LEPIDOPTERISTS’ SOCIETY OF AFRICA

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EDITORIAL

Editor: Doug Kroon

MEMBERSHIP

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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Back issues of Metamorphosis are still available @ R20.00 per copy or US$12.00 for outside South Africa. Fees for outside South Africa are higher due to increased postage. Membership is annual per calendar year and fees are due on January 1 of each year.

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Editorial - comments
Stimulating topics in the June issue include descriptions of new species, original research and methods, conservation issues and the importance of education. Informal articles, the benefits flowing from public exhibitions, and an opinion column add interest. Some contentious issues detailed in the 4th Edition of the I.C.Z.N. are outlined. The rising costs of producing *Metamorphosis* - a challenge facing many journals - is being investigated. A comprehensive analysis of production costs of a typical journal was printed in March 2000 [vide Smith, G.F. & Raper, I. in *S. Afr. J. Bot.* 66 (1): 2–6]. This has many parallels which may help us find some solutions for publishing our journal. Members can assist by forwarding their ideas and suggestions to the Editor. The development of our own web site – now a reality – is outlined in detail. Good news indeed!

Council - comments
The year is already halfway and some members actually managed to swing their nets in weird and wonderful places. It seems that some Branches are very active and manage to get around to beautiful locations or just manage social functions. Keep this up Branches, as ultimately this is what the LepSoc experience is all about.

One of the goals of LepSoc is to promote the study of Lepidoptera and especially to raise enthusiasm with the younger generation. We would like to encourage and challenge Branches to present beginners’ courses for lepidopterists, to invite new and young members to join in on field trips and to present technical courses on other aspects such as photography, conservation, writing reports and so on. We have many very experienced members and we are sure that they would be only too willing to offer some time to promote this very interesting hobby.

Some of our members also make their mark in society. Jonathan Ball passed his B.Sc. (Hons) degree in Nature Conservation *cum laude* at the University of Stellenbosch and also received the prestigious Stevenson-Hamilton Medal for his contribution to natural history in South Africa from the Zoological Society of South Africa. Congratulations Jonathan from all of us and may your efforts, particularly with conservation, serve as an inspiration to us all. Others have participated in exhibitions at *Gardenex* where your society had a beautiful stand. Many members of the public came and watched in fascination the real world of butterflies and moths. Thank you also to those that participated to make this a great event.

Another item of benefit materialised in the Western Cape where Kenneth Gainsford was instrumental in securing research funds for the study of Lepidoptera in the Western Cape. Congratulations to this Branch and we all look forward to a surge of publications and research results from our fellow lepidopterists.

The next major event is of course the Annual General Meeting – 7-8 October. We would like to take this opportunity to encourage one and all to make the effort to participate. The timing is such that you can combine this meeting and the collecting wonderfully lycaenids which grace the Highveld in spring. On the agenda is a new constitution and everyone's input is required. We need to elect a new council so please, forward names for council members and elect members who can lead the Society in the new millennium. This is a great society, please participate and keep it such.

The highlights of the AGM are the talks and the photographic competition. Please submit your contributions to Mark Williams-who is arranging the Agenda – [e-mail: mwilliam@op.up.ac.za]. Tell everyone what you have been doing during the past year by attending, exhibiting and showing off those beautiful slides of Lepidoptera, locations or just the fun of being a lepidopterist.

Bennie Coetzer - Acting President
CHIRINDA FOREST AND THE TALE OF SPINDASIS BRUNNEA

Dave McDermott
39 Norman Drive, Northcliff, Johannesburg

When my brother Phillip and I planned a five-day visit to the great forest of Chirinda at Mount Selinda in Zimbabwe's bountiful (certainly for lepidoptera) and ruggedly beautiful eastern border with Mozambique towards the end of September 1999, *Spindasis brunnea* was the last thing on our minds.

We hoped to fill some holes in our collections, particularly localised Zimbabwe specials like *Iolaus lalos lalos*, *Salamis cacta eileenae*, *Lipaphnaeus adema spindasoides*, *Deudorix dinomenes* and *D. lorisona coffea* and *Apaturopsis cleochares schultzei*. The latter, especially the males, are so fast that I found it almost impossible to pick them up in flight. Instead, I found it much easier to keep a close eye on the damp spots on the road and detect them as they landed to mud puddle.

We took good series of *A. cleochares schultzei*, mostly males but also two fresh females, a number of fresh *Iolaus lalos lalos* of both sexes, a fresh male *D. dinomenes* and a lone *L. adema spindasoides*, a very worn male, which was released. *Papilio ophidicephalus chirinda* was flying in numbers as was *Graphium policenes laurentia*. *Hypolimnas anthedon wahlbergi* f. *wahlbergi* became an irritation, there were so many on the wing but, strangely, we saw only one f. *mima*.

*S. cacta eileenae* was nowhere to be seen, although there are a number of September records from years gone by. Perhaps we did not search the dense forest away from the roads sufficiently but two sightings of large and highly toxic forest cobras, one more than 2 m long, discouraged us from venturing too far off the beaten track.

On one of the days we were able to fit in a quick visit to the magnificent lowland forest areas at the junction of the Rusitu and Haroni Rivers on the Mozambique border where we caught fresh *Belenois thysa* f. *vansoni* (all males) and *Cyrestis Camillus sublineata* but little else of note – March and April are definitely better times, when a much greater diversity of species can be found.

By the end of the week, we were both very satisfied with our Chirinda expedition. Little did we know at the time that I had made what was to turn out to be a very significant capture: On the second morning at Chirinda I had walked from the rest camp huts through the forest to the Swynnerton Memorial, a distance of about three kilometres, while my brother patrolled the vicinity of the rest camp. Where the stream runs under the road just below the memorial, there are a number of damp spots. These were attracting great numbers of a wide variety of species, so many that often one experienced difficulty in deciding what to net first.

Particularly prolific among the various mud-puddlers were *Uranothauma antonorii felthami*. It was while I was examining a large clump of these very active little butterflies – there must have been at least 40 specimens of both sexes bunched together on damp patch no larger than a biscuit tin lid – that my attention was drawn by a larger lycaenid that fluttered up off the ground and settled low down on a shrub at the roadside. It was a fresh *Spindasis*.

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* The genus name *Spindasis* is currently replaced by *Apharitis* or arguably *Cigaritis*
Whether the *Spindasis* had actually been mud-puddling, I cannot say with any certainty. I've never seen any *Spindasis* mud- puddle before. However, this particular specimen appeared to have taken wing from the ground. I netted it and placed it in an envelope without looking at it too closely – my attention already having been diverted by my first sight of a fresh male *A. cleochares schultzei* which had alighted nearby.

That evening I set the *Spindasis* in the poor, wavering light of a kerosene lamp—the forest camp rondavels are not equipped with electricity. Its underside pattern was unusual in my experience but it was only several weeks later when I removed it from the setting board in Johannesburg that I knew that it required more expert identification. I had earmarked *S. brunnea* as a possibility after turning to *Pennington's Butterflies of Southern Africa* but the specimens illustrated there (ex-British Museum) were much darker and smaller with very little orange on the forewing upperside. The text told me that *S. brunnea* had not been recorded since 1938 when two specimens were caught on the southern side of the Zambesi River in the Victoria Falls area. The fact that these records constituted its southernmost known locality sowed further doubt in my mind. I then decided to hand the identification problem over to my more knowledgeable peers at LepSoc – Gauteng. Graham Henning, Alf Curle and Steve Collins, among others, had a look at it. Their verdict was: a female *Spindasis brunnea*. Stephen Woodhall was kind enough to photograph the specimen to make available good reference illustrations.

Chirinda is approximately 300 kilometres south and about 700 km east of Victoria Falls. Is it not strange that this is apparently the first known record of *S. brunnea* at Chirinda, a place where there is such a wealth of lepidoptera and where so many notable lepidopterists have spent so much time collecting and observing? How does this one suddenly pop up all of 62 years after its last recorded capture and so far away from its previously known locality? Needless to say, it was the one and only specimen of *Spindasis* we saw at Chirinda. At Rusitu we saw a single male *S. natalensis* and caught several *S. victoriae* males sporting around small trees at a lay-by near the top of the Rusitu Valley on the main tar road between Chipinge and Chimanimani.

Another fortunate capture for me at Chirinda was *Graphium junodi*. This beautiful swordtail is not included in the extensive checklist of Chirinda lepidoptera compiled by Alan Gardiner. Normally, it is confined to the coast of Mozambique. My son Matthew (20) caught the first one, a very fresh male, patrolling the road near the Swynnerton Memorial on the Mount Selinda village side. An hour or so later, I caught a second *junodi*, a fresh female, in almost the same spot. They were the only examples we saw during the trip.

**Note:** Lepidopterists wishing to collect at Chirinda, will need to obtain permission from the Zimbabwe Department of Forestry. Application must be made in writing to The Manager, Research and Development, Forestry Commission, Harare (Dr E.M. Shumba). The Department asks that collectors submit to them a full list of the species they encounter during their visit, which assists in the maintenance of up-to-date checklists.

The self-catering rondavels at the rest camp are rudimentary but offer beds with linen and blankets, flush toilets and hot water showers. It is essential to take a gas or 12-volt fridge freezer to keep food fresh. Mount Selinda village has very little in the way of shopping facilities so any meaningful resupply has to be obtained from Chipinge some 50 km away.
DON'T THROW YOUR FILM CAMERA A WAY! ... YET.

By Bennie Coetzer
Gauteng Branch, Lepidopterists’ Society of Africa

Photography of Lepidoptera has become an increasingly popular pastime of lepidopterists. Not only is this a far better way of seeing the animals in a natural state but often it is also the only way of keeping natural colours. In recent years the development of digital systems have made digital photography a reality and of course it has several advantages. Images can be stored on computer, printed out at will, transmitted over the internet, incorporated in databases and articles, etc. In general digital images can make life a lot easier than film. So why not change?

A lot of incorrect information is passed around by people not understanding the technologies involved. The purpose of this article is to explain, hopefully in language that the average lepidopterist can understand, the buzz words but also the realities of digital images. Clearly they are here to stay, but, depending on your objective, be wary of just throwing your old 35 mm pal away.

Basics
The first issue is simply the issue of recording images. In regard to this aspect film and digital cameras do not differ fundamentally. In both cases optical lenses direct and focus light onto a light sensitive material e.g. film or CCD. CCD or Charged Coupled Device is simply the electronic equivalent of film in that it converts light into electrical signals. How this happens clearly falls outside the scope of this article. In both cases care has to be taken with focussing, light contrasts, illumination levels, aperture sizes, etc.

The real difference comes in what is called resolution—this being the ability to resolve or discriminate between different objects. When viewing a grid of fine lines from close by, the grid is clear because the eye can resolve the lines from the gaps. If this grid is moved far away it becomes a grey blur as the eye is not able to resolve between the lines. Our eyes are limited in resolution by the cones and rods in the retina. Fortunately we have a great number of these (about 130 million rods, responsible for intensity and resolution and 7 million cones, responsible for high detail and colour), thus allowing us to resolve a great number of items. For example every bit of the image that falls on one rod can be resolved from the light falling on the adjacent rod. Synthetic pictures (film or electronic) are composed of small elements. In electronic form these are generally called pixels (a derivative of PICture ELements). If these elements are smaller than what the eye can resolve no distortion would be visible at all.

In creating the image on a film the resolution is, in good films, approaching molecular level. Thus a very fine resolution can be attained. Electronics on the other hand is still evolving (if the purists will allow me the use of the term) and finer pitches are still in the future. So where do we stand? Film has a resolution of between 110 to 200 lines/nun. This translates to about 8400 pixels across the image. CCD elements as used in high quality camcorders, etc., have a resolution of about 400 elements across the image. This is clearly a lot worse and a lot of detail is lost. If this picture was displayed on a standard computer monitor however, where the horizontal resolution is typically about 72 dpi (dots per inch), the film image at its full resolution will require a monitor
twenty times the size of a normal monitor. Such high resolution is therefore impractical for monitors and such images can only be viewed in small sections at a time.

From this a very important conclusion can be drawn and that is that the required resolution is very dependent on the target display system such as a computer or TV monitor, printed medium or a film screen via a projector. A second very important issue is the required amount of detail to be seen. Thus, for use on a computer monitor with 800-1200 pixels across, digital images can be shown with no additional distortion. The same quality picture shown on a large screen will show significant distortion.

Another very important concept is of course storage. Slides take up a lot of physical space. If converted to electronic form without loss of resolution, a slide image (21x28 mm) will consist of 52 920 000 elements, each represented by three bytes for minimal contrast and colour loss. Such an image will take up approximately 160 MB, or roughly 120 stiffies! Storing at film quality one will be able to store about 6 pictures per GB of hard disk or 2 per CD-ROM. By contrast, an image recorded by a video camera at broadcast quality will require 1.3 MB (500 per CD-ROM) and by common digital cameras approximately 0.24 MB (2700 per CD-ROM).

To allow for practical electronic storage, use is made of image compression. In this technique images are analysed and the information content in the image is used to reduce the amount of storage. To explain this consider the image of a white wall. It will still require 1.3 MB as a normal image, but, since we know that every element is the same and of a specific colour, namely white, the same information could be represented with 6 bytes, three for the colour and say three for the number of pixels of this colour. Natural images are of course much more complex and compression is generally in the range of 20 to 100 times.

The problem with compression is of course that it creates distortion. A commonly used technique is JPEG (Joint Photographic Experts Group) which uses the frequency (amount of change) in an image to compress. Thus it uses more bytes to describe areas of much change and less to describe relatively smooth areas. In this way it can reduce the number of bytes to represent an image by 20 to 100 times. Other commonly used techniques include MPEG-2 (as used by DSTV) and Wavelet Coding.

In order to view a compressed image it has to be uncompressed into essentially a bitmap (see paragraph on bitmaps) file. This uncompressed image is not the same as the original in spite of the fact that it occupies the same amount of space. This is really a distorted image. It is often asked what happens if one re-compresses this image, will it be worse off? The answer to that is yes, it has to be. We are now taking a distorted image and re-compressing it, adding additional distortion. This should not be confused with the repeated reading of the same JPEG image, which obviously does not affect the image quality at all.

**Digital storage formats**
The different formats in which images are stored are often not well understood. Windows Users are used to *.BMP files or bitmap files. These are direct representations of the image (every element represents a specific pixel) and therefore uncompressed. This is also true of *.GIF, *.PCX and *.TIF files. GIF files are often smaller than the equivalent BMP file. This is generally because they use an 8 bit number (as opposed to 24 bits) to represent colour. Compressed images generally have extensions such as *.JPG or *.WVL and are significantly smaller.
Scanning
Another very common tool used nowadays is a scanner. Again manufacturers offer wonderful figures such as 9600 dpi and so on. Most scanners today scan at resolutions of 300-600 dpi. These are then enhanced by software to the resolutions of 9600 dpi. Thus true resolution is 300 dpi, but the pixels in-between, to make up 9600, are interpolated. They do not contain the detail of the actual image, but simply fill in the gaps between the actual samples. This is done to present a pleasant picture, rather than maintain accuracy. When scanning printed images, a resolution of about 4000 dpi would be required as the image was printed at a resolution of 4000 dpi. (Actually more is needed to prevent aliasing, but this falls outside the scope of this article.) If this image is to be printed on a 600 dpi printer, there is no need to scan with a higher resolution unless enlargement is sought.

When scanning film, a resolution of 8 – 10000 dpi is required. If the target presentation is for a 1024x768 computer monitor, scanning only needs to be about 1000 dpi.

Conclusion
After reading all of this one may ask, so what? Obviously we all record images as we go along, and often these will be our only sources of information in the future. Much as our specimens are important, we have to keep our pictures mid the question is how should we go about this task. Should we convert to digital cameras, should we digitise all our slides and put them into computers for easy storage? The answer to this is more philosophical than the rest of the article. From a scientific point of view the highest quality is better. On film it may degrade, on computer it probably occupies too much space. My preference would be to keep the film safe, but to convert it into a practical size for computers mid store it there for ready access. For now I would definitely not like to see Steve Woodhall's famous butterfly shots at presentations on a computer screen, projected or not. The slide projector still renders far more beautiful pictures, the kind that makes my heart bounce.
LEPSOC WEBSITE REPORT PROGRESS & UPDATE

I am sure that we have all read the article by James Young in Hong Kong about the creation of a Society website, published in March 2000 - Metamorphosis 11(1). This is just to advise that we have been quite busy getting a Website together and are happy to report that the framework has been completed by Pierre du Toit and can be viewed (as a Site Under Construction) at http://www.fanatix.co.za/lepsoc.

Pierre hopes to register the website as www.lepsoc.org.za this weekend (30 May 2000). We are being sponsored by Cyberjack and so far the site has cost us nothing, except some hard work – mostly Pierre's. Page/Site hits will be recorded by Cyberjack. Pierre is our Webmaster and I am coordinating a few actions with Doug the Editor, and Mark Williams the referee.

The site has a Landing page, Home Main page, News & Archives, FAQ, Publications, Reviews & Abstracts, Administration, LepSoc Profile and Contact pages. Each of these pages will have further links to specific information, a search facility and some advertising links. A list of Council Members and an e-mail application is envisaged at this stage. Only the Secretary's address will be given for incoming correspondence, to regulate control i.e. all incoming mail will be sorted, recorded and forwarded by the Secretary. After-all, this is what secretaries do (I'm not picking on Alt; our excellent current office bearer.)

Only Pierre has access to the site to make changes and these must be personally authorized by the Editor (Doug Kroon). All changes, additions, new pages and deletions must be channelled through the Editor. I anticipate there will be an additional work-load for Council Members, Referees and Specialist Advisors from incoming questions and queries-so be prepared. From my limited experience working with Pierre and Doug thus far, I have found that actions must be carried through speedily in line with the characteristics of electronic communication and the internet. Fast reactions earn the webpage a sound reputation and good references. Remember the boy scout motto – Be prepared!

We intend to provide links limited to SA and African lepidoptera associated sites, and if you are aware of any, please let us know of some of the more useful ones. I have already approached ABRI, the Transvaal Museum and hope to also get some exposure for the Brenton Blue, Butterfly World etc. At the successful Gardenex Exhibition many visitors asked for our Website address. High praise was also received from a serving member of another S.A. Society who complimented LepSoc with the high quality of our publication – Metamorphosis.

We have started preparing reviews of some local publications such as Doug's catalogue on Lepidoptera of Southern Africa - Host-plants & other associations, Mark's Field Guide to Butterflies and the Namibian Emperor Moths. Ideas, pictures and news are needed right now to fill in the spaces and later our efforts can be refined as we go along.

There are, as can be expected, objectives and limitations to this venture and I want to mention a few. We do not have unlimited space so Please keep Document and Graphics file size down to a minimum. All pictures will have to be digital i.e. JPG, TIF, BMP or GIF format extensions. I am able to scan photographs and slides, but it takes time. I expect that any changes and additions will take a minimum of 5 – 7 days to implement. So don't expect something to be done overnight! We also expect to get World Wide Exposure and more overseas members. I am very excited that eventually we will be able to report on our local activities and adventures. We also hope to draw our African members closer to chat about all the new finds.

This development may act as a stimulus and encourage some members to take up their laptops and record their adventures and exciting discoveries. What are your suggestions regarding "Special Emphasis on the Branches"? Let us have some of your ideas and help us to get this site going. This is also a golden opportunity for members to update their e-mail addresses and pay their subs. I strongly encourage you to respond promptly. We are hoping to announce our "Going Commercial" shortly, and I will advise as soon as this happens. Regards.

Peter Roos
EIGHT NEW SPECIES AND FIVE NEW SUBSPECIES OF AFRICAN BUTTERFLIES (RHOP ALOCERA) - AN ABRI RESEARCH PAPER

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Abstract: This paper is primarily aimed at describing new species and subspecies identified through the rearrangement of the African Butterfly Research Institute (ABRI) collection material and in the course of research for Larsen's book project Butterflies of West Africa and their Natural History. A number of interesting species and subspecies procured by Haydon Warren-Gash are also included. The following species and subspecies are described – Lycaenidae: Ornipholidotos stempferi, O. dowsetti, O. kivu, O. nancy, Iolaus (Epamera) longicauda haydoni, Iolaus (Iolaphilus) caesareus cleopatrae, Iolaus carolinae, Hypokopelates viridis parallela; Nymphalidae: Cymothoe althea bobi, AcrAEA ores oboti; Hesperiidae: Celaenorrhinus nimba, Ceratrichia lewisi, and Paracleros staudei. Subspecies are only described when there are substantial morphological differences that have a biogeographically plausible basis. An error in the description of the genitalia of Ornipholidotos jacksoni Stempffer, 1961 is corrected. Eresiomera beni Stempffer, 1961 is shown to be a junior subjective synonym of E. magnimacula Rebel, 1914. Paracleros substrigata is identified as a senior subjective synonym of P. overlaeti.

Introduction
Our knowledge of Afrotropical butterflies is growing by leaps and bounds. Since the publication of the catalogue Carcasson's African Butterflies (Ackery et al., 1995) almost 400 new taxa have been described, more than half being new species, the remainder subspecies. This means that the number of Afrotropical species is now around 4,000-a six percent increase in as many years.

About half the new species were found during revisions of difficult complexes (Hewitsonia, Epitbla, Aslauga, Lachnocnema, Axiocerses, Euptera), but a steady trickle of species are still taken in the field or accidentally stumbled upon in existing collections. The recent work by Hecq on the Limenitinae has provided a baseline on which to evaluate the genera Euriphe, Bebearia, and Euphaedra, leading to the identification of new species. Collecting in places that are severely under-researched has also yielded new taxa, not least the Fouta Djalon in Guinea. Several large and difficult genera urgently await revision (Alaena, Pseudaletis, Anthene, Cupidesthes, the red Cymothoe, Neptis, Celaenorrhinus, and Ceratrichia) and will add additional species.

The taxa described in this paper are for the most part recently collected species and subspecies, but include a number of taxa that have been housed in collections for some time, ready for description. The majority of the new taxa are in the Lycaenidae, much more than their 40% share of the total fauna would imply. By contrast, there are few new Hesperiidae, though both authors have been especially interested in that family.
The genus *Ornipholidotos*

The genus *Ornipholidotos* is a fascinating one, consisting of some 36 named species. Most can be considered typical species, characterized by having the costa of the forewing and the margin of both wings black. On the forewing there is a black spot at the end of the cell, more or less fused with the costa, while the hindwing has a black cell spot. In a few species (e.g. *O. larseni* Stempffer, 1969 and *O. aurivilliusi* Stempffer, 1947) the costa and cell are so broadly black that the end-cell spot is wholly subsumed. With the species described here, this well-defined group now contains about 27 species. The other nine have divergent patterns, the most outstanding being *O. emarginata* Hawker-Smith, 1933, *O. peucetia* Hewitson, 1866, *O. jax* Collins & Larsen, 1998, and *O. paradoxa* Druce, 1910.

The genus was erected by Bethune-Baker in 1914 with *O. muhata* (Dewitz, 1887) as the type species, but this species cannot today be identified. The holotype is in poor condition, lacking the abdomen, and could be any of about ten currently described species. It is effectively not possible to identify most of the 'standard' *Ornipholidotos* without examination of the male genitalia. These are highly complex, asymmetrical, and very different from those of other butterflies – to the point where the homology of the various parts is doubtful. They are also proportionately larger than in almost all other butterflies – a considerable resource investment. In contrast to the external features, the genitalia almost always provide excellent specific characters. What is more, the genitalia prove to be stable over vast geographical regions. Thus, *O. kirbyi* is found from Uganda to Côte d’Ivoire; without a locality label it is impossible to be sure of the provenance of any individual. In addition *Ornipholidotos* are small, slow-flying, fragile butterflies, most of which never leave the ant–tree of their birth.

The systematic study of the genus was begun in 1947 by the late Henri Stempffer. From a little flat in Paris he almost single-handedly brought some degree of order to the classification of the tropical African Lycaenidae. In 1947 he dissected the first six members of the genus and was amazed by the diversity of the genitalia, though all built to the same ground plan. Between then and 1969, Stempffer described more than twenty new species of typical *Ornipholidotos*. Subsequently only two more were described – *O. tanganyikae* Kielland, 1983 and *O. irwini* Collins & Larsen, 1998.

The African Butterfly Research Institute (ABRI) now has by far the largest collection of *Ornipholidotos* anywhere in the world, and we have begun to study the material in detail. We describe here a further four well-characterized species; others are still under study and more will be found. How many more? It is difficult to guess. We have described six new species so far, and others are pending. The ABRI collection now contains representative material of all known species, barring *O. gabonensis* Stempffer, 1947. The species – *O. issia* Stempffer, 1969 – was recently obtained from Mamou, Guinea by H. Warren-Gash; however, our single *O. likouala* Stempffer, 1969 might in fact be a distinct species. A total of 40 clear-cut species is quite likely.

We are happy to dedicate the first of the new species to the memory of Henri Stempffer, dubbed ‘Master of the African Blues’. He was incredibly helpful, and visiting African entomologists were cheerfully invited to stay in his small Paris flat, already too small for the Stempffers, not to mention the butterfly collection. He described Larsen's

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2 Used in preference to the Anglicised form – Ivory Coast. We also use Cameroun instead of Cameroon.
first new butterfly, *Ornipholidotos larseni* in 1969. He would have been thrilled by the unusual genitalial pattern of *O. stempfferi* (see Larsen (1992) for a light-hearted appreciation of his friend and mentor).

We are continuing a programme of dissection and will continue to publish new species; eventually we hope to integrate all the data in a monograph, including a biogeographical analysis which promises to be most interesting.

**Ornipholidotos stempfferi** sp. nov. Plate 1, Fig. 1a

**Male holotype:** ♂ Cameroun, Sangmelina, Nyangaza, 1.1993. (African Butterfly Research Institute, Nairobi; Genitalia preparation: Slide No. SCC 432 - Plate 5, Fig. a).

**Description:** Forewing 19 mm. This is one of the larger familiar species of *Ornipholidotos*, extensively marked with a not very dense greyish black. The ground-colour is a translucent off-white. Most of the forewing cell is black, except for the outer third of the lower half of the cell, almost obliterating the usual cell-spot. The apex and margin are broadly black. The inner edge of the margin is diffuse and the area between it and the cell-spot is dusted grey. The hindwing has an unusually broad black margin and a medium-sized cell-spot. The underside hardly differs from the upperside.

**Male genitalia:** The male genitalia are highly unusual. The uncus is vast, much larger than in any other species. There is a slight depression in its middle. Both lateral edges are strongly chitinized and carry a thorn at the bottom and at the top. *In situ* the tegumen is curved to the extent that the lateral thorns touch each other, effectively creating a cylindrical tube, as is the case also in *O. aurivilliusi* Stempffer, 1949 and *O. larseni* Stempffer, 1969. On the membranes of the inside of the uncus is a tiny chitinized ‘gnathos’ that is not attached to the tegumen itself. This is asymmetrically placed. The special processes are strongly asymmetrical. One is small and unadorned, the other extremely long and with numerous processes. The vinculum is narrow and the 'saccus' is just a small symmetrical extension of the vinculum, the smallest saccus area of any species apart from *O. aurivilliusi*. Any of these three components on its own would be sufficient to identify the species, so we have no hesitation in describing the species from a single specimen.

**Discussion:** It should usually be possible to identify this species without dissection; if the pattern fits, the tube-like uncus [of a ♂] should be visible without dissection. Since the female genital opening is placed asymmetrically a male cannot be mistaken for a female.

**Etymology:** This species is named in honour of Henri Stempffer, for the reasons given in the introductory section.

**Ornipholidotos dowsetti** sp. nov. Plate 1, Fig. 1b

**Male holotype:** ♂ Republic of Congo, Odzala National Park, Mbanza, ii.1995. (R.J. Dowsett leg., coll. African Butterfly Research Institute, Nairobi; Genitalia preparation: Slide No. SCC 424 - Plate 5, Fig. b).


**Description:** Forewing 20 mm. This is another larger member of the well-known *Ornipholidotos* complex and may be one of the few that can be identified without
dissection, at least if the types are typical for the species. The ground-colour is strongly tinged with primrose (as in many *O. kirbyi*) and it is not very translucent compared to most members of the genus. The dark markings are extensive in a not very dense dark brown. The base of the forewing cell, the costa, and just under half the cell is black. There is a rounded-triangular end-cell spot. The apex and the margin are broadly brown, except in space 1a, where it contracts abruptly, creating an unusual small inward tooth on vein 1. The hindwing has a medium-sized discal spot and a broad brown margin. The underside is similar to the upperside, except that the dark margins are preceded by an area of cloudy dark shading, most notably on the forewing, where the clouding fills up all of spaces 4, 5, and 6. This clouding is just visible on the upperside through translucence. The female is quite similar to the male.

**Male genitalia:** The male genitalia can immediately be recognized by the very long uncal processes, which taper to a point. They are longer than in any other species. There are no small lobes preceding them as in species allied to *O. overlaeti* Stempffer, 1949. The special processes are rather massive, curiously (but fortuitously) reminiscent of those of *O. kirbyi* (Aurivillius, 1895). The saccal processes are spatulate. The penis is of the usual type, including the presence of a tight bunch of tiny cornuti forming a black spot; they seem to be grouped around a larger chitinous cornutus. Some species lack this feature. The overall effect is like that of *O. kirbyi*, except that the uncal processes are pointed and very much longer, while the saccal processes are spatulate. We have no hesitation in describing a species with such distinctive pattern and genitalia based on single pair.

**Discussion:** This species is remarkably different from most others in the strongly primrose ground-colour, the broad margins, and the shape of the forewing margin on vein 1 and space 1a.

**Etymology:** The species is named after R.J. Dowsett, who collected and arranged for collecting butterflies while he was in charge of the ECOFAC project for strengthening Odzala National Park.

**Ornipholidotos kivu sp. nov.** Plate 1, Fig. lc

**Male holotype:** ♂ Zaïre, Kivu, Beni, 20.iv.1941. (R. Ducarme leg., coll. African Butterfly Research Institute; Genitalia preparation: Slide No. SCC 266 - Plate 5, Fig. c).

**Description:** Forewing 15 mm. This is a medium-sized species with relatively limited dark markings. The ground-colour is translucent white, so much so that in patches the locality label can easily be read through the wing. The dark markings are not dense and brownish black. The basal fifth of the cell is black, but the black costa only slightly impinges on the rest of the cell. The end-cell spot is fully fused with the costa as a triangular spot, but it is centred with darker black. The apical area and the margin are not widely black, curving evenly and reducing in width towards the tornus. The hindwing has a moderate margin and a medium-sized black discal spot. The underside is like the upperside. The species cannot be told from several others without dissection, but the dark markings are less developed than that in *O. tiassale* Stempffer, 1969, the species that is closest in genitalic morphology.

**Male genitalia:** The male genitalia are characterized by having the uncal processes bifid so that there appear to be four more or less equal, simple processes. *O. tiassale* from West Africa (Côte d’Ivoire to western Nigeria) is quite similar in this respect. However, the
the present species differs from *O. tiassale* in that:
1. the processes of the uncus are somewhat larger
2. the special processes [of the uncus] are very different
3. the two branches of the saccus are more strongly developed.

*O. irwini* Collins & Larsen, 1998 is the third species with bifid uncus processes, but these are of a more complex, deeply sculpted nature and morphologically quite different.

**Discussion:** This species is only known from the holotype from Kivu, though it may have a wider distribution. Kivu, and adjacent areas of Rwanda, Tanzania, and southern Uganda, have a number of interesting endemic elements, including the spectacular *O. emarginata*. The genitalia make the description of the species on the basis of a single male quite acceptable.

**Etymology:** The species is given the name of the Kivu Province in Zaïre [Belgian Congo] where it was caught (now renamed the Democratic Republic of Congo).

**Ornipholidotos nancy** sp. nov. Plate 1, Fig. 1d


**Description:** Forewing 15 mm. This species is close to *O. perfragilis* (Holland, 1890) (Type locality: Gabon) from which it differs in the complete lack of the prominent round black hindwing discal spot. It is also smaller. The forewing costa is narrowly brown and there is a narrow brown termen. There is no trace of an end-cell spot, even under the microscope. The hindwing margin is narrowly brown. On the underside the margin is considerably wider than on the upperside, visible also on the upperside by translucence (less so in the Odzala paratype). The female is identical to the male. It also resembles *O. tirza* (Hewitson, 1873), which is much larger and lacks dark margins on the hindwing.

**Male genitalia:** The genitalia are rather similar to those of *O. perfragilis*, but with differences in the shape of the uncus (less chitinized) and special processes (narrower and longer) (Plate 5, Fig. d). The stability of the genitalia in the genus is usually strong, and three *O. perfragilis* studied are all identical. The genitalia of *O. tirza* indicate that these three species form a natural grouping.

**Discussion:** The species has been found only at Kelle and Odzala in Congo, as well as Eala in northwestern Zaïre [DRC]. On present knowledge it is allopatric in relation to *O. perfragilis*, which occurs from Côte d’Ivoire to Gabon and Bas-Fleuve in the south, and the Bangui area of the Central African Republic in the north. We did consider describing it as a subspecies of *O. perfragilis*, but we have several hundred examples of that species from both southern Cameroun and the Central African Republic, not one of which has the black hindwing spot significantly reduced; the genitalia are also too well differentiated. The size of *O. nancy* is also constantly smaller.

**Etymology:** The species is given the first name of Nancy Fee, the wife of Larsen in appreciation of her tolerance of an excessive amount of travel and too great a devotion to * Ornipholidotos*. 
Ornipholidotos jacksoni Stempffer, 1961

We thought we had discovered another new species when we found a set of genitalia that matched nothing we had seen before, and new to Kenya (Kakamega Forest). A research assistant picked out a few more males that ‘looked right;’ of these one from Uganda and two from Cameroun proved to be conspecific. One of the most noteworthy features is a large, symmetrical, shield-shaped ‘gnathos’, by far the largest such feature in any member of the genus (genitalia slide preparations: SCC 443 and SCC 445). Most species entirely lack a gnathos. Closer examination showed all other features conforming fully with *O. jacksoni*; we conclude that the ‘gnathos’ was somehow detached by Stempffer while the original preparation was being made-or inadvertently omitted when the drawing was made. This ‘gnathos’ is, as usual in the genus, not actually attached to the tegumen itself but to a membrane covering its inner surface. It is very clear also in lateral view. The species was known only from the types from Uganda, so ours constitute new country records for Kenya and for Cameroun.

Eresiomera magnimacula Rebel, 1914

This small butterfly was precisely and concisely described by Rebel from eastern Zaïre. The small size of the male and the very large orange patch on the forewing inner margin, reaching vein 4, are very characteristic. Subsequently it was even considered a subspecies of *E. isca* Hewitson, 1873, from which it is far removed. Accepting Rebel’s species as *E. isca magnimacula* on the basis of the literature, Stempffer (1961) redescribed this perfectly valid species as *E. beni* (syn. nov.) since it obviously had nothing whatever to do with true *E. isca*, in morphology or in genitalia.

Iolaus (Epamera) longicauda haydoni ssp. nov. [Not illustrated]


**Male paratype:** ♂ Côte d’Ivoire, same data (H. Warren-Gash leg. et coll.).

**Description:** Forewing 17 mm. The male is very similar to that of the nominate subspecies, but it differs in having a larger area of blueish green on the forewing, covering about the basal two-thirds of the cell instead of one third. The black apical markings of the hindwing are slightly less developed. The ground-colour is slightly greener in tone. The nominate subspecies is well figured by D’Abera (1980).

**Male genitalia:** Larsen studied the genitalia of the paratype and compared them to his preparations from the Oban Hills in Nigeria, finding no differences whatever. This slide preparation was unfortunately lost-an oversight of the domestic assistant. The holotype has not been dissected. The genitalia are figured by Stempffer & Bennett (1959).

**Discussion:** When an e-mail from Warren-Gash first alerted us to the presence of *E. longicauda* in Côte d’Ivoire, we were deeply sceptical. The species is known only from eastern Nigeria, though it should also occur in western Cameroun. However, inspection of the two males leaves no doubt, especially since the genitalia do not differ. The apparent disjunction between eastern Nigeria and Côte d’Ivoire is probably not real; the species must also occur in Ghana. Several other species share such disjunctions, with distinct subspecies in Côte d’Ivoire/Ghana.
Etymology: The new subspecies is named after Haydon Warren-Gash who, despite his onerous duties as UK Ambassador to Côte d'Ivoire, has added much that is new to the known butterfly fauna of Côte d'Ivoire.

*Iolaus (Iolaphilus) caesareus cleopatrae ssp. nov.* [Not illustrated]


**Paratypes:** 3 ♂ and 1 ♀ from Odzala National Park, 1995. (Data as for holotype).

**Description:** Forewing 25 mm *I. caesareus* is one of the most spectacular butterflies in Africa, the largest of the *Iolaus*, but has remained an almost unknown entity since it was first collected in western Cameroun and described by Aurivillius (1895). It is the largest of the *Iolaus*, brilliant in colour, and with a very long, strongly spatulate main tail (the tail is sufficient for identification). The forewing margin is strongly concave between the tornus and vein 3. The African Butterfly Research Institute has a series of about a dozen males and thirty females collected between Ebogo (near Douala) and the Djah River in Cameroun; these have a broadly black apex, from the end of the cell to the tornus. Most are even broader than in the illustration of the holotype in Seitz (1895), but these are generally poor. We also have a series from Congo which differs in a number of respects, sufficient for us to believe it might be a distinct species. However, no differences were found in the complex genitalia, so we take a conservative approach, treating it as a subspecies. The differences are:

1. the tone of the ground-colour is a lighter, more greenish blue, especially on the hind wing
2. the forewing margin is much narrower than in the nominate, though variable in width (5 to 9 mm at its widest, against 12 mm in the nominate race)
3. the usual round androconial patch on the hindwing is distinctly smaller
4. the round, black androconial spot on the forewing underside is smaller and less black
5. the female is lighter blue with much white dusting. Both sexes of this new taxon are well illustrated by Berger (1981) - the female as *I. maesa*, despite the presence of the long spatulate tail so characteristic of *I. caesareus*.

**Male genitalia:** The genitalia are most distinctive; they are illustrated by Stempffer & Bennett (1958). We found no significant differences between the two subspecies.

**Discussion:** The species is extremely rare in collections. There are three males and a female in Tervuren and none in the Natural History Museum, London. The main reason for this probably is that they breed on *Loranthus* only in high canopy trees. The series from Congo has a variable width of the forewing apex (5 to 8 mm), though none is as extreme as the two figured by Berger (1981) (4 mm and 9 mm respectively). One specimen from Congo has a larger androconial patch than the others and is not included in the type series. These instabilities may indicate that there is a transition zone between the two, since such variation is unusual in the genus.

**Etymology:** The species is named for Julius Caesar, Emperor of the Roman Empire, so we would like to give Cleopatra some of the glory as well. The beauty of fresh specimens of both subspecies is surely sufficient to please two Majesties!
**Iolaus (Iolaphilus) carolinae** sp. nov. Plate 2, a and b


**Paratypes:** 2 ♀, data as above (leg. et coll. H. Warren-Gash); E. Ghana, Cape Coast, March 1998. (K. Kamara leg., coll. T. B. Larsen).

**Description:** Forewing 20 mm. The male is similar to that of *I. menas* Druce, 1890, but the ground-colour is a darker blue and the forewing apical patch is distinctly wider. The forewing costa is narrowly black, with the blue colour extending beyond the upper cell vein. The black apical patch begins at the end of the cell, leaving the base of space 3 and nearly half of space 2 blue. The black patch is about 1.5 mm in the middle of space 1b, with a triangular extension into space 1a. On the underside of the forewing the androconial brush is black, rather than brown as in *I. menas*. The male is very similar above to *I. trimeni* Wallengren, 1875, but the genitalia are closer to *I. menas*. The hindwing is blue, with a black costa in spaces 7 and 8, and a large dark androconial patch. There is no black margin or apical patch. The tornal lobe is red, but there are no traces of black tornal spots. The abdominal fold is dark greyish brown. The forewing is only slightly lobed. The forewing underside is an unmarked pure white; the androconial brushes are black (brown in *I. menas*, black also in *I. trimeni*). The hindwing is white with a narrow black postdiscal line from the tornus to about vein 4. There are two orange tornal spots, not very large, and of the same colour. The female is powder blue with only the slightest hint of discal lightening. The apex is blackened and the margin is about 2.5 mm in space 1b, then slightly in-turned in 1a. The hindwing costa is a rather light greyish brown, intensifying towards the apex, then continuing as a 1.5 mm wide margin. There is a linked row of black postdiscal striae, placed less distally than in *I. trimeni*. The Ghana female is slightly more violaceous than the Côte d’Ivoire females. The tornal lobe is red, there may be a small orange spot above the outer tail, not centred with black. No other blue [Iolainine] female in West Africa has this spot, except for *I. theodori*, the underside of which has an orange sub marginal line. The female of *I. menas* is predominantly white. The underside is like *I. menas*, but the red spots are more prominent.

**Male genitalia:** The genitalia fall into the group comprising *I. trimeni*, *I. schultzei* Aurivillius, 1905, and *I. menas* which are characterized by a vast fultura and long, narrow elongated valves. The fultura is almost identical to that of *I. menas* while the uncus is narrower and more similar to that of *I. trimeni*. The penis contains a large and a small cuneus and has a small tooth at the distal end, but is more recurved than in *I. menas*.

**Discussion:** This species is close to *I. menas*, though deeper blue and with more extensive black markings, black androconial brushes, and a blue female. It was collected in one of the wettest parts of Côte d’Ivoire, while *I. menas* is a species of the driest savannah zones. *I. trimeni* has different genitalia and is found no closer to Côte d’Ivoire than Shaba.

**Etymology:** The species is named after Caroline Warren-Gash, the wife of Haydon Warren-Gash, who richly deserves to have a butterfly named after her.
**Hypokopelates viridis parallela** ssp. nov. Plate 2, c

**Female holotype:** ♀ Guinea, Fouta Djalon, Labe area, 19.x.1995. (African Butterfly Research Institute, Nairobi).

**Paratypes:** 15 ♂ ♀ and 5 ♂ ♀, same general area, various dates (additional papered material is available).

**Description:** Forewing 18 mm. The female differs markedly from the nominate subspecies in having the basal half of the forewing densely powdered with bluish grey, the costa remaining blackish. It is uniformly black in the nominate subspecies and much deeper in tone. The hindwing costa is blackish above the cell. The cell and the base of spaces 2 and 3 are powdered with blue, while the distal two-thirds of the wing is white. There is a narrow blackish submarginal band, followed by a precise marginal white line. The nominate female has white marginal lunules only in spaces 1b to 3 and the white marginal line is faint. In both sexes the abdominal fold is pure white. On the underside the orange discal band is much narrower, tending towards obsolescence. The light colour of the upperside and the reduction in the orange bands of the underside have an interesting parallel in *Hypolycaena anara* Larsen, 1986. *Iolaus djaloni* Collins & Larsen, 1998 shows the same characteristics on comparison with *I. pollix* Aurivillius, 1895, to which it is closely related. The white abdominal fold in the female is also mirrored in both sexes of these two species. The male upperside is very like that of the nominate subspecies, but the hindwing costa is almost white instead of brown. The discal band of the underside tends even more towards obsolescence than in the female, and is sometimes wholly obliterated.

**Discussion:** This curious subspecies seems to be quite consistent in the Fouta Djalon area (Labé) from where it has been obtained by both the African Butterfly Research Institute, Nairobi and Haydon Warren-Gash. Material from Mamou further to the southeast in Guinea is transitional to the nominate subspecies, which is as might be expected, since the nominate subspecies flies from Conakry to western Nigeria in rain forest habitats.

**Etymology:** The name refers to the parallel evolution of several Theclinae in different genera referred to above.

**Capys stuarti** sp. nov. Plate 3, a and b


**Paratypes:** 2 ♀ ♀, same locality, (S. Norman leg., coll. Natural History Museum).

**Description:** Forewing 15 mm. The male is close to *C. catharus* Riley, 1932 (Type locality: Tanzania, M’Pala) in lacking the usual basal androconial patch on the hindwing, a feature only shared with *C. brunneus* Aurivillius, 1915. Larsen (1986) was wrong in stating that there was a minute brand, having misinterpreted the unscaled area above the precostal vein. It cannot be *C. bamendanus* Schultze, 1908, since Schultze emphasized that the forewing was similar to that of *C. disjunctus* which does not have the broad brown base. In any case, strongly disjunct populations of *Capys* are usually specifically distinct. The basal third of the forewing is light brown, the costa is brown and there is a 3 mm wide brown margin. The hindwing has a broad brown costa and the basal third of
the wing and the abdominal fold is also brown. The amount of brown on the hindwing is
slightly less than usual in *C. catharus*. The underside is light grey. The usual prominent
pattern is only just indicated by a few red scales. The female is slightly larger than the
male. The upperside is light greyish brown, uniform in colour, but with the cilia lighter
than the ground-colour. There is no trace of a red marginal line. The underside is like that
of the male, with the usual pattern hardly discernible. In both sexes the wing margins,
especially that of the hindwing, are hardly scalloped as they are in *C. catharus*.

**Male genitalia:** We have not dissected the specimen since there appear to be no
significant differences between the male genitalia in *Capys*.

**Discussion:** There are some fifteen species of *Capys*, mostly in disjunct populations with
limited ranges. The Jos population is the westernmost of the genus, a position till now
held by *C. bamendanus* from the Bamenda Highlands in Cameroun, a species that has not
been seen for almost a century. All feed on *Protea* (Proteaceae), which is a submontane
genus in the tropical zone. There are species of *Protea* also on the Nimba Mountains and
the Loma Mountains in Sierra Leone; we would not be overly surprised if further species
of *Capys* were found there.

**Etymology:** The species is named for its collector, Stuart Norman, who caught many
interesting species in the Kaduna/Jos area.

*Cymothoe althea bobi* ssp. nov. Plate 4, a

An interesting *Cymothoe* was regularly found by Bob St. Leger in an area north of Nsukka
in eastern Nigeria. It is so close to *C. althea* (Cramer, 1776) from west of the Dahomey
Gap that it is described as a subspecies thereof, though it might eventually be raised to
specific status, especially when the early stages have been studied.

**Male holotype:** ♂ Nigeria, Eastern Region, Idoma Division, Okwoga, 26.i.1968. (R.G.T.

**Description:** Forewing 25 mm. The single male available is somewhat smaller than usual
in *C. althea*, to which it is similar, though differing in the following respects, size apart:
1) The hindwing tornus is not quite as drawn out; 2) the forewing cell has a fine, black,
S-shaped spot; 3) the inner (postdiscal) line of black lunules on the forewing is much
diminished, almost vestigial on the hindwing; 4) and the submarginal line of black
lunules, on the other hand, is almost of the same size, while the marginal dark scaling is
less dense. The underside is as in the nominate subspecies.

**Discussion:** It is always difficult to decide whether to treat a taxon like the present one as
a species or a subspecies. It is certainly different from the main population and St. Leger
informed us that he has seen small, consistent series [north of Nsukka in eastern Nigeria]
collected at many times of the year during several years. It seems to be endemic to the
upper parts of eastern Nigeria; the closest population of the nominate subspecies is in
central Ghana. This is an unusual distribution pattern, but for the moment we give it only
subspecific status.

**Etymology:** We are pleased to dedicate this new subspecies to our late friend, Bob St.
Leger, who did so much to advance butterfly study in Nigeria and who gave freely of his
extensive knowledge to anyone seriously interested in West African butterflies.
Acraea oreas oboti ssp. nov. [Not illustrated]


**Paratypes:** 10 ♂ and 5 ♀ from the Mambilla Plateau (D. Knoop leg.) in Nigeria and various points in Cameroun (African Butterfly Research Institute).

**Description:** Forewing 28 mm. This subspecies flies in the Nigeria/Cameroun mountains, normally not lower than 1,300 metres. The forewing is jet black with white subapical spots that are linked to form an uneven band. There is a large white spot in the cell, a large discal spot, and a tornal spot. The spots are an outstandingly pure white. The hindwing has a primrose patch covering the base and the disk of the hindwing. The nominate ssp. oreas Sharpe, 1891 (Type locality: Kenya, western slopes of Mt Elgon) has primrose spots on the forewing and the primrose patch on the hindwing is much smaller than in ssp. oboti, as well as somewhat deeper in tone. The population in the central Angolan highlands (ssp. angolana Lathy, 1906) has the upper surface like ssp. oboti, but the underside is straw-yellow instead of bright chestnut; there is a long Angolan series in the Natural History Museum, London. Occasionally, Kenyan specimens with white forewing spots are met with (f. albimaculata Neave, 1904), but it must be quite scarce since we never came across it, and the primrose hindwing patch is much smaller than in ssp. oboti. The Nigeria/Cameroun populations seem very stable, though they are found disjunctly on numerous isolated mountains.

**Discussion:** This is a most typical example of the limited, but very interesting, submontane and montane fauna of the Cameroun/Nigeria mountains. A few of these have developed into distinct species, others have developed into distinct subspecies, while yet others have not differentiated from the populations in East Central Africa. The species may be quite common, but generally flies high, though it comes down to water, excrement, and rotten meat. An excellent account of the early stages in Cameroun is given by Bernaud (1994).

**Etymology:** This new subspecies is named after Professor Emmanuel Obot, who was research director at the Okwangwo National Park during two visits by Larsen. He compounds an in-depth knowledge of the Nigerian flora with a talent for interpretation which even laymen understand. When in the forest with ‘Prof’, butterflies sometimes, somehow, managed to take second place!

Celaenorrhinus nimba sp. nov. Plate 4, b


**Description:** Forewing 17 mm. The male ground-colour is dark brown. The forewing is irregularly dusted with ochreous scaling. There is a large, fully-fused hyaline double-spot in the forewing cell, crowned by two tiny dots on the costa. There is a spot in space 2 that is nearly as large, below which is a tiny attached spot just reaching into 1b. There is a small spot also in 3. The three main spots are not fused, though very close to each other. There is a tiny spot in 4 as well as three subapical spots that are not in line. The hindwing is also diffusely covered with ochreous scales, in addition to an ill-defined discal and postdiscal row of ochreous spots. The forewing underside is darker, not having
the irregular overlay of ochreous scales; the tiny non-hyaline spots on the costa are larger, and there is a large non-hyaline ochreous tornal patch in 1b, while all of 1a is whitish. The large tornal ochreous patch is not usually present in *Celaenorrhinus*. About four-fifths of the hindwing underside is ochreous, the outer two-thirds solidly so, except for a few brown spots, brown dots on the cilia, and a very small brown apical area. The base is brown, overlaid with ochreous scales, and there is a pre-discal band of brown patches. The hindwing underside is very different from that of *C. bettoni*. Confusion with any other West African butterfly is impossible. As pointed out by Warren-Gash in his first e-mail on the matter, the upperside is very like that of *C. bettoni* Butler, 1902 (see Evans 1937, Larsen 1996 for illustrations); the latter has an additional spot in space lb of the forewing, the spot in 4 is larger, there is a tiny spot also in 5, and the hindwing underside is much less yellow. The large ochreous tornal patch of the forewing underside unites *C. nimba* and *C. bettoni*.

**Male genitalia:** The species is so unique that we have not examined the genitalia of the single male; this should await a long overdue revision of the entire genus. However, the relationship with *C. bettoni* appears clear.

**Discussion:** We initially thought this butterfly might pertain to the mysterious *Aurina dida* Evans, 1937, collected at Dimbok in Côte d’Ivoire (ex coll. Dyot). Evans had a pair with identical labels at his disposal, and a further unlabelled female has later been added to his synoptic collection at the Natural History Museum, London since 1937. Closer inspection showed that the male is very different from the two females (clearly shown in the illustrations in Evans (1937)), which appear to belong to the exclusively Neotropical genus *Ablepsis* Watson, 1893. We have not been able to trace the male, but assume this is also a mislabelled exotic. It differs strongly from the present species in having the forewing band fully fused, with regular margins. Berger placed the East African *C. bettoni* in an undescribed genus, *Bettonia*. Evans's poor depiction of the genitalia of *C. bettoni* does not seem to preclude its status as a *Celaenorrhinus*.

**Etymology:** The species is named after the Nimba Mountains, which are poorly researched, higher than other forest areas in West Africa except for the Loma Mountains in Sierra Leone, and with a number of endemic and localized species. The remaining forests of the area are an urgent conservation priority.

*Ceratrichia lewisi* sp. nov. Plate 4, c


Paratypes: 1 ♀ same data, 1 ♀from Obudu. (St. Leger leg., in Natural History Museum, London). We believe that Dr L. Berger in Tervuren also has a pair on loan.

**Description:** Forewing 15 mm. This species is related to *C. phocion* (Fabricius, 1781) and *C. clara* Evans, 1937, but differs in having a strongly reduced yellow area on the hindwing. The male forewing is blackish brown with three tiny white spots (spaces 4, 6, and subapical). The hindwing is half black, with a somewhat sullied yellow covering a triangle stretching from the tornus to just above the end of the cell, then along the upper cell-vein to the margin. The female has additional small white spots in space 3 and at the end of the forewing cell; on the hindwing the yellow area is tinged orange and more suffused with black scaling. Both sexes are recognizable at a glance. The underside has a
much larger brown apical patch than *C. clara*. We have not studied the male genitalia in a species that is so readily identified by external characters. This should be done in conjunction with a revision of the entire genus, given that so little material is on hand. Confusion with other *Ceratrix* is impossible.

**Discussion:** The species is only known from the type series which was collected at about 1,400 m near the Obudu Cattle Ranch, where it is sympatric with *C. clara*. We are puzzled that it has not turned up from any of the mountains in Cameroon.

Etymology: The species is named for its collector, C.S. Lewis, about whom we have no information. However, he visited Obudu on several occasions, also collecting the endemic *Liptena priscilla* Larsen, 1995 and the first series of *Pseudathyma legeri* Larsen & Boorman, 1995. He seems to have been aware of the interest in the specimens of all three species since they were placed selectively in the museum. M. Libert assures us that he has not seen it from Cameroon, which we find rather surprising, since the Obudu Plateau is not very high and generally similar to the Cameroun mountains. However, *P. legeri* is also only known from Obudu.

*Paracleros staudei* sp. nov. Inset: Genitalia (☆); and comparison with *P. maesseni* (★)


**Description:** Forewing 15 mm. The two males examined do not differ from the common and sympatric *P. biguttulus*, except by being larger, thereby resembling *P. substrigata* Holland, 1890, which was to be expected in Kenya.

**Male genitalia:** The genitalia of the four species so far recognized are well illustrated by Berger (1978). Though built on the same ground-plan, they are clearly differentiated, especially through the shape and size of the pseudotegumen, though in one case also by the rounded tip of the valves. The new species comes closest to *P. maesseni* in which the pseudotegumen is uniquely tri-angular, pointed, and closely fused with the tegumen right to the uncus. In the new species the pseudotegumen is also triangular, but is much less attached to the tegumen and more erect; more importantly the fusion is also situated significantly further back on the tegumen than in *P. maesseni*. The tegumen itself is not as wide as in *P. maesseni*. The genitalia of an additional specimen from Kakamega was identical on inspection.

**Discussion:** The species comes closest to *P. maesseni* Berger, 1978, but the genitalia preclude the two from being conspecific. *P. maesseni* is known from Ghana, where it is not very common; Larsen caught a single male in the Oban Hills in the Cross River Loop of eastern Nigeria, which came as a great surprise. There are no records east of Nigeria. The Kakamega specimens were examined because they were larger than the common *P. biguttulus*, but all other large specimens examined between Nigeria and Zaïre.
unequivocally pertain to what was named *P. overlaeti* Berger, 1978. The male holotype of *P. substrigata* (Holland, 1890) (Type locality: Gabon) is one of the largest *Paracleros* we have ever seen and cannot possibly be a junior synonym of the small *P. biguttulus* (Mabille, 1889) as suggested by Berger. The genitalia of Holland’s type have been somewhat destroyed by *Dermestes*, including the diagnostic pseudouncus, but J. Rawlins of the Carnegie Museum kindly informs us that they are conspecific with Berger’s *P. overlaeti* of which *P. substrigata* should be considered a senior subjective synonym (*syn. nov.*). We had expected the Kakamega material also to be *P. substrigata*, so their special genital configuration came as a complete surprise.

**Etymology:** We are pleased to name this species after Hermann Staude who has done so much to stimulate interest in African butterflies, not least through his role as editor of *Metamorphosis* at a seminal point in time, when the journal took on a much more pan-African role in tune with the new international role of South Africa.

**Acknowledgements**

This is paper No. 35 stemming from Larsen's preparations for the book, *Butterflies of West Africa - origins, natural history, diversity, and conservation*, due in 2001. Support from the Carlsberg Foundation in Denmark is gratefully acknowledged. Haydon Warren Gash kindly entrusted us with the description of his three interesting new species and subspecies. The co-operation of the Natural History Museum, London is an essential cornerstone of our continued work on African butterflies; we especially wish to thank Phillip Ackery, Kim Goodger, Campbell Smith, and Dick Vane-Wright. We are also indebted to Emmanuel Obot and Caroline Olory for organizing our visits to Okwangwo and the Obudu Plateau.

**References**


Plate 1  Holotypes of four new *Ornipholidotos* species

1a. *Ornipholidotos stempfferi* (Magnification 1.5x)  1b. *Ornipholidotos dowsetti* (Magnification 1.5x)

1c. *Ornipholidotos kivu* (Magnification 1.5x)  1d. *Ornipholidotos nancy* - Holotype and female paratype: Left column

*Ornipholidotos perfragilis*: Right column. (Scale: all slightly reduced)
c. Hypokolepastes viridis - Two subspecies
Left column: Hypokolepastes viridis parallela * from Guinea
Top - Female holotype upperside
Middle - Male paratype upperside
Bottom - Male paratype underside
Right column: Hypokolepastes viridis viridis *
Top - Typical female from Kakum, Ghana
Middle - Typical male from Ghana, Volta, Amedzofe
Bottom - Typical male underside Ghana, Volta, Amedzofe
* (Specimens about 10% natural size)

a. Iolaus carolinae - Uppersides
Male holotype - top
Female paratype - bottom
(Same size as I. trimeni)

b. Iolaus carolinae - Undersides
Male holotype - top
Female paratype - bottom
(Scale: Near natural size)
Plate 3

a. *Capys stuarti* upperside (Magnification 1.3x)

b. *Capys stuarti* underside (Magnification 1.3x)
Plate 4

a. Top Row: Nominate *Cymothoe althea* from Sierra Leone (left) and Guinea (right)
   Bottom Row: *Cymothoe althea bobi*. Left, upperside; Right underside. 0.5x natural size

b. *Celaenorrhinus nimba* male holotype upperside and underside. Slightly enlarged, and same size as *C. bettoni*

c. *Ceratrichia lewisi* uppersides: Top male holotype and below female paratype.
   Enlarged ≈ 1.75x
Plate 5  Genitalia: Line drawings, figures a - d

Fig. a  O. stempfleri

Fig. b  O. dawsetti

Fig. c  O. kivu

Fig. d  O. nancy
What the Lepidoptera tell and the people do at the Vredefort Dome, North West Province, South Africa

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The Vredefort Dome is part of the Rocky Highveld Grassland (Bredenkamp & Van Rooyen, 1996) and is situated in the northern Free State and southern North West Province. Geological research indicates that a meteor struck the earth long ago leaving what is today visible as a series of intricate hills (on a map as a dome shaped series). From an ecosystem perspective the Vredefort Dome appears to be strikingly different from the surrounding highveld, looking more like bushveld though with its own unique mix of vegetation and habitats. The question that springs to mind is what kind of uniqueness the butterfly and moth fauna indicate.

My first experience of the Vredefort Dome was when I caught my first Charaxes jahlusa with bare hands on a fishing trip being ten years old (1977). I thought then that I should come back and did so a bit more than a decade later. The presence of Charaxes jahlusa was indicative that the Dome was not "ordinary highveld" or even Rocky Highveld Grassland, yet more surprises became evident. Papilio nireus, Charaxes jasius saturnus, Iolaus trimeni, Caprona pillaana and Abantis tettensis are far more common than in the surrounding highveld where most of these species are largely absent. Furthermore Jan-Albert Wessels found Sarangesa seineri, R.F. Terblanche found Anthene princeps and Douglas Kroon recorded Hamanumida daedalus at the Vredefort Dome—all at least 100 km from their known haunts. J.E. and R.F. Terblanche are investigating the taxonomic status of Coenyropsis natalii, Kedestes lepenula and Spialia depauperata australis populations from the Dome. Jan-Albert Wessels and Andre Laas (students from the Potchefstroom University) started to do butterfly projects in the area. A mud-puddling project was also initiated. On Buffelskloof—the farm of Johannes van der Merwe—there is a famous mud-puddling spot where a sign post has now been erected with the name: "Butterfly Ditch"! Douglas Kroon started with investigations on the moths and Jonathan Taylor who started late the previous season has now teamed up with him.

The Vredefort Dome, a wonderland easily accessible from many urban areas for short outdoor trips, is unfortunately under pressure for mining. R.F. & J.E. Terblanche wrote a letter to the mining company in which the situation with regard to the Lepidoptera was pointed out. Further investigations on the Lepidoptera may reveal more about an area that is not only extremely interesting for the geologist but also for the naturalist.

Reference

SPECIES RICHNESS, BIOGEOGRAPHY, CONSERVATION AND
POLLINATION ECOLOGY OF BUTTERFLIES (LEPIDOPTERA:
HESPERIOIDEA & PAPILIONOIDEA) IN MKOMAZI GAME RESERVE,
TANZANIA

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Abstract: Mkomazi Game Reserve* encompasses a semi-arid, physiographically diverse savanna incorporating a broad habitat spectrum, from open grassland through Combretum bushland and Acacia-Commiphora woodland to Afromontane forest. A preliminary and largely opportunistic survey recorded 153 butterfly species within the reserve. Based on distribution and habitat preferences we estimate that as many as 419 species may eventually be recorded as occurring in Mkomazi. This is a high species richness for a savanna area the size of Mkomazi, and underlines the important role the reserve plays in conserving a representative portion of the diverse East African butterfly fauna. The topographic and associated habitat diversity contributes towards the presence of a number of different biogeographical elements within the reserve. Three distinct assemblages are discernible within the Mkomazi butterfly community. The commonest assemblage constitutes species associated with Carcasson's Eastern Zone of Open Formations, typically including species with a widespread distribution covering eastern and southern Africa. The remaining two assemblages represent more specialised communities. The Afromontane forest element (Carcasson's Tanzania-Nyasa Zone of Highland Forest) is restricted to less than 1% of the reserve. However, relative to area, the montane forest habitat contains the highest butterfly species richness within Mkomazi and needs to be carefully managed from a conservation perspective. Carcasson's Somalia Zone of Open Formations provides the assemblage most characteristic of the reserve, one whose species are associated with arid scrub and dry grassland of the Somalia-Masai regional centre of floral endemism. A number of new distribution records were documented during the survey. Mkomazi is the northernmost locality that Alaena nyassa major has been recorded, and populations of Belenois margaritacea intermedia and Acraea cerasa cerasa were unexpectedly located within the reserve. A species previously only known from Kenya, Acraea pudorina, was recorded for the first time from Tanzania. We also report on the role that butterflies play in Acacia pollination ecology within Mkomazi. Butterflies along with bees and flies are important pollinators of a number of Acacia species within the reserve.

Introduction: The Order Lepidoptera includes approximately 150 000 species and together with the flies (Diptera), wasps, ants and bees (Hymenoptera) is one of the largest groups of insects

* Sometimes simply referred to as Mkomazi hereafter
after the beetles (Coleoptera). Of the world total of around 17,500 butterfly species, 3,607 occur in the Afrotropical region (Ackery et al., 1995). Many Afrotropical butterfly species are widespread, but there are many ‘hotspot’ areas that have a very rich local diversity, usually including a high percentage of endemic species. The most species-rich area in the Afrotropical region, the Cross River Loop in eastern Nigeria and western Cameroon, containing the Oban Hills and Korup National Park, has nearly 1,100 of the 1,400 West African species (Larsen, 1997; 1998). Many other localities, encompassing smaller areas, have high species richness. Mount Fébé in Cameroon has 700 recorded species (Libert, 1994) and Minziro forest near Bukoba in north-western Tanzania harbours 800 species (Larsen, 1997). Areas such as these urgently need to be afforded conservation status in order to protect as much of Africa’s butterfly diversity as possible (Ackery et al., 1995).

Tanzania has an exceptionally rich butterfly fauna that is now reasonably well known from a species richness perspective (Kielland, 1990; 1994; Congdon & Collins, 1998). Although the butterflies of Tanzania, along with those of Kenya (Larsen, 1991; Collins & Larsen, 1996) and southern Africa (Pringle et al., 1994; Henning et al., 1997), are the best documented in Africa, much preliminary ground work still needs to be done, particularly in Tanzania and Kenya. As part of the five year Mkomazi Ecological Research Programme, which produced an ecological inventory survey of the fauna and flora in Mkomazi Game Reserve in Tanzania (Coe et al., 1999a), a preliminary survey of butterfly species richness in the reserve was carried out. This study has allowed for a valuable initial assessment of the role that Mkomazi Game Reserve plays in the conservation of butterfly diversity in East Africa.

Materials and methods

Study site

Mkomazi Game Reserve is situated in north-eastern Tanzania on the border with Kenya and is contiguous with Tsavo West National Park. The area of the reserve is approximately 3,276 km², with a maximum length of 130 km and a maximum width of 41 km and lies within co-ordinates ranging from 3°47′- 4°33′S and 37°45′- 39°32′E (Coe, 1999). Altitude varies from 230 m in the south-eastern end of the reserve to 1,620 m, the highest of the outlying peaks of the Pare Mountains that lie in the north-western end of the reserve. Annual rainfall ranges between 250 mm to 775 mm and is largely determined by topography, with the physiographically diverse north-western area around Ibaya Camp receiving 400-700 mm (McWilliam & Packer, 1999). Vegetation in Mkomazi is dominated by Acacia-Commiphora bushland present over much of the lowland areas, interspersed with seasonally inundated grasslands, relict patches of Afromontane Forest (mist forest) on the higher peaks, and a range of woodland or scrub habitats on the lower hill slopes (Coe et al., 1999b).

Sampling

Except for a study on pollination of Acacia species (Stone et al., 1996; 1998; 1999) where all the butterfly species visiting Acacia flowers on the study trees were comprehensively documented, the sampling of butterflies in Mkomazi was done on an opportunistic basis. No attempt was made to sample all habitats and altitudes present in the reserve and those that were sampled did not receive exhaustive treatment. Sampling of butterflies was subordinate to more intensive collecting of other
groups of insects, particularly the Hymenoptera. Due to logistical restrictions, most of the collecting effort was concentrated in the western end of Mkomazi leaving the vast majority of the reserve unsampled. However, the western end of the reserve contains the highest physiographic and habitat diversity, with the central and eastern habitats being far more uniform from a topographical and habitat perspective. Seasonal variation in species richness was not assessed; however, collecting was carried out during the two annual peaks of butterfly emergence, which correspond with the bimodal rainfall pattern of ‘long rains’ between February and May, and ‘short rains’ of November and December (Fig. 1). The majority of the specimens were collected during a period of only 36 days, broken between November and December 1995 and April and May 1996. Consequently the checklist presented here is likely to be a gross underestimate of butterfly species richness in Mkomazi and must be assessed as a preliminary survey.

The majority of species were identified from collected specimens, but in a few cases were recorded through observation. The latter approach was only used for common species that are unmistakable in the field. Collected specimens were identified using Kielland (1990), Larsen (1991) and D’Abrera (1980). Steve Collins of the African Butterfly Research Institute (ABRI) Nairobi, assisted with identification of some of the more difficult taxa.

Comparative assessments
The comparative taxonomic composition (subfamily level) and overall species richness of the butterfly fauna in Mkomazi, was assessed by extracting this information from the regional treatments for Tanzania (Kielland, 1990; Congdon & Collins, 1998), Kenya (Larsen, 1991; Collins & Larsen, 1996) and southern Africa (Pringle et al., 1994).
Table 1: Taxonomic composition and comparative species richness of Mkomazi's butterfly fauna. The figures for Mkomazi include both recorded species and (potential species). The Tanzanian count was tallied from Kielland (1990) and Congdon & Collins (1998). The Kenyan figures are derived from Larsen (1991) and Collins & Larsen (1996); the Lake Manyara National Park total from Cordeiro (1990), and the southern African totals are after Pringle et al., (1994).

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The number of butterfly species that could potentially occur in Mkomazi Game Reserve was assessed based on the distribution and habitat preferences of Tanzanian butterflies recorded in Kielland (1990) and Cordeiro (1995). Species whose recorded distribution encompassed north-eastern Tanzania and whose habitat preferences are those that are found in Mkomazi were included in this potential list.

**Results**

*Species richness*

One hundred and fifty-three species of butterfly have been recorded from Mkomazi Game Reserve (Appendix A). Due to the constraints placed on collecting effort by other sampling priorities, the resultant composition of the butterfly faunal assemblage was heavily biased towards the more visible and easily sampled species. The proportion of predicted species richness at family level that has been sampled in Mkomazi Game Reserve is illustrated in Fig. 2 and shows that the Hesperidae and Lycaenidae were vastly under collected relative to their predicted species richness in the reserve. Of the 1387 Tanzanian species 419 species could potentially occur in Mkomazi Game Reserve (Appendix A; Table 1). Most of these are savanna species, but 39 are montane forest species occurring on the North Pare or South Pare Mountains bordering the reserve. A further 84 montane species, recorded in the literature as occurring on the Usambara Mountains, were not included in the potential list for Mkomazi.

![Fig. 2. Proportion of the predicted butterfly species richness for Mkomazi Game Reserve that was actually sampled per family.](image)

The family composition of the butterfly species predicted to occur in Mkomazi (Fig. 3) approximates the family composition of Tanzania’s total butterfly fauna (Fig. 4), but reveals a higher and lower proportion for the Pieridae and Lycaenidae respectively. Thirty-five percent of Mkomazi’s butterfly species richness is restricted to the montane
Fig. 3. Family composition of the predicted butterfly species richness in Mkomazi Game Reserve.

Fig. 4. Family composition of Tanzania's butterfly fauna.

Fig. 5. Contribution of outliers of the Pare Mountains present in the north-western part of the reserve to overall species richness in Mkomazi. Montane = outliers of the Pare Mountains consisting of fragmented Afromontane forest between 1300 m and 1620 m. Lowland = savanna plains with an average altitude of 800 m. Shared = proportion of species that were present in both habitats.
outliers of the South Pare Mountains that occur within the reserve (Fig. 5). The comparative assessment of butterfly species richness, at subfamily level, between komazi and the regional faunas of Tanzania, Kenya and southern Africa illustrates a general pattern of decreasing species richness from Tanzania through Kenya to southern Africa (Table 1 and Fig. 6). Notable exceptions are evident in the Satyrinae, Theclinae, Miletinae and Polyommatinae. A comparison of proportional subfamily contribution to total species richness recorded from Mkomazi and Lake Manyara National Park depicts a highly concordant pattern (Fig. 7). Lastly, the sampled species richness of Mkomazi is placed in the context of other assessments of Afrotropical butterfly species richness and serves to illustrate the disparity in richness between savanna and rainforest butterfly faunas (Fig. 8).

Discussion

Comparison of regional species richness

The Tanzanian butterfly species count of 1387, comprising the 1117 species documented (as recorded or probably occurring in Tanzania) in the Butterflies of Tanzania (Kielland, 1990) and the subsequent 270 additional species recorded in Congdon & Collins (1998), is well over the 853 species that occur in the whole southern African region (Pringle et al., 1994). This exceptionally high species richness also substantially exceeds the 901 species recorded from Kenya (Larsen, 1991; Collins & Larsen, 1996) and is more on a par with Ugandan (1242 species) (Congdon & Collins, 1998) and West African butterfly species richness. Nigeria has 1250 currently recorded species (Larsen, 1998), while the Cameroon fauna has been estimated to total 1550 species (Libert, 1992). Ghana only has 870 recorded species (Larsen, 1995), but is a relatively small country. Within East Africa the comparatively high proportion of endemic species supports the richness of Tanzania’s butterfly fauna. Tanzania has 118 endemic species compared to 25 for Kenya and 34 for Uganda (Congdon & Collins, 1998). Tanzania’s high species richness and endemism is a function of a larger land area, greater diversity of habitat and the presence of the eastern arc mountains, which are speciation ‘hotspots’ (Congdon & Collins, 1998).

A comparative assessment of subfamily composition for regional faunas illustrates a general decline in species richness from Tanzania to Kenya to southern Africa. Tanzania’s higher species richness in comparison to Kenya is attributable to the factors mentioned in the preceding paragraph. The greater species richness of both Tanzania and Kenya than southern Africa is due to the tropical position of the two former countries. Overall butterfly species richness increases with a decrease in latitude with groups such as the hesperiid subfamily Hesperini, nymphalid subfamilies, Limenitinae and Acraeinae and the lycaenid subfamily Lipteninae proliferating in the tropics. However, there are a few notable exceptions such as a number of subfamilies in the Lycaenidae as well as the nymphalid subfamily Satyrinae. Within the Lycaenidae the Theclinae and the Miletinae have a higher species richness in southern Africa than in East Africa, due to the presence of species rich genera such as *Aloeides* and *Chrysoritis* in the former and *Thestor* in the latter subfamily that are centred in the old Cape Province (now divided into Western, Eastern and Northern Cape Provinces) of South Africa (Cottrell, 1978). The Polyommatinae and the Satyrinae have greater species richness in southern Africa than Kenya and a comparable richness to Tanzania due to the presence of the lycaenid genus *Lepidochrysops* and satyrine genera such as *Dira*, *Dingana*, *Cassionympha*,
*Melampias, Stygionympha, Pseudonympha* and *Coenyra* in southern Africa. A number of these genera are endemic to South Africa and contain a proliferation of species that have radiated in the southern part of the continent (Cottrell, 1978).

**Fig. 6.** Comparative subfamily contribution to regional species richness for Tanzania, Kenya and southern Africa.

**Fig. 7.** A comparison of proportional subfamily contribution to total sampled species richness between Mkomazi Game Reserve and Lake Manyara National Park.
Comparison of local species richness

When compiling the checklist of potential butterfly species for Mkomazi, montane forest species recorded by Kielland (1990) and Cordeiro (1995) from the North Pare or South Pare Mountains bordering the reserve were included in the list. This was done because these species may well be present in the isolated Afromontane forests on outlying peaks of these mountains that fall within Mkomazi. However, the montane species from the Usambara Mountains were excluded, because these mountains constitute a region of high species endemism (Rodgers & Homewood, 1982) and are situated at a considerably greater distance from the montane outliers in the reserve than are the Pare Mountains.

Table 2. Contribution of habitat to butterfly species richness at family level in Mkomazi Game Reserve.

<table>
<thead>
<tr>
<th>Family</th>
<th>Montane forest</th>
<th>Montane forest/savanna margins</th>
<th>Savanna</th>
</tr>
</thead>
<tbody>
<tr>
<td>HESPERIIDAE</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>PAPILIONIDAE</td>
<td>3</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>PIERIDAE</td>
<td>3</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>NYMPHALIDAE</td>
<td>6</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>LYCAENIDAE</td>
<td>2</td>
<td>4</td>
<td>28</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16 (10%)</strong></td>
<td><strong>38 (25%)</strong></td>
<td><strong>99 (65%)</strong></td>
</tr>
</tbody>
</table>

Fig. 8. Comparative local butterfly species richness between Mkomazi Game Reserve and two savanna localities: Mwinilunga and Manyara National Park and three rain forest localities: Kakum National Park, Mount Fébé and Minziro forest.
Table 3. Records of butterfly species visiting *Acacia* species in Mkomazi Game Reserve.

<table>
<thead>
<tr>
<th>Lycaenidae</th>
<th>brevispica</th>
<th>drepano-lobium</th>
<th>nilotica</th>
<th>senegal</th>
<th>tortilis</th>
<th>zanzibarica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthene</td>
<td>amarah</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>opalina</td>
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<tr>
<td></td>
<td>otacilia</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azanus</td>
<td>jesus</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
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<tr>
<td></td>
<td>moriqua</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ubaldus</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Leptotes</td>
<td>pirithous</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zizeeria</td>
<td>knysna</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Axiocerces</td>
<td>harpax</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hypolycaena</td>
<td>pachalica</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nymphalidae</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Acraea</td>
<td>neobule</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Danaus</td>
<td>chryssippus</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Amauris</td>
<td>ochlea</td>
<td></td>
<td></td>
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<td>*</td>
<td></td>
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<tr>
<td>Bybila</td>
<td>ilithyia</td>
<td></td>
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<tr>
<td>Hypolimnas</td>
<td>misippus</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
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<tr>
<td>Junonia</td>
<td>oenone</td>
<td></td>
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<tr>
<td></td>
<td>hierta</td>
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<td>*</td>
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<td></td>
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<tr>
<td>Pieridae</td>
<td></td>
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<tr>
<td>Catopsilia</td>
<td>florella</td>
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<tr>
<td>Colotis</td>
<td>danae</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>eucharis</td>
<td></td>
<td></td>
<td>*</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>halimede</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hesperiidae</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coelitades</td>
<td>anchises</td>
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</tr>
</tbody>
</table>

Assessment of the recorded butterfly species richness of 153 species for Mkomazi shows that this conservative total compares favourably with preliminary assessments of local species richness in other savanna areas. Terblanche & Henning (1993) recorded 160 species from the Mwinilunga region in north-western Zambia resulting from nine days of intensive collecting in an area comprising wetter Zambezian miombo woodland, *sensu* White (1983). Kielland (1985) recorded 89 species from Pemba Island. Most of the western half of this coral island is under clove plantations, but forest remnants are still present (Kielland, 1985). A largely opportunistic collecting effort recorded 146 species from the Ngara District in north-western Tanzania (Haldane, 1969). A preliminary survey of Gashaka-Gumti National Park in Nigeria recorded 303 species (Knoop, unpublished report). The park includes savanna, riverine forest, montane forest and montane grassland. Lake Manyara National Park (Arusha region, Tanzania) protects at least 186 species, although this total emanates from a provisional study of the park (Cordeiro, 1990). The park also comprises only 330 km² of which two-thirds consists of the lake (Cordeiro, 1990), and hence is a fraction of the size of Mkomazi. Nonetheless, habitat
diversity is higher than in Mkomazi and includes groundwater and riverine forest, two butterfly rich habitats absent from Mkomazi, although these two habitats were not comprehensively surveyed in Lake Manyara National Park (Cordeiro, 1990). An indication that the faunas in both Mkomazi and Lake Manyara are under surveyed is provided by the comparative subfamily composition of the total recorded species richness. In both surveys the Hesperiidae, Nymphalidae and Lycaenidae are poorly represented. The concordance in composition therefore does not reflect the real subfamily composition of the regional fauna, but rather reflects collector bias towards the larger, conspicuous species that are easier to sample. This bias is highlighted in the depiction of the proportion of the predicted species for each family that has been sampled in Mkomazi (Fig. 2). It is clear from this assessment that only the Papilionidae and Pieridae have been sampled with any degree of confidence. The comparative assessment of the family composition of the predicted species richness for Mkomazi (Fig. 3) with the family composition of the total Tanzanian butterfly fauna (Fig. 4) depicts a largely concordant pattern, further illustrating the family bias in the sampled butterfly fauna of Mkomazi. The higher proportion of Lycaenidae in the total Tanzanian fauna is attributable to the higher species richness of this family in rainforest areas of Tanzania, a habitat absent from Mkomazi. Conversely, the higher proportion of Pieridae in the Mkomazi predicted fauna is indicative of the increased dominance of this family in drier savanna areas.

These comparative assessments suggest that, if real butterfly species richness of Mkomazi approximates the estimated richness, the reserve protects a high butterfly species richness. The total of 419 potential species for Mkomazi is almost a third of the total number of species recorded for Tanzania and is an exceptionally high species richness for a savanna area of this size. This elevated species richness can be attributed to the high physiographical and associated habitat and floral diversity contained within the reserve. The environmental influence on species richness is borne out by the presence of different ecologically adapted assemblages of butterflies within Mkomazi (see below). Notwithstanding this high predicted species richness, comparison with local species richness in rainforest reinforces the relative paucity in savanna areas. For example, Kakum National Park in Ghana, comprising 350 km² of rainforest, an area one-tenth the size of Mkomazi, harbours 440 recorded species of an estimated 550–600 total species (Larsen, 1995). Seven hundred species have been recorded from Mount Fébé in Cameroon (Libert, 1994) and Minziro forest near Bukoba in north-western Tanzania harbours 800 species (Larsen, 1997).

Biogeographical affinities
Mkomazi Game Reserve is situated within the Somalia-Masai regional centre of floral endemism, which includes approximately 2500 plant species of which around half are endemic (White, 1983). Faunistically, Mkomazi lies in the southern region of the Somalia Zone of Open Formations (Carcasson, 1964; Larsen, 1991). The reserve also includes elements of the Highland Forest Division, specifically the Tanzania-Nyasa Zone, defined as encompassing the highland forests of south-eastern Kenya, most of the mountains of Tanzania, mountains of Malawi, Mozambique and eastern Zimbabwe (Carcasson, 1964).

At a regional level Mkomazi falls largely within zoogeographical subzone 4c as defined by Kielland (1990), which includes the East and West Usambara Mountains and
the South Pare Mountains. The butterfly species of the South Pare Mountains have a higher affiliation with those of the West Usambara Mountains than with the North Pare Mountains, whose fauna is closer to that of the Northern Highlands, such as Kilimanjaro (Kielland, 1990). The butterfly faunas of the South Pare Mountains and Usambara Mountains also show some affinity with the Teita Hills in south-eastern Kenya (Kielland, 1990). However, the outliers of the Pare Mountains around Ibaya Camp, in the north-western part of the reserve, can be considered as part of the North Pare Mountain system and consequently fall within subzone 6b of Kielland (1990). This subzone encompasses Kilimanjaro, the North Pare Mountains and the mountains of the Lossogoni Plateau. Since montane forest occurring within Mkomazi is restricted to these north-western outliers, the associated butterfly fauna would be expected to be representative of the faunal assemblage typical of the North Pare Mountains rather than that of the South Pare Mountains. This assertion could not be assessed due to the inadequate sampling of the montane butterfly community within the reserve. Nevertheless, a number of montane forest species, most of which had previously been recorded from both the North and South Pare Mountains, were recorded from Mkomazi during the programme, justifying the inclusion of montane species recorded from these mountains in the potential list for the reserve.

The montane forest species recorded from Mkomazi included *Papilio phorcas nyikanus*, *Papilio echerioides wertheri*, *Mylothris sagala sagala*, *Belenois margaritacea intermedia*, *Acraea cerasa cerasa*, *Acraea quirina rosa*, *Acraea pharsalus pharsaloides*, *Acraea johnstoni johnstoni*, *Junonia tuge la aurorina* and *Alaena nyassa major*. *Acraea cerasa cerasa* is very rare in Tanzania and has not previously been recorded from the Pare Mountains (S.C. Collins, pers. comm.), although it is known from the East Usambara Mountains (Kielland, 1990). Mkomazi is also the furthest north that *A. nyassa major* has been recorded, previously only having been recorded from the Usambara and Uluguru Mountains (Ackery et al., 1995; S.C. Collins, pers. comm.). A species more typical of lowland forest, *Charaxes protoclea azota*, (Hemming, 1989), but one that is found in forest up to 1700 m (Kielland, 1990) was also recorded on top of Ibaya Hill (1400 m) in montane forest. However, another forest species, *Euphaedra neophron littoralis*, that occurs between 400 m and 1600 m (Kielland, 1990) and is reasonably common just outside the reserve at the base of the South Pare Mountains, has not yet been collected from within the reserve and appears to be absent from the montane forest patches. *Euphaedra neophron* may still be recorded in the thicker woodland areas south of the Mandi and Gulela Hills or in the region of Kisiwani River. Two other forest species, whose distribution is not restricted by altitude - *Acraea cabira* and *Celaenorrhinus galenus* - both of which are common and widespread African species, were recorded from montane forest in Mkomazi. Other species, which are normally associated with a wider range of habitats and are typically present in woodland as well as forest, were only encountered in association with montane forest within the reserve. These included *Papilio constantinus*, *P. dardanus*, *Graphium leonidas*, *G. policenes*, *Eronia cleodora*, *Acraea esebria*, *A. natalica*, *Phalanta phalantha*, *Junonia terea*, *Pseudacrea boisduvalii*, *Charaxes brutus*, *C. candioppe* and *Libythea labdaca*. Many of these species were locally abundant on Ibaya Hill and Maji Kununua at the forest margins where savanna elements are penetrating the forest due to fire encroachment and
tree felling. These species are characteristic of forest margins and sub-climax lowland forest (Carcasson, 1964).

Although a dozen or so montane species have already been recorded within Mkomazi there may be further species that are present on the South Pare Mountains, but whose range does not extend into the reserve. This contention is supported by Amauris echeria, Neptis aurivillii, and Mylothris yulei which were recorded during this programme on the South Pare Mountains but were not found within Mkomazi, although this may equally be the result of under sampling within the reserve.

Although most butterfly species are capable of dispersing over large areas, isolated montane forests can act to reduce or restrict inter-population gene flow resulting in subsequent genetic divergence. One possible example of this phenomenon is Belenois margaritaceae, a species centred in the central Kenyan highlands (Larsen, 1991) with four subspecifically defined populations, two of which are restricted to northern Tanzania. Belenois margaritaceae intermedia was recorded on Maji Kununua at 1600 m, but the presence of this subspecies in Mkomazi is at odds with the known distribution of the subspecific populations of this taxon. The subspecies that would be expected to be present in Mkomazi is Belenois margaritaceae plutonica, which is recorded from the North and South Pare and the Usambara Mountains (Kielland, 1990). However, the series collected on Maji Kununua answers to B. m. intermedia as illustrated in Kielland (1990), a subspecies that is currently recorded from the Uzungwa Range (including Image Mountain) and the Nguru Mountains, the latter which are approximately 150 km further south than Maji Kununua. There seems to be no clear-cut geographical division between the different subspecies of Belenois margaritacea, since specimens from one location on the North Pare Mountains are very close to subspecies B. m. kenyensis from the Teita Hills in Kenya, yet a population a few kilometres south in the North Pare Mountains answers to typical B. m. plutonica (Kielland, 1990). As Kielland (1990) suggests, the variation within this taxon may only be the result of ecological factors, a view that seems to be supported by the presence of B. m. intermedia within the normal distribution of B. m. plutonica, and indicates the futility of defining populations such as these at subspecific rank. Cordeiro (1990) records B. m. plutonica at unusually low elevations of around 900m in Lake Manyara National Park and in the Rau Forest Reserve in Moshi District and considers these populations to be ecological variants.

Species that are confined to montane forest in Tanzania occur at lower altitudes in southern Africa where latitude compensates for altitude e.g. Acraea cerasa and Junonia lugela, which are common at low altitudes in Kwazulu-Natal (South Africa), but only present at 1400-1600 m on top of Ibaya Hill and Maji Kununua in Mkomazi. This phenomenon is characteristic of other insect groups such as species in the three families of flies (Diptera): Diastatidae, Campichoetidae and Opomyzidae (Barraclough, 1994).

The majority of species present in Mkomazi enjoy a widespread distribution that extends down to eastern South Africa and are broadly associated with the open biogeographical formations of Carcasson (1964). However, besides the Afromontane Forest butterfly assemblage, there is another unique butterfly community in the reserve. This assemblage is one that is typical of the arid scrub and dry grassland of the Somalia Masai regional centre of floral endemism, sensu White (1983) and corresponds with the biogeographical Somalia Zone of Carcasson (1964) and Larsen (1991). Most of these species are associated with dry Acacia scrub and only just penetrate into northern
Tanzania, enjoying a distribution centred in the dry horn of Africa that typically includes Ethiopia, Somalia, south-eastern Sudan, Kenya, and for a few species, southern Arabia (Ackery et al., 1995). Arid-adapted species recorded from Mkomazi were: Kedestes rogersi (Hesperiidae), Junonia limnoria, Neocoenyra duplex, Acraea chilo, Acraea pudorina (Nymphalidae), Colotis protomedia, Colotis halimede, Colotis vestalis, Colotis chrysonome (Pieridae) and Anthene opalina (Lycaenidae). This is the first record of Acraea (Acraea) pudorina for Tanzania, confirming the predictions by both Larsen (1991) and Kielland (1990) that the species will be found in the arid country in northern Tanzania. Previously this species had only been reliably recorded from central and southern Kenya (Kielland, 1990; Larsen, 1991; Ackery et al., 1995).

Conservation and management
The value of Mkomazi as an invertebrate conservation area lies in the high physiographic and environmental diversity and hence associated habitat diversity that is present within the reserve. This abiotic variation and floral richness in turn contribute to a diverse and rich invertebrate community. Floral richness in combination with topographical and environmental variation is critical in contributing to high faunal species richness. In addition, Mkomazi is the only conservation area in Tanzania that protects a representative portion of the Somalia-Masai Regional Centre of floral endemism (White, 1983). Although this habitat type enjoys protection in Kenya, it is also Tanzania's responsibility to ensure that representative portions of each of the phytochoria that occur in the country are protected. Anthropogenic influence on the reserve’s biota is an ongoing pressure, particularly in the form of pastoralism (Brockington & Homewood, 1999) and the issue of sustainable utilisation urgently needs to be addressed before irreversible human impacts change the ecosystem for good (Packer, 1999). Apart from pastoralists and the associated burning regime to stimulate post-fire growth, there is an added impact of tree felling in the montane forests for poles and charcoal production (Coe, 1999). This cannot be considered to be sustainable utilisation given the slow regeneration time of forest tree species. Montane forest and forest-savanna margins on Ibaya Hill and Maji Kununua contributed to 35% of the total species richness (Table 2) recorded for Mkomazi, with a further third of the remaining butterfly species, recorded from elsewhere in the reserve, also occurring on these hills. Thus a total of 57% of all the butterflies collected in Mkomazi were present on these outliers of the Pare Mountains. This concentration of butterflies was obvious in the field with noticeably higher local species richness and abundance on these hill tops compared to any given locality in the surrounding low lying areas. After the rains the open Setaria – Panicum grass glades fringed by montane forest on Ibaya Hill teemed with butterflies – even more so than the Acacia-Commiphora bushland. The combination and meeting of montane forest and savanna is probably the main contributory factor to this high local diversity. These regions of higher altitude comprise only a very small percentage of the reserve, but proportionate to their area, contribute the most to butterfly species richness in Mkomazi. Relative to area the Afromontane forest is the richest habitat within the reserve. These forests also play an important role as dry season refugia for other insect groups such as cicadas (Villet & van Noort, 1999) and hanging flies (Londt & van Noort, 1999). As such, the geographically restricted montane habitats that are exceptionally prone to degradation require careful
management and are a conservation priority. Loss of montane forest within the reserve will have significant negative impacts on invertebrate species richness.

Butterflies and acacia pollination ecology
Acacias are a dominant feature of the Mkomazi vegetation (Coe et al., 1999b & Stone et al., 1996; 1998; 1999), and butterflies are important flower visitors for a number of them. Mkomazi acacias are members of two subgenera within the genus Acacia – the subgenus Acacia, and the subgenus Aculeiferom. The flowers of the former are usually regarded as nectarless, while flowers of the latter often secrete nectar (Stone et al., 1996; 1998 1999). In practice, our work in Mkomazi has shown this distinction not to be clear-cut, and butterflies are a very sensitive indicator of nectar secretion. Among the Mkomazi acacias, the most abundant nectar secretors are Acacia mellifera and A. senegal. Both of these species have elongate ‘spicate’ inflorescences, and belong to the subgenus Aculeiferom. When in full flower, both species are visited by a huge diversity of insects, including many butterflies. Each floret on the inflorescences (which may contain up to 100 flowers) contains from 1-2 microlitres of relatively dilute nectar (20-30% sucrose) when it opens in the morning, and flowering trees thus represent a very rich source of both water and sugar. The individual florets are c. 5 mm deep, and have a very narrow diameter, such that only flower visitors with long, fine mouthparts (such as butterflies) are able to reach the nectar. In Mkomazi, A. senegal was seen to be visited by 18 butterfly species (Table 3), though this is certainly an underestimate of the total butterfly richness visiting this tree.

Contrary to the generalisation mentioned above, at least two species in the subgenus Acacia definitely do secrete nectar. Acacia brevispica and A. zanzibarica both have flowers in spherical ‘capitate’ inflorescences which secrete very small volumes of highly concentrated nectar, and are visited by a range of nectar feeding insects. The high sugar concentration (c. 70% sucrose) and small volumes (much less than 1 microlitre per flower) of the nectar in these two species means that large nectar foragers such as honey bees do not harvest nectar from the flowers. Both species are popular with butterflies, particularly small blues, coppers and hairstreaks in the family Lycaenidae, skippers in the Hesperiidae, and whites, sulphurs and orange-tips in the Pieridae. We have good data from Mkomazi for A. zanzibarica, which was visited by 18 butterfly species, as many as the more productive A. senegal. Butterfly visitors to A. zanzibarica included Anthene opalina, the Opal ciliate blue, which is regarded as a rare and local dry savanna species whose range extends northwards into the eastern Sahel (Larsen, 1991). Adult butterflies do not harvest pollen, and flowers without nectar are usually ignored by butterflies. Acacia tortilis secretes only very tiny amounts of nectar, and though visited for nectar by a diversity of very small solitary bees (Stone et al., 1996; 1998; 1999) this species was minimally exploited by butterflies (only 4 species observed). This may reflect the availability of alternate, more productive nectar sources, and it is probable that this species would at least be exploited by small butterflies were other sources not in flower. Two Mkomazi acacias seem to secrete no nectar at all (A. drepanolobium and A. nilotica), and on each species we recorded very few flower visitation events by blue lycaenids (Anthene otacilia on Acacia drepanolobium and Azanus ubaldus on Acacia nilotica). These visits were almost certainly feeding ‘mistakes’ by butterflies which probably feed on these acacias as larvae.
Acacias are also important for many lycaenid butterflies as foodplants, and adults and larvae are thus found even on non-flowering acacias (Larsen, 1991). Our observations showed that most small lycaenids—particularly the ciliate blues in the genus *Anthene*, Zebra blues of the genus *Leptotes*, and Babul blues of the genus *Azanus*—were extremely local in their activity, often spending the entire day on a single part of a single tree. Acacias are generally regarded as self-sterile, and so flower visitors which do not disperse between trees cannot be effective pollinators. Where butterflies do not disperse between trees but do take nectar, they should be regarded as nectar robbers rather than pollinators, and feeding them is a cost without benefit for the tree. The larger butterfly species recorded from *Acacia senegal* and *A. zanzibarica*, such as *Danaus chrysippus*, *Amauris ochlea* and *Catopsilia florella*, range widely, and would certainly be capable of effective pollen transfer between *Acacia* individuals.

**Conclusions**

Preliminary assessments indicate that Mkomazi Game Reserve conserves an exceptionally rich butterfly fauna. Consequently the reserve plays a valuable role in protecting a representative range of the butterfly faunal assemblages present in East Africa.

**Acknowledgements**

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**References**


Map – Africa outline, indicating approximate position of Mkomazi research area; Cross River Loop and Mwinilunga, areas mentioned in text are also indicated (after Pohlhill & Wiens, 1998)
Appendix A.
Checklist of Papilionoidea and Hesperioidea for Mkomazi Game Reserve, Tanzania. Nomenclature, hierarchical and species ordering follows Ackery et al., (1995). The 153 species recorded from Mkomazi are denoted in bold text. Potential species not yet recorded from Mkomazi are included in the list, but are indented to distinguish them from the recorded species. Of these potential species, montane forest species recorded in the literature from the North and South Pare Mountains are indicated as such.

### HESPERIOIDEA

#### COELIADIINAЕ

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Location</th>
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<tbody>
<tr>
<td><strong>Coeliades anchises anchises (Gerstaecker)</strong></td>
<td>Ibaya Hill, widespread</td>
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<tr>
<td>Coeliades forestan forestan (Stoll)</td>
<td></td>
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<tr>
<td>Coeliades libeon (Druce)</td>
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<tr>
<td>Coeliades pisistratus (Fabricius)</td>
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<tr>
<td><strong>PYRGINAE</strong></td>
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<tr>
<td>Celaenorrhinus galenus (Fabricius)</td>
<td>Maji Kununua</td>
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<tr>
<td>Tagiades flesus (Fabricius)</td>
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<tr>
<td>Eagris nottoana nottoana (Wallengren)</td>
<td>[North Pare Mountains]</td>
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<tr>
<td>Eagris sabadius astoria (Holland)</td>
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<tr>
<td>Eretis lugens (Rogenhofer)</td>
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<td>Eretis melania (Mabille)</td>
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<tr>
<td><strong>Eretis umbra maculifera (Mabille &amp; Boulet)</strong></td>
<td>Kisima Hill</td>
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<tr>
<td>Sarangesa lucidella (Mabille)</td>
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<tr>
<td>Sarangesa maculata (Mabille)</td>
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<tr>
<td><strong>Sarangesa motozj (Wallengren)</strong></td>
<td>Maji Kununua</td>
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<tr>
<td><strong>Sarangesa phidyle (Walker)</strong></td>
<td>Kisima Plot, Mbono Valley</td>
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<td>Sarangesa seineini Strain</td>
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<td>Netrobalane canopus (Trimen)</td>
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<td>Abantis paradisea (Butler)</td>
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<tr>
<td>Abantis venosa (Trimen)</td>
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<td><strong>Spialia colotes transvaaliæ (Trimen)</strong></td>
<td>Ibaya Camp, Kisima Hill, Maji Kununua</td>
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<td>Spialia confusa obscura (Evans)</td>
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<td>Spialia depauperata depauperata (Strand)</td>
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<td>Spialia diomus diomus (Hopffer)</td>
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<tr>
<td>Spialia dromus (Plotz)</td>
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<td>Spialia mafa higginsi (Evans)</td>
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<td>Spialia spio (Linnaeus)</td>
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<td>Spialia zebra bifida (Higgins)</td>
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<td>Gomalia elma elma (Trimen)</td>
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<tr>
<td><strong>HESPERIIINAE</strong></td>
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<tr>
<td>Metisella medea medea (Evans)</td>
<td>[North Pare Mountains]</td>
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<tr>
<td>Metisella midas midas (Butler)</td>
<td>[North Pare Mountains]</td>
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<tr>
<td><strong>Metisella orientalis orientalis (Aurivillius)</strong></td>
<td>Ibaya Hill, Maji Kununua</td>
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<td>Metisella quadrissignatus (Butler)</td>
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<td>Metisella willemsi (Wallengren)</td>
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<td><strong>Ampittia capenas capenas (Hewitson)</strong></td>
<td>Zange Gate</td>
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<tr>
<td>Kedestes calicles (Hewitson)</td>
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<td>Kedestes mohozuta (Wallengren)</td>
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<td><strong>Kedestes rogersi (Druce)</strong></td>
<td>Kisima Plot</td>
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<tr>
<td>Kedestes wallengrenii (Trimen)</td>
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</tr>
</tbody>
</table>

[Notes on specific locations and catches included]
Gorgyra bibulus Riley
Gorgyra johnstoni (Butler)
Teniorhinus harona (Westwood)
Teniorhinus herilus (Hopffer)  [South Pare Mountains]
Pardaleodes incerta (Snellen)
Parosmodes morantii morantii (Trimen)
Acleros mackenti (Trimen)
Acleros ploetzi Mabille
Semalea arela (Mabille)
Semalea pulvina (Plotz)
Andronymus caesar philander (Hopffer)
Andronymus neander neander (Plotz)
Chondrolepis niveicornis niveicornis (Plotz)  [North & South Pare Mountains]
Monza punctata punctata (Aurivillius)
Fresna nyassae (Hewitson)
Platylesches galesa (Hewitson)
Platylesches moritili (Wallengren)
Platylesches picanini (Holland)
Zenonia zeno (Trimen)
Pelopidas mathias (Fabricius)
Pelopidas thrax inconspicua (Bertoloni)

Borbo borbonica borbonica (Boisduval)
Borbo detecta (Trimen)
Borbo fallax (Gaede)
Borbo fatuellus fatuellus (Hopffer)
Borbo ferruginea ferruginea (Aurivillius)  [South Pare Mountains]
Borbo gemella (Mabille)
Borbo holtzi (Plotz)
Borbo lugens (Hopffer)
Gegenes hottentota (Latreille)
Gegenes niso brevicornis (Plotz)
Gegenes pumilio (Hoffinansegg)

PAPILIONOIDEA
PAPILIONIDAE
PAPILIONINAE

Papilio (Princeps) constantinus constantinus Ward  Ibaya Hill
Papilio (Princeps) dardanus tibillus Kirby  Ibaya Hill, Maji Kununua
Papilio (Princeps) demodocus demodocus Esper  Widespread
Papilio (Princeps) desmondi magdae Gifford  [North Pare Mountains]
Papilio (Princeps) echerioides wertheri Karsch  Ibaya Hill, Maji Kununua
Papilio (Princeps) fuellieborni rydoni Kielland  [South Pare Mountains]
Papilio (Princeps) nires lysaes Doubleday  Ibaya Hill, Kiswani River
Papilio (Princeps) ophidicephalus ophidicephahts Oberthir  Ibaya Hill, Maji Kununua
Papilio (Princeps) phorcas nyikanus Rothschild & Jordan  Ibaya Hill, Kiswane River
Graphium (Arisbe) angolanus angolanus (Goeze)  Ibaya Hill, Maji Kununua
Graphium (Arisbe) antheus (Cramer)  Ibaya Hill
Graphium (Arisbe) leonidas leonidas (Fabricius)  Ibaya Hill
Graphium (Arisbe) philonoe philonoe (Ward)  Ibaya Hill
Graphium (Arisbe) policenes policenes (Cramer)  Ibaya Hill
Graphium (Arisbe) porthaon porthaon (Hewitson)  Ibaya Hill
PIERIDAE
COLIADINAE
Catopsilia florella (Fabricius)
Colias electo pseudohecate Berger
Eurema (Eurema) brigitta brigitta (Stoll)
Eurema (Eurema) desjardinii marshalli Butler
  Eurema (Eurema) regularis (Butler)
  Eurema (Terias) hapale (Mabille)
Eurema (Terias) hecabe solifera (Butler)
  Eurema (Terias) senegalensis (Boisduval)

PIERINAE
Pinacopteryx eriphia melanarge (Butler)
  Nephersonia argia mhondana (Suffert)
Nephersonia buquetii buquetii (Boisduval)
  Nephersonia thalassina sinalata (Suffert)
Eronia cleodora dilatata Butler
Eronia leda (Boisduval)
Colotis amata calais Cramer
Colotis antevippe zera (Lucas)
Colotis aurigineus (Butler)
Colotis auxo (Lucas)
Colotis celimene celimene (Lucas)
Colotis chrysonome (Klug)
Colotis daira jacksoni (Sharpe)
Colotis danae pseudacaste (Butler)
Colotis dissociatus (Butler)
Colotis eris eris (Klug)
Colotis euppie complexivus (Butler)
Colotis evagore antigone (Boisduval)
Colotis evenina casta (Gerstacker)
Colotis halimedea australis Talbot
Colotis hetaera ankolenensis Stoneham
Colotis hildebrandti (Staudinger)
Colotis ione (Godart)
  Colotis pallene (Hopffer)
  Colotis phisadia rothschildi (Sharpe)
Colotis protomedia (Klug)
Colotis regina (Trimen)
  Colotis venosus (Staudinger)
Colotis vesta catachryrops (Butler)
Colotis vestalis castalis (Staudinger)
Belenois aurota aurota (Fabricius)
Belenois creona severia (Stoll)
Belenois gidica gidica (Godart)
Belenois margaritacea plutonica (Joicey & Talbot)
Belenois margaritacea intermedia Kielland
Belenois thyza thyza (Hopffer)
Belenois zochalia agrippinides (Holland)
  Pontia distorta (Butler)
  Pontia helice johnstonii (Crowley)
Dixeia doxo costata Talbot
  Dixeia orbona vidua (Butler)
  Dixeia pigea (Boisduval)

Widespread

Zange Gate

Ibaya Hill, Maji Kununua
Widespread
Umba River, Simba Plot, Kisima Hill
Ibaya Hill, Simba Plot,
Ibaya Hill
Simba Plot, widespread
Ibaya Hill
Ngurunga
Ngurunga
Widespread
Nyati Plot, Mbono Vall., widespread
Widespread
Ibaya Camp, Maji Kununua, widespread
Ibaya Camp, Simba Plot, Maji Kununua
Dinder Dam, widespread
Mbono Valley, widespread
Maji Kununua, Ibaya Hill, Kisima Hill
Kisima Plot, Ubani Plot, widespread
Kisima Plot, Ibaya Camp, Kisiwani

Kisima Plot, widespread
Kisima Plot
Dinder Dam, widespread
Kisiwani River, widespread
Ibaya Camp, Ibaya Hill, Kisima Plot
[North & South Pare Mountains]
Maji Kununua
Ibaya Hill, Kisiwani River
Ibaya Hill

Ibaya Hill
[North Pare Mountains]
Dixeia spilleri (Spiller)

*Appias (Glutophrissa) epaphia contracta* (Butler)  
*Appias (Glutophrissa) lasti lasti* (Grose-Smith)

*Appias (Glutophrissa) sabina phoebe* (Butler)

*Myllothris agatha agatha* (Cramer)  
*Myllothris kilimensis kilimensis* Kielland  
*Myllothris rueppellii tirikensis* Neave

*Myllothris sagala sagala* Grose-Smith  
*Myllothris yulei yulei* Butler

*Leptosia alcesta inalcesta* Bernardi

**NYMPHALIDAE**

**ACRAEINA**

*Acraea (Acraea) acrita* Hewitson  
*Ibaya Hill, Kisima Hill*

*Acraea (Acraea) aganice montana* (Butler)  
*Kisima Hill*

*Acraea (Acraea) anemosa* Hewitson  

*Acraea (Acraea) braesia* Godman  

*Acraea (Acraea) caecilia pudora* Aurivillius  

*Acraea (Acraea) caldarena neluska* Oberthür

*Acraea (Acraea) cerasa cerasa* Hewitson

*Acraea (Acraea) chila chila* Godman

*Acraea (Acraea) egina egina* (Cramer)  

*Acraea (Acraea) equatorialis anaemia* Eltringham  

*Acraea (Acraea) insignis* Distant  

*Acraea (Acraea) lygus* Druce

*Acraea (Acraea) natalica* Boisduval  

*Acraea (Acraea) neobule neobule* Doubleday

*Acraea (Acraea) oncaea* Hopffer

*Acraea (Acraea) petraea* Boisduval

*Acraea (Acraea) pudorella pudorella* Aurivillius  

*Acraea (Acraea) pudorina* Staudinger

*Acraea (Acraea) quadricolor leptis* (Jordan)

*Acraea (Acraea) quirina rosa* Eltringham

*Acraea (Acraea) rabbalae* Ward

*Acraea (Acraea) utengulensis* Thurau

*Acraea (Acraea) zetes acara* Hewitson

*Acraea (Acraea) zonata* Hewitson

*Acraea (Actinote) acerata* Hewitson

*Acraea (Actinote) anacreon bomba* Grose-Smith

*Acraea (Actinote) aubyni* Eltringham

*Acraea (Actinote) baxteri baxteri* Sharpe

*Acraea (Actinote) cabira* Hopffer

*Acraea (Actinote) encedana* Pierre

*Acraea (Actinote) encedon encedon* (Linnaeus)

*Acraea (Actinote) eponina* (Cramer)

*Acraea (Actinote) esebria esebria* Hewitson

*Acraea (Actinote) johnstoni johnstoni* Godman

*Acraea (Actinote) perenna thesprio* Oberthür

*Acraea (Actinote) pharsalus pharsaloides* Holland

*Acraea (Actinote) servona orientis* Aurivillius

*Acraea (Actinote) sotikensis* Sharpe

*Pardopsis punctatissima* (Boisduval)
DANAINAE

Danaus (Anosia) chrysippus aegyptius (Schreber)
   Tirumala formosa formosa (Godman)
   Tirumala petiverana (Doubleday)

Amauris (Amauris) niavius dominicanus Trimen
   Amauris (Amauris) tartarea damocides
   Staudinger
   Amauris (Amaura) albimaculata hanningtoni
   Butler
   Amauris (Amaura) echeria serica Talbot

Amauris (Amaura) ochlea ochlea (Bolsduval)

SATYRINAE

Gnophodes betsimena diversa (Butler)

Melanitis leda helena (Westwood)
   Bicyclus anynana anynana (Butler)
   Bicyclus ena (Hewitson)

Bicyclus safitza safitza (Westwood)

Henotesia perspicua (Trimen)
   Henotesia simonsii (Butler)
   Ypthima antennata antennata van Son

Ypthima asterope asterope (Klug)
   Ypthima granulosa Butler
   Ypthima impura paupera Ungemach
   Ypthima rhodesiana Carcaison
   Ypthimomorpha itonia (Hewitson)
   Physcaeneura jacksoni Carcaison

Physcaeneura leda (Gerstaecker)
   Coenyropsis carcaisoni Kielland

Neocoeurya duplex Butler
   Neocoeurya masaica Carcaison

ARGYNNINAE

Lachnoptera ayresii Trimen

Phalanta eurytis eurytis (Doubleday)

Phalanta phalantha aethiopica (Rothschild & Jordan)

NYMPHALINAE

Hypolimnas anthedon wahlbergi (Wallengren)

Hypolimnas deceptor deceptor (Trimen)

Hypolimnas misippus (Linnaeus)

Salamis anacardi nebulosa Trimen
   Salamis parhassus (Drury)
   Junonia actia (Distant)

Junonia altiilope (Feisthamel)
   Junonia archesia (Cramer)
   Junonia cuama Hewitson

Junonia hierta cebrene Trimen

Junonia limnoria taveta (Rogenhofer)

Junonia natalica natalica (Felder & Felder)
   Junonia octavia sesamus (Trimen)

Junonia oeneone oeneone (Linnaeus)
   Junonia orithya madagascarensis Guenée
   Junonia pelarga (Fabricius)
   Junonia sophia infracta Butler

Junonia tereia elgiva Hewitson

Junonia tugela aurorina Butler

Catacroptera cloanthe cloanthe (Stoll)

Widespread

Ibaya Hill, Maji Kununua

Ibaya Hill

Widespread in bush and woods

Ibaya Hill

Ibaya Hill, Dindera Dam, Kisima Hill

Kikolo Plot

Ibaya Hill

Pangaro Plot

Ibaya Hill, widespread

Zange Gate

Ibaya Camp, Kisima Plot

Widespread

Ibaya Hill, Simba Plot

Zange Gate, Mbono Valley

Widespread

Ibaya Hill, Maji Kununua

Ibaya Hill, Maji Kununua

Mbono Valley
**Cynthia cardui** (Linnaeus)
Antanartia abyssinica jacksoni Howarth  
Antanartia dimorphica dimorphica Howarth  
Antanartia schaeneia dubia Howarth

**LIMENITINAE**

*Byblia anvatara acheloia* (Wallengren)

*Byblia ilithyia* (Drury)

*Eurytela dryope angulata* Aurivillius

*Eurytela hiarbas lita* Rothschild & Jordan  
Sallya boisduvalii boisduvali (Wallengren)  
Sallya morantii morantii (Trimen)  
Sallya natalensis (Boisduval)

*Cyrestis (Azania) camillus sublineata* Lathy  
Neptis aurivillii aurivillii Schultze  
Neptis goochni Trimen  
Neptis kiriakoffi Overlaet

*Neptis laeta* Overlaet

*Neptis saciava marpessa* Hopffer  
Neptis serena Overlaet  
Neptis trigonophora trigonophora Butler  
Harma theobene blassi (Weymer)  
Cymothoe magamabae Rydon

*Pseudacraea boisduvalii trimenii* Butler

*Pseudacraea eurytus conradi* Oberthür  
*Pseudacraea lucretia expansa* (Butler)  
*Euptera pluto kinugnana* (Grose-Smith)  
*Euphaedra neophron violacea* (Butler)  
*Euphaedra neophron littoralis* Talbot

**Hamanumida daedalus** (Fabricius)

**CHARAXINAE**

Charaxes achaemenes achaemenes Felder & Felder  
Charaxes acuminatus usambarensis van Someren  
Charaxes aubyni aubyni van Someren & Jackson  
Charaxes baumannii baumannii Rogenhofer  
Charaxes bohemani Felder & Felder

*Charaxes brutus alcyone* Stoneham

*Charaxes candiope candiope* (Godart)

Charaxes castor flavifasciatus Butler  
Charaxes cithaeron kemethi Poulton  
Charaxes druceanus praestans Turlin  
Charaxes etesipe tavetensis Rothschild  
Charaxes ethalion littoralis van Someren  
Charaxes guderiana guderiana (Dewitz)  
Charaxes hansali baringana Rothschild

*Charaxes jahlusa kenyensis* Jokey & Talbot

*Charaxes jasius saturnus* Butler

*Charaxes kirki kirki* Butler  
Charaxes lasti lasti Grose-Smith  
Charaxes macclounii Butler  
Charaxes pollux mira Ackery

*Charaxes protocelea azota* (Hewitson)

Widespread  
[North Pare Mountains]

**Mbono Valley**

**Ibaya Hill**

**Ibaya Hill**  
[North & South Pare Mountains]

**Zange Gate**

**Ibaya Hill**

**Ibaya Camp, widespread**

**Kikolo Plot**

**Kamakota Hill, widespread**

**Kamakota Hill**

**Ibaya Hill**
Charaxes pythodoris nesaea Grose-Smith
Charaxes varanes vologeses (Mabille)
Charaxes violettera melloni Fox
Charaxes xiphares maudei Joicy & Talbot
Charaxes zoolina zoolina (Westwood)
Euxanthe (Euxanthe) wakefieldi (Ward)
APATURINAE
Apaturopsis cleocharis schultzei Selundit
LIBYTHEINAE
Libythea labdaca laius Trimen
LYCAENIDAE
LIPTENINAE
Alaena amazoula nyasana Hawker-Smith
Alaena caissa caissa Rebel & Rogenhofer
Alaena dodoimensis Kielland
Alaena nyassa major Oberthür
Alaena reticulata Butler
Pentila rogersi parapetrae Rebel
Pentila tropicalis mombasae (Grose-Smith & Kirby)
Ornipholidotos peucetta peucedae (Grose-Smith)
Baliochila aamanica Stephens and Bennett
Baliochila dudiosa Stephens & Bennett
Baliochila fragilis Stephens & Bennett
Baliochila hildegarda (Kirby)
Baliochila lipara Stephens & Bennett
Baliochila minima (Hawker-Smith)
Baliochila pseudofragilis Kielland
Baliochila stygia Stephens & Bennett
Cnodontes vansomerenae Stephens & Bennett
Deloneura ochrascens litoralis Talbot
MILETINAE
Spalgis lemoela Druce
Lachnocnema bibulus (Fabricius)
Lachnocnema brimo Karsch
Lachnocnema durbani Trimen
THECLINAE
Myrina dermaptera nyassae Talbot
Myrina silenus ficedula Trimen
Aphnaeus (Paraphnaeus) hutchinsonii Trimen
Spindasis apelles (Oberthür)
Spindasis ella (Hewitson)
Spindasis homeyeri (Dewitz)
Spindasis mozambica (Bertoloni)
Spindasis tavetensis Lathy
Spindasis victoriae (Butler)
Chloroselas azurea Butler
Chloroselas esmeralda esmeralda Butler
Chloroselas overlaeti Stephens
Chloroselas pseudozeritis tytleri Riley

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[South Pare Mountains)
Ibaya Hill, Zange Gate, widespread

[North Pare Mountains)
Ibaya Hill, Ibaya Camp, widespread

[South Pare Mountains]
Ibaya Hill

Kisima Plot

Ibaya Hill, Maji Kununua

Kamakota Hill

Ibaya Hill

Kikolo Plot
Desmolycaena rogersi Riley
Axiocerses amanga (Westwood)
Axiocerses bambana Grose-Smith
**Axiocerses harpax ugandana** Clench

Iolaus (Epamera) aemulus apatosa (Stempffer)
Iolaus (Epamera) diadema diadema (Karsch)
Iolaus (Epamera) nasissii (Riley)
Iolaus (Epamera) sidus Trimen
Iolaus (Epamera) silanus silanus Grose-Smith
Iolaus (Epamera) tajoraca ertli Aurivillius
Iolaus (Aphniolaus) pallene (Wallengren)
Iolaus (Argiolaus) crawshayi littoralis (Stempffer & Bennett)
Iolaus (Argiolaus) lalos lalos (Druce)
Iolaus (Argiolaus) silas (Westwood)
Iolaus (Pseudiolaus) poultioni (Riley)
Iolaus (Stugeta) bowkeri mombasae (Butler)
Iolaus (Hemiolaus) caeaculus littoralis (Stempffer)

**Hypolycena pachalica** Butler

**Hypolycena philippus philippus** (Fabricius)
Leptomyrina (Leptomyrina) hirundo (Wallengren)
Gonatylorina gorgias sabrina Talbot

**Deudorix (Piloedudorix) caerulea** Druce
**Deudorix (Virachola) antalus** (Hopffer)
**Deudorix (Virachola) dinochares** Grose-Smith
Deudorix (Virachola) diocles Hewitson
Deudorix (Virachola) ecaudata Gifford
Deudorix (Virachola) livia (Klug)
Deudorix (Virachola) lorisona coffea Jackson

LYCAENINAE
Lycaena phlaeus abbatii (Holland)

POLYOMMATINAE

**Anthene amarah amarah** (Guérin-Méneville)
Anthene butleri stempfferi Storange
Anthene contrastata mashuna (Stevenson)
Anthene crawshayi crawshayi (Butler)
Anthene definita definita (Butler)
Anthene hobleyi ufipa Kielland
Anthene indefinita (Bethune-Baker)
Anthene kersteni (Gerstaecker)

**Anthene larydas** (Cramer)
Anthene lasti (Grose-Smith & Kirby)

**Anthene lemnos loa** (Strand)
Anthene ligures amanica (Strand)
Anthene liodes (Hewitson)
Anthene lunulata (Trimen)
Anthene minima (Trimen)
**Anthene opalina** Stempffer

Ibaya Hill, Mbono Valley, Cadaba Plot, Mbula, nr Kisima Hill, Kisiwani Gate

Mboro Valley, Cadaba Plot, Mbula, Kiswani Gate

Kisiwani Hill

Ibaya Hill

Mboro Valley

Kisiwani Hill

[North Pare Mountains]

Mbula, Kiswani Gate, Zange Gate

[North & South Pare Mountains]

[North Pare Mountains]

Kisiwani River

Ibaya Hill

Mbula, Kiswani Gate
Anthene otacilia otacilia (Trimen)
Anthene princeps princeps (Butler)
Cupidopsis cissus (Godart)
Cupidopsis jobates jobates (Hopffer)
Pseudonacaduba sichela sichela (Wallengren)
Lampides boeticus (Linnaeus)
Uranothauma antinorii felthami (Stevenson)
Uranothauma cordatus (Sharpe)
Uranothauma falkensteini (Dewitz)
Uranothauma nubifer (Trimen)
Uranothauma vansomereni Stempffer
Phlyaria heritsia intermedia Tite
Cacyreus lingens (Stoll)
Cacyreus palemon palemon (Stoll)
Cacyreus virilis Stempffer
Leptotes babaulti (Stempffer)
Leptotes brevidentatus (Tite)
Leptotes jeanneli (Stempffer)
Leptotes marginalis (Stempffer)
Leptotes pithi (Linnaeus)
Tuxentius calice gregorii (Butler)
Tuxentius margaritaceus (Sharpe)
Tarucus grammicus (Grose-Smith & Kirby)
Zintha hintza hintza (Trimen)
Zizeeria knysna (Trimen)
Zizina antanossa (Mabille)
Actizera lucida (Trimen)
Zizula hylax (Fabricius)
Azanus jesous (Guérin-Ménéville)
Azanus mirza (Plotz)
Azanus moriqua (Wallengren)
Azanus natalensis (Trimen)
Azanus ubaldus (Stoll)
Eicochrysops hippocrates (Fabricius)
Eicochrysops messapus mahallakoaea (Wallengren)
Euchrysops barkeri (Trimen)
Euchrysops brunneus Bethune-Baker
Euchrysops malathana (Boisduval)
Euchrysops osiris osiris (Hopffer)
Euchrysops subpallida Bethune-Baker
Lepidochrysops lukenia van Someren
Lepidochrysops neonegus neonegus (Bethune-Baker)
Freyeria2 trochylus (Freyer)

Ubani Plot, Mbula, Kisiwani Gate
Ibaya Hill
Ibaya Camp, Ibaya Hill, Kisiwani Riv.
Ibaya Hill

[North & South Pare Mountains]
[North & South Pare Mountains]
[North Pare Mountains]

[South Pare Mountains]
Kisiwani Hill
[North & South Pare Mountains]

Kisiwani River, Mbula

[North Pare Mountains]

Mbula, nr Kisiwana Hill, Zange Gate

Ubani Plot
Ibaya Hill, Mbula, nr Kisiwana Hill, Zange Gate
Ibaya Hill, Kisiwani River, Ubani Plot
Mbula, nr Kisiwana Hill

nr Ubani Plot, Mbula, nr Kisiwana Hill

Ibaya Hill
Nyati Plot
[North & South Pare Mountains]

Ubani Plot

2 Chilades Moore, [1881] is the accepted replacement name for Freyeria.
Preparations
The whole episode started very slowly without any real invitation and with some vague
discussions at Council meetings. What we were expected to do—how, when and where
remained a mystery until three weeks before the show. The reality hits you like a brick
from nowhere when you realise that you have 2-3 weeks to get organized. Veraxai, the
organizers, after being coaxed by Lieveke Noyons, gave us the official invitation to a stand
at no charge.

We had a couple of co-ordination meetings to get the composition of our theme
together, which was "Gardening for Butterflies". Lieveke did a lot of work getting the
plants organized. She also became involved with television producers to procure some
publicity and ended up having to take a trip around Mpumalanga and the Northern Province
filming butterflies. This film, Vlerke met Perke, was shown on 50/50 Veldfokus on Sunday
21 May – some of you may have seen it.

Setting up the stand
We arranged to get together after work at the MTN SUNDOME at about 19h00 on the
Wednesday evening to put up our stand. Absolute chaos reigned around the Sundome with
piles of soil, rocks, exhibition materials, plants and flowers everywhere. The labourers
were like ants threading their way through and over exhibits, each carrying plants and
flowers. We did not believe that there would be any kind of order by the opening at 10h00
the following morning. After locating the organizers, I formalized our papers, entry
permits, parking tokens and most importantly the site of our stand. The stand allocated to
LepSoc was a 3x3 m space, enclosed on three sides with 2.5 m panels. The Simply
Indigenous nursery provided us with some butterfly larval host-plants and Alf Curle
provided green plantpots and also some more butterfly (and moth) larval hostplants for
demonstration and decoration.

Graham, Alf and myself, with our wives set up the exhibit and displays. Alf also
brought a new banner for LepSoc with our Logo which we mounted prominently at the
back of the stand. Posters were stuck on the walls, the plants arranged, the table and chairs
put in place and by 22h00 we were finished with our stand. A few small items were left for
the morning, but otherwise we were quite pleased with the result.

The Exhibition - 13-16 April
Johanna and I arrived at 09h30, the Exhibition starting at 10h00, we were amazed at the
crowd of visitors queuing to get in. The “Bouncer” at the door was adamant that if you did
not have an “Exhibitors Pass” you were not going in until the doors were opened to the
public. We must congratulate the security people as they were most helpful and efficient
throughout the 5 days we were there. Nothing went missing, stolen or broken.
We were very conscious of those members of the public that have fiddling fingers. When we arrived on the Thursday morning we could not believe that in our 10-hour absence the whole arena had been transformed into a most orderly and clean exhibition. Our LepSoc stand looked marvellous against the backdrop of other exhibits after the pathways had been cleaned and tidied. The last few finishing touches were done to our exhibit and we were ready for almost anything.

“Gardening for Butterflies” consisted of some locally available food plants in a display, which we referenced to various posters covering most of the common butterflies that may be discovered in our Gauteng gardens, such as Acraea horta, Papilio demodocus, etc. We had a section on conservation depicting the Brenton Blue, Ruimsig and Alice Glockner Nature Reserves, the Karkloof Blue inter alia. We included Butterfly World and some general pictures and posters. To describe the Research and Survey Programmes, we had Alf Curle put up his posters of day-flying moths and cycads which caught everyone's attention as they approached the stand.

We presented butterfly and moth displays of mimicry, migration, protective resemblance and camouflage with explanatory posters provided by Graham Henning.

From our previous experience with Yebo Gogga we already knew that some of the most frequently asked questions were, “Which is the butterfly that keeps on destroying my crinums and lilies?” “What insect causes my lawn to go yellow?” “Where do all those white moths and butterflies come from and where do they go?” To assist with these commonly asked questions about butterflies and moths we included displays of migrations, the lily borers, armyworms, cutworms and the Mopane worms. We even had some dried Mopane worms for those who felt inclined to taste them.

One of the most interesting questions was, “Do you have the Smarties Butterfly here?” If you are able to guess within 5 seconds which butterfly this lady was referring to, we need you on the stand next year. The answer will be given at the end of this report to give you some time to reflect on your answer.

As a live exhibit, we had a small terrarium with some eggs, larvae and pupae of Catopsilia florella feeding on Boscia leaves and Acraea horta feeding on Kiggelaria africana. These larvae fascinated the children. Some Loranthaceae (Mistletoe) were suspended as food plant examples for the curious gardener who might just be interested in propagating these strange parasitic plants. It could be quite a challenge to grow your own mistletoe in your garden. Perhaps we could hear from someone who has been successful in establishing them in their garden.

Steve Woodhall provided a case of set butterflies specimens of Gauteng. I displayed some of the Emperor moths with which visitors could associate the specimens found in their own gardens. We also had a poster of butterfly and moth publications to inform enthusiasts. We took the opportunity to expose the Lepidopterists’ Society activities by displaying Metamorphosis and some of the other reference books available. These were displayed on the table for cash sales and quite a few were sold. The booklet, Planting for Butterflies by Lieveke Noyons, was our spearhead for the show. The interest was great as we sold over a hundred copies and many people told us they already had a copy. Others would order through the post. Yet others wanted something more advanced which set Lieveke thinking about a more comprehensive version.
There were a number of notable visitors to the stand, amongst others Mr Kithekathe Agriculture Attaché from the Kenya High Commission – who spent about an hour with us discussing various aspects of ecology. Others were Andrew Hankey, with Sharon Turner and Alice Aubrey from the Witwatersrand National Botanical Gardens. Marianne Forsythe from Gauteng Nature Conservation, and many new prospective members from as far afield as Botswana, Zimbabwe and even some tourists from Holland.

**Packing up**
We were most grateful when Sunday evening arrived and we started the “Break-Down” about 17h45 and were finished by 18h45. Our feet needed a well-earned rest from standing and our backs from carrying plants and all the exhibits. Our womenfolk were however well rewarded by the other exhibitors who gave them bunches of cut flowers left over from their exhibits.

**Conclusion**
Firstly our main objective was to encourage the gardening public of Gauteng to plant indigenous so as to attract butterflies, moths and other insects into their gardens. I do believe that we succeeded in this task. There were comments from the organizers who remarked that it seemed to them as if our stand was a constant attraction to the crowds throughout the show. We also had positive feedback from the nurseries Simply Indigenous and Witkoppen Wild Flower Nursery stating that they had a lot of enquiries and sales to customers of plants recommended by LepSoc at the show.

Secondly we wanted the exposure as a Society to recruit new members and to promote LepSoc to the general public. Many of our visitors were completely unaware of our existence, and some had been collecting butterflies for many years. We also needed to build up some additional funds, thus the sale of the books and posters.

Finally it seems that we have been able to change the public image of LepSoc from a society of trophy hunters, to a society of conservation-minded people, concerned about the environment and its insects. There has been a change of attitude from the public at Gardenex. I did not hear one comment from anyone that lepidopterists are just collectors and insect killers. I think this has been helped by the positive attitude resulting from the Yebo Gogga exhibits over the last few years. We can continue this by focusing our efforts on butterfly breeding for education, conservation and research. We renewed old friendships and made a lot of new friends which always makes the job worthwhile.

By the way, the "Smarties Butterfly" turned out to be *Vanessa cardui*.

**Acknowledgements**
I want to thank, Lieveke Noyons, Johanna Roos, Alf Curle, Graham and Eileen Henning, Bennie and Andre Coetzer, Steve Woodhall, Keith and Pamela Roos, Peter Sharland and Lindsay Durham for all of their help in making the exhibit a resounding success.
The International Code for Zoological Nomenclature, 4th edition

Contributors to *Metamorphosis* should note that the 4th edition of the “Code”, as the taxonomists’ “Bible” is widely known, came into effect on 1 January, 2000. The 3rd edition had been published in 1985, and proposed changes to a number of articles were the subject of intense debate during the past five years.

I am pleased to say that changes introduced in connection with the proposal of new names have formed part of the guidelines to authors of this journal for some time. For example, names proposed after 1999 will be available only if it is stated clearly that the taxon is described as new, by adding a suffix such as ‘sp. nov.’ or ‘gen. nov.’, or an equivalent thereof. Similarly, the requirement that new species-group names published after 1999 must be accompanied by the designation of a name-bearing type, i.e. a holotype or syntype-series, has been observed by most journals for a long time.

Lectotype designations have been somewhat curtailed. In addition to the requirement that the designation must be accompanied by the word ‘lectotype’, or a direct translation thereof, which again has been fairly general practice in the past, it is now necessary to demonstrate that the designation of a lectotype clarifies the application of the name in question.

The writer of these lines has often criticized the decline in classical training in modern day biologists. It is therefore with some glee that I can report that the infamous Article 31, which, *inter alia*, includes the rule pertaining to agreement in gender, is still with us. However, another persistent problem when introducing new family names, namely the need to form the genitive case of the name of the type genus, has, it is hoped, been resolved.

Comprehensive information pertaining to other changes can be obtained from the Secretariat of the International Commission of Zoological Nomenclature, c/o The Natural History Museum, Cromwell Road, London SW7 SBD, U.K.; e-mail: iczn@nhm.ac.uk. Copies may also be ordered at this address.

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EDITORIAL POLICY

Manuscripts dealing with any aspect of the study of Afrotropical Lepidoptera will be considered.

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A hard copy of the manuscript, the originals of illustrations, and the computer diskette must be submitted to the editor. The text should be printed on A4 paper, with double lined spacing, and a margin of at least 2 cm on each side. The pages should be numbered consecutively beginning with the title page, and including those carrying references, tables, and legends to figures. All figures, tables and references must be referred to in the text. If a computer diskette is not available, then tables are to be typed on A5 paper, exactly as found in the printed journal. To facilitate proper alignment of tables, or landscape orientation, even if a diskette is used, it would be appreciated if these can be arranged in A5 format (text dimensions having a width 4.5 inches and length 6.5 inches).

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Any opinions expressed in Metamorphosis are those of the contributors and not of the Editor or the Lepidopterists’ Society of Africa.

Additional, expanded author instructions are available on request from the editor.

NOTE: The International Code of Zoological Nomenclature (ICZN), Ed. 4. states that infrasubspecific names applied to a taxon 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 may occasionally be published in Metamorphosis; however, this does not imply that Metamorphosis or the editor accept or endorse such descriptions. To the contrary, these names remain invalid, and should not be italicised when in print and when applied to a particular “taxon” of infrasubspecific status.

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