METAMORPHOSIS

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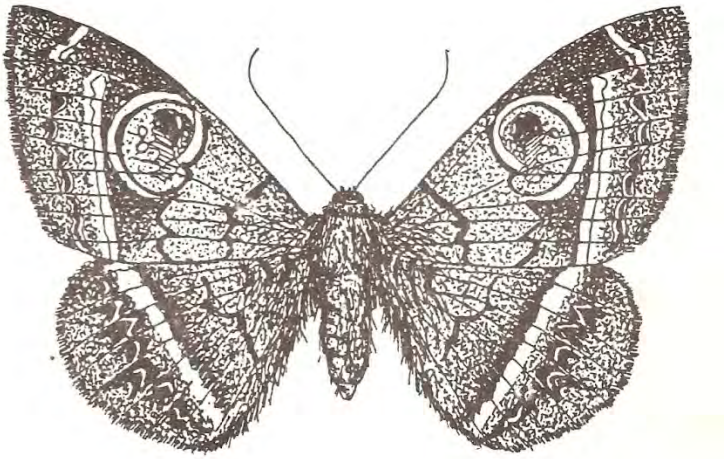

Cyligramma latona (Noctuidae) female
(Forewing length 29 - 43 mm)

LEPIDOPTERISTS' SOCIETY OF SOUTHERN AFRICA

EXECUTIVE COUNCIL

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.

Membership of the Society is open to all persons interested in the study of Lepidoptera. There is no geographical limit to membership.

There are three categories of membership:

Full members	R35,00 p.a.
Junior members and Pensioners	R17,00 p.a.
Affiliate members (Scientific Societies, museums, libraries, schools, etc.	R35,00 p.a.

Persons may become **Life Members** by paying five hundred and twenty-five rands (R525,00)

Membership fees are due on **1 April**. Overseas rates are higher due to increased postage.

CORRESPONDENCE

The Hon. Secretary, P.O. Box 470, FLORIDA HILLS, 1709
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All drawings, unless otherwise stated, are by S.F. Henning.

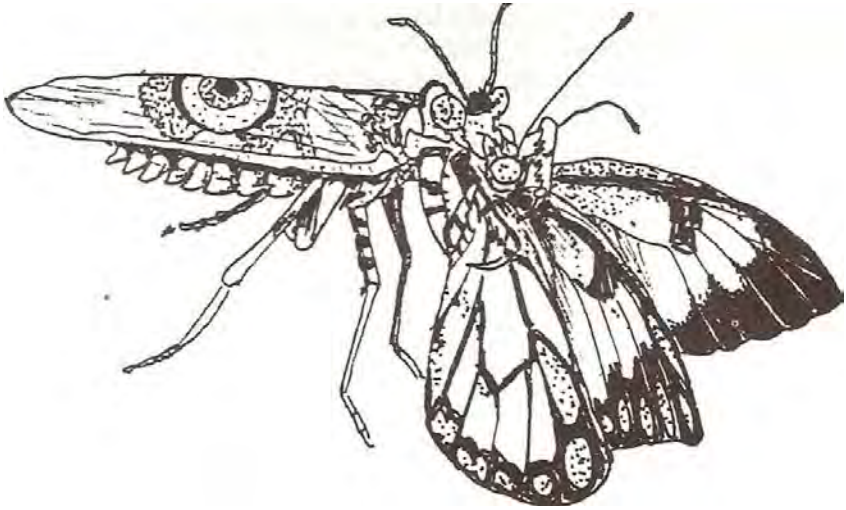
EDITORIAL

The Conference and Annual General Meeting was again a great success this year. What I found of particular interest this year were the papers on the study of some Lepidopteran agricultural pests and the possible use of microlepidoptera living in galls as indicators of environmental pollution. The highlight of course this year was the launch of our new publication - A *Practical Guide to Butterflies and Moths in Southern Africa.* It will certainly fill a gap in the literature and let us hope it will be a great success.

In this issue of *Metamorphosis* we are trying again to break new ground by publishing our first colour plates and species description. Particular thanks should go to Alan Heath, John Ball and Charles Wykeham for putting up the money to produce the plates. Again for having the confidence in the journal to submit their description. As the reputation of our journal improves we can expect more species descriptions and other important scientific papers to publish in it.

Again I plead for more contributions, *Metamorphosis* is only as good and as interesting as the papers you submit to it. Do not be put off by the more scientific articles in this issue, we still need contributions about field trips, anecdotes and so on.

W.H. Henning



The mantid *Pseudocreobotra wahlbergi* grasping a white *Belenois aurota*

COMMENT BY THE PRESIDENT

The fifth Council of the Lepidopterists' Society of Southern Africa commenced duty at the Annual General Meeting in August 1992. A sad farewell was said to our retiring councillors Nolan Owen-Johnston and Bill Steele and a hope was expressed that they make themselves available again in the future to stand for the Council.

The two new members to the Council were welcomed. They are Rolf Oberprieler and John Joannou and I hope they gain as much enjoyment as I have had over the past 9 years serving on the Council.

The Council therefore consists of John Joannou, Rolf Oberprieler, Mark Williams, Steve Woodhall (Treasurer), Graham Henning (Secretary) and Stephen Henning (President). The co-opted members are Lindsay Durham (Social Secretary), Bill Henning (Editor Metamorphosis) and Martin Kruger (representative of the Transvaal Museum).

We all have plenty of ambitious ideas for the future of the Society and let us hope we are as successful in these endeavours as the past Councils have been.

At last our *'Practical Guide to Butterflies and Moths in Southern Africa'* has been published and launched at our recent AGM and Conference. I would like to take this opportunity again to thank all those who contributed and edited this important and attractive little book particularly the co-ordinating editor Steve Woodhall. Let this be the first of many similar ventures.

Stephen Henning

REGIONAL ROUNDUP

The past three months have been the quietest winter in many years. The effects of the current recession have made themselves felt. Activity has not ceased however and our publication "A Practical Guide to the Butterflies and Moths of Southern Africa" was completed and successfully launched at the Annual General Meeting.

The Conference and Annual General Meeting was held at Onderstepoort on the 15th and 16th August 1992. It was a great success and went on late into Sunday afternoon. There were a good number of moth papers presented and the overall number of papers was up on previous years. There was even the pleasure of some new voices being heard.

The quiz on Sunday afternoon, arranged and conducted by John Joannou, was outstanding, with all the delegates participating enthusiastically.

The Society has embarked on research projects in two more reserves. These projects are at Phinda in Zululand and Pilanesberg in the Western Transvaal. Please contact us if you are interested in participating in these projects.

The other current project is the Natal Butterfly Atlas. All Society members should please make a detailed list of their Natal specimens and send it to the Natal Museum, Private Bag 9070, Pietermaritzburg 3200.

I am certainly looking forward to the coming season and wish all members a productive and safe summer. Please keep me informed of your activities. Telephone No work 474-1466 and home 768-1949 (both 011).

Graham Henning

RAMBLINGS OF RUTH SOUTHEY IN MOZAMBIQUE 1957 (PART 4)

By Ruth J.G. Southey

P.O.Box 909, George 6530

(continued from *Metamorphosis* 3(2):69 , June 1992)

We all had a wonderful night on the 22nd August after our Gorongoza expedition, and enjoyed a cold but exhilarating swim. Ruth and I went with Ken to his traps but returned early in blazing heat which steadily got more vicious as the day wore on. We lazed, lunched and swam again. David who had gone to Lone tree kopje came back at 4, more dead than alive, but with a real prize, a specimen of *Iolaus (Epamera) alienus* (Trimen) which brought much joy to the Cookson camp, and this was increased by the capture of a possibly new hawk moth under their mercury vapour lamp. There was a glorious sunset and fine night. Harold Cookson watched the planets nightly, and this night Jupiter and Venus were very close together, Jupiter being in the ascendant. Harold was a knowledgeable man of many and wide interests - entomologist, naturalist, explorer, traveller. He crossed Africa on foot from West to East, observing, collecting en route, and prospecting in Katanga for copper. On the 23rd we woke to overcast skies. We went with the Cooksons to the main road, and the only notable catch was David's *Euthecta cooksoni* Bennett. The afternoon was chilly and overcast, and passed into evening with sundowners, dinner, bed and drizzle.

The next day, 24th, marked a month since we left Balgowan. Breakfast was taken under cover while showers fell. Ruth and I drove to Gondola for supplies; it drizzled the whole way, and on our return, about 8 kilometres from the turn-out, an enormous tree, draped in lianas and creepers lay right across the road, and we only managed to get by on the very edge of the gravel.

In the afternoon we went to Ken's "herbaceous border", unhappily passing through a kraal, where, to Ruth's horror, a madman was at large. We were then caught in a violent downpour, and took shelter under bushes, under huge beautiful trees on the river's edge. We got soaked and made for home, passing several kraals where we saw conical mounds of Kaffir corn, stacked head downwards. Every kraal had its threshing floor. On crossing the river we saw a most cunningly made canoe, made of smoothed-off bark, shaped and turned back and pinned with wooden pegs. It was here that a crested eagle was spotted high up in a tall tree, and we saw tom-toms at all the kraals - the instruments of the previous night's diabolic entertainment.
These appeared to be hollowed out sections of tree trunks, tapering towards the bottom, and covered at the top with skin or hide. Fowl's nests were also made of the same smaller sections, and placed horizontally on bits of wood, raised above the ground, and with a stone step leading to the entrance.

The only joy on the 25th was the capture of several good hawk moths at the Cookson's Camp, after a wet and drizzly day.

There was happiness for Harold on the 26th, with the capture of one *E. cooksoni* when the day was hot and overcast. The evening brought more hawk moths.

More overcast skies on the 27th. After lunch Ken walked us to Lone Tree Kopje to see the msasa trees bursting into new leaf, most beautiful in copper, bronze, red, pink and near purple - memorable indeed, and who can ever forget this miracle of nature? There was no particular catch for the day - very disappointing after the promise of

better weather.

Light showers of rain fell in the night and in the morning - the 28th - the Cooksons and Vissians decided to break camp as the weather was very threatening. Harold and David left after breakfast, and the Vissians at noon, after the skies had cleared partially. After they left, Ken and Ruth arrived back at 1.10, having passed them as they drove away, and Neville was delighted to hear that Ken had netted 2 *E. cooksoni,* saying that it was the highlight of the stay. After leaving them to go on their way, another *E. cooksoni* was netted and jubilation was complete. The camp was very quiet and we missed our friends greatly. It was decided to move on, and by 9.30 a.m. the following day, 29th, we left a very lovely and happy campsite en route for Vila Gouveia. We drove up in the glade of the Amatongas where most of the *E. cooksoni* specimens had been caught, and we all got out of the car and looked about the bushes and trees. I saw one *E. cooksoni* roosting on a vine and yelled to Ken who caught it - a fine female - so one of my ambitions was achieved.

We stopped for supplies at Vila Pery and Gondola where we met a very attractive grey-haired woman who had just returned from a hunting trip, shooting elephant. She warned us of bad roads and worse bridges, and saying that the forests of Vila Gouveia were full of wild game, lions and so on, but these did not molest anyone. We women were most apprehensive of all that lay ahead. We got onto what was the only road to Tete in Nyasaland (now Malawi), and it was awful with pot holes, skid grooves, ruts and the caravan had a cruel passage. The bridges were quite crazy, the smaller ones were merely big logs placed from bank to bank with smaller logs laid across them, the gaps being filled with earth. We lunched on the north bank of the Mocambese river. We then crossed a long bridge, quite the most fantastic contraption imaginable. It was 3 sleeper-lengths in width. When on the other side we walked back to where Africans were mending a breach. The bridge was about 150 ft (about 4 7 m) long and consisted of felled trunks placed across 3 long, foot-wide concrete bars. Other trunks were laid across them and on top of this crazy pile were placed loose sleepers, cracked, broken and undermined by ants. In all we negotiated 3 long and eleven small bridges, each one a nightmarish experience, but most interesting. We crossed the lovely Pungwe River again on the pontoon. Hereabouts Ken was happy to net one *Neptis jordani* Neave. The country was more open, and we saw a herd of (about 70) cattle and the first we had seen in Portuguese East Africa (Mozambique). Much of the forested area had been devastated by fire, but elsewhere the msasas were a glory.

At the entrance to Vila Gouveia there was a great military encampment, where we saw hundreds of Africans in blue cotton uniforms breaking ranks after a session of drill on a vast tree-planted square. Great barracks stood on the left, and many white soldiers of various ranks were seen. From among these an English-speaking corporal was found and he directed us to the administrator's (magistrate's) office. We were enchanted with Vila Gouveia where streets were very wide, clean swept and lined with lemon trees. At the office, after considerable delay, Ken was interviewed by the administrator, who kindly offered to guide us to the campsite. This was a local pleasure resort about 2.5 miles (5.5 km) out of town and where a glorious river ran over great slabs of sloping rock. We camped in an open space near a swimming pool surrounded by lovely trees and ferns. Thankfully we went to bed by 7.15 after refreshments - what would we have done without Celestine?

We were rudely awakened by Ken at 5.30 a.m. (sunrise being 6.30) with coffee, and he dashed off up the mountain to explore, and came back in ecstasies with what he had seen. After breakfast we all went to bait the traps, explore and be shown the

local sights - the filtration plants. Then up steps round great rocks, until halfway up the hill we saw the most lovely and cascading waterfall. A little valley lay below, green with trees of incredible beauty and loftiness, ferns and flowers – a paradise of natural beauty. Butterflies - *Charaxes, Papilio* _and all the smaller species flying at about 100 ft (about 32 m), then soaring down and up again through the filtered sunlight.

Ken went off with his net while Ruth and I had refreshing bathes in cold rushing water, and then dried ourselves on the rocks in the sun. On his return a little later, Ken was most excited, and full of enthusiasm about the possibilities of the area. He went off again and we wandered about and THEN I caught a black and purple skipper, which turned out to be a rarity - *Platylesches affinisima* Strand, and Ken, who had never netted one, was most pleased. He returned later with a wonderful bag. After lunch he took us to see some magnificent red mahogany trees on the banks of a stream, after having first passed through a burnt bamboo belt, all beginning to sprout anew. The stream went rushing and tumbling over rocks and fallen trees - another paradise of ferns, flowers and butterflies flying from ground to tree tops, anything up to 120 ft (about 37 m) above. The mahogany trees were most majestic, with beautiful clear, clean trunks for about 40 ft (about 13 m), then with branches soaring into the blue. Sadly we also saw many felled, frightful wastage as only a section of 18-20 ft (6-7 m) was used and the rest left to rot. The sections got hand squared, then sawn by hand into great planks, about 18" x 2" (65 x 5 cm), on a rude support. On our return we found Senor (the local Administrator) and Senhora Bougarde inspecting work going on at the pool and round-abouts. They accepted an invitation to tea; both had some words of English and progress was made in friendship if not conversation.

The next morning, 31st, we went up to bait the traps. On the way we met the Bougardes with two little Bougardes and we were invited to dinner at their home at 7 p.m. We were asked if we should like some fruit, this offer was gratefully accepted, and half an hour later a basket of perfect lemons and tomatoes arrived followed by boxes of fresh oranges and grapefruit - what fruity luxury!

Ken returned after midday with some valuable specimens including one glorious *Cyrestis camillus sublineata* Lathy - white and gold, and two blues, (possibly new) rather like *Hypolycaena buxtoni* Hewitson. Later we swam, polished up· and prepared for our dinner date. While waiting we took out the cards and played a few hands of our usual game of cut-throat bridge - quite often a near thing!

At the Bougardes' home we met Senhora Bougarde Senior, recently out from Portugal, two friends of the family and all the children - Maria, Joanna, Edonardo, Antonia, Fernando and Maria Louisa. After a whisky (weeskie) and soda, we went in to dinner, served· very much -after our style - soup, fish and lettuce, foie-gras between times, roast beef and chips, all served and handed round by two liveried natives. We had delicious dry white wine, then port wine from the Oporto Cellars of Real & Cie, with sweets and fruit. Liqueurs were served with coffee at the table.

Conservation fairly sparkled in a mixture of Portuguese, French and English. A very happy (and successful) evening ended with "Boa noite, muito obrigado" from us and "Nie te dank" from them. Dates were made for lunch at the piscini for the morrow with our friends, and for sundowners with us in the evening.

I think it is time to say "good night", "bonne nuit and boa noite" -before returning to wanderings, butterflies and revelries - to say nothing of cut-throat bridge.

.... To be continued....

A NEW SPECIES OF *POECILMITIS* BUTLER (LEPIDOPTERA: LYCAENIDAE) FROM THE CAPE PROVINCE, SOUTH AFRICA

By A. Heath and J.B. Ball

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and

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Abstract. A new species of lycaenid butterfly, *Poecilmitis blencathrae* spec. nov., is described from the Cape Province of South Africa.

Introduction

This butterfly was discovered by Charles Wykeham whilst accompanied by Ingrid Hansen in December 1991 in high altitude fynbos on the Waaihoek mountains between Worcester and Ceres. . This is the forty-ninth species of the endemic South African genus *Poecilmitis* to be described. It is one of the orange members of the genus; lacking the blue colouration exhibited by many of its congeners.

This taxon is unique among its congeners in that it exhibits features from the orange members of the genus as well as from those with blue colouration. It is most similar to *P. wykehami* Dickson 1980, *P. endymion* Pennington 1963, *P. daphne* Dickson 1975 and *P. palmus* (Cramer, 1781).

Poecilmitis blencathrae spec. nov., Plate 1.

Diagnosis:

The upperside ground colour is a bright luminous orange without any blue present on either sex; there is very little basal darkening. Although it is perhaps more closely related to *P. wykehami,* it is a much larger insect, specimens comparing well in size to most *P. endymion.* The outer angle of the forewing apex is also similar to *P. endymion.* The apex and outer margin of the forewing upperside is very heavily blackened; in this respect alone it resembles *P. daphne,* particularly the female. In contrast, the hindwing upperside has very little black margination; both vein 7 and 8 are emphasised by lJlack scaling. In many specimens, particularly the males, the discal row of black spots is almost obsolete, thereby resembling the hindwing of *P. palmus,* however this spotting is a very variable feature and a few specimens do have bolder spots. The hindwing cilia are mainly orange and white with just a few black scales. The forewing cilia are black with white sagittal interneural intrusions; in most female specimens, this feature is more pronounced, particularly at the apex of the wing where the small white markings intrude slightly onto the wing surface itself. The underside is clearly marked in both sexes and similar to that of *P. endymion,* although possessing a lighter marginal area on the hindwing.

Description:

- **Male holotype.** Forewing length 15,2 mm; antenna-wing ratio 0,49. *Wings,*

upperside. Ground colour, a luminous orange with no trace of blue pigmentation. Forewing: a broad black outer margin extends from the tornus to a heavily blackened apex; inner edge of this marginal band irregular, 1,5 mm wide at the tornus, 3,5 mm in space 2, where it merges with the black quadrate spot. An orange submarginal quadrate spot interrupts tile black marginal band in space 3 and causes a reduction in its width to 2 mm, thereby isolating the proximally placed black postdiscal quad rate spot in space 3. Inner edge of black apical patch almost straight from vein 4 across to costa, ending just a little distad of the small costal spot in space 9 encompassing the apical spots, leaving only a trace of orange scales to indicate their distal edge. Only the spots in spaces 1, 3, 9 and the narrow but distinct cell spot isolated from the heavy black apex and margin. Very little basal darkening present except for some dark grey scaling extending almost 2 mm along inner margin. Cilia black with small white interneural marks; those at the apex somewhat more sagittate, with the points extending slightly onto the wing surface. Hindwing: a little dark grey scaling basally, extending along the abdominal fold where it divides to form a pincer shape. Veins 7 and 8 emphasized by fine black scaling, the discal row of black spots represented by a narrow black smear in 7, by a small black patch in 6, a narrow line in 5 and weak spots in 4 and in 3. Those in 4-7 being in a straight line. Outer margin fin ely black from the costa, weakening towards vein 3 and 2 where it is broken into blackened vein endings. A short black median line extends down the tornal tail to its tip. Cilia mostly orange and white except for a little black at the vein endings. *Underside*. Boldly marked and comparable with *P. endymion* except in. the following respects: Forewing submarginal black band is conjoined with spots in spaces 2 and 4; the sub-basal spot In space 1 discrete. Hindwing: submarginal neural 'fingers ' considerably lighter and hence less contrasting than in *P. endymion*.

- Male paratypes. Forewing lengths 11,6-16,6 mm, mean 14,0 mm. *Wings, upperside*. Similar to holotype but discal row of black spots on hindwings varies from almost obsolete to being quite bold. *Underside*. Generally similar to holotype. *Genitalia*. No significant differences were observable between the genitalia of this species and those of *P. wykehami* or *P. endymion*.

- Female allotype. Forewing length 17,0 mm; antenna-wing ratio 0,47. *Wings.* Similar to the male except for its considerably greater size and the following features. *Upperside.* Forewing: outer margin more convex, black apical patch more striking and black spots larger. Orange scales beyond apical spots are absent. White interneural cilia markings more striking, especially those at the apex. Hindwing: black outer marginal line slightly thickened interneurally in spaces 5 and 6; discal spots are bolder and vestigial spots also detectable in spaces 1, 2 and the end of cell. *Underside*. Similar to the male except for being much paler over the entire hindwing and also along the forewing outer margin.

-Female paratypes. Forewing lengths 13,7-17,0 mm, mean 15,2 mm. Wings. Generally similar to the allotype. *Genitalia*. No significant differences were observable between this species and other members of the genus.

Etymology

Named after the home of the late C.G.C. Dickson - 'Blencathra', at the specific request

of the discoverer of this butterfly, his nephew Charles Wykeham.

Material examined

Holotype ♂: SOUTH AFRICA, Waaihoek Mountain near Worcester, Cape Province, 26.i.1992, C.W. Wykeham. Allotype ♀: same data as holotype but 19.i.1992. Paratypes: same data but 1♂ 15.xii.1991; 9♂ 2♀ 19.i.1992; 11♂ 4♀ 26.i.1992, C.W. Wykeham; 7♂ 4♀ 26.i.1992; 2♂ 3♀ 3.ii.1992, J.B. Ball; 3♂ 4♀ 3.ii.1992, A.K. Brinkman; 2♂ 3♀ 8.ii.1992, A. Heath.
The holotype and allotype are in the Transvaal Museum, Pretoria; paratypes in the collections of C.W. Wykeham (Cape Town), J.B. Ball (Cape Town), A.K. Brinkman (Cape Town) and A. Heath (Cape Town).

Distribution and habitat

This insect flies close to the peaks on the Waaihoek Mountain between Worcester and Ceres in the Western Cape. It is found at an altitude of just over 1600 m (above the snow line) and the vegetation in the type locality is classified as mesic mountain fynbos (Moll *et al.,* 1984) and seldom exceeds 60 cm in height.

Acknowledgements

We wish to acknowledge the provision of material for examination by C.W. Wykeham and A.K. Brinkman.

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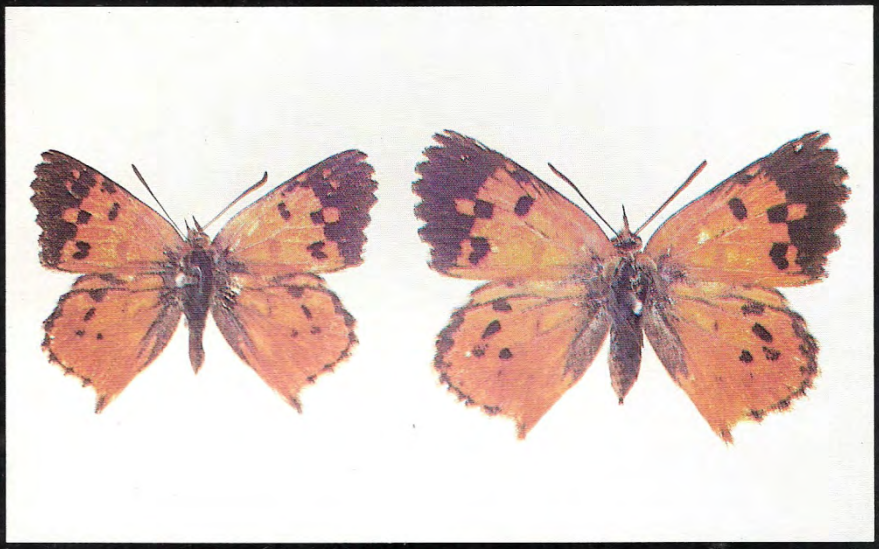
Plate 1



Poecilmitis blencathrae spec. nov.
Holotype male (left), allotype female (right).
Uppersides - top undersides - bottom

Photo A. Heath

Plate 2

a. *P. constantinus* - eggs

b. *P. constantinus* - 1st instar larva

c. *P. constantinus* 2rd instar larva

d. *P. constantinus* - 3rd instar larva

e. *P. constantinus*- 4th instar larva

f. *P. constantinus* - 5th instar larva

g. *P. constantinus*- pupa

h. *P. constantinus* - adult

A COMPARATIVE STUDY OF THE IMMATURE STAGES OF THE SOUTHERN AFRICAN SPECIES OF *PAPILIO* LINNAEUS AND AN ACCOUNT OF THE LIFE HISTORY OF *PAPILIO CONSTANT/NUS* (WARD), 1871 (LEPIDOPTERA: PAPILIONIDAE)

By J.G.Joannou

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Abstract. The life history of *P. constantinus,* the only outstanding Southern African *Papilio* is traced for the first time. This has enabled keys to be constructed which differentiate the early stages of the members of this group.

Introduction

The life histories of the bulk of the Southern African members of the genus *Papilio* have been known for some time - descriptions having been published by various authors from as long ago as 1911. In 1949, G. van Son, with input from G.C. Clark and others, conveniently covered all but *P. euphranor* Trimen and *P. constantinus* in Part 1 of his memoirs. Although the life history of *P. euphranor* was known from 1946, R.W. Wells' account was not published until 1957. The remaining member of this group has, until recently, maintained its secrecy regarding the early stages to all but a very few. It is perhaps, this insect's very specific host plant requirements that have been responsible for this. M.C. Williams (pers. com.) is of the opinion that *P. constantinus* will only lay on *Vepris reflexa* Verdoorn, having on many occasions, tried and failed, to induce it to lay on the more widespread *V. undulata* Verdoorn & Smith. A detailed account of the early stages is presented here, for the first time.

With this the closing of the final chapter of the Southern African *Papilio* life histories, it has now become possible, again, for the first time, to construct keys for the early stages of the group. The exercise has highlighted some possibly useful pointers for use in future taxonomic work.

A DESCRIPTION OF THE LIFE HISTORY OF *PAPILIO CONSTANTINUS*

Methods and materials

During a visit to Chuniespoort, Transvaal in January, S. Woodhall and M. Williams observed a female *P. constantinus* laying on *V. reflexa.* The insect was captured and returned to the Reef together with food plant. Two days later, in captivity, the female oviposited on the *V. reflexa* and six of the eggs were passed on to the author. The larvae on hatching were fed on *V. undulata,* which was readily accepted.

The species was reared indoors in sealed plastic containers. Foodplant, slightly in excess of requirement was given daily and any uneaten portions removed. This was increased in relation to volumes being consumed by the growing larvae, ensuring that at no point were they deprived of food . The container was cleaned every second day with a small brush to remove frass and food particles. After each cleaning session the container, covered with gauze to restrain the larvae, was allowed to stand open to aerate and be subjected to morning sunlight for fifteen minutes. The larvae were never physically moved from resting sites but if opportune, they would periodically be

temporarily housed elsewhere whilst the container was sanitised in hot (70°C) tap water. It was then dried and allowed to completely cool off before the larvae were re-introduced. The food plant was kept refrigerated (4° C) in airtight, sealed plastic bags and in this state lasted a week at a time.

Life history

Egg: Approximately spherical, pale yellow, measuring 1.2mm in diameter and laid singly on either surface of the leaf. Later if fertile the egg develops a brown spot in the area of the micropyle (although no such structure is actually visible) and two uneven rings develop, the upper of which is more pronounced. The egg stage lasts 4 days. See plate **2a**.

1st instar: On hatching, the 3mm larva consumes only a portion of the egg shell. The head is brown and tucked in below a fold of the 1st segment making it visible only when extended for feeding. NB This habit is consistently adopted by all the larval stages. The ground colour of the 1st, 2nd, 6th, 7th, 11th, 12th and last segments is yellow, dorsally marbled with various shades of brown. The 3rd, 4th and 5th segments are brown variegated by lighter shades of the same colour. Laterally the 5th segment is invaded by the yellow colour of the 6th and 7th. The 8th, 9th and 10th segments are again brown with burnt orange dorsal markings. As with the 5th segment, the 10th is laterally invaded by the yellow colour of the last three segments. The 1st segment bears two pairs of setose processes, one small and insignificant, the other very pronounced. Due to the larva's habit of head tucking these are projected forwards. The setal papillae of the 2nd, 3rd and 4th segments although smaller than the processes of the 1st, are also prominent. The 12th segment bears a pair of posterior projecting processes whose ends are setose. Duration of the first instar is 4 days growing to 8mm. See plate **2b**.

2nd instar: The larva now has a waxy appearance with the markings much the same as previously. There are however colour changes, the head is pea green while the previously brown and yellow portions are now olive and off white respectively. There is also the appearance of an additional smaller pair of posterior processes on the 11th segment. Sky blue dots develop dorsally and sub-dorsally, adjoining the setae but only on the dark coloured areas. These remain present in all the latter instars.
The second instar lasts 4 days and grows to 15mm. See plate **2c**.

3rd instar: The 2nd, 3rd and 4th segments are enlarged. The larva now has a lustrous appearance and is darkly blotched olive green in colour with white markings. These only extend dorsally on the 6th and 7th segments, but laterally also occur on the 1st, 2nd, 5th, 6th, 7th, 10th, 11th and 12th segments. The processes on the 1st, 11th and 12th segments are pale yellow. The 3rd instar grows to 21 mm in 4 days. See plate **2d**.

4th instar: No major differences occur in the 4th instar apart from a lightening of the green and reduction in the extent of the white: This stage lasts 5 days and attains a length of 26mm. See plate **2e**.

5th instar: The final instar is finely mottled green with remnant white markings laterally on the 5th, extending dorsally to the 6th and 7th segments. The processes on the 12th segment remain prominent but are now glabrous whilst those on the 11th are reduced to small moles. The smaller pair of processes of the 1st segment disappears and the remaining pair becomes glabrous and lemon yellow in colour. They are adjoined by a lateral white stripe of the same width extending to the prothoracic

segment. There is a lateral ocellus on the 3rd segment. The 5th instar grows to 33mm in 7 days. See plate **2f**.

Pupa: Pupation occurs in a suitable site on the foodplant, often a stem or leaf petiole inclined at 45 degrees to the vertical. The cremaster is attached to a pad and the pupa is held in a horizontal position by a girdle. It is light green in colour with a pale yellow lateral stripe extending from the cremaster to just short of the eye. The pupa is tapered at both ends and depressed dorso-ventrally particularly at the margins. The head is well defined and bears a bifid process. Measured laterally as a straight line the length from cremaster to tip of the cephalic process is 33mm. The pupal stage lasts 13 days. See plate **2g**.

Results

The resulting imagines (see plate 2h) were compared for size against wild caught cabinet specimens and were well within the range of the latter. By extension, it can be taken that the dimensions given for the various instars and pupa would approximate those of naturally breeding populations.

KEYS TO THE FINAL INSTAR LARVAE AND PUPAE

With the life history of *P. constantinus,* the last undescribed Southern African *Papilio* now completed, it has become possible to construct keys for the differentiation of the various members within this group. The marked similarity of the early larval instars would require too fine an analysis and the keys therefore, are based only on the final instar larvae and the pupae. Although microscopic analysis of the first instar larvae might prove to be a better diagnostic tool in taxonomic studies, the keys presented here are intended more as an aid to identification of material in the field.

KEY TO FINAL INSTAR *PAPILIO* LARVAE

1 Conspicuous, paired tubercles on thoracic segments ..... *Graphium* species
- Without tubercles on thoracic segments 2

2 Raised, transverse bands on meta-thoracic and 1st abdominal segments.... 3
- Without transverse bands on meta-thoracic and 1st abdominal segments…. 6

3 Thoracic shield present …… 4
- Thoracic shield absent …….. 5

4 Feeding on Rutaceae; raised band on metathoracic segment containing yellow dots …… *P. nireus*
-.Feeding on Lauraceae; raised band on metathoracic segment containing orange-red dots ..... *P. euphranor*
5 Conspicuous ventro lateral stripe ..... *P. demodocus*
- Ventro lateral stripe absent ..... *P. ophidicephalus*

6 Eye spot insignificant or lacking ..... *P. echerioides*
- Metathoracic eye spot present..... 7

7 6th and 7th segments dorsally weakly suffused with white; small but visible blue spots dorsally and sub dorsally; small paired moles on 11th segment ..... *P. constantinus*
- 6th and 7th segments dorsally strongly suffused with white; conspicuous sky blue spots dorsally and sub dorsally; no moles present on 11th segment .... *P. dardanus*

KEY TO *PAPILIO* PUPAE

1 Thoracic keel almost reaching or extending beyond ends of cephalic processes; body wedge shaped, terminating sharply: posteriorly..... *Graphium* species
- Thoracic keel, if present, well below cephalic processes; body attenuated both ends ……. 2

2 Viewed dorsally, distinct thoracic abdominal waist with conspicuous, progressive, lateral widening of the ensuing segments. Widest at the 4th abdominal segment- (+1.3 times wider than the waist)..... 3
- Waist absent, or if present, in-distinct and un-accompanied by any marked lateral widening of the ensuing abdominal segments..... 5

3 Cephalic processes lateral facing..... *P. nireus*
- Cephalic processes anterior facing..... 4

4 Dorsal plane strongly curved ..... *P. echerioides*
- Dorsal plane (excluding thoracic keel) more or less a straight line ... *P. euphranor*

5 Thoracic projection present..... 6
- no thoracic projection, thorax evenly curved 7

6 Dorsal median and central lateral surfaces textured, otherwise more or less smooth..... *P. demodocus*
- All surfaces textured, bark-like... ..... *P. ophidicephalus*

7 Cephalic processes distinctly bifid..... *P. constantinus*
- Cephalic processes anteriorly fused to form pointed cone shaped projection..... *P. dardanus*

Discussion

As can be seen from the keys, the final instar larvae and pupae of the Southern African members of the genus *Papilio* may easily be differentiated from each other and from the genus *Graphium* Scopoli. Apart from morphological differences between the two genera it should also be noted that the former use species of *Rutaceae, Lauraceae, Ptaeroxylaceae, Sapindaceae* and *Umbellifereae* whilst *Graphium* species have only ever been observed laying on *Annonaceae* and one isolated record of *Malpighiaceae.*

It can be seen from the keys of both the larvae and the pupae that some sort of taxonomic sequence is evident. It was felt that this aspect should be expanded upon by evaluating and tabling the characteristics used. The evaluation of these characters,

was influenced by the presence or absence of these features in the closest related groups. As the *Papilionidae* are at the taxonomic extreme of the superfamily, the bias towards the *Pieridae* was unavoidable. In attempting to use these features to demonstrate relative distance from, or proximity to, the Southern African *Pieridae,* it was felt that not all characters should carry the same weight. However, applying accurate ratios was deemed to be beyond the scope of this work and a somewhat simplistic approach was adopted viz.

Characters consistently absent or consistently present in the comparative group..... Value 2
Characters usually absent or usually present in the comparative group.... ... . Value 1
Characters more or less evenly absent or present in the comparative group..... Value 0

The characteristics are summarised below:-

Always absent in *Pieridae* :
- Larvae: Raised bands on metathoracic and first abdominal segments.
  Thoracic shield.
  Eye spots laterally on metathoracic segment.
- Pupae: Distinct thoracic abdominal waist with exaggerated, progressive, lateral widening of the first four abdominal segments.
  Laterally pointing cephalic processes.

Usually present in *Pieridae* :
- Larvae: Dorsal and sub dorsal spots.
- Pupae : Dorsal plane curved.

Present/absent in *Pieridae* :
- Larvae: Ventro lateral stripe.
- Pupae: Thoracic projections.
  Coarse texture.

The table below depicts the arbitrary values so allocated.

	Character	In Pieridae		In Papilionidae	
A	Raised bands	Absent	0	Present	2
B	Thor. Shield	Absent	0	Present	2
C	Eye spots	Absent	0	Present	2
D	Waist	Absent	0	Present	2
E	Ceph. process	Facing ant.	0	Facing lat.	2
F	Spotting	Present	0	Absent	1
G	Dorsal plane	Curved	0	Straight	1

Taking the values from the previous table and extending them for each species, the sequence appearing in the keys is approximated thus .....

	A	*B*	*C*	*D*	*E*	*F*	*G*	*TOTALS*
NIREUS	2	2	2	2	2	1	1	**12**
EUPHRANOR	2	2	2	2	1	1	1	**11**
DEMODOCUS	2	0	2	0	0	1	1	**6**
OPHIDICEPHALUS	2	0	2	0	0	1	1	**6**
CONSTANTINUS	0	0	2	0	0	0	1	**3**
DARDANUS	0	0	2	0	0	0	1	**3**
ECHERIOIDES	0	0	0	2	0	0	1	**2**

Conclusion

Such postulations are of course open to criticism. Although these are valid features, either present or absent in the two families, their relative taxonomic worth is difficult to quantify. The above table indicates the possibility of three species groups within the genus but beyond that, the illustration of distance from (NIREUS = 12) or proximity to (ECHERIOIDES = 2) the Pieridae, is not intended as an absolute statement. It is rather intended to demonstrate an opinion that the immature stages should play a far greater role in phylogenetic studies.

Acknowledgements

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

I. Genus *Pontia*

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Abstract. The bursae copulatrix of five species of *Pontia* were morphologically described and numerically analysed. There is no appendix bursa in two species. The shapes of signa are different according to species. In particular, the signum of *P. daplidice* is shaped like a belt. The inner surface processes are spindle-like and the inner surface folds are not strongly developed. Twenty-one qualitative characters were selected and phenograms of *Pontia* were obtained from the data.

Key Words: *Pontia,* Bursa copulatrix, Phenogram

Introduction

Pontia is a genus belonging to the Pierinae. Four or more species have been recorded around the world and most of them are distributed in the Palearctic Region (Smart, 1978). Some research has been done on the biology and morphology of *Pontia* (Albert, 1971; Yata, 1981). From Korea, two species have been recorded (Seok, 1973; Kim, 1976; Lee, 1982). A morphological study on *Pontia* from Korea has been carried out by Cheong and Lee (1989). In spite of the fact that the number of species of this genus is so few, very few comparative morphological studies have been performed.

In this study, five species from different localities in the Palearctic Region were morphologically compared and were numerically analysed. The bursae copulatrix of female genitalia were dissected and the macro and micro structures were observed under a stereoscopic and a scanning electron microscope respectively (Dawes, 1984). The qualitative characters selected from the female genitalia were numerically analysed by various clustering methods and phenograms of the genus *Pontia* were constructed using these characters (Gordon, 1981; Dunn & Everitt, 1982). Through this study, the characteristics of each part of the bursa copulatrix was described and the phenetic relationship between the species was established.

Results

1. *Pontia sisymbrii* (Figs. 1-1, 2-1, 3-1)

The corpus bursa spherical, without appendix bursa; the length of the ductus bursa 2,0 mm. The signum at the neck; signum short ribbon-like and constricted. Inner surface folds developed, with spindle-like inner surface processes.

2. *Pontia daplidice* (Figs. 1-2, 2-2, 3-2)
The corpus bursa spherical; the length of the appendix bursa about a third of the corpus bursa; the length of the ductus bursa 1, 7 mm. The signum at the neck; signum belt-like and straight. Inner surface folds strongly developed, with spindle-like inner surface processes.

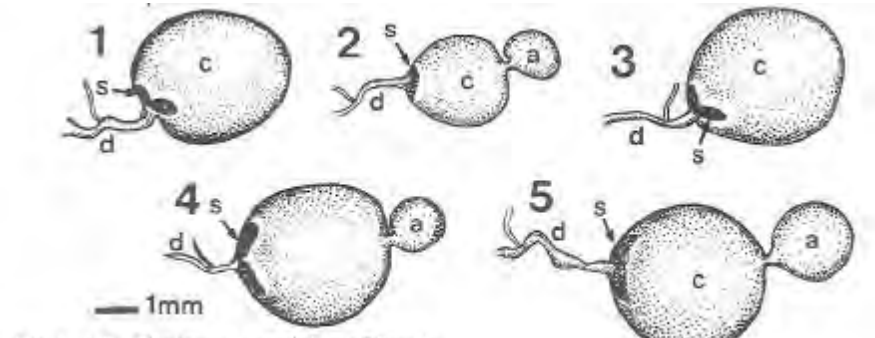


Fig. 1. 1-5. The bursa copulatrix of *Pontia*.

1 : *P. sisymbrii;* 2 : *P. daplidice;* 3 : *P. beckerii;*
4 : *P. protodice;* 5 : *P. occidentalis*

3. *Pontia beckerii* (figs. 1-3, 2-3, 3-3)
The corpus bursa spherical, without appendix bursa; the length of the ductus bursa 2,0 mm. The signum at the neck; signun1 ribbon-like and constricted. inner surface folds undeveloped, with spindle-like inner surface processes.

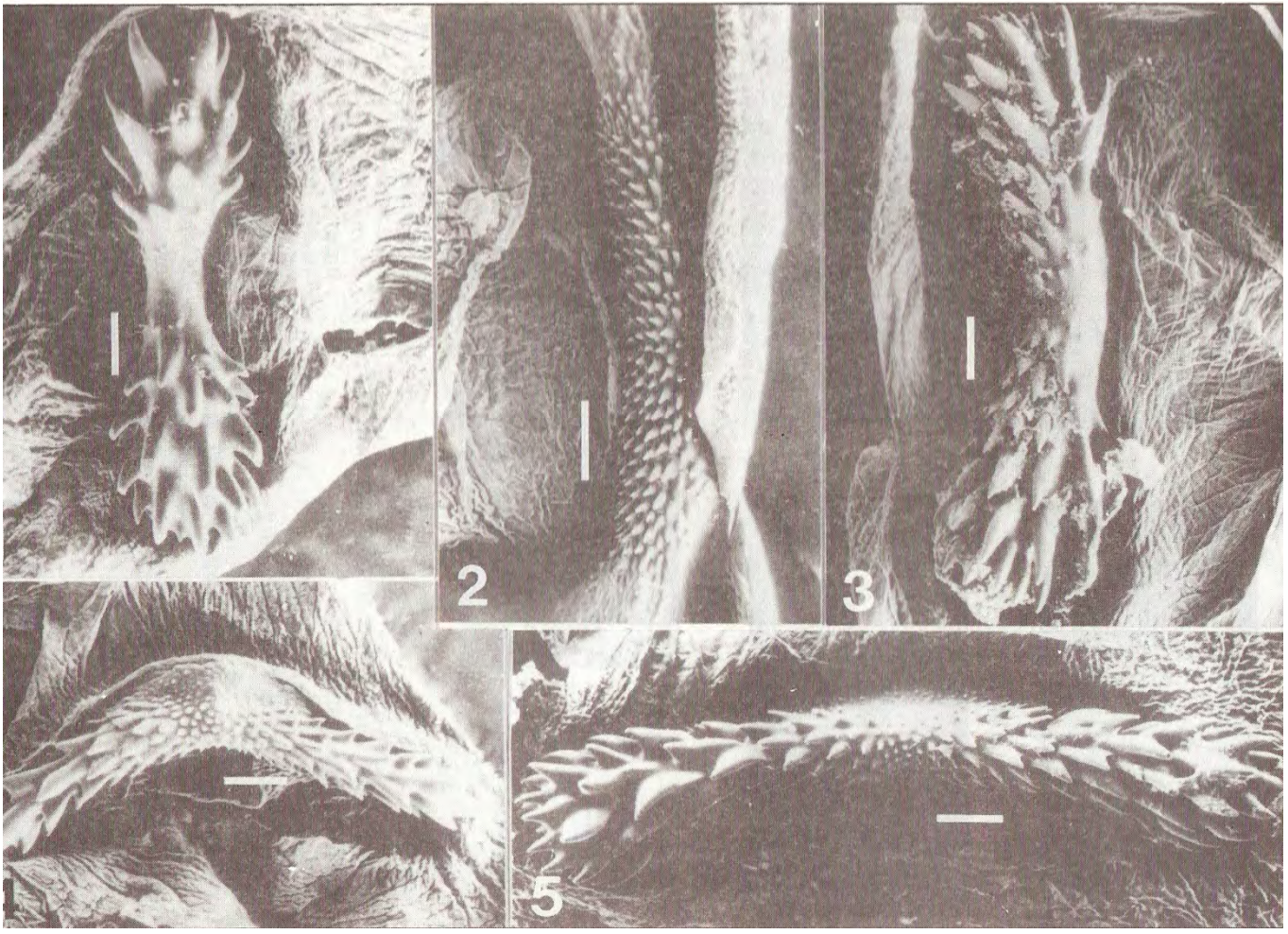
4. *Pontia protodice* (figs. 1-4, 2-4, 3-4)
The corpus bursa spherical; the length of the appendix bursa about a third of the corpus bursa; the ductus bursa curved and the length 1,5 mm. The signum at the neck; the signum curved and slender at both ends; fine spines on the middle part of the signum. Inner surface processes spindle-like.

5. *Pontia occidentalis* (figs. 1-5, 2-5, 3-5)
The corpus bursa spherical; the length of the appendix bursa about half of the corpus bursa; the ductus bursa curved and the length 2,7 mm. The signum at the neck; signum slender, curved and ribbon-like; fine spines on the middle part of the signum. Inner surface folds weakly developed, with spindle-like inner surface processes.

Figs. 2. 1-5. The signa of *Pontia* (opposite)

1. *P: sisymbrii* 2. *P. daplidice* 3. *P. beckerii*
4. *P. protodice* 5. *P. occidentalis*

Scale bars : 10 µm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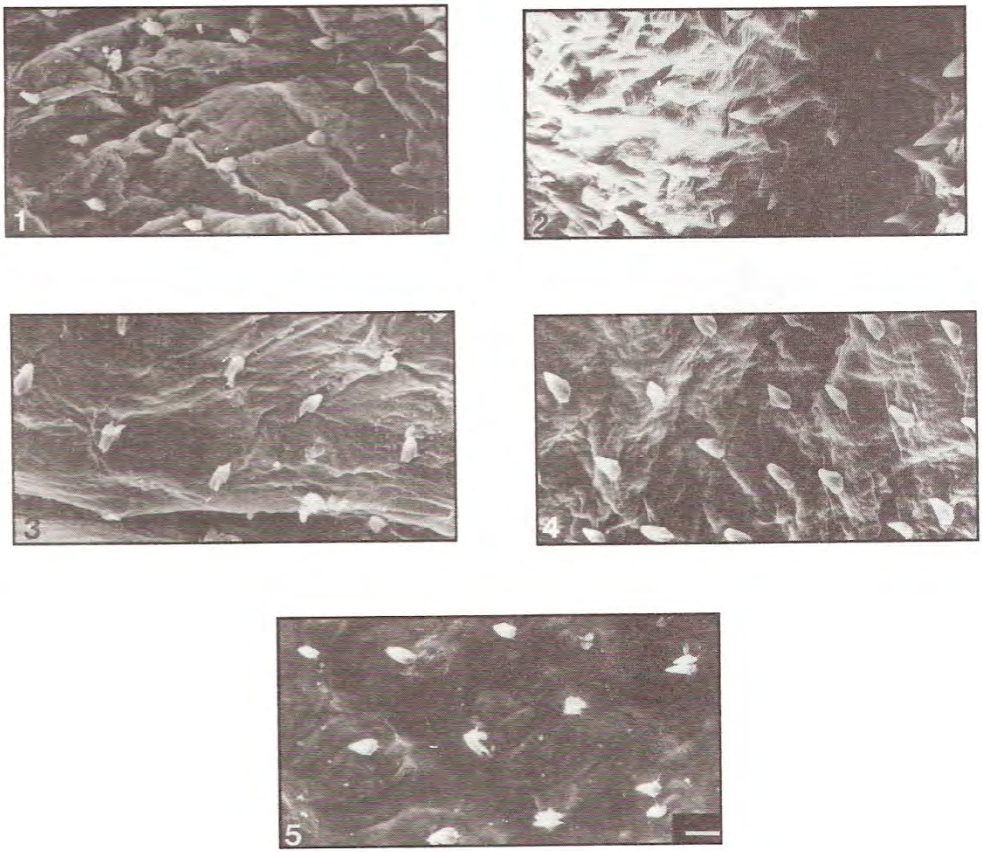
5



Figs 3. 1∽5. The inner surface processes of *Pontia*.

1. *P. sisymbrii* 2. *P. daplidice* 3. *P. beckerii*
4. *P. protodice* 5. *P. occidentalis* scale : 10 μm

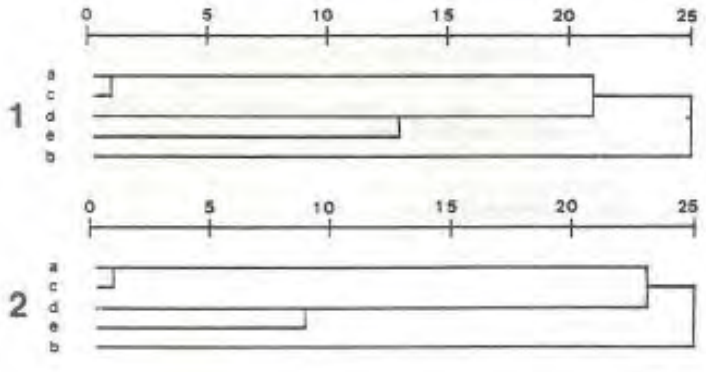


Fig. 4. 1-2. Phenograms obtained from bursa copulatrix of *Pontia*

1. Single linkage. 2. Complete linkage. a - *P. sisymbrii;* b - *P. daplidice;* c - *P. beckerii;* d - *P. protodice;* e - *P. occidentalis.*

Table 1. The characters from bursa copulatrix of *Pontia*

1. with appendix bursa
2. appendix bursa longer than 1 /3 of corpus bursa
3. appendix bursa longer than 1 /2 of corpus bursa
4. ductus bursa curved
5. corpus bursa spherical
6. with signum
7. signum vertical
8. signum at the neck
9. signum curved
10. signum straight
11. signum ribbon-like
12. signum belt-like
13. signum constricted
14. signum slender at both ends
15. with fine spines on the middle part of signum
16. with spindle-like inner surface processes
17. inner surface folds developed
18. inner surface folds undeveloped
19. inner surface folds strongly developed
20. lengths of processes about 1 um
21. with paired processes

Numerical Analyses

Twenty-one qualitative characters were selected from the bursa copulatrix of *Pontia* (Table 1). Character states were analysed by using various clustering methods. The phenetic relationships among the species were illustrated by using dendrograms (Figs. 4-1 2). *P. sisymbrii* and *P. beckerii* were most closely related-to each other, and *P. daplidice* most distantly. *P. protodice* and *P. occidentalis* appeared as somewhat similar species. The results were the same in both clustering methods except for small differences at the combining level.

Discussion

The structure of the bursa copulatrix of *Pontia* is heterogeneous. The corpus bursae of two species lack an appendix bursae. This case is unusual in Pieridae as most females of Pierid butterflies tend to have appendix bursae. The signa are positioned at the cervix and they are apomorphic. Spherical spermatophores are scraped by cervical signa and free sperms can be directly introduced to the ductus bursae. Signa of *P. sisymbrii* and *P. beckerii* are similar in their shapes, and the spines on the signa are big and strong. Signa of *P. protodice* and *P. occidentalis* are rather similar to each other but not as close as in the previous example. The region of differentiation of the spines is situated in the centre of the signum. It is believed that the fine spines developed at the centre and spread to both poles. In four species, the signa are more or less curved and they can scrape a large region of spermatophores. The signum of *P. daplidice* is peculiar and projects into the lumen and surrounds half the entrance of the corpus bursa. The spines on the signum form a symmetric pattern. The inner surface processes are similar in all the species, however, *P. daplidice* bears bigger and stronger ones than those of the other species.

From cluster analyses, the close relationship between *P. sisymbrii* and *P. beckerii* is caused mainly by the absence of appendix bursae and the constricted ribbon-like signa. *P. daplidice,* as can be seen from the discussion above, differs from the other species in all characters investigated. It therefore appears that the internal female genitalia can be used to discriminate between the different species in the genus *Pontia.* It can also be concluded that the morphoevolutional rate for the female organs is different for the various species in the genus.

Acknowledgements

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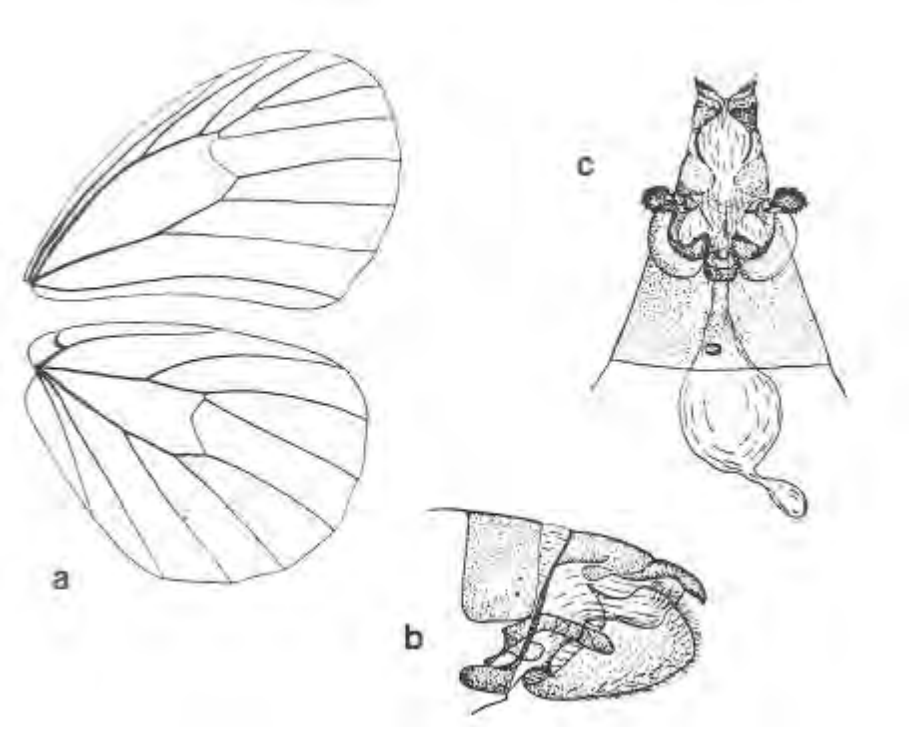


Pontia helice (Linnaeus)
a - wing venation; b - male genitalia; c - female genitalia (after van Son, 1949).

PHYLOGENETIC NOTES ON THE AFRICAN SPECIES OF THE SUBFAMILY ACRAEINAE - PART 1

(Lepidoptera: Nymphalidae)

By G.A. Henning

17 Sonderend Str., Helderkruin, 1724.

The phylogeny of the subfamily is discussed and four new subgenera are described. The subfamily Acraeinae is analysed and an alternative arrangement to that of Pierre 1987a is presented. The hypothetical development of the Tribe Acraeini is discussed. In selecting one primary characteristic (the male aedeagus), it is hoped the phylogeny of the subfamily will be simplified.

Key Words: *Acraea;* taxonomy; phylogeny; subgenus.

Introduction

The genus *Acraea* was described by Fabricius in 1807. The distinguishing characters of the subfamily are the well-developed lower discocellulars of the hindwings (as in Satyrinae and Danainae) but without vein A3 in the forewing (present in Danainae). There is a total lack of an anal fold on the hindwing. The subcostal vein is never swollen at the base. The cells of all wings are closed.

The first grouping within the subfamily was undertaken by Doubleday (with Hewitson and Westwood) in 1848 when he divided *Acraea* into six named groups, but the characters used were unsatisfactory. Mabille in 1885 then divided *Acraea* into four groups based on the genitalia. The comprehensive monograph by Eltringham 1912 on the genus *Acraea* divided it into nineteen groups, while Aurivillius (Seitz 1925) made three groups and many sub-groups.

Van Son 1963 divided the species from the southern African region into twenty three groups based on the genitalia. The genera *Bematistes* and *Pardopsis* were kept separate. Other works have grouped the species systematically but not defined species-groups.

Pierre 1987a determined an arrangement which divided *Acraea* into two subgenera, synonymised the genus *Bematistes* and changed the status of genus *Actinote* to that of a subgenus. Within these subgenera he further divided them into six super-groups under subgenus *Actinote* and five super-groups under subgenus *Acraea.*

Henning (1986) found, while researching the genus, that the male genitalia, particularly the aedeagus, showed apparently valuable phylogenetic characteristics. Other characters are certainly valid and do have a strong bearing on the phylogeny of the genus and most of these have been dealt with by Pierre 1987a.

The initial work in this paper was done without reference to the paper by Pierre (1987a) and it was gratifying to see the many similarities in our respective conclusions.

Method

The approach followed here is somewhat simpler than Pierre 1987a and retains the *Bematistes* and *Actinote* as separate genera and divides the genus *Acraea* into three subgenera. *Hyalites* is raised to generic status based mainly on the male pterothoracic claws, *Hyalites* is further divided into four subgenera. A cladistics analysis of the genera is also done.

In the phylogenetic analysis I am primarily using the male genitalia in gradations of width, place more emphasis on some symplesiomorphs (ancestral characters) than does Pierre 1987a. All the synapomorphs (derived characters) used by Pierre 1987a are accepted, the only change being that of the *cerasa* group of two species which I treat differently.

Taxonomy of the Acraeinae

FAMILY NYMPHALIDAE - SUBFAMILY ACRAEINAE

TRIBE ACRAEINI

SUBTRIBE ACRAEINA

GENUS *Acraea* Fabricius 1807
Subgenus *Acraea* Fabricius 1807
Subgenus *Rubraea* (subgen. nov.)
Subgenus *Stephenia* (subgen. nov.)
GENUS *Bematistes* Hemming 1935 (stat. rev.)

SUBTRIBE ACTINOTINA

GENUS Actinote Hübner 1819 (stat. rev.)
GENUS *Hyalites* Doubleday 1848 (stat. rev.)
Subgenus *Hyalites* Doubleday 1848 (stat. rev.)
Subgenus *Pareba* Doubleday 1848 (stat. rev.)
Subgenus *Aurora* (subgen. nov.)
Subgenus *Alacria* (subgen. nov.)

TRIBE PARDOPSIDINI

GENUS *Pardopsis* Trimen 1887.

KEY TO THE TRIBES OF ACRAEINAE

1. Forewing veins M 1 and M2 separated; radial stalk arises from upper angle of cell; paronychia and pulvilli absent ..... Acraeini
- Forewing veins M 1 and M2 connate; radial stalk arises from cell before upper angle; paronychia and pulvilli present .... Pardopsidini

KEY TO THE SUBTRIBES OF THE TRIBE ACRAEINI

1. Claws of male pterothoracic legs with inner furrow; aedeagus narrow; juxta not subtriangular, vinculum not 'v' shaped; primary foodplant Passifloraceae …… Acraeina
- Claws of male pterothoracic legs without inner furrow; aedeagus not narrow; juxta subtriangular; vinculum 'v' shaped; primary foodplant Urticaceae ..... Actinotina

KEY TO THE GENERA OF THE TRIBE ACRAEINI

1. Base of hindwing underside without black spots and with interneural lines; veins often heavily darkened; blue scaling present in some species; forewing radials arched ..... *Actinote*
- Base of hindwing underside with black spots and without interneural lines; veins not heavily darkened; blue scaling not present in any species; forewing radials not arched 2
2. Forewing, all radials stalked; cell of hindwing short being slightly more than a third of the total wing length; pupa with paired dorsal processes on first four abdominal segments …….. *Bematistes*
- Forewing, R1 given off from cell; cell of hindwing about half the total wing length; pupa without abdominal processes 3
3. External claw of pterothoracic legs has a hollow longitudinal furrow on the inner surface, aedeagus narrow ..... *Acraea*
- External claw of pterothoracic legs without a furrow, aedeagus not narrow..... *Hyalites*

KEY TO THE SUBGENERA OF THE GENUS *ACRAEA*

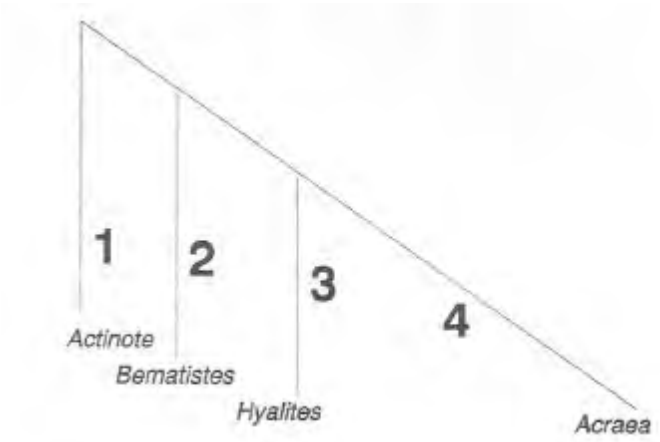
1. Aedeagus thin, needle-like ..... *Acraea*
- Aedeagus narrow but not needle-like 2
2. Aedeagus anteriorly bifid .... *Rubraea*
- Aedeagus not anteriorly bifid …..... *Stephenia*

KEY TO THE SUBGENERA OF THE GENUS *HYALITES*

1. Hindwing with a rudimentary vein between second anal and second cubital veins 2
- Hindwing without rudimentary vein 3
2. Hindwing underside without basal spots; M1 generally arising from radial stalk ……..... *Pareba*
- Hindwing underside with basal spots; M1 and radial stalk connate ….. *Aurora*
3. Claws of male pterothoracic legs asymmetrical; aedeagus distally rounded or acute ..... *Hyalites*
- Claws of male pterothoracic legs symmetrical; aedeagus distally truncate ..... *Alacria*

Subgenus (undetermined) ·- *actinotina*

CLADOGRAM OF GENERA IN TRIBE ACRAEINI



CLADISTIC ANALYSIS

1. [Primary foodplant is Asteraceae]; [base of hindwing underside without basal spots] but with black intemeural stripes; [aedeagus narrow distally broadening slightly anteriorly]; vinculum 'v' shaped; juxta subtriangular; [blue scares present in some species]; veins darkened; [hindwing marginal spots and hyaline portions of wing absent]; [rudimentary vein A3 present]; [forewin6 radials prominently arched]; cell of hindwing long; [palps black]; [larval headshield can be densely spined]; [pupa has two rows of short spines on the dorsum of the abdomen]; terminal segment on male anterior legs short; [claw on male pterothoracic legs without longitudinal furrow], asymmetrical.
2. Primary foodplant is Passifloraceae; base of hindwing with black spots; aedeagus narrow; blue scales not present; [hindwing marginal spots and hyaline portions of wing absent]; rudimentary vein A3 not present; forewing radials stalked;[cell of hindwing short]; [palps black] with white stripe; larval headshield smooth; [pupa with long processes on dorsum of abdomen]; anterior legs of male terminate in a small spine; claw on male pterothoracic legs with longitudinal furrow, asymmetrical.
3. Primary food plant *is* Urticaceae; base of hindwing with black spots [absent in one subgenus]; aedeagus broad; vinculum 'v' shaped; juxta subtriangular; blue scales not present; marginal spots present on hindwing underside in some species [some groups have no marginal spots]; portions of wings can be- hyaline due to scale structure or density; [rudimentary vein A3 present in some species]; forewing radials not prominently arched or stalked; cell of hindwing long; palps ochreous with black hairs; larval headshield without spines; pupa without spines or processes;[claw on male pterothoracic legs without longitudinal furrow], asymmetrical or symmetrical [symmetrical claws in one subgenus].

4. Primary foodplant Passifloraceae; base of hindwing with black spots; aedeagus narrow; blue scales not present; marginal spots present on hindwing underside in most species; portions of wings can be hyaline due to scale structure or density; [rudimentary vein A3 present in very few species}; forewing radials not prominently arched or stalked; cell of hindwing long; palps ochreous with black hairs; larval headshield without spines; pupa without spines or processes; claw of male pterothoracic legs with longitudinal furrow, asymmetrical; modified 8th sternites or tergites, or both, in some groups.

Synapomorphic characters included above were weighted in the following order:
1. Aedeagus.
2. Radials on forewing.
3. Cell of hindwing.
4. Furrow in claw on male pterothoracic legs
5. Basal spots on hindwing underside.
6. Vinculum and juxta.
7. Foodplant.
8. Anterior legs.
9. Larval headshield.
10. Pupa.
11. Rudimentary vein A3.
12. Blue scales.
13. Marginal spots and hyaline wings.
14. Palps.
15. Modified 8th sternites and tergites.
16. Veins darkened.

The female genitalia and scales are not included in the above but are included in descriptions below and are dealt with in more detail by Pierre 1987a.

Symplesiomorphic characters in clades above are indicated in square brackets [ ]. Expressed in terms of 1 for present or derived and 0 for not present or derived, the clades can be defined as follows for the genera based on the 16 characters listed above.

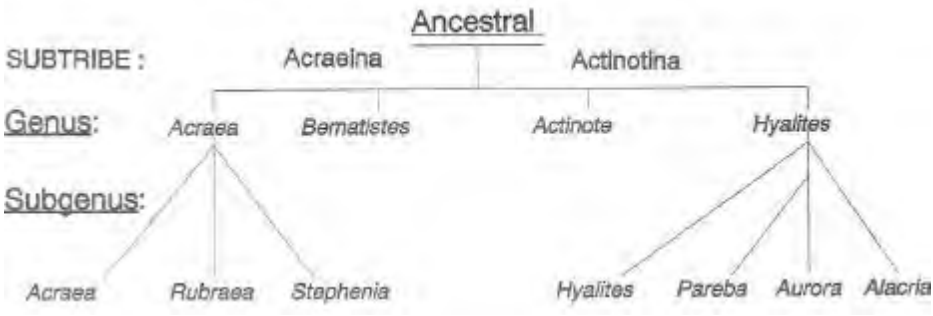
Actinote	0010000100000001
Bematistes	1101111010111000
Hyalites	1110101111011100
Acraea	1111111111111110

Other symplesiomorphic characters not included above are the dark internervular marginal lines on the hindwing underside and the dark transverse forewing band found in some species. The lack of spots (except on the base of the hindwing which is dealt with above) is also a factor.

These characters were determined by their occurrence in both South American and African genera or in the tribe Pardopsidini or other Nymphalidae such as the Heliconinae and Argynnini (Nymphalinae).

The following cladogram gives the apparent development based on the above cladistic analysis and resulting in the aedeagus being narrower on the left and becoming progressively broader to the right.

Tribe: ACRAEINI



TAXONOMIC NOTES ON THE TRIBE ACRAEINI

Subtribe ACRAEINA Fabricius 1807

Type genus *Acraea* Fabricius 1807

Legs: External claw of male pterothoracic legs has a longitudinal furrow.
Male genitalia: Vinculum long, not 'v' shaped; juxta elongate, not subtriangular; aedeagus narrow.
Female genitalia: Sub-pupillary gland not developed anteriorly; two terminal glands; ductus sclerified (due possibly to narrow aedeagus); bursa spherical generally with signa.
Foodplants: Principal foodplant Passifloraceae.

Genus *ACRAEA* Fabricius 1807

Type species: *Papilio horta* Linnaeus 1764 (selected by Scudder, 1875). An African and Indo-Australian genus.
Palps: Ochreous with some black ribbon-like scales.
Legs: Anterior legs without terminal spine. External claw of male pterothoracic legs has a hollow longitudinal furrow on the inner surface. Claws of male pterothoracic legs asymmetrical.
Wing venation: Radials not stalked; cell of hindwing half the length of the wing.

Subgenus *Acraea* Fabricius 1807

Male genitalia: Aedeagus thin, needle like; modified- tergites or sternites often present; valves elongate, broad basally, may be inwardly curved or have inward projections; uncus beak-shaped and elongate.
Female genitalia: Ductus short, of even width and sclerotized; paired signa very small or absent; sterigma usually large plate; in *satis* modified 8th tergite and sterigma possibly perform copulatory function therefore no sternite present; bursa copulatrix spherical.
Early stages: Egg short, ovoid, almost as broad as it is high.
Foodplants: Passifloraceae, Turneraceae, Malvaceae, Theaceae, Flacourtiaceae,

Violaceae, Vitidaceae, Acanthaceae, Celastraceae.

Subgenus *Rubraea* **subgen. nov.**

Type species: *Papilio egina* Cramer 1775.An exclusively African subgenus. This subgenus was revised by Pierre 1988 as a super-group.
Wings: All species with clearly defined marginal spots on the hindwing underside. Hyaline patches absent.
Male genitalia: Aedeagus not thin and needle-like; the *acrita* group is thin distally but basally massive; aedeagus anteriorly strongly bifid. The valves are not narrowed distally and may have prominent projections or processes posteriorly. Highly modified 8th tergite present in *acrita* group.
Female genitalia: Sterigma a convex plate with U shaped ridges with the ostium placed at the anterior end; ductus short; bursa rounded with signa small or absent.
Early stages: Eggs conical and about three quarters as broad as it is high.
Foodplants: Passifloraceae, Turneraceae, Flacourtiaceae.

Subgenus *Stephenia* **subgen. nov.**

Type species: *Papilio caecilia* Fabricius 1781.
An exclusively African subgenus.
Wings: All species with clearly defined marginal spots on the hindwing underside; hyaline patches restricted to subapical area of forewing.
Male genitalia: Aedeagus and sclerotized saccus elongate; valves comparatively short and angular, distally broad; uncus short; saccus pronounced.
Female genitalia: Sterigma produced posteriorly; ductus long; bursa round with paired small rounded spinose signa.
Early stages: Egg; conical, two thirds as broad as it is high, flat topped.
Foodplants: Passifloraceae, Turneraceae, Malvaceae, Flacourtiaceae, Tiliaceae

GENUS *Bematistes* Hemming 1935a stat. rev.

Type species: *Papilio epaea* Cramer 1779 (selected by Scudder, 1875).
An exclusively African genus which, up until Pierre 1987a, had been considered a well-characterized genus.
Palps: Black with lateral white line.
Legs: Anterior legs of male with terminal spine; pterothoracic claws of male asymmetrical. External claw with longitudinal furrow.
Wing venation: All radial veins of forewit1g stalked; R1 arising fron1 beyond the upper angle: Cell of hindwing short, being slightly more than a third of the wing length.
Wings: Marginal spots on hindwing underside absent.
Male genitalia: Uncus very short; bilobed. Aedeagus long and narrow but not needle-like.
Female genitalia: Two sub-pupillary glands. Bursa with four spinose signa; ductus sclerified; bursa rounded.
Early stages: Egg cylindrical, almost twice as high as wide, evenly domed on top.
Pupa with four pairs of long dorsal processes on the first four abdominal segments.
Foodplants: Passifloraceae.

Subtribe ACTINOTINA subtrib. nov.

Type genus *Actinote* Hübner 1819

Legs: External claw of male pterothoracic legs without a longitudinal furrow; generally nearer to symmetrical than Acraeina (symmetrical in one subgenus).
Male genitalia: Vinculum short, 'v' shaped; juxta short and subtriangular; aedeagus not narrow.
Female genitalia: Sub-pupillary gland developed anteriorly; one terminal gland; ductus not sclerified (due possibly to broad aedeagus); bursa generally elongate, not spherical, generally without signa.
Foodplants: Principal foodplant Urticaceae.

Genus *Actinote* Hübner 1819 stat. rev.

Type species: *Papilio thalia* Linnaeus (Opinion 214, 1954)
This South American group had, up until Pierre 1987a, always been considered a separate genus.
Palps: Black.
Legs: Claws of pterothoracic legs of male asymmetrical. External claw without longitudinal furrow.
Wing venation: Genus *Actinote* has the hindwing rudimentary vein between the second cubital and second anal vein. The forewing radials are also prominently arched.
Wings: The genus lacks basal spots on the hindwing underside, the other genera have basal spots on the hindwing underside. Similarly there are interneural dark lines basally which are also not found in the other genera. The veins of *Actinote* are often darkened. Some species also exhibit blue scales which are not found in any of the other genera. The hindwing underside marginal spots are also not present in this genus.
Male genitalia: Tile aedeagus is straight and slender, not narrow or needle shaped, becoming slightly broader anteriorly; vinculum 'v' shaped; juxta subtriangular.
Female genitalia: Sterigma forms a vestibulum; one terminal gland; sub-pupillary gland developed anteriorly; .
Early stages: Larval headshield can be densely spined; pupa has two rows of short spines on the dorsum of the abdomen.
Foodplants: Asteraceae, Urticaceae.

Genus *Hyalites* Doubleday 1848 stat. rev.

Type species: *Papilio lycia* Fabricius 1775 (selected by Scudder, 1875) = *Papilio encedon* Linnaeus 1758.
An African and Indian genus.
Legs: Claws of male pterothoracic legs equal or unequal in the male. External claw without longitudinal furrow.
Wing venation: As in *Acraea* with subgenera *Pareba* and *Aurora* having a rudimentary vein between the second cubital and second anal vein.
Wings: Wing shape generally more rounded than found in the other genera. Models of various mimics plus apparent Mullerian mimics.

Subgenus *Hyalites* Doubleday 1848 stat. rev.

Wings: A somewhat variable subgenus with most species lacking· upperside spots found in genus *Acraea* and also lacking clearly defined spots on the hindwing underside.
Male genitalia: Aedeagus not narrow, distally acute. Valve broad tapering distally to an upturned apex; v1nculum 'v' shaped; juxta subtriangular.
Female genitalia: Sterigma with a pouch-like vestibulum with a posterior projection that is prominent in subgenus *Aurora* and concealed in some groups of subgenus
Hyalites. Ductus short and narrow; bursa large; sub-pupillary gland developed anteriorly; one terminal gland.
Early stages: Egg; cylindrical, two-thirds wide as it is high, narrowing sharply dorsally to a flat top.
Foodplants: *Encedon* group: Urticaceae, Fabaceae, Commelinaceae. *Eponina* group: Convolvulaceae, nliaceae, Sterculiaceae, Malvaceae, Solanaceae, Caesalpinioideae, Rosaceae, Lythraceae, Convulvulaceae, Poaceae (Zea). *Obeira* group: Moraceae, Cecropiaceae, Compositaceae, Urticaceae, Asteraceae. *Cerasa* group: Flacourtiaceae, Violaceae, Euphorbiaceae.

Subgenus *Pareba* Doubleday 1848 stat. rev.

Type species: *Papilio vesta* Fabricius 1787 (= *issoria* Hübner). (Indian)
This is a monotypic Indo-Chinese subgenus.
Wing venation: This subgenus has the rudimentary vein between the second cubital and the second anal vein. M1 generally arises from the radial stalk.
Wings: Hindwing underside without basal black spots. There are clearly defined angled marginal spots on the hindwing, very similar to those found in genus *Acraea.* Spotting of both wings generally absent in the male and limited in the female.
Male and female genitalia: Similar to *Hyalites.*
Foodplants: Urticaceae, Loganiaceae.

Subgenus *Aurora* subgen. nov.

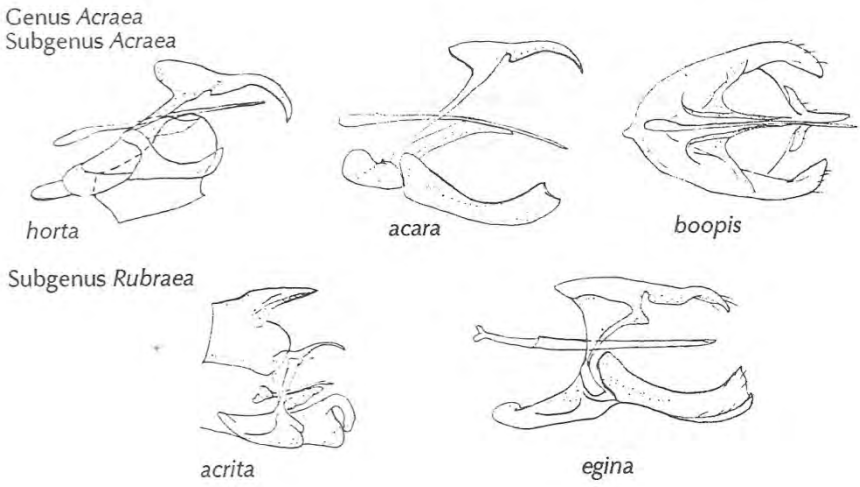
Type species: *Acraea anacreon* Trimen 1868.
An exclusively African subgenus. One species in this group *(mirifica)* has been closely aligned with *Actinote* by Pierre 1987a due to its dark palpi and the concavity of the female genitalia.
Wing venation: This subgenus has the rudimentary vein between the second cubital and the second anal vein, as found in *Actinote.*
Wings: Some species have clearly defined rounded marginal spots on the hindwing underside, similar to those found in genus *Acraea,* rarely found in subgenus *Hyalites.* Forewings and hindwings clearly spotted, similar to genus *Acraea.*
Male genitalia: Uncus beak-shaped, half the length of the tegumen, acute at tip; valve short and broad basally narrowing to a blunt upturned apex distally.
Aedeagus tapering at both ends, curved slightly.
Female genitalia: Sterigma forms a vestibulum, the posterior side projecting ventrally; ductus very short; signa indistinct oval patches; sub-pupillary gland developed anteriorly; one terminal gland.

Early stages: Egg narrows dorsally with an evenly rounded top; it is only slightly higher than it is broad.
Foodplants: Rosaceae, Fabaceae, Passifloraceae, Turneraceae, Polygonaceae

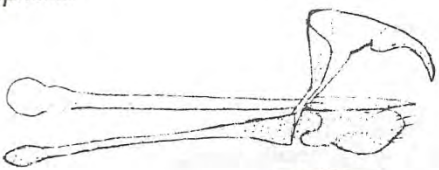
Subgenus *Alacria* subgen. nov.

Type species: *Acraea semivitrea* Aur. 1895
The species of this subgenus are generally stronger fliers than the species in the other genera and subgenera. African.
Legs: Claws of pterothoracic legs equal in both sexes.
Wing venation: Similar to *Hyalites.*
Wings: Forewings elongate. Hindwing spots largely restricted to basal area.
Male genitalia: Beak-shaped uncus small; valves elongate and upturned, obtuse distally; aedeagus short and stout, distally truncate and anteriorly bulbous; juxta very small; vinculum broad.
Female Genitalia: There is a large anal pouch; sterigma small with little sclerification; bursa elongate with two elongate signa.
Early stages: Egg not conical but more cylindrical in shape. It is twice as high as it is broad. The pupa is shorter and stouter than the other genera.
Foodplants: Urticaceae, Moraceae, Dioscoreaceae, Euphorbiaceae, Passifloraceae, Menispermaceae, Asteraceae.

MALE GENITALIA OF SPECIES GROUPS WITHIN THE AFRICAN SUBGENERA

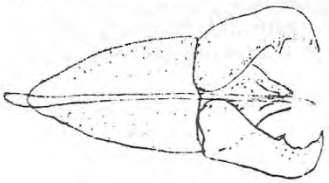


Subgenus *Stephenia*



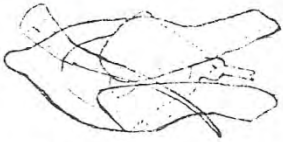
caecilia

Genus *Bematistes*



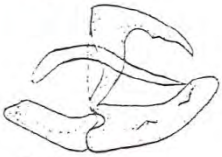
aganice

Genus *Actinote*
(SOUTH AMERICAN)

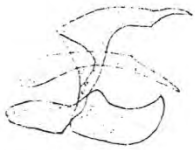


equatoria

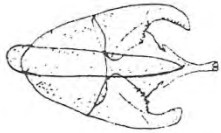
Genus *Hyalites*
Subgenus *Hyalites*



esebria

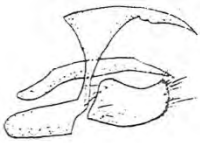


obeira

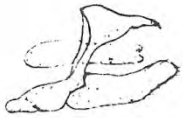


cerasa

Subgenus *Aurora*
Subgenus *Alacria*

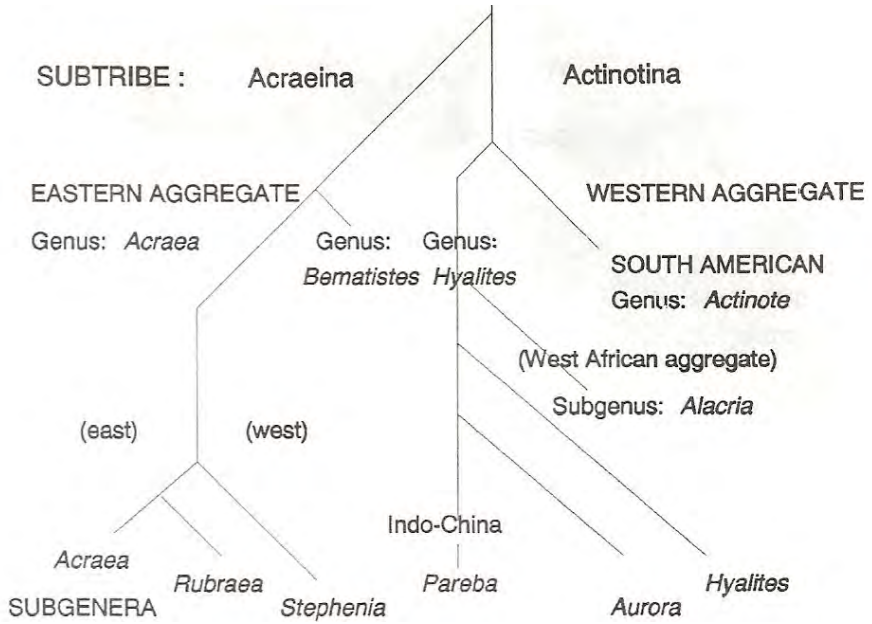


anacreon



semivitrea

HYPOTHETICAL CLADOGRAM OF THE TRIBE ACRAEINI



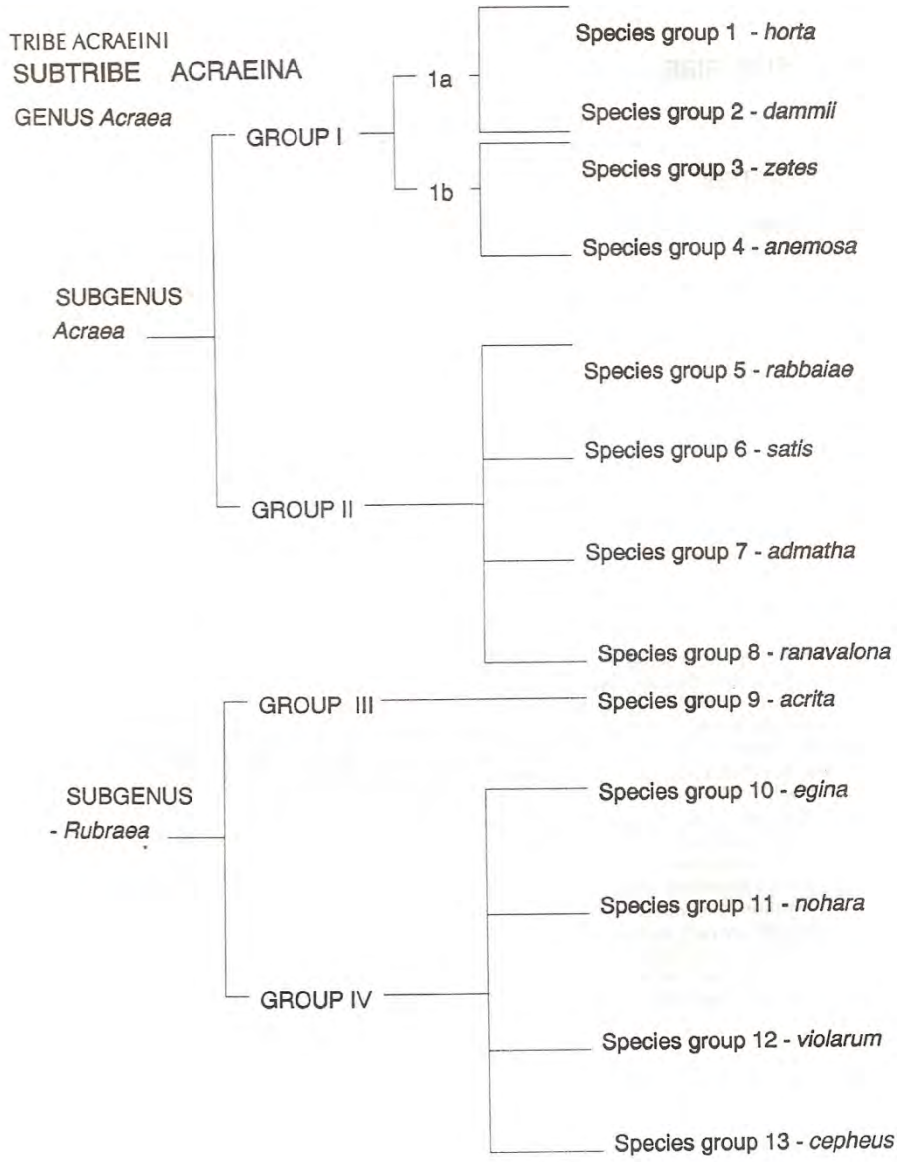
HYPOTHETICAL BIOGEOGRAPHIC DEVELOPMENT

The four genera possibly separated during the late Cretaceous when the land mass Pangaea was divided by seas and wide rivers. South America was separated off by the early Atlantic Ocean, taking *Actinote* with it. The present-day African continent was split into three; West Africa, possibly with *Hyalites,* was isolated by a sea reaching across where the Sahara now lies and splitting Africa into two land masses; East and southern Africa was separated from central Africa by the Rift Valley which was probably filled with water, *Bematistes* possibly being isolated in the west and *Acraea* in the east. The Indo-Australian taxa possibly spread at a later time through Arabia and Indo-China.

Some symplesiomorphic characters which appear to be influenced by the eastern African biosystem are:

1. Hyaline forewings and hindwing margins (marginal spots move inwards from the margin leaving a clear area).
2. Coalescing of hindwing markings (particularly on Madagascar)
3. Development of hindwing marginal markings.
4. Development of clear forewing spots and lighter ground colours.

PHYLOGENY OF THE AFRICAN MEMBERS OF SUBFAMILY ACRAEINAE



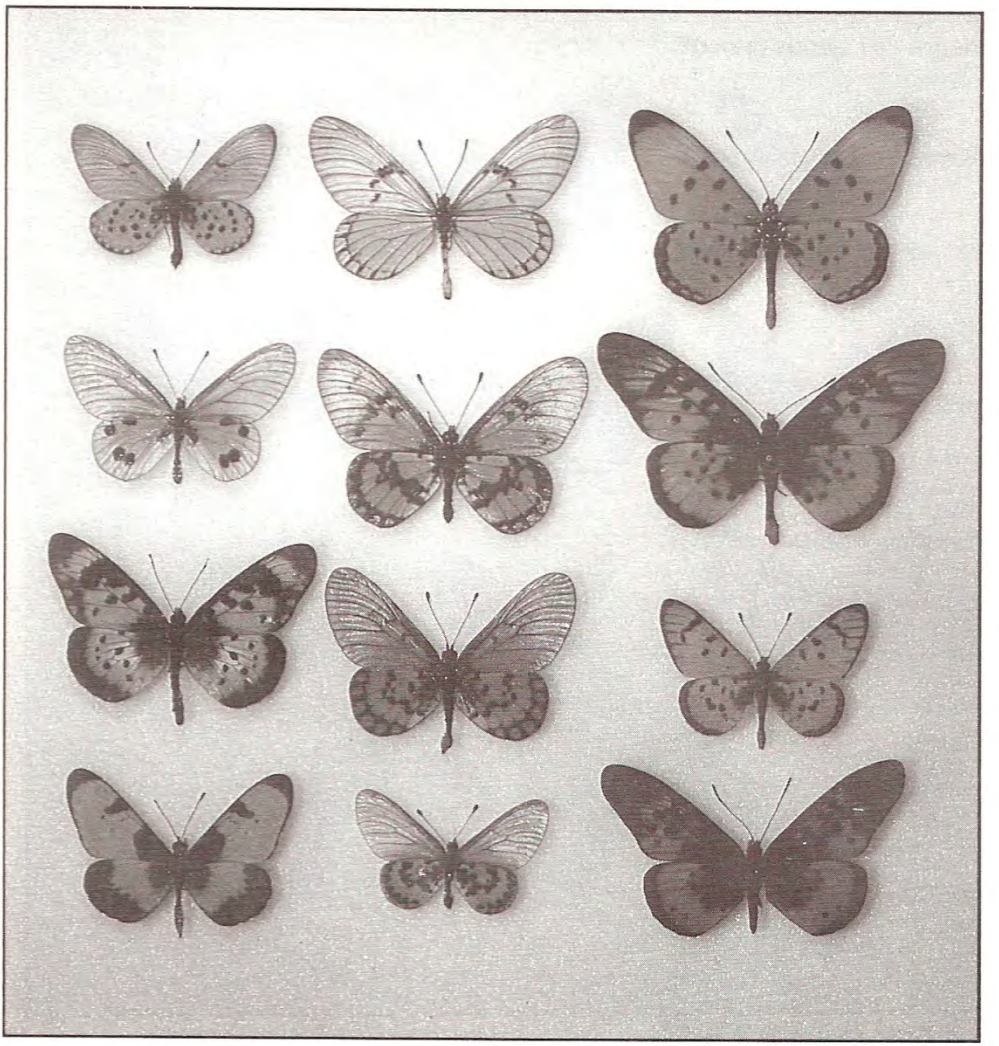


Fig. 1. Tribe Acraeini
Column 1 - S/G 1 *Acraea (Acraea) horta*; S/G 2 *A.(A.) dammii*;
S/G 3 *A.(A.) acara*; S/G 4 *A.(A.) anemosa*.
Column 2 - S/G 5 *A.(A.) rabbaiae*; S/G 6 *A.(A.) satis*;
S/G 7 *A.(A.) boopis*; S/G 8 *A.(A.) ranavalona*.
Column 3 - S/G 9 *A. (Rubraea) acrita*; S/G 10 *A.(R.) egina*;
S/G 11 *A.(R.) nohara*; S/G 14 *A. (Stephenia) rogersi*.
(S/G = species group)

Photo S.E. Woodhall

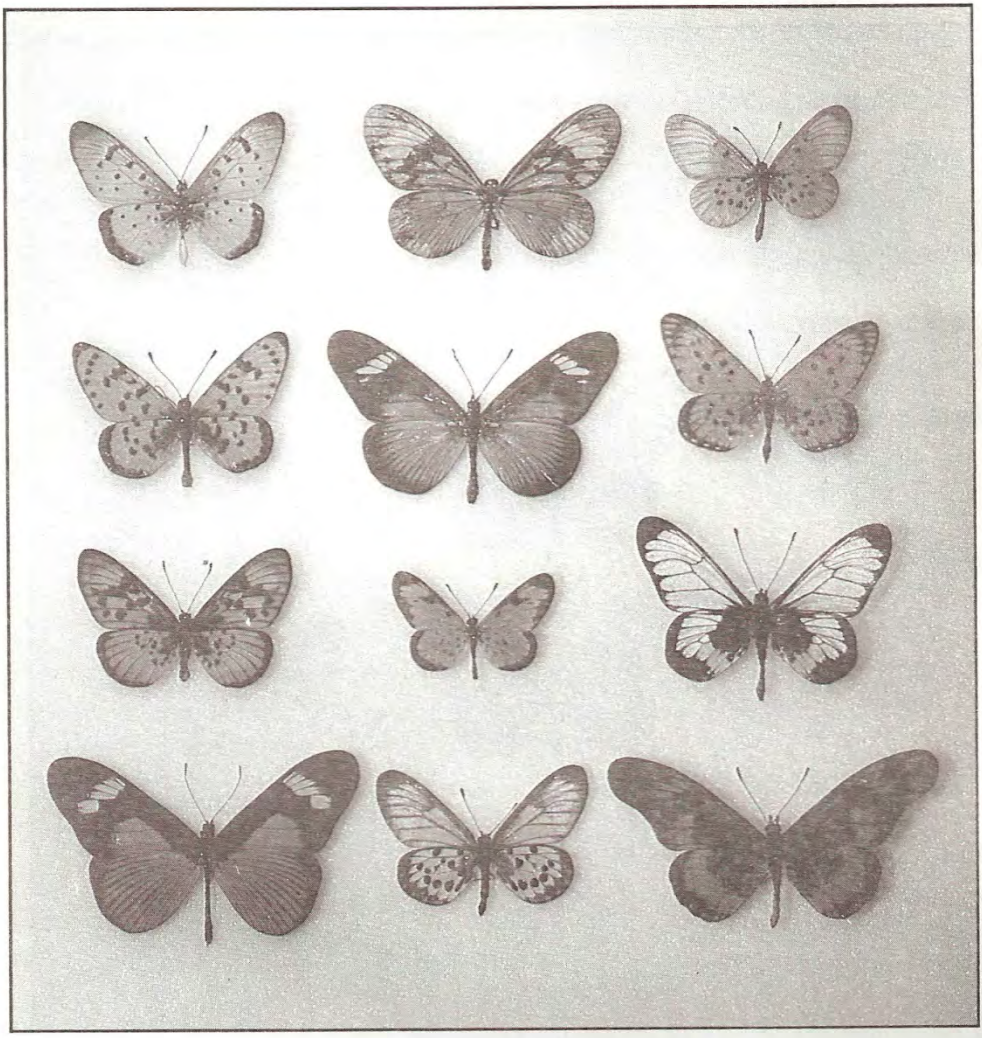
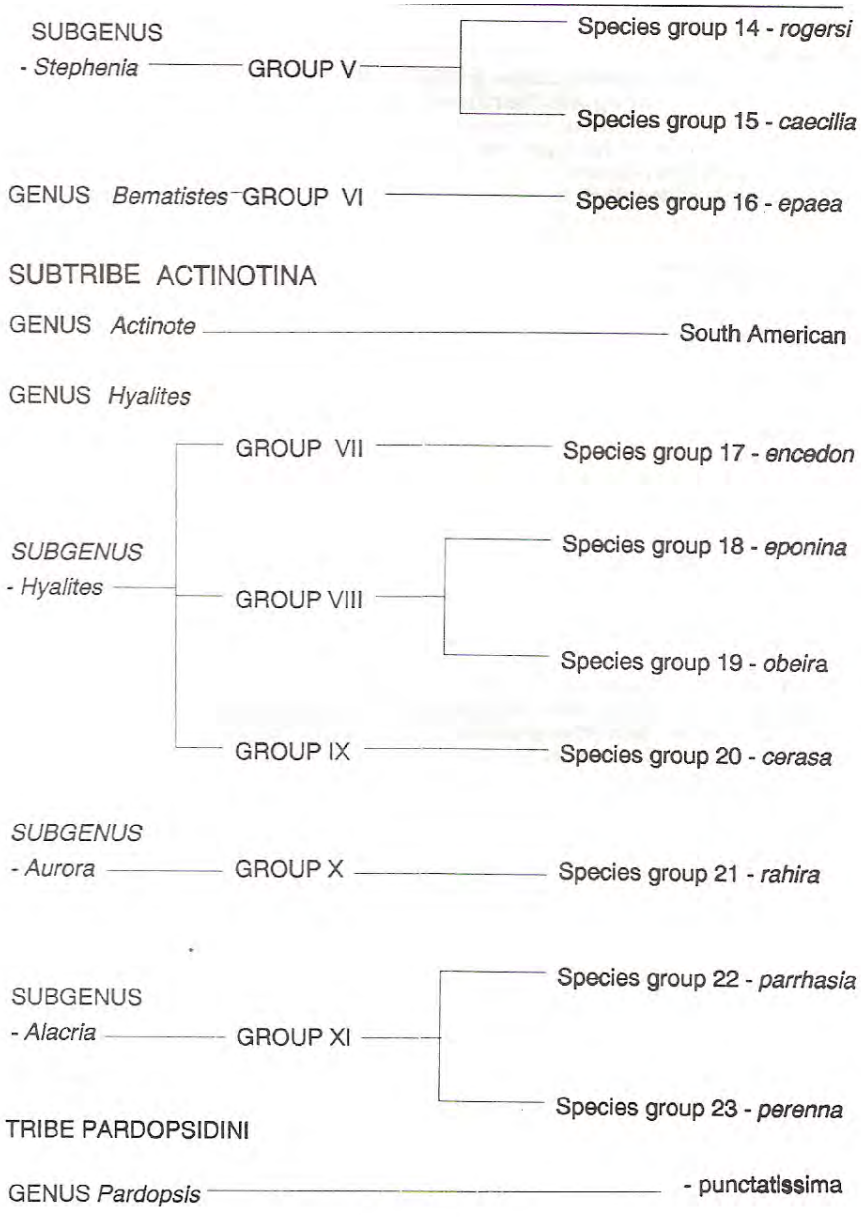


Fig. 2. Tribe Acraeini
Column 1 - S/G 15 *Acraea (Stephenia) caecilia*; S/G 12 *A. (Rubraea) violarum*; S/G 13 *A. (R.) petraea*; S/G 16 *Bematistes tellus*.
Column 2 - *Actinote anteas*; S/G 17 *Hyalites (Hyalites) esebria*; S/G 18 *H.(H.) eponina*; S/G 19 *H.(H.) obeira*.
Column 3 - S/G 20 *H.(H.) cerasa*; S/G 21 *H.(Aurora) anacreon*; S/G 22 *H.(Alacria) semivitrea*; S/G 23 *H.(A.) perenna*.
(S/G = species group)

Photo S.E. Woodhall



To be continued ...

Discussion- Part 1

The defining of subgenera and super-groups in this subfamily is long overdue. I think any splitting into anything less than described subgenera is seen as an opinion and not a formal classification. An enormous amount of ground-work has been done by Pierre from France and his work has helped lay the platform for the classification above. As stated previously this classification is an option to that proposed by Pierre 1987a. I am confident that the classification presented here is fairly accurate, and the close similarity to that of Pierre confirms it.

Acknowledgments

My thanks to my brother Stephen Henning for his assistance, and to Steve Collins and Alan Heath for their generous help. My thanks also to my father Bill Henning and Ivan Bampton for advice.

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DESCRIPTIONS OF TWO NEW SUBSPECIES OF *CHARAXES* OCHSENHEIMER (LEPIDOPTERA: NYMPHALIDAE) FROM THE BLOUBERG IN THE NORTHERN TRANSVAAL, SOUTH AFRICA

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Abstract. *Charaxes xiphares staudei* subspec. nov. and *Ch. druceanus solitaria* subspec. nov. from the Blouberg in the Northern Transvaal, South Africa are described, and notes are given on the Blouberg.

Introduction

The Blouberg (23 00'-23 06'S, 28 50'-29 05 'E) is an isolated massif situated near the western end of the Zoutpansberg in the Northern Transvaal. The nearest towns are Pietersburg and Louis Trichardt, both just over one hundred kilometres away.

The Blouberg reaches a height of some 2051 m. The vegetation is mixed woodland with some forest ren1ain1ng on the upper mountain and there is some dense thicket at the base (Greyling & Huntly, 1984). The vegetation is described as Arid Sweet Bushveld (Veld Type 14) (Acocks, 1975). The rainy season is summer (October to March) and the annual average rainfall varies from 340 -630 mm. The annual average temperature ranges from a minimum of 8 C to a maximum of 31 C.

Due to its isolated situation several distinct subspecies of butterflies have evolved in the forest remnants on the Blouberg, the most notable being *Dira swanepoeli isolata* van Son (Nymphalidae: Satyrinae).

It has long been suspected that *Charaxes xiphares* and *Ch. druceanus* could be found in the forest patches on the upper reaches of the Blouberg. Wolfgang and Hermann Staude visited the area between the 10th and 13th October 1985 and collected a number of specimens of *Ch. xiphares* and a few *Ch. druceanus.*

These specimens were recently shown to Graham Henning who recognised them both as being distinct from the subspecies found on the Zoutpansberg, namely *Ch. xiphares bavenda* van Son and *Ch. druceanus entabeni* van Someren.

Ch. xiphares is an inhabitant of cool, evergreen montane forests, while *Ch. druceanus* is always found in association with its foodplants, usually species of *Syzygium* (Myrtaceae). Most of the Myrtaceae are riparian trees, occurring on the banks of rivers, streams and swamps, but are also found in forests. These conditions generally do not occur on the western part of the Zoutpansberg and *Ch. xiphares bavenda* and *Ch. druceanus entabeni* are not found much further west than about 30 km west of Louis Trichardt. The flat dry bushveld separating the Zoutpansberg from the Blouberg would also pose an impassable barrier to these two species. This being the case it would appear that there is no gene flow between the populations of these two species on the Blouberg and Zoutpansberg.

Specimens of both species from the Blouberg are much smaller than those from the Zoutpansberg, probably due to the drier conditions which prevail there. In *Ch. xiphares* from the Blouberg the male forewing lengths measure from 39,5-44 mm, mean 42 mm (n = 26), while the females measure from 43.3-50 mn1, mean 46 mm (n = 22). In *Ch. xiphares bavenda* the male forewing lengths measure 46-48 mm, mean 47 mm (n = 10), while the females measure from 51-57 mm, mean 54 mm (n =21). The females of *Ch. xiphares* from the Blouberg unlike those from the Zoutpansberg

are predominantly white or blue-banded on the hindwing. Of 22 females captured only four were yellow-banded, i.e. 18%. In *Charaxes xiphares bavenda* about 50% of females recorded have a yellow hindwing band.

In *Ch. druceanus* from the Blouberg, the male forewing length measures 38 mm (n = 1), while the females measure from 41-44, mean 42,3 mm (n=S). In *Ch. druceanus entabeni* the male forewing lengths measure from 41 -42,5 mm, mean 42 mm (n=6), while the females measure from 47-50 mm, mean 48,5 mm (n=6). The *Ch. druceanus* from the Blouberg differs mainly from all the other subspecies in the extensive silvery markings of the underside.

Charaxes xiphares staudei **subspec. nov.**, Plate 3

Diagnosis:

- **Male.** Smaller than *bavenda* with larger postdiscal s pots on the forewing upperside. Underside forewing with pale discal marks larger than in *bavenda.* Hindwing underside with marking generally more reduced and obscured than in *bavenda,* the basal black lines usually completely absent. Tails usually shorter.
- **Female.** Much smaller than *bavenda* and differs from it in having larger discal spotting on the forewing upperside, particularly the spot in area CuA1 which is greatly elongated. The hindwing patch is generally sma11er than in *bavenda* and an unusual female form occurs with it, being entirely blue in colour. The tails are shorter.

Description:

- **Male holotype.** Forewing length 40,5 mm; antenna-wing ratio 0,42.
Wings/ upperside. Ground colour blue-black with a strong blue sheen. Forewing: crossed by a row of blue discal spots and a row of postdiscal spots, of which the upper two subapical spots are white, the others blue. Hindwing: crossed by a blue discal band, which is irregularly indented on the distal margin by black along the veins; the discal band with slight white scaling proximally as *bavenda;* there is also a row of small blue submarginal spots and a marginal series of golden-ochre lunules.
Underside. Forewing: basal area light olive-brown crossed by black and white lines; distal portion of cell darker olive-brown and apex defined by a black line just beyond which is lighter olive-brown. Discal area dark olive-brown extending as far as postdiscal line of spots, of which the two subapical ones are whitish , the others golden-ochreous; within the dark discal area are pale olive marks, corresponding to the upperside blue spots, which are outlined proximally with narrow bluish-white lunate marks outlined in black crossing areas M3, CuA1 and CuA2 Beyond the postdiscal series of spots the wing is light olive-brown. Hindwing: greyish olive-brown without markings except for a row of olive-ochreous postdiscal lunules, a faint row of whitish-violet marks and an admarginal row of greenish-ochre lunules. Tails very short, upper 2 mm, lower 1 mm.

- **Male paratypes.** Forewing ·lengths-39,5-44 mm, mean 41,7 mm; antenna-wing ratios 41 -43, mean 42.
Wings/ upperside. Forewing: blue spotting as in holotype but is larger or slightly smaller in some specimens. Hindwing: submarginal blue spots usually much larger than in holotype, being almost conjoined in some specimens. *Underside.* Forewing: as in holotype but black markings larger and better developed. Hindwing: usually without

basal black markings as in holotype but occasionally specimens have faint wavy basal black lines as in the other subspecies. Tails as short as in holotype.

- **Female allotype**. Forewing length: 49 mm; antenna-wing ratio 0,38.
Wings, upperside.
Ground colour brownish-black. Forew1ng: markings more or less as in holotype but discal spots much larger and white and they touch the postdiscal row in CuA1 and CuA2; the discal spot in area CuA1 in particular is greatly elongated; the double discal spot in CuA2 is large and distinct, in 2A is suffused with blue scaling; the two subapical spots in the postdiscal row are large and white, while the remainder are increasingly more ochreous and ill-defined. Hindwing: crossed by a fairly large white blue margined patch which commences as a single white spot at mid-costa then increases in width to M2, then merges into inner fold above anal angle; submarginal spots violet-blue; admarginal lunules golden-ochreous.
Underside. Similar to holotype, but ground colour slightly more greyish-brown and forewing discal and postdiscal marks white and more pronounced as on upperside. Hindwing differs from holotype in having pronounced brownish-white discal band and basal wavy black lines; postdiscal ochreous lunules also larger and stronger. Tails short, both upper and lower being 3 mm long.

- **Female paratypes**. Forewing lengths: 43.3-50 mm, mean 47 mm; antenna-wing ratios 0,39.
Wings, upperside. Forewing: similar to allotype but white discal spotting may be slightly larger or smaller. Hindwing: discal patch as in allotype with variable amount of white and blue scaling; submarginal blue spots usually larger and better developed. *Underside.* Similar to allotype with white markings slightly variable in size.

Female form *louisae* form nov.

- **Female holotype**. Forewing length: 48 mm; antenna-wing ratio 0,36. *Wings.* Similar to nominate female form out upperside hindwing patch blue with only a faint trace of white scaling proximally.

- **Female paratypes**. Forewing lengths: 45-47 mm, mean 46 mm; antenna-wing ratio 0,36-0,37, mean 0,37. *Wings.* Similar to holotype but upperside hindwing blue patch usually without any trace of white scaling.

Female form *arikae* form nov.

- **Female holotype**. Forewing length: 45.8 mm; antenna-wing ratio 0,38. *Wings.* Similar to nominate female form 6ut upperside hindwing patch yellow becoming ochre distally, and mid-costal spot white.

- **Female paratypes**. Forewing lengths: 44,5-49 mm, mean 46,8 mm; antenna-wing ratios 0,37-0,38, mean 0,38. *Wings.* Similar to holotype but one specimen with hindwing patch ochre with blue scaling.

Material examined.

Holotype ♂: SOUTH AFRICA, Blouberg, Northern Transvaal, 10-13.x.1985, W. & H. Staude. Allotype ♀: same data as holotype. Paratypes 21♂ 8♀ same data as holotype; 4♂ same data but 8-9.x.1989, R.H. Watmough; 3♀ same data but 9.iv.1989, R.H. Watmough. Form *louisae* - ♀ holotype same data but 13.x.1985, W. & H. Staude. Paratypes 3♀ same data; same data but 28 & 31.v.1987, R.H. Watmough. Form *arikae* - ♀ holotype: same data 13.x.1985, W. & H. Staude. Paratypes 3♀ same data. Holotypes and allotype in the Transvaal Museum, Pretoria. Paratypes in the Transvaal Museum, Pretoria and in the Collections of W. & H. Staude and W.H., S.F. & G.A. Henning.

Distribution and habits

Charaxes xiphares staudei occurs in the montane forests on the Blouberg in the northern Transvaal. The males can be observed along the edges of the forest or clearings where they establish their territories. They can often be observed perched high up on some projecting twig, from which they will dart out and investigate all intruders which happen to encroach upon their territories. The females can usually be observed flying around the edges of clearings or amongst the undergrowth looking for suitable foodplants on which to oviposit.

Specimens were recorded from a high north-eastern facing valley by the Staude's. It has also been recorded from the north-western slopes by P. Liversidge and I. Coetzer.

***Charaxes druceanus solitaria* subspec. nov.**, Plate 4

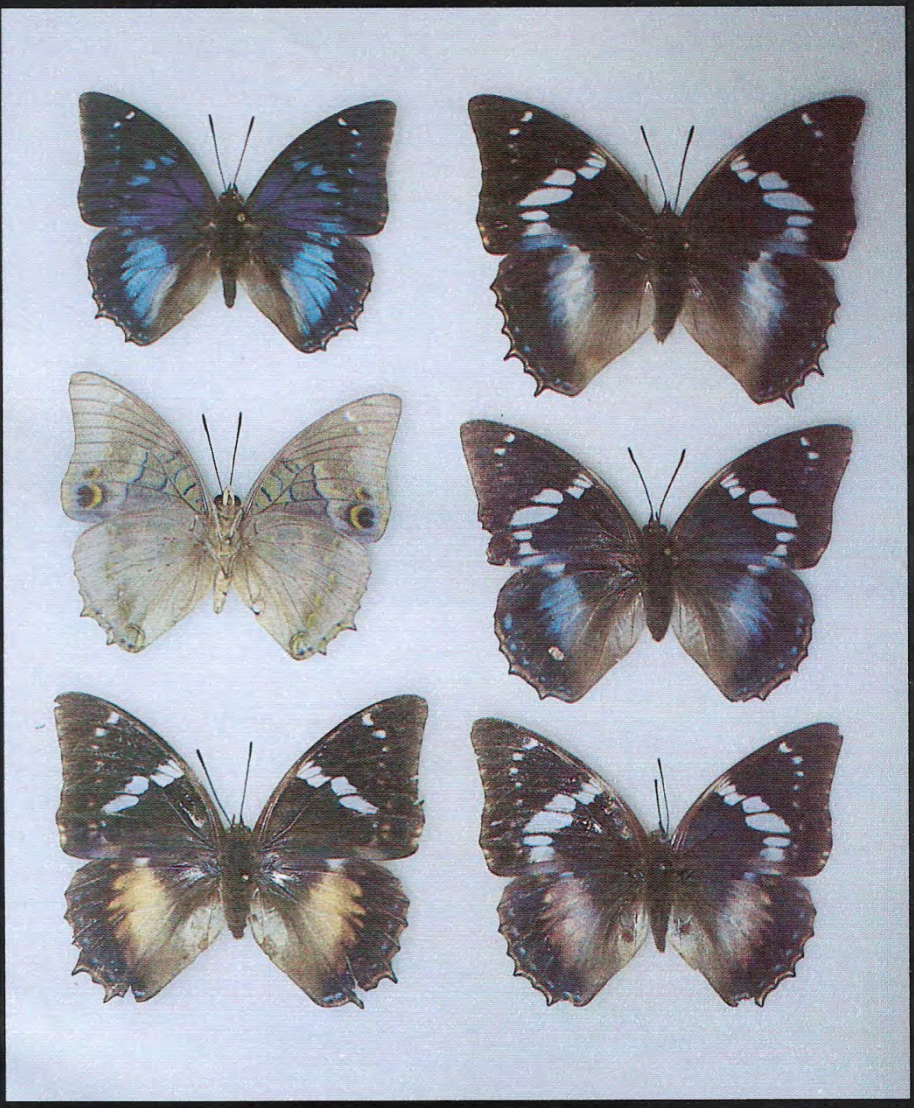
Diagnosis:

- **Male**. Closest to subspecies *entabeni,* but much smaller and wings not as elongate. Upperside of the wings darker; hindwing with basal chestnut-brown colour extending to postdiscal area with just a narrow orange-tawny discal bar. Underside silvery markings far more extensive than in *entabeni,* particularly in the postdiscal area of the hindwing where the wavy silvery lunules virtually extend across the whole area between the discal bar and submarginal silvery line.
- **Female**. Closest to subspecies *entabeni,* but much smaller. Upperside of wings darker. Underside differs from *entabeni* in the same manner as the male.

Description:

- **Male holotype**. Forewing length 38 mm; antenna-wing ratio 0,41.
Wings, upperside. Forewing: chestnut-brown basally; followed by a series of median black spots, one elongated subcostal spot towards end of cell, with a quadrate elongate spot at end of cell; large contiguous spots subbasally in M 1-RS and a smaller one distad in M2, large triangular spots subbasally in M3 and CuA1, with a smaller one below in CuA2; orange-tawny discal bar is widest on inner margin and gradually narrows anteriorly to M 1, where it divides into two, the outer arm continuing into the postdiscal row; distal portion of wing is black and along the margin is a series of tawny-rufous spots. Hindwing: from base to postdiscal area chestnut brown, darkening s

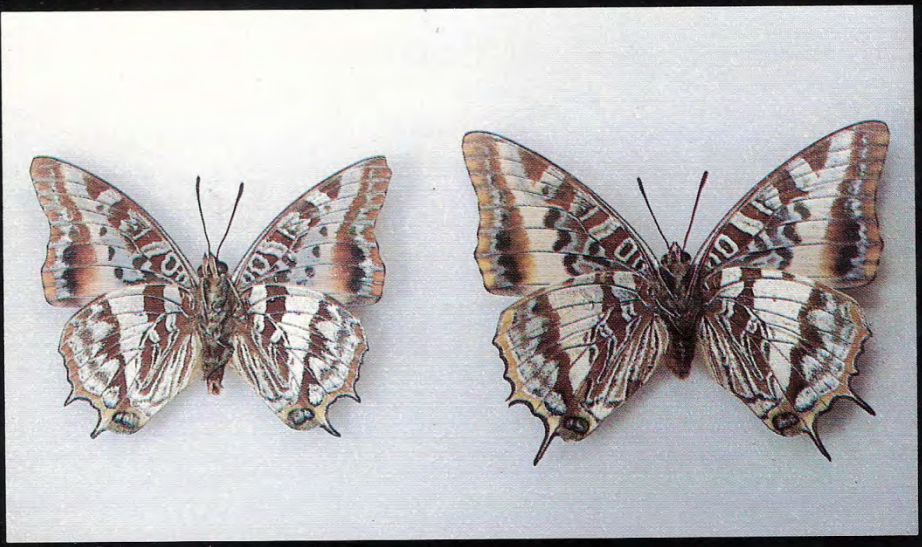
Plate 3



Charaxes xiphares staudei subspec. nov.
Column 1 - male holotype upperside (top), male paratype underside (centre), female form *arikae* form nov. paratype (bottom)
Column 2 - female form *staudei* allotype (top), female form *louisae* form nov. paratype (centre), female form near *arikae* paratype (bottom)

Photo S.E. Woodhall

Plate 4



Charaxes druceanus solitaria subspec. nov.
Holotype male (left), allotype female (right).
Uppersides - top undersides - bottom

Photo S.E. Woodhall

lightly at costa, crossed by a narrow orange-tawny discal band which is widest at the costa and narrows to M2; distal portion of wing black, crossed by contiguous tawny-rufous admarginal lunules partially separated by black along the veins; purplish-blue submarginal spots from anal angle to M3. *Underside.* Forewing: basal area bright chestnut and crossed by a number of black bars outlined in silvery-white, three in cell, a double one beyond cell, a large oval black and silver mark subbasally in CuA1 joined to a silver and black crescentic mark just beyond, with another above it subbasally in M3; silvery-white discal band similar in shape to that of upperside; outer half of band tawny-orange and distally bordered by a series of submarginal black and silver triangular marks which are largest at tornus and decrease in size to subapex; margin dull orange-tawny broken by silver along the veins. Hindwing: basal bright chestnut area crossed by silvery linear marks which are widest at the costa, then taper and join with a narrower mark crossing subapex of cell and extend down towards anal angle; inner fold traversed by three silvery lines conjoined at base and merge into end of discal band; silvery-white discal band widest at costa and tapers to above anal angle; distal to this band the ground colour is light chestnut and crossed by a broad wavy silvery-grey line which just touch along the veins a series of silvery-grey submarginal lunules; admarginal lunules dull orange-tawny and margin black. Upper tail 3,0 mm and lower tail 4,2 mm long.

- **Female allotype**. Forewing length: 44 mm; antenna-wing ratio 0,36.
Wings, upperside. General pattern as in holotype but with basal areas paler and the discal bands considerably paler and wider, that on the hindwing extending and narrowing to slightly above the anal angle. *Underside.* As in holotype, but with all marks larger and bolder.

- **Female paratypes** . Forewing lengths: 41-42 mm, mean 41,5mm; antenna-wing ratios 0,36-0,37, mean 0,375. *Wings.* Uppersides and undersides basically similar to allotype.

Material examined

Holotype ♂: SOUTH AFRICA, Blouberg, Northern Transvaal, 10-13.x.1985. Allotype ♀: same data as holotype. Paratypes 2♀ same data as holotype; 2 ♀ same data but 9.x.1989, R.H. Watmough. Holotype and allotype in the Transvaal Museum, Pretoria. Paratypes in the collection of W. H., S. F. & G.A. Henning.

Distribution and habits

Ch. druceanus solitaria only occurs in the montane forests on the Blouberg. The males usually establish territories on the tops of high trees. The females usually stay in the vicinity of their foodplants. Specimens were recorded on the north-eastern and north-western slopes with *Ch. xiphares staudei.*

Acknowledgements
Our sincere thanks are due to Messrs H. Staude, R.H. Watmough and W.H. Henning who have so willingly assisted during the study. Our thanks also to Mr P. Liversidge, Mr I. Bampton and Dr I. Coetzer.

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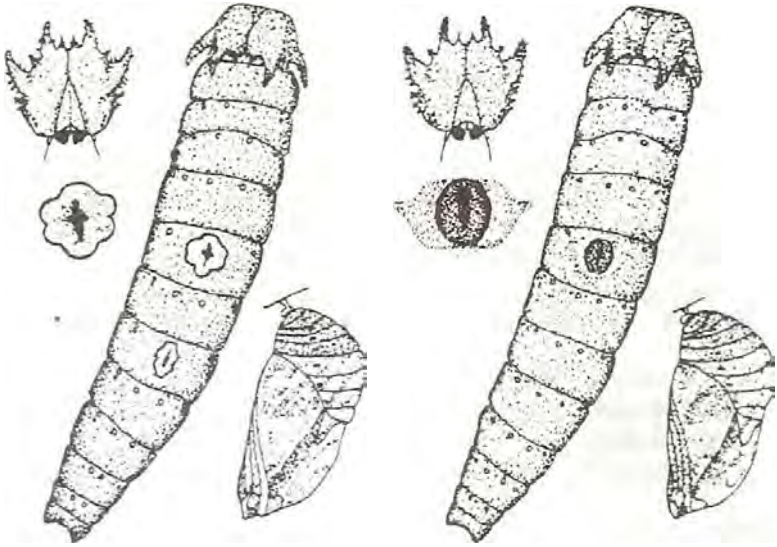

A **B**

Charaxes xiphares fifth instar larvae showing dorsal ornamentations, head shields and pupae:
A. *Ch. xiphares kenwayi;* B. *Ch. xiphares woodi.*

GETTING TO KNOW MOTHS
- AQUATIC MOTHS –

By Stephen Henning

5 Alexandra Street, Florida 1709

Only a small number of Lepidopteran species are aquatic and these are moths belonging to the family Pyralidae (Pyraloidea) which pass their immature stages under water. The aquatic members belong to the subfamilies Nymphulinae and Schoenobiinae. These moths are found throughout the world from Europe and North America to Africa and Australia.

The Nymphulinae and Schoenobiinae are generally small moths with long slender legs. On the head the antennae are simple and ciliated and the chaetosemata is present. The wings are characterized by vein R5, in the forewing, arising separately from the cell. These two subfamilies along with the Pyraustinae are often treated as a separate family, the Pyraustidae.

They usually inhabit swampy areas or margins of pools and reedy streams. The moths usually rest on the underside of foliage and are readily disturbed by day. They fly in the evening and after dark amongst the herbage and low down over the surface of the water. They readily come to light and may occasionally travel some distance from their breeding places. The early stages are usually found in stagnant ponds and the quiet parts of rivers, not in fast flowing water. The larvae are semiaquatic, often having tracheal gills for underwater breathing. Some are leaf miners, others stem borers. The presence of these caterpillars in any pond or lake can be readily determined by examining the floating leaves of water lilies or other aquatic plants. Depending on the species one could notice oval pieces (often about 25 mm long) cut out of the leaves, and on the underside of the leaves the missing pieces will be found attached by silk with a fat caterpillar between them and the leaf. In other cases the leaves become discoloured, forming blotched or blackened areas and often floating on the surface. One species of the Schoenobiinae, *Tryporyza innotata* (Walk.) is an agricultural pest as it attacks rice crops in south-east Asia and Australia.

In Southern Africa there are 33 species of Nymphulinae belonging to 10 genera. The subfamily Schoenobiinae is slightly smaller, consisting of 17 species belonging to 6 genera. As with most Southern African Lepidoptera the life histories of these species are unknown. It is assumed from overseas studies of these subfamilies that most will prove to be aquatic or semi-aquatic.

Subfamily Nymphulinae

The Nymphulinae consist of long-legged, delicate moths. They are commonly called Chinamarks from the fancied resemblance of the markings on their wings of some species to the potters' marks inscribed on the bottom of good china. In the genus *Nymphula,* the eggs are usually laid on the underside of floating leaves, the female bending her abdomen over the edge of a leaf to lay them. In some *Catalysta* species the eggs are laid on the host plants under water or on the surface of the water.

The larvae are typical caterpillars with three pairs of true legs on the thorax and five pairs of prolegs on the abdomen. In the genus *Nymphula,* the larvae are usually leaf miners at first and live throughout life below the surface of the water. Two definite larval

types occur; those with filamentous tracheal gills when mature and those in which such organs are absent. When the larvae get larger they spin pieces of leaf together to form a chamber or case in which they five. When feeding, the caterpillar puts it head outside the case and nibbles the leaf to which it is attached. The larvae feed on leaves near the surface of the water; the parts of the leaves attacked become discoloured, forming blotches. While feeding some species of *Nymphula* attach the case to the food-plant with silk; otherwise the case floats freely on the surface.

During early larval life respiration appears to be cutaneous and spiracles if present are closed. In some *Nymphula* and *Cataclysta* respiration subsequently takes place by open spiracles. In other species it is performed by means of tracheal gills with or without the presence of functional spiracles. Some species of *Nymphula* without tracheal gills appear to construct waterproof cases. It has been noticed that if one of these cases is opened the caterpillar is quite dry inside, and is, no doubt, breathing the air with which it is filled. The aperture to the case is so small and the pile of hairs on the caterpillars so close that no water appears to enter the case when the larva puts its head outside to feed.

The *Nymphula* larvae pupate in white to greyish-white or pinkish cocoons usually attached to the food-plant. Depending on the species these silken cocoons may be partly submerged or even a centimetre or more above the water level. In others pupation takes place in an air-filled cocoon spun by the larva and attached to submerged plants. The pupa has three pairs of spiracles, and of course breathes the air which is contained in the cocoon. The adult is not affected by contact with the water during emergence.

The newly hatched larvae of some *Catalysta* species crawl about on a leaf for a time and construct a case of irregular pieces cut from the leaves of the food-plant. They pass through four instars and enlarge the case as they grow. The case is usually irregularly oval, constructed of overlapping leaves with a leaf or two hanging down at each end to hide the opening. They look rather like the cases of Caddis-fly larvae (Order Trichoptera). They also often closely resemble an accidental accumulation of leaves. The larvae are active, readily protruding the front half of their bodies from the case to feed. The case contains air; only in the first instar are the larvae in contact with the water. The larvae pupate just below the surface in a dense oval cocoon of white silk covered with leaves of the food-plant.

Species of Nymphulinae found in Southern Africa

Ambia chalcichroalis Hampson
Ambia melanalis Hampson
Argyractis nyasalis (Guenée)
Argyractis nymphulalis Hampson
Argyractis periopis Hampson
Argyractis sambesica (Strand)
Bradina admixtalis (Walker)
Bradina hemiphaealis Hampson
Cataclysta blandialis Walker
Cataclysta capensis (Hampson)
Cataclysta fraterna Butler
Cataclysta fuscalis Hampson
Parthenodes africalis Hampson
Cataclysta nyasalis Hampson
Cataclysta perirrorata Hampson
Hymenoptychis sordida Zeller
Luma flavimarginalia Hampson
Luma holoxantha Hampson
Nymphula affinialis (Guenée)
Nymphula circealis (Walker)
Nymphula depunctalis (Guenée)
Nymphula diminutalis (Snellen)
Nymphula fluctuosalis Zeller
Nymphula geometralis (Guenée)
Nymphula stagnalis Zeller
Piletocera flavalis Hampson

Parthenodes albiceps Hampson
Parthenodes angularis Hampson
Parthenodes scotalis Hampson
Piletocera lanceolalis (Guenée)
Piletocera signiferalis (Wallengren)
Stegothyris fasciculalis (Zeller)

Subfamily Schoenobiinae

The Schoenobiinae are mostly white or creamy-white moths, sometimes with narrow wings. On the forewing a tubular CuP vein is present near the inner margin. The haustellum is vestigial. The females often have a large anal tuft of hair scales used to cover the egg masses. In some species the females are dimorphic: the long-winged forms are aerial while those with reduced wings live entirely in the water, using their fringed mid- and hind legs for swimming.

The larvae are borers of grass, reeds and sedges. The classic aquatic examples of the subfamily from overseas studies belong to the genus *Acentropus* and were studied in detail by Berg (1941). The young larva tunnels in the petioles of *Potamogeton* and other water plants. It then constructs a tube of portions of leaves spun together, but open at both ends. A cocoon is spun in a rather similar leaf shelter, the pupa being almost completely submerged. Respiration in the larva appears to be cutaneous at first as it is only in the later stages that the tracheae filled with air. The adults are not affected by contact with water during emergence.

Species of Schoenobiinae found in Southern Africa

Adelpherupa albescens Hampson
Brihaspa frontalis (Walker)
Donacaula pulverea Hampson
Patissa geminalis Hampson
Patissa rubrilinealis Hampson
Patissa virginea (Zeller)
Schoenobius attenuata Hampson
Schoenobius chrysostomus Zeller
Schoenobius craminarius Zeller
Schoenobius forficella Thunberg
Schoenobius ignitalis Hampson
Schoenobius marginepunctellus de Joannis
Schoenobius phaeopastalis Hampson
Schoenobius porrectellus Walker
Schoenobius rufalis Hampson

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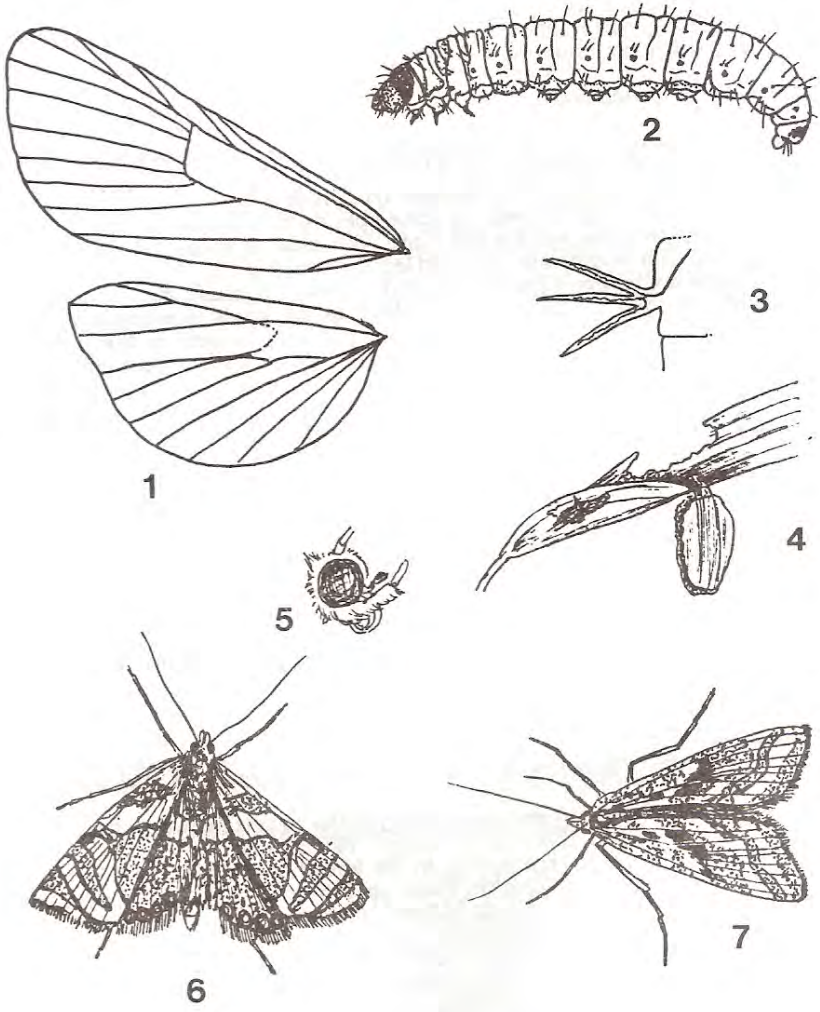

Pyralids (Pyralidae). 1. Wing venation of typical pyralid; 2. typical pyralid larva; 3. tracheal gill of *Nymphula* larva; 4. *Nymphula* larva case attached to leaf; 5. head of *Nymphula* larva; 6. *Cataclysta perirrorata* adult. 7. *Nymphula fluctuosalis* adult.

PHOTOGRAPHER'S CORNER No. 8

By Steve Woodhall

The judging of the 1992 Slide Competition took place at the recent Conference in August. There were disappointingly few entries, but what there were, were of high quality. The judging was probably more difficult than ever before, and probably all these shots were of sufficient quality to have won in previous years' competitions.

Dave Upshon finally scooped the cup with a marvellous shot of *Charaxes jasius saturnus.* He also got first and second runner up in the scientific section with stunning close-ups of the early stages of *Dingana alaedeus.*

Reinier Terblanche won the top scientific slide with a shot of a yet undescribed *Durbania* from QwaQwa. Rolf Oberprieler won first runner-up in slide of the year with his shot of the giant emperor moth *Coscinocera hercules,* and Peter Sharland got into the awards for the first time, with his second runner-up shot of *Tuxentius melaena.*

We are going to have to address the problem of low entries. I know there are a lot more photographers out there. The Council will be looking at the problem, but if any members have suggestions, please write to us.

NEW MEMBERS

Colin Congdon, P.O. Box 40, Mufindi, Tanzania.
Chris Ficq, 32 Finch Street Roodepoort 1724
Adolf Nicklaus, P.O. Box *BBO,* Lydenburg, 1120.
Mike Prettejohn, P.O. Box 24 Mweig9, Kenya.
Haydon Warren-Gash, British High-Commission, P.O. Box 30465, Nairobi, Kenya.

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Peter Ward, 43 4th Avenue, Parkhurst, Johannesburg 2113. Tel. (011) 788-3176 (H), 881 -8111 (W).
Johan Greyling, new telephone numbers (015) 913817 (W), 937519 (H).

FORTHCOMING EVENTS

The following are the major social events for the remainder of 1992. Various outings and meetings to discuss Lepidoptera. The dates and venues are as follows:

Saturday 28th November 1992 at 12:30

BRING AND BRAAI

Mr John Joannou, Route 47, Krugersdorp
Telephone (H) 011-956 6526 or (W) 011-762 5551 for instructions on how to find his plot.

For further information or suggestions for Social Events phone Lindsay Durham (H) 011-788 3674 or (W) 011 -880 1434.

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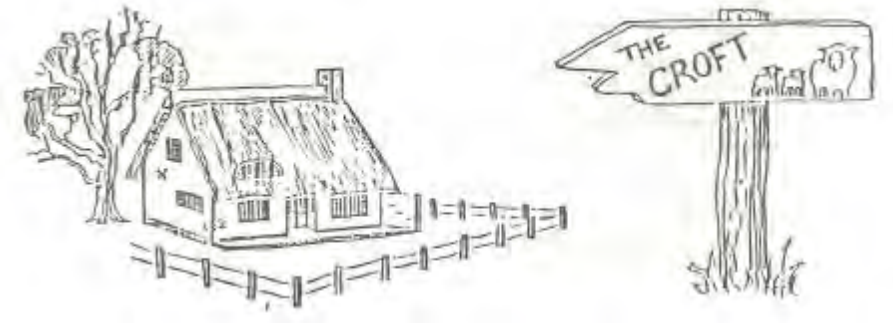

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CORRIGENDA

Volume 3 March 1992 Number 1 page 25 - line 2 from above, for "**Lycaenidae**" read "**Hesperiidae**".
The title for the paper should therefore read:

PLATYLESCHES AYRESII TRIMEN AND *P. LANGA* EVANS ARE DISTINCT SPECIES (LEPIDOPTERA: HESPERIIDAE)

Papilio euphranor male underside

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METAMORPHOSIS

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