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The aims of The Lepidopterists' Society of Africa are to promote the scientific study and the conservation of Lepidoptera in Africa, and to provide a communication forum for all people who are interested in African Lepidoptera.

Metamorphosis, which is the official journal of the Society, publishes original scientific papers as well as articles of a less technical nature.

Membership of the Society is open to all persons who are interested in the study of Lepidoptera. There is no geographical limit to membership. There are four categories of membership:

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Covers: Front: *Iolaus (Epamera) aphnaeoides* unds. [photographed *in situ*, S.E. Woodhall]
Back: *Agelanthus natalius* flowers [photographed by S. E. Woodhall]

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Editorial

The challenge of maintaining the high standard of *Metamorphosis* is a high priority. On behalf of the Society and as incoming editor I want to express a warm and sincere thank you to Hermann Staude for providing an informative, interesting, and most importantly, authoritative journal. He delivered with enthusiasm, objectivity and the necessary diplomacy, sometimes in the face of sharply divided opinions and criticism.

A synoptic overview of the Proceedings of the 2nd International Lepidopterists' Conference of Africa was published last year. The cost of producing a stand-alone volume of the presentations is too expensive. However, several articles in this volume and subsequently will cover some of these in detail. Individuals who presented at the conference are encouraged to submit articles. Members of the Society, unable to attend the Conference in Cape Town, can thereby share and benefit from the unique presentations by experts participating in this exchange of viewpoints. In this issue Colin Congdon and Ivan Bampton update and highlight host-plant usage of *lolaini* and name changes to several well-known Loranthaceae.

The responsibility and function of an editor is exacting. Material of scientific merit has to be carefully presented. At the same time this journal must satisfy a general readership, with many persons only pursuing a hobby but who, by way of financial contributions, want snippets of news and information regarding the Society's activities. It serves as a platform for communication and the exchange of information. A good mix is essential. Colour plates certainly enhance a publication, but the onus of funding is a problem and rests with the author. Your contribution can be more general articles, snippets of news or other noteworthy items. Layout and presentation, style, consistency, accuracy, correctness and spelling (or misspellings) especially of scientific terms are editorial issues essential to improve readability. Readers have a responsibility too – articles must be submitted timeously.

Editor**Council Comments**

A new Millennium has dawned on us. May we take this opportunity to wish all our members a very good new year with lots of happy experiences in their research, collecting. At the same time we would encourage our members to help us ensure that LepSoc still offers what it was originally meant to be – a forum where enthusiasts can share experiences and information. We would also like our members to support the new directions we're taking namely a strong emphasis on conservation and our role in promoting it for our children and of course our aim to promote the study of Lepidoptera.

As you will have noticed, the Council decided to increase membership fees for 2000 only nominally. This is to ensure that we do not lose members due to economic reasons. However, we would like to encourage those who can to become sponsor members. This will give us much needed funds for the improvement of *Metamorphosis* and to assist with more publications. In 1999 LepSoc assisted with at least two noteworthy publications, Douglas Kroon's host-plant catalogue and the Brenton Blue Saga. For information about ordering these contact any council member or you can respond to the enclosed advertisement.

Last but not least, you will all have noticed that we have a new editor for *Metamorphosis* – Douglas Kroon. We would like to take this opportunity to welcome him and wish him success with his new venture. To Hermann Staude we would like to say a very big thank you. Hermann, you did a great job. Under his editorship *Metamorphosis* has become a great magazine and we believe that in Douglas we have found a worthy successor.

Bennie Coetzer - Acting President

**NEW OBSERVATIONS OF ANT ASSOCIATIONS AND LIFE HISTORY
ADAPTATIONS
(LEPIDOPTERA: LYCAENIDAE) IN SOUTH AFRICA**

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Abstract: Some recent advances have been made in the study of ant-lycaenid relationships, particularly in the discovery of trophallaxis as a primary food source in at least two instances, *Chrysoritis dicksoni* (Gabriel) and *Thestor yildizae* Koçak. The caterpillars of myrmecophilous species from two genera, *Chrysoritis* Butler, and *Aloeides* Hübner were observed to make sounds which may play a communicative role in their association with host ants. The final instar of *Thestor basutus basutus* (Wallengren) appears to feed upon organic detritus within the ants' nest, providing a rare example of commensalism.

Further knowledge has been gained within the genus *Aloeides* in the discovery of two newly identified genera of ant associates - *Monomorium* Mayr and *Pheidole* Westwood (Myrmicinae) and the observation that host ant eggs are used as the primary food source in the final instar of *A. pallida grandis* Tite & Dickson. Also that the dorsal nectary organ is absent in the final instars of *A. dentatis* (Swierstra), and *Trimenia malagrida maryae* (Dickson & Henning) whilst those where it is now known to exist in earlier instars but lost in the final instar, include *A. apicalis* Tite & Dickson, *A. thyra* (Linnaeus), *A. pa/lida grandis* and *Phasis thero thero* (Linnaeus). The appearance and disappearance of the dorsal nectary organ (DNO) is discussed and current knowledge tabulated. The environmental conditions which may have affected the evolution of trophic strategies and caterpillar morphology is postulated. It is also argued that behaviour can be a labile characteristic among closely related lycaenid species and hence not a reliable taxonomic character at higher levels.

Key Words: Lepidoptera, Lycaenidae, Lycaeninae, *Thestor*, *Aloeides*, *Chrysoritis*, evolution, myrmecophily, trophallaxis, commensalism, oophagy, aphytophagy, life histories, acoustics, Formicinae, Myrmicinae.

INTRODUCTION

Over 80% of South African lycaenids have an association with ants at some time during their life history (cf. Fiedler, 1991). A range of associations exist, both mutualistic and parasitic. At one extreme of this continuum, this manifests in structures on the caterpillar, which can potentially serve specific functions in its symbiosis with ants by emitting broad spectrum communication signals. At the other extreme, caterpillars are more species specific and appear to masquerade as members of the ant colony (the ant or one of its brood) and survive by preying on ant brood or on the ants' resources. A holistic study of the *methymna-group* in the genus *Lepidochrysops* by Cottrell (1965), set an exceptionally high standard for the taxonomic treatment of butterflies in southern

Africa, unequalled in the 35 years since. He included what was known of the ecology, early stages and ant associations in his diagnosis. However, the first major work devoted to the early stages of South African lycaenids was produced by Clark & Dickson (1971); they made an enormous contribution to our knowledge, particularly on the morphology, detailing the myrmecophilous organs possessed by the caterpillar. Detailed behavioural studies of lycaenids and their ant association under laboratory conditions were subsequently pioneered by Claassens (1972, 1974, 1976) and Claassens & Dickson (1977). A survey of aphytophagy and its relationship to myrmecophily was produced by Cottrell (1984), where he discussed the prevailing knowledge of myrmecophily worldwide. Henning, S.F., (1983 a & b, 1984, 1987, 1988) and others published several accounts of myrmecophily, adding further to the pool of knowledge. Pierce (1984) described how ant association could have influenced the evolution of diversity among the Lycaenidae. In an extensive work Fiedler (1991) listed, summarised and analysed all the published accounts of lycaenid life history from all over the world. A summary of parasitic Lepidoptera was conducted by Pierce (1995) and more recently Fiedler (1998) reviewed the lycaenid-ant interactions among the *Maculinea* van Eeke of the northern hemisphere in a comparative framework and drew some conclusions regarding the evolution of these interactions.

Despite all the above, no more than 25% of life histories are known among our southern African lycaenid species (Williams, 1996); this is certainly a gross overestimate if ant-caterpillar interactions are to be considered.

This paper is mainly concerned with southern African species with a special focus on Cape fauna. It summarises and discusses some of the ideas and knowledge gained, particularly during the past five years on myrmecophilous lycaenids, both published and unpublished, including the following: Williams & Joannou, 1996; Heath & Brinkman, 1995 (a & b); Heath, 1997 (a & b), 1998; Claassens & Heath, 1997 and Edge & Pringle, 1996. The number of described species indicated against each genus is summed from the list produced by Williams (1999). A glossary of terms used in this document is given at the end of this paper.

MATERIALS & METHODS

INDUCING OVIPOSITION:

In inducing oviposition among species of *Thestor* butterflies, females were each placed in a papier-mâché tube 90mm dian leter by 90nun long, closed at the top with netting and placed on a flat surface; the female was placed inside this tube for three days at room temperature and protected from direct sunlight. The method for inducing oviposition among species of *Chrysoiritis* is described by Heath (1997: 5). Attempts by the authors to induce oviposition among *Aloeides* has not yet been very successful.

OBTAINING EARLY STAGES IN THE FIELD:

The method used to search for *Chrysoiritis* larvae in the veld was to search in the debris beneath potential foodplants which had ants present. For *Thestor* the method was to upturn large boulders covering ants ' nests in areas where the adults are known to fly. For *Aloeides* the method was to search in the soil beneath potential foodplants or near the food plant. For species of *Aloeides* and *Thestor* the materials and method of studying interaction between ants and caterpillars was similar to that described in Claassens (1972;

1974). In the case of *T. basutus basutus* studied by the authors, the final instar caterpillar was obtained from within a nest of the ant *Anoplolepis custodiens* near the farm Wahroonga in KwaZulu-Natal by Mr. Sheng-Shan Lu and posted to one of the authors on 25th November, 1999. In the case of *Trimenia malagrida maryae* the caterpillars and pupae were sought in spaces and cracks in the bedrock of the limestone fynbos near De Hoop by means of pick-axe and crow-bar (cf. Heath & Brinkman, 1995b).

A final instar caterpillar and pupa were collected together with a nest of the ant *Anoplolepis custodiens*.

STUDY OF BEHAVIOUR IN CAPTIVITY:

Following receipt of *T. basutus basutus*, a nest of *A. custodiens* ants with three queens and ample brood was immediately obtained from the saddle of Table Mountain and installed in a formicary. The formicary was similar to that described by Claassens & Heath (1997). Before being introduced into the nest section of the formicary the *basutus* caterpillar was rolled among some ant brood which had been kept apart for the purpose, and left among the brood for about two hours. This was to acquire the scent of the new ant colony and prevent attack by the ants, but also to see if any interaction took place between caterpillar and brood.

In the case of *Aloeides pallida grandis*, four final instar caterpillars were obtained from within a nest of the ant *Lepisiota capensis* on the Franschoek Pass and a large colony of *L. capensis* ants with ample brood was also obtained from there. Firstly the ants were introduced into the formicary and then the caterpillars were introduced into the arena of the formicary for study. Pieces of *Aspalathus spinosa* were placed in the arena in water similar to that described by Claassens & Dickson (1977). Similar collections and studies were done for *Aloeides aranda* from Shaw's Pass near Caledon, *A. thyra* from Lions Head, Cape Town, *A. pierus* (Cramer) from Mamre and *A. apicalis* from Koringsberg, near Moorreesburg.

In the case of *T. malagrida maryae*, the caterpillar was placed in a large plastic container, together with soil and the ants *Anoplolepis custodiens* (Formicinae) for observation as described by Heath & Brinkman (1995b).

RESULTS (CURRENT KNOWLEDGE)

THESTOR HÜBNER [29 species]

In captivity, *Thestor* species oviposit on almost any surface without plant material, ants or Homoptera being present. This was confirmed with females in captivity, in the following 17 species: *T. yildizae* Koçak, *T. rileyi* Pennington, *T. stepheni* Swanepoel, *T. braunsi* van Son, *T. kaplani* Dickson & Stephen, *T. petra* Pennington, *T. brachycerus* (Trimen), *T. dukei* van Son, *T. barbatus* Henning & Henning, *T. murrayi* Swanepoel, *T. rossouwi* Dickson, *T. strutti* van Son, *T. pringlei* Dickson, *T. dicksoni* Riley, *T. protumnus mijburghi* Dickson & Wykeham, *T. vansoni* Pennington and *T. basutus basutus* (Wallengren) (Heath, unpubl.). The only ant so far known to associate with *Thestor* is the pugnacious ant *Anoplolepis custodiens* (Formicinae) (Clark & Dickson, 1971; Claassens & Dickson, 1980; Cottrell, 1984; Claassens & Heath, 1997).

The first three instars of *Thestor basutus capeneri* fed naturally upon coccids infesting grass. The fourth instar kept in captivity died, since its diet could not be determined. (Williams & Joannou, 1996). The final two instars of *Thestor yildizae* Koçak

lacked both DNO and TO's; the penultimate instar (Pl. 1, Fig. 1) was white and the final instar (Pl. 1, Fig. 2) amber-coloured. They were distinctly woodlouse-shaped and almost oval when viewed dorsally, possessing an extremely small head with an extendable fleshy neck and found living inside the nest of the ant *Anoplolepis custodiens*. The caterpillar continuously solicited regurgitations from all approaching ants within the nest by quickly extending the neck and placing its mouth close to the ant's mouthparts. It seemed that the ant was unaware of the caterpillar's bulk during this exchange and little attention was paid to it by members of the nest, although occasionally an ant would investigate the spiracle on the first abdominal segment. The caterpillars appear to subsist entirely on these ant regurgitations during the last two instars. They subsequently pupated within the nest portion of the formicary. The pupae were also amber-coloured. In the veld, pupae of *T. strutti* van Son, *T. rileyi* Pennington and *T. pictus* van Son have been found under rocks in the nest of the ant *A. custodiens*; *T. pictus* caterpillars have also been found (Heath and Claassens, unpubl.) and all were similar to those of *T. yildizae* described above and by Claassens & Heath (1997). Despite the ants taking them inside the nest, the first instar caterpillars of *T. yildizae* and *T. rileyi* in captivity did not survive and their true diet could not be determined; ant regurgitations and ant brood were both tried several times as possibilities but without success (Claassens & Heath, 1997 & subsequent unpublished observations).

The final instar of *T. b. basutus* from KwaZulu-Natal was similar to *T. yildizae* in shape and colour but the segments were rather more defined, presenting a coarser profile when viewed laterally. It was not seen to solicit regurgitations from any ant during the four weeks it was studied. When presented with ant eggs and brood the caterpillar made no attempt to feed upon them. On one occasion about four days after being introduced to the nest it was seen to pass frass. It appeared to be feeding upon minute particles on the substrate of the nest and the ants sometimes deposited very small particles near the caterpillar. The head was often protected under the thoracic segments where it could access the detritus but was sometimes observed extended and swinging from side to side. It would be withdrawn sharply if an ant passed close by. The caterpillar often stayed in one spot for lengthy periods, sometimes up to two days, periodically turning on its own axis to face in a different direction. The caterpillar died on the 23rd December 1999 before it could pupate, almost four weeks after it was received from Sheng-Shan Lu.

Caterpillars and pupae of *Thestor* species were usually discovered in ants' nests beneath large rocks in the veld. Many of these rocks are systematically turned over by baboons and it is strongly suspected by the authors that *Thestor* caterpillars and pupae are included in the diet of these primates.

On eclosion, the butterfly abdomen had fine fluff attached (presumably to inhibit ant attacks) and whilst its wings were not yet expanded, it hastily made its way to the nest exit and climbed away from the ants before expanding its wings. This was observed for *T. yildizae*, *T. rileyi* and *T. pictus*.

CHRYSORITIS BUTLER [59 species]

The DNO appears in the second and subsequent larval instars (Clark & Dickson, 1971; Heath, 1997), a feature so far known to be shared only with *Crudaria* Wallengren (Clark & Dickson, 1971) in the Aphnaeini tribe where it normally appears in the third instar; the TOs appear in all instars (Heath, 1997). The caterpillars are almost all known to be

herbivorous and considered obligately associated with ants (Pl. 2, Figs 3 & 4) (Heath, 1997). While ants in the genus *Crematogaster* (Myrmicinae) have been recorded as being the most common ant associates, a species of *Myrmecaria* (Myrmicinae) has been observed as the ant associate in two species of this genus (Heath, 1997).

Oviposition in captivity among the *Chrysoiritis* usually occurred only when the correct ant was present but laid upon almost any surface; stimulus rarely being enhanced by the addition of foodplant (Heath, 1997). This phenomenon has been confirmed in the following 38 species: *Chrysoiritis thysbe* (Linnaeus), *C. whitei* (Dickson), *C. lycia* (Riley), *C. chrysaor* (Trimen), *C. midas* (Pennington), *C. atlantica* (Dickson), *C. rileyi* (Dickson), *C. azurius* (Swanepoel), *C. henningi* (Bampton), *C. trimeni* (Riley), *C. perseus* (Heilmig), *C. williamsi* Heath, *C. zeuxo* (Linnaeus), *C. zonarius* (Riley), *C. coetzerei* Dickson, *C. chrysantas* (Trimen), *C. plutus* (Pennington), *C. pyramus* (Pennington), *C. balli* (Dickson & Henning), *C. bamptoni* (Dickson), *C. lyndseyae* (Henning), *C. hyperion* (Dickson), *C. swanepoeli* (Dickson), *C. beaufortia* (Dickson), *C. violescens* (Dickson), *C. daphne* (Dickson), *C. kaplani* (Henning), *C. stepheni* (Dickson), *C. nigricans* (Aurivillius), *C. uranus* (Pennington), *C. pan* (Pennington), *C. adonis* (Pennington), *C. palmus* (Stoll), *C. endymion* (Pennington), *C. dicksoni* (Gabriel), *C. blencathra* (Heath & Ball), *C. wykehami* (Dickson), *C. psyche* (Pennington), *C. orientalis* (Swanepoel) (Heath, unpubl.). These, with the exception of *C. dicksoni* were never found inside the ants' nest but when found in the wild, they were always in a corral beneath or near the foodplant and attended by three or more host ants. The caterpillars were often found singly or in pairs but sometimes as many as five or six of varying sizes could be found together within the corral (Heath, 1997).

The first, second and the final instar caterpillars of *Chrysoiritis dicksoni* were observed to subsist solely on ant regurgitations. No frass was observed. The final instar caterpillars live and pupate within the carton nest of the host ant *Crematogaster peringueyi* Emery. The caterpillars do not walk about but remain in one spot almost continuously, periodically turning to face in a different direction (Heath, 1998). Despite relying on trophallaxis, the caterpillar has a functional DNO present in the second instar, which is still present in its final instar, which is typical of its herbivorous congeners in *Chrysoiritis* but in this case the DNO is less frequently visited by the host ants.

Scale (Homoptera) is always present and attended by the host ants close to where *C. dicksoni* flies and it is believed that the scale or its secretions may in some way be necessary for the survival of the caterpillar (Heath & Brinkman, 1997; Heath, 1998). The ants which readily stimulated *C. dicksoni* to oviposit were taken from near the butterfly colony and tended scale insects but the same species of ant from elsewhere, where this scale was not in evidence, when introduced, caused oviposition to cease (cf. Heath & Brinkman, 1997). Oviposition resumed when the local ant was re-introduced. The scale insects have not so far been identified.

ALOEIDES BUTLER [57 species]

Clark & Dickson (1971) illustrate the egg and the early larval instars of four species and of all larval instars of a further five species but make no reference to the ant associates. The DNO on *Aloeides* caterpillars appears in the third and subsequent instars (Clark & Dickson, 1971) but in some species, e.g. *A. apicalis* Tite & Dickson, *A. pallida grandis* Tite & Dickson and *A. thyra* (Linnaeus) it is absent in the final instar (Heath & Claassens,

unpubl.). However, at least one species, *A. pierus* (Cramer), retains its DNO until pupation. The final instar caterpillars of *A. apicalis* taken from Koringberg near Moorreesburg lack a DNO but earlier instars do have one. One caterpillar, assumed to be a penultimate instar was seen to produce a secretion from its active DNO which was immediately taken by one of the host ants (Heath & Claassens, unpubl.).

The final instar caterpillars of *A. pallida grandis* kept in captivity, remained inside the host ants' nest for four months, but grew appreciably without foraging outside to feed; they eventually pupated. This phenomenon indicated that they had adopted an aphytophagous feeding strategy during their final instar. Although the DNO was absent, the TOs were present but they were not seen to evert. Their frass was pinkish in colour. On later occasions they were seen to feed upon the eggs of the host ant. In one part-nest of *Lepisiota capensis* Mayr which was collected and used in the study there were over 20 queens. Despite ample brood of all stages being present in the nest, the caterpillars were not seen to feed upon any stage other than the egg.

Although the DNO of *A. thyra* could not be located in its final instar, it nevertheless does feed on *Aspalathus* during this time (Claassens & Dickson, 1977) but it is not known if at any time trophallaxis or eggs form any supplementary part of its diet.

Until now, the only ant genus known to be associated with *Aloeides* caterpillars was *Lepisiota* (= *Acantholepis*) (Formicinae), however, two additional ant genera have recently been discovered by Heath & Claassens (unpubl.). The ant *Monomorium fridae* Forel associated with *A. apicalis* at Koringsberg and *Pheidole capensis* Mayr associated with *A. aranda* (Wallengren) at Shaw's Pass, Caledon and on the Elandsberg near Seweweekspoort. This was confirmed on a minimum of eight separate instances for each of the two *Aloeides* species concerned and, in each locality, *Lepisiota* ants were present nearby in the respective habitat, but were not seen to interact with the caterpillars.

Summarising the new and published records to date, of ant associates in the *Aloeides* genus:

- *Lepisiota capensis* (Formicinae): *A. pallida grandis*, *A. thyra*, *A. pierus*, *A. dentatis dentatis* (Swierstra).
- *Monomorium fridae* (Myrmicinae): *A. apicalis*.
- *Pheidole capensis* (Myrmicinae): *A. aranda*.

Note that *A. pallida grandis* caterpillars were found resting inside the ants' nest itself, which might be a metre or two from the foodplant. In contrast, the *Aloeides* species, *apicalis* and *aranda* which associated with *Monomorium* and *Pheidole* ants respectively, were not usually inside the ants' nest but were generally found tended by four or five ants in a corral just below the soil surface close to the foodplant (*Aspalathus* spp.), but a metre or more from the ants' nest.

In all instances where the caterpillar of *Aloeides* species was observed to pupate they were seen to lose their normal colour pattern two or three days prior to the pupation itself and became a pale greyish-green.

PHASIS HÜBNER [4 species]

The DNO on *Phasis thero* (Linnaeus) caterpillars appears in the third and subsequent instars (Clark & Dickson, 1971) but is absent in the final instar (Heath & Claassens, unpubl.); the TOs are present in all instars. It is not known if trophallaxis takes place, since the interaction between the caterpillar and host ant has not been closely studied. A

final instar larva was recently found inside a carton nest of *Crematogaster peringueyi* ants although pupae are often found in hollow stems of the foodplant (Heath, unpubl.).

TRIMENIA TITE & DICKSON [5 species]

A final instar and pupa of *Trimenia malagrida maryae* were both found in small spaces about 5cm deep inside the bedrock in limestone fynbos. They were attended by the pugnacious ant *Anoplolepis custodiens*. The caterpillar and ants were studied in captivity but it could not be determined what the larval food was since the caterpillar shunned any light during this time. When disturbed, it was seen to be attended by many ants, with a concentration around the head of the caterpillar (cf. Heath & Brinkman, 1995b). There was no vegetation within a metre of the original site where the caterpillar was found and it survived for two weeks before pupating which further supports the assertion that it is aphytophagous, at least in the final instar. Despite the presence of TOs, the caterpillar had no DNO and was, in all respects very similar to that of *Trimenia argyroplaga* (Dickson) as found and described by Pringle in Pringle *et al.* (1994: 179). It is interesting to note that the colour and pattern of the two *Trimenia* caterpillars was also similar to those seen among the *Aloeides* (Heath, unpubl.).

LEPIDOCHRYSOPS HEDICKE [126 species]

They are all generally thought to be phytopredacious, a belief based upon the few life histories which have been published and similar to that of the *Maculinea* of the northern hemisphere. No work is known to have taken place on the early stages in the past decade. Our current knowledge is based upon the life history or partial life history of eleven species by Clark & Dickson (1971), Claassens (1976), Henning S.F. (1983) and Williams (1990). Most of these accounts are restricted to the first two or three instars, however Claassens (1976) and Henning S.F. (1983) studied the interaction between caterpillar and ant of three of these species under laboratory conditions. A distillation of the published accounts shows that the caterpillars do not possess TOs during any instar but the DNO appears in the 2nd instar and remains until pupation. The caterpillar is phytophagous for the first two instars and then becomes predacious on the brood of a species of *Camponotus* Mayr (Formicinae) ant. Trophallaxis has also been observed for late instars in the ants' nest (Claassens, 1976; Henning S.F., 1983).

ORACHRYSOPS VÁRI [11 species]

Little is known about the ant association of the *Orachrysops* early stages. It was formerly thought to be phytopredacious, similar to the *Lepidochrysops* (Henning & Henning, 1989) but recent work demonstrates otherwise for *O. niobe* (Trimen) (cf. Edge & Pringle, 1996: 114). The caterpillar of *O. niobe* has been bred in captivity through to pupal stage without ant association, feeding entirely on its foodplant *Indigofera* sp. The DNO appears in the 2nd instar and subsequent instars; the TOs are present in all instars but are not well developed, lacking the protective superstructure seen in other taxa. Neither DNO nor TOs were seen to be active. One species of ant suspected of being an associate is *Camponotus niveosetosus* (Mayr) (Edge, 1999: 104 in Steenkamp & Stein, 1999), although all the indications published so far suggest that *O. niobe* has a facultative ant association at most and hence may associate with more than one ant species.

CATERPILLAR ACOUSTICS

The final instars of *Chrysoritis thysbe* (Linnaeus), *C. dicksoni*, *Aloeides pierus* (Cramer) and *A. pallida grandis* were observed to produce sounds. All four made drumming sounds but *C. thysbe* also made a high-pitched buzzing sound intermittently. These sounds are believed to be one mode of communication in the caterpillar's association with ants (Heath, 1998).

DISCUSSION

APHYTOPHAGY

Phytophagy is certainly the most common trophic practice within the Lepidoptera, and even within the myrmecophilous lycaenids it is the dominant practice. Despite this there is growing evidence that aphytophagy is more widespread than was previously thought. It has long been known that the caterpillars of *Lepidochrysops* and of the palaeartic genus *Maculinea* change from one trophic practice to another during their larval stages; starting as herbivorous for the early instars and then changing to predacious on ant brood (Cottrell, 1984). It should not be surprising therefore that similar changes in trophic practices can also occur in individuals of other genera although some, such as trophallaxis, feeding on detritus or on ant eggs is difficult to detect without close study; a near impossible task in the field.

ALOEIDES - DNO

The provision of secretions from the DNO of lycaenids is one part of the mutualistic relationship between ant and caterpillar, the honeydew serving to appease any passing ant (cf. Lenz, 1917). The presence of ants serves to reduce the risk of attack from predators and parasites (Pierce, *et al.*, 1987). Hence, the absence of the DNO at the final instar of some *Aloeides* species suggests that the appeasement strategy is no longer applicable at that stage and that another relationship has replaced it. It seems highly probable that when regurgitating food to a caterpillar or permitting the brood eggs to be eaten, the ant is treating the caterpillar as a member of the colony, possibly the larval stage of a queen. Thus the relationship, no longer mutualistic, has become parasitic. It seems doubtful if the DNO as a provider of honeydew, has any useful role in such a relationship, especially since the DNO must be a costly character to maintain. See Table 1 for a generalisation on the presence of a DNO among the genera under consideration. In contrast, the PCOs almost certainly play a major role in manipulating the way the ants respond to the caterpillar.

THESTOR - COMMENSALISM

There is still very much to learn about the life histories of *Thestor* but it is already clear that the trophic strategy is not constant throughout the genus nor is it constant between the instars. Miletinæ caterpillars are generally known to prey on Homoptera (Pierce, 1995: 427; Cottrell, 1984: 18), however it would seem that this practice may be confined to the first few instars among the *Thestor*. It is interesting to note that despite clear evidence of parasitic behaviour in the form of trophallaxis in the final two instars of *T. yildizae*, a congener, *T. b. basutus* appears to exhibit commensalism as a detritivore at the same stage of its life cycle. Fiedler (1991: 21) cited the African Liptenini as being the only examples of commensalism, known to him. In view of the difficulty of

observing the practice of feeding upon detritus, it would easily go unnoticed and perhaps could form part of the feeding strategies among other species. It is known for species to simultaneously practice two trophic strategies at the same stage of their life, such as trophallaxis and carnivory (Claassens, 1976; Henning S.F., 1983; Sanetra & Fiedler, 1996).

It is interesting to note that despite an obligate ant relationship, the ants' presence does not serve as a cue in oviposition; this has also been noted among the *Maculinea* (Pierce, 1995: 426). It was proposed by Claassens & Heath (1997) that the territory of the adult is restricted by the presence of both ant and Homoptera, implying that oviposition can be random within the limits set by the adult territory.

Table 1. Presence of DNO and TOs on caterpillars

Taxa	DNO appears in 2 nd instar	DNO present in 3 rd instar	DNO present in pen- ultimate instar	DNO present in final instar	TOs present in any or all instars
<i>Thestor</i>	N	N	N	N	N
<i>Chrysoiritis</i>	Y	Y	Y	Y	Y
<i>Trimenia</i>	?	?	?	N	Y
<i>Phasis</i>	N	Y	?	N	Y
<i>Aloeides</i> ; type 1	N	Y	Y	Y	Y
<i>Aloeides</i> ; type 2	N	Y	Y	N	Y
<i>Aloeides</i> ; type 3	N	?	?	N	Y
<i>Lepidochrysops</i>	Y	Y	Y	Y	N
<i>Orachrysops</i>	Y	Y	Y	Y	Y

Note: *Aloeides* type 1, e.g. *A. pierus*; type 2, e.g. *A. thyra*; type 3, e.g. *A. pallida grandis*. It is possible that with further study, type 3 and *Phasis* may prove to be the same as *Aloeides* type 2.

CHRYSORITIS DICKSONI

In the case of *C. dicksoni* the change to aphytophagy may have been quite recent, since it still retains the DNO and TOs until pupation. Being the only aphytophagous species within this large, mostly herbivorous, ant-obligate genus it is assumed to be a very recently derived behavioural character with insufficient time for the DNO to have responded to redundancy. This argument can be supported by the observation that the nectar produced is not prompted for by frequent attention and palpation by the ants during the final instar as with congeneric species, presumably because it lacks the nutrients to make it attractive. It would also appear that the cycle of nutrient rotating from ant to caterpillar and back again is an inefficient process and hence unlikely to persist for long. It is possible that the DNO of *C. dicksoni* could become redundant and eventually absent in the process of evolutionary time. Fiedler (1998: 7) considers such parasitic relationships less stable and subject to higher extinction rates than other non-parasitic ant relationships. In this case he is probably right in view of the few tenuous populations which remain and the conservation status of endangered.

LEPIDOCHRYSOPS - DNO and TOs

The published accounts of eleven species of the *Lepidochrysops* (9%) suggest that many, if not all 126 life histories follow a similar pattern, being phytopredacious, lacking TOs but retaining their DNO. This is very similar to the *Maculinea* despite the two genera not being particularly closely related; also that the behaviours must have evolved independently (Cottrell, 1965: 106). This being the case, it is surprising that the DNO in both genera is retained until pupation. It is actively used prior to the caterpillar's adoption and entry into the ants' nest but is not known to produce secretions afterwards. In the case of the *Maculinea*, Fiedler (1998: 10) suggests that the DNO secretions supplement the adoption procedure and that the caterpillar's odour alone may not be sufficient, however Henning's (1983b) experiments with corn cob grits does not support this assertion for *Lepidochrysops*.

The resulting change in the caterpillar's relationship with the host ant after entry into the nest (both genera) and the accounts of trophallaxis for both genera (Claassens, 1976: 285; Sanetra & Fiedler, 1996) suggest that the DNO is of no further service in maintaining a reward-appeasement strategy. Why then is it retained? The trophic strategy of both genera appears to be fairly constant and hence cannot be seen as a recently derived character. Is it possible that in the late instars the DNO serves some purpose other than to secrete honeydew? Fiedler (1998) attributes the Jack of TOs in *Maculinea* to the endophytic life-habit of the early larval instars rather than its life-habit within the ants' nest but the tubercles generally appear in the third instar among the Polyommatae and hence the two endophytic instars would not have had them anyway. There is also little likelihood of endophism ever having taken place in the final two instars among ancestral generations of *Lepidochrysops* in view of the structure of foodplants used.

EVOLUTIONARY PATHS

Assuming that herbivory is the ancestral trait among lycaenid caterpillars, it is reasonable to suggest that aphytophagy for all or part of the larval stage might once have originated as a facultative trait among stressed individuals in ancestral generations. It is easy to see how this could have arisen through selective pressures such as shortage of

normal food during seasonal periods of drought or cold (see Table 2). This, combined with the existence of PCOs on the caterpillar which can produce chemical cues capable of manipulating ant behaviour, could account for changes in diet. It is also highly probable, that the trait of facultative aphytophagy may exist today among other related lycaenids currently assumed to be wholly phytophagous.

The proposed evolutionary stages implied in Table 2 can be associated with certain South African taxa, as follows:

Orachrysops - 1

Chrysoritis and some *Aloeides* - 2

Lepidochrysops, some *Aloeides* and *Chrysoritis dicksoni* - 4

Thestor - 5 and 6

Lachnocnema (Trimen) - 6

Fiedler (1998) concluded that ant-parasitic relationships are a rare specialisation of a few scattered lycaenid lineages and are principally derived along three evolutionary routes: (i) via predation on Homoptera (Miletinae), (ii) from obligate mutualism (Aphnaeini) or (iii) from facultative mutualism (*Maculinea*). Note that Fiedler (1998) in his own definition excluded feeding upon Homoptera as being parasitic on ants; we would include it, since the Homoptera clearly provide a food resource for the ants. We are not convinced that his route (i) is necessarily correct and suggest that predation on Homoptera may be a derived character following exposure to the ants' food resource, which is most likely to occur during an obligate ant relationship.

TAXONOMIC CHARACTERS

Despite a view that closely related species tend to have closer biologies than do more distantly related species (Gaston, 1994: 55), our experience suggests this is often the case. In his argument in support of his *Recognition Concept of Species* Paterson (1985: 25) describes how various fertilisation systems can be very different among closely related organisms yet similar to more distantly related ones. The aphytophagous behaviour of *C. dicksoni* when compared to its congeners stands out and is probably unique among the *Chrysoritis*, whilst the monophyly of this genus has been well supported (Heath, 1997; Rand, 1998). From our recent observations it is now clear that both phytophagy and aphytophagy exist among the *Aloeides* which is neither constant within the genus nor within the species' life history. Cottrell (1984: 12) lists trophallaxis as one of the trophic strategies used by *Spindasis takanonis* Matsumura, whilst congeners are believed to be phytophagous. The two species of *Thestor* so far studied by the authors show that their aphytophagic strategies are not the same. This tells us not only that aphytophagy may be far more widespread than previously thought but it also indicates that intraspecific behaviour can be very labile and should not be relied upon as a taxonomic character at higher than species level. Many of the species of *Chrysoritis* adopt particular mate selection strategies such as males patrolling ridges or hills where the females go to find a mate, whilst sister species patrol in gulleys and others on slopes (Heath, unpubl.). This is another example of behaviour being a useful characteristic when comparing closely related species although most likely inappropriate at higher levels.

Table 2. Environmental conditions which may have caused extant trophic behaviour and caterpillar morphology

ENVIRONMENTAL CONDITIONS	EVOLUTIONARY RESPONSE	BEHAVIOURAL STATE ACHIEVED	CATERPILLAR MORPHOLOGY
1 Ant predation – many ants	Appease ants	Facultatively myrmecophilous	PCOs, DNO & TOs active
2 Local predominance of one ant species	Specialised and closer interaction with ants	Obligately myrmecophilous	PCO's, DNO & TOs vigorously used
3 Seasonally impoverished vegetation	Alternative foods used occasionally	Facultatively aphytophagous	No change
4 Persistently poor vegetation	Specialised aphytophagy (also safer in ants' nest)	Aphytophagous in some instars	DNO or TOs redundant or lost in some instars
5 Parasites and predators	Spend most time safe(r) in ant nest	Aphytophagous in most or all instars	Loss of DNO or TOs in some instars
6 Exposure to Homoptera due to ants tending them, plus shortage of other food	Exploit presence of Homoptera via ant trails	Homoptera predation in some or all instars	Total loss of DNO & TOs

Note: Stage 6 might also have evolved directly from any of the other stages

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Plate 1



Fig. 1 Penultimate instar caterpillar of *Thestor yildizae*.



Fig. 2 Final instar of *Thestor yildizae* receiving regurgitations from a 'major' pugnacious ant *Anoplolepis custodiens* within the ants' nest.

Plate 2



Fig. 3 A cocktail ant *Crematogaster peringueyi* is startled whilst inspecting the DNO of a final instar *Chrysoritis thysbe* when its TOs are suddenly everted.



Fig. 4 Final instar *Chrysoritis thysbe* about to pupate, providing honeydew from its DNO to host ant *Crematogaster peringueyi*.

GLOSSARY OF TERMS USED

- Aphytophagy:** Feeding other than on vegetation.
- Brood:** Refers to the immature stages of the ant.
- Corral:** A secluded place (other than ants' nest) where one or more caterpillars rest when not feeding and where they are tended and protected by three or more ants.
- Caterpillar, instar, pupa:** The immature stages of the lycaenid butterfly.
- Commensalism:** A symbiotic relationship where members of one species benefits but the other neither benefits, nor is harmed.
- Detritovore:** One who feeds on organic detritus.
- DNO:** Dorsal nectary organ or honey gland present on the 7th abdominal segment on many lycaenid caterpillars.
- Endophytic:** Living and feeding within plant tissue, e.g. flower buds or fruit.
- Facultative:** An ant's opportunistic and symbiotic association with a caterpillar, which is not continuous and where more than one species of ant could be involved.
- Formicary:** An artificial ants' nest built to enable observation of activity within the nest.
- Herbivorous:** Feeding upon non-woody plant tissue.
- Honeydew:** A substance produced by the DNO containing sugars and traces of amino acids.
- Mutualistic:** A symbiotic relationship which provides some benefit to both the ant and the lycaenid such as protection and grooming in exchange for honeydew secretions.
- Myrmecophily:** Any association with ants during any part of the life cycle of a lycaenid.
- Obligate:** The lycaenid depends for survival on the presence of a specific ant, *i.e.* to stimulate oviposition and for larval and pupal protection.
- Oophagy:** Eating own eggs or the eggs of a nest mate; in this case, the caterpillar eating the eggs of the host ant.
- Parasitic:** Lycaenid caterpillar exploiting the ants without providing anything in return; this may occur *inter alia* being fed by the ants, feeding on the ants' eggs, their brood or on the ants' food resource.
- PCOs:** Perforated cupola organs or lenticles, being minute perforated epidermal glands (modified setae), capable of secreting chemical substances which can manipulate an ant's behaviour.
- Phytopredacious:** Initially a herbivore feeding on flower heads, but in later instar(s) predacious on other insects, e.g. ant brood.
- TOs:** A pair of tentacle organs or tubercles present on the 8th abdominal segment of many lycaenid caterpillars. Their purpose is uncertain but is probably to alert attendant ants and maintain their attendance.
- Trophallaxis:** Mouth to mouth transfer of food; a very common practice between members of an ants' nest, but in this context, it means the transfer of crop contents from ant to caterpillar.

CITRUS SWALLOWTAIL *PAPILIO DEMODOCUS* ESPER, IN THE GARDEN AND BEHAVING STRANGELY

Alan Heath

We have several Mexican Orange plants *Choisya temata* growing in our garden in Pinelands. We have had a few for many years and found that specimens of the Citrus Swallowtail *Papilio demodocus* were very strongly attracted to them. We often find caterpillars and eggs on them. This has been very useful, especially when explaining about the life cycle of a butterfly to interested people, especially children; we could almost always find something to show.

A couple of years ago I took cuttings and despite a low success rate, managed to plant several more plants and this year we have reaped our rewards in the number of *P. demodocus* flying about.

On a sunny day whilst seated in our 'office', whilst working on the PC we need only to glance out the window to see these attractive butterflies 'doing whirlies'. Other butterflies, pierids, lycaenids and hesperiids often come to investigate, to see what is attractive, so that is another spin-off.

We once noticed a shrike helping himself to a green final instar and the next day repeating the deed, so nowadays we collect the final instar caterpillars and keep them indoors where neither the shrike nor the parasitic wasps can reach them. It really is a pleasure releasing these lovely butterflies into the garden and watching them take their maiden flight. They may be a pest in the citrus orchards but are a real delight in urban gardens.

The main reason for writing this short article was due to what I saw this morning as a female *P. demodocus* hovered and moved between the plants seeking out a suitable leaf on which to oviposit. I noticed that it stopped, still hovering motionless between two plants, its wings almost closed although vibrating fast. I took a closer look because at first, it appeared to be ovipositing in mid-air. It was actually ovipositing on the outer support strand of a spider's web. I watched it lay two eggs on the horizontal silken strand and then as I took a closer look it flew off. When I looked even more closely, I noticed another egg, a deep purple colour, almost ready to eclose, was on the same strand; so I think that a *P. demodocus* must have oviposited on the same silken strand a few days earlier. There was little to be seen of the web itself as most of it had disappeared.

I have often found butterfly eggs laid by mistake on something very near to the foodplant but in this case, the difficulty of ovipositing on a horizontal silken strand seems beyond belief.

THE BIG EVENT
Second International Lepidopterists' Conference of Africa
Kirstenbosch, Cape Town, 4-6 November 1999
An overview (and then a bit of a safari)

S.E. Woodhall

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It took a bit of fast-talking to get time off from work in November, which is the busiest part of the year for my employer. In fact I had no idea how much stress I had been working under until I got on the plane to Cape Town on the evening of Tuesday 2nd November... when I realized - I'd escaped! I got to Esther and Eugene van der Westhuizen's place to find Eugene a butterfly widower with a bottle of red wine for company, so I helped him finish it. This was an appropriate welcome to the Cape... and thanks, Eugene and Esther, for putting me up during the conference.

I took the 3rd off to get myself into the groove for a Lepidoptera conference. Originally I wanted to hit the mountains but found weather waiting for me, so I did an about turn and headed for Red Hill in search of *Aloeides egerides*. This I did not find, but I did find one Commander R.D. Stephen instead. This was the second time I have driven somewhere and found Steve mysteriously driving just in front of me, totally unexpectedly. The last time was when I went to his house to drop off some kit for the safari that forms the second part of this journey ... I thought he was at Mariepskop but there he was driving down the road towards his house just as I got there!

We walked over the hills above Simonstown for some time, but we didn't find much. One interesting record was *Chrysoritis pyroeis pyroeis*. Alan Heath told me later that he had never seen it there. There were a few *Aloeides thyra* about, and the odd *Chrysoritis thysbe* and *Stygionympha vigilans*. But it was a tonic, standing among the fynbos, looking at the flowers, listening to the birds, watching the boats on the deep blue sea ...

Later that day I went on to Kirstenbosch to meet up with Jenny Heath and make sure all was well for the photographic competition. Jenny was in her element, whizzing around like a supercharged *Aphnaeus hutchinsonii*. Everything was fine, all the equipment was working OK, and I met a kindred spirit in Phil de Vries, and we sat down to enjoy a cool frostie or six. Who should turn up next but Steve Collins, making some wry observation as to how hooligans always congregate ... the Conference was on!

We ended up in the Spur in Pinelands, making new friends and renewing old acquaintances, but we really behaved ourselves and I was in bed before midnight. As in Kenya, the thrill was in bouncing my weird theories on butterflies off internationally renowned experts and not being laughed at ... well perhaps they all waited until they went to bed ... The wonderful thing about all LepSoc conferences is the feeling of being amongst kindred souls, and the international ones are particularly special. There *are* nutcases like me on other continents too.

The next day dawned somewhat cloudy but no one cared, and we all got together bright and early. I won't go into any great detail on the individual papers, as they will be covered in more detail later on. The first two sessions were very good for me because

they covered my beloved Lycaenidae, or Lycaenoidea as one astute speaker referred to this family combined with Riodinidae. It was exciting to hear Naomi Pierce talk firsthand about her work on lycaenid life history evolution, especially as all the papers in the same session were related, some by her co-workers. Phil de Vries showed us how the Riodinids, which at first glance look so similar to Lycaenids, show some real differences, especially in the larvae.

The lunches at the conference were first-class. The only snag was that this was prime networking time and I, for one, found myself spending so much time chatting that I had no time to eat. Then when the guest speaker's address started I found myself sneaking out of the room to answer a call when who should I meet but Thalia Lincoln, the best botanical artist in SA. She is one of my heroes and we had a great chat about art, and I was chided for not doing more painting ...

Later on Richard Stephen and I went to the Forester's Arms to watch the 3rd place play off of the Rugby World Cup. We completed the humiliation of the All Blacks but this should really have been the final ... and it was a great place to watch the game. Those who "wussed" out - you missed all the fun.

The next day saw me playing truant for a morning with Haydon Warren-Gash and Duke Knoop, both of whom had been very interested in my accounts of Red Hill. We got there to find wonderful weather but not many butterflies (although there were more than there had been on the 3rd). It was great fun to see people having primary experiences with the blue *Chrysoritis*. There were quite a few *C. pyrois* around, and a few *C. thysbe*. It is always instructive to meet new lepidopterists and see their *modus operandi*. Haydon is like a stealth fighter - he announces he is off up that ridge over there, disappears, and minutes later you see him swiping around, having seemingly used warp drive to get up there. And as for Duke - I could see how the computer game Duke Nukem got its name... the fynbos around Red Hill is peppered with little circular depressions where his singular overhead smash shot was used! It does seem to work well with *Aloeides*, however...

In the afternoon I had to be back for the photographic competition, and there were some interesting papers. After the day's activities ended we all headed for the Waterfront, where we started proceedings in a pub called Quay 4. To our surprise there was a band playing a tune called the Brenton Blues. I know Jenny has a passion for organising everything, but this was carrying things a bit far ... I hope they pay a royalty to the Society! Later on we hit the Sports Cafe and filled a huge table. Good cheer prevailed and tall tales abounded.

The next day was the last, and it had seemed to come very quickly. I had been looking forward to Dr. Rose's paper on Himalayan Swallowtails as I thought it would give me some clues in my dream of one day catching a Kaiser-I-Hind, so I was disappointed that he couldn't make it. In the afternoon at Butterfly World, everyone else had lunch or watched the anticlimactic Rugby World Cup final. I sat in front of Esther's computer keying in photographic judging scores. If I had not had Esther and Eugene helping me I would never have finished, so thanks again to the van der Westhuizens. Eventually we finished and calculated the placings in one click of a mouse (never again will I use a calculator to do this - thank goodness for Microsoft Excel!) We had time for a few cold ones in the garden and I went into the butterfly house to see what was potting. I've been to Butterfly World lots of times now. It gets better every time. Esther's new display of mounted specimens from around the world (in the area that her office used to

occupy) is a big improvement. Also, funnily enough I can normally walk around the flight house with all the *Morphos*, etc, flitting around and never feel the itch to have a net in hand. I put this down to some innate decency that prevents true sportsmen from shooting ornamental ducks etc ... until I saw my first ever live *Kallima inachus*. It even sat on my hand sucking sweat. One of my "lifers" alongside *Morpho cypris*, *Teinopalpus imperialis*, *Charaxes lactinctus*, *Phasis thysbe* (sorry Alan but it was called that when I was a kid) ... wow. My hand itched, but I resisted the temptation.

Next we had to find our way to Rhebokskloof. Alan Heath's studies of the genus *Chrysoritis* has led him to imitate them in real life ... with him in the lead we thought he knew where he was going but in fact he was relying on some other people who said they did. But they went off in the wrong direction and we ended up circling around just like a *Chrysoritis* before settling on the correct route to the wine farm. Eventually we got there, and most of us went off to taste wine (or should I say swill it?) whilst the chosen few got to put the arrangements for the slide competition prize-giving together. Before I tell you all what the results were, I will explain how the judging was done. First of all we had one session per day of the conference, each covering one of the three categories of the competition. The judging was done using peer judging forms. The results were calculated and the top six slides in each category were handed over to professional photographers for judging. This was done to ensure a balance between peer evaluation of the photos and an idea of their pure photographic merit. The judges were a mix of professional and top amateur photographers:

J.J. van Heerden of Audio Lens

Steven Johnson (co-author of *Table Mountain - A Natural History* and one of South Africa's top close-up photographers)

Jeanette du Toit (member of the Cape Photographic Society)

Roy Johannesson (member of the Cape Photographic Society)

The judges decided between themselves which three of the eighteen were the slide of the year and the two runners up. The results were:

Illustrative category:

1.	Tom Fox	<i>Pteronympha simplex</i>	Prize	Three-bottle pack of wine
2.	Johan Greyling	<i>Astictopterus stellatus</i>	Prize	Signed card by Thalia Lincoln and Kirstenbosch calendar
3.	Johan Greyling	<i>Kedestes marshalli</i>	Prize	36 exposure roll of Agfa Slide film

Scientific category:

1.	Tom Fox	<i>Hamadryas ferorlia</i> mating	Prize	Three-bottle pack of wine
2.	Tom Fox	<i>Chlosyne jamais</i> ovipositing	Prize	Signed card by Thalia Lincoln and Kirstenbosch calendar
3.	Steve Woodhall	<i>Trimenia malagrida</i> <i>paarlensis</i>	Prize	36 exposure roll of Agfa Slide film

General category:

1.	Michel Pierson	Trap filled with the rarest African <i>Charaxes</i> species	Prize	Three-bottle pack of wine
2.	Keith Roos	A "bottoms up" shot of searchers for <i>C. aureus</i> larvae	Prize	Signed card by Thalia Lincoln and Kirstenbosch calendar
3.	Graham Henning	Larva hunters in the freezing rain	Prize	36 exposure roll of Agfa Slide film

Slide of the year:

1.	Keith Roos	<i>Calliorotis</i> new species	Prize	Signed prints by Diana Carmichael
2.	Tom Fox	<i>Pteronympha simplex</i>	Prize	Three-bottle pack of wine
3.	Steve Woodhall	<i>Trimenia malagrida paarlensis</i>	Prize	36 exposure roll of Agfa Slide film

After the prizes were presented, a gourmet dinner was enjoyed by all. As usual, the theories and tales got taller and shaggier as the evening wore on. Eventually we all shoved off and got to bed, as the next day was safari time!

I met Richard Stephen at the airport where we dropped off my rent-a-racer and loaded my gear into the trusty Hilux. The weather was a little threatening but once we had met up with Eileen and Graham Henning at Butterfly World, things began to look up. By the time we got up to Ertjielandskloof behind Gydo Mountain it was cool but sunny. Fun was anticipated. We set off up the deep kloof, "thrutching" our way through the "fynbos. Eileen regretted her decision to wear shorts. At the top we split up, Hennings to the left, Stephen to the right and yours truly right up the middle. As I climbed the steep slopes of Gydo's middle peak I could see them all swinging nets, and I was finding some nice *Chrysoritis adonis* and *C. uranus*. But butterflies were scarce and as I reached the summit ridge, I began to anticipate defeat by *Thestor vansoni*. I could find no little flat areas of the kind beloved of *Thestors*, until, exhausted, I reached the summit. Then I looked down to the north (I had climbed the west ridge) and saw a "Thestorish-looking", dry sandy wide ledge. As I looked down, what should I see but a tiny insect fluttering around some rocks? There she was! A whoop of triumph rang over the hills as I bagged her. I sat down on a summit rock and looked over the vast Ceres Valley as I savoured the moment. Trouble was ... there were no more. Hours of searching, tapping rocks with my net handle, produced nothing. At least now I know where to look in future.

The long trudge down Gydo was just as wearisome as it ever was. Meeting the others at the bottom I found that they had not found any *T. vansoni* on their peaks. I was surprised, as Richard had seemed to be heading for some promising barren rocks. That night, Richard and I got permission from Mrs Herbst and set up camp inside the Kloof itself. After a dinner of Chicken á la Stephen (a gas grille inside a cardboard box to fend off the wind produces a very nice result), we hit the sack. I was in the tent, and boy, did it get cold! Richard's moth traps did not do very well and he attributed this to the cold and the proximity of water. It rained in the night, but wrapped up in my down sleeping bag I was fine. My cheap polyurethane foam mattress (R12!) kept me comfy. Next morning

dawned cold and cloudy, but slowly the sun came out. By 0800 it was quite nice and we set off to meet the Hennings at the western end of the mountain massif.

After getting permission from Mrs Fourie at the farm Long Acres, we went up the same western spur that had produced such riches for me two years ago. That was in December and this was November, but the weather was warm. This was the infamous dirt track where my wife's RAV4 suffered a puncture on a previous expedition. Richard's Hilux was a tougher customer but he was not happy with the "road", which has to be one of the roughest I have seen anywhere.

We walked to the crags, but the only people to see the sought-after *Lepidochrysops quickelbergei* were the Hennings, much to Eileen's amusement. She proved yet again that baleful lurking on the lower slopes is often a better plan than wild climbs to the peaks. All we men found were loads of *L. gydoae*, both sexes, with particularly large and fresh females flying early in the morning. *C. uranus* was abundant below the crags as usual. I was able to get a few more of the interesting form of *Pseudonympha trimenii* that flies there. By early afternoon we were all feeling somewhat bushed (Richard having abandoned plans to go to the high peaks to look for *T. vansoni*) and we headed back down to Long Acres where we knew cold beers awaited ...

Mrs Fourie and her family run a delightful little guesthouse with a restaurant. After a lot of beers (even Graham got stuck in), Richard graduated to his beloved Navy Rum and we ate some very welcome Pasta Alfredo. This is wonderful grub on collecting trips where the strenuous climbs demand carbo-loading. Well that's my excuse and I will stick to it. Sitting in a pub, sinking cold beers and talking about nothing in particular is a fine thing to do whilst nursing that special, welcome soreness that follows a good climb.

It was warmer in camp that night, but still not many moths came to the traps. We broke camp and set off early to meet Graham and Eileen in Prince Alfred Hamlet. We drove via Laingsburg and Seweweekspoort to Oudtshoorn and then to Uniondale. At Seweweekspoort we looked for *Thestor tempe* with no success, but we did find a colony of *Tsitana tulbagha kaplani*. Then on the other side of Oudtshoorn we looked on some hills that three years ago had produced butterflies for Johan Greyling and me. This time we searched in vain, for all we got was one *Chrysoritis* (which looks like *plutus*). Richard was very chuffed with a Cicada he got, so it was not a waste of time.

Eventually we reached Uniondale where Gail gave us a permit to go up the Kammanassie. True to form the massif was benign that afternoon, no cloud, but I was not going to get excited yet ... this mountain has defeated me too often with her spiteful weather. After a bit of a moment when we lost Graham and Eileen at the tum-off to the hills, we left the Henning mobile at Mnr Woudberg's fann. I know of old what Kammanassie can do to Toyota Corollas. Everything was loaded into the Hilux, and off we went up the fabled road.

Richard's Hilux camper has not got a low centre of gravity, and the Kammanassie road has some interesting bits. Bits where it contours along a mountainside with steep drops above and below the road, and the drainage ditches run across it at an angle of 45°. I didn't realise how white Richard's knuckles were getting until I pointed out a ravine filled with flowering Keurbooms, and got a somewhat terse request not to point out the views!

The last section of the road is where I had conceded defeat in the RAV4 last December, but I had not been trying too hard with the usual Kammanassie thunderstorm

looming. This time we had no choice as the campsite lay at the end. Eventually we got there, with two rather shook up Hennings gingerly getting out of the back.

The Kammanassie campsite has to be one of the most unspoiled I have ever seen. Apart from the road, a small shelter and new loo (Gail's pride and not available yet until the concrete had set!), there is nothing visible of man and his works. The stream water is finer than Perrier. *Chrysoritis* fly in the fynbos right next to the camp. Richard got a female that looked like me to be *C. lysander*, not a butterfly I would expect to see on Kammanassie. Later we both missed a male that might have cleared up the mystery. Perhaps it was *C. henningi*.

After an evening of good cheer helped along with my specialty, fettuccine á la pilchards (dead easy to do when camping), we got a good night's sleep. Richard was up betimes to check his moth trap but although it was better than Gydo he was not very successful here either - again we were near a stream, a factor that he believes puts the kibosh on light traps. The morning was light - the dawn of the world. Unlike Gydo, Kammanassie does not lie under a major air traffic corridor so there were not even high jets to disturb the peace. The crags around us lit up like gold in the sunrise as we cooked breakfast. We could hardly wait to get up to the peaks, and at about 0830 we were at the base of the peak with the radio mast and starting to climb. We were very aware that this was where Alan Heath had had his accident and were wary of loose rocks. To my delight the weather held good. I detoured along the gullies on the southeast face, hoping to find *Chrysoritis daphne*. None did I find, so I headed for the summit. Here there was a view of great magnificence. The Outeniqua mountains were in clear view to the south, and beyond them we could see Knysna Heads and dimly, in the distance, the sea. There was not a cloud in the sky but there were plenty of *Chrysoritis balli*. Most were males but there were a few females. The only other butterfly on the summit was a tatty *Charaxes pelias*.

Around all of the smaller peaks surrounding the main summit, *C. balli* males were skylarking. Females were on the slopes lower down, and we originally thought they were *C. daphne*, but we were wrong. There were surprisingly no *Lepidochrysops* to be seen. We came off the hill and headed for our second objective, the spur where last year I had found *Aloeides pallida jonathani*.

As soon as we drove up the road towards the spur, a big orange *Aloeides* flew up from under our wheels. It was a mint male, *A. pallida jonathani*. This resulted in a somewhat happy G.A. Henning, but no more did we see that day. We climbed the low peaks to the south of the main massif, and all hell broke loose. Every little peak swarmed with *Lepidochrysops*. One of the finest experiences as a lepidopterist is to approach a hilltop and see little dark forms dogfighting all over the place. Most were *L. robertsoni* but there were lots of both *L. braueri* and the sought-after *L. balli*.

The great advantage to camping on the massif was that we could stay as long as we liked and not have to worry about the drive down. AND ... no afternoon rain!

After a successful day the night in camp is always full of good cheer and this was no exception. We had originally planned an extra day into our itinerary, to allow for the normal uncooperative weather. However, there was no sign of any of the high altitude cirrus clouds that presage a cold front, so we went to bed happy. I was completely exhausted! In the morning we woke to a change in the weather. It was still sunny and warm but there was a gale force northerly wind blowing. It had played havoc with our

gear but I had slept clean through it. We breakfasted and broke camp, then we headed off to the peaks. My objective was to find *Chrysoritis daphne*. I stuck to the area on the lower southeast face of the radio mast peak, but found nothing. It was only when I clambered right down the gullies almost to the top of the cliffs that I found them. They fly at high speed across the mountainside and are impossible to follow, let alone catch. Anyway, I was camera-less on this trip, my trusty Nikon FA having been stolen from my car whilst in Durban before this trip. The insurance replacement was not ready in time, so photographing *C. daphne* will have to wait until next time.

We made a stop at the same spot we had visited the day before, finding more of the same species, before going to the spur where I had found *Orachrysops brinkmani* three years ago. Despite intensive searching we found none. The foodplant, which had been abundant that year, was nowhere to be seen and everything looked very dry. We did find more *L. balli* and a couple of *Thestor murrayi*, but that was all. We wended our way down the massif, wanting to get some miles under our wheels before nightfall. At the farm, the berg wind was really making itself felt - it must have been close to 40°C there, like standing next to an open fan driven oven. We said our good-byes and Richard and I set off in the direction of Graaff-Reinet.

We had not been sure how far we would get by nightfall, but we did get to Graaff-Reinet before dark. The campsite there has a wonderful ablution block and we had not showered since Saturday. Ahh - the joys of stinging hot needle jet showers ... Supper was of Richard's making - all sorts of tins of curryish things mixed together with extra curry powder - better than an Indian restaurant! We had a few man-sized rum and cokes and hit the sack.

In the morning it was already hot at 0730 and Richard woke me to inform me that the campsite was full of *Aloeides*, all mud puddling on water leaking from pipes. These turned out to be *A. depicta*, mostly females. A few other species were on the mud, including a massive fresh female *Tylopaedia sardonix* that first I took for a *Cynthia cardui* ...

We wound our way back via Lootsberg Pass (where we found absolutely nothing) and Springfontein. Despite being dreadfully dry and overgrazed by sheep, there were quite a few butterflies at the showgrounds and even more at the graveyard koppie. *Stygionympha irrorata* (or the thing that flies at this spot that looks like it) was out, to Richard's satisfaction. There were, however, no *Aloeides pallida pallida*. *Tylopaedia sardonix* was out, as was *Argyraspodes argyraspis*, *Chrysoritis chrysaor*, and *Lepidochrysops ortygia*.

All too soon it was time to go, and we drove back to Gauteng and all its cares. I was doing most of the driving and you cannot travel or manoeuvre fast in Richard's rig. You know you are getting close to home when idiots in red upmarket cars give you the middle finger for not getting out of their way quickly enough ...

Many thanks are due to Richard Stephen for the transport and Esther and Eugene van der Westhuizen for accommodation and to all concerned for their company and good fellowship. Also to the Western Cape Nature Conservation Dept. for issuing permit No. 240/99, and to the Eastern Cape Nature Conservation Dept. for issuing the permit which was stolen with my camera and will have to be replaced! A full list of all species recorded will be provided in due course.

ABERRATIONS AND HOW TO CATCH THEM

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Recently, Bill Steele, Graham Henning and I went to the Saltpan at Vivo to look for Bill's Flying Dutchman. This is a tiny *Orachrysops* that he once caught there years ago and has regularly gone back to look for since. Well, we were stalking through the green savanna, eyes peeled for anything blue, with hundreds of *Colotis* flying everywhere mostly *danae annae* and *ione* with the odd *amata calais*, *pallene*, *regina* and *evagore antigone* putting in an appearance. Occasionally a *Pinacopteryx eriphia* or a *Nepheronia buquetii* would tum up. The sun shone wannly, little white clouds sailed fatly overhead, and although the purple *Vernonia* flowers that attract such huge numbers of lepidoptera were not out, there were plenty of butterflies. But there were no *Orachrysops*, despite the *Indigofera* that was common, and no *Lepidochrysops vansonii* on the *Ocimum canum* that was growing in the wetter places. Graham and Bill were disappointed, I was philosophical - this is not the first time I have looked for this thing with Bill.

I was watching some *C. danae annae* females fluttering around their foodplant, *Cadaba termitaria*, when I noticed one looked a little darker than normal. As I watched, she sat on the plant and closed her wings for a moment, and my heart began to pound. Where she should have had a median row of black-ringed orange spots, there was a set of streaks running right down the wing bases, so that her entire basal area was black with orange streaks. What might have been a Harry Casual sweep to collect a nice specimen for the series became the old frozen dead log routine. I muttered some *sotto voce* prayers and Graham heard me, and came to see what I was after. As I struck, the bag caught on a thorn and I thought I had lost her, but Graham told me she was in the net and sure enough she was.

Into a film can she went, to await photography in an escape-proof environment. Graham did his usual thing of telling me what a nauseating swine I was, and this brought Bill over to see what was going on. When he saw the specimen, he cried - "Oh no, he's done it again!"

Believe it or not, this was the seventh aberrant butterfly I have caught with Bill. I only have seven in my collection, and all were caught in his presence ... so I have now come to the conclusion that the way to catch aberrations is to go collecting with Bill Steele!

It all started in the early days, when Bill, Graham (him again) and I went to Boons in the old Western Transvaal to look for *Aloeides dentatis maseruna* and *Lepidochrysops ketsi*. We were successful, and there were also lots of *Lepidochrysops patricia* frequenting the same *Salvia*-plants that *L. ketsi* feeds upon. I spotted one that had big black streaks on the underside. These were evident on the upperside as well, as shown in the illustration. Bill, like me, used to collect Chalkhill Blues (*Lysandra coridon*) at Royston Heath in the UK, and amid comments of "ooh, that's nice", observed that we'd have liked to get a "form *radiata*" as extreme as this on the Heath.

The new ICZN rules do not allow for the naming of forms¹, so I cannot do this here other than in jest. In homage to *L. coridon*, the above mentioned *L. patricia* is hereby dubbed form *radiata* (Plate 3, No. 1).

A couple of years later, Bill and I and if I recollect correctly, I think Nolan Owen Johnston as well, went to the shooting range at Mooi River in what was then Natal to look for *Lepidochrysops*. I do love these high altitude grasslands, bright green and dotted with innumerable multicoloured flowers. The sun was high and it was a lovely hot day. We were partly successful, finding the odd *L. tantalus* and *L. ignota* sitting on the *Becium* flowers. One of these turned out to be a male with oddly elongated black forewing submarginal spots. Bill made some comment about the luck of the devil, but I put this one down to skill at the time. I have to admit now it was luck, so it is called form *fortuna* (Plate 3, No. 2).

Later that summer, Bill and I went down to Gwaliweni in the Lebombo Mountains to look for *Acraea satis*. It was an extremely hot, steamy day with lots of butterflies everywhere. The *A. satis* were not rare, flying along the road and needing long extensions to get at them. We saw a male react instinctively and swoop down on an unsuspecting female. I believe this is common *Acraea* behaviour. Hardly a surprise though – the Laws of Nature prevail even here. After a while I got a lovely aberrant male with all his black spots either absent or drawn into long streaks. Bill told me he was getting a little fed up with me always catching "ab's" and waving them under his nose! And then he caught one! This put the seal on a very good day. Later I found that he had donated it to ABRI in the form of one Steve Collins - greater love hath no man ... and he has not since caught an "ab"!

For that reason, the aberration has to be called form *donatis*, to teach him to hang onto his prizes in future (Plate 3, No. 3).

Next summer, we all went to Golden Gate in the Free State for the weekend to look for all the wonderful things that fly there. We had a great Saturday with the *Torynesis orangica* and decided to go to the lower slopes of Generaal Kop on the Sunday. The weather was a bit damp and cloudy but the *Aloeides* were out. We found both *A. maluti* and *A. rileyi*. There is a little quarry on the circular game drive below the mountain where these can be quite numerous. I saw Bill, walking ahead of me, look at and then decline to catch what looked like a worn female *rileyi*. When worn, *Aloeides* often go a pale yellow colour and *rileyi* is a particularly deep orange ... I looked at her sitting on a flower and realised she was perfect! I caught her and walked across to Bill, who was by this time sitting on a rock enjoying the stunning views over the Maluti Mountains and the weirdly shaped rocks of Golden Gate. He called me all sorts of names... as you can see from the illustration she really is lovely, a strange semi-albinistic aberration. Perhaps form *pallida* is the right name, but Bill would call her something ruder (Plate 4, No. 1).

¹NOTE: The *International Code of Zoological Nomenclature* (ICZN) clearly states that infrasubspecific names are invalid and have no standing in terms of the Code. However, some forms and aberrations--curiosities--are of general interest to our readership. Articles utilising such terms are occasionally published in this journal; however, this does not imply that *Metamorphosis* or the editor accept or endorse such descriptions. To the contrary, these names remain invalid despite being applied to a particular insect of infrasubspecific status.

The next spring, we went to Kuruman in the Northern Cape to look for *Aloeides simplex*. We found them flying in good numbers with *A. molomo krooni* in the rubbish dump near the graveyard. Some collecting spots are beautiful but this one is literally a dump. It was terribly hot and dry as only Kuruman can be, but as we found the glorious pinky-orange *simplex* we didn't really notice. Occasionally a specimen of *Acraea neobule* would float past, much smaller than the ones we get in Gauteng and behaving differently. We took these whenever they turned up, and then I noticed one that was much darker than the others. Bill saw him floating along with me lumbering in pursuit, and also saw the dark hindwing. I eventually got him, and saw that his entire hindwings were black with pink veins, as can be seen in the colour plate. The black spots have enlarged to the point where they cover the wing. This can only be form *melanica*. (Plate 4, No. 2). Later on, Nolan Owen-Johnston got one with even more black on the wing.

We now bring the scene forwards a few years to January 1997, with Bill, Chris Ficq and I going up the wonderful tar road up Moteng Pass in Lesotho to the New Oxbow Lodge. As we neared the turn to the lodge we noticed a lot of satyrid activity in a vlei by the road. Out we got to find not only *Pseudonympha machacha* but also *P. varii* in a riverbed. These ringlets were fun to catch as they were quite fast flying and a wrong step meant a soggy boot in this vlei. So we took up stances on the sides of the boggy bits and sallied forth as specimens came by. Then I saw one that looked a bit funny, and as I got closer I spotted the total lack of eyespots on the upperside ...

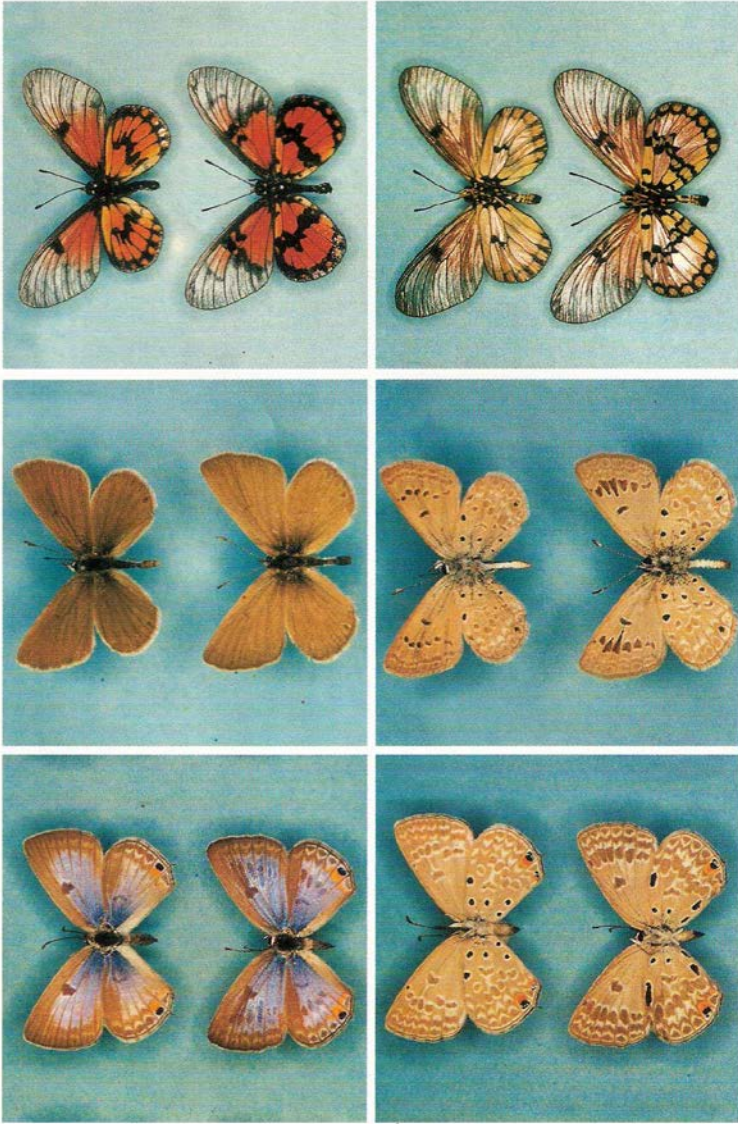
By this time we all had nearly a full series and were executing some nice cricket strokes. Of course, following Woodhall's First Law, the act of capturing this specimen was far more difficult than the last ones. I thundered through the vlei issuing wild stone age slogs and Chinese cuts at it, finally catching him to the accompaniment of gales of laughter from my companions. But get him I did and Bill was philosophical about it ... by this time he was used to my catching "ab's" in his presence. As this one had no eyespots I will call it form *caeca* (Plate 4, No. 3).

So there we have it - seven aberrations. Five of them - both of the *Lepidochrysops* and the *Acraeas*, and the *Colotis*, all show elongation of black spots. This seems to be quite a widespread phenomenon and it would be interesting to hear from others who have caught these. Certainly the genus *Acraea* throws them up fairly often and they are not rare amongst the Polyommatae either. I wonder what causes them?

"Blind" ringlets are not unknown from the UK, and coppers with very pale coloration also turn up from time to time. So what I have caught here is not really that unusual in any respect. I have still to get a real world-beater like Douglas Kroon's black *Colias electo*. The strangest thing is the weird co-incidence of Bill Steele being there every time I got one!

I still haven't given the *Colotis danae annae* "ab." a name yet, so in the honour of my good luck talisman I will call her form *steeleii* (Plate 4, No. 4).

Plate 3 (Upper- and under- sides illustrated) (Scale - Reduced about 50%)



1. *Lepidochrysops patricia* ♀, normal and aberrant "form radiata", South Africa, North-West Province, Boons, 3.1.1987.

2. *Lepidochrysops ignota* ♂, normal and aberrant "form fortuna", South Africa, KwaZulu-Natal, Mcozi River, 2.XI.1991.

3. *Acraea saxis* ♂, normal and aberrant "form donatis", South Africa, KwaZulu-Natal, Gwaliweni Forest, 14.II.1992.

Plate 4 (Upper- and under-sides illustrated) (Scale - Reduced about 50%)



Provisional notes on the Food plants of the Iolaini
(Lepidoptera, Papilionoidea, Lycaenidae)

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Abstract: Foodplants are listed for some Iolaini (Lepidoptera, Lycaenidae) known from Eastern and Southern Africa. The higher classification of the Loranthaceae is given (Polhill, 1998). A classification of the Iolaini based on foodplant preferences is found broadly to agree with the current classification arrived at using conventional criteria.

Key words and phrases: Iolaini, Loranthaceae, Taxilloid, Tapinanthoid, Genera, species groups, foodplant preferences.

Introduction

Much is now known about the imagines of African butterflies, although more species will continue to be identified. Many groups are in need of revision, and it is possible that advances in nuclear biology will result in more discoveries. Nevertheless it is likely that new work will increasingly be in the field of butterfly ecology. And here we have only just begun.

We need to know about population dynamics, predators and parasites, diseases, relations with other insects, the effects of climate. But above all we need to know the life histories of our butterflies, and in the great majority of cases this means we need to know about plants.

The recent publication of Polhill and Wiens' *Mistletoes of Africa* is very important in this respect. We now have a complete revision including full descriptions and many illustrations of all the African Loranthaceae and Viscaceae, families which are the principle foodplants of several groups of butterflies.

Methods and Materials

The study area is Eastern and Southern Africa, including Kenya, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, Botswana, Namibia and South Africa.

The present paper lists the known foodplants (Table 1) of one of these groups, the Iolaini (Sapphires), using Polhill's revision. The butterflies were observed in the field, and many bred or reared from egg and larval stages. Foodplants are given for 67 of the 73 Iolaini known from the study area. Plant specimens were identified at RBG Kew.

Butterflies are categorised as having – many ^a, several ^b, or 1 – 2 ^c hosts. The hosts are those listed in Kielland 1990 (¹), Pringle *et al.* 1994 (²), Larsen 1991 (³) and largely unpublished observations by the authors (⁴). (Table 1 - Explanatory superscripted codes.)

Foodplant genera given in full at first mention, are abbreviated thereafter as appropriate. They are Loranthaceae except where stated. A broad classification of Loranthaceae is given following Polhill and Wiens 1998, with grouping of the genera (Table 2). The known utilisation by numbers of Iolaini species for groups of foodplants is investigated and tabulated (Table 3).

The Iolaini are divided into three groups based on foodplant preferences (Table 4) and a revised classification of the Iolaini using this information is given (Table 5). Butterflies and Loranthaceae mentioned in the text are listed in the Appendix.

Table 1. Foodplants of Eastern and Southern African *Iolaini***Explanatory key codes to entries with superscripts**

Butterflies are categorised as having:

^a = Many hosts (for 10 species)^b = Several hosts (for 14 species)^c = 1 – 2 hosts (for 43 species)

Hostplant references:

¹ Kielland, 1990² Pringle *et al.*, 1994 (In *Pennington's Butterflies*)³ Larsen, 1991⁴ Unpublished observations by the authors**(Sub)Genus and Species****Food plants**

<i>Iolais bolissus</i> ^c	<i>Tapinanthus dependens</i> flowers ⁴
<i>Epamera aemulus</i> ^c	<i>Oncocalyx quinquenervius</i> ²
<i>E. alienus</i> ^a	<i>Helixanthera tetrapartita</i> ⁴ , <i>H. kirkii</i> ² , <i>Oncocalyx ugogensis</i> , <i>Agelanthus mollerii</i> , <i>A. natalitius</i> ⁴ , <i>A. subulatus</i> , <i>Oliverella rubroviridis</i> ² , <i>Englerina macilentia</i> ⁴
<i>E. apatosa</i> ^c	<i>Helixanthera kirkii</i> flowers ⁴
<i>E. arborifera</i> ^c	<i>Englerina woodfordioides</i> ³
<i>E. aphnaeoides</i> ^c	<i>Tapinanthus oleifolius</i> ²
<i>E. aurivillii</i> ^c	<i>Globimetula braunii</i> , <i>Englerina gabonensis</i> ⁴
<i>E. australis</i> ^a	<i>Vanwykia rubella</i> , <i>Erianthemum dregei</i> , <i>Phragmanthera usuiensis</i> , <i>Globimetula braunii</i> ² , <i>G. anguliflora</i> , <i>G. mweroensis</i> , <i>Helixanthera tetrapartita</i> , <i>Tapinanthus erianthus</i> ⁴ , <i>T. oleifolius</i> ² , <i>T. dependens</i> ⁴ , <i>Agelanthus subulatus</i> ²
<i>E. bakeri</i> ^c	<i>Tapinanthus oleifolius</i> ² , <i>T. dependens</i> ⁴
<i>E. bamptoni</i> ^c	<i>Helixanthera tetrapartita</i> flowers ⁴
<i>E. bansana yalae</i> ^c	<i>Englerina woodfordioides</i> ⁴
<i>E. congdoni</i> ^a	<i>Oedina pendens</i> , <i>H. verruculosa</i> , <i>Englerina inaequilatera</i> , <i>Agelanthus bipartitus</i> , <i>A. zizyphifolius vittatus</i> , <i>A. atrocoronatus</i> , <i>A. uhehensis</i> ¹
<i>E. diametra</i> ^c	<i>Actinanthella wyliei</i> ^{1,2} , <i>Oliverella hildebrandtii</i> , <i>Englerina woodfordioides</i> ⁴
<i>E. dubiosa</i> ^b	<i>Phragmanthera usuiensis sigensis</i> , <i>Erianthemum schelei</i> ¹ , <i>Oedina pendens</i> , <i>Englerina inaequilatera</i> ⁴
<i>E. farquharsoni</i> ^c	<i>Globimetula braunii</i> ⁴
<i>E. fontainei</i> ^c	<i>Tapinanthus dependens</i> flowers ⁴
<i>E. frater</i> ^c	<i>Tapinanthus dependens</i> flowers ⁴
<i>E. helenae</i> ^b	<i>Agelanthus zizyphifolius vittatus</i> , <i>A. subulatus</i> , <i>Englerina inaequilatera</i> ⁴
<i>E. hemicyanus</i> ^c	<i>Globimetula braunii</i> flowers, <i>Phragmanthera usuiensis usuiensis</i> flowers ⁴
<i>E. jacksoni</i> ^b	<i>Plicosepalus meridianus</i> , <i>P. curviflorus</i> , <i>P. sagittifolius</i> ⁴
<i>E. mermis</i> ^b	<i>Helixanthera verruculosa</i> ; flowers of <i>Oncella ambigua</i> , <i>Agelanthus sansibarensis</i> , <i>A. subulatus</i> ⁴

- E. mimosae*^b *Plicosepalus curviflorus*³, *P. kalachariensis*^{2,4},
*Moquiniella rubra*¹, *Oncocalyx fischeri*¹
- E. nasisii*^a *Tapinanthus oleifolius*², *Actinanthella wyliei*, *Englerina inaequilatera*, *E. macilenta*, *Agelanthus molleri*⁴, *A. zizyphifolius vittatus*, *A. subulatus*, *A. nyasicus*, *A. pungu*², *A. igneus*⁴, *Oliverella rubroviridis*²
- E. neavei katera*^c *Agelanthus krausei*⁴
- E. nolaensis amanica*^c *Agelanthus subulatus*, *A. sansibarensis*⁴
- E. obscura*^c *Plicosepalus kalachariensis*²
- E. penningtoni*^c *Helixanthera garciana* flowers⁴
- E. pollux*^c *Agelanthus krausei*⁴
- E. pseudopollux*^c *Agelanthus zizyphifolius*⁴
- E. sibella*^c *Globimetula braunii*, *Englerina woodfordioides*⁴
- E. sidus*^a *Agelanthus bipartitus*, *A. zizyphifolius vittatus*, *A. kraussianus*, *A. subulatus*, *A. fuellebornii*, *A. sambesiacus*, *Englerina inaequilatera*, *E. schubotziana*, *E. woodfordioides*, *Moquiniella rubra*^{1,2}, *Oliverella hildebrandtii*⁴, *Oncocalyx quinquenervius*¹, *Tapinanthus oleifolius*
- E. silanus*^c *Agelanthus subulatus*, *A. sansibarensis*⁴
- E. stenogrammica*^c *Globimetula braunii*, *Agelanthus krausei*⁴
- E. tajoraca*^b *Plicosepalus curviflorus*³, *P. meridianus*, *P. kalachariensis*⁴, *Oncocalyx fischeri*¹, *Englerina kagehensis*⁴
- E. violacea*^a *Phragmanthera usuiensis usuiensis* flowers, *Helixanthera tetrapartita*; flowers of *Globimetula braunii*, *G. mweroensis*, *G. pachyclada*, *G. rubripes*, *G. anguliflora*; *Tapinanthus erianthus*⁴, *T. oleifolius*, *Agelanthus fuellebornii*²
- Aphniolaus pallene*^c *Ximenia americana*¹, *X. caffra*² (Olacaceae)
- Etesiolaus catori*^c *Manilkara*, *Synsepalum*⁴ (Sapotaceae)
- Argiolaus aequatorialis*^c *Phragmanthera usuiensis usuiensis*⁴
- A. crawshayi*^c *Phragmanthera u. usuiensis*, *Erianthemum dregei*¹
- A. dianae*^b *Phragmanthera polycrypta*⁴, *Erianthemum* sp.
- A. iturensis*^c *Erianthemum* sp.⁴
- A. lalos*^c *Phragmanthera usuiensis usuiensis*, *Erianthemum dregei*⁴
- A. maritimus usambara*^b *Phragmanthera usuiensis sigensis*, *Oedina pendens*¹, *O. congdoniana*⁴, *Erianthemum schelei*¹
- A. montana*^c *Phragmanthera usuiensis usuiensis*⁴
- A. ndolae*^a *Vanwykia rubella*, *Erianthemum taborense*¹, *E. dregei*, *E. virescens*, *E. schelei*, *Phragmanthera usuiensis usuiensis*, *P. proteicola*⁴
- A. pamae*^c *P. usuiensis usuiensis*, *P. eminii*, *P. proteicola*⁴
- A. paneperata*^c *Phragmanthera capitata*⁴
- A. parasilanus*^b *P. usuiensis usuiensis*, *P. polycrypta*, *P. brieyi*⁴
- A. poecilaon*^b *Phragmanthera usuiensis usuiensis*, *P. brieyi*⁴, *P.*

	<i>polycrypta</i>
<i>A. silarus</i> ^a	<i>Phragmanthera u. usuiensis</i> ¹ , <i>P. dschallensis</i> , <i>P. proteicola</i> ⁴ , <i>Erianthemum dregei</i> ¹ , <i>E. taborense</i> , <i>E. virescens</i> , <i>E. schelei</i> , <i>Vanwykia rubella</i> , <i>Tapinanthus erianthus</i> ⁴
<i>A. silas</i> ^b	<i>E. dregei</i> , <i>E. virescens</i> , <i>Moquiniella rubra</i> ²
<i>A. stewarti</i> ^b	<i>Phragmanthera</i> sp., <i>P. u. usuiensis</i> , <i>E. schelei</i> ⁴
<i>Argiolaus</i> sp. (Gatamayo) ^c	<i>Erianthemum dregei</i> ⁴
<i>A. sp.</i> (Mbisi) ^c	<i>Phragmanthera u. usuiensis</i> ⁴
<i>Iolophilus gabunica</i> ^c	<i>Globimetula braunii</i> ⁴
<i>I. iulus</i> ^b	<i>Globimetula braunii</i> , <i>G. mwareoensis</i> , <i>Tapinanthus erianthus</i> , <i>Englerina woodfordioides</i> (in captivity) ⁴
<i>I. jamesoni</i> ^c	<i>Globimetula braunii</i> ⁴
<i>I. trimeni</i> ^a	<i>Agelanthus subulatus</i> ² , <i>Globimetula braunii</i> ¹ , <i>G. pachyclada</i> , <i>G. rubripes</i> , <i>G. anguliflora</i> , <i>Tapinanthus dependens</i> ⁴ , <i>T. oleifolius</i> , <i>T. erianthus</i> ⁴ , <i>T. rubromarginatus</i> ²
<i>Tanuetheira timon</i> ^b	<i>P. usuiensis usuiensis</i> , <i>P. polycrypta</i> , <i>P. capitata</i> ⁴
<i>Pseudiolaus poultoni</i> ^c	<i>Helixanthera kirkii</i> , <i>Englerina macilenta</i> , <i>E. triplinervia</i> , <i>Agelanthus sansibarensis</i> ⁴
<i>P. lulua</i> ^c	<i>Helixanthera woodii</i> ⁴
<i>Stugeta bowkeri</i> ^a	<i>Ximenia americana americana</i> ¹ , <i>X. americana caffra</i> ⁴ (Olacaceae), <i>Viscum rotundifolium</i> ² (Viscaceae), <i>Erianthemum dregei</i> ¹ , <i>E. taborense</i> , <i>Phragmanthera dschallensis</i> , <i>Helixanthera tetrapartita</i> , <i>Tapinanthus erianthus</i> ⁴ , <i>T. oleifolius</i> ² , <i>Agelanthus molleri</i> , <i>Oncocalyx ugogensis</i> , <i>Englerina macilenta</i> ⁴
<i>S. carpenteri</i> ^c	<i>Emelianthe panganensis</i> ⁴
<i>S. marmorea</i> ^c	<i>Ximenia americana caffra</i> ⁴ (Olacaceae)
<i>S. mimetica</i> ^c	<i>Emelianthe panganensis</i> , <i>Helixanthera tetrapartita</i> ⁴
<i>S. subinfuscata</i> ^c	<i>Tapinanthus oleifolius</i> ²
<i>Hemiolaus coeculus</i> ^c	<i>Olax dissitiflora</i> ¹ , <i>O. obtusifolia</i> ⁴ (Olacaceae)

Species from the study area for which no foodplant is known with certainty: *Epamera bellina*, *E. iasis**, *E. umbrosa*, *Iolophilus menas*, *Argiolaus cottrelli*, *Etesiolaus pinheyi*.

Voucher material Voucher Loranth specimens with Congdon accession numbers are lodged in the Royal Botanic Gardens Herbarium at Kew, all determined by Polhill. Butterflies bred by the first author are housed at ABRI (African Butterfly Research Institute), Nairobi. Some specimens reared by Bampton are preserved in the Henning Collection, Florida, South Africa. *Epamera congdoni* and *Epamera mermis* have been assimilated into the collections of the Natural History Museum, London.

*Early host-plant records are in many cases incorrect. This may be due to misidentification of either plant or butterfly, or to subsequent changes in taxonomic arrangement. We have excluded these records from the checklist, pending verification. Readers of the standard reference works (Kielland, Larsen, "Pennington's") should be aware that most of the old Loranth names have now changed, or may not apply within their old distributions. We have incorporated the new revised names in the list above.

A Broad Classification of the Loranthaceae

(After Polhill: *Mistletoes of Africa* 1998)

The genera fall into two main groups:

Tapinanthoid with simple or irregularly branched hairs

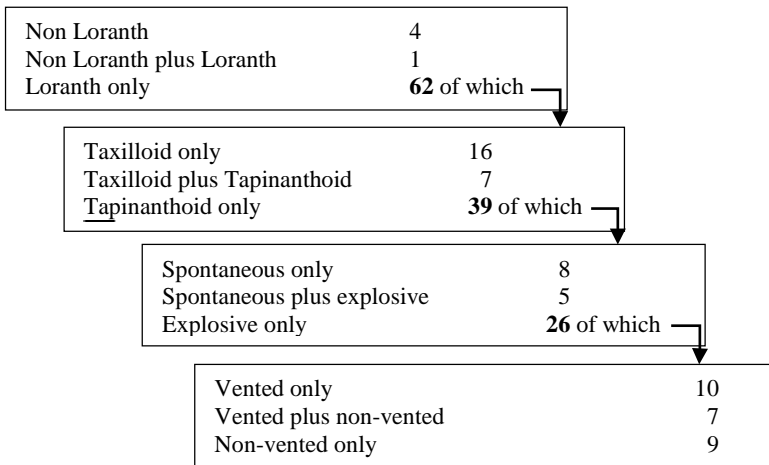
Taxilloid with stellate or dendritic hairs

The Tapinanthoid genera are divided into those whose flowers open spontaneously, and those which open explosively when prodded. The explosive flowered genera are further subdivided into those whose ripe flower buds have vents, and those which lack them.

Table 2. Grouping of genera

<p><u>Tapinanthoid</u></p> <p>Spontaneous <i>Helixanthera</i> <i>Plicosepalus</i> <i>Emelianthe</i></p> <p>Explosive (Vented) (Non-vented) <i>Actinanthella</i> <i>Tapinanthus</i> <i>Oncocalyx</i> <i>Moquiniella</i> <i>Oliverella</i> <i>Globimetula</i> <i>Englerina</i> <i>Agelanthus</i></p>	<p><u>Taxilloid</u> <i>Vanwykia</i> <i>Oedina</i> <i>Oncella</i> <i>Erianthemum</i> <i>Phragmanthera</i> <i>Septulina</i></p>
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Table 3. Numbers of species of *Iolaini* according to known foodplant utilisation



Discussion

Although there are confirmed breeding records for 67 of the 74 species of *Iolaini* known from the study area (90.5 %), the foodplant preferences of most species of *Iolaini* are still imperfectly known. Therefore some which appear to have narrowly defined requirements may in fact be more generalist. Given that more than half the *Iolaini* are known from only one or two species of foodplant, it is not surprising that most use only one group or subgroup of foodplant. Nevertheless, some trends are clear.

Argiolaus are mainly Taxilloid feeders. The records of *silas* on *Moquiniella* and *silarus* on *Tapinanthus* stand out as exceptions. All except *poecilaon* have very similar larvae and pupae. All have larvae which retain a covering of short hairs through to final instar, a characteristic they share with *Tanuetheira*.

Iolaphilus. Tapinantheid feeders with similar early stages. The eggs are sometimes laid in groups in the axils of leaves, where they closely resemble scale insects. They are covered in a sticky substance, which does not always protect them from parasites. An exception is *gabunica*. Heath (1985) places this species to *Argiolaus*, but in the latest revision (Carcasson, 1995) it is in *Iolaphilus*. Certainly the foodplant and the pupa suggest *Iolaphilus*, and while the larva is of *Argiolaus* shape, it is hairless in the manner of *Iolaphilus*. We do not know the egg.

Stugeta. Divides into two groups. The *bowkeri* group are larger insects, with *bowkeri* and *marmorea* on *Ximenia*, a foodplant not available in the very arid habitat of *subinfuscata*. The *carpenteri/mimetica* group are smaller, and feed on related (and unspecialised) Tapinantheid genera. They have very small, shiny eggs with reduced dimples.

Pseudiolaus. The two species have similar feeding habits.

Epamera divides into several groups

- *australis*, *dubiosa* and *congdoni* are generalists, with the latter mainly on Tapinanthus.
- Three other species are known from both Tapinanthus and Taxilloids, *hemicyanus*, *mermis* and *violacea*. They are largely flower feeders, which need a wide range of foodplants to maintain a succession of broods. With *frater*, *fontainei*, *sibella* and *aurivillii*, they represent a coherent group with similar larvae. All other *Epamera* are Tapinanth feeders.
- there are four species in the *aemulus* group. *Epamera apatosa*, *bamptoni* and *penningtoni* feed on *Helixanthera* flowers, with *aemulus* as an outgroup on *Oncocalyx*.
- the *pollux* group comprises in addition *helenae*, *nolaensis*, *silanus* and *pseudopollux*. All are on *Agelanthus*, although *helenae* also uses *Englerina*. Their larvae are very similar, and prefer old foliage in deep shade.
- *jacksoni*, *mimosae*, *obscura* and *tajoraca* are *Plicosepalus* feeders, are related, and have similar larvae.
- *aphnaeoides*, *nasisii* and *diametra* feed on Tapinanthus whose flowers open explosively. They have similar larvae.

- *farquharsoni* has similar early stages to those of *australis*, the larvae preferring mature foliage in deep shade.
- *arborifera* is broadly similar to *congoni* and is probably related.
- The remaining species, *alienus*, *bakeri*, *neavei*, *stenogrammica* and *sidus* have no obvious affiliations within the subgenus in the study area, with *sidus* having by far the widest range of known foodplants.

Aphniolaus pallene is only known with certainty from *Ximenia*. The foodplant preferences of the remaining genera are self explanatory, although mention should be made of *Etesiolaus*, which is the only member of the Iolaini recorded with certainty from a host outside the Santalales.

Conclusions

Taxonomic groups within the Iolaini show clear preferences for foodplants in one or other of the two major divisions of the Loranthaceae. Of the eight species of purely Loranth feeders which are known to transgress, three are flower feeders, one is driven by lack of an alternative in part of its range, and one is very rarely found to transgress. Only *Argiolaus silarus*, *Epamera australis* and *E. dubiosa* freely choose both Taxilloids and Tapinanthoids.

Table 4. Based on foodplant preferences, the Iolaini divide into three groups

<u>Polyphagous or non-Loranth.</u>	<u>Taxilloid</u>	<u>Tapinanthoid</u>
<i>Hemiolaus</i>	<i>Argiolaus</i>	<i>Iolaus</i>
<i>Etesiolaus</i>	<i>Tanuetheira</i>	<i>Epamera</i>
<i>Aphniolaus</i>		<i>Iolaphilus</i>
<i>Stugeta</i>		<i>Pseudiolaus</i>

Table 5. A revised classification of the Iolaini on this basis would consist of six genera

<i>Iolaus</i> Hübner (1819)	
Subgenera	<i>Iolaus</i>
	<i>Epamera</i> Druce (1891)
	<i>Iolaphilus</i> Stempffer and Bennett (1958)
	<i>Pseudiolaus</i> Riley (1928)
<i>Argiolaus</i> Druce (1891)	
Subgenera	<i>Argiolaus</i>
	<i>Tanuetheira</i> Druce (1891)
<i>Hemiolaus</i> Aurivillius (1923)	
<i>Etesiolaus</i> Stempffer and Bennett (1959)	
<i>Aphniolaus</i> Druce (1902)	
<i>Stugeta</i> Druce (1891)	

This classification, based on life histories, broadly supports the existing taxonomic groupings arrived at using other criteria.

Apart from a few species on *Polygonum* (Polygonaceae), *Mylothris* feed on the same groups of plants as the *Iolaini*, and are found to do so in other parts of the world such as South East Asia and the Americas as well as in the rest of Africa. There is therefore scope for further studies on the lines of the work outlined above.

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Stop Press: (Pers. comm. C. Congdon, March 2000)

- Material designated as *Globimetula braunii* is more likely to be *Globimetula anguliflora* if it originates in riverine forest in NW Zambia (pers. comm. Polhill).
- *Epamera nolaensis amanica* has been found on *Agelanthus tanganyikae* in the Nguru mountains.
- *Hemiolaus* has been taken out of the *Iolaini*.
- *Stugeta umbrosa* has been omitted in the presentation above. It inhabits arid coastal areas of Kenya and Somalia. The foodplant is unknown. The specimens illustrated in D'Abbrera 1980 (as *Epamera umbrosa*) are not coastal *umbrosa*. If the male illustrated is indeed the TYPE then coastal "*umbrosa*" lacks a name.

Appendix**Genera and species mentioned in the text (subspecies omitted)**Lepidoptera

- Aphniolaus pallene* Wallengren 1857
Argiolaus aequatorialis Stempffer & Bennett 1958
Argiolaus cottrelli Stempffer & Bennett 1958
Argiolaus crawshayi Butler 1900
Argiolaus diana Heath 1983
Argiolaus iturensis Joicey & Talbot 1921
Argiolaus lalos Druce 1896
Argiolaus maritimus Stempffer & Bennett 1958
Argiolaus ndolae Stempffer & Bennett 1958
Argiolaus pamae Heath 1983
Argiolaus panepinata Druce 1890
Argiolaus parasilanus Rebel 1914
Argiolaus poecilaon Riley 1928
Argiolaus silanus Druce 1885
Argiolaus silas Westwood 1851
Argiolaus stewarti Heath 1985
Epamera aemulus Trimen 1895
Epamera alienus Trimen 1893
Epamera apatosa Talbot 1935
Epamera aphnaeoides Trimen 1873
Epamera arborifera Butler 1900
Epamera aurivillii Rober 1900
Epamera australis Stevenson 1937
Epamera bakeri Riley 1928
Epamera bamptoni Congdon & Collins 1998
Epamera bansana Bethune-Baker 1926
Epamera bellina Plötz 1880
Epamera congdoni Kielland 1988
Epamera diametra Karsch 1895
Epamera dubiosa Stempffer & Bennett 1959
Epamera farquharsoni Bethune-Baker 1923
Epamera fontainei Stempffer 1956
Epamera frater Joicey & Talbot 1921
Epamera helenae Henning & Henning 1989
Epamera hemicyanus Sharpe 1904
Epamera iasis Hewitson 1865
Epamera jacksoni Stempffer 1950
Epamera mermis Druce 1896
Epamera mimosae Trimen 1874
Epamera nasisii Riley 1928
Epamera neavei Druce 1910
Epamera nolaensis Stempffer 1951
Epamera obscura Aurivillius 1923
Epamera penningtoni Stempffer & Bennett 1959
Epamera pollux Aurivillius 1895
Epamera pseudopollux Stempffer 1962
Epamera sibella Druce 1910
Epamera sidus Trimen 1864
Epamera silanus Grose-Smith 1889
Epamera stenogrammica Riley 1928
Epamera tajoraca Walker 1870
Epamera umbrosa Butler 1885
Epamera violacea Riley 1928
Etesiolaus catori Bethune-Baker 1904
Etesiolaus pinheyi Kielland 1986
Hemiolaus coeculus Hopffer 1855
Iolaphilus gabunica Riley 1923
Iolaphilus iulus Hewitson 1869
Iolaphilus jamesoni Druce 1891
Iolaphilus menas Druce 1890
Iolaphilus trimeni Wallengren 1875
Iolus bolissus Hewitson 1873
Pseudiolaus lulua Riley 1944
Pseudiolaus poultoni Riley 1928
Stugeta bowkeri Trimen 1864
Stugeta carpenteri Stempffer 1946
Stugeta marmorea Butler 1866
Stugeta mimetica Aurivillius 1916
Stugeta subinfusata Grünberg 1910
Tanuetheira timon Fabricius 1787
- Plants
Actinanthella wyliei (Sprague) Wiens 1978
Agelanthus atrocoronatus Polh. & Wiens 1998
Agelanthus bipartitus Balle ex Polh. & Wiens 1997
Agelanthus fuellebornii (Engl.) Polh. & Wiens 1992
Agelanthus igneus (Danser) Polh. & Wiens 1992
Agelanthus krausei (Engl.) Polh. & Wiens 1992
Agelanthus kraussianus (Meisn.) Polh. & Wiens 1998
Agelanthus molleri (Engl.) Polh. & Wiens 1992

- Agelanthus natalitius* (Meisn.) Polh. & Wiens 1992
- Agelanthus nyasicus* (Baker & Sprague) Polh. & Wiens 1992
- Agelanthus pungu* (De Wild) Polh. & Wiens 1992
- Agelanthus sambesiacus* (Engl. & Schinz) Polh. & Wiens 1992
- Agelanthus sansibarensis* (Engl.) Polh. & Wiens 1992
- Agelanthus subulatus* (Engl.) Polh. & Wiens 1992
- Agelanthus uluensis* (Engl.) Polh. & Wiens 1992
- Agelanthus zizyphifolius* (Engl.) Polh. & Wiens 1992
- Emelianthe panganensis* (Engl.) Danser 1933
- Englerina gabonensis* (Engl.) Balle 1956
- Englerina kagehensis* (Engl.) Polh. & Wiens 1992
- Englerina inaequilatera* (Engl.) Gilli 1971
- Englerina macilentata* Polh. & Wiens 1998
- Englerina schubotziana* (Engl. & K. Krause) Polh. & Wiens 1992
- Englerina triplinervia* (Baker & Sprague) Polh. & Wiens 1992
- Englerina woodfordioides* (Schweinf.) M. G. Gilbert 1985
- Erianthemum dregei* (Eckl. & Zeyh.) Tieghem 1895
- Erianthemum schelei* (Engl.) Tieghem 1895
- Erianthemum taborensis* (Engl.) Tieghem 1895
- Erianthemum virescens* (N.E. Br.) Wiens & Polh. 1992
- Globimetula anguliflora* (Engl.) Danser 1933
- Globimetula braunii* (Engl.) Danser 1933
- Globimetula mweroensis* (Baker) Danser 1933
- Globimetula pachyclada* (Sprague) Danser 1933
- Globimetula rubripes* (Engl. & K. Krause) Danser 1933
- Helixanthera garciana* (Engl.) Danser 1933
- Helixanthera kirkii* (Oliv.) Danser 1933
- Helixanthera tetrapartita* (EA. Bruce) Wiens & Polh. 1992
- Helixanthera verruculosa* Wiens & Polh. 1998
- Helixanthera woodii* (Schltr. & K. Krause) Danser 1933
- Manilkara* spp.
- Moquiella rubra* (A. Sprengel) Balle 1954
- Oedina congdoniana* Polh. & Wiens 1997
- Oedina pendens* (Engl. & K. Krause) Polh. & Wiens 1992
- Olax dissitiflora* Oliv.
- Olax obtusifolia* De Wild
- Oliverella hildebrandtii* (Engl.) Tieghem 1895
- Oliverella rubroviridis* Tieghem 1895
- Oncella ambigua* (Engl.) Tieghem 1895
- Oncocalyx fischeri* (Engl.) M.G. Gilbert 1985
- Oncocalyx quinquenervius* (Hochst.) Wiens & Polh. 1998
- Oncocalyx ugogensis* (Engl.) Wiens & Polh. 1985
- Phragmanthera briei* (De Wild) Polh. & Wiens 1992
- Phragmanthera capitata* (Sprengel) Balle 1962
- Phragmanthera dschallensis* (Engl.) M.G. Gilbert 1985
- Phragmanthera eminii* (Engl.) Polh. & Wiens 1992
- Phragmanthera polycrypta* (F. Didr.) Balle 1956
- Phragmanthera proteicola* (Engl.) Polh. & Wiens 1992
- Phragmanthera usuiensis* (Oliv.) M.G. Gilbert 1985
- Plicosepalus curviflorus* (Bentl. ex Oliv.) Tieghem 1894
- Plicosepalus kalachariensis* (Schinz) Danser 1933
- Plicosepalus meridianus* (Danser) Wiens & Polh. 1985
- Plicosepalus sagittifolius* (Engl.) Danser 1933
- Synsepalum* spp.
- Tapinanthus dependens* (Engl.) Danser 1933
- Tapinanthus erianthus* (Sprague) Danser 1933
- Tapinanthus oleifolius* (Wendi.) Danser 1933
- Tapinanthus rubromarginatus* (Engl.) Danser 1933
- Vanwykia rubella* Polh. & Wiens 1998
- Viscum rotundifolium* L.f. 1781
- Ximenia americana* L.
- Ximenia caffra* Sand.

Photographer's Corner No. 10

S.E. Woodhall

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For the last sixteen years I have been using my trusty Nikon FA for butterfly and landscape photography. Anyone who has bought *Living Butterflies of Southern Africa* has seen the results. Like any piece of kit you use for a long time, the FA was part of me. So imagine how I felt when some low life liberated it from the back of my car on a recent business trip. Even though I had kept up the exorbitant replacement insurance payments, it was still like having a limb amputated. As it was I had a big fight with my insurers over the excess and had no camera at the Conference in November 1999.

Eventually, I negotiated a settlement. I had money to spend on a new camera system (yes, the ***** got the lot, flash, lenses, everything) and had to decide what to buy. Nikon again, but which one? The FA was almost top of range when I got her but the official replacement was the F60. Plastic ... yech. And it only takes electrically coupled lenses, so the old Nikon promise that you can retrofit any of its old lenses to any new camera has been broken. But it is not like some of these new SLR's where you cannot set exposures manually at all. It has aperture, shutter and programme modes as well as special modes (even close up, but I prefer to make my own decisions). It has 3-stop deliberate over- or under- exposure, essential to what I do. The F90 is metal, and Bill Steele has one, so I borrowed an F60 from the dealer and went to compare the two. I eventually decided that the metal body and ability to use old mechanical Nikkor lenses did not justify an extra R3000. It was a shock to find out what I would have had to spend to use a 55mm Micro-Nikkor if this hadn't been stolen as well. I would have had to buy an F90 or trade the old lens in. I also didn't like not having depth of field preview, and when using flash I can't adjust the shutter speed below 1/125s without having to settle for f2.8 and no arguing! These are minor quibbles that have not harmed my photography.

The F60 comes with a very nice standard lens but the official replacement for my trusty 35-105 Zoom-Nikkor was the awesome AF Nikon 28-105mm zoom. Bill's 24-120 zoom has a wider ratio but the 28-105 is a genuine macro lens that close focuses to 100 mm and gets ½ life size on film. Great for bigger butterflies.

Finally, my Sunpak Auto DX12 ring flash was replaced by the new one, which is more powerful and works well with the F60's computer - despite Nikon's dire warnings about using aftermarket flashguns. No way was I paying R7000 for the SB21B! The Sunpak was R2500, and Peter Sharland told me recently that a Starblitz TIL ringflash costs R1000 less, but I know how bulletproof the Sunpak is. Better the devil you know ...

My tests round at Bill's showed me that despite weighing less than my wife's compact camera, the F60 is a serious tool. So how has life been with an autofocus SLR? Well I blush to say it, but I wish I had traded in years before. A casual photographer somewhere is now probably using my old FA, and the thought still sickens me, but I needed kicking into the 21st century.

One difference with the new system is that I listened to Phil de Vries at the conference when he told me not to waste time with a 55mm lens in future. I had a good look at his 105mm AF Micro Nikkor and decided I wanted one ... R7200 (choke). I had just persuaded the Chancellor of the Woodhall Exchequer that the investment was justified (and kissed at least one year 2000 safari goodbye) when the agents told me there were none in SA and they were on special import only. My gnashing of teeth turned to scorn when Danie from FotoCats suggested I try the aftennarket Sigma version. I only use *NIKON* equipment. But then I read the road test, and saw that the Sigma's optical performance is actually rated *better* than the Nikkor. I borrowed, I tried, and I bought.

I've now had the set-up for a few months and am getting used to it. All the equipment I need to take great butterfly pix fits into a small rucksack and weighs so little I can take it anywhere - even up the Waaihoek Trail. The autofocus is so quick that nothing ever gets away. In fact I now use my left hand to do things like holding windblown perches still - I can hold the camera, adjust focus, change aperture, etc. all with my right hand. The result is great shots taken in the wild. The autofocus has the fascinating ability to tell the camera not to expose the shot until it is happy - you just frame the subject, hold the shutter button down and when it comes into focus, bam! Sometimes I prefer to use manual focus and hit the button when I'm happy with the shot, but I find myself using auto more and more. Autofocus these days is ultra-quick. My fears of subjects flying off whilst the camera tries to hold focus are gone. Sometimes it hunts back and forth until it gets it right, but the process is so quick that it doesn't matter.

The Sigma 105mm macro is f2.8 maximum aperture. The image in the viewfinder is bright and I can see immediately when it snaps into focus. It allows me to hold focus at a far greater distance, and photograph butterflies that I would have frightened away with my old 55mm Micro-Nikkor. It is very light as well. I have no doubt that you could bowl the Nikon 105mm to Lance Klusener and have him spank it to long off for six with no damage. I don't think the Sigma would take this kind of treatment at all. But it is less than half the price and works wonderfully. Butterflies down to the size of small Lycaenids are a joy to photograph in the field because I can half-fill the frame with one at 150mm from the front element. I have yet to use it with extension tubes as I am still waiting for them to be delivered!

As for the 28-105mm Zoom, I should really have bought a 28mm wide-angle lens years ago. Landscapes are so much better taken at this focal length. A polarizing filter for its 63mm front element cost an arm and a leg, but wait until you see the pix I took at Waaihoek with it. The nice thing about this lens is that I can leave it on the camera and take landscape shots, photograph plants, and use the flash to photograph butterflies the size of *Vanessa cardui* upwards.

Finally, I really did not want to find out if the F60 was as bulletproof as the FA was. But I did. I took it to a Christmas party to take candid shots, and a dog grabbed the strap and pulled it off the table onto a stone floor with a *crash!* The zoom lens was attached and I picked it up expecting to see a smashed front element at the very least. But it was fine. I have put several rolls of film through the camera with no problems since this happened. Glass reinforced nylon is evidently as tough as titanium!

THE INTERNET- ELECTRONIC MEDIUM

A call from Hong Kong Methods used to create a Society Website

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A New Era

The advent of the Internet, facilitates making friends in the different parts of the world easy; almost seeming like neighbours from next door.

Messages and photographs can be sent by a click and at low cost. ICQ and net meetings can be read and viewed simultaneously. At the same time, the Internet provides a wealth of information by means of websites whether for personal or business alike.

A website facilitates the provision of information as well as serving as a place for communication. It is a powerful tool for advertisement and which can even be cost free. Its use can promote the image of the Society and acts as a symbol of prestige. However, it may depend very much on the efficacy of the initial design of the website and the subsequent maintenance of the site. For example the website can provide the information about the Society, a database on the Lepidoptera in South Africa, a forum for discussion and means of communication between members of the Society as well as the outside world. It surely falls in line with the objectives of the Society.

The Internet is the trend of today's world and the future to come. It has already paved the way of better communication for fellow members between South Africa and Hong Kong. Some basic principles, questions and answers, and advice are set out below.

The Set Up

When it comes to computers, I feel that I am an idiot. Sometimes, even the simple commands in the simplest software have puzzled me a while. The idea of setting up a website or even just the maintenance of one had never come into my mind. Having been taught by a fellow computer expert that the set up and any subsequent amendment to web pages had to be written in HTML—Hyper Text Markup Language – I was totally put off and discouraged from learning more about websites and webpages thereafter.

However, after a while, I had a chance to talk to a friend from Mainland China, who had set up his own website and which covered 650 species of butterflies of the Guangdong Province. I was very surprised that my friend was so sophisticated that he knew of HTML.

To my surprise, he was using some software in the market, with which we do not even have to know the HTML. They are user-friendly and are as simple as the use of Microsoft Word and Excel software. Of course, we do have to have the general knowledge for the normal usage of the computer and scanning of photographs into the computer. This software can translate word text into HTML automatically and by using the copy and paste buttons, a page of the website can easily be created. The software comes with some standard designs of website pages to be used instantly. We have to insert the details and

the whole website with individual pages can be uploaded onto the server and to be viewed by worldwide viewers instantly. One of the website design software packages is Microsoft FrontPage, which is easy to use. It is totally user-friendly and is compatible with other Microsoft software.

Free websites and air space

There are many worldwide servers, which provide free air space for websites as well as personal e-mail addresses. **Geocities.com** and **member.xoom.com** are popular and are absolutely free. If you wish to register your own domain name or URL, for instance **sals.org**, the cost for the first two years will be around US\$100. However, the price may vary from time to time and we need to check beforehand.

Once a website has been registered the webpages can then be uploaded onto the servers and can be viewed immediately. However, in order to upload webpages to the website, a software procedural package called Internet File Transfer Protocol is needed.

FTP – File Transfer Protocol

The FTP software communicates with servers across the Internet either to upload any file or to download the requested information file. One useful FTP software package, called CuteFTP, can be downloaded from the Internet. Once the CuteFTP software is in place and connected to the server, the Web Pages may then be uploaded onto the designated server.

Both Netscape and Microsoft Internet Explorer are commonly used as browsers for the Internet. As they are developed differently each with their own characteristics. Web pages on the Internet may look differently depending on the software used. Therefore, don't be alarmed if your webpage appears and differs from your original work done using e.g. Microsoft FrontPage.

Above all, it is not difficult to set up and understand-practice makes perfect.

NEWS FROM THE EAST

James Young, Life Member of the Lepidopterists' Society of Africa and the Hong Kong Lepidopterists' Group (HKLG).

... tells us of his visit to South Africa in January 2000, and gives some news from Asia and mysterious China with its magnificent butterflies.

The ever-increasing attention drawn to the open door policy of China to the rest of the World, makes me feel that it is a good time to foster closer ties between the Lepidopterists' Society of Africa and the Hong Kong Lepidopterists' Group.

I guess many members of both Societies are tempted to visit China or vice versa for a holiday. There are frequent direct flights operating between Hong Kong and Johannesburg by the national carriers SAA and Cathay Pacific. Mobility between South

Africa and Hong Kong is easy. Both South Africa and Hong Kong seem to be stepping stones to the hinterland, whether for the rest of Africa or as a gateway to China. I envisage that there will be a better exchange between the two Societies in the near future.

As a member of both Societies, I think I should take the initiative to focus on the perspectives of our South African counterpart and encourage looking to the east - China! Comprehensive information on Chinese Lepidoptera is still a myth. Very little collecting has been done in China and books on Lepidoptera are incomplete and outdated. For butterflies alone, the definitive butterfly book, *Monographia Rhopalocerorum Sinensium*, records around 1,300 species by Professor Chou Io. This is far too a low figure especially where we are looking at the few representatives of Lycaenids and Hesperids in the book. Even for Hong Kong with a landmass of only 1 100km², we have 230 recorded species of butterflies. I foresee that many new species will be discovered in the near future but many of their life histories are still unknown. This situation has prompted the surge in the collection of Chinese butterflies and thereby butterfly trade. Many dealers are desperate to get their hands on Chinese specimens particularly those showy Papilios including *Teinopalpus imperialis* and *T. aureus*, *Agehana elwesi* and other *Bhutanitis* species.

Many foreigners have been collecting in China and some have even gone as far as disguising themselves with local traditional tribal clothing while collecting in the remote nature reserves. Occasionally, they are caught collecting in those national parks and reserves. From what I gathered from a Hong Kong dealer in some years back, I estimated that he was making millions of dollars from this undesirable trade, as all butterflies for sale are not farmed. This clearly indicates the popularity of the Chinese butterflies in the Oriental Region. I think African butterflies are subjected to the same fate and are traded in large numbers each year.

Both Societies share a common and ongoing task of educating people to protect and preserve our butterflies and moths and have devised codes for collecting for members to follow. I think the two Societies have done their part of educating their members. In Hong Kong we strive to promote the art of butterfly-watching and photographing them in their natural habitats.

We hope that by educating people especially young children to appreciate the beauty of butterflies, a concern for their protection and survival, we can also come to care for the place we all share and live in. We believe that we can treasure our butterflies by admiring their beauty in their natural environment rather than in glass display cabinets. By doing so, we can then conserve them for our future generations.

The HKLS organises field trips for butterfly watching within Hong Kong and surrounding areas and particularly in nature reserves in the Guangdong Province of Mainland China. If anyone wishes to come along for watching beautiful butterflies and of course moths, please feel free to contact the Hong Kong Lepidopterists' Society Limited at hkls@xoommail.com or visit the HKLS website at hkls.org. If you have any queries, please feel free to contact myself direct at my e-mail address:

jamyong@netvigator.com. I will always try to assist.

Do contact him; you can be assured of an enthusiastic and worthwhile response. Visit his website, and view activities. The power of electronic communication is evident. He shares some highlights of his South African visit to Gloster Game Farm – a day trip with several members of LepSoc. **Ed.**

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Figures must be boldly drawn in black waterproof ink, and arranged in clear and logical plates on stiff white, preferably A4-sized board. All the figures must be numbered in a common sequence in Arabic numerals, irrespective of whether they are line drawings, photographs, diagrams, graphs or maps. Magnifications should be indicated by scale bars on the figures.

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