LEPIDOPTERISTS' SOCIETY

OF SOUTHERN AFRICA

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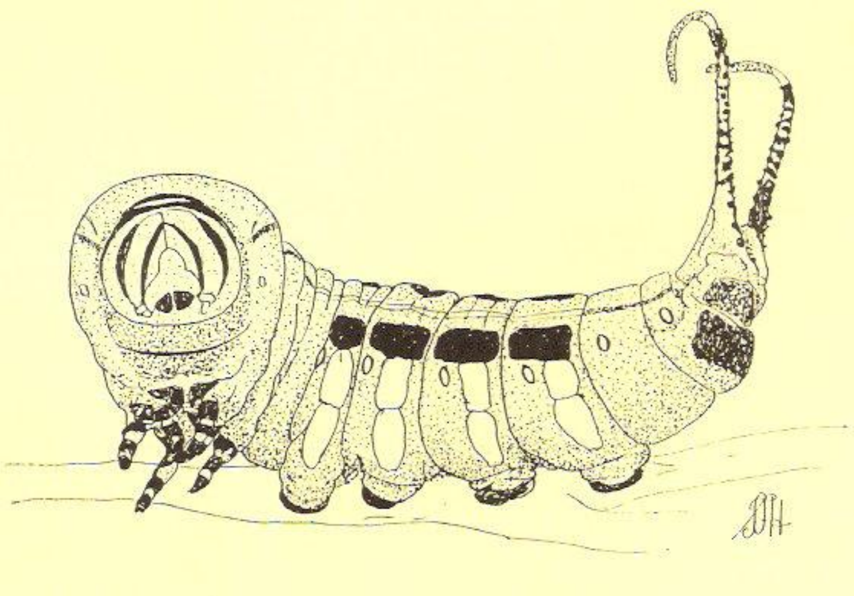
Editor : W.H. Henning



Puss moth, *Notocerura spiritalis* (Notodontidae), larva in alarm pose.

Type setting : D.M. Kroon

Editorial

Butterflies have finally made it! In the conservation world that is. The *South African Red Data Book – Butterflies* by S.F. & G.A. Henning, published in April 1989 was out of print by September 1989. Due to demand the F.D.R. (Foundation for Research and Development), a division of the C.S.I.R., is now reprinting it at Sasolburg. It is nice to see that insects are finally being considered biologically worthy of the attention of conservation bodies like those dedicated to the protecting of elephants and rhinos.

The Society itself is in the process of publishing a booklet entitled *How to collect and study Lepidoptera*. Over the years we have had numerous enquiries from new members and collectors on how to make a net, make setting boards, breed butterflies, make cabinets, photograph butterflies, trap moths and so on. We have finally got around to getting a group of experts to write this information up into a handbook which will be available to members and other interested parties in late 1990 or early 1991. Mr S. Woodhall is the coordinating editor of this work.

Since we appear to be on a literary theme let us have a look at some of the publications we will be likely to see in the near future.

First of all there is the long awaited revised second edition of *Pennington's Butterflies of Southern Africa*. This brings the first edition right up to date and should be published by mid-1991. Included for the first time **in colour** are Gowan Clark's life history plates on the Swallowtails and Whites. Several new species and subspecies are also described for the first time.

Also nearly completed is *Gardening with Butterflies in Southern Africa* by A.J.M. Claassens & S.F. Henning. Here the authors hope to answer the perennial question – 'What can I do to attract butterflies to my garden?' This book deals with 50 butterflies most likely to be encountered in a garden and what plants most suitable for a garden can be used by these species. It also deals in quite a lot of detail with the biology of butterflies in general. This includes chapters on migration, myrmecophily, courtship and mating, and breeding of butterflies in captivity. A must for the bookshelves of all butterfly enthusiasts and gardeners alike. It should be published some time in 1991.

Finally there is a five volume *magnum opus* entitled *Butterflies of Southern Africa* by G.A. Henning, S.F. Henning, J. Joannou & S. Woodhall. This work has a completely different slant to *Pennington's Butterflies of Southern Africa* mentioned earlier. Here the theme leans towards the biology and conservation of butterflies. The text is done in a similar manner to that of the *South African Red Data Book – Butterflies* with distribution maps for all species. There is a brief description of the butterfly – adult, egg, larva, pupa – followed by a section on habitat and habits (biology) of the species; then distribution and flight period; and finally a note on its conservation status. All species are to be illustrated by photographs of butterflies in the wild – adult, final instar larva, pupa and, if available, the egg. If photographs are not available the species is painted in a natural pose by S.F. Henning. This work will also include checklists of most of the major Nature Reserves in Southern Africa. The first volume will be published in late 1991 and will cover the families Hesperiidae, Pieridae and Papilionidae. After that there will be one volume published every year until it is completed. It is being produced in five volumes to keep the cost down and to make it available to as many people as possible. In this age of environmental awareness and the emphasis on conservation, this work may indicate the way we will be studying butterflies in the future.

Regional Roundup

Graham Henning

During the past couple of months the weather has generally been favourable and several trips have been undertaken.

Manoutsa Caravan Park on the Olifants River, below the Strydom Tunnel, was visited on several occasions by, at various times, John Joannou, Steve Woodhall, Chris Ficq and Graham Henning. A good number of the distinct female forms of *N. argia* from this region were obtained and eggs were collected by G. Henning. The foodplant was identified as a *Hippocratea* sp. (Celastraceae). When flowers or pods are available the species can be positively identified. An egg was also laid by a captive female and John Joannou has two healthy larvae on the go. *P. anacardii nebulosa* was found and several 'Old Gold' females were collected. No eggs were, however, laid by captive females. A perfect male *D. chrysippus* form *klugii* was also collected by G. Henning. Many other species were observed, and S. Woodhall collected a *B. ena* in a high trap at the Tunnel along with many *Charaxes*.

Waterpoort and the Saltpan were visited by Steve Woodhall, Bill Steele and Ryan Steele. No *C. celimene* were encountered and little of value was on the wing except a *H. misippus* female form *alcippoides*.

Zululand was visited on several occasions by Clive Quickelberge, Martin Lunderstedt and friends, Dave and Esme Edge, Steve Woodhall and Nolan Owen-Johnston. One *E. achlys* female was found at Manguzi by M. Lunderstedt but C. Quickelberge found a number earlier on along the Pongola River. *D. dinomenes* were scarce at both Manguzi and Makatini, although M. Lunderstedt saw a reasonable number at Makatini. D. Edge recorded worn specimens at Hluhluwe in early June. *E. neophron* were again in good numbers at Manguzi and one was even seen at the relatively dry Makatini locality. *N. thalassina, B. thysa* female f. *vansoni*, *D. doxo parva* and *D. spilleri* (below Ubomba) were the interesting whites. *A. acrita* was found at both Manguzi and Makatini. *L. hirundo* was common and a couple of *D. vansoni* were collected and a number of galls with larvae were also found.

Glenn O'Connor of Natal records a visit to Vryheid with his brother and caught 13 male and 5 female *G. hottentota*. They were collected in an area about 5m x 3m. "This was not near a marsh but on top of a hill. They were feeding on the flowers of Blackjack plants and flew erratically around and then landed on grass stalks. They were the commonest butterfly there. They were all caught on partly cloudy days in the middle of April." His brother later found female *C. alphaeus* and *S. wichgrafi* in May at Drakensberg Gardens.

Trying the Transvaal

Mike and Pat Schlosz

Trying, not really, although those heavy thunderstorms after midday, just when things start happening, can be.

At the beginning of February, 1990 my wife Pat and I spent two glorious weeks butterflying in the beautiful Northern and Eastern Transvaal. This was our first visit to the Transvaal and will long be remembered as an unforgettable experience.

Our first swing of the nets was on the way up, after an overnight stop at Parys in the O.F.S. Numbers of *Azanus* spp. were circling and feeding at flowering Acacias. *Castalius hintza hintza* and *Tarucus sybaris sybaris* were also plentiful.

Our trip took us as far north as the Saltpan in the Vivo district where both seasonal forms of *Charaxes zoolina* were out in some numbers. They could virtually be touched while feeding at banana applied to tree trunks. Without exception every specimen observed was missing a tail or two. *Charaxes jasius saturnus* was similarly observed, as were one or two other *Charaxes* spp., identification of which was not possible. Bushveld and grassveld species observed or captured in the area included: *Colotis vesta* f. *pluvius*, *Colotis agoye agoye, Colotis danae annae, Belenois aurota, Belenois creona severina, Axiocerses amanga, Axiocerses bambana, Acraea eponina manjaca, Acraea axina, Acraea rahira, Acraea natalica* f. *umbrata, Acraea* sp. similar to *A. natalica* but not the same as those illustrated in the current *Pennington's*, *Sarangesa phidyle, Lachnocnema durbani, Junonia oenone, Hypolimnas misippus* f. *dorippoides, Melanitis leda*.

Following this we took the Witvlag road, near Louis Trichardt and saw or captured *Acraea caldarena, Byblia ilithyia, Pinacopteryx eriphia* f. *eriphia*, numerous other grassveld species and saw flying, out of reach of a net a rather turquoise looking tailed *Graphium* sp. Stopping at the roadside in the Northern Transvaal was an absolute joy. Up to forty butterflies covering six or eight different species would be observed feeding at a flower patch. By comparison in the Cape the two most likely butterflies to be seen if any, would be *Pontia helice* and *Colias electo*. Unfortunately with few exceptions, butterflies in most areas visited were worn, indicating the end of a brood or season; this applied to all butterfly families.

After a few days in the far Northern Transvaal, we headed down through Duiwelskloof to Magoebaskloof. In the Buffelsberg area, near Duiwelskloof, hilltopping butterflies included *Euchrysops malathana malathana, Artitropa erinnys, Hamanumida daedalus, Iolaus trimeni, Charaxes jahlusa, Lepidochrysops plebeja plebeja, Lepidochrysops patricia, Graphium angolanus angolanus, Precis archesia, Acraea terpsichore neobule*, many different *Charaxes* spp., some so worn that when perched on the end of an Acacia branch they looked more like a piece of dry vegetation. Magoebaskloof was our base for the next few days and we spent most of our time in the Haenertsburg district, and a full day in Tzaneen, going from shop to shop and from one industrial area to the next in search of material for setting boards, as the ones we had were all occupied; we were eventually successful.

At Haenerstburg and Magoebaskloof butterfly species included: *Aloeides dryas, Phalanta phalantha aethiopica, Lachnocnema bibulus, Spindasis mozambica, Antanartia dimorphica, Acraea natalica, Cymothoe alcimeda alcimeda, Cymothoe alcimeda trimeni, Papilio ophidicephalus transvaalensis, Papilio dardanus cenea, Charaxes varanes, Acraea nohara nohara* and a single *Alaena margaritacea*.

We still hadn't reached the celebrated Eastern Transvaal, so on down to Graskop where we settled in for a few days. The weather unfortunately was not very kind to us, but over a period of days we were fortunate enough to see numerous *Charaxes* species chasing around the tree tops, including a very worn *Charaxes candiope, Tarucus bowkeri transvaalensis, Poecilmitis aethon, Eurema brigitta, Kedestes wallengrenii, Eicochrysops messapus mahallokoaena* – it's hard to believe that these beautiful, blushing little butterflies are the same species as nominate *messapus*, so common in the Cape – *Precis octavia sesamus*, and on the Long Tom Pass, *Pseudonympha swanepoeli*.

On down to the Barberton district for *Platylesches moritili*, *Colotis antevippe gavisa*, among others. In the Sheba Mine area, we were surprised to see *Antanartia schaenia* at the top of a 10 metre high tree (we watched it with binoculars) chasing off intruders or passersby; we always believed that these were ground level butterflies.

On our way home we found a small colony of *Lycaena clarki* near Springfontein in the Orange Free State.

Of interest to us as well throughout our trip was the variety of moths not found in the Cape, these included *Cyligramma latona, Phalera imitata, Sphingomorpha chlorea, Nothabraxas commaculata*, and a beautiful metallic gold *Trichoplusia orichalcea*.

The Transvaal has left its indelible mark on us and we are looking forward to further trips in the future, perhaps at another time of the year.

The development of 'false head' wing patterns and behaviour in Lycaenidae

Stephen Henning

Camouflage, mimicry, and other forms of deceptive appearances have presumably evolved under selective pressures from predators who hunt by sight. A fascinating example of deceptive coloration is the hypothesis that the underside wing pattern and behaviour of lycaenid butterflies (Lepidoptera: Lycaenidae) creates an impression of a head at the posterior end of the butterfly that diverts predator attacks towards the less vulnerable end of the insect.

This 'false head' hypothesis is discussed in books on protective coloration of animals (for example Wickler, 1968; Edmunds, 1974) and general works on butterflies (D'Abrera, 1971; Owen, 1971). However, the first comprehensive review of the subject was only published in 1980 by Robbins, who supplied a lot of important information omitted by these authors of these more popular books. Robbins (1980, 1981) discussed observations of predators attacking lycaenids and the putative behaviour of lycaenids to enhance the deceptiveness.

A number of biologists going as far back as Kirby & Spence (1818), Trimen (1887) and Poulton (1890, 1902) have independently noted that the tails and spot of colour at the anal angle of most lycaenid butterflies resemble antennae and eyespots respectively.

The impression of a head is further strengthened by other aspects of wing pattern and morphology:
1) The anal angle is frequently everted at right angles to the wings so that the 'head' has a three-dimensional appearance, particularly when viewed from above;
2) The tails are crossed so that they 'flicker' when the hindwings are moved in a sagittal plane, and are white-tipped so that they are more conspicuous than the stationary real antennae;
3) The wings of some species have conspicuous lines converging (and presumably leading a predator's eye) towards the anal angle (Fig. 1).

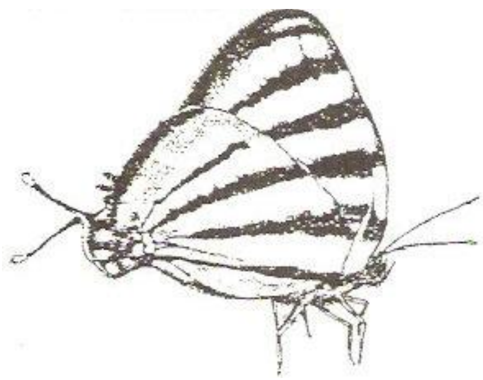


Fig. 1 – The "false head" butterfly, *Arawacus aetolus*. Note the tails (false antennae) and enlarged anal lobe with white highlights (false head) at the posterior end of the butterfly. The dark bands and wing outlines converge at the anal angle (after Robbins, 1981).

Although specimens illustrating the 'false head' hypothesis in popular books have all these characters, the number of such characters possessed by any one species varies considerably.

Several authors (Poulton, 1890; Bell, 1906; Sibree, 1915) stated that the anal angle of lycaenid hindwings should break off if grabbed by a predator, so an attacked butterfly can escape (a situation analagous to lizards which autotomize their tails when grabbed). Van Someren (1922) confirmed that the anal angle of lycaenids breaks off when a lizard grabs it, and that the butterfly escapes unharmed. Robbins (1980) points out that it is likely, therefore, that an enlarged or elongated anal angle area would be advantageous to the butterfly, and may be the adaptive significance of the angular hindwing shapes of many lycaenids, particularly 'hairstreaks' (Theclinae).

One proposed 'false head' behaviour of lycaenid butterflies is moving their hindwings alternately back and forth along the cephalic-caudal axis while resting. The function of hindwing movements is generally interpreted as attracting the attention of predators to the 'false head' (Trimen, 1887; Poulton, 1890; Salt, 1931). However, Robbins (1980) points out two problems with this interpretation. First, tailless species lacking conspicuous spots at the anal angle also move their hindwings. Poulton (1918) suggested that "the movement now observed in tailless lycaenids has persisted from some ancestral time when tails were present" and perhaps secondarily direct attention to patterns on the hindwing margins. However, as Robbins (1980) points out, it might be advantageous for a butterfly to draw a predator's attention to its hindwings whether or not the insect had a 'false head'.

Robbins' second problem of interpretation is that hindwing movements occur sporadically. Lycaenid butterflies have been observed occasionally moving their hindwings while walking, while ovipositing, and while apparently basking in the sun (see Robbins, 1980). Robbins believes that hindwing movements attract the attention of predators, but that it remains to be shown that their sporadic and seemingly unpredictable occurrence is advantageous.

A second behaviour which presumably enhances deceptiveness of lycaenid butterflies is landing head downwards. Observations of this behaviour have been contradictory, perhaps because few species land on vertical substrates, such as tree trunks, on which head position can be unequivocally recorded.

Robbins (1980) because of these contradictory reports did a study on Neotropical 'false head' lycaenids to determine the angle of inclination on landing. From his study he tentatively concluded that lycaenids which rest on vertical surfaces land head-downwards, lycaenids which rest on broad leaves land head-downwards 'on average', and lycaenids which rest on the scale-like foliage of some gymnosperms show no statistical preference for head-downwards or head-upwards.

Although lycaenids tend to land head-downwards, the advantage of this behaviour for butterflies with 'false head' wing patterns is obscure. Longstaff (1905, 1906) stated that the resemblance of a 'false head' to a real head would be more "striking if … Lycaenids … habitually rest with the head downwards", but stated no explicit reasons for this proposal. Longstaff (1908) reported proposals of Sidgwick that a butterfly which rests "head downwards is less conspicuous than one in the opposite position" and of Marshall that "the headdown position gives the insect a much better opportunity of launching into a rapid flight, and thus evading attack … ". Neither of these proposals, however, explains how landing head downwards would increase the resemblance of a 'false head' to a real head. Later authors (e.g. Wickler, 1968) suggested that most butterflies rest head-upwards, and as a result, predators would be likely to attack the posterior end of lycaenids which rest head-downwards. Robbins (1980) points out, however, that evidence indicates that most butterflies, like lycaenids, rest head-downwards (see Marshall, 1902 and Longstaff, 1908). Robbins himself had never seen any species which consistently rested head-upwards. A predator, then, would not 'expect' a lycaenid to be resting head-upwards, and landing head-downwards should probably be removed from the repertoire of presumed 'false head' behaviour.

A third behaviour which hypothetically enhances the deceptiveness of lycaenid butterflies is turning around immediately upon landing. Curio (1965) suggested that turning around upon landing might deceive a visually-hunting predator which saw the direction in which the butterfly landed. Robbins (1980) observed 231 landings of the neotropical lycaenid *Arawacus aetolus* to more accurately describe this behaviour. On 131 (58%) occasions, the individuals did not turn within 5 seconds of landing. He, however, found that individuals of other species, such as *Strymon basilides*, turn around less frequently (less than 10% of the times they land). He concludes that if turning around upon landing is deceptive, then the variance in frequency of this behaviour must be explained.

There are three proposed mechanisms by which a 'false head' at the posterior end of a lycaenid might provide protection from predators. First, Kirby & Spence (1818), Trimen (1887), and Bell (1906) suggested that 'false head' wing patterns alarm or menace potential predators. This hypothesis is probably not true for mantids (Burn, 1906), and is clearly not true for lizards (van Someren, 1922) which preferentially direct their attacks towards the 'false head' of lycaenids.

Second, Kirby & Spence (1818) and Poulton (1890) suggested that the apparent presence of two heads confuses potential predators. Once again, the directed attack of lizards towards the 'false head' falsifies this hypothesis, at least for the species van Someren observed. Robbins (1980) points out that there are some Neotropical species, however, which have an 'eyespot' at the base of the hindwings (near the thorax), as well as a 'false head' (e.g. *Rekoa meton*), and it is possible that such wing patterns confuse predators.

A third suggestion is that 'false head' patterns deflect predator attacks towards the less vulnerable posterior end of the butterfly. A number of authors (Poulton, 1902; Burn, 1906; Longstaff, 1906) considered lycaenid butterflies with the anal angle (or adjacent areas) of both hindwings broken off to be indirect evidence of a predator's unsuccessful attack directed at the 'false head'. Robbins (1980) points out that three lines of evidence support this proposal. First, van Someren (1922) confirmed that the unsuccessful attacks of lizards produce this kind of wing damage.

Second, Robbins (1980) marked individuals of *A. aetolus* using felt-tip markers, and monitored them under field conditions for several weeks to determine whether symmetrically missing pieces of hindwing can result from gradual wear. He found that hindwing margins gradually frayed with age, rather than breaking cleanly to produce symmetrical damage.

Third, Robbins confined six *A. aetolus* females in net bags (for an average of three days each) over plants with recurved spines on branches and both leaf surfaces (*Solanum lancaeifolium*) to determine whether sharp objects, such as thorns, might cause symmetric gaps in hindwing margins. He found that although wing margins of these specimens frayed rapidly, as is usually the case with butterflies confined by net bags, there was no symmetrical damage. Thus, he concluded that the rate at which lycaenid butterflies sustain symmetrical damage to their hindwings is a relative measure of the frequency of unsuccessful predator attacks.

How can one test whether 'false head' wing patterns deflect predator attacks? It has been suggested that you can compare the frequency of specimens with damage at their anal angle to the frequency of specimens with damage to other parts of the wings. If 'false head' wing patterns do deflect predator attacks, then the frequency of predator-inflicted damage should be greatest at the 'false head'. Such a comparison assumes that the wings of lycaenid butterflies will break off wherever grabbed. Robbins (1980) tested this hypothesis by measuring the force required to break different parts of a lycaenid wing using an artificial 'beak' apparatus. He found that the outer margins of both wings and the hindwings adjacent to the anal angle break the most easily, while the forewing costal vein and the area where all four wings overlap are the most resistant to breakage (more than four times stronger than the anal angle area). He said that these results are corroborated by the incidence of beak marks (impression of beaks on butterfly wing surfaces – not breakage) on lycaenid butterflies. Robbins states that the majority of beak-marked individuals which he had seen had been grabbed by all four wings or across the forewing costal vein. This result indicates that wings do not break when grabbed in these areas. Thus, Robbins concludes, the frequencies of predator-inflicted wing damage to different areas of the wings cannot be used to test the 'false head' hypothesis. However, these results also indicate that, in terms of probability of escape, it is most advantageous for the butterfly to be grabbed at its 'false head'.

A second way to test whether 'false head' wing patterns deflect predator attacks is to compare the predicted and observed deceptiveness of a wide range of lycaenid wing patterns. If 'false head' wing patterns do deflect predator attacks, then species possessing more of the proposed components of 'false head' wing patterns should have a higher frequency of predator-inflicted hindwing damage. To prove this hypothesis Robbins (1981) used two samples of lycaenid butterflies (Eumaeini). The first sample consisted of more than 1000 specimens of about 125 species from Colombia and the second of almost 400 specimens of about 75 species collected in Panama Province.

As a measure of predicted deceptiveness, Robbins scored specimens for the following components of false-head wing patterns: (1) the presence of two or more contrasting lines converging, and leading a predator's eye to the eyespot at the anal angle of the hindwings, (2) the occurrence of an anal angle of less than 65° as measured from the base of the hindwing to the anal lobe to the end of vein M_1, (3) the presence of anal angle coloration contrasting with the ground coloration, and (4) the presence of tails which presumably represent false antennae. Robbins then placed species with all four of the above characters in rank 1, those with three characters in rank 2, those with two characters in rank 3, and those with one or zero characters in rank 4.

Robbins (1981) considers species placed in rank 1 (Fig. 2) to be classic examples of false-head butterflies. Species in rank 2 typically are similar to rank 1 wing patterns, but have more rounded hindwings. Species in rank 3 (Fig. 3) usually have a tail and a coloured eyespot, but lack convergent lines and sharply tapered anal angles. Species in rank 4 typically have rounded hindwings that lack linear markings.

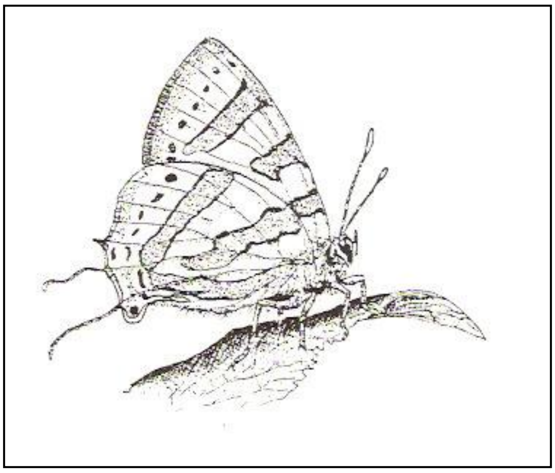


Fig. 2 *Iolaus (E.) diametra natalica* showing rank 1 characteristics

The behaviour of all the lycaenids in the different ranks is similar. First, species in all ranks move their hindwings alternately back and forth. Second, species of all ranks land on leaves or flowers, and not on the ground. Third, available data on time of activity and height above ground of activity show only minor differences in behaviour.

As a measure of deflected predator attacks, Robbins counted the number of specimens in each rank that showed evidence of an unsuccessful predator attack directed to the anal angle of a butterfly's hindwings. He scored as predator-damaged those specimens that were missing a symmetrical piece of hindwing or that had beak marks on their hindwings.

Robbins (1981) found from the comparison of the frequency of deflected predator attacks with rank of predicted deceptiveness for the Colombian sample (table 1, $x^2 = 38.3$, $P < .001$) confirms the prediction of the 'false head' hypothesis, and shows that predators attack various wing patterns differently. Results for the smaller Panamanian sample are nearly identical (Robbins, 1978). Species with classic false-head wing patterns (rank 1) are five times as likely to have sustained wing damage from a deflected predator attack than species with average false-head wing patterns (rank 3). Further, the small differences observed in life spans or times of activity could not account for the fivefold differences between ranks 1 and 3 (Robbins, 1981)

TABLE 1

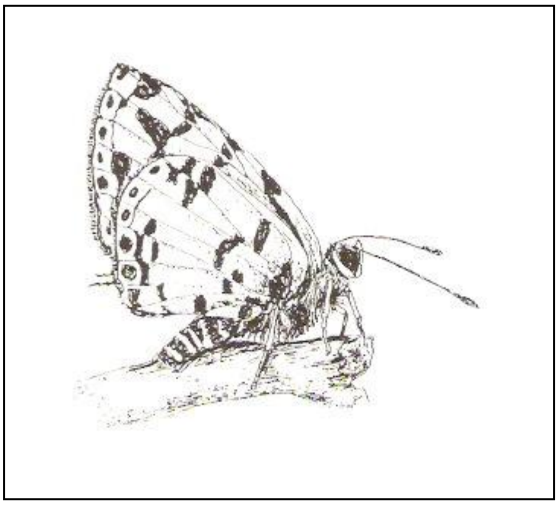
Number and percentage of specimens with symmetrical damage to the hindwings for ranks of predicted deceptiveness (after Robbins, 1981)

RANK	1	2	3	4
No. of specimens without damage	51	257	528	107
No. of specimens with damage	15	36	26	4
% of specimens with damage	22.7	12.3	4.7	3.6

A third, more direct way to test whether 'false head' wing patterns deflect attacks is to watch how predators attack lycaenid butterflies. Such systems are difficult, at best, to set up in the lab (e.g. Collenette, 1922), and there is only one report of predators attacking lycaenids under field conditions. Van Someren (1922) reported his observations of lizards attacking lycaenids. He found that lizards invariably attacked the posterior end of these insects, and did not attack when the real head of the butterfly was closest to the lizard. Further, van Someren reported that lizards were successful only if they grabbed part of the butterfly's body; otherwise they got a piece of hindwing, and the butterfly flew off. Thus, van Someren confirmed that the 'false head' of a lycaenid butterfly can deflect predator attacks to its posterior end, and as a result, the butterfly may escape unharmed.

One may ask if species with rank 1 wing patterns are more deceptive than species with other wing patterns, as the 'false head' hypothesis predicts, then why have not more lycaenid species evolved rank 1 wing patterns? Robbins (1981) says that one explanation is that genetic processes such as pleiotropy (Manley, 1978) or a lack of genetic variation over evolutionary time may have retarded changes in wing patterns. He observes that although this explanation may be valid for some species, evidence indicates that ventral wing patterns undergo evolutionary change frequently. For instance he states that rank 1 wing patterns evolved independently at least six times in the Neotropics and very closely related species may have significantly different wing patterns (e.g. *Panthiades battus*, rank 1; *P. bitias*, rank 3). In addition Robbins says that there are numerous other cases of convergent wing pattern evolution among Neotropical lycaenids.

Robbins' second explanation is that ecological factors are responsible for maintaining wing pattern variation among lycaenid butterflies. This situation could arise in several ways. First, contrasting black and white rank 1 wing patterns may be more conspicuous than other wing patterns to visually hunting predators, but more deceptive once the butterfly is detected. In this case, Robbins says the advantages of deceptiveness might be balanced by the disadvantages of conspicuousness. Second, wing patterns may be correlated with palatability. Although unpalatable butterflies are usually 'tough' in order to survive the attack of a naïve predator (Trimen, 1869), an unpalatable lycaenid would have an alternative strategy available to it. If such insects evolved conspicuous, but deceptive, wing patterns and sequestered some noxious compounds in their wings, as monarch butterflies do, (Bower & Glazier, 1975), then naïve predators would grab a piece of distasteful hindwing, not otherwise harm the butterfly, and learn to avoid that wing pattern (Robbins, 1981). Third, the aspect diversity hypothesis (Rand, 1967; Ricklefs & O'Rourke, 1975) and the anomaly hypothesis (Sargent, 1973) predict that a diversity of wing patterns decreases predator efficiency by confusing or surprising predators. Fourth, ventral wing patterns may result from selection by forces other than predation, such as thermoregulation and sexual selection (Robbins, 1981). Robbins points out that if the first three processes are important determinants of wing pattern variation, then it will be necessary to modify the 'false head' hypothesis as presently stated and to reformulate the mechanism by which predators exert selection on these butterflies. However, the data in Robbins's papers (1980, 1981) show that predators attack the various wing patterns differently. Thus Robbins concludes that predation influences the evolution of lycaenid wing pattern diversity irrespective of possible modifications to the 'false head' hypothesis.



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Collecting butterflies in Hong Kong

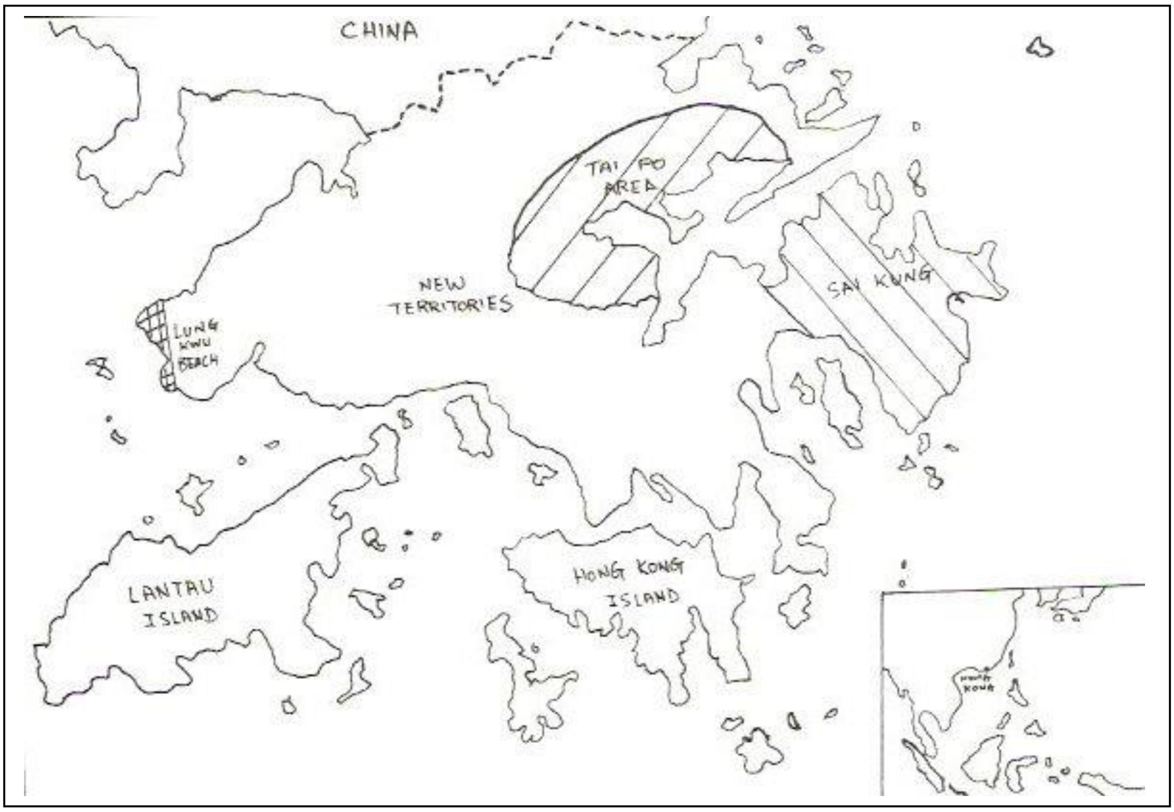
James Young

Hong Kong, a British Crown Colony is situated on the southern part of China. It has a population of six million people but covers only a mere 400 square miles.

The climate is sub-tropical with temperature ranging from 6°C to 34°C. Collecting can be done nearly throughout the year as the winter is generally very mild. One can always find some *Delias* flying around on a sunny day during the winter months.

Though Hong Kong is highly developed with commercial buildings and residential blocks everywhere, there are many country parks and scattered scrublands where collecting can be carried out. While there are always some woodlands around villages in the New Territories, these woodlands, so-called 'Fung Shiu Forests' are generally burial and worshipping grounds for local villagers and have been well preserved. These woodlands are ideal and provide good collecting sites for rarer species. A permit is always required for collecting in country parks and is rarely issued by the relevant department. However, the enforcement is lacking and park wardens can seldom be seen.

Collecting is usually carried out around Tai Po area, Sai Kung Peninsula in the New Territories and The Peak on the Hong Kong Island. There are also some classical sites where local collectors tend to go on the weekends and they include the Lung Kwu Beach in Castle Peak, Fung Yuen Village in Tai



Po and the Fanling Primary School. These areas are very secluded and certain rare species tend to colonise in these areas. Outlying islands are promising and contain some rare species.

There is no single species which one can say is endemic to Hong Kong as Hong Kong is just a tiny place off Mainland China. However, if we are to look at Hong Kong as a distinct location separate from the rest of China, new species can occasionally be collected, being strays from the Mainland. Some new species may even establish themselves in Hong Kong. Several species that are commonly found in Hong Kong nowadays are actually recent migrants from overseas and China. On the one hand, Hong Kong is connected to Mainland China and on the other, Hong Kong imports a lot of ornamental plants from overseas and which provides a good passage way to establish new records in Hong Kong. These plants may include certain species of citrus and palms.

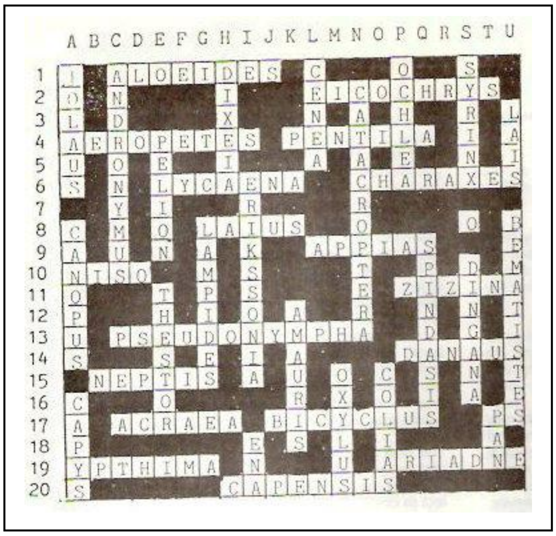
The best time for collecting appears to be in the Spring and Autumn seasons when fresh offspring start to appear. At the same time, the weather is not too hot to collect in comfort.

Overcollecting is never a problem in Hong Kong as far as conservation is concerned. There are only a handful of collectors in Hong Kong. One always believes that individual collecting can never deplete a species in question. It is the building of new towns and construction of new highways which destroy butterfly breeding areas. Collectors are concientious adults.

Crossword - *Metamorphosis* no. 25

John Joannou

Having been asked for a repeat performance by the Editor, it is perhaps only fair that I offer some explanations as to how the answers to the previous puzzle were derived. In the event of any errors/inaccuracies, I can only apologise and take refuge behind the shield of poetic licence! Construction of a crossword puzzle is not easy and takes up a lot of time, so while I enjoy producing them, it would also be nice to know how they are being received out there – some feedback would be appreciated!



ACROSS

1C (G) – Bitter March for Julius: Bitter = Aloe, March for Julius (Caesar) = ides.
2L/8S/17T (G) – Tiny bug with monstrous name: Longest trinomial I know of – *Eicochrysops messapus mahallokoaena*.
4A (G) – Start the plane for the boy's sake to catch this beauty: Start of plane = aero for Pete's sake. Common name = Mountain beauty.
4K (G) – Scrambled tape and nothing else can replace this yellow lycaenid: Scrambled = anagram, nothing = nil and else signifies further anagram.
6E (G) – The family is named after this one: The 7 letter spacing means that it could be *Papilio* or *Lycaena* and intersecting answers are required for further clues.
6N (G) – The cleaning lady uses the fireman's door breakers to get to this strong flier: Cleaning lady = Char, fireman's door breakers = axes.
8G (S) – Single subspecies represents the entire S.A. family: We only have one family which is represented by a single subspecies – *Libythea labdaca laius*.
9L (G) – This pierid likes doing things the Venetia (n) (s) way: Even I was uncomfortable with this one! Venetian Way = Appian Way, (n) (s) = substitute n with s.
10A (S) – Living in unison with this common skipper: In denotes hidden or included.
11P (G) – I replace Miss Gabor's A's with sodium to form this little blue: Miss Gabors' = Zaza, replace her a's with i's = Zizi, with sodium = Na.
13C (G) – False mythological maiden: False = Pseudo, mythological maiden = nymph. The additional a required is then obvious.
14P (G) – African king: King = monarch.
15B (G) – This black and white chap somehow is inept without me: Somehow = anagram of is inept, without me = lacking an i.
17C (G) – The heartless capital of Ghana is enough to expose this slow flier: Capital of Ghana = Accra, heartless = Acra (ea).

17J (G) – We follow a small two wheeler: We = us, follow means after, smaLL = shortened, two wheeler = bicycl(e).
19A (G) In my path I find a confused satyrid: Confused = anagram.
19O (S) – A rained out ant lover: Out = anagram.
20H (S) – Sips cane crudely: = anagram as well as an allusion to *Crudaria.*

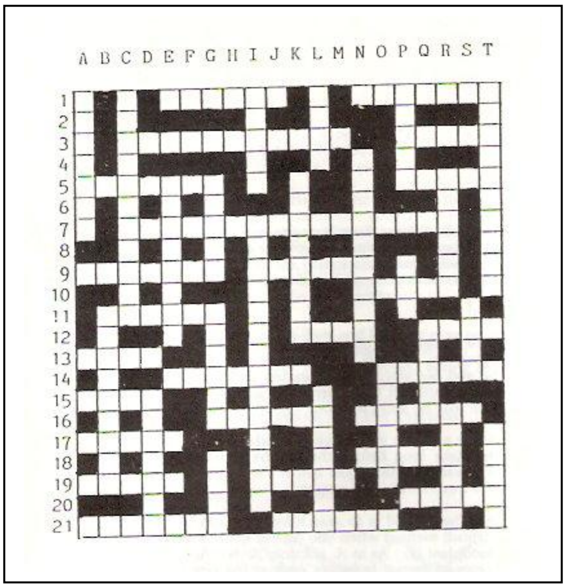
DOWN

A1 (G) – Symbolic gold in upturned soil reveals the saphires: Symbol for gold = Au, upturned = anagram, common name = saphires.
A8 (S) – This forest skipper can alter soup: Alter = anagram.
A16 (G) – Emblem eater: S A emblem = protea = foodplant.
C1 (G) – An old Italian leader flirts with this skipper: Old Italian leader = Caesar, flirts = philander.
E4 (S) – The Free State's only blue copper: *pelion* is the only blue *Poecilmitis* in this area.
E11 (G) – This drab lycaenid can be found in the story book: In = hidden.
G8 (G) – When palms die they become ubiquitous blues: Become = anagram.
H1 (G) – I aid ex converts to pierids: Converts = anagram.
16 (G) – This mocking lycaenid was discovered by a Viking's ancestor: Sorry! This one was obscure to say the least! Firstly it should read descendant not ancestor. Mocking = allusion to *acraeina*, Eriksson (ia) = Nordic connotations.
J18 (S) – Juggle a Scots negative for this brown: Juggle = anagram, Scots negative = nae.
K12 (G) – Nothing in French love is replaced by a well known model: Nothing = 0, replaced by A, French love = Amour.
L1 (S) – Swallowtail meets a serene end in Cape Town: End of serene = ene, vehicle registration for Cape Town = CA.
M15 (S) – Turn lousy X rated movies from blue to brown: Turn = anagram – again a bit confusing with the bit about the movies! Sometimes its difficult to make it fit!.
N2 (G) – Using rope on the waterfall provides a different way out for a pirate: Different way = synonym ie waterfall = cataract. Out = anagram, common name = pirate.
O15 (G) – Another social to introduce this fodder feeder: Another = anagram, fodder feeder = recognised lucerne pest.
P1 (S) – It's a danaid exclaims the Scot before spilling ale: Scots exclamation = och, spilling = anagram.
Q9 (G) – Different turns conceal gibberish said the Bard: Different turns = spins, gibberish = anagram, Bard = play on words – common name barred blue.
S1 (S) – The other Metisella twin: *Meninx* and *syrinx* the metisella twins. Intersecting answers required to determine which one.
S10 (G) – A follower of the Zulu king's slayer: A follows Dingan.
T17 (S) – This copper plays the pipes: The pipes of Pan.
U3 (S) – Set sail for this orange-tip: Set = anagram.
U8 (G) – Although poisonous, the new mate is best for this forest dweller: new = anagram.

Butterfly crossword puzzle

John Joannou

All answers are scientific names of butterflies. Spelling per Kroon & Vári's 'cross-referenced indices'. Numbers in first set of brackets indicate character length of answer and letters G, S or s in second set denote generic, specific or subspecific name. Answers in next *Metamorphosis*.



ACROSS
1E (6) (G) Zambian leader at home, half thanks the little blue.
1N (6) (S) Very short William in the Afrikaans news looking for an *Aloeides*.
3C (11) (G) Or Christy is different, or this isn't a copper.
3P (5) (S) This blue is the captain's immediate superior.
5A (7) (S) In the lead, my boy and I go looking for a *Charaxes*.
5P (5) (s) Vehicle in the Automobile Association is a red model.
7C (16) (G) Oyster butterfly.
9A (7) (S) This acraea is different on a seam.
9I (6) (S) Starterless vehicle out of control joins this white in the meadow.
10N (5) (S) Guru on a camel hides this *Sarangesa*.
11B (6) (S) Yank taxi leads Irish Republican Army to the reds.
12K (4) (S) I + 1 = *Colotis*.
12Q (4) (S) Commonest grizzley.

13A (4) (S) Ms Fitzgerald's bar.
14E (7) (S) Allen lives in Port Elizabeth with a unique blue.
14O (6) (S) Strange, heartless special Cape *Charaxes*.
15A (4) (S) In serene bays lies this skipper.
16G (6) (S) Say hydrochloric acid differntly and it becomes a bronze green beauty.
16N (6) (S) I leave old Mohammed boxing and search for browns.
17A (5) (S) Short tempered *Thestor*.
18N (5) (S) Using the heads of many impis, royal Zulus always discover this blue.
19A (5) (S) King John's Carta for this brown.
19I (5) (S) Headless hobo finds ladies underwear and locates a marbled skipper.
20P (5) (S) Mickey's best friend is a forest nymph.
21A (7) (S) Third grade donkey in a class with 16N.
21J (6) (S) German and Spanish affirmatives find us a cosmopolitan *Charaxes*.

<u>DOWN</u>
A1 (7) (S) Red or blue asks confused tailess Victor when he joins teetotallers.
B11 (9) (S) Dealer can trade in toxic butterflies.
C1 (11) (G) Change later Pancho or you won't find the leopard.
D15 (7) (S) This *Charaxes* is at home with u in a European mountain range.
E5 (8) (G) This forest lycaenid hides with Bob or on Ian.
G5 (5) (S) Before Los Angeles I go looking for a lover of coastal forests.
G11 (6) (S) Endless liar follows half the Mau-mau strangely enough and finds Rosa.
G18 (4) (s) Senorita with the coloured spectacles.
I1 (5) (S) Hidden by the cohort amongst the wild peaches.
I7 (14) (S) Strange hippos hid a clue which could expose this swallowtail.
K5 (8) (S) This pierid is a strange epitah for Lisle.
L1 (4) (S)The French female gender is a *Colotis*.
L15 (7) (S) Starry blues make strange satires.
N4 (10) (G) Red lycaenid named after an ancient Greek hero.
O14 (6) (G) Broken hasp is replaced by a Cape copper.
P1 (5) (S) Anacreon's allies reconstruct the atomic explosive device.
P9 (3) (s) This skipper is spelt differently to what one does on a door to attract attention.
Q12 (5) (S) Nothing in grain stores is replaced by a tailed blue.
R5 (6) (S) Anagram loses a hand to this scarlet chap.
R16 (6) (S) Seymour, an usher, hides coppers of the solar system.
S11 (4) (S) In between thank you little *Platylesches*.
T1 (10) (S) G I ashore in confusion looking for lycaenids.
T17 (5) (S) Learner in Vietnam's neighbour finds a rare blue.

Two female *Zophopetes dysmephila* fly in for supper

Mike and Pat Schlosz

I've heard numerous rumours over the years of how or who introduced *Zophopetes dysmephila* to the far western Cape. The stories are well worth listening to; some of them may even be true; it is a popular consensus, however, that our winters down here are far too severe for the butterfly to establish itself. I have heard fairly recently that it has lost a lot of its former ground in the Cape Town to Sea Point area, while I have always found it to be fairly prolific in the Claremont area of the Southern suburbs of Cape Town, being horrified at times while walking our dog to observe pupae and remains of final instar larvae hanging from palm leaves 'de-hemmed' by White Eyes.

On 18 and 23 March, 1990 while preparing supper, Pat shouted to me to bring a net. What she thought was a medum sized fast flying moth was trying to get into the soup. I dashed through, net in hand and captured, on both occasions, fresh female specimens of *Zophopetes dysmephila*. This was at approximately 6.30 p.m.

The fluorescent light in the kitchen must have attracted them. I'm pleased to report that the butterfly at least appears to be holding its own in some areas of Cape Town.

A reply to: The riddle of *Aphnaeus hutchinsonii*

Alan J. Gardiner

It was with interest that I read the article on *Aphnaeus hutchinsonii* in *Metamorphosis* **1** (24), the *Aphnaeus* being one of my favourite lycaenid groups. In 1978 I bred *A. erikssoni* undescribed ssp. from Bulawayo, on *Burkea* *africana* trees. The trees contained *Crematogaster* nests, the larvae in the later instars use the nests as predator avoidance 'hideouts'. A couple of years later, 1980, I found a few larvae of *A. orcas*. These were found feeding on a *Loranthus* sp. just outside Mufulira, Zambia (larvae were also found from the Mwinilunga district on the same Loranthus). With the aid of Alan Heath my first *A. orcas* was bred through. In captivity this species did not require the presence of *Crematogaster* ants.

Unfortunately my butterfly collecting ceased from 1981 to 1986, but having returned to Zimbabwe I have once again put a net to the hand. In 1987 I found *A. erikssonia mashunae* breeding on *Julbernardia globiflora* and *B. africana*. This same year Ian Mullin also bred *A. erikssonia mashunae* on *J. globiflora*. Ian has also seen *A. marshalli* ovipositing on *J. globiflora* while Rob Paré has observed females investigating *Brachystegia boehmii*.

It appears that firstly each species may have quite distinctive breeding habits and secondly each species may have a number of foodplants (the foodplants being fairly closely related, both *Burkea* and *Julbernardia* are in the Caesalpinoideae).

Two methods can be used for locating the foodplant of *Aphnaeus* (as with other butterflies):

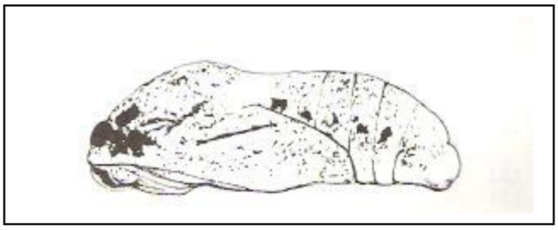
1) To watch females, if you have located a spot where females have been seen, the temptation of netting them must be halted. Swanepoel (1953, *Butterflies of South Africa, Where, when and how they fly*, Maskew Miller Limited, Cape Town pp 163-164) gives the following account for *A. hutchinsonii*: "You should see them hover in and out of the leafless thorn-tree branches, depositing their eggs here and there on the twigs and occasionally on mistletoe, on which the larvae also feed." and "The female that comes up there to lay her eggs usually arrives by 12 noon, when it is hot and sunny. She hovers in and out among the branches, deposits an egg, then flies to another tree where she repeats the performance. She may lay more than one egg on the same tree." Once a female in the laying mood has been seen, it does not take long before she will be observed ovipositing. Try walking around just below the peak, the area where the fresh female was caught.
2) The second is to search for eggs and larvae (a more difficult method when you do not know exactly what the foodplant is). As in *A. erikssoni*, *A. hutchinsonii* also appears to favour laying its eggs at the end of branchlets (but not always the case, they may also lay on the branches and the trunk). The eggs are fairly large and when empty quite easy to see. The full eggs are exceedingly difficult to locate, in the *Aphnaeus* I have bred they are dark grey and often laid on the edge or just under the bark.

Swanepoel also gives the following information on the breeding of *A. hutchinsonii* "… the twigs on which the young larvae feed, boring a tunnel into them and selecting larger branches as they grow bigger. The larvae generally pupate in the hollows of the thicker branches or in the trunk." There is another reference to the early stages of *A. hutchinsonii* (which unfortunately I do not have) by T.H.E. Jackson (1937, *Trans. R. ent. Soc. Lond.* **86**: 216,217).

The following summary for the known foodplants of *Aphnaeus* can be made:

1) *A. erikssonia mashunae* – *Julbernardia globiflora*; *Burkea africana*.
2) *A. erikssonia* undescribed ssp. – *Burkea africana*.
3) *A. hutchinsonii* – *Acacia* sp.; Mistletoe sp.
4) *A. orcas* – *Loranthus* sp.
5) *A. marshalli* – *Julbernardia globiflora*; *Brachystegia boehmii* (?).

I hope the above information is of use to you and helps to solve your riddle.



Aphnaeus orca pupa, lateral view (*Del.* Alan J. Gardiner

Getting to know moths – The goat moths

Stephen F. Henning

The goat moths (or carpenter moths) belong to the family Cossidae (Superfamily Cossoidea). They are medium to large moths with dull grey to brown spotted to mottled wings. The fore wings are generally long and narrow and the body is often massive. Like other wood-boring insects, the low nutritive value of ligneous food results in much variation in size of the adult moths.

These moths are nocturnal fliers and lay their eggs on the bark of trees, or in the tunnels from which they have emerged. The larvae are internal feeders, boring large galleries in the wood of forest, shade and fruit trees or in the pith of seeds, often causing serious damage. A few species make mobile homes like the Psychidae (bag-worms). Unlike some of the beetle borers, goat moths do not tunnel in cut timber, selecting only growing trees or shrubs. A few species are of economic importance in that they attack live timber trees, orchard trees or garden shrubs.

In Southern Africa there are two distinct subfamilies made up of several genera and about 60 species. They have been dealt with by Janse (1917), Seitz (1930) and Pinhey (1975).

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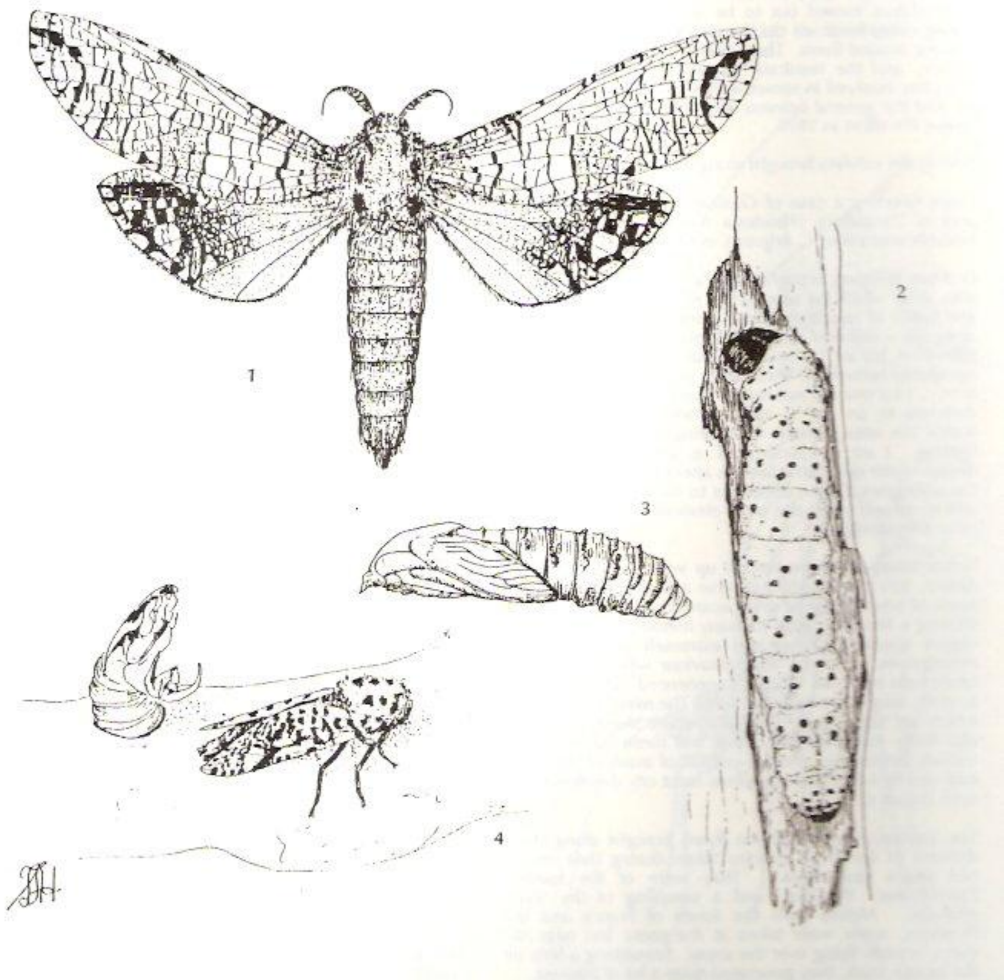


The goat moths (Cossidae). 1. *Xyleutes vosseleri*, female. 2. Cossid larva in tunnel in wood. 3. Typical cossid pupa. 4. Newly emerged *Azgophleps leopardina* adult, with pupa skin projecting from tunnel.

Exhibits at the annual general meeting of the Lepidopterists' Society 1989

Bill Steele

In order to offer even more interest to delegates at the AGM, it was decided to call for exhibits from the members. The response was pretty good considering it was our first attempt at putting on a small show, and in fact the only problem experienced was in finding enough room for everybody to put their various goodies down. The exhibits were called for only on the last day of the conference, so that that could be brought in and taken away on the same day. This policy was adopted in the light of the additional risk to the exhibits that an overnight stay would have meant.

The exhibits turned out to be a major attraction, and during every break on the Sunday, people could be seen flocking around them. There was something for everyone to see, and the resultant discussion and repartee got everyone involved in something. A good time was had by all, and the general opinion was that we should certainly repeat the effort in 1990.

Among the exhibits brought along were the following:

Denis Crocker: a case of *Charaxes* all taken in the Dett area of Zimbabwe (Rhodesia then) in the early 70's. Notable was a fine *C. fulgurata* in A1 condition.

Dr Mark Williams brought along a formicarium, complete with ants, which he uses in his research into life stages and habits of *Lepidochrysops*. Another was also brought along (of a different design) by John Joannou. Similarly, John uses his for his research into the life stages of ant associated butterflies. These were of great interest to a lot of us … I for one did not realise that red light is effectively darkness to an ant … offering one an opportunity to watch the ants without their being aware of unnatural lighting. I am sure several of us went off plotting the design of our own formicariums after that. I must say that the willingness of the exhibitors to discuss their displays, and to answer even the most elementary questions was most refreshing.

Nolan Owen-Johnston turned up with a drawer full of *Alaena*, *Iolaus*, and other diverse and unusual lycaenids some of which were of great scarcity, even undescribed, offering a first time view to many members of some very elusive species. Nolan was extremely helpful offering descriptions of habitat and behaviour which would certainly help both the 'not so experienced' and the fundis to study these species in the wild. The minute differences which are sometimes used to speciate these gems was also freely explained. I for one find these butterflies extremely interesting, and the pursuit of many of them can take you to wilderness paradises most city dwellers never even dream of.

The Steeles (myself and son Ryan) brought along three drawers of European species taken during their recent two year's visit there. They were of the families Papilionidae, Pieridae, and a sampling of the Nymphalidae. Mostly from the south of France and the Pyrenees, some were taken at the snow line near Andorra, actually flying over the snow. Something a little off the beaten track, they generated quite a lot of interest.

Dr Douglas Kroon brought along a very comprehensive moth exhibit which consisted of a display of moths covering the typical families (and including a few rarities, some of which you only ever see in pictures). To sate the appetites of even the most demanding, Dougie also had some light trapping equipment on show, including a trap simply constructed from easy to find oddments. He also had a Heath trap which collapses down to almost nothing, and yet is extremely effective. Dougie was regaled upon to detail collecting methods, and all those who listened went away with plenty of good ideas.

Cmdr Richard Stephens came along with a collection of South African Hawk Moths, and as I recall gave quite a few duplicate specimens away to other collectors.

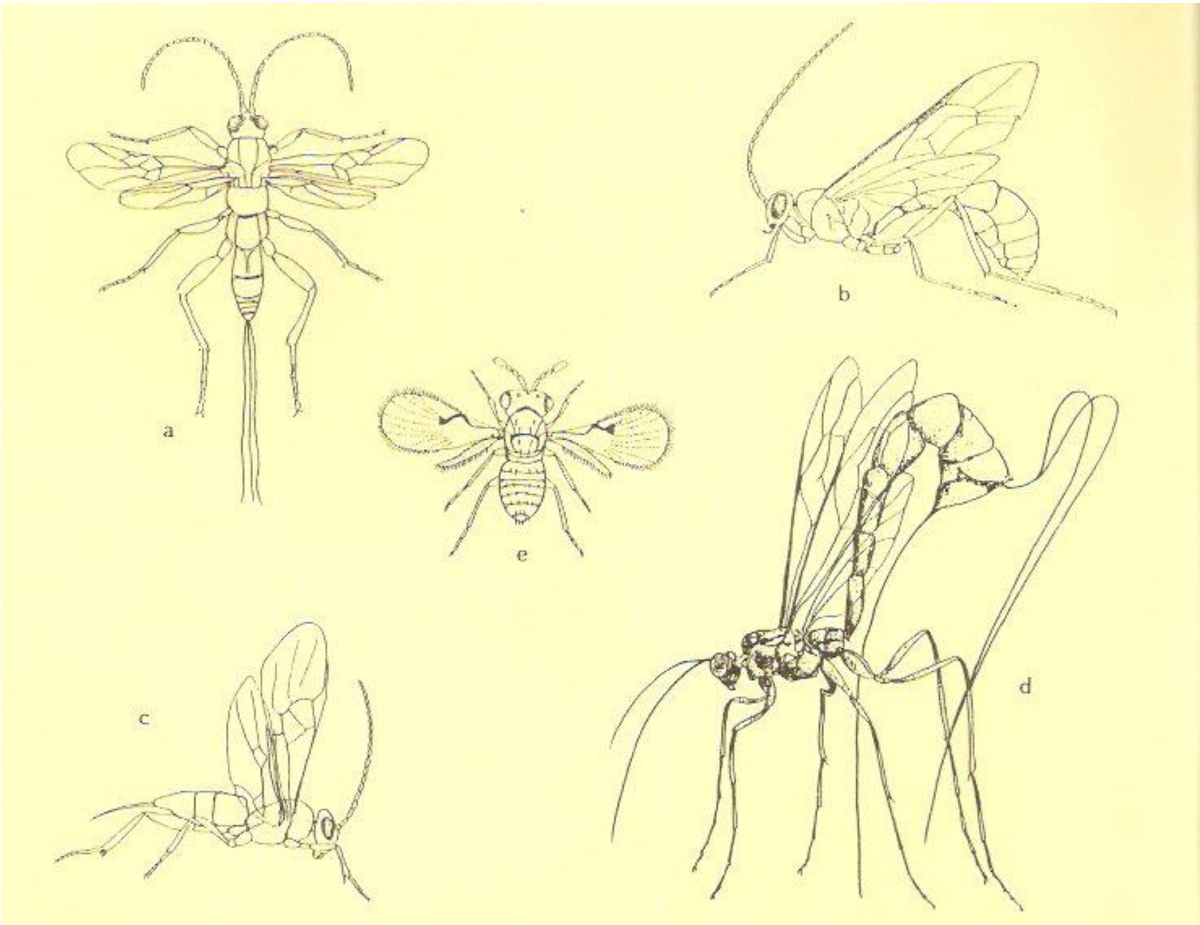
Steve Woodhall was having a 'lekker' day, and he had a very interesting collection of aberrations, and Manguzi forest rarities for all to see. I particularly remember a couple of fine 'radiata' aberrations of *Lepidochrysops patricia* … most of us would give our teeth for one of these, let alone two. Steve also brought along his photographic equipment for everyone to drool over … Steve was willing to explain his photographic techniques, and quite a few of us got some useful hints and tips.

Alf Curle had a most unusual gynandromorph on show, as I remember it was one of the black *Charaxes* (*ethalion*?). A most unusual specimen.

David Swanepoel had some of his fine handiwork on show in the form of a range of setting boards in carrying cases. They were on sale for a very reasonable price considering the amount of workmanship involved. Both Steve Woodhall and myself ordered a set … anyone making setting boards at home today should be able to sell all and more than he could ever produce. Personally, I would like to see far more members bringing along collecting equipment, apparatus, books, in fact anything either made specifically to sell to other members, or spare to their requirements. These days it is often hard if not impossible to source things for the lepidopterist … so, if you no longer need it, you know what to do.

All in all, everyone enjoyed the exhibits. Not only was it nice to see them, but they also generated plenty of opportunity to meet other lepidopterists, and to get an insight into the aims and the knowledge of fellow members. Beginner and fundi alike enjoyed our little show, and it added plenty of interest to an already exciting day.

Well, a year has almost gone by, the first reminders of the forthcoming AGM are already out, and its time to be booking for the next seminar. In view of the undeniable success of the exhibits at the last meeting, let's do it again! Bring along anything you may think is of interest … a drawer of specimens, some equipment, photographs, whatever … it doesn't matter so long as it is to do with lepidoptera. Don't forget, we only need the exhibits on the last day. Your exhibit doesn't have to be professionally presented either … there are plenty of us who are still very much in a learning stage. Beginner and expert alike,



Various parasitic wasps of Lepidoptera, a. *Orgilus sp.* female (Ichneumoidae); b. Ichneumonid sp. (Ichneumonidae); c. *Apantales* sp. female (Braconidae); d. Ichneumonid female ovipositing; e. *Trichogramma* sp. (Trichogrammatidae)
(from *Gardening with Butterflies* by A.J.M. Claassens & S.F. Henning)

it all makes for a good get together. We will supply steel tables and seating, but as before we will keep it informal. There's no need to book in or anything. Just bring it along, and put it on the table!

I look forward to seeing you there, as for me it's a toss up … shall I bring some more European butterflies, or maybe some specimens from Shyalongobou Forest, then there are British moths, or perhaps some African danaids … you'll just have to wait and see!

New Members

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