LEPIDOPTERISTS' SOCIETY
OF SOUTHERN AFRICA

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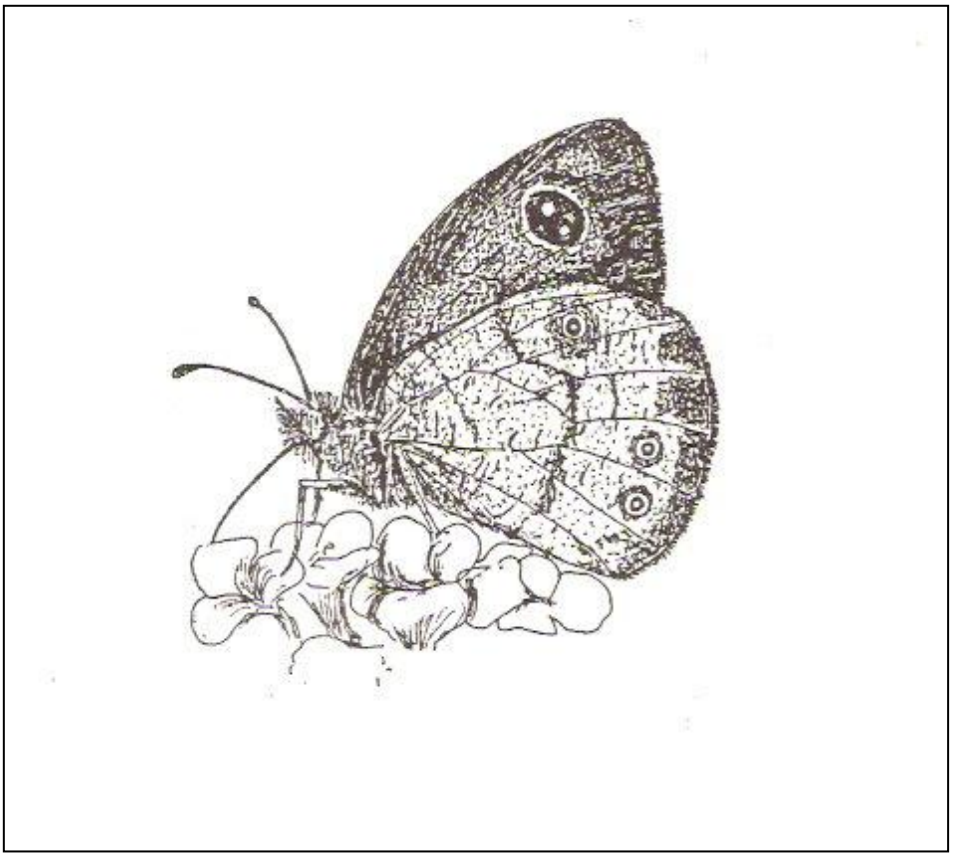
Editor: N.K. Owen-Johnston



Editorial Comment

"Why should I remain a member of the Lepidopterists' Society?" "What has the Society done for me?" These questions and other similar ones, express a sentiment that is being expressed more and more frequently by members of our Society. Before I try to answer them, let's look at the history of our Society and the progress that we have made so far.

The dictionary defines a society as a body of persons associated for a common purpose. This is exactly what we are. We are a body of persons who share a common interest in butterflies and moths.

We started our existence as the Lepidopterists' Study Group. A group of people who got together under the guiding hand of Dr Mark Williams to pool our efforts and study butterflies. From this humble beginning we developed into the Lepidopterists' Society of Southern Africa.

Societies such as ours do not spring into existence complete with all the trimmings at the wave of a magic wand. They evolve over a long period of time under the guidance of the committee and those members who are prepared to put in the time and effort without which the Society would wither and die.

I feel a deep sense of pride when I look back on our achievements so far. We now have a constitution and a committee that is prepared to give time and effort to the Society. Apart from our news letter, *Metamorphosis*, we have seen the publication of our first scientific work, *Southern African Lepidoptera – A Series of Cross-Referenced Indices*.

There are plans to publish more papers of a serious scientific nature in the future.

We have established contact with several nature conservation bodies and are busy studying the butterflies on a number of nature reserves. Amongst these are: Suikerbosrand Nature Nature Reserve and the Lapalala Wilderness. Beyond South Africa's borders, excellent work has been done in the various nature reserves of South West Africa by Mr. H.C. Ficq. Further to this we have received the green light for studying the butterflies in the Golden Gate Nature Reserve and are in contact with the Natal Parks Board with a view to conducting surveys and doing work in various Natal nature reserves and game parks. This aspect of the work being done by the Society and its members is extremely important to us as it established our identity as a conservation orientated society. Hopefully this will assist members in acquiring the necessary permits to work in our forests and nature reserves in the future.

But this is not the only work being done on butterflies in South Africa at present. Let's pause a while and look at some of our members' efforts. Through the efforts of Bill, Stephen and Graham Henning, the first Butterfly Nature Reserve was established at Ruimsig in Roodepoort. This reserve was created to preserve and protect the last known habitat of *Aloeides dentatis dentatis* on the Witwatersrand.

This is an outstanding achievement and is certainly the greatest achievement in butterfly conservation in South Africa. Further to this Stephen Henning is busy publishing a monumental work on the *Charaxes* of Africa. *The Red Data Book of South African Butterflies* has been written by Stephen and Graham and it is being refereed prior to publication. Graham is busy working on a revision of the *Capys* species in Africa and the *Aloeides* group of butterflies. In addition to this there are a number of papers that they are currently working on. In the Eastern Cape, Ernest and Victor Pringle are working on a revision of *Pennington's Butterflies of Southern Africa*. This is a monumental task which deserves the full credit and support of all our members. May we take the opportunity of wishing them every success in their efforts. Ivor Migdoll's *Field Guide to the Butterflies of Southern Africa* was published late last year. This is the finest book on Southern African butterflies to appear since the publication of *Pennington's Butterflies* and it fills a very important gap in our butterfly literature. I

know of several people who have developed a keen interest in our local butterflies since it appeared on our bookshelves and I have no doubt that it will inspire many more people to take an interest in butterflies in the future. I am hoping to get a review of this work for inclusion in a future edition of *Metamorphosis*.

Clive Quickelberge's work on the butterflies of Natal is another example of the fine work being done by our members.

Steve Woodhall and John Joannou are busy compiling photographic records of the early stages of the butterflies of South Africa with a view to publishing a book in the future. We wish them every success in this venture. In Zimbabwe, Rob Pare, Ian Mullins and Ivan Bampton are doing sterling work on the butterflies of this region. Dr. Mark Williams is busy working on the *Lepidochrysops* group of butterflies. In Sasolburg, Dr D.M. Kroon is doing excellent work on our moths. I have seen some of his photographic work on the micro moths and the depth of beauty and variety of interesting characteristics found in this fascinating group is staggering. In Pretoria, Rolf Oberprieler and Mark Williams are working on the emperor moths. Examples of their work have been exhibited at our previous annual general meetings. In the Cape , Alan Heath is working on the life histories of the *Poecilmitis* group (see *Metamorphosis* 1 (*20*)).

I have no doubt that there are many other members working on their own projects at the present time. Please let us know what you are busy working on. The Society is there for you to use as a forum for the exchange of ideas and information.

As you will see from the above, there is probably more work being done on butterflies in South Africa right now than has ever been done in the past. I would like to think that the Society is encouraging and stimulating your efforts.

To return to the questions posed at the start of this editorial, "Why should I remain a member of the Lepidopterists' Society?" and "What has the Society done for me?" I feel that the answers are obvious. It is only by communicating with each other and using the Society as a forum for the free exchange of ideas and information that we can keep our interest alive. This is what the Society does for you. It stimulates your interest and keeps alive your enthusiasm!

Regional round-up

Cape Province – We are indebted to Alan Heath of Cape Town for the following report on the butterfly scene in the Western Cape. The emergence of butterflies this season was about 4 weeks later than in the past few seasons (this agrees with the records made by Ivan Bampton and myself in early October 1987 – Editor). In general numbers were less than in previous years but some very interesting observations were recorded. A colony of *Aloeides* was found in the Cape Agulhas area where both *A. egerides* and *A. quickelbergi* were found flying together. Amongst the very scarce *Argyrocupha malagrida malagrida* and *A. malagrida maryii*. Alan has been doing research into the early stages of the *Poecilmitis* group of species and the ants associated with them. Ants have been collected from as far afield as Port Nolloth in the north and Kammanassie Mountains in the east. This is a very painful exercise as the most reliable method of sorting out the ant species is by examining the winged males. These are found in the ant nests and the ants take violent exception to having their nests searched. Every ant is capable of inflicting a wound reminiscent of being stuck with a red hot needle. An unsuspecting man may try and collect some specimens once, but it takes a really dedicated man of science and courage to make a regular habit of it.

The ants are with Dr Prins at the S.A. Musuem in Cape Town and it is hoped that their identification and classification will assist Alan in his research into the life cycle of the butterflies. So far Alan has recorded early stages of the following *Poecilmitis* species*: P. kaplani, P. endymion, P. brooksi brooksi* and *P. thysbe*.

Orange Free State – Martin Lunderstedt reports the discovery of a strong colony of *A. pierus* from the Welkom district. A visit to the highest hill in the Vrede area towards the end of last year by Mr. G.A. Henning and S. Woodhall revealed a strong colony of *A. susanae* on one of the highest points. An unidentified small black *Aloeides* was found flying with this species. Other species recorded were: *Poecilmitis chrysaor, Aloeides henningi* and *Lepidochrysops lacrimosa*. The locality was visited a few weeks later but it was found that the small black *Aloeides* was no longer on the wing, although the colony of *A. susanae* was till flying well.

A visit was paid to the Golden Gate Nature Reserve and arrangements were made to do work in the Reserve next season.

Natal – The butterflies in this area appeared to be between broods when R. Paré and Ivan Bampton were searching the area during March this year. Ivan reports that they were scarce and nothing spectacular was observed. C. Ficq paid a visit to Durban during April and had the tremendous good fortune to record a *Deudorix dinomenes* in the Burman Bush area. The colony of *Deudorix diocles* on the *Bauhinia galpinii* growing below the fenced area on Burman Drive is doing well and Chris recorded eggs and larvae in abundance. Clive Quickelberge reports that his trip through Zululand was a great success. The highlight of this trip was the discovery of a colony of *Euriphene achlys* near Kosi Bay. Clive has promised to give us a report on this trip and we look forward to it with keen anticipation.

Transvaal - Graham Henning
January – A trip to Haenertsberg was undertaken in an attempt to record the life history of *A. margaritacea*; unfortunately no females were seen. There were a few males about which were photographed. A number of *Acraea* species were seen including *A. anacreon* females. The mating behaviour of *A. zetes acara* was observed; the male grabbed the female in mid-air and the two crashed straight into the ground from about 2 metres high. Copulation occurred as the male held the female tightly into the base of a clump of grass. Once the male was firmly attached he went into a semi-comatose state and the female was able to fly away with the male dangling behind.

The Waterberg was also visited in January in an attempt to find another locality for *E. acraeina*, but again our efforts proved fruitless. A male *A. lygus* was the only record of interest.

February – I have searched at Woodbush for *Psedonympha swanepoeli* on a number of occasions in the past without success. Many possible localities have been overgrown or planted with pine trees. However, this year after wading through a marsh for over 3 hours I emerged with a pair. Subsequent visits to the locality yielded nothing.

The Ruimsig Entomological Reserve at Roodepoort was visited several times during February and more than thirty specimens of *A. dentatis dentatis* were seen on one occasion; this is the greatest number seen for many years. *K. nerva* was also out in numbers.

A dentatis maseruna were also plentiful at Boons in the Western Transvaal and a *D. chrysippus* form *transiens* was collected at this locality.

March – Further research by the Lapalala team has yielded the long-awaited record of *Acraea zetes barberi* and *A. zetes acara* flying together in the same field. *A. lygus* was also recorded there.

Early March also saw Ernest and Anne Pringle visiting the Transvaal from their natural habitat in the Eastern Cape! True to form Ernest came up with *Pentila tropicalis* in Venda; apparently a new record for the Transvaal. Their specimens represent the darker populations found in Zimbabwe and Mozambique. *D. diocles* was also recorded.

April – Komatipoort was visited for *Anthene liodes* but only one female was recorded along the Komati river.

A couple of trips to Venda yielded more of the dark *P. tropicalis* and *D. diocles* were found breeding in *Combretum* seeds. *P. picanini* was a welcome record as was a single specimen of *A. neander*. Other species of interest were *A. anacreon bomba, Bicyclus ena, Acraea nohara* near form *halali* and a large *Cnodontes* female. *P. lucretia expansa* were plentiful in every colour from white to brick red. A total of 117 species were recorded.

May – A brief visit to Woodbush yielded practically nothing but Debegeni Falls had many of the usual forest species – a total of 59 species being recorded.

On the way back from Manguzi Forest in Zululand (where *E. achlys* and a female *C. etesipe tavetensis* were recorded) we stopped at Pongola and found an *Acacia* with galls containing *Deudorix vansoni/penningtoni* larvae.

(Participants in the above – John Joannou, Chris Ficq, Graham Henning, Paul Kruger, Nolan Owen-Johnston and Steve Woodhall.)

NOTE – Recent genitalia investigations on the genus *Ypthima* showed *Y. granulosa* at Manguzi in Zululand and a single female from Swadini in the Blyderivierspoort Nature Reserve in the Eastern Transvaal.

Migrations – The recent good rains have resulted in odd migrations over the past few months. Paul Kruger at Pietersburg has been monitoring his area and he notes the following:

January – *B. aurota* was principal migrant with *C. florella* a secondary migrant. *P. nireus lyaeus* was seen to follow migrants along a short stretch of forest. The following were also seen to participate: *C. antevippe, B. ilithyia, J. hierta cebrene, C. subfasciatus, P. demodocus* and *C. eris.*

February – very little recorded.

March – *A. natalica* was seen sporadically flying in a north easterly direction with *B. aurota* and *C. florella*. *P. eriphia* has now joined the migration in some numbers.

April – *P. eriphia* was still migrating as was *B. aurota* and *C. florella.* *C. florella* was sometimes seen flying in a northerly direction while the others were flying in an easterly to north easterly direction. *V. cardui* were observed migrating about 15 m above the ground in an easterly direction at a rate of 1 or 2 every five minutes.

Zimbabwe – When Ivan Bampton and Ian Mullins visited the eastern border area at the end of February they met with mixed fortunes.

At Mt. Selinda they were plagued by bad weather and the only record of note was a single *Mimacraea neokoton*. However, on the Vumba Mts they found the larvae of *Charaxes nichetes leoninus* abundantly on *Uapaca kirkiana*. About a dozen larvae of *Abantis arctomarginata* were also found on this plant. Martin Lunderstedt has recently returned from an extensive trip to Zimbabwe and I have pleasure in presenting an edited account of his report for your perusal:

"During my recent visit to the Eastern Highlands of Zimbabwe, just after extremely good rains, I encountered and observed many different and interesting butterflies. On the way up through Masingo way, I went through a positive swarm of *Eurema brigitta* and all you could see at the Pungwe river were hundreds of little yellow jewels against the green bush.

In Mutare proper, I observed the following species: *Charaxes boueti macclounii, C. zoolina zoolina* – both forms and intermediates, *C. castor flavifasciatus, C. baumanni selousi, Berbearia mardania orientis, Baliochila barnesi* and *B. lipara, Deudorix caerulea obscurata* and *D. zeloides, Ornipholidotos peucetia peucitia, Mimacreaea marshalli marshalli, Sallya morantii.* One interesting observation was a female *Iolaus silarus* that was caught in a bait trap.

On the Vumba I observed *Gnophodes betsimena diversa, Aphysoneura pigmentaria latilimba*, a massive hatch of *Cymothoe alcimeda rhodesiae* and *C. vumbui, Acraea johnstoni confusa, Acraea pentapolis epidica, Neptis swynnertoni* and *Antanartia dimorphica* and *A. schaeneia dubia*. (The record of a *A. pentapolis epidica* is extremely uncommon … Congratulations on this record – Editor).

Chirinda forest was interesting as a large number of *Appias sabina udei* including the female form *phoebe* were seen. Other records of note were: *Anthene sheppardi, Apaturopsis cleocharis* (very scarce – Editor), *Acraea satis, A. igola* and *A. egina areca.*

At the Pungwe Bridge in the Honde Valley I observed the following: *Euriphene achlys, Neptis serena, Cyrestis camillus sublineatus* (very common*), Precis cuama* and a strong colony of *Pentila swynnertoni*.

Interesting observations in the Burma Valley included *Teriomima puellaris, Axiocerses punicea, Myrina dermaptera nyassae* and *Charaxes etesipe tavetensis.*

Some other interesting things were finding both *Charaxes xiphares vumbui* and *Euxanthe wakefieldi* in Meikle's Jungle at Mutare.

Up at Leopards Rock Hotel on the Vumba, a very interesting nymphalid flew into the undergrowth near the old fish pond. The upper side was a very striking red and the underside a uniform brown. As the creature disappeared fairly rapidly I came to the (maybe wrong) conclusion that it was a female *Euphaedra orientalis*. It had the same gliding pattern as *E. neophron* and was extremely shy. Could some other collector possibly shed more light on this conundrum?

On the return trip Martin recorded a large migration of butterflies that stretched from West Nicholson in Zimbabwe to the Soutpansberg in R.S.A. Of note were *Belenois aurota, Danaus chrysippus*, many other *Colotis* and *Acaea natalica.*

Junonia hierta cebrene Trimen breeding in the Cape Peninsula in 1986, with notes on territorial expansion of some Lepidoptera – part II

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(The editors of *Metamorphosis* wish to apologise to Mr. A.J.M. Claassens and the members of the Society for omitting to publish Part II of his article in *Metamorphosis* No. 19 as promised.)

Other migrations of butterflies which have resulted in non-endemic species establishing themselves in the Peninsula and the extreme south western Cape have already been recorded. The most spectacular migration of this kind concerns *Mylothris agathina* (van der Riet, 1984; Claassens, 1984; Geertsema, 1985; Claassens & Dickson, 1986). This butterfly, which is now accepted as a good species in itself, has established itself firmly in all coastal and near-coastal areas of the south western Cape, wherever its parasitic food-plant, *Colpoon compressum*, occurs. This plant, according to Visser, 1981, occurs along the West coast up to about Darling, but Keith Coates Palgrave, 1977, shows the distribution of *C. compressum* to approximately the Olifants River mouth. The recorded most northerly distribution of *M. agathina* is the Clanwilliam area.

During the late summer and autumn and continuing very strongly into the winter, of 1986, *M. agathina* was the most common butterfly on the wing in much of the Peninsula and some nearby areas. In some places, like Muizenberg, Hout Bay and Camp's Bay the butterfly was strikingly plentiful and its early stages could be spotted on the food-plants without difficulty. There was a marked increase in breeding activity in May when oviposition was most evident.

A third species, *Catopsilia florella*, established itself in the extreme south western Cape a considerable number of years ago (Claassens & Dickson, 1980; Claassens, 1984).

What is the real reason behind the migration which have resulted in the extension of the geographical distribution of these species? A number of factors causing migrations have been put forward recently by Henning, 1983 and Henning, 1984; Geertsema, 1985, and others, but ordinary migrations as we have known them to occur for many years, do not seem to have resulted in territorial expansion of the migrating species, e.g., *Nepheronia buquetii* and *Belenois aurota*. The three species, *florella, agathina* and *cebrene* appear to have extended their range of distribution over a number of years, and by degrees, eventually building up populations in new localities from where they migrated still further westwards.

The availability of suitable food-plants is a prerequisite for any butterfly to build up viable populations in new localities. The presence of such food-plants in the extreme south western Cape, although having made territorial expansion possible, cannot be the main reason or main stimulus for the westward movement of the three species concerned. The food-plants must have been in these areas for very many years, a good example being *Colpoon compressum*.

Apart from the territorial expansion as a result of migratory movements there is also a territorial expansion due to large scale introduction of food-plants carrying the early stages of certain insects. Thus *Zophopetes dysmephila dysemphila* was introduced into the extreme south western Cape together with the palms on which its early stages occurred. Another striking example was described by Geertsema, 1985, and concerns the bombycid moth *Ocinara ficicola* Westwood & Ormerod. This insect travelled to the extreme south western Cape on plants of *Ficus retus*a, which were obtained from the Transvaal. Both the skipper and the silk moth have expanded their original limited new territory and have become widespread in these areas, partly due to further batches of food-plants with early stages of the insects on them still being introduced. C.G.C. Dickson, personal communication, referred to yet another apparent example of territorial expansion, namely that of the very conspicuous moth *Aganais speciosa* Drury (Hypsidae), "I personally never saw it in Cape Town before 1948, when a larva was found on a cultivated fig tree, eating a leaf. It had been caught previously at Knysna. Since then larvae have been found, not infrequently, on ordinary fig trees (*Ficus carica* L. (Moraceae) and the imagines observed in the area above Cape Town adjoining the slopes of Lion's Head during the summer". I have caught two imagines in Sea Point and I have seen several specimens against the walls of Sea Point Boys High School during the last 15 years or so. It is realized, however, that something may have been published on the territorial expansion of this moth in the past but neither Mr. Dickson nor I are aware of this being done. There is a possibility that this moth was introduced here on plants of *Ficus* species.

Territorial expansion as a result of migratory movements seems to be on the increase. Progressively worsening drought conditions in the Eastern and Northern parts of the country, coupled with a never ending eradication of natural vegetation for the sake of grazing, agriculture and the provision of more and more residential areas are likely contributing factors to the seemingly increasing tendency of certain Lepidoptera to search for new breeding grounds. In the south western parts of the Cape climatic conditions have been more favourable for the migrants concerned and at least on their arrival here, they did not meet with any intraspecific competition for food or parasites.

Transport of larval-infested plants from one part of the country to another may go on for many years and locally bred populations may be joined and strengthened by further introductions of early stages. Territorial expansion due to migratory movements may be and no doubt is, also a continuing process. Early summer appearances of fresh specimens of *C. florella* in the Cape Peninsula are almost certainly the offspring of locally bred late autumn or early winter imagines. A proportion of the later summer specimens seen here may well have arrived from more easterly parts of the country and are in fact believed to have done so. The same overlapping may occur between locally bred and migrant populations of *M. agathina* and even of *J. h. cebrene*. In any case, in two of these butterflies the populations are at present continuous or almost continuous, from their original eastern limits of distribution right down to the extreme south western Cape. This may also be the case in *J. h. cebrene*, at least as far as the coastline is concerned, east of the Peninsula. Mr. Wayne Haselau of Cape Town noticed that in the summer of 1986 this butterfly was very well established in a westerly direction as

far as Still Bay. In this connection it is fair to point out that it is suggested that *J. h. cebrene* could also migrate to the Peninsula from the north or north-east – a matter which requires verification.

Acknowledgements
Sincere thanks are expressed to Mr C.G.C. Dickson for his stimulating interest and his generous supply of information and advice. Thanks are extended to all collectors who kindly supplied records of sightings.

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Why the collecting of Lepidoptera should not be banned

S.F. Henning

Although over collecting is often mentioned as one of the chief threats to insect populations (together with pesticides), there are no documented cases of extinctions or even local extirpations of insect populations due to indiscriminate collecting anywhere in the world (Pyle & Opler, 1975; Xerces Society, 1979). The major or only factor in the loss or decline of insect populations throughout the world is habitat destruction. Even four decades of wide use of organic pesticides has not resulted in the extinction of any insect, except for the possible loss of some ecto-parasites and symbionts of birds of prey which have undergone drastic population declines due to pesticide residues (Pyle et al., 1981).

Since all overseas studies (see Pyle et al., 1981) have established that the decline of insect populations throughout the world is due to habitat destruction, this must be of prime importance in all our considerations. In South Africa the butterflies most at risk are the myrmecophilous (ant associated) Lycaenidae. These species are often quite local and rare as they require the presence of both the host ant and host plant as well as optimal climatic conditions. Being thus confined to a limited area, often no larger than a tennis court, these species are particularly vulnerable to any disturbance of their preferred habitat. Thus the building of a house, the construction of a road or the ploughing of a field could lead to the extinction of a rare species confined to a single locality.

The only people at the moment who know where these isolated populations of rare species are located are the butterfly collectors. The collectors are therefore in a position to draw the attention of the authorities to these areas when they become threatened, so that steps can be taken to preserve them. This has already been done. For example, the lycaenid butterfly, *Aloeides dentatis* (Swierstra) was known from several localities in the Transvaal and the Orange Free State. One by one these colonies have been destroyed by township development and agriculture. One of the last thriving colonies is near Roodepoort in the Transvaal, and it is now also under threat of township development. A butterfly collector (author above) realizing the possible danger to the continued existence of the species if this colony was also lost, set out to see if he could get the area preserved. Working through the West Rand Branch of the Wildlife Society, the Roodepoort City Council was approached to get the area protected. It was also through the efforts of another collector, Mr. C.G.C. Dickson, in Cape Town that the ant associated lycaenid butterfly *Oxychaeta dicksoni* (Gabriel) has been protected. To date, under the watchful eyes of the butterfly collectors not a single butterfly species in South Africa has become extinct.

Another factor to consider is that a large number of Lepidoptera species still remain undescribed in Southern Africa. For example, butterflies have been collected in South Africa for well over 100 years yet we are still discovering about 10 new species and subspecies a year as more wilderness areas are penetrated. Also, our knowledge of the life histories of the described species is far from complete. Possibly not even half of the life histories of southern African Lepidoptera are described. This means one does not even know the requirements for survival of most Lepidoptera species in Southern Africa. Therefore, it appears that we will still need butterfly and moth collectors for a few years yet to locate the undescribed species and to work out the life histories of the known species. Without the collectors we could live with a clear conscience as species will be lost through habitat destruction without anyone being the wiser that they were under threat or even existed.

Our plea is then not to ban the collecting of butterflies but possibly a restriction on the collecting of certain rare or endangered species. This would not be too difficult to enforce as the endangered species are usually ones confined to a small limited area. Best of all is to get the habitats of the endangered species declared Nature Reserves to prevent the only likely cause of their extinction, habitat destruction.

One way of doing this is, by working through the Lepidopterists' Society of Southern Africa, to make up a list of endangered species. Pin-point their localities and then the conservation bodies can make sure that they are not likely to be built on or ploughed up in the near future. If they are endangered, to institute measures to get the areas declared Nature Reserves. Let us keep our excellent record of not having a single butterfly species in South Africa becoming extinct.

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Report on the Ruimsig Entomological Reserve - 1986

G.A. Henning

The Lepidopterists' Society are still monitoring the reserve on a regular basis (at least monthly since September). We are in regular contact with Mr Bosman and he is immediately informed of any problems we may have. For 1986 the following items are relevant.

1) *Aloeides dentatis*
A number of visits were made to the reserve during 1986. Special attention has been taken over the summer season during the flight period of *Aloeides dentatis*.

Aloeides dentatis was first discovered in 1986 during late September and has been recorded every month since. Not many specimens were seen on each visit, there usually being only 5 or 6 on the wing at any one time. Most of these were seen flying on the dirt track next to the power lines.

The reason for the small numbers is probably the lack of food plant due to the area not being burnt at the end of winter. The long grass restricting the major growth of the food plant *Hermannia depressa* to the open dirt track. *H. depressa* is a pioneer plant which needs open spaces and plenty of sun in which to grow. The edges of the reserve were burnt and *H. depressa* is growing in profusion in this area, unfortunately the ant is not present so these plants are not being utilized as a food source by *A. dentatis*.

The taxonomic status of the Ruimsig colony has also come under scrutiny during 1986 and is still currently being researched. However, the following results have been recorded.

a) *A. dentatis maseruna* from Heilbron was recorded breeding on *Hermannia cristata*, an erect species with narrow leaves about 15 cm high. *H. depressa* was found growing at the same locality but was not being used as a food plant by sub-species *maseruna*. *Hermanni*a species are of the Family Sterculiaceae.
b) *A. dentatis* sub species? from Heidelberg (Suikerbosrand) was recorded breeding on a small erect plant about 10 cm high. This plant is possibly a *Lotononis* sp. of the Family Leguminosae. The specimens recorded are much larger than *dentatis* from Ruimsig and their wings are very square by comparison. These specimens were found at an altitude of roughly 1900 metres. Both *maseruna* and *dentatis* (Ruimsig) have only been recorded at the high altitude. This population is obviously distinct from the Ruimsig one.
c) Research is being undertaken at the type locality of *A. dentatis*, which is at Waterval Onder. Several visits have been planned and we have already undertaken two in January, collecting a small number of *Aloeides* at 2000 metres which are also being investigated.

It would appear from the above that the *A. dentatis* colony at Ruimsig is unique in comparison to its neighbours. When the type locality has been rediscovered it is planned to publish a paper on the group. The Ruimsig population is also the smallest of the *dentatis* recorded and is the only population recorded feeding on *Hermannia depressa*. The habitat at Ruimsig is also unlike any of the others seen.

2) A meeting between the Lepidopterists' Society and the Potchefstroom University took place at the Reserve during December. We hope some fruitful management suggestions will result from the Potchefstroom University research.

3) During November 1986 the Lepidopterists' Society exhibited at the Earthlink Expo at Wemmer Pan for 10 days. The Ruimsig Reserve was prominently displayed on two large posters with photographs of the reserve and of *A. dentatis*. The reserve elicited a great deal of interest and the exhibition, which included all the major conservation bodies, was a great success. As far as I can ascertain around 100, 000 people visited the Expo and from our observations and comments from the organizers the Lepidopterists' Society stand was one of the busiest. We certainly had long queues at times and not many people went past without coming in. We intend participating in these kinds of ventures in the future and the Ruimsig Reserve will be a major feature.

4) In association with the Wildlife Society the Lepidopterists' Society has been trying to obtain funds for the notice boards at the reserve, however, we have so far been unable to elicit any favourable response. We will, however, continue to be actively involved.

5) In association with the CSIR the writer and Mr. S.F. Henning are compiling the official "Red Data Book" of Southern African butterflies. This publication will be the basis for all conservation measures on butterflies in the future. The conservation measures already implemented and those urgently required will be prominently featured. The first Entomological Reserve in Africa (Ruimsig) will have a special place as well as being featured under *Aloeides dentatis*.

6) The following list of species have been seen in the Reserve during 1986:

PAPILIONIDAE
Papilio demodocus Esper

PIERIDAE
Colias electo electo (Linnaeus)
Catopsilia florella (Fabricius)
Eurema brigitta (Cramer)
Colotis evenina (Wallengren)
Colotis subfasciatus (Swainson)
Belenois aurota (Fabricius)
Pontia helice (Linnaeus)

LYCAENIDAE
Spindasis mozambica Bertolini
Axicerses tjoane (Wallengren)
Leptomyrina henningi (Dickson)
Aloeides dentatis dentatis (Swierstra)
Aloeides taikosama (Wallengren)
Aloeides trimeni trimeni (Tite & Dickson)
Aloeides aranda (Wallengren)
Tarucus sybaris sybaris (Hopffer)
Lampides boeticus (Linnaeus)
Leptotes pirithous (Linnaeus)
Lepidochrysops ignota (Trimen)
Lepidochrysops patricia (Trimen)
Euchrysops dolorosa (Trimen)
Eicochrysops messapus mahallokoaena (Wallengren)
Azanus jesous jesous (Guerin-Meneville)
Zizeeria knysna (Trimen)
Zizula hylax (Fabricius)

NYMPHALIDAE
Byblia ilithyia (Drury)
Catacroptera cloanthe (Stroll)
Junonia hierta cebrene (Trimen)
Junonia orithya madagascariensis (Guenee)
Vanessa cardui (Linnaeus)

ACRAEINAE
Acraea horta (Linnaeus)
Acraea neobule neobule (Doubleday)

SATYRINAE
Pseudonymph narycia narycia (Wallengren)
Stygionympha wichgrafi wichgrafi (van Son)

DAINAINAE
Danaus chrysippus (Linnaeus)

HESPERIIDAE
Coeliades pisistratus (Fabricius)
Eretis umbra umbra (Trimen)
Spilia asterodia (Trimen)
Spialia diomus ferax (Wallengren)
Spialia spio (Linnaeus)
Spialia mafa mafa (Trimen)
Tsitana tsita (Trimen)
Kedestes nerva (Fabricius)
Kedestes barberae barberae (Trimen)
Platylesches ayresii ayresii (Trimen)
Gegenes niso niso (Linnaeus)

This list totals 46 species, which represents just under half the recorded species. However, of the species currently breeding in the reserve, it probably represents about eighty percent.

The Lepidopterists' Society will continue to monitor the reserve during 1987. We can only hope that funds can be obtained to erect the Notice Boards during this year.

Should there be any further requirements please contact the undersigned.

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On the status and nomenclature of infraspecific taxa in zoology

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I have often noticed that lepidopterists tend to treat taxonomic units below the species level very loosely and indiscriminately. It is largely as a result of this practice that the literature on Lepidoptera, more than any other group of insects, is cluttered with a chaotic array of names (and all their misspellings). The unravelling of the resulting nomenclatorial tangles not only usually presents great headaches to the systematist, but also frequently leads to inevitable and unpopular changes of widely used names. The perpetuation of this unfortunate habit of wildly naming infraspecific taxa in Lepidoptera has prompted me to make the following comments on the matter, which I hope will solicit some understanding of and consideration for infraspecific taxa and make local lepidopterists exercise care and caution in establishing these.

Firstly, the status of taxa below the species level needs clarification. This, of course, is primarily dependant upon the status and definition of the species itself, and although it is not my intention to dwell upon the difficulties and problems pertaining to the formulation of a satisfactory species concept here, a few introductory remarks are nonetheless necessary.

Species concepts

The species is the largest genetically cohesive group of individual organisms in nature and thus forms the basic unit of evolution, i.e. in evolutionary processes species behave as individuals themselves. The formulation of a suitable species concept that allows the identification of the actual species taxa in nature has long been a focal point (and one of great controversy) in systematics and, indeed, continues to be a contentious issue today. Suffice it here to say that in entomological practice we still largely apply a purely morphological species concept (based on character discontinuity) to most groups or, more rarely if we are able to carry out cross-breeding experiments, the biological species concept. The latter concept, which emphasizes reproductive isolation as the means to establish the limits of a species, by definition relates to synchronous and sympatric populations only, i.e. it is a relational, non-dimensional concept which cannot identify species involving phenotypically identical or different populations separated in time or space. Furthermore, it is limited to bisexually reproducing organisms; units with obligatory unisexual (parthenogenetic) or asexual (vegetative) reproduction are not identifiable as species within this concept,. It is largely these shortcomings which have now, with the advent of phlogenetic systematics (cladistics), undermined the biological species concept, and it is replaced by the evolutionary species concept.

This is defined as a single lineage of ancestor-descendant populations maintaining its identity from other such lineages and with its own evolutionary tendencies and historical fate. There are also those who reject all these relational so-called 'isolation concepts' that require the presence of other species to identify with the one under study, and who advocate a 'recognition concept' which emphasizes mechanisms by which individual organisms recognize each other as sexual mates; this concept purports to establish the limits of a species without having to separate (isolate) closely related species at the same time, but is still open to the same objections as raised against the biological species concept.

Subspecies concepts

Irrespective of any particular species concept though, we have to return to the notion that the species forms the basic unit of evolution and that it is the entity that actually undergoes speciation. Speciation is a gradual process, involving the slow diminishing of gene flow, or of its potential, between sections (populations) of a species. At some time in the speciation process, then we encounter populations between which only a limited amount of gene flow is possible (indicated as 'reproductive resistance' such as partial hybrid inviability, sterility or lowered fertility) and which usually also display some other forms of consistent difference in their morphology, biology or behaviours. To some, such identifiable populations in the process of becoming separate species are subspecies.

Of course, there is another common source of differences within a particular species, namely geographic variability (polytypism). This is usually expressed by slight, gradually changing (unless secondarily disrupted) differences in colour, size and shape, and is predominantly linked to climatic variables (e.g. temperature, humidity) and/or biotic factors (other species, host plants, substrate, etc.). Such differences *per se* have nothing to do with speciation (although of course they can enter into a speciation process) and are often only of a temporary nature, as exemplified by the famous peppered moth *Biston betularia*. This moth developed a melanic colour form in certain areas in response to the blackening of its resting substrate by industrial pollution, only to lose this colour form again when the blackening disappeared. Similarly, it stands to reason that the periodic climatic vicissitudes on earth can cause a species (or a geographic part thereof) to change e.g. its colour shading to and fro accordingly (cf. Gloger's rule), to drop a dry season colour form as the climate becomes wetter, and so on. To others, such (often rather temporary) identifiable allopatric populations are subspecies too.

And finally, there are species which exhibit consistent differences within a population, or sympatrically. Such cases of clear-cut dimorphism or polymorphism are usually only due to a simple single-gene dominance, much as eye colour in humans. Sure enough, in Lepidoptera such differences are also frequently given subspecific status.

So, can we then arrive at a satisfactory subspecies concept? Certainly, we can restrict the field of available options by excluding intrapopulation variation (polymorphism) – simple, genetically determined variations within a population form no subdivision of the species and should only be referred to as 'morphs'. The nomenclature of such morphs will be referred to below. But we are still left with two rather different interpretations of the term subspecies, namely the one as a mere category of convenience and the other as an evolutionary (speciation) unit. Let us examine each of them a little closer.

The subspecies as a category of convenience

The subspecies as an entity of convenience to classify geographic variation has been clad in many a definition, e.g. a population that inhabits part of the distribution area of a polytypic species; a geographic race that differs in easily observable features; a geographic race given a Latin name; an adaptation to diverse environments (ecotype); a population displaying some degree of (but not absolute) character discontinuity from other populations of the species; a population differing in gene composition (actual genes or gene frequencies) from others of a species; and the classical definition of 'an aggregate of phenotypically similar populations of a species, inhabiting a geographic subdivision of the range of the species, and differing taxonomically from other populations of the species'.

This last, comprehensive definition implies a number of characteristics of this subspecies concept which are often overlooked:

1) Subspecies are allopatric and/or allochronic; two subspecies reported from the same place indicates a wrong usage of the term.

2. A subspecies may consist of a number of local populations which are slightly different genetically and phenotypically from each other, but these are not named as they are not 'taxonomically' different, i.e. do not have sufficient morphological diagnostics.

3. Subspecies cannot overlap as species sometimes do, as populations in an area where two subspecies meet are intermediate and combine characters of both subspecies, i.e. there is only one population of the species in any one area, no matter how variable.

Theory aside, how do we go about identifying and delimiting such subspecies in practice? How different must a population be to justify subspecific recognition? How shall we treat intermediate populations? When should geographic isolates be called subspecies and when full species? It is exactly with these and similar questions that the difficulties of the geographic subspecies concept become really apparent, for the differences within a polytypic species are not only quantitative and gradual, but also reversible. And although such variation is not always continuous and random and the gradients are often steeper at some places than at others, thus providing us with some break points, we are still left with transient zones. Also, where the actual differences between populations are still real, the classification thereof into subspecies is a purely arbitrary procedure and often presents us with the problem that too few named subspecies leave too much diversity in them, whereas too many blur the distinctions between them. We have to note very emphatically that no non-arbitrary criterion is available to define the subspecies category.

Some purportedly 'more objective' methods have nonetheless been put forward to do exactly this, e.g. the 75% rule whereby a subspecies is recognized if 75% of its individual members are phenotypically different from all other populations (implying that 100% difference demarks full species), or the coefficient, of difference (CD), defined as the difference of the mean of two populations divided by the sum of the standard deviation of the two. Both these criteria are open to many objections, the most serious probably being that the populations must first be defined on some other (arbitrary) basis, e.g. geographical distribution, and that both methods demand a comparison between a representative sample of the population under study and adequate representative material of the rest of the species – a requirement virtually impossible to satisfy. In addition, one may justifiably doubt

whether a 100% difference between populations will provide a meaningful criterion for specific rank and likewise whether a lesser, arbitrary percentage will provide a sound basis for defining subspecies.

With these two examples I shall leave the above questions and their 'solutions' and refer the interested reader to Mayr (1969) for further details. More important for us here is to outline the most serious difficulties facing the geographic subspecies concept:

1. Different characters often show different, independent patterns of geographic variation (character incongruity).

2. Phenotypically indistinguishable populations may occur in geographically separated areas.

3. Populations within a formally recognized subspecies may form geographic 'races'.

4. Subspecific differences are generally reversible, resulting in a temporariness of subspecies (see example of the peppered moth).

5. Characters may change clinally, or gradually along a continuous line, from one geographic extreme to another without clear break points, although the end populations are quite different from each other.

The subspecies as an evolutionary unit

Returning to the concept of the subspecies as a stage in the speciation process, we are again faced with difficulties in defining it. As mentioned above, speciation is principally a gradual process which stretches from populations differing in frequencies of a few genes to such evolving genetic (reproductive) isolation. This gradual increase in genetic incompatibility is sometimes classified into five so-called levels of evolutionary divergence: a) local populations, b) geographically separated subspecies, c) semispecies (allopatric or sympatric, genetically incompletely isolated populations usually yielding fertile females but sterile males when crossed), d) sibling species (genetically isolated but phenotypically indistinguishable) and e) reproductively fully isolate, phenotypically distinguishable species. Although the subspecies here again has a geographic connotation, it is clearly described as a stage in the process of speciation (evolutionary divergence) between two populations and not a category of convenience to classify phenotypic differences – these are subordinate to genetic differences. In evolutionary theory these five levels may – although by virtue of the graduality of speciation continuous with one another – demarcate significant stages in the speciation process and thus warrant identification as such; in practice, however, they are hardly separable from each other and clearly not intended as classificatory units. Or how is a semispecies to be treated in classification.

The definition of the evolutionary species concept has given the subspecies a further interesting dimension in evolution: as the traditional, exclusive use of the interbreeding community criterion (biological species concept) results in a tendency to view speciation as incomplete until a stage of sympatry is reached (proving the reproductive isolation), allopatric differentiated forms thus represent incomplete speciation and must be regarded as subspecies of a single polytypic species, although they can be perfectly good evolutionary species (lineages). A subspecies under one species concept may thus be a valid species under the other.

The subspecies in classification

We see that not only the practising systematist but also the evolutionary theorist is saddled with a term clouded in vagueness and ambiguity, quite apart from their confounding subspecies concepts as such. Does the subspecies category, therefore, have any general usefulness in classification?

The purpose of classifying organisms is to break their diversity down into units manageable to human intellectual capacity and to incorporate information about the attributes of these units into names in a hierarchial system, which allows quick access to particular data of selected units. We classify for reasons of our own convenience, and our classificatory categories (and the groups of organisms we assign to these) are therefore arbitrarily defined – although modern phylogenetic systematics aims at lowering this level of arbitrariness. An exception in this context is, however, presented by the species category, as the species taxa themselves are (in theory at least) real units of nature which can therefore not be defined but only described. It is precisely because of this difference that we still debate species concepts, but not, for example, 'family concepts'.

Since diversity is also encountered within many species, we may legitimately attempt to classify this diversity as we do above the species level. However, the only classificatory category available below the species level, the subspecies, differs from all other taxonomic categories in that its boundaries can never be fixed and finite, as by definition its members can interbreed with members of other subspecies of the same species. This precludes both an arbitrary delimitation of the subspecies taxa (as we do in supraspecific categories) and in an operational definition of the category itself (as we have for the species category).

In addition, the subspecies category in classification is an optional one and not compulsory as species, genus, family etc. are; we do not have to subdivide even markedly polytypic species. Neither does the occurrence of intraspecific variability itself require the designation of subspecies; we can, however, use these if we judge that our understanding of this variability is increased by establishing discrete division of the species with formal names. In the past, naming subspecies was probably the only means to increase our understanding of such variability, although it has long been argued that it is in fact inconvenient and downright misleading to impose an artificial partitioning and a formal nomenclature on a dynamic, continuous pattern of variability in nature. Modern objective, quantitative techniques such as multivariate analysis now allow us to study geographic intraspecific variability by mapping continuous variation of not only single characters but many characters simultaneously, overcoming the classical problem of incongruity between the distributions of different characters. This mapping of multivariate patterns offers much greater insights into the variation of a species than treating it with a number of characters and climatic or other conditions, and it reflects the dynamic, continuous and plastic pattern of intraspecific variation much better than a rigid set of formal names. No wonder that scientists studying such variation of multivariate analysis refrain from naming subspecies even if they can identify definite geographic isolates.

Nomenclature of infraspecific taxa

The International Code of Zoological Nomenclature stipulates that the name of a species must be a binomen (a generic and a specific name). A trinomen, where a subspecific name is added after the species name, is an acceptable option but not compulsory. Below the species category, the Code recognizes only a subspecies category; infrasubspecific entities as such are explicitly excluded from its scope. To determine the rank of an infraspecific name, the following rules apply:

A name is treated as subspecific if, in the original publication,

a) it is clearly denoted as being the name of a subspecies,
b) it is established as the third name of a trinomen,
c) it was established as the name of a variety or form before 1961,

and it is treated as infrasubspecific if, in the original publication,

a) it is expressly established with infrasubspecific rank,
b) it is established as an addition to a trinomen,
c) it is established as a variety or form after 1960

Sections c) imply that a name established as a variety or form before 1961 is to be regarded as a subspecies and written as a trinomen without any 'var.' or 'f'. between the species and subspecies name, but that such names are to be treated as infrasubspecific and dropped altogether from nomenclature if they were established after 1960. Infrasubspecific names have no status in Zoological Nomenclature and are not covered by its rules such as priority, homonymy, type concepts etc. It is thus a futile exercise to publish (after 1960) a name for a variety, form, aberration, morph etc., furnish a full description of the animal and designate a holotype for it, as none of these efforts are recognized for nomenclatorial purposes. Such names cannot enter into priority or synonymy with any other species-group name, and they can be re-used (adopted) as the name of a species or subspecies by someone else, in which case they take the date and authorship of that subsequent treatment. A name published in 1980 as e.g. *Danaus chrysippus* var. *capensis* by Smith is invalid but becomes available for nomenclatorial purposes if Brown in 1985 uses it as *Danaus chrysippus capensis* or *Danaus capensis* and takes Brown, 1985 as author and date. A name established as *Danaus chrysippus capensis* var. *melanicus* is likewise invalid but can become available if subsequently used as *Danaus chrysippus melanicus*, then again being attributed to the subsequent author. Describing a variety or form now is therefore only a waste of energy and publishing space; authors are just as much to blame for the continuation of this practice as are the editors of the journals that publish it. In fact there is an obligation on everyone to weed out this unfortunate, outdated and confounding practice.

Conclusion

Although the description of subspecies is quite acceptable for nomenclatorial purposes (provided it is done properly), at the end of my discussion I wish to contend that describing new subspecies is just a confusing and undesirable practice, in view of both the highly contentious and vague term subspecies and the undesirable constraint that a formal classification and nomenclature places on our understanding of the variability of species. What makes matters worse is that such subspecific names fall under the jurisdiction of the Zoological Code and therefore enter into priority etc. with species names, burdening the literature with an immense load of rather meaningless names attached to ill-defined groups of organisms. I am not implying that we should altogether refrain from attaching names to clearly distinct differences within a species – after all, a name can and should replace a thousand words of description – but I want to advocate that we should keep such names informal and out of the official nomenclature. What differences does it make whether a name such as *melanicus* denotes a geographic, an altitudinal, a seasonal or just a mutational difference from other phenotypes of the species, as they are all equally undelimitable? We should refrain from describing formal subspecies and designating holotypes for these (especially if they are as usual based on single or few specimens!) and rather concentrate on studying infraspecific variability in detail (with informal names if necessary) before we jump to conclusions and to the pen to establish yet another infraspecific name which has to be dragged through the literature for ever. Answering the question about the usefulness of the subspecies category posed above, I have to conclude, along with others, that there is no general usefulness in maintaining a subspecies category in classification; instead this practice only impedes progress in our understanding of intraspecific variability and of speciation processes and burdens taxonomic literature with an unnecessary array of names with little value.

FURTHER READING

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MAYR, E. 1969. *Principles of systematic zoology*. McGraw-Hall Inc., New Jersey.
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Literature referenced in these works should also be consulted.