fore-*

Glycine — *Vanessa cardui* (Nymphalidae) : *Alenophalera inconspicua* (Notodontidae).

Indigofera — *Syntarucus telicanus, Lampides boeticus, Eicochrysops mahalla koaena, Freyeria trochilus* (Lycaenidae) : *Coeliades forestan, C. pisistratus* (Hesperiidae) : *Euproctis haregreavesi* (Lymantriidae) : *Nadiasa diplocyma* (Lasiocampidae) : *Azygophlebs inclusa* (Cossidae) : *Chalciope hyppasia, Tathorhynchus homogyna* (Noctuidae).

Lablab — *Vanessa cardui* (Nymphalidae) : *Chloridea obsoleta* (Noctuidae) : *Etiella zinckenella, Maruca testulalis* (Pyralidae).

Lathyrus — ? *Teriomima aslauga, Lampides boeticus* (Lycaenidae).

Lespedeza — *Eurema hecabe* (Pieridae).

Lupinus — *Vanessa cardui* (Nymphalidae) : *Etiella zinckenella, Maruca testulalis, Mecyna gilvata, M. polygonalis* (Pyralidae).

Medicago — *Colias electo* (Pieridae) : *Spindasis mozambica, Azanus jesous, Syntarucys telicanus, Lampides boeticus, Zizeeria knysna, Actizera stellata* (Lycaenidae) : *Bracharoa quadripunctata* (Lymantriidae) : *Tathorhynchus exsiccata* (Noctuidae).

Melilotis — *Syntarucus telicanus* (Lyncaenidae).

Millettia — *Coeliades forestan* (Hesperiidae) : *Goodia kuntzei* (Saturniidae) : *Lophostethus demolini, Rhadinopasa hornimani, Platysphinx stigmatica* (Sphingidae) : *Plecoptera punctilineata* (Noctuidae).

Mundulea — *Spindasis nyassae, S. ella, S. natalensis, Syntarucus telicanus, Petrelaea sichela* (Lycaenidae) : *Platysphinx stigmatica* (Sphingidae).

Ononis — *Chloridea peltigera* (Noctuidae).

Ostryoderris — *Platysphinx stigmatica* (Sphingidae).

Phaseolus — *Colias electo* (Pieridae) : *Vanessa cardui* (Nymphalidae) : *Virachola antalus, Syntarucus telicanus, Lampides boeticus, Euchrysopus malathana* (Lycaenidae) : *Coeliades forestan* (Hesperiidae) : *Spilosoma maculosa, S. screabilis* (Arctiidae) : *Herse convolvuli* (Sphingidae) : *Diastemina simplex* (Notodontidae) : *Euxoa longidentifera, Spodoptera littoralis, S. exempta, Chloridea obsoleta, Achaea catocaloides, Phytometra limbirena, P. orichalcea, Anticarsia irrorata* (Noctuidae) : *Lamprosema indicata, Maruca testulalis* (Pyralidae).

Pilostigma — *Dysphylia viridella* (Pyralidae).

Pisum — *Virachola antalus, Syntarucus telicanus, Lampides boeticus* (Lycaeniidae) : *Charidea homochroa* (Zygaenidae) : *Amsacta flavi-*

costa (Arctiidae) : *Agrotis segetum, Spodoptera littoralis, S. exigua, Chloridea obsoleta, Syngrapha cirmumflexa, Phytometra orichalcea, Sphingomorpha chlorea* (Noctuidae) : *Maruca testulalis* (Pyralidae).

Podalyria — *Lampides boeticus* (Lycaenidae).

Pseudarthria — *Acraea encedon* (Acraeidae) : *Spilosoma maculosa* (Arctiidae) : *Nudaurelia guenzii* (Saturniidae) : *Pectinophora noctuiformis, Diastemina simplex* (Notodontidae) : *Mocis undata, Bomolocha ectoglauca* (Noctuidae).

Pterocarpus — *Platysphinx stigmatica* (Sphingidae).

Rhynchosia — *Euchrysops osiris* (Lycaenidae) : *Diastemina simplex* (Notodontidae) : *Chalciope hyppasia* (Noctuidae).

Robinsonia — *Coeliades forestan* (Hesperiidae).

Schotea — *Virachola antalus, Anthene definita* (Lycaenidae).

Sesbania — *Colias electo, Catopsilia florella, Eurema hecabe, E. desjardinsi* (Pieridae) : *Syntarucus telicanus* (Lycaenidae) : *Coeliades forestan* (Hesperiidae) : *Nadiasa distinguendum* (Lasiocampidae).

Smithia — *Euproctis melanopholis* (Lymantriidae) : *Maruca testulalis* (Pyralidae).

Sutherlandia — *Virachola antalus, Lampides boeticus* (Lycaenidae).

Tephrosia — *Ramesa macrodonta* (Notodontidae).

Trifolium — *Dasychira georgiana* (Lymantriidae).

Vigna — *Virachola dinochares, Spindasis natalensis, S. mozambica, Euchrysops osiris, E. malathana* (Lycaenidae) : *Spilosoma lutescens* (Arctiidae) : *Dasychira georgiana* (Lymantriidae) : *Spodoptera littoralis, Chloridea obsoleta, Mocis undata, Anticarsia irrorata* (Noctuidae) : *Lamprosema indicata, Maruca testulalis* (Pyralidae).

Virgilia — *Lampides boeticus* (Lycaenidae).

Voandzeia — *Lamprosema indicata* (Pyralidae).

Zornia — *Zizeria knysna* (Lycaenidae) : *Mocis mutuaria* (Noctuidae).

PASSIFLORACEAE

Adenia — *Bematistes aganice, B. quadricolor, B. poggei, B. tellus, Acraea rabbaiae, A. insignis, A. egina, A. caecilia, A. doubledayi, A. sykesi, A. melanoxantha, A. perenna, A. acrita, A. caldarena, A. oncaea, A. natalica, A. asboloplintha, A. anacreon* (Acraeidae).

Barteria — *Euproctis molundiana* (Lymantriidae).

Modecca — *Acraea anemosa* (Acraeidae).

Ophiocaulon — *Acraea natalica* (Acraeidae).

Passiflora — *Bematistes aganice, Acraea terpsichore, A. zetes, A. acrita, A. equatorialis, A. natalica, A. asboloplintha* (Acraeidae).

Tacsonia — *Acraea zetes* (Acraeidae).

Tryphostemma — *Bematistes aganice, Acraea rabbaiae, A. terpsichore* (Acraeidae).

PEDALIACEAE

Sesamum — *Acherontia atropos* (Sphingidae) : *Antigastra catalaunalis* (Pyralidae).

PHYTOLACCACEAE

Phytolacca — *Creatonotus vittata, Rhodogastria atrivena* (Arctiidae) : *Spodoptera littoralis* (Noctuidae).

PINACEAE

Pinus — *Bracharoa quadripunctata, Orgyia basalis, O. mixta, Mylantria xanthospila* (Lymantriidae) : *Nadiasa butiti, N. livida, Pachypasa pallene, P. payri, Gonometa podocarpi, G. regia, G. nysa* (Lassiocampidae) : *Nudaurelia tyrrhea* (Saturniidae) : *Psyche aethiops* (Psychidae) : *Elaeodes brevicornis, Diparopsis castanea, Spodoptera littoralis,* ? *Ariathisa semiluna, Achaea catella, Mocis repanda, Phytometra limbirena, Nagia gravipes* (Noctuidae) : *Buzura edwardisi, Cleora herbuloti, C. rothkirchi, C. dargei, C. pavlitzkiae, Oedicentra albipennis Xanthisthisa tarsispina* (Geometridae) : *Plodia interpunctella* (Pyralidae).

PIPERACEAE

Piper — *Bunaea alcinoe* (Saturniidae) : *Medasina ugandaria* (Geometridae : *Nomaeosoma dimera* (Pyralidae).

PLUMBAGINACEAE

Limonium — *Scopula lubricata* (Geometridae).

Plumbago — *Syntarucus telicanus* (Lycaenidae) : *Afrophyla vethi, Scopula ochroleucaria* (Geometridae).

PODOCARPAE

Podocarpus — *Gonometa podocarpi* (Lasiocampidae) : *Salagena irrorata, S. discata* (Metarbelidae).

POLYGONACEAE

Antigonum — *Colocleora divisaria* (Geometridae).

Oxygonum — *Euproctis fasciata* (Lymantriidae) : *Hippotion osiris* (Sphingidae) : *Grammodes geometrica* (Noctuidae) : *Scopula nigrinotata, Rhodometra sacraria, R. sevastopuloi* (Geometridae).

Polygonum — *Mylothris bernice* (Pieridae) : *Acraea rahira* (Acraeidae) : *Pachypasa papyri* (Lasiocampidae) : *Grammodes geometrica* (Noctuidae) : *Hemerophila simulatrix* (Geometridae).

Rumex — *Lycaena pseudophlaeas, L. abbotti* (Lycaenidae) : *Celerio lineata, Hippotion celerio* (Sphingidae) : *Agrotis segetum* (Noctuidae).

POLYPODACEAE

Adantium — *Eriopus latreillei* (Noctuidae).

Pteridium — *Elaeodes brevicornis* (Noctuidae).

Ferns generally — *Bombycopsis indecora* (Lasiocampidae) : *Elaeodes prasinodes, Eriopus maillardi* (Noctuidae).

PORTULACACEAE

Portulaca — *Hypolimnas misippus* (Nymphalidae) : *Celerio lineata* (Sphingidae).

Talium — *Hypolimnas misippus* (Nymphalidae).

PROTEACEAE

Faurea — *Pygaera roseitincta* (Notodontidae).

Grevillea — *Anadiasa punctifascia* (Lasiocampidae).

Macadamia — *Virachola dinochares* (Lycaenidae).

Protea — *Charaxes drucaenus* (Nymphalidae) : *Capys catharus* (Lycaenidae) : *Cinabra hyperbius* (Saturniidae).

PUNICACEAE

Punica — *Virachola livia, Hypolycaena philippus* (Lycaenidae) : *Porthesia producta* (Lymantriidae).

RANUNCULACEAE

Clematis — *Odontestra albivitta* (Noctuidae) : *Colocleora simulatrix* (Geometridae).

RESEDACEAE

Caylusea — *Pontia helice* (Pieridae).

Reseda — *Chloridea obsoleta* (Noctuidae).

RHAMNACEAE

Couania — *Castalius margaritacea* (Lycaenidae).

Maesopsis — *Charaxes lacteitinctus* (Nymphalidae) : *Rhodogastria atrivena* (Arctiidae) : *Euproctis rubroguttata* (Lymantriidae) : *Nadiasa livida, Pachypasa subfascia, Leipoxais crenulata, Odontogama nigricans, Gonobombyx angulata* (Lasiocampidae) : *Epiphora albida, E. vacuna, Nudaurelia nictitans, Imbrasia epimethea* (Saturniidae) : *Neopolyptychus serrator* (Sphingidae) : *Acanthopsyche sierricola* (Psychidae) : *Spodoptera littoralis* (Noctuidae) *Buzura abruptaria, Ascotis selenaria* (Geometridae) : *Sacada prasinalis* (Pyralidae).

Scutia — *Charaxes dilutus, C. etheocles, C. berkeley, C. ethalion, C. baileyi* (Nymphalidae) : *Eagris nottoana* (Hesperiidae).

Ziziphus — *Tarucus grammicus, T. mediterraneus, T. ungemachi, T. theophrastus, Castalius calice, C. cretosus, C. hintza* (Lycaenidae) : *Porthesia producta, P. dewitzi, Euproctis fasciata, Orgyia mixta* (Lymantriidae) : *Gonobombyx angulata* (Lasiocampidae) : *Epiphora mythimnia, E. bauhinae* (Saturniidae) : *Grammodes stolida* (Noctuidae) : *Pingasa rhadamaria, Petrodava leucicolor, P. albosignata* (Geometridae) : *Pagyda traducalis* (Pyralidae).

RHIZOPHORACEAE

Cassipourea — *Nepheronia argia* (Pieridae).

ROSACEAE

Alchemilla — *Acraea rangatana* (Acraeidae).

Cydonia — *Orgyia vetusta* (Lymantriidae).

Erioborya — *Nadiasa cuneatum* (Lasiocampidae) : *Pogononeura xantholepia* (Pyralidae).

Parinare — *Polyptychus corydoni* (Sphingidae).

Prunus — ? *Hypolimnas misippus* (Nymphalidae) : *Virachola dino-*

chares (Lycaenidae) : *Nadiasa distinguendum, Pachypasa subfascia* (Lasiocampidae) : *Nudaurelia guenzii* (Saturniidae) : *Celerio lineata* (Sphingidae) : *Parallelia algira* (Noctuidae).

Pygeum — *Diapalpus griseus* (Lasiocampidae) : *Latoia albipuncta* (Limacodidae).

Pyrus — *Orgyia vetusta* (Lymantriidae) : *Latcia vivida* (Limacodidae).

Rosa — *Anthene definita* (Lycaenidae) : *Euproctis molundiana, Dasychira georgiana, Orgyia basalis* (Lymantriidae) : *Lechriolepis nigrivenis, Bombycopsis indecora, Nadiasa diplocyma* (Lasiocampidae) : *Nudaurelia guenzii, N. amathusia, Lobobunaea phaedusa* (Saturniidae) : *Latoia viridissima, Niphadoepis alianta* (Limacodidae) : *Chloridea obsoleta, Achaea catocaloides* (Noctuidae).

Rubus — ? *Nyctemera leuconoe* (Arctiidae) : *Jacksonia striata, Trabala charon, Leipoxais marginepunctata* (Lasiocampidae) : *Nudaurelia amathusia* (Saturniidae) : *Parallelia algira, Grammodes stolida* Noctuidae).

RUBIACEAE

Adina — *Cephonodes hylas* (Sphingidae).

Anthospermum — *Temnora pylades* (Sphingidae).

Burchellia — *Cephonodes hylas, Temnora zantus* (Sphingidae).

Burttdavya — *Leipoxais crenulata* (Lasiocampidae) : *Deilephila nerii, Nephele rosae* (Sphingidae) : *Dirades theclata* (Epiplemidae) : *Phorma pepon* (Limacodidae).

Canthium — *Stilpnotia nigripes, Dasychira affinis* (Lymantriidae).

Cinchona — *Lobobunaea christyi* (Saturniidae) : *Deilephila nerii* (Sphingidae).

Coffea — *Virachola lorisona, V. dariaves, Anthene indefinita* (Lycaenidae) : *Balacra testacea, B. ehrmanni* (Syntomidae) : *Asura obliterata, Spilosoma atridorsia, Rhodogastria pannosa, R. bubo* (Arctiidae) : *Porthesia producta, P. dewitzi, P. aethiopica, Dasychira plagiata, Orgyia basalis, O. hopkinsi* (Lymantriidae) : *Bombycopsis indecora, Pachypasa sericeofasciata, Pseudometa castanea* (Lasiocampidae) : *Epicampoptera andersoni, E. marantica, E.* glauca (Drepanidae) : *Buncaea alcinoe* (Saturniidae) : *Cephonodes hylas* (Spingidae) : *Thosea aurifrona, Narosa africana, N. flaccidia, Latoia urda, L. vivida, L. hexamitobalia, Phorma pepon, Niphadolepis alianta, N. bipunctata, Miresa coccinea* (Limacodidae) : *Acanthopsyche alba, Chalia emiliae, Monda rogenhoferi* (Psychidae) : *Euxoa cymagrapta, Agrotis bisignata, A. spinifera, A. segetum, Polia dipterigidia, Spodoptera littoralis, S. exigua, S. exempta, Chloridea obsoleta, Lophoruza semiscripta, Achaea catocaloides, A. mabilli, Rhesala maestalis, Simplicia inflexalis* (Noctuidae) : *Lophostola annuligera, Hemerophila simulatrix, Ascotis reciprocaria, Cleora nigrisparsalis, Epigynopteryx ansorgei, E. coffaea, E. tabitha, Hyalornis docta* (Geometridae) : *Obtusipalpis fusipartalis,*

Euzophera sagax, Cryptolabes gnidiella, Dichocrocis crocodora, Lygropia amyntusalis, Thliptoceras octoguttale, Terastia meticulosalis (Pyralidae).

Coprosma — *Hippotion eson* (Sphingidae).

Galium — *Sphingonaepiopsis nana, Macroglossum trochilus, Celerio lineata* (Sphingidae).

Gardenia — *Cephonodes hylas,* ? *Deilephila nerii* (Sphingidae) : ? *Margaronia sericea* (Pyralidae).

Hymenodictyon — *Cephonodes hylas* (Sphingidae).

Ixora — *Hypolycaena philippus* (Lycaenidae) : *Cephonodes hylas* (Sphingidae) : *Thosea aurifrons* (Limacodidae).

Kraussia — *Cephonodes hylas* (Sphingidae).

Mitragyna — *Isopidia angustipennis* (Drepanidae) : *Deilephila nerii, Nephele rosae* (Sphingidae) : *Latoia vivida* (Limacodidae) : *Macellopsis ustata* (Noctuidae).

Nauclea — *Nephele rosae* (Sphingidae) : *Chalcidoptera trogobasalis* (Pyralidae).

Oldenlandia — *Sphingonaepiopsis nana, S. ansorgei, Basiothia medea, Celerio lineata* (Sphingidae).

Oxyanthus — *Cephonodes hylas* (Sphingidae) : *Aletiis helcita, Cartaletis libyssa* (Geometridae).

Pavetta — *Cephonodes hylas* (Sphingidae).

Pentanisia — *Basiothia medea* (Sphingidae).

Pentas — *Tasema fulvithorax* (Zygaenidae) : *Basiothia medea, Hippotion eson* (Sphingidae) : *Heraclia superba* (Agaristidae).

Psychotria — *Mylantria xanthospila* (Lymantriidae) : *Pseudoclanis postica, Temnora livida, T. funebris, T. sardanus, T. marginata* (Sphingidae).

Randia — *Cartaletis libyssa* (Geometridae).

Rubia — *Macroglossum trochilus* (Sphingidae).

Rytignia — *Cracilodes nysa* (Geometridae).

Spermacoce — *Basiothia medea, Hippotion celerio* (Sphingidae).

Tricalysia — *Thliptoceras octoguttale* (Pyralidae).

Vangueria — *Cephonodes hylas* (Sphingidae) : *Petovia dichroaria* (Geometridae).

RUTACEAE

Calodendrum — *Papilio dardanus, P. phorcas, P. mackinnoni, P. lormieri, P. ophidicephalus, P. rex, P. constantinus, P. bromius, P. magda, P. teita, P. jacksoni, P. echerioides, P. homeyeri, P. cynorta, P. nireus, P. demodocus* (Papilionidae).

Citrus — *Papilio dardanus, P. phorcas, P. mackinnoni, P. lormieri, P. ophidicephalus, P. rex, P. constantinus, P. bromius, P. magda, P. teita, P. jacksoni, P. echerioides, P. homeyeri, P. cynorta, P. nireus, P. demondocus* (Papilionidae) : *Porthesia producta* (Lymantriidae) : *Nadiasa diplocyma* (Lasiocampidae) : *Epiphora albida,*

Imbrasia eblis (Saturniidae) : *Latoia viridissima* (Limacodidae) : *Salagena atridiscata* (Metarbelidae) : *Prasinocyma pupillata, Xenimpia erosa* (Geometridae).

Clausena — *Papilio dardanus, P. phorcas, P. mackinnoni, P. lormieri, P. ophidicephalus, P. rex, P. constantinus, P. bromius, P. magda, P. teita, P. jacksoni, P. echerioides, P. homeyeri, P. cynorta, P. nireus, P. demodocus* (Papilionidae) : *Prasinocyma pupillata* (Geometridae).

Fagara — *Papilio dardanus, P. phorcas, P. mackinnoni, P. lormieri, P. ophidicephalus, P. rex, P. constantinus, P. bromius, P. magda, P. teita, P. jacksoni, P. echerioides, P. homeyeri, P. cynorta, P. nireus, P. demodocus* (Papilionidae).

Teclea — *Papilio dardanus, P. phorcas, P. mackinnoni, P. lormieri, P. ophidicephalus, P. rex, P. constantinus, P. bromius, P. magda, P. teita, P. jacksoni. P. echeriocides, P. homeyeri, P. cynorta, P. nireus, P. demodocus* (Papilionidae) : *Leipoxais peraffinis* (Lasiocampidae).

Toddalia — *Papilio dardanus, P. phocas, P. mackinnoni, P. lormieri, P. ophidicephalus, P. rex, P. constantinus, P. bromius, P. magda, P. teita, P. jacksoni, P. echerioides, P. homeyeri, P. cynorta, P. nireus, P. demodocus* (Papilionidae) : *Palla ussheri* (Nymphalidae).

Vepris — *Papilio dardanus, P. nireus, P. demodocus* (Papilionidae).

SALICACEAE

Populus — *Phalanta phalantha* (Nymphalidae) : *Cerura marshalli* (Notodontidae) : *Eulophonotus myrmyleon* (Cossidae).

Salix — *Phalanta phalantha* (Nymphalidae).

SALVADORACEAE

Azima — *Nepheronia buqueti* (Pieridae).

Dobera — *Charaxes hansali* (Nymphalidae).

Salvadora — *Belenois zochalia, Colotis vesta, C. auxo, C. phissadia, C. calais, Nepheronia buqueti, Eronia cleodora, E. leda* (Pieridae) : *Charaxes hansali* (Nymphalidae).

SANTALACEAE

Osyris — *Mylothris chloris* (Pieridae) : *Charaxes tiridates, C. hansali* (Nymphalidae).

Thesium — *Eicochrysops messapus* (Lycaenidae).

SAPINDACEAE

Allophylus — *Charaxes varanes, C. fulvescens, C. acuminatus, C. brutus, Euphaedra neophron, E. medon, E. eleus, E. coprates, E. alternus, E. spatiosa, E. uganda* (Nymphalidae) : *Hypolycaena phillipus, Azanus mirza* (Lycaenidae) : *Eagris lucetia* (Hesperiidae) : *Dasychira albibasalis, D. daphne, D. gloveri* (Lymantriidae) : *Tagoropsis flavinata* (Saturniidae) : *Marcipa dimera* (Noctuidae).

Blighia — *Euphaedra spatiosa* (Nymphalidae) : *Andronymus caesar* (Hesperiidae) : *Aletis helcita* (Geometridae).

Cardiospermum — *Charaxes varanes* (Nymphalidae) : *Virachola antalus* (Lycaenidae) : *Dasychira lampropoda* (Lymantriidae).

Deinbollia — *Euxanthe trajanus, E. tiberius, E. eurinome, E. crossleyi, E. wakefieldi, Charaxes pollux, C. violetta, Euphaedra neophron, E. medon, E. eleus, E. coprates, E. alternus, E. spatiosa, E. uganda, Euryphura achlys* (Nymphalidae) : *Virachola dinomenes* (Lycaenidae) : *Andronymus caesar* (Hesperiidae) : *Nudaurelia zambesina, N. natalensis, Goodia kuntzei* (Saturniidae) : *Egybolis vaillantina* (Noctuidae).

Hippobromus — *Papilio demodocus* (Papilionidae).

Pappea — *Charaxes jahlusa* (Nymphalidae) : *Serrodes inara* (Noctuidae).

Paulinnia — *Euphaedra neophron, E. medon, E. eleus, E. coprates, E. alternus, E. spatiosa, E. uganda, E. fraudata, Neptis trigonophora, N. rogersi, N. nysiades* (Nymphalidae) : *Hippotion eson* (Sphingidae).

Phialodiscus — *Euxanthe trajanus, E. tiberius, E. eurinome, E. crossleyi, Charaxes brutus, C. bipunctatus, C. tiridates, Euphaedra neophron, E. medon, E. eleus, E. coprates, E. alternus, E. spatiosa* (Nymphalidae) : *Andronymus caesar* (Hesperiidae).

Sapindus — *Egybolis vaillantina* (Noctuidae).

Schmidelia — *Charaxes varanes* (Nymphalidae) : *Anthene definita, A. liodes* (Lycaenidae).

SAPOTACEAE

Achras — *Dasychira proleprota* (Lymantriidae).

Butyospermum — *Cirina forda* (Saturniidae).

Chrysophyllum — *Euryphura plautilla, E. achlys, Euryphene sophus, Pseudacraea boisduvalis, P. eurytus, P. lucretia* (Nymphalidae) : *Dasychira umbrensis, D. geoffreyi, D. carpenteri* (Lymantriidae) : *Nephele aequivalens* (Sphingidae).

Manilkara — *Pseudacraea boisduvali, P. eurytus, P. lucretius* (Nymphalidae) : Cirina forda (Saturniidae).

Mimusops — *Pseudacraea boisduvali, P. eurytus, P. lucretia* (Nymphalidae).

Pachystelia — *Pseudacraea lucretia* (Nymphalidae).

Syderoxylon — *Pseudacraea lucretia* (Nymphalidae) : *Euproctis fasciata, Dasychira proleprota* (Lymantriidae) : *Cirina forda* (Saturniidae) : *Latoia latistriga* Limacodidae) : *Eutelia mima, Achaea mercatoria* (Noctuidae).

SCROPHULARIACEAE

Antirrhinum — ? *Danaus chrysippus* (Danaidae) : *Precis orithya* (Nymphalidae) : *Celerio lineata* (Sphingidae) : *Phytometra ni* (Noctuidae) : *Antigastra catalaunalis* (Pyralidae).

Russellia — *Spilosoma investigatorum, S. lutescens* (Arctiidae).
Striga — *Precis orithya* (Nymphalidae).

SIMARUBACEAE

Balanites — *Bunaea alcinoe* (Saturniidae) : *Corcyra cephalonica* (Pyralidae).

SMILACACEAE

Smilax — *Dasychira batoides, Orgyia affinis* (Lymantriidae) : *Pseudometa castanea* (Lasiocampidae).

SOLANACEAE

Capsicum — *Virachola antalus* (Lycaenidae) : *Creatonotus leucanioides* (Arctiidae) : *Spodoptera exempta, Phlegetonia catephioides* (Noctuidae).
Cyphomandra — *Phytometra signata* (Noctuidae).
Datura — *Acherontia atropos* (Sphingidae) : *Ascotis reciprocaria* (Geometridae).
Lyceum — *Acherontia atropos* (Sphingidae).
Lycopersicum — *Coelonia mauritii* (Sphingidae) : *Spodoptera littoralis, Chloridea obsoleta, Phytometra acuta, P. ni* (Noctuidae).
Nicotiana — *Acraea eponina* (Acraeidae) : *Spilosoma investigatorum* (Arctiidae) : *Acherontia atropos, Coelonia mauritii* (Sphingidae) : *Euxoa longidentifera, Agrotis spinifera, A. segetum, Lycophotia muscosa, Polia inferior, Trachea consummata, Spodoptera littoralis, S. cilium, Athetis atriluna, Chloridea obsoleta, Phytometra acuta, P. limbirena, P. orichalcea, P. signata* (Noctuidae).
Petunia — *Scopula ochroleucaria* (Geometridae).
Physalis — *Acherontia atropos* (Sphingidae).
Solanum — ? *Anapheis aurota,* ? *Pontia helice* (Pieridae) : ? *Acraea acerata* (Acraeidae) : *Coeliades forestan* (Hesperiidae) : *Balacra testacea* (Syntomidae) : *Spilosoma aurantiaca, S. sulphurea, S. lutescens, S. atridorsia, S. jacksoni* (Arctiidae) : *Euproctis fasciata* (Lymantriidae) : *Acherontia atropos, Coelonia mauritii* (Sphingidae) : *Euxoa longidentifera, E. cymograpta, Eublemma admota, E. aurantiaca, E. chlorochroa, E. olivacea, Selepa docilis, Syngrapha circumflexa, Phytometra acuta, P. ni* (Noctuidae) : *Euzophera villora, Leucinodes orbonalis, Sceliodes laisalis* (Pyralidae).
Withania — *Acherontia airopos* (Sphingidae).

STERCULIACEAE

Cola — *Abantis paradisea* (Hesperiidae) : *Anomis simulatrix* (Noctuidae).
Dombeya — *Eagris nottoana, Netrobalane canopus* (Hesperiidae) : *Lophostethus demolini* (Sphingidae) : *Pardasena virgulana* (Noctuidae).
Hermannia — *Acraea eponina* (Acraeidae) : *Spialia diomus* (Hesperi-

idae) : *Earias biplaga* (Noctuidae) : *Comibaena leucospilata, Chloroclystis consobrina* (Geometridae).

Melhamia — *Spialia zebra, S. confusa, S. dromus* (Hesperiidae).

Sterculia — *Asterope boisduvali* (Nymphalidae) : *Cropera sudanica* (Lymantriidae) : *Earias biplaga* (Noctuidae).

Theobroma — *Mylothris yulei* (Pieridae) : *Spilosoma maculosa* (Arctiidae) : *Cropera sundanica* (Lymantriidae) : *Nudaurelia dione* (Saturniidae) : *Eulophonotus myrmyleon* (Cossidae).

Waltheria — *Spialia dromus* (Hesperiidae).

TACCACEAE

Tacca — *Spilosoma lutescens* (Arctiidae).

THEACEAE

Thea — *Acraea insignis* (Acraeidae) : *Niphadolepis alianta* (Limacodidae) : *Euzophera sagax* (Pyralidae).

TILIACEAE

Corchorus — *Bracharoa quadripunctata* (Lymantriidae) : *Neomoncena convergens* (Limacodidae) : *Anomis sabulifera* (Noctuidae).

Grewia — *Charaxes brutus, C. numenes, C. cithaeron, C. tiridates* (Nymphalidae) : *Tagiades flesus, Eagris sabadius, E. nottoana, Netrobalane canopus, Caprona pillaana* (Hesperiidae) : *Arniocera auriguttata* (Zygaenidae) : *Rhodogastria atrivena* (Arctiidae) : *Pteredoa monosticta* (Lymantriidae) : *Lophostethus demolini* (Sphingidae) : *Anaphe reticulata* (Thaumetopoeidae) : *Hoplitis excellens* (Notodontidae) : *Chasmina tibialis, Lophocrama phoenicochlora, Acripia chloropera, Anomis sabulifera, A. leonina* (Noctuidae) : *Neostege holoxutha* (Pyralidae).

Triumfetta — *Acraea excelsior, A. sotikensis, A. uvui, A. bonasia, A. cabira, A. eponina* (Acraeidae) : *Spialia confusa, S. diomus, S. dromus* (Hesperiidae) : *Anaphe infracta* (Thaumetopoeidae) : *Earias citrina, Anomis sabulifera* (Noctuidae).

TROPAEOLACEAE

Tropaeolum — *Crocidolomia binotalis* (Pyralidae).

TURNERACEAE

Wormskoldia — *Acraea caldarena, A. oncaea, A. natalica, A. anacreon* (Acraeidae).

TYPNACEAE

Typha — ? *Aterica galene* (Nymphalidae) : *Dasychira georgiana* (Lymantriidae) : *Ugiodes cinerea* (Noctuidae).

ULMACEAE

Celtis — *Charaxes cithaeron* (Nymphalidae) : *Libythea labdaca, L. laius* (Libytheidae) : *Anthene ligures* (Lycaenidae) : *Nudaurelia*

alopia, Lobobunaea jamesoni (Saturniidae) : *Pseudoclanis postica, Polyptychoides grayi* (Sphingidae) : *Eulophonotus myrmyleon* (Cossidae).

Chaetacme — *Charaxes, castor, C. cithaeron* (Nymphalidae) : *Pseudoclanis postica* (Sphingidae).

Trema — *Charaxes cithaeron* (Nymphalidae) : *Rhodogastria atrivenis* (Arctiidae) : *Agyrostagma niobe* (Lymantriidae) : *Nudaurelia walbergi, N. dione* (Saturniidae) : *Pseudoclanis postica* (Sphingidae).

Ulmus — *Orgyia mixta* (Lymantriidae).

UMBELLIFERAE

Bubon — *Papilio demodocus* (Papilionidae).

Daucus — *Rhodochrysea superbella* (Pyralidae).

Gummifera — *Papilio demodocus* (Papilionidae).

URTICACEAE

Australina — *Neptis saclava, N. kariakoffi, Atanartia schaenia, A. abyssinica, A. hippomene, A. delius* (Nymphalidae).

Boehmeria — *Acraea pentapolis, A. esebria, A. johnstoni* (Acraeidae) : *Vanessa cardui, Atanartia schaenia* (Nymphalidae).

Fleurya — *Achsaea orestia, A. esebria, A. johnstoni* (Acraeidae) : *Hypolimnas deceptor, H. dubia, H. usambara* (Nymphalidae).

Gariadina)
Laporta)
— *Vanessa cardui* (Nymphalidae).

Pilea — *Neptis saclava, N. kariakoffi,* (Nymphalidae).

Poulzolzia — *Acraea jodutta, A. lycoa, A. esebria, A. johnstoni* (Acraeidae) : *Atanartia schaenia, A. abyssinica, A. hippomene, A. delius* (Nymphalidae).

Urera — *Acraea oreas, A. peneleos, A. quirinalis, A. amicitiae, A. ansorgei, A. disjuncta, A. alcippoides, A. penelope* (Acraeidae) : *Hypolimnas antevorta, H. salmacis, H. monteironis, H. usambara, H. dubia, Salamis cacta* (Nymphalidae).

Urtica — *Vanessa cardui, Atanartia schaenia, A. abyssinica, A. hippomene, A. delius* (Nymphalidae) : *Phytometra ni* (Noctuidae).

VALERIANACEAE

Valeriana — *Celerio lineata* (Sphingidae).

VERBENACEAE

Clerodendrum — *Palla violinitens, Neptis strigata, N. poultoni* (Nymphalidae) : *Hypolycaena philippus* (Lycaenidae) : *Celama melanoscelis* (Arctiidae) : *Acherontia atropos, Coelonia mauritii, Praedora leucophaea* (Sphingidae) : *Zinara ploetzi* (Limacodidae).

Duranta — *Acherontia atropos, Coelonia mauritii* (Sphingidae) : *Glania cervina* (Psychidae) : *Nyblaea flavipicta* (Noctuidae) : *Antigastra catalaunalis* (Pyralidae).

Gmelina — *Olapa tavetensis, Dasychira gloveri* (Lymantriidae) : *Ctenolita anacompa, Baria elso* (Limacodidae).

Lantana — *Lepidochrysops peculiaris* (up to 3rd instar) (Lycaenidae) : *Spilosoma flava, S. lutescens* (Arctiidae) : *Euproctis fasciata, E. torrida, E. hargreavesi* (Lymantriidae) : *Acherontia atropos, Coelonia mauritii* (Sphingidae) : *Cetola pulchra, Spodoptera littoralis, Achaea lienardi, Hypena jussalis, H. strigata, H. ignotalis* (Noctuidae) : *Scopula bigeminata, Coenina aurivena, Nothobraxas commaculata* (Geometridae).

Verbena — *Acherontia atropos, Basiothia medea* (Sphingidae) : *Phytometra accentifera* (Noctuidae).

VIOLACEAE

Rinorea — *Acraea cerasa, A. cuirina, A. admatha* (Acraeidae) : *Cymothoetheobene, C. lurida, C. sangaris* (Nymphalidae).

Viola — *Issoria hanningtoni, I. excelsior* (Nymphalidae).

ZINZIBERACEAE

Aframomum — *Laelia lignicolor* (Lymantriidae) : *Mallocampa audea* (Lasiocampidae) : *Bunaea alcinoe, Goodia oxytela* (Saturniidae) : *Macrosenta longicauda* (Notodontidae) : *Stroteroides nigrisignata* (Limacodidae).

Amomum — *Xanthodisca vibius, Leona stoehri* (Hesperiidae) : *Diaphone eumela* (Noctuidae).

Elettaria — *Laelia bethuneana* (Lymantriidae) : *Mallocampa audea* (Lasiocampidae).

Zinziber — *Semalea arela, Caenides soritia* (Hesperiidae).

ZYGOPHILLACEAE

Tribulus — *Zizeeria knysna* (Lycaenidae).

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A.E.S. Conservation Group

1979 resolutions for those wanting to conserve our insect fauna :

1. Strengthen the cause of insect conservation by joining our Group (see Where to Write panel in this Bulletin).
2. If you are already on our list, please remember that no more Group Bulletins will be sent if you have not paid your subscription this year. Minimum subscription was 35p for A.E.S. members and 65p for other individuals and bodies. 1978 late payments welcome.
3. Join your local Naturalist Trust and help to ensure that insects receive the attention they merit in Wild Life Conservation.
4. Become our representative for your area. No specialised knowledge is necessary. Please write to D. Lonsdale for details.