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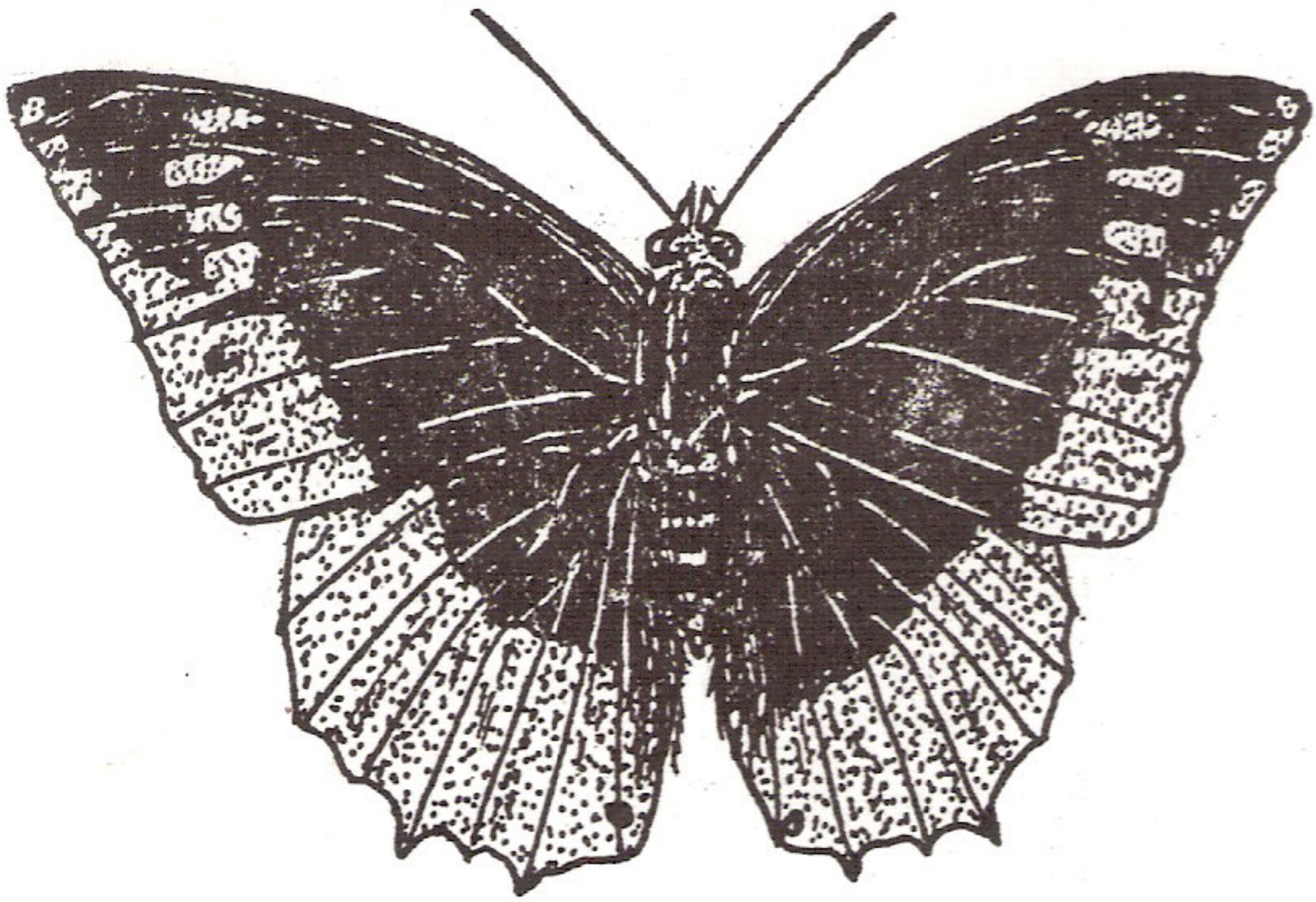

Charaxes protoclea azota (Nymphalidae) male
(Forewing length 40 - 42 mm)

LEPIDOPTERISTS' SOCIETY OF SOUTHERN AFRICA

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

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:

	Local	Overseas	
Full members	R60,00 p.a.	US$44.00 p.a.	UK £22
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Membership fees are due on **1 April**. Overseas rates are higher due to increased postage.

CORRESPONDENCE

General - The Hon. Secretary, P.O. Box 470, FLORIDA HILLS, 1716
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Membership Fees - The Hon. Treasurer, P. O. Box 67317, Bryanston, 2021

All drawings, unless otherwise stated, are by S.F. Henning.

Editorial

As editor of *Metamorphosis* my prime responsibility is towards you the readers of the journal, and we attempt to publish what you want. It is not always easy to know what the readership wants, but through the society's recent membership survey, feedback from the AGM and feedback from the Cape Branch, a number of "readership wants" became clear.

One of the top "wants" is that we should publish more scientific articles. This coincides with another responsibility the society has, namely that it must ensure that new information gathered by its' members be made available to the scientific community at large. What makes our society different is that the majority of our members are not formally trained scientists .We come from a wide variety of backgrounds but we have one thing in common and that is our fascination for those delicate insects with scales on their wings. In our pursuit of these insects we all become involved with research to some extend but often we do not know what to do with information, which is new to science, thus gathered. This is where our team comes in. Mark Williams, our scientific editor, together with a number of experts in various fields are willing to do much more than what is normally called for, to assist any prospective author, in presenting his information in such a way that it is acceptable to all. Authors often think that they have somehow failed when a manuscript is returned to them for revision. In reality any scientist will tell you that the manuscript that gets published, as is, the first time it is submitted, is a great rarity even among professional scientists. One author compares this process with a mill. He says that it may be difficult but every time his work goes through the mill it comes out better, more refined, and he becomes rightly more and more proud of it and in the end it will carry his name.

You can assist me in my duty of publishing more quality scientific articles, at the same time help yourself and contribute to science , by submitting your manuscripts and by allowing the mill to turn.

Hermann S Staude

COMMENT BY THE PRESIDENT

The 1995 AGM and conference was again a great success. There was a strong conservation theme this year with the Brenton Blue Project occupying pride of place. From our questionnaire sent out last year conservation is a high priority with our membership and it appears that you the member want the Society to be even more involved in conservation projects.

The Brenton Blue (*Orachrysops niobe*) project has gained considerable support particularly in the Eastern and Western Cape due mainly to the efforts of Dave Edge, Ernest Pringle and Graham Henning. However, the project will need considerable funds, particularly once the reserve has been proclaimed, for fencing, clearing away exotic vegetation and so on. To this end the Society has produced a limited edition of 350 sets of a portfolio of four signed and numbered prints of threatened butterflies of the Knysna area by Stephen Henning, which is selling at R350 per set. More details of this offer appear elsewhere in this issue. Please support our effort. Any monies left over after completion of the project will be returned to the central fund of the Lepidopterists' Society of Southern Africa for use in any other similar projects.

It always gives me great satisfaction and pleasure when members of our Society gain recognition for their achievements with regard to butterflies. On behalf of the Lepidopterists' Society I would like to offer our congratulations to Ernest Pringle for being the recipient of the **Stephenson-Hamilton Award** by the Zoological Society of Southern Africa for exceptional contribution to zoology by an amateur naturalist.

Finally, I must end on a sad note. I would also like to pay tribute to Rob Paré who has been such an integral part of our Society since its inception. As you probably know, he was tragically killed earlier this year in a light aircraft crash. He was a fairly regular contributor to *Metamorphosis* with his well written and amusing articles. He was also always willing to share his knowledge of Zimbabwean butterflies and contributed to the revised edition of *Pennington's Butterflies of Southern Africa.* Rob will never be forgotten because every time you look at the cover of *Metamorphosis* you see the Society emblem which he designed. Some of you may remember the competition for a Society emblem which was held over ten years ago. Rob was the winner with his sketch of the *Iolaus* that now graces all Society's publications. He may be gone but certainly not forgotten.

Stephen Henning

REGIONAL ROUNDUP

The winter is past and the new season is upon us. Early success has already been achieved with *Sarangesa ruona* being found in good numbers north of the Zoutpansberg by Johan Greyling, Andrew Mayer and Nolan Owen-Johnston. Other records from this area were *Anthene talboti* and *Anthene contrastata*. During the winter months a new member, Stoffel Peypers, has found many species in abundance to the north of the Zoutpansberg with flowers at Messina being covered with thousands of *Colotis regina*. At Waterpoort Stoffel collected an aberrant male *regina* with a pinkish upper surface and pink tips.

In the Cape the members are busy preparing for the coming season as well as being involved in the BRENTON BLUE PROJECT which will hopefully take up a lot of time. The Brenton Blue - *Orachrysops niobe* - must have its life history documented and the distribution of the foodplants and ants carefully plotted. Anyone interested in participating in the project in any way please contact Dave Edge or myself. Ernest Pringle, who is one of the organisers of the BRENTON BLUE PROJECT, went to the farm Verrekyker near Wolseley and found a few *Thestor strutti*, he then went to Bain's Kloof and in a similar habitat found *Thestor strutti* in numbers. It is gratifying that more localities for the RED DATA species are being found. This will serve to give some perspective to those of us involved in conservation so that our efforts can be aimed at the truly rare and endangered species.

William Rieger from Ladismith in Natal reports *Hypolimnas deceptor* from La Lucia a species very seldom seen. He has also collected a strange *Hypolimnas anthedon* from False Bay which appears to be a form millari. Furthermore he has also found a strangely coloured *Pseudacraea eurytus* which requires further investigation.

At the conference we were pleased to see slides of the early stages of *Pseudiolaus lulua* bred by Steve Collins during the latter part of last year. We hope to have details published in the near future. Also at the conference was a drawer of female forms of *Appias sabina* collected by Rudolf Swart. The myriad of forms and intermediates that he has compiled are staggering. This species still requires to be bred in South Africa. Allan, Pam and Brian Plowes had a holiday in the Ivory Coast and brought along many specimens for us to drool over. Alf Curle had specimens from Cameroon and Kenya and had a case of *Pseudonympha varii* on display. There was a case of specimens of the *Dingana dingana* group with an astonishing new insect from the western mountains of the Northern Province which was discovered by Jan Coetzee. There were many other displays of Emperor Moths, many interesting Geometrids and butterflies plus a table for the BRENTON BLUE PROJECT selling T-shirts, prints etc.

The following was the final list of talks for the AGM and conference over the weekend 12-13th August 1995. As can be seen it was a full two days of Lepidopterology. The braai at the home of Mark Williams on Saturday night was also a great success. Nonah du Toit wrote that it was "an absolutely superb weekend" and that she could happily attend two conferences a year!

SATURDAY 12th AUGUST

1 Welcome and address by the President, Stephen Henning
2 Annual General Meeting
3 Life history of *Iolaus trimeni* - Mark Williams
(A view through an electron microscope)
4 Collecting in the Days of AJT Janse - Martin Kruger
5 Lepidoptera as measuring tools in Conservation –
Hermann Staude
6 The Threatened Lepidoptera of South Africa and the Brenton Blue Project - Graham Henning
7 Role of Lepidoptera in the Ecology of plant communities in Africa - Reinier Terblanche
8 A Butterfly Trip to the Ivory Coast on video - Brian Plowes

SUNDAY 13th AUGUST
1 The Palaeobiology of South African Butterflies - Steve Woodhall
2 A new concept of the Macariini (Lepidoptera:Geometridae: Ennominae) - Martin Kruger
3 The Emperor Moths of the World - Rolf Oberprieler
4 African Activities, slides from Steve Collins showing some of the activities in which he is engaged - Ivan Bampton
5 A trip to Cameroons - Alf Curle
(An entertaining look at the pleasures of collecting in darkest Africa)
6 Quiz on Lepidoptera - John Joannou
7 A European visit, slides from Britain, a butterfly farm in Sweden and collecting in Sweden - Bill Steele
8 Butterfly Localities, many superb shots of localities visited by Steve over the last year - Steve Woodhall

Conservation was a major talking point during the conference and should any members know of any localities for RED DATA butterflies which are threatened in any way please do not hesitate to inform us. We are vigorously undertaking the promotion of butterfly conservation in South Africa and would appreciate your support in our endeavours.

Graham Henning

ASPECTS OF THE LIFE HISTORY, DISTRIBUTION AND POPULATION FLUCTUATIONS OF *OXYCHAETA DICKSONI* (GABRIEL) (LEPIDOPTERA, LYCAENIDAE)

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Abstract: New information is given on the life history, distribution and population fluctuations of the endangered Cape lycaenid butterfly *Oxychaeta dicksoni* (Gabriel). Associations are noted between the larva of *O. dicksoni*, a cocktail ant, an armoured scale insect and a *Phylica* plant species, with particular reference to trophallaxis having been observed. The second instar larva is described and illustrated.

Introduction

The endangered species *Oxychaeta dicksoni* (Gabriel, 1946) was named for C.G.C.Dickson who discovered this interesting butterfly. Although the insect was placed in *Phasis* Hubner, 1819 by Gabriel in the description, Tite & Dickson (1973) erected the monotypic genus *Oxychaeta* for it, based on the distinctive scales of the palpi and venational characteristics of this butterfly.

The type locality for *O. dicksoni* was given as "near Melkbosch Strand" (Gabriel, 1946). Later it was assumed that the butterfly had become extinct in this locality through habitat destruction and overcollecting (Cottrell 1978).Cottrell noted that no specimens had been seen from 1970 to 1977, despite a wide search for the insect by Dickson and other collectors. Cottrell (1978) conducted an extensive search and rediscovered *O. dicksoni* in two tiny "subcolonies", eight or nine specimens in total, on the 31st August 1977. In 1979, L.E. Schoeman, B. Stuckenberg and J. Londt located a further population at Witsand, over 200km ESE of the type locality (Schoeman, pers. comm.). This habitat was subsequently destroyed by alien vegetation and building development. Ten years later E.L. and A.E. Pringle located another population of *O. dicksoni*, near Vermaaklikheid (Pringle *et al*., 1994).

The locality of the *O. dicksoni* population, discovered by Cottrell, near Cape Town, has since independently been found by several Cape collectors, including the authors. Cottrell (1978) stated that during its flight period, *O. dicksoni* is under a real threat from overcollecting and that a diligent searcher could net the whole colony in a matter of minutes. He further stated that a fire during the adult flight period would be disastrous. He expressed the view that

the species is extremely vulnerable and considered it of the utmost importance that the land on which the colonies exist be protected as soon as possible. Cottrell (1978) also listed two other vulnerable lycaenids, *Poecilmitis nigricans nigricans* (Aurivillius) and *Aloeides egerides* (Riley) as well as four species of threatened plants which could all be found at the same site. *Oxychaeta dicksoni* is listed in the Red Data Book and now classified as endangered (Henning & Henning, 1989 & 1995). Because of this, and the above observations, we are of the opinion that the exact locality of the two extant populations of *O. dicksoni* should not be published until its habitat has been given appropriate protection.

Cottrell (1978) described the habitat as south-western coastal macchia. Clark & Dickson (1971) described the type locality as sand-veld with short vegetation. They observed that *O. dicksoni* exhibited gregarious behaviour, the males in particular tending to congregate in little spots of their own. Cottrell (1978) noted that the females did not display the same attachment to a localized area as did the males. He postulated that the subcolonies represented appetitive sexual assembly areas within a wider area, occupied by the entire colony.

Clark & Dickson (1971), described (as *Phasis dicksoni*), what was then known of the insects' life history. They stated that its flight period extended from early August to early October. They described the egg, the first instar larva and the pupa, as well as the final instar larva, but did not state whether a DNO (dorsal nectary organ) was present or not. Cottrell (1984) observed that the larvae of predatory species generally lack DNO's or, if these exist in early instars, to have non-functional DNO's in their predacious stages. Clark & Dickson (1971) concluded that the larva was not phytophagous, since young larvae refused to feed upon any of the plants on which eggs had been laid. They noted that the early stages were closely associated with the cocktail ant *Crematogaster perengueyi* Emery, since pupae and final instar larvae had been found within ant nests. They described examining *C. perengueyi* ant nests and finding in one "... a very large number of larvae and pupae of the butterfly in about equal numbers, all the larvae seen, being full-grown specimens." They also found numerous ant larvae in the nests they examined, which they assumed constituted the diet of *O. dicksoni* larvae. Dickson (pers. comm.) stated that the month when the larvae and pupae were discovered as given by Clark & Dickson (1971) was incorrect and that it was August, not October. Tite & Dickson (1973) noted the affinity between the larva of the genus *Oxychaeta* with those of the genera, *Chrysoritis* Butler, and *Poecilmitis* Butler.

Material and Methods

No investigations into the life history were carried out during 1992 and 1993. This was due to a drastic drop in the number of imagines and the potential danger of interfering with a population so fragile and seemingly on the brink of extinction. To determine the extent of population fluctuations during past years, the number of specimens in various collections were regarded as an historical indicator. The following collections were consulted: The holotype and

paratypes in the British Museum of Natural History and the Dickson collection, as recorded in the description (Gabriel, 1946); the Transvaal Museum in Pretoria, including the collection of Swanepoel; the South African Museum in Cape Town; and the private collections of Henning, Heath, Brinkman, Ball, Wykeham and Duke.

In September 1994, a female *O. dicksoni* butterfly was captured near Cape Town and induced to oviposit by being placed in a small carton covered by netting, and containing some *Phylica* stems together with two *perengueyi* ants taken from a nest at the same site. These were replaced by other ants from the same nest every two days. About twenty of the eggs laid by the female were retained for this study and the remainder returned to the *O. dicksoni* population site and deposited in what seemed to be suitable places, close to associated ant nests and scale infestations.

Two arrangements were used for studying the larvae and their relationship with *perengueyi* ants. The first consisted of a raised wooden board, one metre square, with feet in water. A plastic bucket containing sand and a small ants' nest (taken from the perimeter of the *O. dicksoni* population site), together with a potted *Phylica* plant previously infested with armoured scale, was placed on the wooden board. This was placed in a light, but the sheltered, position outside, to allow the plant and scale to survive. The other arrangement consisted of a petri dish containing one or more *O. dicksoni* larvae and two *perengueyi* ants; this was placed under the microscope for detailed observations. The ants were replaced every two days by others taken from the nest from which the female had emerged. The ants were fed on honey-water solution and insect carrion.

A colour-slide was taken of the second instar larva of *O. dicksoni*. The illustration (fig.1) in this paper was drawn on white paper from the projected slide.

Results

The fluctuations in population size, noted by the authors, prompted an enquiry into the number of specimens recorded during preceding years. The following is a count of specimens recorded each year since the butterfly was discovered. The numbers represent the total number of specimens captured that year at Cape Town and housed in the collections included in the enquiry. The numbers in brackets are those which were observed but which were not collected. Note that prior to 1977 the locality is assumed to be the original locality near Melkbosch Strand but from 1977 onwards the locality discovered by Cottrell is taken to be the capture locality.

1946=5, 1947=3, 1948=17, 1949=18, 1950=4, 1951=5, 1952 to 1958=0, 1959=3, 1960 & 1961=0, 1962=22, 1963=6, 1964=15, 1965=4, 1966 to 1968=0, 1969=1, 1970 to 1976=0, 1977=(9), 1978 & 1979=0, 1980=2, 1981=2, 1982=1, 1983=2, 1984=2, 1985 to 1986=0, 1987=6, 1988=2, 1989=4 (40 to 50), 1990=16, 1991=(60 to 70), 1992=(5), 1993=(0), 1994=(9).

During the past seven years we have found eight subcolonies of *O. dicksoni* within an overall area of about 60 ha. Each of these subcolonies occupied about 150 sq.m. This colony is believed to be the one Cottrell re-discovered in 1977. Even in years when the population numbers were high, only about five of these subcolonies were noticeably active during any one year. Veld fires accounted for some of these subcolonies becoming inactive, by destroying both the vegetation and ant nests above the ground.

In 1991 Heath (unpbl. obs.) noted that the *C. perengueyi* ants at one of the *O. dicksoni* subcolonies were tending armoured scale insects (Homoptera, Coccidae) which infested the stems of a *Phylica* sp. found in the area. Infestation was at ground level and just below, in the form of hard, resinous encrustations which were sometimes covered with a protective sheath of grey, fibrous material built by the ants, and so constructed as to enable the ants to move around and attend the scale from within the sheath. A female *O. dicksoni* was captured and induced to lay eggs. One of the resulting larvae was placed in a petri dish, together with a *perengueyi* ant, and was carefully observed under a microscope. The larva was seen to raise its front section and beg for food directly in front of the ant. This was repeated several times, together with a vigorous clasping motion of the first pair of legs. However, there was no response from the ant, which remained motionless throughout this process. Eggs and larvae of the ant were placed in the petri dish but the *O. dicksoni* larva took no interest, even when walking over them. Three more first instar larvae were placed on a cut piece of *Phylica* stem infested with armoured scale (but without ants). The larvae settled close to the scale without wandering, and remained alive for four or five days without any sign of feeding.

In 1991 the Cape Town population flourished, with very good numbers of 60 to 70 imagos being seen by us. The population near Vermaaklikheid also flourished that year (Pringle pers. comm.). The next year saw a considerable decline at both localities, with only five sightings at Cape Town, and Pringle (pers. comm.) stating there were fewer at Vermaaklikheid. None were seen at either locality in 1993 despite many extensive searches made by both authors, and others, throughout the normal flight period. On 3rd September 1994 we came across a very small sub-colony at the Cape Town locality; there were between 8 and 10 males all flying in an area of about 150 to 200 sq.m. Despite an extensive search, no other sub-colonies were found.

The next day, a newly emerged female was seen to climb to the top of a *Phylica axillaris* Lam.(Rhamnaceae) bush beneath which was an inconspicuous nest of *C. perengueyi* ants. After 20 minutes the female tried to take off but was too heavy, and dropped to the ground about three or four times. The female climbed a little higher and managed to fly to another bush about a metre away. Several males had been 'playing around' very close, but without taking notice. As soon as the female had flown to that bush another male flew directly to a twig beneath her and raised his abdomen to

meet hers. There was no foreplay or display of any sort. Mating commenced immediately; the wings of both partners were closed from the moment the male landed to the time they had finished mating (about ten minutes). They parted and flew another two metres when the male attempted to mate again but the female moved away. the female was then collected to provide eggs for this study.

A search was made beneath the *Phylica* bush from where the female had emerged. A slightly convex carton, nest-like structure, about 40mm high and 80 to100mm wide, could be seen among the stems. It appeared to be the beginnings of a new carton-nest but when probed it was very flimsy. In the process of gathering some ants, five *O. dicksoni* pupae were seen lodged about 50mm below the ground surface. They were all in an upright position (head uppermost).

The female was induced to oviposit, using *Phylica* stems and *perengueyi* ants; both the plant stems and the ants were taken from where the female had emerged. Well over half of the eggs laid were deposited on the nylon net covering and the sides of the container used to house the female. The female commenced laying the same evening. The female laid about 100 eggs over a period of ten days, stimulated by the original ants but stopped laying for three to four days when replacement *perengueyi* ants, taken from another locality some 10km distant, were used to induce further oviposition. When ants, taken from where the female had emerged, were re-introduced, the female laid 20 more eggs within the space of a few hours. When the female had exhausted her eggs the female still attempted to oviposit. The female was then released in the original locality and this behaviour continued. The males took no interest in the released female. Another female appeared in the area showing exactly the same behaviour, continuously attempting to oviposit but, presumably, having spent all her eggs. These two were the only females seen at the site, it being assumed that any other females would have left the localized area where the males had congregated earlier.

The eggs took between 18 and 20 days to hatch. Ten first instar larvae were placed on *Phylica axillaris* infested with armoured scale. Each larva positioned itself close to an armoured scale encrustation and remained there, with at least one ant in attendance, almost all the time. The larvae remained resting singly or in pairs at the base of a scale swelling. Each larva rested upon a fine, silken pad which it had constructed; at no time was it seen to leave its pad, its only movement was to turn to face in the opposite direction.

On a few occasions a first instar larvae was seen to sit up and beg for food from an ant. Mouth contact was briefly made but no feeding was observed, since this was outside without adequate visual aid. After two to three weeks the larvae moulted to the second instar. After a further ten days the ants reduced their attendance and the larvae were often alone. One larva could still be seen on the armoured scale encrustation on 1st November; the others were presumed taken by spiders or had died.

Immediately after emergence three of the original larvae were placed in a petri dish (on or about 1st October) upon some small, dry twigs together with two ants (those used to stimulate the female, and taken from where the female had emerged). The ants were replaced every alternate day from a well-fed group of about 20, kept in a separate container. Two of the larvae in the petri dish died within seven to ten days. The ants would sometimes ignore the remaining larva, especially when they were first introduced into the petri dish. This was presumably because they were agitated at being disturbed. Shortly after being introduced, and after they had calmed down, the ants would cringe and appear sick when coming near the larva, waving their antennae vigorously over the larva. It was not possible to see any sign of feeding despite frequent observations. After about two weeks the larva entered its 2nd instar.

Three days later, on the 18th October at about 19.30pm, trophallaxis was observed. Once seen, it was noticed more often and was observed several times between 19.00 and 20.00hrs. The larva manipulated its honey-gland, which looked moist at such times, but seemed to produce pheromones rather than secretions. This caused the ants to act differently when close by (within about 10mm). The ants would often cringe and appear to vomit but no sign of any regurgitation could be detected. Their locomotion would be affected, as if they were under the influence of alcohol; at times clumsy and at times laboured, whilst displaying erratic movements. The ants most notable behaviour was to wipe their mouthparts with their legs (or vice versa), and clean their antennae, whilst cringing. The ants would often stand close to, or even on the larva itself, whilst doing this. After this behaviour the ants would move out of range, still appearing rather intoxicated; they would often return to the larva and repeat this procedure. The larva would suddenly raise its forepart and beg for food. It would aim for the ants' mouthparts and when making contact would somehow lock-on to the ant's mouth for about 10 seconds. This behaviour would be repeated once or twice and then the ant would stagger away. The ant would sometimes return and cringe again, or apply its mouthparts close to the larva's honey-gland. It could not be seen if any fluid was taken but the ant would stand with its head over the glandular area for up to a minute at a time. Both before and after this was observed the two ants would sometimes exchange food between themselves. This entire activity was seen to take place again, at about the same time, (19.00 and 20.00hrs) on the 19th, 20th and 21st of October. It was not feasible to observe the larva continuously, hence this behaviour could well have taken place at other times during the day or night.

On 22nd October a few bright-red nymphs of the armoured scale insect appeared on the potted *Phylica.* Two nymphs were placed near the head of the larva in the petri dish. Within a minute or two the larva started to devour a nymph and within half an hour ate most of the second one. More nymphs were placed on the dry sticks in the petri dish but the larva did not show any further interest.

On the 29th October the petri dish larva died. It should be noted that at no time during the entire 29 days of observation were any larval faecal pellets noticed in the petri dish.

During two visits in mid-July 1995 to the site of the 1994 *O. dicksoni* subcolony at the Cape Town locality, we examined seven *C. perengueyi* ants' nests. Each one was constructed to include one or more stems of *Phylica axillaris* within its structure. No larvae were found in any nests but one, two and three *O. dicksoni* pupae, respectively, were found in three of the nests, whilst the other four nests had none. Of the three nests with pupae, all had some armoured scale infestation on the *Phylica* stems but none of these nests contained ant brood. The exterior of two of these nests, which were of the carton type and about 60mm high, were badly degraded and the ants were not very numerous or aggressive. One of these nests was located between the stems of a *Phylica axillaris* bush and did not protrude noticeably above the ground; it had a small colony of ants.

Of the four nests in which no pupae were found, one was degraded with few ants and no brood, one was located between the stems of a *Phylica* bush with some ant brood, and two were about 200mm high, of the carton type and heavily populated with ant brood and very aggressive ants. There were several *Phylica* bushes with signs of ant colonies beneath them but it was thought better to avoid further disturbance that year.

On the 30th July 1995 we searched for armoured scale infestation on large *Phylica axillaris* bushes in the area surrounding, and immediately adjacent to, the 1994 subcolony. No scale infestation was found after a careful examination of more than 100 bushes although, admittedly, the search was not exhaustive. A similar search was made at the site of a subcolony which had previously been destroyed by fire. Armoured scale, together with *C. perengueyi* ants, were found on two adjacent *Phylica* bushes in the centre of the site but not on the bushes surrounding it, despite searching the area extensively.

No steps have been taken to conserve the population area discovered by Cottrell in 1977. The area is subject to frequent man-made veld fires and considerable littering. Alien vegetation has encroached into the area in the form of exotic *Acacia* species, although encroachment is partly kept in check by the veld fires and firewood felling.

Description of the 2nd instar larva of *Oxychaeta O. dicksoni* (figs. 1 & 2)

The second instar larva (fig.1) was of the same flattened shape and type as those of *Chrysoritis* Butler, and *Poecilmitis*, Butler, both of which were well illustrated (as *Poecilmitis*), by Clark & Dickson (1971). It possessed the same type of DNO, situated dorsally on the seventh abdominal segment. It had the same type of tubercles, head and prothoracic shield as well as similar mushroom-shaped setae,however it lacked the fine, lateral cilia present on second instar larvae of the other two genera.

The *O. dicksoni* larva was 2,0 mm long (excluding setae) with a translucent, greyish-white basal colour. Some small red markings were

present in irregular rows; these markings tended to be obsolescent towards the anterior end. Four or five, large, mushroom-shaped setae (fig.2) were located on the extreme lateral bulge of each segment. Hair-like setae were absent but the segments and carapaces were sparsely covered with minute mushroom-shaped setae. Six, club-shaped setae protruded from the posterior end of the larva and were grey at the base but whitish for the distal two thirds, each of these club-shaped setae was narrow proximally, being broadest at about three quarters of its length, thereafter broadly pointed distally. These six setae were held in a horizontal plane and the middle four converged posteriorly, when viewed dorsally. Eight setae were arrayed along the anterior margin of the larva, close to the prothoracic shield; these were mostly forward-pointing and convergent.

Discussion

We believe that the extant Cape Town population of *O. dicksoni* incorporates a number of subcolonies which manifest at specific locations within a 60 ha. area. In years when a subcolony becomes active the adult butterflies, especially the males, are seen to fly conspicuously in a very restricted area. These subcolonies are active in some (often consecutive) years but inactive in others. It would appear that in addition to veld fires, there may be other, as yet unknown, factors at work which dictate whether a sub-colony is active or not. It is our opinion that these fluctuations are not, at present, influenced by collecting although it is conceivable that this could possibly happen in the future if collecting was allowed to go unchecked.

It is probable that these subcolonies, when active, are indeed appetitive sexual assembly areas (Cottrell, 1978) and that a heavy infestation of the armoured scale perhaps serves as a stimulus for the male butterflies to congregate, our observations show that oviposition is stimulated by the presence of ants which tend the armoured scale and that the female butterflies only lay on plants frequented by such ants. It is not known what relevance the armoured scale could have for the *O. dicksoni* larva. Perhaps the immature scale forms part of the larval diet, although the observation that a nymph was eaten, does not mean this happens in nature.

The absence of larvae in any of the ants' nests examined by us in July 1995 is interesting, since equal numbers of pupae and larvae were found within an ants' nest, in August 1963 (Clark & Dickson 1971) and by Dickson (*pers.comm*.). It is possible that the larvae they found would have emerged as adults in the following year. We believe that some of the pupae found in the nests in July 1995 were not recently formed and could perhaps have been there for several months. If emergence or pupation is delayed for one or more years then this would account for the subcolonies fluctuating in their degree of activity.

If *O. dicksoni* larvae are aphytophagous, as suggested by Clark & Dickson (1971), then it has three possible sources of food throughout its larval phase, namely ant brood, scale insect or trophallaxis. If ant brood is the diet of later instars of *O. dicksoni*, then their rate of food intake would be affected by

the variable amount of ant brood present. This could extend the period in the larval state, and bring about diapause if the supply of brood was insufficient to sustain a larva through to pupation. A similar situation could exist if the armoured scale was the larva's diet, although it would take much longer, possibly a year or more, for the scale to re-establish itself after being depleted. Although trophallaxis was observed in the second instar it seems unlikely that this could sustain a group of six or more larvae through to pupation in one small ant nest. We have been unable to examine a final instar larva but it is assumed that the DNO was either inconspicuous or absent when examined by Clark & Dickson (1971); this would support the belief that they may become non-functional if the larva is predacious (Cottrell 1984).

If the actual population of larvae, pupae and imagines, combined periodically drops to nine or less specimens, then this butterfly's chance of long term survival must be very close to zero. It seems almost certain that some *O. dicksoni* must remain in the larval or pupal state for more than one season, if the population is to remain viable.

It is interesting to note that for the past three to four years, the population fluctuations in the Vermaaklikheid population 200 km away, appear to be similar to those at Cape Town. This,however, needs to be monitored over a longer period before it can be considered at all significant.

Although the numbers of specimens housed in collections are no substitute for actual population numbers, they do provide some historical information. It may be assumed, for example, that 1948, 1949, 1962 and 1964 were fairly good years for population numbers at the type locality. The years 1970 to 1976 represent a gap in our information, since the Melkbosch Strand population was assumed to have been spoilt or destroyed before Cottrell had found the new population. If Cottrell found only nine specimens in 1977 then that year might be regarded as one of the poor years for population numbers, rather like 1992 and 1993. It is not known what the population numbers were, just prior to Cottrell's discovery, but had the years 1975 and 1976 been high in numbers, similar to 1990 and 1991, then a definite pattern of 14 year population peaks would be evident. This is only a speculative idea but further monitoring will help to clarify the issue.

Conclusions

It is reasonable to assume that in nature trophallaxis sustains the larva through to its second instar, but it remains unknown what the later instars feed on. It is probable, however, that they feed on armoured scale or on ant brood. Further work is necessary to determine their food source and the part played by the armoured scale. The duration of the larval or pupal phase also requires further investigation. It becomes clear that population numbers, based on observations or catches, are quite erratic, with some periods of relative abundance, followed by barren years. In view of this it is important to monitor the population numbers in future years and to determine all factors which affect their numbers. We believe that all the foregoing work is essential if *O. O. dicksoni* is to be properly conserved for future generations. Urgent steps

are required, now, to provide adequate protection for the remaining populations and their habitat, particularly whilst this research continues.

Acknowledgments

We wish to acknowledge Dr H. Robertson, S.A Museum, Cape Town and J. Vlok, Cape Nature Conservation, for their identification of the insects and of the *Phylica* plant respectively. We also acknowledge financial assistance provided by the Department of Zoology, University of Cape Town, through the Charles Dickson Research Grant. We acknowledge the assistance given by M. Kruger, Transvaal Museum, Pretoria, for providing collection information on *O. dicksoni* specimens housed there. We would like to thank Dr H. Geertsema, Stellenbosch University, for reading the final draft and for his advice during the final stages of this paper.

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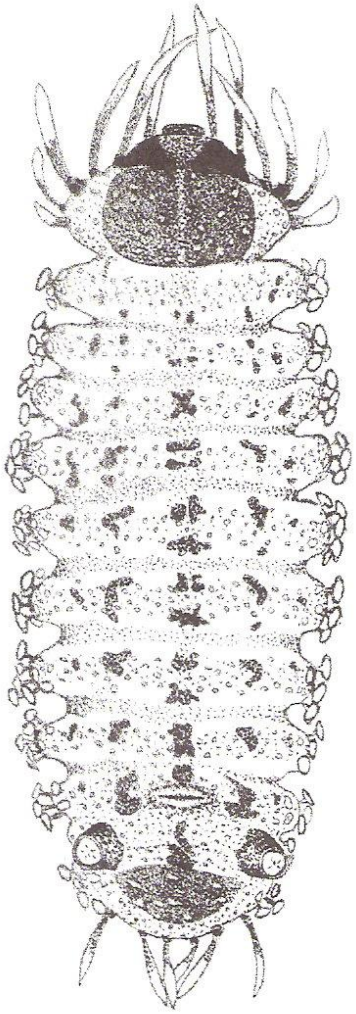

fig. 1
Second instar larva, dorsal view
(~ 53x natural size)

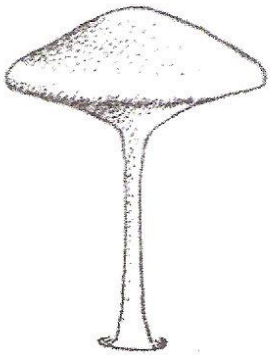

fig. 2
Mushroom-shaped seta from larva
(~ 950x natural size)

Early stage of *Oxychaeta dicksoni* (Gabriel, 1946)

Drawn by A. Heath

TWO "TENDERFEET" HEAD NORTH TO POMENE, MOZAMBIQUE 10 - 14 May 1995

By N. I. Curle
6 van der Riet St, Piet Retief, Eastern Transvaal

This summer saw the Curles clambering over mountains searching for elusive *Aloeides* and *Pseudonympha* species, and very little else. The *Aloeides* and *Pseudonympha* form part of two separate, but detailed, investigations currently underway, but more about these some other time. With this in mind, my second son, Michael and I headed north to Mozambique on the 9th of May for an excursion to greener pastures. Simon, my firstborn, was not allowed to go as the mosquitoes in Mozambique are armed and dangerous. Most, if not all, have become immune to the normal protection against malaria and the latest drugs interfere with his treatment for leukaemia.

Two days before we left, I stood on a nail that went through my shoe and into my foot, (the first of the tenderfeet). We were fortunate in that the trip had been planned well in advance and coincided with a fishing trip undertaken by some friends from Piet Retief. I must say that fishermen do things in style!.

Before continuing, I think it wise to fill others in on the hazards of travelling in Mozambique. Before leaving home en route to Mozambique, you should have the following in your possession: a valid passport; a visa imprinted onto a page in the passport; a valid driver's license (The South African Book of Life is sufficient); the ownership documents in respect of all the vehicles (4x4's, trailers, boats etc.) that you wish to take with you; a reliable 4x4 and a roadworthy trailer. All the vehicles should have excellent tyres and at least one spare tyre for each vehicle. I was forced to use the spare tyres on my Land rover as well as my trailer, as two of my tyres were written off during the trip. Over and above this, you must take all the food, cold drinks and water that you will need during your stay.

As one crosses the border, do not be surprised to be accosted by a "broker" who will attend to all the stamping of the necessary forms as well as the acquisition of insurance in case of an accident. Your South African insurance policy will only cover damage to your own vehicle and you should check that it does in fact cover travel in Mozambique. Third party vehicles and pedestrians etc. fall under the cover of this extra "Motor Vehicle Fund." Crossing the border costs about R200.00, excluding the cost of the visa (which should have been purchased earlier). Be certain to exchange your money at the border with one of the many exchange brokers as the exchange rate decreases as one heads north. The currency is measured in thousands of Meticais and a tank full of fuel (90 litres) costs 346 500 Meticais or about R157.50 which is about the same as in South Africa. An exchange rate of 2200 Meticais to the Rand is not unreasonable, but I have heard of people receiving as much as 2500 Meticais. Further north, the rate decreases to 1800 Meticais.

Before leaving, it is advisable to have at least R2000 on your person to pay for extraneous expenses.

The roads are reasonable except for a thirty kilometre stretch just north of Xai Xai (pronounced Shy Shy) where one must decide which pothole will cause the least damage to your vehicle. The drivers reminded of those in Gauteng. At least the drivers in Gauteng put on their flickers just before they change lanes. The drivers in Mozambique just change lanes. As there is only one lane travelling in each direction, this can be a little disconcerting. The local constabulary appear out of nowhere in the middle of the bush and stop your car. Seat belts, flickers and lights are all checked. If these are not being worn or do not work, you will be expected to contribute about R50.00 to the local coffers. For those persons who do not have their driver's licence on their person, there is a distinct possibility of spending some time in the local jail. The distance between towns is also worth mentioning. The major towns, which are equivalent to South African "dorps" or English villages are about 250 kilometres apart. The shops in these villages are one-man trading stores with exceptionally limited merchandise. We travelled from shop to shop to shop in search of some flour and eventually found some in the seventh shop.

Mozambique is a poor country. Poor in every respect other than bushveld, butterflies, crabs and snakes. There are very few animals left in the country as most seem to have been eliminated by the war. Driving north from Piet Retief, we passed through Swaziland which prides itself in the number of cattle that it has. These are so numerous and move so freely across main roads that they have come to be known as "Swazi Robots". Goats are also plentiful in Swaziland. As one crosses the border into Mozambique, the number of animals decreases as one travels north. North of Xai Xai there are no more cattle to be seen and as for goats, they appear to have almost been eliminated from almost all of Mozambique. Our camp was at Pomene, just south of Bazaroute but 1100 kilometres north of Piet Retief. The countryside is beautiful. Unfortunately much of the wildlife has probably been eaten by the local people in an effort to exist. During our stay there I only saw one small troop of monkeys and one baboon. Not only was the wildlife sparse but it seemed as though humanity had also been depleted as a result of the war. The people that are there are friendly but have a strange sense of values. Beers and cigarettes proved more valuable to twelve year old children than Meticais. The war appears to be over and we experienced no antagonism when we encountered the locals.

The weather was exceptionally good to Michael and me and we had an enjoyable week. Unfortunately Michael stood on some hot ash buried in some sand next to our campfire and burnt his foot badly. Fortunately, it happened just before we came home so it did not interfere unduly with our collecting. It did, however, mean that we had one more tender foot.

Butterflies were plentiful and what follows is a list of the more interesting species that we collected.

Colotis eunoma eunoma - mostly worn specimens but some fresh ones were taken.

Acraea machequena - one male taken, although we saw others flying in the upper branches of the trees.
Acraea acara acara - males were common but only one female was recorded.
Charaxes protoclea azota - one fresh male only.
Charaxes pseudophaeus - one worn female only.
Charaxes castor - males and females were fairly common. They appear to be somewhat darker than the normal *flavifasciatus*!
Protogoniomorpha anacardii nebulosa - one male taken.
Euphaedra neophron neophron - one male and two females taken.
Iolaus sp. - two females were taken, one with more white on the upper surface of the wings. Probably *silarus silarus* but more specimens need to be taken.
Hypolycaena sp. - males and females, which appear to be *caeculus caeculus*. However, one male was significantly smaller in size and bright blue instead of the normal azure blue. It was a very exciting find and more specimens need to be caught.
Spindasis sp. - males and a few females, which answer to the description of *ella*. However, the yellow colour on the underside is strong, with black markings.
Spindasis sp. - males and females of *natalensis*. One male answers to the description of *natalensis* form *obscura*, where the blue is darker and very shiny, with extremely long tails.
Axiocerces tjoane - three females were taken which had very strongly marked undersides, especially on the hindwing.
Chloroselas sp. - two males were taken, which are probably *pseudozeritis*. The underside markings are dark and mottled.

Clearly this is a most interesting locality which opens up more questions than it answers. As a holiday spot it is unbelievably beautiful. On the one side is a beautiful white beach where children can swim in relative safety. Not ten yards from the beach, my traps were catching *castor, pseudophaeus* and *protoclea azota*. I understand that the name Inhambane, the Province of Mocambique that we were collecting in, means Mistletoe. There was certainly plenty of that just fifteen metres from the beach but although I inspected several plants, there were no lycaenid ova, larvae, or pupae to be seen.

All in all, it was a pleasant excursion, to greener pastures, and we both enjoyed it immensely. So much so that a return visit is on the cards.

Please note:
There have been some reports of vehicles being attacked in Mozambique. Readers planning an expedition into that country are strongly advised to familiarize themselves with the current security situation.

USE OF STATISTICS IN COMPARING SETS OF DATA

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Variation is natural in all living creatures, and size is subject to considerable variation within butterfly species. Its use as a distinguishing factor between very similar species is dangerous, because size is so easily affected by factors such as foodplant health and climatic conditions.

However, in controlled scientific observations (for example, those carried out in Woodhall, 1995, The effects of alternative foodplants on the morphology of *Charaxes ethalion ethalion* (Boisduval, 1847), and *C.vansoni* Van Someren ,1975), where all the butterflies of each species are bred under identical climatic conditions and only the foodplant type has been varied, one still encounters size variation. Normally, the size of a population is expected to vary about an average, or mean, in what is called a "normal distribution" (fig.1). Such a distribution can be described mathematically so that exact measurements of the spread of results about the mean can be made. A simple measure of spread is the range of results. For example in my paper, the female *C.e.ethalion* bred on *Albizia* had a mean forewing length of 37.5mm and the range was 35.0mm to 39.3mm. Unfortunately the range is rather meaningless as it does not allow for "outliers" or freaks, which will influence the range but not reflect the true variation in the population.

The use of the standard deviation, which in mathematicians' terms is the root mean square deviation from the mean, allows comparisons to be made between different populations if we assume the populations to be normally distributed. Experience of many different populations with natural variation has shown that random variation about a mean generally shows up in the typical "bell curve" shown in fig.1. The placing of the mean in the exact middle of the curve is the application of the "central limit theorem", which states that in normally distributed populations, 50% of results will fall above the mean, and 50% below it.

Many amateur lepidopterists are put off statistics by the aura of school desks and dreaded maths homework that can be associated with them. However, the maths are not difficult and most hand-held calculators will allow one to key in one's data and arrive at a standard deviation by simply pressing a button. To use them in studying insect populations, however, a little knowledge of the theories and maths involved is essential. The standard deviation of a sample set of data is calculated as follows:

$$s = \sqrt{\frac{\sum(x-x)2}{(n-1)}}$$

s is the sample standard deviation (sigma) is a symbol for the sum of a set of items

x is each individual item, result or observation in the set of data (the sample)
$\bar{x}$ is the arithmetic mean or average
n is the number of observations in the sample

So first of all, one calculates the mean of the set of items. This is done by adding all individual observations or items and dividing the resultant sum by the number of results. One then subtracts the mean from each result and squares it (which removes minus signs), adding all these squared differences. Then one divides the sum of the squared differences by the number of items in the set minus one, and takes the square root to arrive at the standard deviation. As an example, consider this example. The forewing lengths of 12 male specimens of *Charaxes ethalion ethalion* were measured, and found to be as follows:

29.7mm, 32.0mm, 30.5mm, 31.5mm, 30.7mm, 31.5mm, 30.3mm, 30.6mm, 30.6mm,
29.9mm, 31.5mm, and 30.8mm.

The SUM of these is:
29.7+32.0+30.5+31.5+30.7+31.5+30.3+30.6+30.6+29.9+31.5+30.8 = 369.6

The NUMBER of items (n) is 12, therefore
The MEAN ($\bar{x}$) is: 369.6/12 = 30.8mm

Subtracting the mean from each result and squaring it is best illustrated by a table:

Item	Value x (mm)	Difference from mean x-$\bar{x}$	Squared difference $(x-\bar{x})^2$
1	29.7	-1.1	1.21
2	32.0	1.2	1.44
3	30.5	-0.3	0.09
4	31.5	0.7	0.49
5	30.7	-0.1	0.01
6	31.5	0.7	0.49
7	30.3	-0.5	0.25
8	30.6	-0.2	0.04
9	30.6	-0.2	0.04
10	29.9	-0.9	0.81
11	31.5	0.7	0.49
12	30.8	0.0	0.00

Sum of squared differences = 5.36

Mean of squared differences = 5.36/n-1 = 5.36/11 = 0.487

Root of mean of squared differences (standard deviation) = 0.698

The standard deviation is a very useful "statistic" (as such numbers are called), which allows one to make some important discoveries about one's experiments, because using calculus it can be shown that:

68.26% of all measurements of a normally distributed population lie within one standard deviation either side of the mean;

95% of all measurements of a normally distributed population lie within 1.96 standard deviations either side of the mean;

95.44% of all measurements of a normally distributed population lie within two standard deviations either side of the mean;

99.74% of all measurements of a normally distributed population lie within three standard deviations either side of the mean.

This is shown in fig.1. Practically, this means that if the mean wingspan of male *C.e.ethalion* is found to be 70.3mm, s.d 2.52mm, we can assume that 68.26% of individuals will have wingspans between 67.8mm and 72.8mm. We can also assume that 95% of individuals will have wingspans between 65.4mm and 75.23mm.

It is practically impossible to measure every individual in a population and arrive at the true population standard deviation. Imagine catching and measuring every *C.e.ethalion* in the Tshatshingo Forest! All one can do is to take a sample, and try to make it bigger than 30 specimens. Strictly speaking, one should also test the samples to see whether they really are normally distributed. Readers who wish to study this problem in more detail are referred to Sokal & Rohlf (1981)(2). One can make inferences about the true population variation from sample means because the central limit theorem shows that if the means of many samples from one population are calculated, they are, just like the individual values that go to make them up, normally distributed about the true population mean. Knowledge of sample standard deviations allows one to find out if they truly come from one total population, or whether they come from different populations (fig.2). This is done by tests of significance, which make the use of statistics so valuable to the student of nature.

A simple test of significance is to work out the probability that two sample means come from different populations. When looking for the effects of different foodplants on the morphology of butterflies (Woodhall, 1995), it was possible that the use of *Albizia* or *Peltophorum* as a foodplant has no effect on forewing size of male *C.e.ethalion*. Such a possibility is termed a "null hypothesis" by statisticians. Another possibility or hypothesis was that feeding the larvae on different foodplants will, in fact, have a significant effect on the forewing size of the male population. A test of significance allowed me to decide which

hypothesis is closer to the truth, and to be able to say how certain I was that this is so.

We already have an idea that if two samples of *C.e.ethalion* have mean wingspans that differ by more than 9.88mm, then we are 95% sure that they come from different populations, because the standard deviation is 2.52mm in fig.1. However, the standard deviation of a sample is not the same thing as that of the whole population.

The central limit theorem states that sample means from one population will be normally distributed about the population mean, with a standard deviation equal to the standard error of the mean. The standard error is calculated as follows:

$$\text{standard error} = \frac{\sigma}{\sqrt{n}}$$

σ = standard deviation of the population
n = size of the sample(s) (number of items/observations in a sample - see above)

One is unlikely to know the true value of o, so we use s, the standard deviation of the sample, and adjust it by a correction factor known as Bessel's factor:

$$s. \frac{n}{n-1} = \text{estimated } \sigma$$

and use this to work out standard error.

What this means practically is that if one has two sets of results (or sets of "data") from an experiment of the type described in Woodhall, 1995, then if the means differ by more than 3.92 (2 x 1.96) standard errors one is at least 95% certain that the two results are in fact different and do not simply vary due to chance; in other words as the statisticians have it, one is looking at a difference that is significant at the 95% level (fig.2). It is possible to work out the exact difference between the means of the two sets of data in numbers of standard deviations, and use special tables to work out just how significant the difference is.

Unfortunately, to assume that the results of one's experiments follow a normal distribution is only possible when one has more than 30 results. Time and costs mean that one has much less data. When this is the case, the use of the normal distribution becomes risky, because as the number of data shrinks, the assumptions holding up the central limit theorem become invalid.

This is where the "student's t" distribution is of value. A person called WS Gosset, writing under the pen-name "A student", showed that the means of samples smaller than 30 data are distributed around the population mean in a manner similar to, but not exactly a normal distribution. To use the student's t distribution, one calculates the sample standard deviations and standard errors

in the normal way, but the t-distribution replaces the normal distribution, and significance tests are done using this distribution, are often called "t-tests".

As stated above, for large samples 95% of sample means will lie within plus or minus 1.96 standard errors of the true population mean. For small samples, 1.96 is replaced by a factor t, which varies with the sample size or, more correctly, with the degrees of freedom. The number of degrees of freedom in this kind of problem is (n-1) for a sample of size n. If one is comparing two sample means, as in Woodhall, 1995, then one pools the numbers of data in each sample to arrive at the degrees of freedom. As can be seen in the tables accompanying this paper, the comparison of forewing length for males of *C.e.ethalion* compares a sample of 12 data for *Peltophorum*-fed specimens and 13 for *Albizia*-bred ones. This is a total of 25 data, so the degrees of freedom are (12 + 13 -2) = 23. There is a separate t distribution for small samples of each different size. This is simplified by the use of t-tables, which give the t-statistics for each level of degrees of freedom at varying levels of significance. As an example, the t-statistic at 95% significance for 23 degrees of freedom is 2.069. The two sample means differ by 4.06 standard errors, which is far greater than 2.069. In fact these two means differ at the 99.8% level of significance, which has a t-statistic of 3.485. This means that feeding males of *C.e.ethalion* on the two different foodplants has a very significant effect on wing size; there is only a 0.2% chance that this difference is due to random variation.

The t-test assumes that there is no significant difference between the variances of the two populations sampled, so strictly speaking this should also be tested.

Statistical tests of significance are the reason why modern scientific authors quoting parameters such as forewing size no longer simply quote a range, for example "60-66mm wingspan". The practice is to quote the mean, standard deviation and sample size, for example "mean forewing length 30.8mm, s= 0.67mm, n= 12". This allows subsequent workers using the paper to compare their data with the original paper and get an idea of the significance of any differences. The mathematics are not difficult, basic statistics do not need knowledge of any truly frightening maths; in fact as shown above it is all a matter of arithmetic. Most modern calculators allow standard deviations to be worked out automatically by keying in the data, so all that is needed is a knowledge of how to calculate the test statistics.

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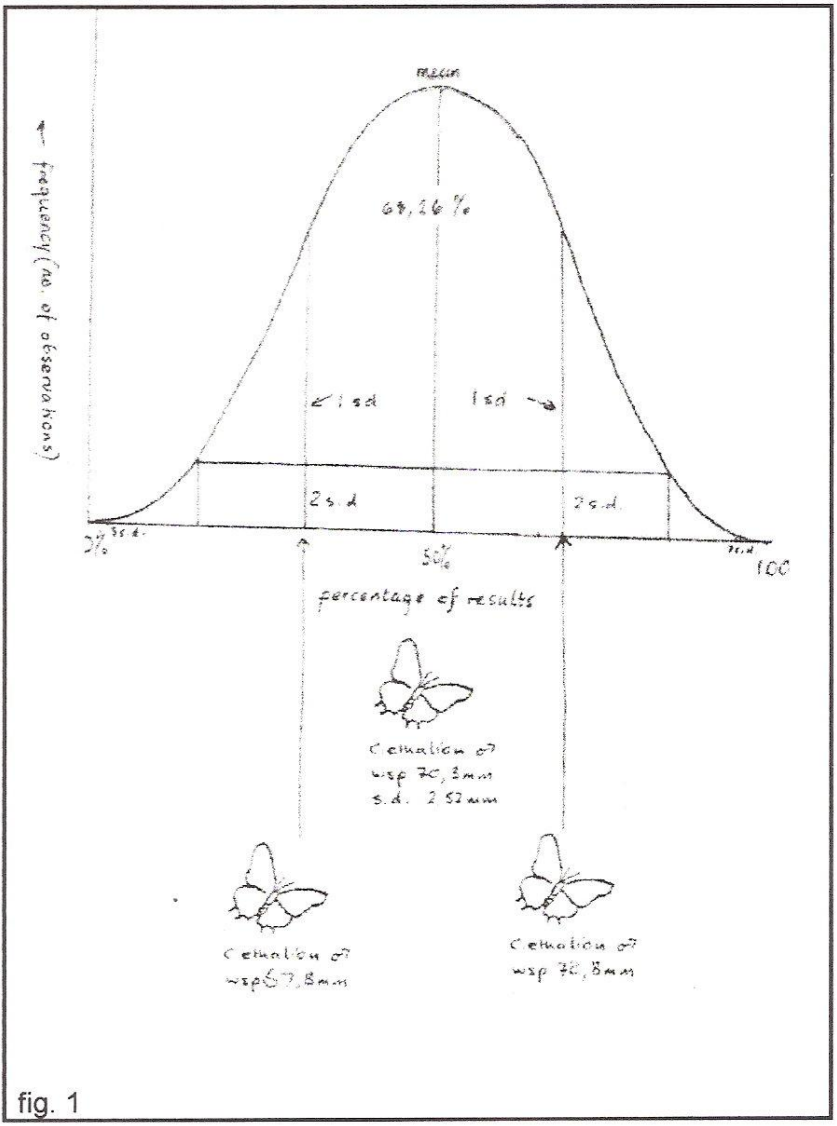
mean
68,26 %
1 s.d
1 s.d
2 s.d
2 s.d
95 s.d.
95 s.d.
2%
50%
100
percentage of results
Catalon ♂
wsp 70,3mm
s.d. 2,52mm
Catalon ♂
wsp 67,8mm
Catalon ♂
wsp 72,8mm

fig. 1

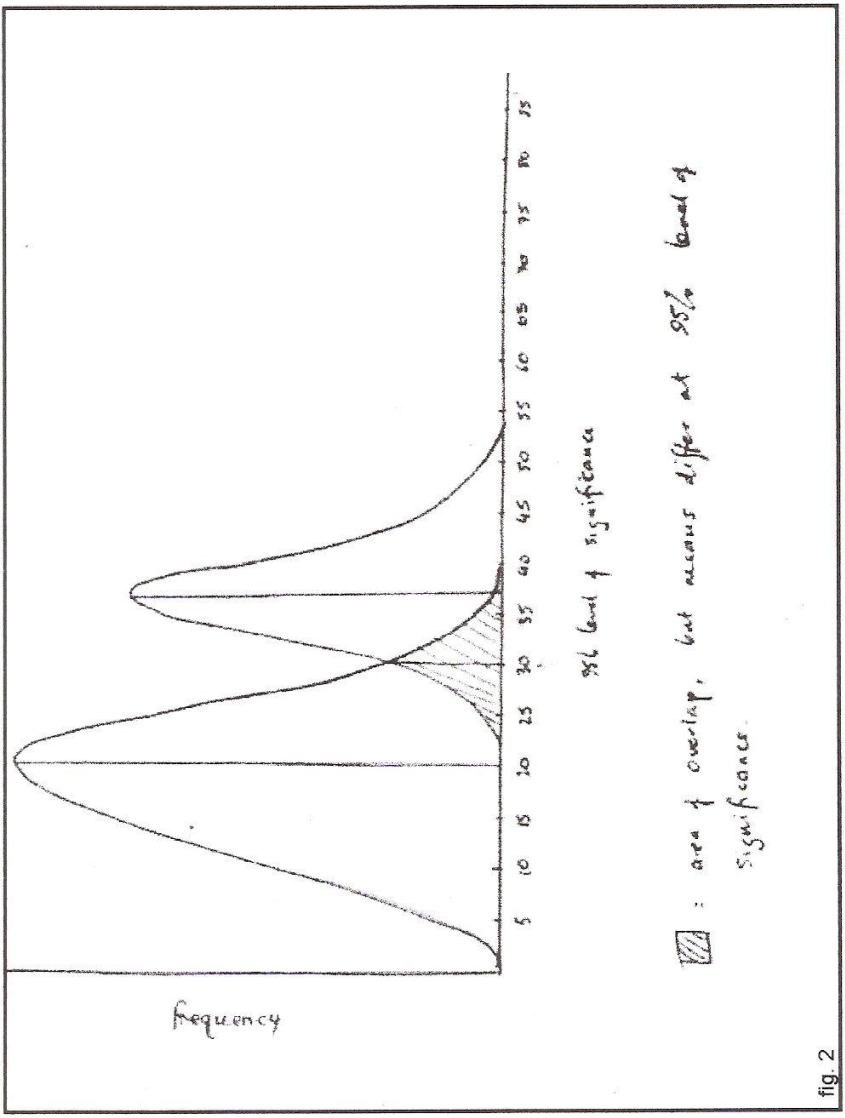
Frequency
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
95% level of significance
: area of overlap, but means differ at 95% level of significance.

fig. 2

BUTTERFLIES IN KAKUM NATIONAL PARK, GHANA

By Torben B. Larsen
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Introduction

As part of background research for my book, *The butterflies of West Africa - origins, natural history, diversity, and conservation* I decided to study the butterfly fauna of Kakum National Park in depth. Virtually no attempts have been made to compile complete lists of butterflies from single localities in West Africa, though such lists would be a useful aid to assessing total biodiversity. A further advantage of studying single localities in depth is the gradual development of an understanding of seasonality, the relative frequency of the various species, their habits and habitat preferences which is hard to obtain through flying visits to many localities.

Kakum National Park consists of about 350 km² of tropical rainforest in good condition, though parts were selectively logged not that long ago. It is one of the most important conservation areas in West Africa, where rainforest has been lost at an alarming rate throughout this century. Perhaps the largest indicator of the continuing health of the forest is the presence of the small forest elephant, a well-differentiated subspecies of the savannah elephant, so shy that its habits and social organization are still only poorly understood.

The Park has become something of a 'conservation flagship' in Ghana since it is readily accessible by tarmac road from Cape Coast, a town some 150 km west of the capital, Accra. Cape Coast was for long a slaving centre and the coastline is dotted with forts (Potuguese, English, Dutch, Danish) which stand as living testimonials to one of the worst examples ever of the human capacity for inhumanity. The Park is being developed by the Ghana Wildlife Department with technical support from *Conservation International* and financial support from *USAID*.

The purpose of this paper is to give an impression of the butterfly fauna in a West African rainforest setting.

The biogeographical setting

The West African rainforest is one of four major forest regions in Africa, all of which are - or at various times were - in continued faunal contact. The Afrotropical region has some 3,700 species of butterflies, more than two-thirds of which are forest species. About 900 forest species occur in western West Africa, i. e. the area west of the *Dahomey Gap* - a biogeographical barrier where a tongue of savannah breaks the forest zone between Ghana and western Nigeria. North of the forest zone occur an additional 100 or so savannah species. So far 870 of the thousand West African species are known with certainty from Ghana.

Since all the forest zones in Africa are, or have been, in recent faunal contact, there is considerable similarity between the regions. Levels of regional

endemicity are relatively low. Thus, hardly any genera of butterflies are limited to West Africa,

but about 120 species are - 15 % of the forest fauna. The remainder are found in other forest regions as well, often ranging right through from Sierra Leone to western Kenya, and even to the East African costal forests.

The butterflies of Kakum

I have spent some 60 days in the field (35 field days, defined as 5 hours' collecting a day in good weather conditions) at Kakum on numerous occasions over the past 18 months. In the course of this I have established the presence of almost 440 species of butterflies - half the Ghana total and nearly two-thirds of Ghana's forest butterflies. However, many remain to be discovered and I would expect the total to be somewhere between 550 and 600.

To place these figures in perspective, the highest published figures from elsewhere in West Africa are around 380 (Olokemeji, Gambari, and Agege in Nigeria (Larsen, Riley & Cornes 1980, Riley & Cornes 19710, Hopkins 1970). The most detailed faunistic study yet of butterflies in West Africa is the review of the Liberian fauna by Fox *et al*. (1965). At that point only 475 were known with certainty from Liberia. During their many years of collecting, Fox and his wife caught far fewer species in Liberia than I have personally found at Kakum.

Table 1 The butterflies of Ghana and of Kakum National Park (as of June 1994)

Family/Subfamily	Africa	Ghana	Kakum
Papilionidae	87	27	17
Pieridae	173	47	24
Lycaenidae	1473	285	115
Riodinidae	14	2	0
Libytheinae	3	1	1
Danainae	19	6	6
Satyrinae	298	47	25
Apaturinae	2	1	0
Charaxinae	187	49	20
Nymphalinae	562	169	109
Acraeinae	199	39	25
Hesperiidae	478	191	91
TOTAL	3495*	864*	433*

* present totals about 3650, 870, and 441

A short walk in Kakum National Park

A good day in the tropical forests is one that is partly cloudy, so that sun and shade alternate. This keeps down temperatures so that butterflies are active all day - and allows the collector to survive the whole day as well! On very sunny days heat shuts down much of the activity by noon-time, and many of the undergrowth species do not leave their hiding spots. A walk should be planned to take in both abandoned logging-roads, open clearings, and the dark forest paths where the sun hardly penetrates. A well-planned walk on a good day can be very satisfying indeed. I regularly see as many as 150 species in a single day. My personal record is 225, on an absolutely perfect day in the Gambari Forest, near Ibadan in Nigeria, at the right time of the year, when my local experience was at its best.

Papilionidae

There are at least 17 swallowtails (Papilionidae) at Kakum. The giant emperor swallowtail (*Papilio menestheus* Drury) is the most common, together with *Papilio cyproeofila* Butler; the males of both patrol along open paths. Occasionally, the huge *Papilio horribilis* Butler will swoop down from the canopy with the wings held a third open. There are three of the brilliant, green-banded swallowtails of the *Papilio nireus*-group, often joining the long-tailed swordtail *Graphium policenes* Cramer at damp patches. An occasional flash of emerald, hurtling along at prodigeous speed, announces the rare *Graphium tyndaraeus* Fabricius - one of the most beautiful of all African butterflies.

So far neither of Africa's largest and most spectacular butterflies (*Papilio zalmoxis* Hewitson and *Papilio antimachus* Drury) have been sighted at Kakum, but they may well be there. Both are remarkably scarce, local, and seasonal in West Africa.

Pieridae

The whites and yellows (Pieridae) of Africa are very similar to those of Asia and the Neotropics - indeed *Appias* and *Eurema* are pan-tropical genera, and *Belenois* is well represented in Asia. Among the most prominent is the forest grass yellow (*Eurema senegalensis* Boisduval); on old logging roads, where the sensitive plant (*Mimosa pudica*) has penetrated, the common grass yellow (*Eurema hecabe* Linné) of open habitats may also be found. The two normally never fly together. The most prominent of the whites are four members of the genus *Leptosia*, flying everywhere with what must be among the weakest flights of any butterflies. On warm days large numbers of *Belenois* and *Appias* come to damp sand. Some of the Pierid females show a remarkable degree of dimorphism which has not been systematically studied; they seem to be mimics of *Mylothris*. Many of the African Pieridae (not least the *Colotis* and related genera) are savannah butterflies and these never penetrate the forest, though several of them invade cleared agricultural land. There are only 25 Pieridae at Kakum and few remain to be discovered.

Still missing is the ghost (*Pseudopontia paradoxa* Felder), the only member of the subfamily Pseudopontiinae, with its transparent wings and amazing venation. Just posssibly Kakum is not wet enough, but it seems to be generally rare in Ghana, and during my extensive collecting I have taken just two in Ankasa National Park.

Lycaenidae

The Lycaenidae are by far the largest group of African butterflies with about 40 percent of the total fauna, but they are a very mixed lot indeed. The most unusual are the African subfamily Lipteninae. These are small white, yellow, red, orange, or black butterflies - often with beautiful patterns - that are strictly limited to the proximity of *Crematogaster* ants which build large paper nests on tree-trunks. There seems to be no real symbiosis - the larvae have no honey glands - but no ants ... no butterflies. The Lipteninae are so bizarre that many were originally described as Pieridae or Acraeinae. They are not at all numerous at Kakum and need looking for. They gather in little clusters on twigs or tendrils, especially those of Marantaceae which have extra-floral nectaries. They never visit flowers and their proboscis is reduced in length compared with flower feeding Lycaenidae. My favourites are the almost clearwing *Ornipholidotos*; I was particularly pleased to find a colony of *Ornipholidotos larseni* Stempffer, which I never saw again since finding one of the types in Nigeria in 1967! The largest of the Liptenines is *Mimacraea darwinia* Butler, a stunning mimic or co-mimic of *Acraea epaea* Cramer. Some 30 of these species have been recorded, but there must be many more.

The *Epitola* section of the Lipteninae are usually blue on the upperside, and therefore rather less unusual. The huge genus *Epitola* probably has some 30 Ghanaian species, but I have only taken three or four at Kakum. They seem to live high up, just below the canopy, and are only seen when they come down to display on their chosen parade ground. Each species has its own display time, lasting less than an hour. On three separate occasions, within a few minutes of 11.30, I have taken a single male *Epitola carcina* Hewitson in exactly the same spot. It will be a long time before all the *Epitola* and related genera in Kakum have been recorded, but the largest of them (*Hewitsonia boisduvalii* Aurivillius) is fortunately there. *Conservation International* is planning to construct a canopy walkway which may help in pinning down the habits of these particular butterflies. I shall certainly spend many days on the walkway with a long-handled net. So far only ten members of the *Epitola*-group have been found; there must be at least 20 more.

There are a few members of the subfamiles Miletinae and Liphyrinae, the truly carnivorous species, which feed on Homoptera or ants. Of these, only *Megalopalpus zymna* Hewitson is tolerably common. I took a single female of the moth butterfly (*Euliphyra mirifica* Holland), which feeds on the early stages of the vicious tailor ants (*Oecophylla*); I had no idea what it was till I took it out of the net!

The Aphnaeinae and Theclinae are numerous and mostly rather similar to Oriental species, and many would not look out of place in the Neotropics. Most

are quite scarce, however. For instance, there are some 25 of the beautiful *Iolaus* in Ghana, but I have only taken four or five at Kakum. The rarest are members of the

Pseudaletis, about which Denis Owen (1991) recently wrote; my total is a single battered male of *Pseudaletis leonis* Staudinger which dropped out of the canopy. One species that is common is the false-head butterfly, *Oxylides faunas*. Not only does it have the amazing false-head, but it has an extra twist - it turns 180 a fraction of a second before landing in order to improve the effect. I pointed out this phenomenon to a group of Wildlife Department staff during my first visit to Ghana and word has spread. Now I keep being told the story in other parks by staff who do not know me - an interesting example of how effective informal communication channels can be. I have about 30 members of this group so far, but there must be amost twice as many. And there are new species to be found; I have just described *Diopetes kakumi*, a beautiful new Theclinae.

Apart from *Anthene* and related genera, the Polyommatinae are poorly represented in the forest zone. The most evident are the snow-white members of the *Oboronia*, including by far the easternmost colony of *Oboronia liberiana* Stempffer. The Polyommatine tally so far comes to 35.

Only two Riodininae of the genus *Abisara*, well represented also in Asia, are known from West Africa. They seem to be restricted to the very highest points of West Africa (700 m +) and may well be genuinely absent from Kakum.

The only African mainland Libytheid, *Libythea labdaca* Westwood is usually absent, but then occasionally turns up as a migrant by the million. Since it is found only in the forest zone, it is difficult to fathom why these large-scale movements take place.

Nymphalidae

The Danainae are poorly represented in Africa, but all six Ghanaian species have been recorded. However, *Danaus chrysippus* Linné only occurs as a stray in the forest proper and always looks distinctly uncomfortable; it is very common in the open agricultural lands surrounding Kakum.

About 30 Satyrinae have so far been found, and they behave just as Satyrinae usually do in the tropics. More than half belong to the genus *Bicyclus* and I am beginning to be able to guess which species are where. Many live only in dense undergrowth and are best lured out by fruit bait - this is especially true for the huge blue-banded *B. hewitsoni*. Other species frequent more open forest, some are on swampy ground, and a few are found only along paths and in clearings.

The Charaxinae are among the jewels of African butterflies and can nearly only be caught by the use of traps. I have not been overly diligent in this respect, and have taken only 20 so far. Now that I have a vehicle it will be easier to set traps and procure bait, so the total will rise to over 30 - perhaps including the rare *Charaxes hadrianus* Ward which I have taken futher down the coast.

Now come the African forest butterflies *par excellence*, the genera *Euryphura* (two in Kakum), *Euriphene* (twelve in Kakum). *Bebearia* (sixteen), *Euphaedra* (sixteen), and related genera (six). They are all hooked on fermenting fruit, and where monkeys and hornbills have dislodged lots of figs, the forest floor is carpeted with these spectacular butterflies. The *Euphaedra* are among the most beautiful butterflies in Africa. My favourite is the rare and very shy *Euphaedra perseis* Drury
which is a phenomenal mimic of a day-flying moth, and which has adapted its flight pattern accordingly. They may not look that similar in a box, but I am hard put to tell them apart in nature.

The beautiful *Cymothoe* have seven representatives in Kakum. They are also fruit-feeders, but less tied to the forest floor. I found a lovely new species there, only to discover that it had already been described as *Cymothoe aubergeri* Plantrou from Côte d'Ivoire as recently as 1977 and never referred to since. There should be six of the related *Euptera* and *Pseudathyma* in Kakum, but they are extremely scarce, and I have only one.

Four or five *Pseudacraea* are found in the park, and as the name implies, they are among the finest mimics of *Acraea* that can be imagined. There is disagreement over whether some species are polymorphic and breeding experiments are called for. I believe them to be strongly polymorphic and under the same sort of genetic control as swallowtails such as *Papilio memnon* Linné and the female of *P. dardanus* Brown, but it could be that several species are involved. Here is a splendid topic for a postgraduate thesis.

So far no less than sixteen of at most twenty species of *Neptis* have turned up - as many as twelve species in a single day. How males and females in this genus establish their respective *bona fides* I cannot say - several are almost impossible to tell apart under the microscope, but they obviously manage well in the field! *Neptis nysiades* Hewitson is perhaps the the world's most variable butterfly - or perhaps not, since I suspect it may be a complex of six to ten distinct species.

The remaining Nymphalinae (some 25 species) tend to be species of clearings and paths, often large and very visible. The African Oakleaf (*Kallimoides rumia* Doubleday) dive-bombs any passing butterfly. The mother-of-pearl (*Salamis parhassus* Drury) circles lazily overhead, occasionally picking a fight with a neighbouring male. The beautiful Diadem (*Hypolimnas salmacis* Drury) adds a splash of blue of almost morpho-like intensity. Finally, two of the few African Argynnini (*Phalanta eurytis* Doubleday & Hewitson and *Lachnoptera anticlia* Hübner) add their bright cinnamon to the scene.

The Acraeinae are rarely much in evidence, though there may be a time during the dry season when they are more common than I have yet seen them. Several species do have sudden population explosions at odd times of the year. Nonetheless, more than 25 species have already been recorded and there are probably no more than another five to be found. The subfamily is rather poorly represented in West Africa. The most interesting and complex species annd groups are from the montane forests and the denser Zambesian savannahs. There are only 40 in all of West Africa, but twice as many in Kenya.

Hesperiidae

Some 90 skippers have so far been recorded, and there are more to come, since getting a complete representation of skippers depends on a lot a trudging along forest paths catching large numbers of the common species to check for the scarcer ones. Few skippers are common and many are exceedingly rare. Thus, I have seen but one *Celaenorrhinus rutilans* Mabille, a large and most evident species, and three rare *Celaenorrhinus* that should be present have not yet been seen. Members of the *Katreus* and *Calleagris* are almost 'once-in-a-lifetime' events - on my last trip I saw *Calleagris lacteus* Mabille for the first time after spending more than a hundred days in suitable forests. The paradise skippers of the genus *Abantis* are almost impossible to come across in West Africa; one of the most characteristic (*Abantis eltringhami* Jordan) is still known only from the holotype.

The most spectacular skipper in Africa is the giant skipper (*Pyrrhochalcia iphis* Drury), the archetype of a forest butterfly. Its slow, buzzing - but far from clumsy - flight in the semi-twilight of the dense forest is a familiar sight. It came as a real surprise to me that it was common right in the centre of Cape Coast township as well. That kind of ecological tolerance is genuinely rare among forest butterflies.

I find the skippers a most exciting group and it is sad that they are all too often ignored or relegated to secondary status. Several of the recent major books on African butterflies exclude them completely.

Conclusion

There are probably nearly 600 butterfly species in Kakum, and up to 150 of them can be seen on a good day's walk. This is interesting and important on its own. I shall have more to say about the composition, ecology, and biodiversity of Kakum butterflies when I have studied them further. But butterflies, being relatively well known, can also be looked at as a proxy for wider arthropod biodiversity. Only about one percent of all described arthropods are butterflies, so the 600 butterflies probably act as proxy for an absolute minimum of 60,000 other arthropod species. But most other arthropods are much less studied than butterflies, where 90 % or more are known (I have only found a dozen new species in Ghana so far). Only between 15 and 35 percent have been formally described, so it is a safe bet that the Kakum butterflies are a proxy for 200,000 to 400,000 other arthropods.

That is the treasure house which Kakum National Park protects. The Ghana Wildlife Department, with the support of outside donors like the IUCN, Conservation International, and bilateral donors, is doing a good job with a minimum of resources, conserving the last remaining patches of unspoilt habitats. And while Ghana does have a genuine self-interest in ensuring the conservation of its original biodiversity and natural resources, the rest of the world does as well.

So, please join me in three cheers for Kakum National Park. It is one crucial link in an all too fragile chain of nature reserves that protect the last

remnants of the forest ecosystems of West Africa, the study of which has hardly begun.

Acknowledgements
This is paper no. 11 resulting from my initial research for the book *Butterflies of West Africa - origins, natural history, diversity, and conservation (1993-1998)*. The field work has been generously supported by the Carlsberg Foundation in Denmark. The Ghana Wildlife Department has supported the project throughout; their field staff are extremely helpful, and their large veranda tents are wonderful when it rains for days on end. Few places in Africa are as welcoming, safe, and decent as rural parts of Ghana. At a time when most news out of Africa are bad, let Ghana get credit where credit is due.

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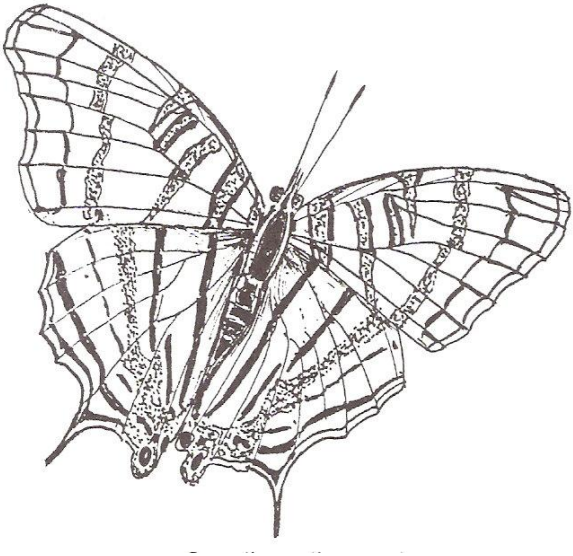

Cyrestis pantheus male

THE MANAGEMENT OF THE BUTTERFLY ERIKSSONIA ACRAEINA TRIMEN, 1891 (LEPIDOPTERA: LYCAENIDAE) IN THE WATERBERG.

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Erikssonia acraeina is a threatened species of butterfly that was discovered in Ovamboland in 1891. It was not seen again until it was collected at Mongu in Barotseland, Zambia by Dr C.B. Cottrell in 1955. A third locality was found in 1980 by Dave and Esmé Edge (Pringle et al, 1994) in the Waterberg in the Northern Transvaal Province, where it occurs on private land in the only known colony in South Africa. The extent of this colony is very small, covering less than one hectare. Several attempts to locate other colonies in the vicinity have been unsuccessful. According to Henning & Henning (1989), the butterfly is classified as vulnerable (IUCN Threatened Status Category). In view of the fact that the population numbers of this colony are very low it is essential that positive conservation actions be taken to improve the viability of this species. To do that, it is necessary to study the butterfly and its interaction with the environment thoroughly.

Erikssonia acraeina is a myrmecophilous species and the adult females lay their eggs only where they can find nests of the ant *Acantholepis capensis* as well as the larval foodplant *Gnidia kraussiana* in close proximity to each other. After the larvae have emerged from the eggs they
shelter in the host-ant nests from where the ants accompany them while feeding.

This particular colony of *Erikssonia acraeina* occurs in Acocks' veldtype 20, Sour Bushveld. The habitat consists of open *Burkea africana/Ochna pulchra* savannah in deep, reddish sand with a west-facing slope of about three degrees.

A wheel-point survey to determine proportional species composition in the Perdekop study site produced 57 species of plants.

The larval foodplant, *Gnidia kraussiana*, is a perennial plant with a large rootstock. The aerial parts of the plant die off in winter and sprout new shoots each summer. Under-utilization, of the veld, in the past, in this specific area, caused low-density bush encroachment by *Ochna pulchra* and shrub forms of *Burkea africana*. A dense cover of moribund grass was also present because game was absent and livestock had been excluded due to the presence of *gifblaar, Dichapetalum cymosum*. As far as could be established the last fire in the study area before 1989 was in 1984. This allowed a large build-up of moribund material and a corresponding decrease in butterfly numbers. Since 1989 when fires were reintroduced, on a bi-annual cycle, significant increases in butterfly numbers were recorded. A similar increase was also noted in the number of ant colonies.

The density of the foodplants varies between one plant per eight m² and one plant per 200 m². *E. acraeina* has been found to occur mostly in areas with foodplant densities of between one plant per eight m² and one plant per 28 m².

Little is known about the host ant *Acantholepis capensis*. Increases in the number of ants' nests are noted in the seasons following veld fires, probably as a result of the ants preferring a more open type of habitat (Samways, 1983).

It seems that the butterflies also require a slightly more open habitat as they are prevented from laying their eggs on the soil close to the ants' nests when large quantities of debris or vegetation cover the ground. This is also important because the newly-hatched larvae must be in close proximity to the host-ant nests. When eggs are laid on the stems of the foodplants, due to unsuitable conditions being found on the ground, only a few of these eggs hatch. When a female selects a site for oviposition she may be selecting only for the ant pheromone which can sometimes cause the larvae to be stranded without food because a foodplant may be too small to sustain the larvae towards the end of the season.

Mark-and-release studies have been done annually in order to detect population fluctuations. This does not appear to have a negative effect on the butterfly's life cycle as marked specimens have been observed two to three weeks following marking.

Previous land use practices, which included the exclusion of game, cattle and fire, resulted in an increase in moribund material to such an extent that it probably caused a decrease in the number of host-ant nests and therefore also a corresponding decrease in butterfly numbers. This also probably prevented the butterfly from finding suitable sites to lay its eggs. The destruction of ants' nests caused by the heavy utilisation of *Gnidia kraussiana* by porcupines, from time to time may also have had a negative effect on butterfly numbers. On top of this, since this colony was discovered in 1980 it was impacted up until 1985 by collectors who visited it to take series of specimens for their collections. There were even rumours that this butterfly was being exported to America to be sold to collectors.

The increase in butterfly numbers after veld fires shows that proper management can have a positive effect on the numbers of the butterfly. It is also clear that continuous management is necessary because of a decline in the butterfly numbers in relation to an increase in moribund material.

Because this colony of *Erikssonia acraeina* occurs on private land it is not easy to continuously ensure sound management techniques, the lack of which may cause unnecessary changes in the habitat which can result in the extinction of the butterfly as its numbers are already critically low. This area also has a limited carrying capacity due to its small size and therefore attempts to introduce the butterfly to other similar areas should be made in order to optimise genetic diversity and to afford protection against catastrophies such as accidental poisoning through agricultural practices. The Marakele National Park is a formal conservation area in the close vicinity of this colony, and which is managed in a scientific way. If, after a thorough study of selected areas in this Park, suitable habitat can be found, this may be an ideal place for introductions

where the populations of introduced butterflies can be protected and managed to ensure their continued existence.

I wish to thank the National Parks Board and the Park Warden, Mr Piet van Staden, for their enthusiastic support and permission to work in the Marakele National Park, as well as Mr John Cleverdon, owner of the farm Sterkfontein, where *Erikssonia acraeina* occurs and the farm manager, Mr M.J. Willemse for their permission and support. Thanks are also due to my colleague, Mr Wayne Boyd for linguistic criticism of this article.

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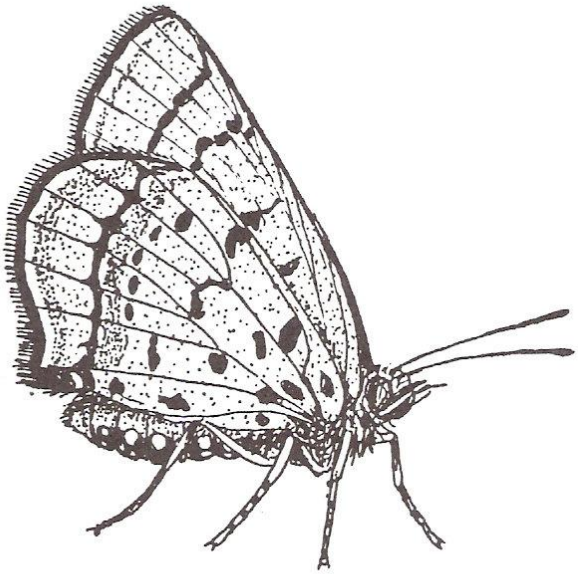

Erikssonia acraeina female

SOME BUTTERFLIES AND MOTHS FOUND ON PARADISE ISLAND: EASTER 1993

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Paradise Island, also known as Ihla De Santa Carolina, lies in the Moçambique channel. It forms part of a group of islands lying just off the coast from Vilancoulos. These islands are Bazaruto, Benguela, Margaruque, and Santa Carolina which is the smallest, and also closest to the mainland. The approximate latitude and longitude of this island is: 21° 37' S; 35° 27' E. The island is crescent-shaped and low, but being well-wooded, with a sand hill on the N. E. Side, is easily identified. The approach to the island, by sea, lies through a channel which takes one to the anchorage off the western end. (i.e. inside the crescent.) A disused runway, approximately 650m long, is used by intrepid aviators.

There is a settlement and a hotel on the island. At the time of writing a timeshare scheme, originating from South Africa is also in operation. Many years ago llha De Santa Carolina was the principle Portuguese establishment in the area, and a small garrison was stationed there. The remains of the old fort are still visible today. After the second world war, a Portuguese entrepreneur, suspected of supplying diesel to German submarines off the coast in exchange for gold, bought the island. He build the hotel and established one of the most successful game fishing centres in the world, which operated until the collapse of Portuguese rule in 1974. Since then Paradise Island has slipped into disuse and degradation. Much of its marine ecosystems, especially coral reefs, have been damaged through illegal and' unethical fishing practices. The Moçambique department of nature conservation, in conjunction with the World Wildlife Fund, are attempting to do something about this sad state of affairs. The writer visited the island over a five day period during Easter 1993 and was able to net most of the Lepidoptera species noted here. Some of the more common species were identified while on the wing or when at rest. List of Lepidoptera found on the island during April 1993:

Butterflies:

Papilionoidea:

Danaus chrysippus aegypticus (Schreber)
Melanites leda helena (Westwood)
Henotesia perspicua (Trimen)
Hyalites encedon (Linnaeus)
Euxanthe wakefieldi (Ward)
Byblia ilithyia (Drury)
Hypolymnas misippus (Linnaeus)
Catacroptera cloanthe (Stoll)
Precis oenone (Linnaeus)

Vanessa cardui (Linnaeus)
Phalanta phalantha aethiopica (Rothschild and Jordan)
Hypolycaena philippus (Fabricus)
Anthene definita (Butler)
Lampidus boeticus (Linnaeus)
Catopsillia florella(Fabricus)
Eurema hecabe solifera (Butler)
Colotis ione (Godart)
Colotis antevippe garisa (Wallengren)
Belenois aurota (Fabricus)
Belenois creona severina (Stoll)
Dixeia pigea (De Boisduval)
Mylothris agathina (Cramer)
Papilio demodocus Esper

Hesperioidea:

Tagiades flesus (Fabricus)

Moths:

Noctuoidea:

Diaphone eumela (Stoll)
Sphingomorpha chlorea monteironis Butler
Othreis tullonia (Clerck)
Cyligramma latona (Cramer)
Egybolis vaillantina (Stoll)

Several species of small moths were observed but were not identified. On several occasions *D chrysippus, H misippus,* and C *florella* were seen flying out over the sea towards Bazaruto island. On these occasions the prevailing wind seemed to favour their flight direction. The distance between Santa Carolina and Bazaruto is approximately ten kilometres. Reports received from fishermen on ski-boats and yachts in the area of the island chain at the time, state that "plenty of white coloured butterflies were seen flying past the boats ..... ". Unfortunately the reports conflict on actual flight direction. As a general rule, though, it would appear that the butterflies in question were moving in an easterly direction off the mainland over the sea towards the island group and possibly beyond. No specimens were removed from the island.

THE GREAT MARIESKOP ADVENTURE

by S E Woodhall
10 Bay Close, Bloubosrand ext 9, Randburg, South Africa

Last year Mike Graham-Walker, the Mariepskop forester, rang me. He asked me to arrange a slide show for member of the Mariepskop Conservancy on the butterflies of the area, and I replied that it would be a pleasure. Could we bring along a few members to sample the delights of Mariepskop? Certainly, said Mike.

This was a weekend awaited with bated breath by many members, a chance at last to visit an area where the really fabled beasties fly. There was the added spice, as far as I was concerned, of uncertainty. Where would we stay? On a previous trip the Upshons and I had camped at the picnic site, but for a proper Society meet we needed more salubrious accommodation. Mike told me we could use the hiking trail huts and gave me a 'phone number to ring. This brought me into contact with the bureaucracy of the (then) Lebowa Department of Tourism. Our original weekend of 26-26 Feb 1995 was out because I had left it too late to book (true, too true!) but we could make the following weekend. There were dark mutterings that I had arranged this to allow myself to go and see the Rolling Stones, these of course are vicious lies. A cheque was despatched to secure our booking and arrangements began. A big "I'm sorry" to all those who could not make it as a result of the change. There's always next year! In any case, the chalets were filled to bursting with lepidopterists.

The mothing side of the safari has been dealt with admirably by John Joannou. This article describes the antics of the rhopaloceran fraternity. Certain names have been omitted to save blushes, you all know who you are!

My party had hoped to leave nice and early but we were stymied by one of us having a wee prang in his motorcar on the way to my house. We finally left at about 5pm, with sympathy for the prangee being tempered by the prospect of the six hour late night drive ahead of us. Never mind we thought, we know the way and it's an easy drive. And it was, but as we drove from Lydenburg to the Abel Erasmus pass, ominous flashes of lightning could be seen to the east. PLEASE don't let it rain, we all thought. We got to the petrol station at Manoutsa Park, where we filled the gas-guzzling double-cab up to the brim. I had grim memories of nursing my Isuzu down Mariepskop with Dave and Andy Upshon thinking they might have to push, and that was an ecomony car by comparison. We were fascinated by the solitary *Argema mimosae* (Boisduval) fluttering around the lights at the garage, sadly it had a tail missing. I did find a single sphingid sitting on a petrol pump, which turned out to be *Hippotion rosae* (Butler). This greatly pleased John Joannou, for whom it was a new record and quite a rare and local species.

As we drove past Swadini and struck out on the Mariepskop road, we noticed it had been raining heavily and indeed, it was still spotting. Some bits of the dirt/sand road were a little hairy and I began to anticipate finding

lepidopterists' cars stuck in the mire. One section even had the double cab going crabwise for a while, and our driver (not me, I am not a dirt-road expert) had quite a few little moments on the steeper sections. It started to seriously rain as we ascended the mountain, which didn't give me too much pause as we were all used to the moods of escarpment mountains. Eventually we reached Mike's house and the chalets, it was too late to braai as well as too wet so we hit the sack with prayers for a sunny morn. The moth men were about their nocturnal ramblings but we were dead to the world, I didn't even awake to the famous snoring ability of one of them!

The morning dawned foul and wet, and breakfast was an inside affair. Excursions were made to inspect moth traps (moth men are an indispensable source of entertainment on wet trips) and hopeful comments were made. "I'm sure it's going to clear, it always does in the forests". "It was only a thunderstorm, the weather forecast didn't mention a cold front", etc., etc. This began to sound more and more like whistling in the dark (or rather the wet) when as if with a fanfare of trumpets, blue sky became visible. This was just as some pessimists were beginning to make going home noises, and I must admit Mother Nature left it a bit late. However, by 10:30 all was hot and steamy and those brave souls who had trusted their instincts and hung traps in the forest were soon rewarded with *Charaxes marieps* Van Someren and Jackson.

John Joannou has already waxed lyrical about the forests at Mariepskop. The wonderful thing about this mountain is the sense of isolation one feels in its woodlands. There is something special about being high up on a wild mountain in virgin jungle. Mariepskop is one of the best. It is not as isolated as Blouberg but thankfully its vegetation has not been raped like that mountain's has. Its forests are not as big as Knysna or Woodbush, but they seem huge because of the magnificent mountain setting. Although the usual exotic plantations are present, they do not seem to intrude and there is one particular vista near the Deneys Reitz memorial from which no pines or gums can be seen - just acres of forest and huge crags with a million miles of Africa in the distance. With a little imagination one can visualise strange creatures in the dense forest - there is a bit of Conan Doyle's "Lost World" about Mariepskop. Indeed, the view from the clifftop at the Reitz memorial is the only place in southern Africa that I have seen an unbroken rainforest as far as the eye can see, like pictures of the Amazon forest with treetops looking like green broccoli in the distance. Long may it survive.

Although the sun was shining, there was still some cloud about and butterfly activity was generally fitful. This did not worry the Hesperiidae however, and beautiful fresh specimens of *Celaenorrhinus mokeezi separata* (Strand) and *Calleagris krooni* Vari were playing about in sun-dappled shady spots everywhere. *Paralethe dendrophilus junodi* (Van Son) was also common. Papilionidae were not common and only a few *P.dardanus cenea* Stoll, *P.echerioides echerioides* Trimen
and *P.ophidicephalus ayresi* Van Son were seen. Charaxinae, however, were quite abundant and in addition to *C.marieps* several *C.xiphares kenwayi* Poulton and *C.druceanus moerens* Jordan were found among the commoner

species. The main Pierid interest was *Mylothris trimenia* Butler, which was found in its usual haunts near the army married quarters. Not many notable Lycaenids were around, which is not surprising as March is not the best time for them. However, Graham Henning found *Azanus mirza* (Ploetz) in the bushveld at the foot of Mariepskop.

The evening was balmy and warm, and several of us went off with Mike Walker to present our slide show to the conservancy members at Kampersrus. There was another member of the Society there, Kobus de Kock. The show was well received by the small but enthusiastic audience, and we will definitely do another one next year as word will have got around and more people can be expected to attend. A lively question-and-answer session followed the slides.

We then drove back up to the camp where we found the evening braai in full swing, not all our members had wanted to drive all the way down the mountain to hear my drivellings. Alcoholic beverages had been consumed in quantity and certain individuals had a good head start on me. A roaring fire had been lit and a cosy atmosphere prevailed. For at least one member it was a little too cosy and he discovered the rather steep drop down a grass bank at the back of the braai area, somewhat precipitately. He was enjoying the stars over the lowveld, and entranced, took a step forwards and disappeared, as if someone had opened a trapdoor. Luckily only his dignity was hurt, and he stayed down among the long grass and bushes for a while nursing it. I laughed as long as hard as anyone, which made what happened to me the next day a little poetic. Other recollections are of enormous rump steaks being placed on a white-hot (literally!) blazing fire for a few seconds and then being eaten by blood-dripping carnivores with their hands - I had to agree that this beats the normal slow-cooked dried out braaied meat one has to endure when firewood is scarce. The crispy, charred fat and rare meat make a great taste combination, but at least I ate mine with a knife and fork!

It was 11 o'clock at night and Herman Staude and John Joannou arrived with tales of moth light traps being rendered invisible by the numbers of sphingids arriving. We all decided that this was a super way to end an evening, so we piled into the Sani and the Double Cab and wound our slow way to the top. I had not been all the way to the top of Mariepskop before and to do it in the dead of a misty night (clouds had arrived as we finished cooking supper) was an interesting introduction to this eerie place. Slowly we ground our way up the seemingly never-ending uphill concrete road - the forest taking on a totally different atmosphere to its daytime aspect. Eventually we came upon the trap and we could see that the guys had not been exaggerating. The only time I have seen as many sphingids was once in November at the Engen One-Stop petrol station at Kranskop in the Waterberg, where a migrating swarm had settled for the day. This night we were in the middle of a migrating swarm and what a sight it was. Literally thousands of streamlined, buzzing hawkmoths everywhere - most of them were *Agrius convolvuli* (L.) and *Hippotion celerio* (L.), but there was a generous sprinkling of rarer species. For me it was a thrill to see some of my childhood dream species from England in such numbers. British readers of Metamorphosis will know what I mean when I say this. To see

good numbers of the above two species as well as Oleander Hawks *Daphnis nerii* (L.) and Death's-head Hawks *Acherontia atropos* (L.) was one of the most wonderful treats Africa has given me, even though I no longer collect them. When I saw my first-ever *Hippotion osiris* (Dalman), the Large Striped Hawk, I nearly reverted to hawk-collecting. I have always loved Silver-striped Hawks (*H. celerio*), and *osiris* is like a massive, more brightly coloured version of these, as big as a convolvuli.

As well as the beauty of these hawkmoths, there is the mystery. Where did they come from and where were they going to? Were some of them destined to end up in England to delight collectors there? We know so little about the habits of these great travellers. Mariepskop's great height allows us to get to the altitude at which these insects migrate, so this is an opportunity for someone to do some specimen marking one day.

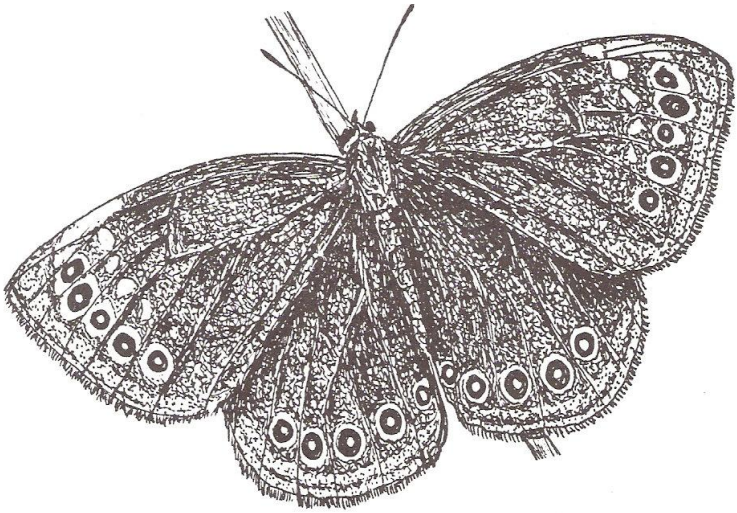
A couple of members, influenced by one or two Castle Lagers, felt a great brotherhood and affinity for these romantic insects. They wanted to experience what it feels like to be a hawkmoth, so they insinuated themselves inside the trap, where they stood and tried manfully to catch specimens by hand to ask them. After a few chinese swipes at these agile fellows the inevitable happened and someone fell over the tractor battery powering the lights. Instant darkness resulted, and when torches were lit a wondrous sight was seen by all- a collapsed pile of white netting draped over two struggling shapes. It looked like a rude film from the 1950's. This must have been the first moth trap to have caught a real live lepidopterist, and two at that! Eventually the trap was re-erected and switched on, not without a few somewhat terse comments from Herman who asked me quietly to take them back down to the camp and please would we NOT stop at his other traps. It was proving hard enough for him to find Geometrids with all the sphingid hustle and bustle, without these butterfly collectors making it worse!

The next day dawned cool and misty, and long lie-ins were the order of the day - there were a few cases of cocktail flu around. After a leisurely breakfast we stirred ourselves, said goodbye to the moth men who were leaving later that morning, and sallied forth. Much the same species were flying again, but the day was slightly warmer and more was on the wing. I spied a *Papilio euphranor* Trimen, sailing around a clearing next to the road. I put my long extensions together and spotted him sitting looking at me from the top of a tall kiepersol tree (*Cussonia* sp.) growing up from the dense ferny undergrowth. Keeping my eye on him I thrust my way into the ferns..... and the ground disappeared below me! I fell into a bitterly cold little stream with steep (1.5m) banks, which was totally hidden by an abominable thicket of ferns and worse..... brambles. My net and extensions still protruded through the greenery. Slowly I extricated myself to find that my companions for the day actually found this funny. I suppose it was - people suddenly disappearing down holes have been an essential ingredient of slapstick movies for years. I could have broken a leg and none of them would have been able to help for laughing. Of the *euphranor* there was no sign..... he didn't stick around to enjoy the joke.

Nolan Owen-Johnston and I decided to have a look at the summit plateau in the daylight, so off we went. Unfortunately for us, the top of the mountain was clouded up so we saw no butterflies. An inspection of this "lost world" will have to wait until our next visit.

Later that day, Bill Steele' s friend Joan Morris, and her niece Celeste Allen, made the major catch of the weekend. Celeste caught a perfect female *Dira jansei* (Swierstra) at the carpark above Klaserie Waterfall. Everyone who hasn't yet got jansei converged on this spot like a flock of vultures but alas, no more were seen. We then finished off the afternoon looking for *M.trimenia* adults and larvae. No larvae were found (I thought I had some eggs which I gave to Nolan, but they turned out to be *M.agathina* (Cramer)), but a few adults were taken. I did my party trick by finding a pupa and final instar larva of *Iolaus silarus* Druce, on the same *Loranthus* as used by the *Mylothris*. Once one has a search image for these, it seems that they jump into sight by magic. The pupa produced a wasp but the larva pupated and this emerged a few weeks later as a beautiful male. It was much larger and well-marked than specimens from drier bushveld areas, and it would be interesting to see females from Mariepskop.

With these last few successes we all said our goodbyes and started home. Mike said we would be welcome next year, and our thanks are due to him for making this trip possible.



Dira jansei male

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S. A. Butterflies, a Monograph of the family Lycaenidae, Murray & Desmond, 1935.
Butterflies of South Africa, where, when, and how they fly, Swanepoel D. A., 1953.
Life Histories of the South African Lycaenid Butterflies, Clark & Dickson, 1971.
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