

METAMORPHOSIS

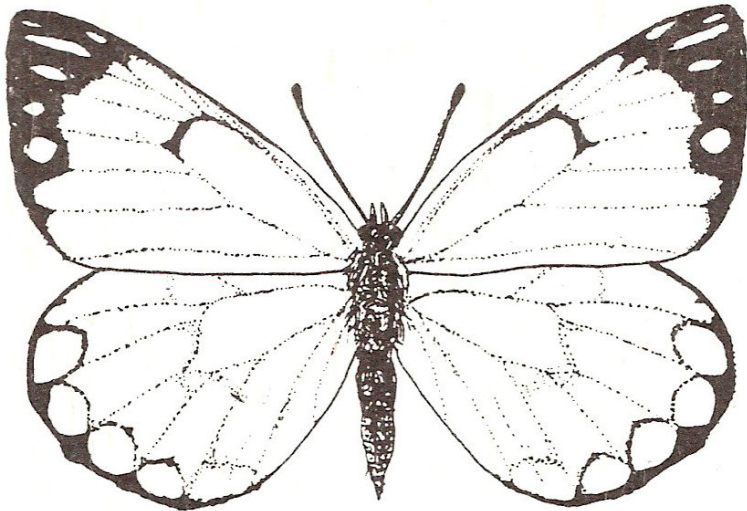


JOURNAL OF THE LEPIDOPTERISTS'
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Belenois (Anaphaeis) aurota (Pieridae) male
(Forewing length 24 – 30 mm)

LEPIDOPTERISTS' SOCIETY OF SOUTHERN AFRICA

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The **aims** of the Lepidopterists' Society of Southern Africa are to promote the scientific study and conservation of Lepidoptera in Southern Africa; and to promote the publication of original scientific papers as well as articles of a less technical nature in the journal, *Metamorphosis*, or other publications of the Society.

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EDITORIAL

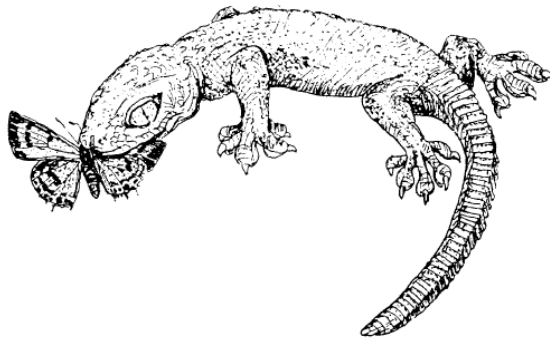
This issue of *Metamorphosis* is not as impressive as the September 1992 one mainly because we do not have sufficient funds to produce such a large edition every quarter. We do not want to increase the subscriptions too much if we can help it so the only other alternative is sponsorship. Perhaps you know of someone, or even a company, who would be prepared to sponsor *Metamorphosis* possibly to a tune of R50, R100 or more per issue. The sponsors could be listed on the back cover of each issue. Currently a print run of a normal 40 page *Metamorphosis* costs us about R2200. Postage comes to an additional R120 (local) and R400 overseas. From this you can see that we barely come out on our subscriptions each year.

Adding to the problem is that approximately 20% of members are late, or have forgotten altogether, to pay their subscriptions. We give our members a period of grace of two years, but it does add to the burden of the Society. If you no longer wish to belong to the Society please drop the Secretary a line so that we do not continue supplying you with a journal that you do not want and that costs the Society money. If you do have financial problems due to the current economic situation, let us know and we can make other arrangements.

I must again call for contributions. Remember this is your journal for you to record your observations and voice your opinions. If you do not like the papers published in the journal, it is up to you to do something about it, as we can only publish what is submitted to us.

A lot of our members, particularly those from overseas, are interested in starting up correspondence and possibly swapping the odd specimen. I feel if people take the trouble to write to you it is only good manners to reply, even if it is only to say you are not interested. Recently two of our overseas members, one from Spain and the other England, between them wrote 135 letters to local members, and received only one reply. I personally think it's disgraceful!

W.H. Henning



Gecko eating lycaenid butterfly *Anthene definita* female

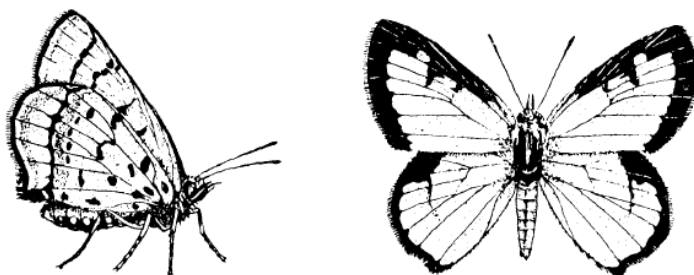
COMMENT BY THE PRESIDENT

One of the main concerns of the Society is to encourage conservation. The easiest way for most of us to get involved is to help the various conservation bodies with the checklisting of the lepidopteran fauna in nature reserves. This a lot of us have already done and provisional checklists are now available for a number of reserves in the Transvaal such as Suikerbosrand, Blyderivierspoort and Lapalala. Last month several members went to the Pilanesberg Nature Reserve to commence cataloguing of the species there. These are important exercises in that we are building up an idea of which species are already protected on the reserves. This will enable us eventually to build up a conservation priority list of the species not yet protected on reserves. Measures can then be motivated to get these species protected as well. A good example of this is *Erikssonia acraeina* Trimen whose habitat is now a National Heritage Site and is under scientific investigation by the Transvaal Nature Conservation Department.

However checklisting a nature reserve is not an easy task. The area has to be visited during every month of the year to ensure that all the species are picked up, even those with a limited flight period. Also huge areas of the parks must be covered to include every habitat type. It may take several years before a comprehensive list of species for a particular park is available. So you can see obtaining this information is difficult and time consuming and cannot be left just to one or two individuals. As a Society we all should get involved and spread the load among a number of people. Most of us are within an easy day trip of a Reserve. If you concentrated on your own local reserve we would soon build up knowledge about all the reserves in the country.

If you are interested in getting involved contact the authorities of the reserve or approach them through the Lepidopterists' Society. In addition, when weekend outings are organised to more remote reserves come along and join the fun as these trips always turn out to be great social occasions. So please get involved and help us conserve our butterflies.

Stephen Henning



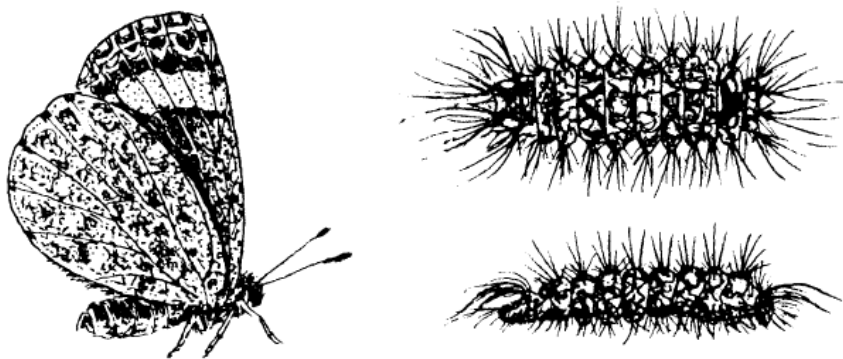
Erikssonia acraeina female underside (left), male upperside (right).

REGIONAL ROUNDUP

The new season began with but scant relief from the drought and even less economic relief. There are, however, those collectors who are undaunted by such setbacks and many trips have been made and even more planned.

September in the Cape often yields some interesting captures. Jon Ball collected a few *L. jamesi* Swanepoel from South west of Sutherland in the Tanqua Karoo and also on the Swaarweerberg near Sutherland. At present he knows of four localities for this brassy brown *Lepidochrysops*. Along with Alan Heath he also found *L. bacchus* Riley near Sutherland. He records very few *O. dicksoni* (Gabriel) at the Atlantis locality but found a few of the *Chrysoritis* sp. at Nieuwoudville. Alan Heath and Tony Brinkman went for *L. penningtoni* Dickson in Namaqualand but apparently only saw one. They did find *Poecilmitis dicksoni* Henning, *P. bamptoni* Dickson and *lindseyae* Henning near Wallekraal.

In the Transvaal *L. procerca* (Trimen) was found at Carletonville by Alf Curie, Nolan Owen-Johnston and Chris Ficq as well as at near Badplaas at Gladdespruit by Chris Ficq and Rudolf Swart. Further to the East at Barberton Nolan and Alf collected a couple of *L. jefferyi* (Swierstra) as well as the *Aloeides* sp. in fair numbers. In the eastern Transvaal *L. irvingi* (Swanepoel) was flying as well *L. ignota* (Trimen) and the *Orachrysops* sp. *B. phosphor* (Trimen) was searched for but not found. During late September there were lots of *I. (S.) bowkeri* Trimén, *I. (E.) alienus* Trimén and various *Spindasis* at Enoch's Walk, but no *I. (A.) pallene* (Wallengren) were seen. Paul Kruger from Pietersburg recorded numbers of female *A. tjoane* Wallengren flying around a small Acacia near his home. Upon investigation he found hundreds of eggs being laid. He has been watching them for several weeks now and has been out at night and seen the larvae climbing up from the foot of the tree along with their attending ants. A recent report is that all the green leaves have been consumed and Paul has resorted to bringing in daily supplies of branches from trees further afield and placing them around the base of the tree for the larvae to feed on. He reports that the larvae rather stupidly still climb the tree and go past the branches when they emerge at night and have to be herded back to the green leaves by the agitated ants. A very interesting observation. This is the first time I have heard of a Lepidopterist feeding larvae in their natural habitat!



Durbania amakosa male underside (left), final instar larva, top and side view (right).

Paul further records a migration of *B. aurota* (Fabricius) in early October. They were flying in a different direction to the usual North East, on this occasion they were flying North West. Similar observations have been made at various places through the Transvaal. I recorded them on the Witwatersrand at a rate of about 15 per minute over a 100 metre front. The migration did not last very long and peaked on about the 10th October (when the above rate was recorded).

Natal was visited in October by Chris Ficq, Dave Upshon, Ivan Bampton and John Joannou. John stayed at Wahooonga and collected *L. tantalus* (Trimen & Bowker) and an *Orachrysops* while the others went to Bulwer Mountain where they were rained upon. A couple of *Chrysoritis oreas* (Trimen) were found as well as *A. oreas* Tite & Dickson. Larvae of *D. amakosa* Trimmen were found beneath the overhanging rocks.

At the end of October Chris Ficq recorded a male and a female *L. lotana* at Ysterberg near Pietersburg. It is good to know that the species still exists there. Recent rains and lack of grazing by the owner, at the request of Johan Greyling, has brought forth a fine crop of *Becium* this year. One wonders just how long a *Lepidochrysops* larvae can live in the ants nest under adverse conditions?

Also at this time Alf and Neville Curle with Nolan visited the large mountain above Dirkiesdorp where they recorded some *Dingana* and *Aloeides*. Dave Upshon visited the nearby Wakkerstroom locality and found nothing of interest. The weather was cloudy at both localities.

The season is in full swing and we would like to record what is happening so please keep me informed.

Graham Henning



Chrysoritis oreas male underside

COLLECTING IN THE NORTHERN TRANSVAAL

By Johan Greyling

P.O. Box 199, Pietersburg 0700, South Africa

This has been an exceptionally dry year all over the southern part of Africa and the effect was also felt in the Northern Transvaal. Most butterflies were not as common and abundant as they normally are. In spite of this I have had a generally good year of collecting and a few memorable moments, collecting some beautiful butterflies.

From February to June, Harald Selb joined me almost every weekend in collecting. We were regularly accompanied by Simon Joubert. Together we searched the North as I had not yet done in my 22 years of collecting. We were on the road every weekend, visiting old famous spots, where all the great spirits of collecting waved their nets and new places where we were the first to do the exploring. Always we found something exciting.

This year the Soutpansberg was not what I expected it to be. At the Soutpan were only a few whites, but Harald still managed to collect a series of *Colotis amata calais* (Cramer). An exciting catch was *Lepidochrysope vansoni* (Swanepoel) in April. *Spindasis phanes* (Trimen) was not common but we saw at least two or three on each visit.

Waterpoort was very dry at the time of our visits - 1 March, 14 March, 19 April and 10 May. We could only find one *Colotis celimene amina* (Hewitson) during this time. Between Waterpoort and Masequa we spotted a good looking spot next to the road. An isolated thunderstorm must have occurred here because the grass was green and tall. Many whites, swallowtails and blues were flying here; it was similar to 1979 when the place was swarming with millions of butterflies.

We returned four times to Hanglip to collect *Dira swanepoeli* (van Son), but this was all in vain, seeing that they failed to emerge this year, as the particular spot was very dry on all visits. While searching intensively I stumbled on a dead monkey, with *Charaxes brutus natalensis* Staudinger, *Ch. varanes* (Cramer) and *Ch. candiope* feasting on the decaying animal. As usual *Celaenorrhinus mokeezi separata* (Strand) was common in Hanglip. There were also a large number of *Bicyclus safitza* (Hewitson) fluttering under the trees. These browns had recently emerged and blended well with the surroundings. Harald also had luck with *Charaxes xiphares bavenda* van Son, perfect specimens being attracted to his trapnet.

Punda Maria was devastatingly dry; we were scorched and almost dehydrated while looking for *Dixea doxo parva* Talbot. In 1982 there were large numbers of these small whites when I visited this locality with D.A. Swanepoel. This year we struggled to collect even as few as nine. Their habitat, just outside the Kruger National Park is almost destroyed by local peoples' small fields, as well as their feeding goats, since their foodplant is the only green vegetation around. This locality produced only one specimen. On a later visit we found the other specimens at the camp.

Buffelsberg, near Munnik, and the nearby Koedoe river valley was equally dry and dead this year. There was no sign of the usual visitors on the Buffelsberg. Bushveld *Charaxes*, such as *Ch. jasius saturnus* Butler, *Ch. achaemenes* C. & R. Felder and *Ch. jahluca rex* Henning were not common. *Abantis venosa* Trimen and *A. paradisea* (Butler) were also absent.

We found a large colony of *Aloeides dryas* Tite & Dickson near Woodbush. They are

common here, sitting on rocks and playing around Protea trees on the koppie. They were joined in their sporting by the most handsome *Capys alphaeus extentus* Quickelberge. D.A. Swanepoel comments the following on *C. alphaeus*: "If you watch them at play with their fellows you will see them whirl round and round among the boulders or over low plants, rising and falling, zig-zagging this way and that way, then spin round again like a miniature whirlwind. This sometimes goes on for hours on end with only short rests in between. It usually flies very rapidly from tree to tree, seldom rising higher than twelve feet above the ground." Watching *C. alphaeus* is indeed a captivating experience. On this occasion we were fortunate enough to net two females.

Although *Capys disjunctus* Trimen was previously noted in the near vicinity they were not observed in this particular spot, however *Junonia (Precis) octavia sesamus* (Trimen), *Aeropetes tulbaghia* (Linnaeus) and *Cupidopsis cissus* (Godart) were commonly found.

During February and March *Paraethe dendrophilus junodi* (van Son) was found abundantly in Woodbush. Most of the rainforest's butterflies were on the wing, although not as common as usual.

From the end of January to the end of May we caught large numbers of *Appias sabina phoebe* (Butler) in Malta forest. What an exciting butterfly to collect, especially the females! Later on they were also found in Woodbush. Harald Selb collected a female at Chuniespoort in March. Malta forest also produced numbers of *Azanius mirza* (Plotz) which is a rare butterfly in the north. To successfully locate this butterfly, one should visit one of the numerous kloofs of the Wolkberg mountains in the Eastern Transvaal.

There were many skippers, among which *Sarangesa motozi* (Wallengren) was common throughout the summer months. *Platylesches moritili* (Wallengren) and *P. neba* (Hewitson) were also found in large numbers. *Kedestes macomo* (Trimen) were also playing about the grass in the shade of trees. *Acraea acara* Hewitson and *A. admatha* Hewitson were gliding graciously with *Pseudacraea boisduvali trimenii* Butler over the tree tops.

Charaxes xiphares draconis Jordan was seen in numbers on a visit flying with *Ch. varanes*, *Ch. candiope* and *Ch. druceanus moerens* Jordan which are common in April in the forest of Marieps mountain. We also saw a number of the more exclusive *Ch. marieps* van Someren & Jackson, but these did not want to come to the traps like *Ch. druceanus moerens* and *Ch. xiphares draconis*. *Calleagris krooni* Vári was common although most were not at their best at these times. On the summit we found *Tarucus bowkeri transvaalensis* Quickelberge.

Harald Selb and I tried to breed *Ch. brutus natalensis*, *Ch. varanes*, *Ch. candiope* and *Ch. xiphares* but sadly failed. A worthwhile trip was a visit to Malta forest via the old Jan Smuts road and Orrie Baragwaneth pass. This road leads to magnificent scenery which reveals the fantastic peaks and displays an alluring uniqueness of shape and structure. Sudden encounters with "little" boulders and dongas in the tract for kilometres on end overwhelms the true size of the sheer drop of the cliff on the edge of the "road". Because of the poor condition (probably the worst south of Egypt) you should not try it without a 4 x 4 and even then it's a really nerve-racking experience. The organisers of the Roof of Africa event have not experienced this.

Chuniespoort was not in such a bad state this year. There were many whites like the beautiful *Colotis regina* (Trimen), *C. ione* (Godart), males and females and *C. celimene* were also collected. *Axiocerses tjoane* (Wallengren) was observed on every visit. At times we could

net about ten in one swipe of the net. Accompanying them was *Iolaus bowkeri tearei* Dickson. We had a memorable day collecting various specimens of *Iolaus silarus* Druce and *I. trimeni* Wallengren females. They were emerging from the bush to feed on Aloes next to the road. As soon as one was netted, another arrived to fill its place. There were many other species joining in the party. On one small flowering bush I observed the following all feeding at the same time: *Iolaus silarus*, *Spindasis natalensis* (Westwood), *S. ella* (Hewitson), *Virachola antalus* (Hopffer), *Anthene contrastata mashuna* (Stevenson), *Eronia cleodora* Hübner and *Colotis regina*.

During this period from January till May we collected every weekend and sometimes even on Wednesday afternoons. The weather was excellent and not a single day was overcast or windblown.

I pray for rain this coming season, but in spite of the dry year, I have had a pleasant time. Many thanks to Harald Selb and Simon Joubert for joining me and making it worthwhile.



Charaxes marieps male underside

SYSTEMATIC NOTES ON THE CYMOTHOE ALCIMEDA GROUP
(PART 4)

By A.H.B. Rydon

3 Roeheath, N. Chailey, E. Sussex, BN8 4HR, United Kingdom

(continued from *Metamorphosis* 3(1): 14, March 1992)

I ended Part 3 of this paper with a question as to whether *Cymothoe alcimeda trimeni*, based on Paul Kruger's observations during two migrations of a number of species of butterflies at East London on 25th March and 2nd April 1981 (*Metamorphosis*, Vol. 2(2): 8-9), was capable of migrating south-westwards as well as north-eastwards, since Kruger says that on the 26th March the butterflies were migrating in the opposite direction to their original direction, that is from a north-easterly direction to a south-westerly one. He does not say whether he saw *trimeni* reversing its direction of flight, but assuming that it may occasionally do so accounts for a *trimeni*-like male that was sent to me by Dr Pinhey, late of the National Museum, Bulawayo, in September 1968, together with specimens of *C. alcimeda clarki* and *C. alcimeda rhodesiae*, as I said on pp. 14-15 of Part 2 of this paper in *Metamorphosis*, Vol. 2(4). It is possible that this *trimeni*-like male (see figs 27, 28) may have been sent to Capt. R.H.R. Stevenson by Dr Hesse of the South African Museum when the former was working on his description of *C. alcimeda rhodesiae* for his paper on new South African butterflies in *Occ. Pap. Rhod. Mus.* 1(3): 12, 1934, as he compares *rhodesiae* with a specimen of a "variety" of *alcimeda* sent to him by Hesse which was "distinctly lighter and less heavily marked" than *rhodesiae* and which had been taken at Caledon, Cape Province. Though Stevenson says the Caledon specimen he had received from Hesse was "very much damaged", the specimen figured by me in this paper (figs 27, 28) may have been sent to Stevenson later by Hesse. Its label says: *C. alcimeda* ♂, Oudebosch, Rivier Zonderend, Caledon, C.P., leg. S.A. Museum. It was determined as *C. alcimeda alcimeda* by Stevenson! This specimen, with other Bulawayo material, I returned to Dr Pinhey early in 1973, so, presumably, it is still in the National Museum. When I visited the South African Museum in March 1970, I noticed there was an unset male specimen of nominate *alcimeda* from Oudebosch, Caledon, which had been collected by Rodney Wood. So, is one to believe the label that says a specimen of *trimeni* was caught at Caledon by the South African Museum, or not? If one does believe it, then it proves that *trimeni* occasionally migrates to the Cape, but apparently does not establish itself there, nor does it intermix with nominate *alcimeda* there, thus indicating, if anything, that *alcimeda* and *trimeni* are distinct species.

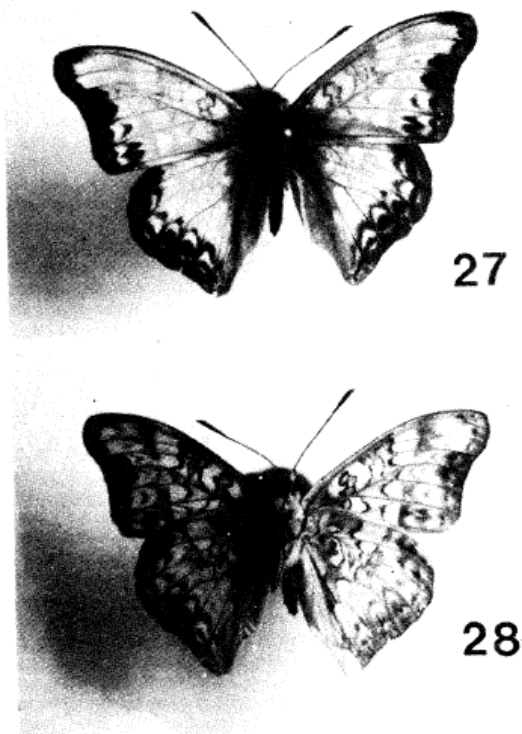
The late Charles Dickson, with whom I had corresponded for twenty-two years, was quite certain that *trimeni* and *alcimeda* were distinct species, and this view was confirmed when he had a look at the *alcimeda* (s.l.) material in the South African Museum in May 1969, by courtesy of Dr A.J. Hesse. As I have already indicated in Part 1 and 2 of this paper, even within nominate *alcimeda* (quite apart from *trimeni*) there are several distinct populations, three of which I mentioned on p.12 of Part 1 (*Metamorphosis*, 2(1)), namely one from Oudebosch (in the western Cape), one from the Knysna area, and one from Grootrivierpas (east of Knysna). However, I failed to mention the possibility of yet another population at Grootvadersbosch, near Swellendam, from where Dickson sent me photos of a female caught on 19.xi.1967 by C.W. Wykeham, which has a wider light median band in the hindwing

upperside than in the other females of nominate *alcimeda* that I have seen, and a ferruginous ground colour on its underside rather than the greyish of *alcimeda* from Oudebosch. More material is obviously required from Grootvadersbosch (which I visited with Dickson and Danie Rossouw on 4th April 1970, but failed to get any *alcimeda*, though *Charaxes xiphares* f. *occidentalis* van Son was on the wing, and *Aeropetes tulbaghia* (Linnaeus) was coming readily to banana-baited traps). Though "splitters" may wish to break up the *alcimeda* group into nominate *alcimeda* and its "races", *trimeni* and its "races", and raise *rhodesiae* to species rank (all of which would be justified on the various grounds given in this paper), *alcimeda* itself represents a compact group within the genus *Cymothoe* (which comprises more than 70 species) and should therefore be retained as such in order to keep its identity within that omnibus genus, namely as a subgroup of Aurivillius's *caenis* group in Seitz, 13: 152.

On page 20 of *Metamorphosis*, 2:4, I suggested that the female forms of nominate *alcimeda* and *trimeni* gain some protection in the field by resembling *Neptis* species, *Junonia* species and *Eurytela* species wherever they fly together. Van Someren & Jackson refer to this kind of mimicry as "simple" or "primitive" in their paper entitled "Some Comments on Protective Resemblance amongst African Lepidoptera (Rhopalocera)" in the *J. Lepid. Soc.*, 13(3): 121-150 (1959), and they give several ways it works among *edible* butterflies (in an East African context mainly, but which applies to South Africa equally). I also mentioned that the males of *alcimeda* and *trimeni* were protected by the movement of the common white Pierine *Dixeia charina* (Boisduval) over the tree-tops and in the woods where the males like to battle with one another for much of the day. At Port St. Johns, in April 1970, *trimeni* was flying with *Cymothoe coranus* Grose-Smith, the males even sharing the same under storey trees at the edge of the forests, except that *C. coranus*, though a much larger insect than *trimeni*, would in the end be chased away by being constantly dive-bombed by the smaller but more aggressive *trimeni* males. Whether the presence of the larger *coranus* male, with its creamy upperside, has had some evolutionary effect on the equally creamy *trimeni* is a moot point, but the superficial similarity of the two taxa is remarkable. They cannot, however, be mistaken in the field, as the males and females of *C. coranus* are much larger than *trimeni* and fly with a more noticeable droop of the wings, as do many of the larger species of *Cymothoe* in the equatorial forests to the north. Unfortunately, neither *trimeni* nor *coranus* would come to my banana-baited *Charaxes* traps, so I had to catch them "the hard way", i.e. with the net. I noticed the odd *alcimeda* male flying in the direction of an abandoned guava plantation, so it may have been attracted by the fallen fruit, as were numerous *Charaxes* which, in their turn, were attracting the attention of a large number of Drongos (*Dicrurus adsimilis*) which are very partial to large *Charaxes*! The light colouring of the males of *trimeni* allow them to travel across open country away from the protection of forests because they are protected by looking like some of the common white Pierines on the wing, and therefore can take part in migrations, as Kruger noted at East London in 1981, without too much risk from avian predators. However, the more distinctive females are unlikely to enjoy this kind of immunity from predation unless they also join a migration of similar-looking *Precis* or *Junonia* species, which are known to migrate occasionally. *Neptis* species are not known to migrate, so the white-banded female forms of *trimeni* cannot safely do so. I observed male *C. trimeni clarki* flying boldly in the open high up by the edge of a mountainside forest on 19th April 1970 where I had stopped to do some collecting with Barton-Eckett on my way to Stutterheim from

Alice, which indicates that *trimeni* males can travel across country alone if necessary. The late Ken Pennington also informed me, when I called at "Yellow-woods", Balgowan, on the 26th April 1970, that males of *trimeni* from nearby Karkloof forest often came to flowers in his garden. I am uncertain whether he included the females which are more forest-bound.

To be continued



Figs 27-28. Upperside and underside of a *trimeni*-like male of *C. alcimeda* with the following data on its labels: *C. alcimeda* ♂, Oudebosch, Rivier Zonderend, Caledon, C.P., leg. S.A. Museum; determined as "*C. alcimeda alcimeda*" by Capt. Stevenson; in the National Museum, Bulawayo, Zimbabwe.

COMPARATIVE MORPHOLOGY AND SYSTEMATICS ON THE FEMALE INTERNAL GENITALIA OF THE PIERIDAE (LEPIDOPTERA)

II. Genus *Pieris* and other genera of Pierinae

By Seon Woo CHEONG and Chang Eon LEE*

Department of Biology, College of Natural Sciences, Kyungpook National University, Taegu 702-701, Korea

*Present address: department of Biology, College of Natural Sciences, Changwon National University, Changwon Kyung-Nam 641-773, Korea

Abstract. The macro and microstructures of bursa copulatrix of twenty-three species of Pierinae were compared and systematically discussed. All 14 species of Pierinae which were studied in this paper had prominent appendix bursae. Among these species of Pierinae, the appendix bursa of *Aporia crataegi* was biggest in size, while the ductus bursa of *Hebomoia glaucippe* was longest length. The shapes of the signa on corpus bursae were also observed. Generally the signa of *Pieris* were plate-like, horizontal to the bursae, and symmetrical. However, signa were folded, vertical to the bursae and asymmetrical in many other genera. Generally, folded signa are located on the cervical parts of corpus bursae, but in genus *Appias* and in some species such as *Aporia crataegi*, *Anaphaeis aurota*, *Metaporis agathon*, *Tatochila autodice* and *Hebomoia glaucippe*, folded signa were located on the dorsal parts. Moreover, the signum of *Cepora nadina* was cervical but plate-like. The shape of signum was variable according to the species and is considered as an important character in the classification of Pierinae. In addition, the fine structure of the innersurface processes of corpus bursae were compared. The processes of *Pieris* were not sharp but triangular and varied between different species. The processes in other genera exhibited unique patterns respectively.

Introduction

The subfamily Pierinae consists of 12 genera and some 142 species. The first of these, the genus *Pieris*, contains about 30 species. Most of them are distributed in the Palearctic region, and some are migratory. The wings of the females are usually darker than those of the males. The genus *Aporia* has twelve or more species and is found in the Palearctic region. *Ascia* consists of six or more American species, and *Tatochila* has about twelve Neotropical species. The genus *Synclon* contains only the one species *S. callidice* from the Palearctic. *Anaphaeis* has several species and *A. aurota* is an Afrotropical species. The genus *Theochila* from Brazil has been poorly studied but shows many similar features to the Pierinae. Thus, we also decided to investigate the relationship of this genus to the Pierinae. *Metaporis* which consists of six or more species from the Indochina region. *Cepora* is a genus of thirty or more species from the Indo-Australian region. *Hebomoia* consists of two or more species and *Appias* contains forty or more African and Indo-Australian species (Smart, 1978). Among the above species, four species of *Pieris* and two species of *Aporia* have been reported from the Korean Peninsula [Soek, 1973; Lee, 1982].

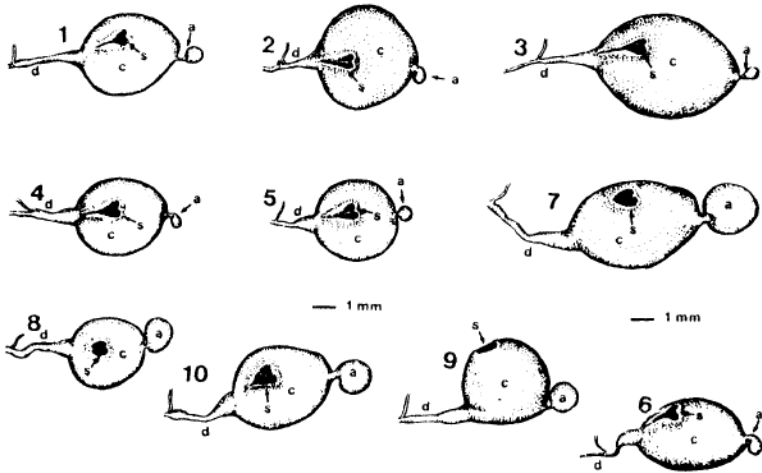


Fig. 1. 1-6. Bursa copulatrix of the Pierinae

1: *P. verginensis*; 2: *P. bryoniae*; 3: *P. melete*; 4: *P. manni*; 5: *P. ergane*; 6: *P. napi*;
 * d: ductus bursa c: corpus bursa a: appendix bursa s: signum

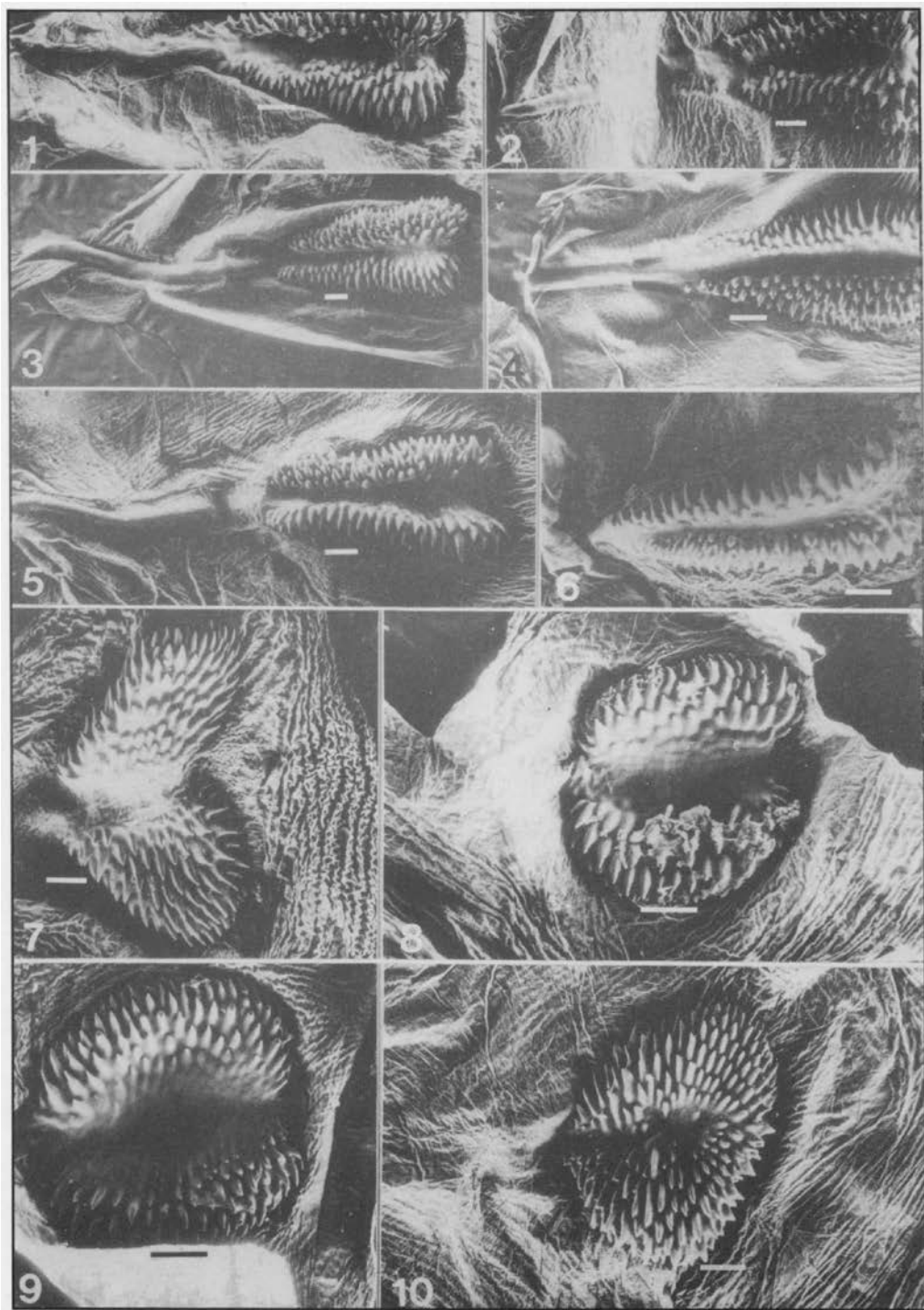
In the classification of the Papilionoidea many morphological characters, especially the shapes of genitalia are used. Morphological and ecological studies have performed by Yata (1979) and Eitschberger (1986) on *Pieris*. On other species of Pierinae, only a few papers have been published, but there was no comment on the significance of the bursa copulatrix in classification (Shirozu, 1952; Hancock, 1985). In fact there are few reports on them Cheong *et al* (1988, 1990). The internal genitalia of an insect is an important character among many characters for insect classification. Since the shape the organ is distinct to taxa, the evolutionary trend of the organ can be considered as a kind of criterion on one taxa.

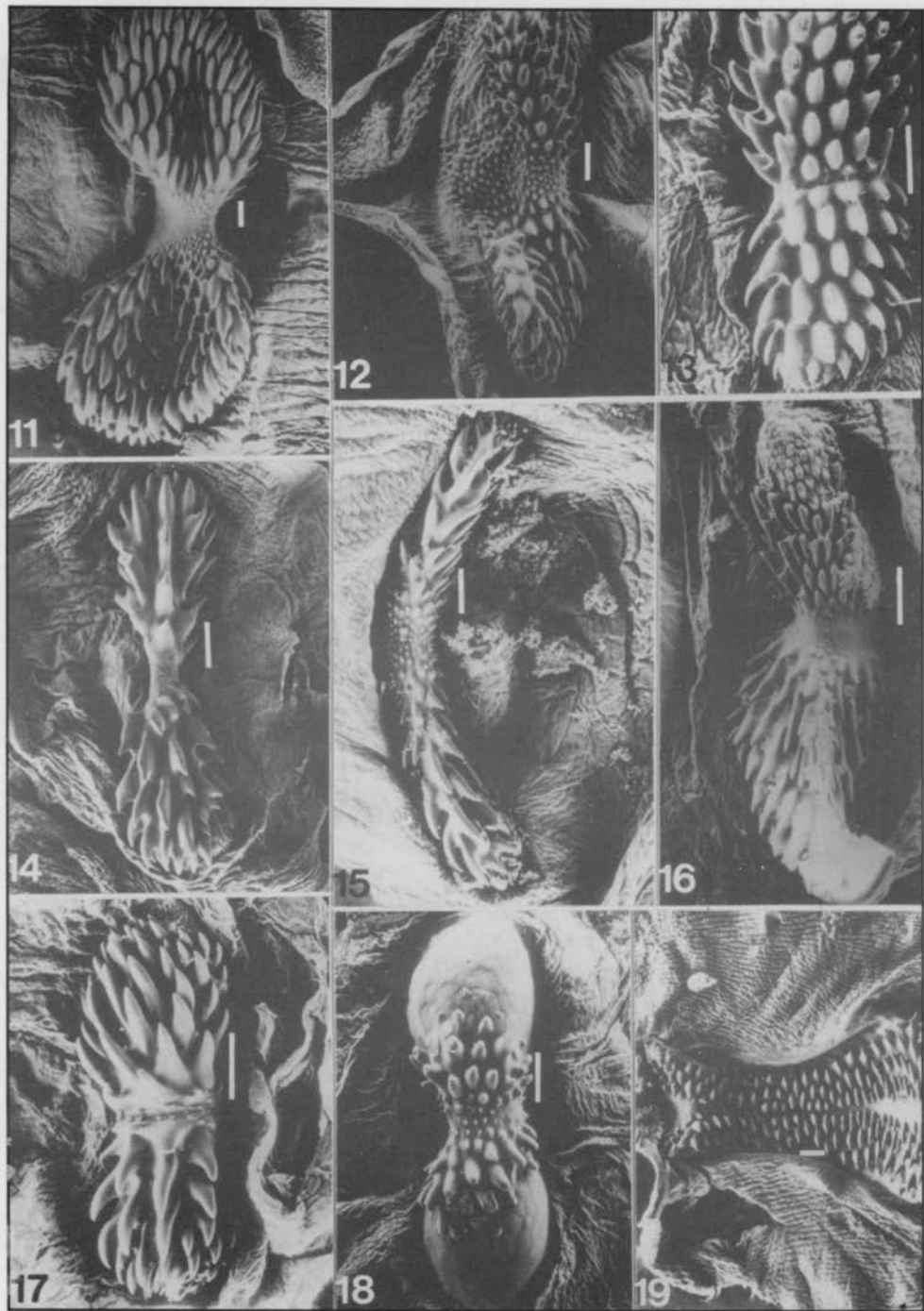
In this study, we attempted to clarify the macro and microstructures of the bursa copulatrix (a part of the female internal genitalia used for the temporary storage of sperm) in twenty-three species of Pierinae. The unique shape of each part was compared between different species and genera.

Fig. 2. 1-10. Signa of the Pierinae. (opposite)

1: *P. verginensis*; 2: *P. bryoniae*; 3: *P. melete*; 4: *P. manni*; 5: *P. ergane*; 6: *P. napi*;
 7: *P. brassicae*; 8: *P. rapae*; 9: *P. canidia*; 10: *P. krueperi*.

* scales: 100 µm





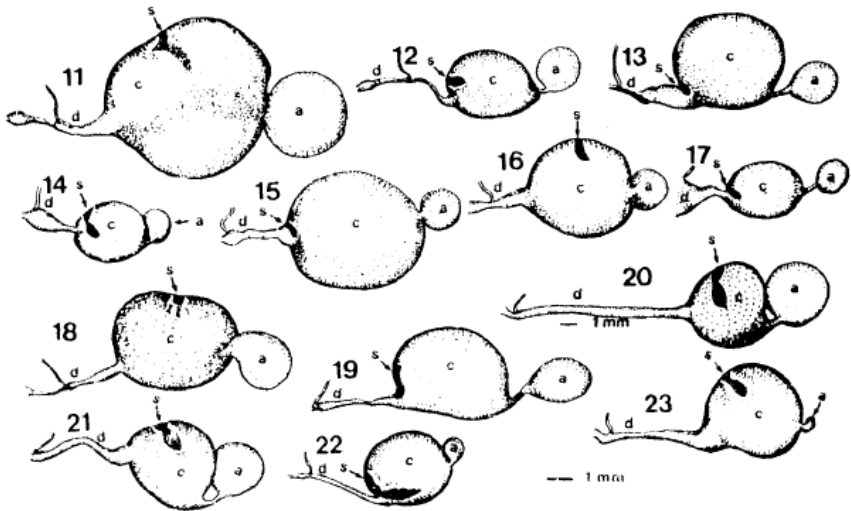


Fig. 1. 7-23. Bursa copulatrix of the Pierinae

7: *P. brassicae*; 8: *P. rapae*; 9: *P. canidida*; 10: *P. krueperi*; 11: *A. crataegi*; 12: *A. hippia*; 13: *A. munuste*; 14: *T. autodice*; 15: *S. callidice*; 16: *A. aurota*; 17: *T. maenacte*; 18: *M. agathon*; 19: *C. nadina*; 20: *H. glaucippe*; 21: *A. lagela*; 22: *A. drusila*; 23: *A. albina*.

* d: ductus bursa c: corpus bursa a: appendix bursa s: signum

The efficiency of each part in the role it plays and the evolutionary trend of the organ were also considered. Lastly, the value of the characters of the bursa copulatrix on the systematics of Pierinae was considered, and the systematic position of the species in each genus and in the subfamily were discussed on the basis of the bursa copulatrix.

Fig. 2. 11-19. Signa of the Pierinae (opposite)

11: *A. crataegi*; 12: *A. hippia*; 13: *A. monuste*; 14: *T. autodice*; 15: *S. callidice*; 16: *A. aurota*; 17: *T. maenacte*; 18: *M. agathon*; 19: *C. nadina*.

* scales: 100 μ m

Materials and methods

Twenty-three species were investigated during this study. Dried specimens were collected by exchange and only one species was obtained in some genera. Ten species of *Pieris* from many countries in Europe and Asia, and three species of *Appias* from Taiwan, India, Brazil and the United States of America were collected. Two species of *Aporia* were obtained from Japan and some countries in Europe. *Tatochila autodice* and *Theochila maenacte* were collected from Brazil. *Hebomoia glaucipe* and *Cepora nadina* of Taiwan, *Ascia monuste* of the U.S.A., *Anaphaeis aurota* of Saudi-Arabia and *Metaporis agathon* of Indonesia were also collected. For each species, abdomens from at least five or more females were boiled in 10% KOH, and were dissected in saline solution. Bursae copulatrix were observed under a stereoscopic microscope. The corpus bursae were separated from the bursae copulatrix and turned inside out for the observation of the fine structures of the innersurfaces. They were then dehydrated in a graded ethanol series. The samples were coated with 200A gold ion, and examined with ISI-SS 130SEM.

Results

The bursa copulatrix of Pierinae consists of the ductus bursa, the corpus bursa and the appendix bursa. The ductus seminalis was diverged on the ductus bursa and connected to the vestibulum. In the general shape of *Pieris*, corpus bursae were oval or spherical, cervix bursae were general and appendix bursae were small. Signa were located at the dorsal parts of the corpus bursae and were heart-shaped. Signa had long median sclerites. In *Aporia*, corpus bursae were oval or spherical, and appendix bursae were developed. Signa were dorsal and nearly cervical. They were ribbon-like with middle constrictions. In *Appias*, corpus bursae were spherical, ductus bursae were thick and cervix bursae were developed, and sizes of appendix bursae varied with species. The positions of the Signa were also variable. Innersurface processes were relatively big and were spindle-shaped. The specific morphology of the bursae copulatrix are as follows.

Pieris verginensis (Figs. 1-1, 2-1, 3-1)

The corpus bursa oval, the appendix bursa weakly developed, the mean length of the ductus bursa 3.0 mm. The heart-shaped signum is dorsally situated, the median sclerite elongated. Innersurface folds weakly developed, with weak spine-shaped innersurface processes.

Pieris bryoniae (Figs. 1-2, 2-2, 3-2)

The corpus bursa spherical, the appendix bursa weakly developed, the mean length of the ductus bursa 2.3 mm. The heart-shaped signum is dorsally situated, the median sclerite elongated. Innersurface folds weakly developed, with spine-shaped innersurface processes.

Pieris melete (Figs. 1-3, 2-3, 3-3)

The corpus bursa oval, the appendix bursa weakly developed, the mean length of the ductus bursa 3.0 mm. The long heart-shaped signum is dorsally situated, the median sclerite elongated. Innersurface folds developed, with weak spine-shaped innersurface processes.

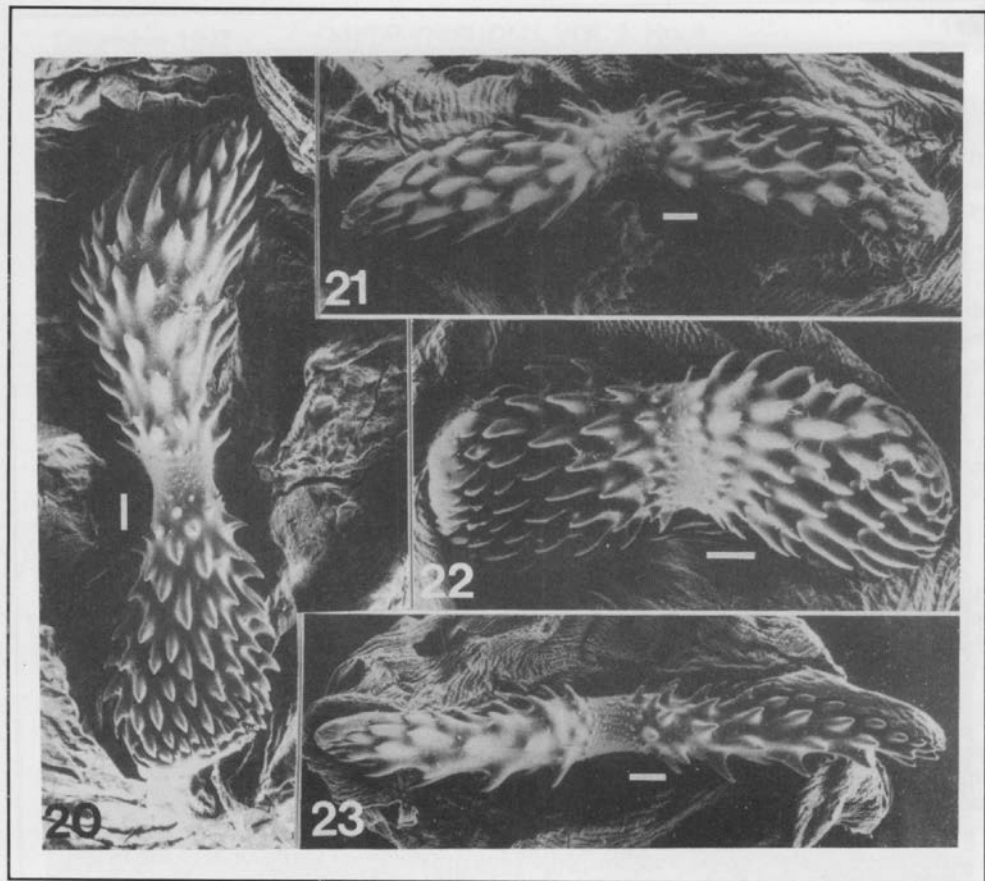
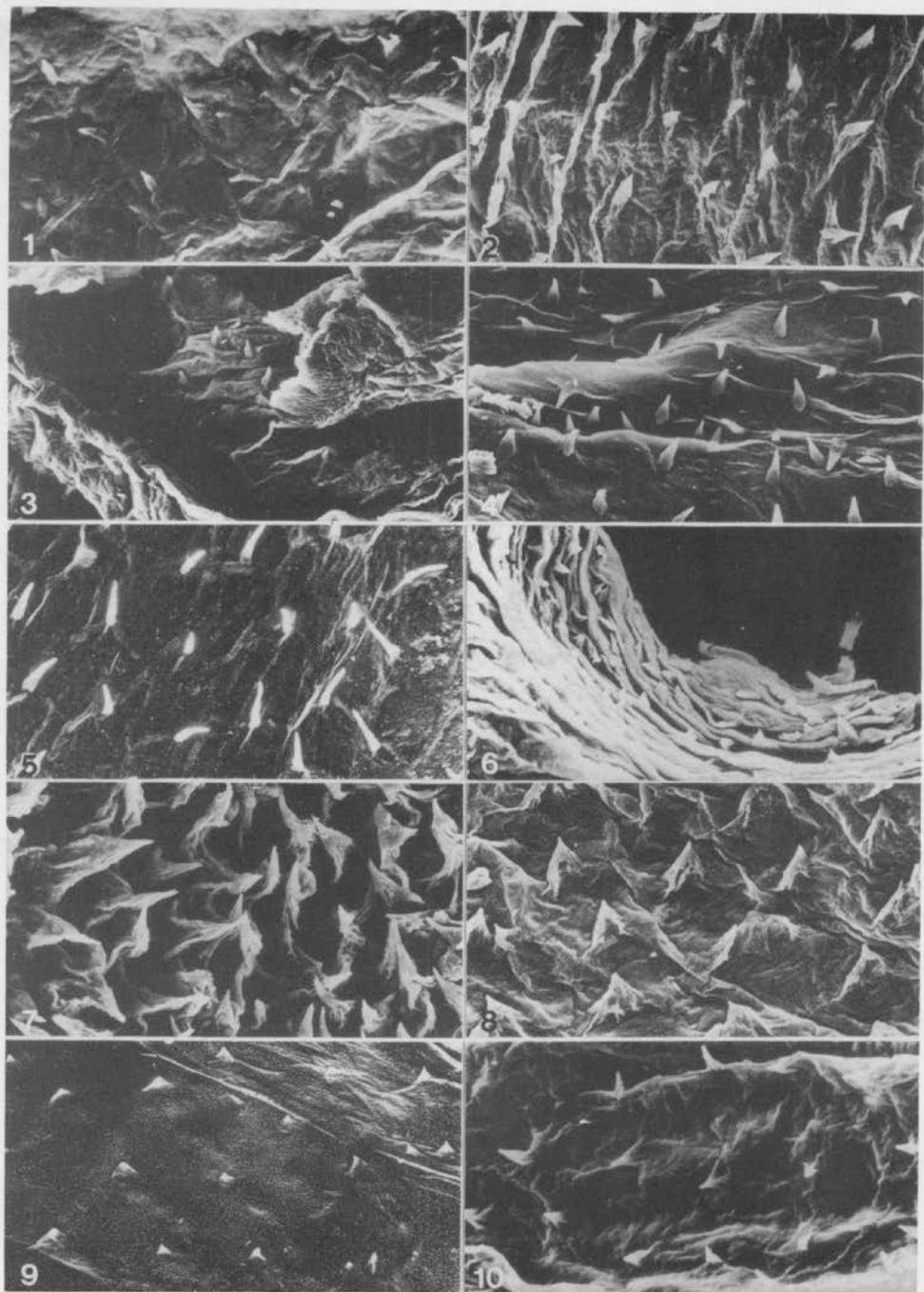


Fig. 2. 20-23. Signa of the Pierinae

20: *H. glaucippe*; 21: *A. lagela*; 22: *A. drusila*; 23: *A. albina*.

* scales: 100 μ m



Pieris manni (Figs. 1-4, 2-4, 3-4)

The corpus bursa spherical, the appendix bursa weakly developed, the mean length of the ductus bursa 2.8 mm. The long heart-shaped signum is dorsally situated, the median sclerite elongated. Innersurface folds undeveloped, with spine-shaped innersurface processes.

Pieris ergane (Figs. 1-5, 2-5, 3-5)

The corpus bursa spherical, the appendix bursa weakly developed, the mean length of the ductus bursa 1.8 mm. The long heart-shaped signum is dorsally situated, the median sclerite elongated. Innersurface folds undeveloped, with slender spine-shaped innersurface processes.

Pieris napi (Figs. 1-6, 2-6, 3-6)

The corpus bursa oval, the appendix bursa weakly developed, the mean length of the ductus bursa 2.8 mm. The long heart-shaped signum is dorsally situated. Inner-surface folds well developed, with short spine-shaped innersurface processes.

Pieris brassicae (Figs. 1-7, 2-7, 3-7)

The corpus bursa oval, the mean length of the appendix bursa about 1/3 of the corpus bursa, the mean length of the ductus bursa 4.0 mm. The short and heart-shaped signum is dorsally situated, the median sclerite vestigial. Innersurface folds developed, with paired and spine-shaped innersurface processes.

Pieris rapae (Figs. 1-8, 2-8, 3-8)

The dorsal part of corpus bursa strongly swollen, the mean length of the appendix bursa about 1/3 of the corpus bursa, the mean length of the ductus bursa 2.8 mm. The round signum is dorsally situated, the median sclerite vestigial. Innersurface folds weakly developed with weak triangular innersurface processes.

Pieris canidia (Figs. 1-9, 2-9, 3-9)

The dorsal part of the corpus bursa strongly swollen, the appendix bursa weakly developed, the mean length of the ductus bursa 2.8 mm. The round signum is dorsally situated, the median sclerite vestigial. Innersurface folds undeveloped, with weak triangular innersurface processes.

Pieris krueperi (Figs. 1-10, 2-10, 3-10)

The corpus bursa oval, the mean length of the appendix bursa 1/3 of the corpus bursa, the mean length of the ductus bursa 2.8 mm. The heart-shaped signum is dorsally situated, the median sclerite vestigial. Innersurface folds weakly developed, with spine-shaped innersurface processes.

Fig. 3. 1-10. Innersurface processes of the Pierinae (opposite)

1: *P. verginensis*; 2: *P. bryoniae*; 3: *P. melete*; 4: *P. manni*; 5: *P. ergane*; 6: *P. napi*; 7: *P. brassicae*; 8: *P. rapae*; 9: *P. canidia*; 10: *P. krueperi*.

* scale: 10µm

Aporia crataegi (Figs. 1-11, 2-11, 3-11)

The corpus bursa spherical, the mean length of the appendix bursa 1/2 of the corpus bursa, the mean length of the ductus bursa 3.7 mm. The signum is dorsally situated and has a constricted ribbon-shape, with long spines. Innersurface folds strongly developed, with big and strong innersurface processes, and basal folds well developed.

Aporia hippia (Figs. 1-12, 2-12, 3-12)

The corpus bursa oval, the mean length of the appendix bursa 1/2 of the corpus bursa, the mean length of the ductus bursa 3.8 mm. The signum is situated supracervically and has a constricted ribbon-shape with fine spines on the middle part. Innersurface folds strongly developed, with large tongue-shaped innersurface processes.

Ascia monuste (Figs. 1-13, 2-13, 3-13)

The corpus bursa spherical, the ductus bursa swollen and with a sclerotized part, the mean length of the appendix bursa over 1/3 of the corpus bursa. The thick ribbon-shaped signum is situated at the neck. Innersurface processes small and papillar.

Tatochila autodice (Figs. 1-14, 2-14, 3-14)

The corpus bursa oval, the ductus bursa swollen, the mean length of the appendix bursa 1/3 of the corpus bursa. The dumb-bell-shaped signum is situated dorsally. Innersurface processes small, dense and spindle-shaped.

Synchloe callidice (Figs. 1-15, 2-15, 3-15)

The corpus bursa spherical, the ductus bursa relatively short and somewhat swollen, the appendix bursa small. The signum is slender and curved and situated at the neck. Innersurface processes small, sparse and papillar.

Anaphaeis aurota (Figs. 1-16, 2-16, 3-16)

The corpus bursa spherical, the appendix bursa small. The signum is situated dorsally, it is asymmetrical with a prominent process at one end. Innersurface processes weakly developed.

Theochila maenacte (Figs. 1-17, 2-17, 3-17)

The corpus bursa oval, the ductus bursa wide at the entrance, the mean length of the appendix bursa 1/3 of the corpus bursa. The thick ribbon-like signum is situated at the neck and has long spines.

Metaporis agathon (Figs. 1-18, 2-18, 3-18)

The corpus bursa oval, the mean length of the appendix bursa 1/2 of the corpus bursa. The ribbon-shaped signum dorsally situated and is without spines at each end. Innersurface processes look like arrowheads.

Cepora nadina (Figs. 1-19, 2-19, 3-19)

The corpus bursa oval, the mean length of the appendix bursa 1/2 of the corpus bursa. The signum has the modified shape of a heart and is situated at the neck. Innersurface processes not sharp.

Hebomoia glaucippe (Figs. 1-20, 2-20, 3-20)

The corpus bursa spherical, the ductus bursa thick and very long, the mean length of the appendix bursa over 2/3 of the corpus bursa. The signum is asymmetric with one of the ends sharp and is dorsally situated. Innersurface processes relatively large with sharp tips.

Appias lagela (Figs. 1-21, 2-21, 3-21)

The corpus bursa spherical, the appendix bursa weakly developed, cervix bursa strongly developed, the mean length of the ductus bursa 4,1 mm. The signum is situated dorsally and is slender and slightly curved with fine spines on the middle part. Innersurface folds developed, with tongue-shaped innersurface processes.

Appias drusila (Figs. 1-22, 2-22, 3-23)

The corpus bursa spherical, the mean length of the appendix bursa 1/2 of the corpus bursa, the mean length of the ductus bursa 4.1 mm. The thick ribbon-shaped signum is situated dorsally and has fine spines on the middle part. Innersurface folds developed, with spine-shaped inner-surface processes.

Appias albina (Figs. 1-23, 2-23, 3-23)

The corpus bursa spherical, the mean length of the appendix bursa 1/2 of the corpus bursa, the mean length of the ductus bursa 4,1 mm. The thick ribbon-shaped signum is situated dorsally and has fine spines on the middle part. Innersurface folds weakly developed, with tongue-shaped innersurface processes.

Discussion

From the above study we found strong morphological differences between the bursa copulatrix of the various genera under investigation. The shape of the bursa copulatrix is fairly stable among the species of the same genus. Thus, the structure of the organ can be considered as an important taxonomic indicator at least on the generic classification of Pierinae.

In the morphology of the bursa copulatrix of the genus *Pieris*, it was found that there were no distinct differences between the species *P. melete* and *P. napi*. *P. verginensis* only differs slightly from these two species in features of the basal ridges on innersurfaces and that of the folds. The morphology of *P. manni* and *P. ergane* are very similar except for the shapes of the innersurface processes. *P. brassicae*, *P. krueperi*, *P. rapae* and *P. canidia* can be separated from other species since signa occupy different positions. They all share the horizontal signum and the median sclerite. The appendix bursae of *Pieris* are small and their signa are thin and plate like. The signum shows the transitional state that change from the plesiomorphic state to the apomorphic one. The plesiomorphic state does appear in moths with a pair of long signa. The median sclerite, considered as the vestigial organ of the fusion of two signa, remain in many species of *Pieris*. In the rest of the species additional features are noticeable such as extinct vestiges, shortened signa, folded edges and the formation of the free leaf in the lumen of the corpus bursa. Therefore, *Pieris* is considered as a model genus showing the evolution of the signum from a plate-like horizontal structure to one that is folded and vertical.

The bursa copulatrix of *A. crataegi* is proportionally large compared to body size and from this we can infer that the spermatophore is also proportionally large. In general, the dorsal and plate-like signum has been considered as the plesiomorphic one by Cheong et al. (1990), and

the dorsal signum is usually plate-like. However, *A. crataegi* has the considerably folded signum despite the fact that it is located dorsally. The spines of the signum are not very sharp so it may not be efficient. In *A. hippia* the signum tends to move from the dorsal part to the neck of the corpus bursa. Its signum appears more effective than that of *A. crataegi*. The innersurface processes of both species are considered as weak for the vast size. The two species of *Aporia* which are cited in this study may not be closely related phylogenetically due to the different arrangements of the bursae copulatrix. *A. monuste* has a dorsally swollen corpus bursa and a vertical signum. Therefore, the bursting of the spermatophore may occur at the bottom. The shape of signum and innersurface processes are similar to those of the genus *Gonepteryx* of Coliadinae. The signum of *T. autodice* is located at the neck of the corpus bursa and free sperms may be temporarily stored in the swollen part of the ductus bursa. The signum appears strong and may have the main scraping role together with numerous innersurface processes. *S. callidice* is equipped with the cervical and curved signum. The curved signum may increase the scraping area of the signum to the round spermatophore. The signum of *A. aurota* is unusual in that it is asymmetrical with a horn on one side. It is assumed that the asymmetric horn gives a successful tearing effect on the spermatophore. The signum of *T. maenacte* resembles that of *A. monuste* but is better developed. *M. agathon* has a dorsally situated signum but it is of the derived and folded type. By the degeneration of the spines on both poles, the tearing effect will be limited to the centre. As the distance between the signum and the ductus bursa is fairly long, it may have an unfavourable reproductive position.

If we accept the fact that the dorsal plate-like signum is plesiomorphic, we still have to consider how it evolved to the cervical folded state. It appears that the folding of the signum preceded its change of position. This is because several examples of dorsal folded signa have been found but rarely the opposite condition of cervical and plate-like, the exception being *Cepora nadina*.

H. glaucippe is a special species of Pierinae and is separated as the tribe Colotini based on its unique wing venation. The ductus bursa of this species is the longest in the Pierinae, thus free sperms will have to return a long distance to the ductus seminalis. The asymmetric and dorsal signum is similar to that of *A. aurota*. *H. glaucippe* is also considered separate from the Pierinae because its haploid chromosome number 17 appears to be uncommon (Maeki & Remington, 1960).

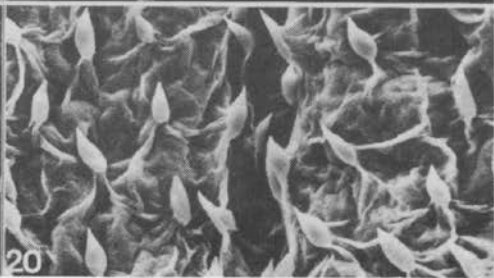
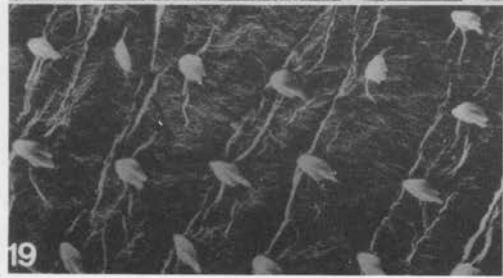
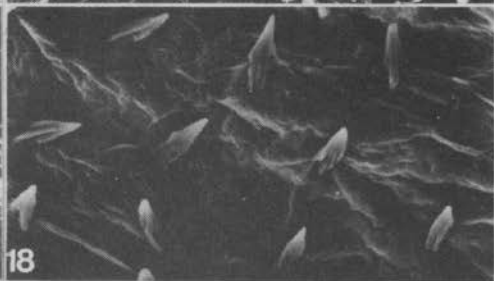
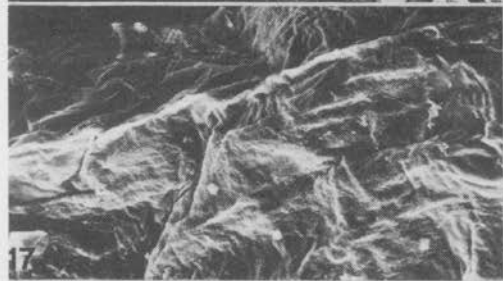
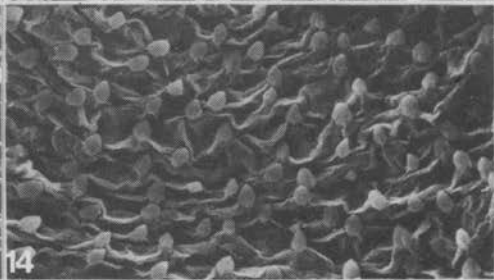
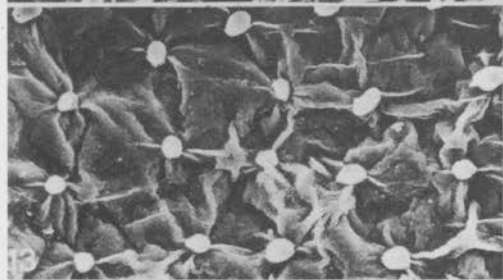
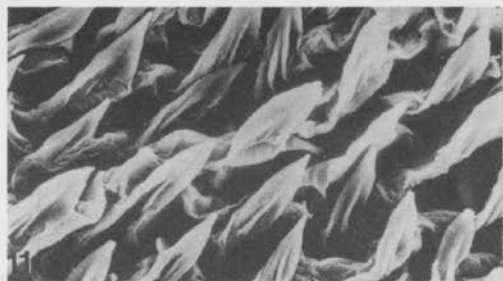
Among the three species of *Appias*, *A. drusila* appears to be separate from the others. This species has the cervical signum which also differs in shape from the other two species.

For some genera, we could only collect one species and therefore discussion is limited. From the above discussion, we can conclude that the bursa copulatrix exhibits arrangements unique to genera and to species. From this we can conclude that the characters of the bursa copulatrix can be used as a diagnostic index in the classification of the Pierinae. In particular, the characters should be authentic criteria on the generic hierarchy.

Fig. 3. 11-20. Innersurface processes of the Pierinae (opposite)

11: *A. crataegi*; 12: *A. hippia*; 13: *A. monuste*; 14: *T. autodice*; 15: *S. callidice*; 16: *A. aurota*; 17: *T. maenacte*; 18: *M. agathon*; 19: *C. nadina*; 20: *H. glaucippe*.

* scale: 10 μ m



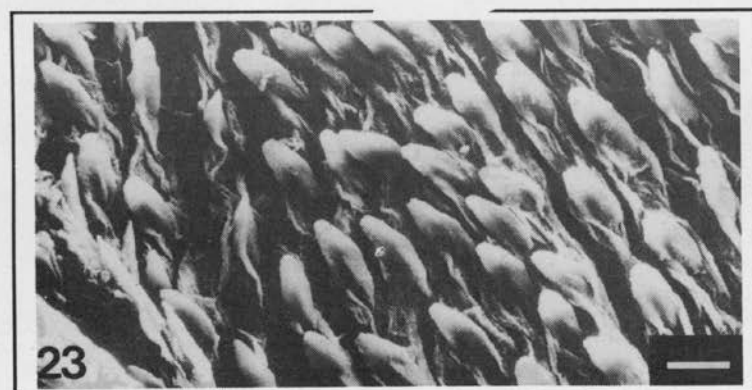
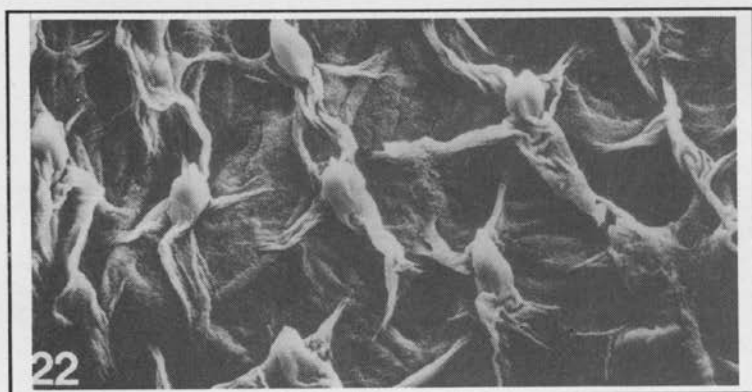
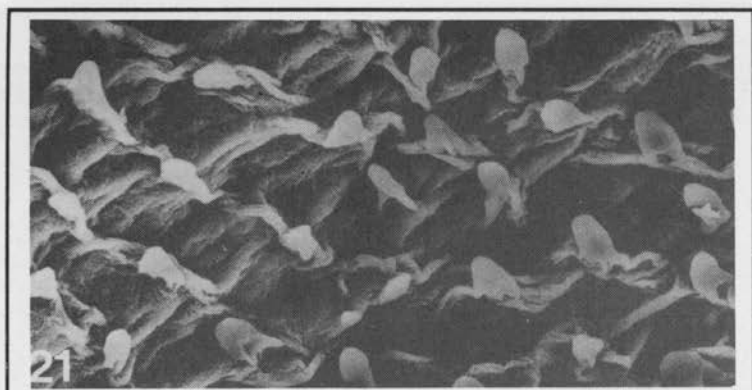


Fig 3. 21-23. Innersurface processes of the Pierinae

21: *A. lagela*; 22: *A. drusila*; 23: *A. albina*.

* scale: 10 μ m

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References

- CHEONG, S.W., LEE, C.E. & PARK, H.C., 1990. A microscopic study on the bursa copulatrix of Korean Pieridae (Lepidoptera). *Esakia, Special Issue 1*: 167-172.
- CHEONG, S.W., PARK, H.C. & LEE, C.E., 1988. A comparative study on the bursa copulatrix of Korean Pierid butterflies (Lepidoptera: Pieridae). *Nature & Life (Korea)* **18**(2): 39-46.
- EITSCHBERGER, U., 1986. Erste Erganzung zu Systematische Untersuchungen am *Pieris napi-bryoniae*-Komplex (s.l) (Lepidoptera, Pieridae). *Atlanta* **16**: 253-264.
- HANCOCK, D.L., 1985. Notes on some Pierid butterflies (Lepidoptera) recorded from Zimbabwe. *Transactions of the Zimbabwe Scientific Association* **63**(1): 1-7.
- LEE, S.M., 1982. *Butterflies of Korea*. Insecta Koreana, Korea, 125pp.
- MAEKI, K. & REMINGTON, L., 1960. Studies of the chromosomes of North American Rhopalocera. *Journal of the Lepidopterists' Society*, **13**: 193-203.
- SEOK, J.M., 1973. *The distribution maps butterflies in Korea*. Po Chin Chai, Ltd., Seoul, Korea, 517pp.
- SHIROZU, T., 1952. New or little known butterflies from the North-Eastern Asia, with some synonymic notes. I. *Sieboldia* **1**(1): 11-37.
- SMART, P. F., 1978. *Encyclopedia of the butterfly world*. Shujunsha, Ltd., Japan, 275pp.
- YATA, O. 1979. Photoperiodic response of four Japanese species of the genus *Pieris* (Lepidoptera: Pieridae). *Kontyu* **47**(2) 185-190.



Belenois (Anaphaeis) aurota final instar larva.

DESCRIPTIONS OF A NEW SPECIES OF *PLATYLESCHES* HOLLAND
AND A NEW SPECIES OF *CELAENORRHINUS* HÜBNER
(LEPIDOPTERA: HESPERIIDAE) FROM TANZANIA

By Jan Kielland

4916 Borøy, Norway

Abstract. A *Platylesches* species (Lepidoptera: HesperIIDae) occurring Tanzania, and previously believed to be identical to *Platylesches ayresii* from Southern Africa is described as *Platylesches larseni* spec. nov. A second hesperiid species, *Celaenorrhinus cordeironis* spec. nov. is also described.

Platylesches larseni spec. nov., Text Figs 1, 2, 3; Plate 1: Figs 1, 4

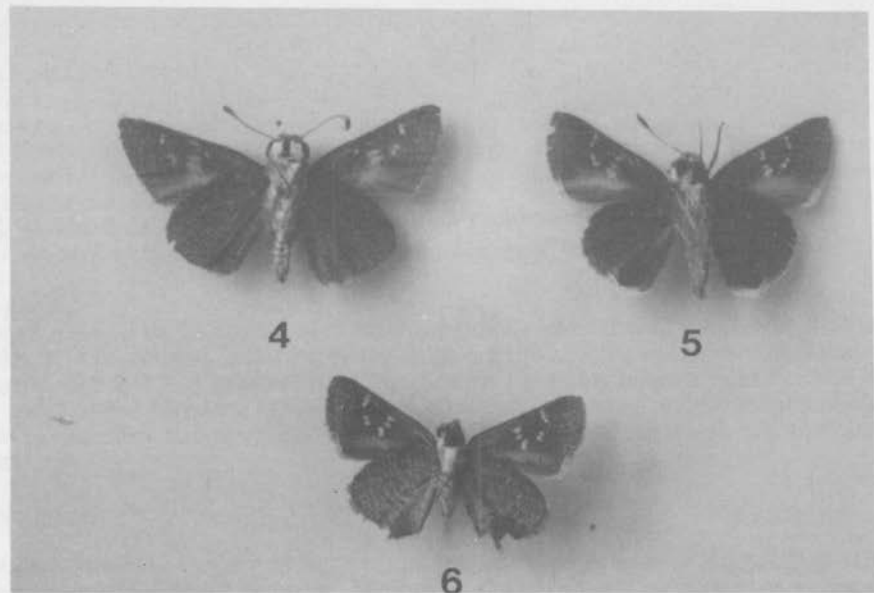
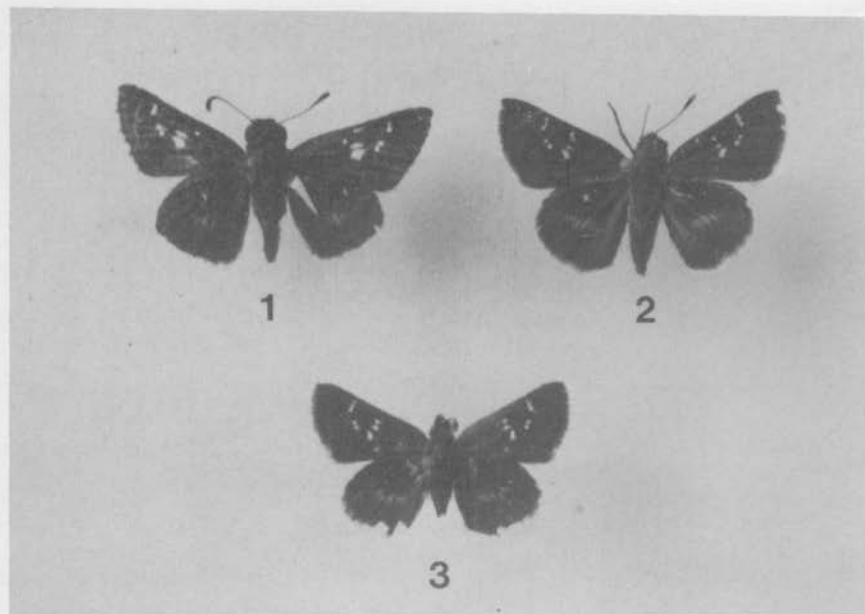
This is the species referred to as *Platylesches ayresii* Trimen, 1889, in Kielland (1978 & 1990). Iot-ben Larsen informed me that he has examined material of *P. ayresii* J and *P. langa* Evans, 1937, which occur from Mozambique to South Africa (*P. langa* also in Mpanda, Tanzania) and he found that they indeed are distinct from each other, but that one population occurring in Tanzania, which I referred to as *P. ayresii* is not identical with that species. Larsen kindly sent me a male *P. ayresii* from the Transvaal to compare with the Tanzanian material which shows characters both externally and in its genitalia differing from those of *P. ayresii*.

Diagnosis:

Considerably larger than *P. ayresii* (length of forewing 14,7 mm; *P. ayresii* 12,6 mm. Male with forewing more elongate and pointed than in *P. ayresii*; hindwing also differently shaped, with apex more angled and outer margin straighter (both in *P. ayresii* and *P. langa* the apex is more rounded). Underside with upper white spot in forewing cell lacking (in *P. ayresii* two cell spots are present); the spot in space 2 is much larger and broader; only two subapical spots, or if three the upper one is tiny (in *P. ayresii* and *P. langa* these three spots are almost equal in size). Underside with dark brown striations closer together than in *P. ayresii*; no white marginal line at tornus of forewing and near anal angle of hindwing as is the case in *P. langa* and *P. ayresii*. Genitalia with the entire tegumen-uncus structure (Fig. 1) proportionally smaller than in *P. langa* (Fig. 4). The valva (Fig. 2) is broader than in *P. ayresii*. (Fig. 8). The heavily chitinized distal end of the valva (Fig. 2) is much shorter than in the other two species (Figs 5 & 8) and its shape at the base is also different. The aedeagus (Fig. 3) is without spines while that of *P. langa* has laterally placed spines on its distal part, six on the left side (Fig. 6) and two on the right. The female is unknown.

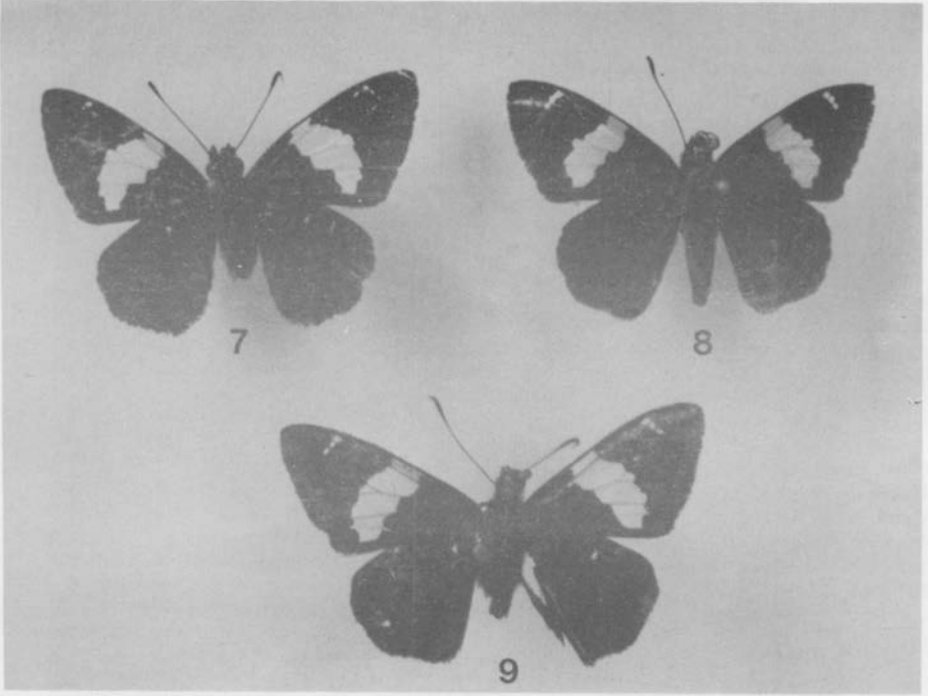
Description:

- **Male.** Forewing length 14,8 mm. *Antenna.* Short, dark brown above, whitish below; club thick and short, apiculus short and strongly bent. *Wings, upperside.* Ground colour brown. Forewing: one small white medial spot in cell; two white spots in spaces 2 and 3 of discal area, that in 2 being larger and broader; postdiscal area with a spot in 3 and 4; two or three subapical spots, the upper one if present is tiny. Hindwing: with usual row of pale discal spots



Figs 1-6. Upperside 1-3. 1. *Platylesches larseni* ♂ holotype. 2. *P. langa* ♂. 3. *P. ayresii* ♂. Undersides 4-5. 4. *P. larseni* ♂ holotype. 5. *P. langa* ♂. 6. *P. ayresii* ♂.

Plate 2



Figs. 7-8. Uppersides. 7. *Celaenorrhinus cordeironis* ♂ holotype. 8. *C. kimboza* ♂.
9. *C. sanjeensis*

which are slightly more elongate than in *P. ayresii*. Cilia of both wings brownish. *Underside*. Ground colour pale brown with darker brown striation. Forewing: apex and tornus striated as the rest of the wing, except for a small pale discal patch below cell; white spotting as on upperside. Hindwing: uniformly brown striated without spots; margin of spaces 1a and 1 b a little paler than ground colour. *Genitalia* (Figs. 1 - 3). Uncus rather narrow distally; two distal protuberances close together; valva with bipectinate dorsodistal process and with slight serration distad; end of succus rounded; aedeagus without spines.

- **Female.** Unknown.

Etymology

Named after Torben Larsen who realised that this species was distinct from *P. ayresii*.

Material examined

Holotype ♂: TANZANIA, Katuma River, Mpanda, 1600 metre, August 1974, J. Kielland. Paratypes: 2 ♂ same data as holotype; 1 ♂ same data but July 1972.

Distribution and habits

P. larseni occurs in riverine forests from 1500 to 1600 m. The males are attracted to wet sand in the river beds and to bird droppings. They were found flying sympatrically with *P. langa* in the Sandstone Range from Sitebi Mountain to Ntakatta Forest in the Mpanda District.

Celaenorrhinus cordeironis spec. nov., Text Figs. 10, 11, 12; Plate 2 Fig. 7

Diagnosis:

Closely related to *Celaenorrhinus kimboza* Evans, 1949 and *C. sanjeensis* Kielland, 1990. It is somewhat larger (forewing lengths 21,6-22,1) than *C. kimboza* (forewing lengths 19,8-21), but smaller than *C. sanjeensis* (forewing lengths 23mm). The discal band of the forewing is white (in *C. kimboza* yellowish) and differently shaped than in the other two species. The male genitalia differ in the uncus and somewhat in the valva.

Description.

- **Male.** Forewing lengths 21,6-22,1 mm. *Head*. Dark brown with a patch of white scales below the eyes. *Antenna*. Dark brown, a small pale patch on the underside below club; club rather short, apiculus bent and nearly as long as Club. *Palpi*. Third joint very short, second joint very long, with a white stripe laterally. *Wings, upper-side*. Ground colour blackish-brown.

Forewing: subapical area with three small spots forming a narrow line, much narrower than in *C. kimboza* and *C. sanjeensis*; discal band white with outline uneven as in *C. kimboza*, but much wider at the middle and upper spot in 1 b narrower and more squarish.



Figs. 1-9. *Platylesches larseni*. 1. Dorsal aspect of tegumen-uncus and left valva; 2. valva in lateral view; 3. aedeagus. *P. langa*. 4. Tegumen-uncus; 5. valva; 6. aedeagus. *P. ayresii*. 7. Tegumen-uncus; 8. valva; 9. aedeagus.

Hindwing: unmarked blackish-brown. *Underside*. As on the upper-side. *Genitalia* (Figs. 10-12). Uncus slightly shorter than in *C. kimboza* (Fig. 13-15); tegumen differs in the knobby lobe situated dorso-laterally (distal end of tegumen not lobed, but angled in *C. kimboza*); valva longer and comparatively narrower than in *C. kimboza*. (In *C. sanjeensis* [Figs. 16-18] tegumen-uncus is rather similar but valva differs somewhat).

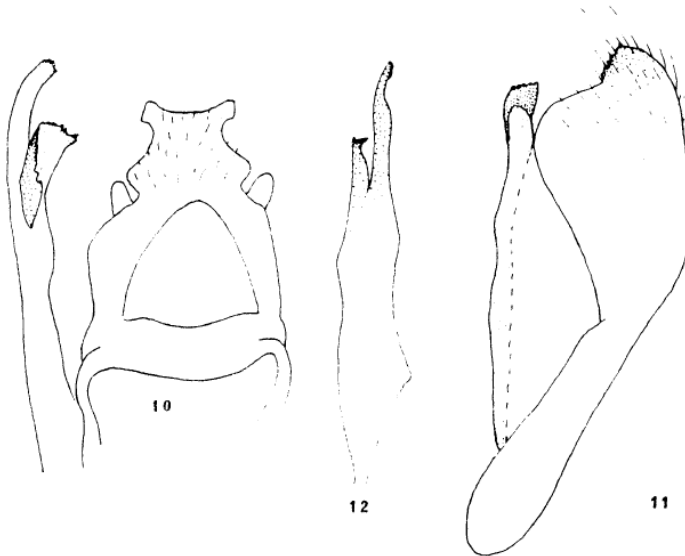
- **Female**. Unknown.

Etymology

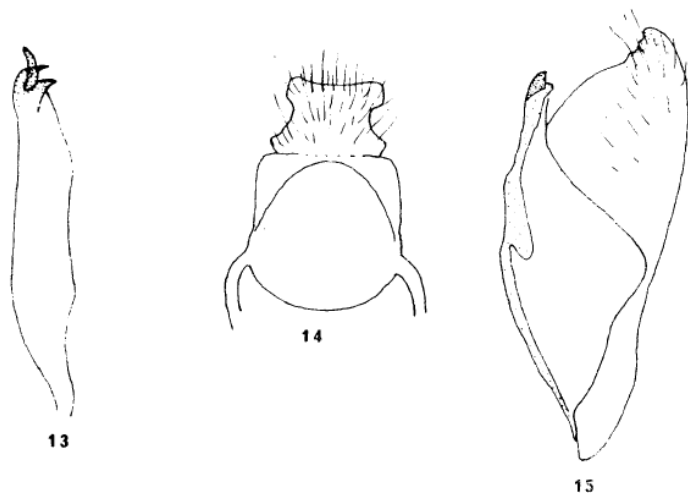
This species has been named after its discoverer, Mr Norbert Cordeiro.

Material examined

Holotype ♂: TANZANIA, Mtai Forest, East Usambara, 325 m, 13.vii.1990, Norbert Cordeiro.
Paratype: 1 ♂ same data but 15.vii.1990.



Figs. 10-12. *Celaenorrhinus cordeironis*. 10. Tegumen-uncus and right valva in dorsal aspect; 11. valva seen laterally; 12. aedeagus.



Figs 13-15. *C. kimboza*. 13. Aedeagus; 14. tegumen-uncus; 15. valva.

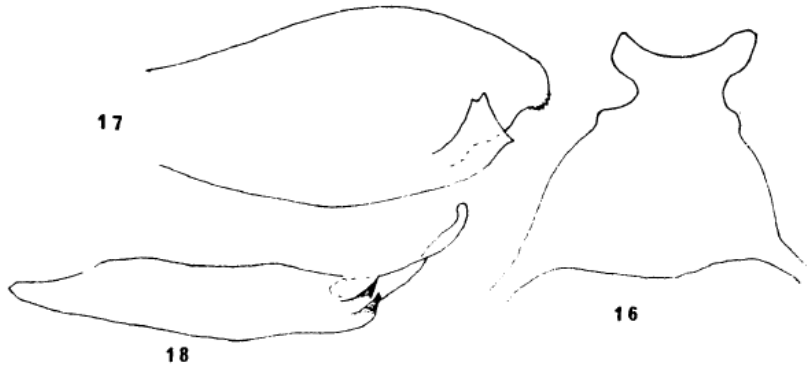
Distribution and habitat

This species flies in lowland forest at an altitude just above 300 metres on the East Usambara. It was taken close to a stream.

Discussion

It is interesting to note that these three closely related species of *Celaenorrhinus* are inhabitants of lowland forest, and are all, apparently, very localized. *C. kimboza* has only been taken in the Kimboza Forest at the foot of the Uluguru Mountains, in limestone formations at an altitude between 300 to 350 metres. *C. sanjeensis* has only been recorded at 400m in the forest at the foot of the Uzungwa scarp, Sanje, Kilombero Valley. Finally *C. cordeironis* was found in the Mtai Forest at an altitude of 325 metre on the East Usambara. Both *C. sanjeensis* and *C. cordeironis* were taken near a stream, *C. kimboza* in the forest and mostly away from streams.

One might suggest that these three species originate from one parent species which, at a time of more even climate, when the forest was contiguous all along from Kilombero to the Usambaras, occurred all the way along the coastal forests. Later at a drier period, the forest belt was interrupted by large tracts of different habitat and thereby disrupted the species distribution, leaving it in small, isolated patches of forest where its foodplant still grows.



Figs 16-18. *C. sanjeensis*. 16. Tegumen-uncus; 17. valva; 18. aedeagus.

Eventually, possibly due to slight differences in environmental conditions, three separate species may have evolved.

Acknowledgements

My sincere thanks are due to Messrs Torben Larsen and Norbert Cordeiro who have so willingly assisted during this study.

References

- KIELLAND, J., 1978. A provisional checklist of the Rhopalocera of the eastern side of Lake Tanganyika. *Tijdschrift voor Entomologie*. **121**(4): 147-237.
1990. *Butterflies of Tanzania*. Hill House, Melbourne & London.
LARSEN, T.B., *Platylesches ayresii* Trimen and *P. langa* Evans are distinct species (Lepidoptera:Hesperiidae). *Metamorphosis* **3**(1): 25-27.
PINHEY, E., 1965. *Butterflies of Southern Africa*. Nelson, Johannesburg.

RAMBLINGS OF RUTH SOUTHEY IN MOZAMBIQUE 1957
(PART 5)

By Ruth J.G. Southey

P.O. Box 909, George 6530

(continued from *Metamorphosis* 3(3):85, September 1992)

On the first of September after early coffee and breakfast, we all walked upstream with our nets. Later, Ken carried on up the hill while Ruth and I returned to camp to prepare for the Administrador's lunch-party at noon, round the swimming pool, in wonderful surroundings. What a party it turned out to be too - great hilarity and merriment. Ken, some 800 ft (about 260 metres) up the hill heard the hubbub, and rather wished he had been there when he came back very hot and tired in mid-afternoon, and limping badly, and without having caught anything of particular note. The Administrador and his party, the local doctor and his Goanese Portuguese wife, the National Commissioner and his wife came to us for sundowners, and more happiness all round. After our dinner came cut-throat bridge with Ken very much in the lead over the period.

The next day, the 2nd, after our usual early coffee and breakfast, Ken went off at 8.15, with a police guide, to go up the mountain beyond Vila Gouveia in his car. We went to the waterfall area and collected till lunchtime. At 2.30 Ken arrived back, having driven almost to the top of the mountain in defiance of all laws of gravity and common sense! He netted two specimens of what he thought was a new butterfly, and if this proved to be so, it would be called *bougardii* after the Administrador. He was most pleased with a good bag of various species. He said the view from the mountain was magnificent. Now, can you believe it?, after tea, bathe, sun-downers and dinner, we took up the cards again for cut-throat bridge, and Ruth excelled herself by nearly catching up on Ken's accumulated lead, and leaving me dismally in the rear.

The 3rd September saw the skies heavily overcast, with intermittent bursts of sunshine. After breakfast (have you noticed that we never missed a meal?) we went to my particular damp sand patch, and there was the most amazing sight - a whirling mass of swallowtails, 'yellows', and little 'blues' of many sorts. Among others I netted were *Uranothauma antinorii* f. *feltami* (Stevenson) and *U. poggei* (Dewitt) which Ken accepted as 'useful' - it was a good day.

On the 4th we were woken early by a shower of rain, and with darkening skies as time went on, Ken decided that we should move on. We left camp at 10.45, and Vila Gouveia at 11, after farewells to our kind friends. We planned to park on the Pungwe River, but the site was unsuitable, and we made for the Mocambeze River. However, this plan changed again, and it was decided that we should go on to the Soffes at Border farm.

Shortly before reaching Vila da Manica (old Mosaquese) the car's second and top gears went kaput, and it was found that the split pin from the arm was missing. Ken replaced this with a spring from a clothes peg! So the journey continued through Manica, and on to the Penhalonga road on to the Soffes' sawmill Border Farm. We were shown (in the half dark) where we could camp, by young Alan Soffe. Celestine miraculously produced dinner, after which we again took up the cards for a couple of hands of cut-throat and then dropped wearily into our beds.

On the next morning, 5th, we were wreathed in mist. After this lifted, Ken went into the bush above the house, and Ruth and I walked with our nets down the road and found a glorious parking place in a grove of pecan nut trees. At lunch it was decided to move, which we did in mid-afternoon, and settled happily, ending the day with our usual routine.

The next day was highlighted by an invitation from Mrs Soffe to have hot baths - luxury of the highest order - and then by Ken's capture of two *Celeanorrhinus bettoni* Butler, which he had very much hoped to net. My offerings (which I was sure were good) were summarily discarded! A delightful dinner at the house ended a good day.

On the 7th I netted several acceptable specimens, but the afternoon was heavily overcast, and spent in doing camp chores. After breakfast (did we never stop eating?!) next morning, I was thrilled to net a *C. bettoni*, and missed another by slipping into the river, but Ken caught one and was most pleased.

Our friends joined us for sundowners, and that evening the decision was made to leave the next day.

The 9th dawned beautifully - clear and cloudless, and at 8.30 Ken drove to the sawmills to have the caravan drawbar, which was splitting, welded, only to find that both sides were almost totally split, and so a big job was only completed by one o'clock.

I had a satisfactory morning, going out to look for my lost *C. bettoni* where I had no success. I did, however, net several other desirable specimens including *Lipaphneaus aderna spindasoides* (Aurivillius), a puzzling *Neptis* and two *Alaena nyassa* Hewitson. We moved off and had our lunch on the border side of Vila da Manica (old Mosaquese). We then passed through both Customs posts with no trouble, and so back to Rhodesia (Zimbabwe) and Umtali where we collected post. We then went on up into the Vumba Mountains in the glory of msasas, and reached the Cookson's mountain home at 4. We got a charming, warm welcome from Harold and David. We tea-ed and bathed. Then followed celebrations at sundowners and dinner, where I had my first savour of fine Rhenish wine - soft and delicious. Rather weary and worn but very happy, we retired to bed. What a wonderful trip, never to be forgotten (what friends), though now as I write in 1992 so many, too many, have gone.

Through the years following the 1957 Mozambique trip, and from 1963 when I started my own collection, now kindly housed by Dr Jonathan Ball in his private museum in Pinelands, how many wonderful and fine "butterfly" people I have met. Some of whom I came to know very well, or with whom I have corresponded - the Penningtons, Cooksons, Vissians, Charlie Dickson and Gowan Clark, Georges van Son, Lajos Vári, Elliot Pinhey, R.D. Barnes, Caroline and Jonathan Ball, Victor and Ernest Pringle, David Swanepoel, Douglas Kroon, the Hennings, John Hardman, Cameron MacMaster, David Hull and Rudi Mijburgh, Norman Brauer, Clive Quicquelberge, Kit Cottrell, Charles Wykeham, Jim Brown, Mark Williams, Andre Claassens, Brian Stuckenberg - and having named them, I salute you all, wherever you may be.

Vale!

GETTING TO KNOW MOTHS - MONKEY MOTHS -

By Stephen Henning

5 Alexandra Street, Florida 1709

The monkey moths belong to the family Eupterotidae (BOMBYCOIDEA). They are medium to large-sized (wingspans range between 30 and 120 mm) and generally have broad, rounded wings with long, marginal cilia, and furry bodies - hence the common name monkey moths. The patterns on the wings may be intricate, but are never conspicuous and colourful as in some Saturniidae. The cryptic arrangement of lines and dots on the wings provide camouflage for the moths during the day when they rest on tree trunks. The fore and hindwings are linked by a frenulum. Antennae are pectinate (hairy) in both sexes, but the branches are short, soft and usually folded together to give the antennae a slender appearance. The haustellum (proboscis) and labial palps are reduced but functional.

The larvae are thickly coated with long hair, sometimes in tufts, and may be swept back to give the caterpillar a woolly appearance. Very little is known about oviposition, larval development and foodplants of the majority of species. Many apparently favour grasses as food. Pupation takes place in flimsy silken cocoons on the ground among leaves, and the long larval hairs are often wound into the cocoon.

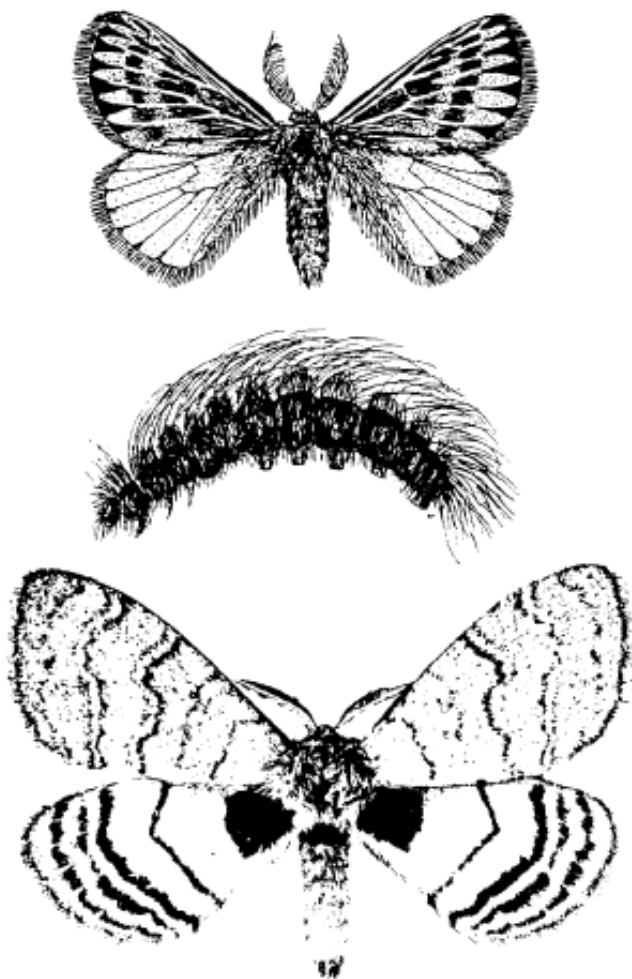
These moths are strictly nocturnal and have a slow soft flight pattern. If disturbed when at rest, they usually remain inactive, clinging to the substrate or feigning death. They are rather uncommon and even lights attract a limited number of specimens of a particular species. The larger species seem to be more common in high altitude forest and grasslands. The majority of species occur in the southern and eastern parts of Southern Africa.

There are some 20 genera and 67 species in Southern Africa belonging to two subfamilies the Striphnopteryginae and Janinae.

The Eupterotidae of Southern Africa have been dealt with by Pinhey (1975), Oberprieler (1985), Aurivillius (1901) and Seitz (1926). Vári and Kroon (1986) provide detailed lists of all the species in Southern Africa.

References

- AURIVILLIUS, P.O.C., 1901. On the Ethiopian genera of the family Striphnopterygidae. *Bih. Svenska VetenskAkad. Handl.* **27**(4)(7): 1-3.
- OBERPRIELER, R.G., 1985. Lepidoptera: Eupterotidae. In *Insects of Southern Africa*. Edited by C.H. Scholtz & H. Holm. Butterworths, Durban. p. 381.
- PINHEY, E.C.G., 1975. *Moths of Southern Africa*. Tafelberg, Cape Town.
- SEITZ, A., 1926. *Macrolepidoptera* (Gross Schmetterlinge der Erde). **14**. Publ. Alfred Kernen, Stuttgart.
- VÁRI, L. & KROON, D.M. 1986. *Southern African Lepidoptera. A series of cross-referenced indices*. Lepidopterists' Society of Southern Africa & Transvaal Museum.



Monkey Moths (Eupterotidae)- 1. *Marmaroplegma paragarda* male. 2. *Janomina mariana* larva. 3. *Janomina westwoodi* male.

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