Abstracts of the Workshop on Lepidoptera Research in the Afrotropical Region

18–21 November 2011

Hans Cottage and Kakum National Park, Ghana

Editor: Szabolcs Sáflán
Butterfly Conservation Society, Ghana, Tema 2011

ISBN 978-963-08-2732-4

Cover Design by András Gosztom, BrandAvenue Ltd. Budapest Hungary
Technical editor: Gyula Kovács
Printed in Hungary

The publication will be available online at www.abdb-africa.org (bibliography database).

Recommended citation:
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It is with much pleasure that I welcome participants to the

**Workshop on Lepidoptera Research in the Afro-tropical region**

Reading an early list of participants from many countries, from Ghana, from elsewhere in Africa, and from further afield was very encouraging. When I first arrived in Ghana in early 1993 to start fieldwork for my book on the butterflies of West Africa, I had been living for several years in Botswana as Nelson Mandela was released and the apartheid regime was being abolished. I had collected butterflies only a few days in Ghana on previous business trips, but now I was in Ghana on my own and for real. And “for real” turned out to be good, despite some degree of hardship from time to time. The dreaded “WaWa” (“West Africa wins again”) seemed to have moved elsewhere. My flight logs inform me that I have left Accra almost twenty times since that first visit.

Much has changed since then. During my first visits the only attempt to call my wife did not succeed. Now one gets upset if the internet is not available on some remote hilltop or national park. When I first came, Hans Cottage – literally – was a hole in the ground. Food has much improved. I am sure you will be comfortable and well looked after during your stay.

Our knowledge of the West African butterfly fauna has grown by leaps and bounds since my first visit to Ghana. The lists for Gambia, Guinea-Bissau, Burkina Faso, Togo, and Bénin have grown. The number of new species in eastern Nigeria has grown. Most recently much better data have been coming out of Liberia and Guinea. Somebody will soon have to rewrite my book on “Butterflies of West Africa”.

But much remains to be done: The butterfly lists of even the best researched localities are still incomplete at about 85-90% of the true totals, which are needed for long-term monitoring. The early stages and host-plants are poorly known. Detailed field studies of all aspects of butterfly behaviour and ecology are still thin on the ground. I trust the workshop will result in Ghana becoming a focal point for continuing butterfly research, with a greater participation by African researchers. And I trust that it will assist in using our increasing knowledge of butterflies to promote conservation of endangered habitats.

For those of you not familiar with the tropical butterflies of Africa the field trip should be a wonderful adventure; for those of you who already know them, it should be a welcome reunion. We shall be visiting some of the most biodiverse places in Ghana with 600+ species in each.

So let us enjoy the workshop and our opportunity of interacting with an international group of people bringing a wide range of experience to bear on what we all love – butterflies.


*Torben B. Larsen*
*Honorary President*  
*Butterfly Conservation Society, Ghana*
The background to this workshop…

SEL (Societas Europaea Lepidopterologica) holds a Congress every two years, often including various workshops for those with a particular interest. When I was General Secretary I received a suggestion from a member that in a future Congress there might be an Afrotropical workshop. I thought to myself “why not hold one in Africa?”

Then after the SEL Congress in Romania in 2009 Kwaku Aduse-Poku wrote a report also suggesting a Congress be held in Africa.

I made soundings of various lepidopterists who I knew were working on the Afrotropical fauna, both European and African residents. The response was positive. Having an interest chiefly in moths, most of which are nocturnal, my idea was that if we could meet in a place rich in biodiversity it might be possible to collect or study moths in the (first part of the) night, deal with the results in the morning, and arrange seminars in the afternoon. The next task was to find a suitable venue.

Since the Convention on Biodiversity was held in Rio de Janeiro in 1990 it has become increasingly difficult to find host countries where such activity might be permitted. Fortunately Ghana and its lepidopterists came to the rescue, ably assisted by Szabolcs Sáfian.

Hopefully we may prove from our workshop that Lepidopterists are responsible people, who can offer a service to potential host countries. We must expect conditions and provide local institutions with data from our work, but if we can begin a sequence of such workshops it will make a contribution to our understanding of the Afrotropics and their ecology, in a part of the world that is still poorly known and yet severely threatened.

Whether butterfly and moth enthusiasts can coexist remains to be discovered!

David Agassiz
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Dealing with the African diversity of Lepidoptera, Tortricidae – challenges and pleasures

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Worldwide the family Tortricidae contains more than 9000 described species. In Europe there are about 1000 species, in Norway 363 species, and from Africa south of Sahara there are 450 nominal species. A comprehensive catalogue of the world fauna of Tortricidae was published by John Brown and collaborators in 2005. The information in the catalogue is also available on the internet: http://www.tortricidae.com/default.asp. A moderate estimate of the size of the African fauna is 2000 species, a more optimistic one is around 4000, implying that we know about 10 % of the species. Species of Tortricidae are usually easy to recognize as such due to the shape of their labial palps, the shape of the forewings and their wing pattern. There is a series of certain wing pattern elements which appear again and again in different versions among the various species. In the subfamily Tortricinae the wings basically have transverse fasciae that may form blotches and bands. The subfamily Olethreutinae have costal strigulae, often a dorsal blotch or mark, and a mirror in the tornal area. In the male genitalia the two subfamilies can be separated by the presence of a basal excavation in the olethreutine valva. In the female genitalia the apophyses anteriores are linked with the sterigma in the Tortricinae. When working with the material it is first sorted to morphospecies based on external appearance. The next step is to check the genitalia. That will, hopefully, solve the generic placement, and also group varieties of the same species together. Of course most of the specimens dealt with are undescribed. To get familiar with all the taxa that already have names is the biggest difficulty when working on the African fauna. Half of the named African tortricids, 227, were described by Edward Meyrick from 1908 to 1938. He described ca. 16 000 species of Microlepidoptera worldwide during his career. He almost never illustrated his species. He was of the opinion that as long as he had a clear picture in his mind what a species looks like, it is not so important that others have.

The main challenges meeting the taxonomist dealing with the African fauna are:

- old descriptions poor.
- available material often inadequate for description.
- only fragments of the real fauna collected and available.

The solution to these challenges is to go to collect new material which is:

- fresh.
- in good condition.
- in sufficient numbers.

This activity gives the pleasure of exploring a variety of exciting habitats, discovering new and strange forms, uncovering more of nature's beauty, and putting more pieces together in the tree of life.
When and where did the Pasha and Radjah evolve? A phylogeographic hypothesis of the genus Charaxes

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Despite the long popularity of Charaxes among collectors and researchers, their evolutionary history is largely unknown. The current and accepted species groupings and relationships within the genus are based exclusively on adult morphology and life histories. Here, we examine the monophyly and evolutionary affinities of the species-groups within the genus Charaxes and explore how they relate to members of their closest genera (Euxanthe, Polyura and Palla) using 4167 bp of sequence data from five (1 mitochondrial and 4 nuclear) gene regions. Within the proposed phylogenetic framework, we estimate ages of divergence within the genus and also reconstruct their historical biogeography. We included representatives of all known species-groups in Africa and Asia, all known species of Euxanthe and Palla and two exemplar species of Polyura. We found the genus Charaxes to be a paraphyletic group with regard to the genera Polyura and Euxanthe, contrary to the earlier assumption of monophyly. We found that 13 out of 16 morphologically defined species-groups with more than one species were strongly supported monophyletic clades. Charaxes nichetes is the sister group to all the other Charaxes. Polyura grouped with the ‘zoolina’ and ‘pleione’ species-groups as a well-supported clade, and Euxanthe grouped with the ‘lycurgus’ species-group. Our results indicated that the common ancestor of Charaxes diverged from the common ancestor of Palla in the mid Eocene (45 million years ago) in (Central) Africa and began diversifying to its extant members 15 million years later. Most of the major diversifications within the genus occurred between the late Oligocene and Miocene when the global climates were putatively undergoing drastic fluctuations. A considerable number of extant species diverged from sister species during the Pliocene. A dispersal–vicariance analysis suggests that many dispersal rather than vicariance events resulted in the distribution of the extant species. The genus Polyura and the Indo-Australian Charaxes are most likely the results of three independent colonizations of Asia by African Charaxes in the Miocene. We synonymise the genera Polyura (syn. nov.) and Euxanthe (syn. nov.) with Charaxes, with the currently circumscribed Charaxes subdivided into five subgenera to reflect its phylogeny.
The Lepidoptera on Acacia in the Kenyan Rift Valley

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Acacia is often dominant in semi arid areas, and is regarded as a threatened habitat type. It is surprisingly rich in species, some widespread, some local.

Larvae of Lepidoptera on Acacia were sampled during the last 8 years. They were found on leaves, in spinnings, in leaf mines, on flowers, in seeds, in fungus galls and in swollen thorns (domatia). Some 200 spp. have been bred. Ants often frequent Acacias, especially those with domatia “ant-galls”. Traditional wisdom is that there is a mutualist relationship between ants and trees. At first it seemed that chiefly Lycaenidae lived on such trees on account of their mutualist relationship with the ants. Further investigation showed that some moths also inhabit these domatia and 23 spp. from 11 different families have been bred. Ants appear hostile to moth larvae and it is unclear how larvae manage to use this resource, investigations will soon be made to see whether any are predatory or feeding on other substances. On some Acacia spp. there are more Lepidoptera larvae than ants. It is not known what stimulates the plant to produce domatia, so many ecological questions remain unanswered.
South Africa is one of the centres of species and genus diversity of casebearers (Lepidoptera: Coleophoridae) in the Afrotropical Region

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South Africa is a special Biogegraphic (sub) Region of the Afrotropical Region whose boundary does not coincide with botanical boundaries of the Cape Region. The Coleophoridae of the region are not well known. There are only 49 described species (Baldizzone & van der Wolf 2006), which probably constitute only 20–30% of the resident species of the afrotropical fauna. Most of them (63%) were described from Namibia and South Africa and only one species among them – Coleophora scaleuta Meyrick, 1911 has a widespread distribution in the region, others are known only from their type locality. The species analysis shows, that the species of Sahara-Arabian fauna (Anikin 2007) have a generic connection with casebearers from Namibia and South Africa. Uniqueness and endemicity of south-african Coleophoridae fauna show this territory to be one of the centres of species and genus diversity in the Afrotropical Region. The future investigation of food-plants and understanding of the generic status of known casebearers of the family (Falkovitsh 2003) will throw light on processes of faunagenesis in this group not only in the Afrotropical but also in the Oriental and Palaearctic Regions.
Diversity of androconial structures and male-specific chemicals in *Bicyclus* butterflies and their role in pheromone communication

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Males of many butterfly species, across all the major taxonomical groups, have androconias; clearly defined and often complex secondary sexual characters. Androconias are usually formations of dense hair bushes and patches of scales different to the normal pattern bearing wing scales. Being conspicuous and showing limited variation between conspecifics these structures are of major importance in taxonomy, often being the most readily identified difference between closely related species. Traditionally androconias have been considered producers of male sex pheromones, often referred to as scent scales, but empirical tests of this claim are remarkably few.

The butterflies of the genus *Bicyclus* (Nymphalidae: Satyrinae) display an extraordinary diversity of androconial structures distributed over several locations of their wings. Behavioural experiments using the model species *Bicyclus anynana* suggested that androconias per se were not necessary for mating success as long as the pheromone compounds were still present. This study suggested that they have no, or a very limited, role outside chemical communication between the sexes.

Given the high diversity of wing surface based androconias within the genus, and *Bicyclus anynana* being the subject of much previous research, they provide a suitable model system for comparative studies. We analysed the position and structure of androconias as well as the chemical compounds they contain in a phylogenetic context across several species groups of *Bicyclus*. The number of species-specific chemicals was very high and the observed pattern of evolution was different between androconias and chemicals. It is also remarkable that many androconias contained no chemicals at all, suggesting they have other functions, perhaps including being involved in visual signalling during courtship or acting as pheromone dispersers. Since the structures are highly elaborate and conserved within each species, it is unlikely they that have lost their function but still remain intact.
Lymantriidae diversity in Ghana and Liberia (Lepidoptera : Heterocera)

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Since January 2009, both authors, sometimes together, sometimes separately, organized field trips to collect Lymantriid moths in Ghana and Liberia. The trips targeted mostly forest areas and the most important sites visited were: Likpe Mountains (Volta Region), Bunso Arboretum (Eastern Region), Bia Conservation Area (Western Region) in Ghana and the Putu Range (Grand Gedeh County) in Eastern Liberia. During the field trips, more than 180 species of Lymantriids were caught, most of which were also processed for obtaining DNA samples: leg pairs were stored in absolute alcohol and analyzed by the molecular team of the zoology department of the Royal Museum for Central Africa (JEMU). It is anticipated that amongst these species quite a few are new to science amongst others in the genera Euproctis and Dasychira. The authors will continue their inventory of Lymantriidae in West Africa, including previously unsurveyed areas.
The Lepidopterists’ Society of Africa – Its history, current status, achievements and future plans

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The Lepidopterists’ Society of Africa, LepSoc, founded in 1983 from the Lepidopterists’ Study Group, began as a loose association of collectors, enthusiasts and professionals. Contact details were made available to all, and a Journal, *Metamorphosis* began. This was allocated an ISSN code and is currently published quarterly. Yearly AGMs and conferences are held, usually in SA but one was in Kenya. The Society has been responsible for several conservation initiatives, such as the Ruimsig Entomological Reserve, the Alice Glockner Nature Reserve, the Coega Redevelopment and the Brenton Blue Reserve. Numerous publications on African Lepidoptera have been published by LepSoc, either as stand-alone efforts or as partnerships. The Society started formal specimen data gathering via Lepidops and Lepibase in 1993; this has grown into a large undertaking with many thousands of data. In 2005 the Society entered into a joint agreement with the ADU (Animal Demographic Unit) of the University of Cape Town, and SANBI, the SA National Biodiversity Institute, to manage SABCA, the SA Butterfly Conservation Assessment. This followed ADU initiatives in avian and reptilian biogeographical studies. This had SA and Norwegian government funding and gathered over 1/3 million data over 4 years. It built a platform for LepSoc and created interest among the conservation-minded public. The data have been used to generate a conservation plan for all South African butterflies, rare and common. It has formed the basis for the formation of a group of Custodians Of Rare and Endangered Lepidoptera (COREL), who are driving autecological and synecological studies of these species, and clarifying the ownership and conservation status of the land they occupy. LepSoc’s future plans centre around expanded public involvement in Lepidoptera conservation via citizen scientist programs and education. At the same time, focused study and responsible collecting of Lepidoptera will be encouraged. Sourcing funding for these activities and objectives is taking a greater proportion of the Council’s time. Economies are being sought by using the Internet to communicate with members, and exploring electronic media such as blogs, social media and e-commerce. A move is under way to move *Metamorphosis* to purely electronic format, with printed communication via a higher circulation journal, *Environment*, published in partnership with other organisations such as the Wildlife Society.
In butterflies, there are several phenomena, attracting attention. I would like to mention two of them. The first one is seasonal changes in appearance (seasonal polymorphism and polyphenism), the second one deals with frequent myrmecophily in blues (Lycaenidae). The seasonal changes are found in many butterfly families. Whereas in Temperate regions there are usually spring and summer forms, in the Tropics and Subtropics there are usually dull dry and bright wet season morphs. Famous African species are for instance members of the genera *Bicyclus* or *Precis*. Seasonal polymorphism and polyphenism attracted much attention in physiological studies; we already know, how the changes are induced and how the pattern is built (evo-devo), however, its importance in nature is still obscure.

Myrmecophily, i.e. mutualism between ants and different other organisms is frequently found throughout the butterfly family Lycaenidae plus some Riodinidae. Furthermore, unlike other butterflies, larvae of some species have a totally carnivorous lifestyle. There are prerequisites for myrmecophily in a major part of the family (i.e. presence of nectar glands), however, only in a few groups is the relationship mandatory. It seems that obligatory myrmecophilic evolved more times independently from facultative myrmecophilic and it is unclear if there is a link between myrmecophilic and the predatory way of life. The best known examples of African obligate myrmecophilic are butterflies of the genus *Lepidochrysops*.

The study was supported by Grant Agency of the Czech Republic, P505/10/2248.
The presentation will focus on the discovery curve of the Afrotropical butterflies since Linné described the first in his *Systema Natura* (ed. X) in 1758, which was the starting point for systematic study. We are now closing in on 4,200 valid species and the discovery curve seems to be continuing.

This is in large part because the resources for identification and our knowledge of distributions has increased by leaps and bounds during the past twenty years. While working on my book on the butterflies of West Africa I found that effectively all known forest species had been recorded between 1990 and 2006 (97% of 972 species), which was a pleasant surprise. Eight of the missing species have since been recorded as have more than twenty new to science or new to West Africa.

However, forests are fast disappearing, especially submontane forests and small expanses of broadleaf forest in savannah zones, which often have an interesting fauna. Together with birds, butterflies are so well known that they can be used for long-term monitoring. This demands that good baselines are available for comparative studies 50 and 100 years from now. Very few African forests have been sufficiently well documented to allow for such studies. Kakamega Forest in Kenya is one, the Atewa Range in Ghana another (Boabeng-Fiema, Wli Falls, Bobiri Forest, Bia NP, and Ankasa NP already have slightly less complete inventories).

Butterflies should not be the subject of nature conservation ... they should be ambassadors and instruments for nature conservation. Here even individual species can play a role: *Myloethris atewa* is a very special member of the genus found only on the Atewa Range in Ghana and makes an excellent ambassador for a very special and very threatened habitat – certainly representing many other organisms, not yet known, that need such protection.

Finally the presentation will focus on the future of butterfly research in Africa based in part on my experience with a revision of all the African Hesperiidae.
The Southern African Butterfly Conservation Assessment (SABCA): The metamorphosis is complete

Silvia MECENERO

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The Southern African Butterfly Conservation Assessment (SABCA) was a four year project, launched in 2007 and which came to an end in March 2011. SABCA was aimed at determining the distribution and diversity of butterflies in the atlas region (South Africa, Lesotho and Swaziland). It was a partnership between the South African National Biodiversity Institute, the Lepidopterists’ Society of Africa (LepSoc) and the Animal Demography Unit (University of Cape Town). SABCA has compiled a comprehensive database of distribution records from museum and private collections, field surveys and its virtual museum (VM). About 400 000 records have been digitized and processed. These records will be made publicly available on SANBI’s data portal (http://sibis.sanbi.org/). Field surveys were conducted around South Africa and prioritised to gaps. A final gap analysis has shown that many gaps still remain, especially for the Northern Cape, North West, Free State and Lesotho. SABCA’s online VM (http://vmus.adu.org.za), aimed at raising public awareness for butterfly biodiversity, has received about 18 000 photographs from about 260 contributors. Field surveys and the VM have resulted in some good records of: species range extensions, new species localities, new species/subspecies, and rare and endangered species. Data have also been included from South Africa’s very first butterfly censuses, two of which took place last year and the third earlier this year. The aim of the censuses is to conduct these biannually into the long-term, so as to monitor butterfly populations in relation to climate change and land use practices. Conservation assessments have been completed for each of the 793 butterfly taxa in the atlas region. These were based on the IUCN Red List system. Preliminary results show that 8% of the taxa were listed as threatened (59 taxa) or Extinct (3 taxa). The majority of the threatened taxa are from the family Lycaenidae, whereas taxa in the families Papilionidae and Pieridae are all Least Concern. 90% of the taxa were listed as Least Concern and of these about 5% (62 taxa) were flagged as rare but not threatened. The Grassland biome, one of the region’s largest biomes, contains the greatest number of threatened taxa, and the Fynbos biome contains the second most number of these taxa. Endemics make up 52% of the taxa in the atlas region. The family Lycaenidae contains the greatest proportion of endemics and the family Pieridae contains the least. All the threatened taxa are endemic to the atlas region. The main threats to our butterflies are habitat loss and habitat degradation. The publication emanating from SABCA, the Conservation Assessment of Butterflies of South Africa, Lesotho and Swaziland: Red List and Atlas, will include information on the methods used, analyses on the conservation and threats of our butterflies, future priorities and recommendations for using the book. Each taxon will be presented together with its conservation assessment and Red Listing, distribution map (quarter-degree grid scale and divided into three time periods) and photos of pinned specimens. The publication will be available by year-end. Post-SABCA, LepSoc has taken responsibility for the VM, which continues to receive photographic records, as well as for the biannual censuses and monitoring the Critically Endangered taxa through their custodianship programme.
Macroeological approaches towards understanding spatiotemporal patterns in butterfly diversity and distribution in southern Africa

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Biodiversity conservation is strengthened through understanding the macroecological processes underlying species richness and species distribution patterns, and how these are impacted upon by climate changes. The relevance of insects to biodiversity conservation and for exploring biodiversity patterns and processes has been increasingly recognised. The main aim of this research project is to examine spatiotemporal patterns in butterfly diversity and distribution in southern Africa and its application towards butterfly conservation, using the recently compiled butterfly distributional database emanating from the SABCA project. The main objectives are: 1) to examine the determinants of butterfly species richness and how richness relates to species ranges sizes, and 2) to determine South Africa’s areas important to butterfly conservation at a regional scale and the extent to which protected areas and Important Bird Areas capture these areas. Due to the limitations of the SABCA database, spatial and statistical models aimed at presence-only data will be explored for modelling species distributions and species richness. The results of this study will be useful for guiding conservation management priorities for butterflies and biodiversity in South Africa.
Notes on the Lepidoptera fauna of the Namib Desert

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The Lepidoptera spectrum of several localities in the Namib Desert is discussed regarding distribution, ecology, diversity and origin of species. The Namib is not a compact, homogenous and isolated desert. It is largely influenced by the neighbouring areas. There are many river beds, almost dry throughout the year, which cut through the Namib and reach the Atlantic coast, especially in the northern and central parts. They are lined with remnants of river bank vegetation that is well developed in the interior of Namibia. Together with their host plants many Lepidoptera species follow the river banks, and so occur in the middle of the Namib without being true desert species. An example is *Ornativalva kalahariensis* (Gelechiidae), a common species which together with its host plant *Tamarix usneoides* reaches even the coastal dunes. Another landscape structure that contributes to more heterogeneity are inselbergs. They receive more precipitation from coastal fog than the surrounding plains and thus exhibit a richer flora & fauna. The species occurring in such localities can be considered as extralimital posts/exclaves of the adjacent Nama-Karoo Biome. Lichen fields are another special biotope (habitat) in the Namib desert. In Lepidoptera, species of the subfamily Lithosiinae (Arctiidae) are known to be specialised lichen feeders. In fact, several species of this group occur in the Namib Desert and even on the offshore Guano islands.
How to Assess ‘megadiverse’ families of Lepidoptera: a DNA barcode library for all African Geometridae

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Lepidoptera have served as a model group to test the effectiveness and utility of DNA barcoding. The campaign to barcode all species of Geometridae represents one of the most ambitious components of the overall barcode effort on Lepidoptera in the framework of the international Barcode of Life project (iBOL). Reflecting work carried out since 2006, the Geometridae are now the most heavily sampled family worldwide, both numerically (>85K barcodes in the Barcode of Life Database BOLD), taxonomically (>13K species), and geographically (samples from >145 countries). So far, some 3,200 geometrid species have been described from the African continent (Herbulot 1992; Scoble et al. 1995; Scoble & Hausmann 2007). In 2010, the ZSM started to assess this fauna by gathering DNA barcode data from specimens in the ZSM, Ochse, Staude, and Lenz collections. By late 2011, some 10,000 African geometrids, representing 2,550 species had been submitted to BIO for DNA barcoding. So far, barcodes have been obtained from approximately 8,000 specimens belonging to some 2,300 species (as recognized by Barcode Index Numbers, ‘BINs’). Most countries from the continent are well represented, but the faunas of the Uganda, D.R.Congo, Angola, Namibia and Madagascar require additional sampling to improve species coverage. Plans call for the validation of sequence records and identification of all specimens during 2012, followed by rapid public data release. In this presentation, we emphasize the crucial role of DNA barcoding for the rapid assessment of global biodiversity and show results and patterns from such work on African Geometridae and highlight the importance of data release publications. The application of barcode data in identification, taxonomy, ecology and other disciplines of biodiversity science, such as applied entomology and industry, are shown through case studies drawn from the geometrid campaign. Information on the criteria for the selection of study sites in West African rainforests as well as sampling protocols under tropical conditions are given.
Do they really have to eat their hosts? A different kind of myrmecophily in Afrotropical Lycaenidae

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Myrmecophily amongst Lycaenidae is a well known phenomenon, as a large proportion of larvae of lycaenids develop in the environment of ants worldwide. This relationship could be restricted to occasional visits by ant-workers on the foodplant, but in other cases it can be absolutely obligate, when the butterflies are not able to survive without the presence of ants and we can go even further: most obligately mymecophilous caterpillars feed on the ant-brood or they are fed by ant-workers. In the strictly Afrotropical tribe Epitolini, a strange kind of myrmecophily was discovered. Almost all species in the tribe live exclusively around trees, infested by arboreal Crematogaster ants and in many cases the imagos can be found only around these ant-trees. According to hundreds of personal observations, almost all observed species (belonging to genera such as Epitola, Cerautola, Geritola, Cephetola, Hewitsonia, Stempfferia and Iridana) lay eggs on the tree bark in close vicinity to the ant-nest or right into ant-runs. All caterpillars develop amongst the ants, some of them having thousands of interactions with ant-workers every day. Still, they do not predate on ant-larvae, neither are they fed by ant-workers living a cuckoo-like life. The Epitolini larvae simple feed on algae and/or lichen that grows on the tree bark. This relationship does not seem to fit into the categories described in Fiedler (1991) and would be best introduced as “loose-obligate myrmecophily”.
Gola Forests; a butterfly paradise on the border between Liberia and Sierra Leone

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The Gola Rainforest National Park on the eastern border of Sierra Leone and the Gola National Forest in Liberia on the other side of the border cover about 200 000 hectares of rainforest, forming the westernmost continuous forest area in the Upper Guinean Forest Zone. These forests have been of conservation interest for a long time but effective protection of the area was not possible due to the turbulent history of both countries in the recent decades. After normalisation of the situation, international conservation organisations such as RSPB and Birdlife International with their local counterparts (Forestry Division Sierra Leone, Conservation Society of Sierra Leone, Forestry Development Authority Liberia and the Society for the Conservation of Nature of Liberia) initiated projects in both countries to enable effective protection of the Gola Forests. As part of Gola Forest Programme and Across The River Project, several butterfly surveys were carried out in both countries. The first results have been presented by Belcastro & Larsen (2006), who recorded 380 species from the Gola Forest Reserves (now Gola Rainforest National Park). Sáfián (2010) added over another 100 species to the checklist during two surveys, including the newly described Euriphene taigola Sáfián & Warren-Gash, 2009 and the cryptic Pseudopontia gola Sáfián & Mitter, 2010. Libert (2010) also described Neurellipes gola Libert, 2010 from the newly collected material. Already, the three surveys proved that Gola (Sierra Leone) has an extremely high diversity of butterflies and the species composition is characteristic of wetter types of forests in good condition with many rare species. Field surveys in January and February 2011 in Sierra Leone in the corridor areas between the Gola Rainforest National Park and the border and in the Gola National Forest in Liberia revealed over 440 butterfly species, including many new records and three potentially new to science: two Geritola spp. and one Liptena sp. As Belcastro & Larsen (2006) already mentioned in their report, the estimate of 600 species present in the Gola Forests might easily be an underestimate; now with the new data, it could easily be stated that the Gola Forests across the Moro and Mano rivers are amongst the most significant protected areas in West Africa not only for the rich primate fauna and pigmy hippos, but also for butterflies.
Introducing ABDB, a multi-functional online database on Afrotropical butterflies

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ABDB – African Butterfly DataBase (www.abdb-africa.org) is an open-source integrated website, which was first launched in 2009 as a beta-version. The database collects, stores and provides information about all Afrotropical butterfly species, for butterfly scientists, conservationists and enthusiasts all over the world. The dataframe of ABDB is based on the ‘Catalogue’ (Ackery et al. 1995) and the ‘Encyclopaedia’ (Williams 2008). They were used to build up a searchable multi-level database, which stores online-updatable information about the butterfly species (taxonomy, ecology, distribution and magnifiable photos of set specimens), the localities and habitats (description, geo-referenced data) and the literature used. ABDB also hosts a multimedia database, where nature photos of imagos and early stages, genitalia images, videos could also be uploaded. ABDB is aimed to be developed as the main scientific platform for butterflies south of the Sahara with contribution of further developers and institutional partners.
Batesian mimicry in Papilio dardanus: Unmasking the markers of disguise

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Papilio dardanus is a model system for studying the evolutionary genetics of Batesian mimicry. The polymorphic mimetic patterns of the females of this species are controlled by a single Mendelian switch locus, \( H \). Understanding the mechanisms and evolution of this switch has been a classic problem in evolutionary genetics since its inception. We are now working on elucidating the precise molecular identity and functioning of \( H \). Previous work has highlighted the transcription factors \textit{engrailed} and \textit{inverted} as very strong candidates and we aim to functionally characterise these genes in \textit{P. dardanus} and test whether they are indeed the mimicry switch locus. Data from sequencing the genomic region around these genes reveals extensive linkage disequilibrium and the association of particular alleles of \textit{engrailed} and \textit{inverted} with particular mimetic morphs. Population genetic inference clearly suggests that one of these morphs, \textit{f. planemoide}\emph{s} arose in West Africa and spread into other populations, presumably due to strong selection acting on novel phenotypes. The \textit{P. dardanus} system provides a unique opportunity to examine how one species can occupy multiple adaptive peaks in phenotype space and we are now in a position to apply new technology to this old question.
The butterfly community of the Mendong Buo area

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The butterfly community of the Mendong Buo community area (Cameroon, NW province, Big Babanki area; approximately 2200 m asl) known from the four longer stays in dry seasons will be presented. It is the mosaic of mountain forest remnants, forest clearings dominated by *Pteridium aquilinum*, submontane grasslands maintained by occasional grazing, species-rich scrub and scrubby vegetation along streams. Besides generalists with wide distribution, it hosts several Gulf of Guinea endemics and several widely distributed afromontane specialists. The habitat preferences of the three endemic taxa (*Colias electo manengoubensis*, *Bicyclus anisops* and *Mylothris jacksoni knutsoni*) will be presented with comments on the landscape development and conservation.
The investigation of Pterophoridae of Africa began in the middle of the 19th century. It is associated with names such as Zeller, Walker, Felder & Rogenhofer and Walsingham. The latest author, Lord Walsingham, in 1881 published a special work on micro-Lepidoptera of South Africa, where he mentioned 13 species of Pterophoridae, five of which were described as new to science. (Walsingham 1881). The early 20th century marked a new stage in the descriptive entomology. Edward Meyrick described of a huge number of Lepidoptera species worldwide. Southern Africa has been the most investigated. More than 100 species of African Pterophoridae were described by Meyrick. In the middle of the 20th century the investigation of Pterophoridae resumed in a new more detailed study using genitalia diagnostics (while in the time of Meyrick this diagnostic has not been used principally.) In this period of investigation an invaluable contribution was made by French lepidopterist L. Bigot. Later, in the late 20th century up to the present moment the investigations of the Pterophoridae fauna became more intense. Works on the description of new species belong to the French colleagues L.Bigot, Ch. Gibeaux, as well as to E. Arenberger (Austria) and C. Gielis (Netherlands). Nowadays the Afrotropical region Pterophoridae fauna has more than 250 species.

In spite of quite an intensive current study of Pterophoridae, the Afrotropical region fauna is still studied poorly and fragmentarily. The most investigated is the fauna of South Africa. At the same time this part of Africa is the most rich for the study. For example, in only one province of Natal the authors of this paper found 76 species, 8 of which are described as new to science (Ustjuzhanin & Kovtunovich 2010), taking into account that this area is not very large. It is also necessary to note the diversity of species of the genus Agdistis. In South Africa alone during recent years we have described 25 species. About 10 species new to science are being prepared for description. The less studied regions are West Africa, the Sahel, as well as central and north-eastern part of the Afrotropical region.

At the moment the systematics of African Pterophoridae is not well developed. In many respects it still remains at a hundred years ago, when the species were described. There are also problems with family systematics and identification of tribes. Often one can find in one family species which are totally unrelated, and contrariwise, related species are placed in different genera. There are many synonyms which complicates the understanding of species status. It is necessary to establish recombination. The first attempt to form a logical structure of families with recombination and identification of synonyms was performed by us in the article on the province of Natal mentioned above (Ustjuzhanin & Kovtunovich 2010). In this work we have reduced 3 genera and 17 species to synonyms and established 14 new combinations. We consider that such reconstruction in Pterophoridae is needed for the entire Afrotropical region. Our further research is aimed at the ordering of systematics and identification of the fauna of African Pterophoridae. We published several works on the fauna of Pterophoridae of Lesotho and Ethiopia. The review articles on South Africa, Zimbabwe, Malawi, Mozambique and other countries are forthcoming.

Thus, the fauna and systematics of Pterophoridae in the Afro-tropical region is nowadays very relevant and promising.
Lasiocampidae Africana: present results and perspectives

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Up to the beginning of 21st century about 657 Lasiocampidae taxa were described from the Afrotropics; last revisional articles were written by Rougeot (1977, 1984) for Ruwenzori. Fresh revisions (Zolotuhin 2007, Zolotuhin & Gurkovich 2009a, 2009b) conclude that about 20 % (about 110-120) species are synonymous but a third are still undescribed; most genera are complete para- and polyphyletic complexes. The estimated number of species inhabiting Africa without Mediterranean and Asia Minor elements but with species of Sahel and Sahara reaches about 700 species from 116 genera (24 of them are already established and more 34 will be established as new). Barcoding project starting under BOLD is discovering a number of cryptospecies and helping to solve complete taxonomic situations in some species complexes.
Discussion abstracts

Introducing Ashanti African Tours a West African Travel Destination Specialist

by Mark WILLIAMS

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Ashanti African Tours (www.ashantiafricantours.com) is a West African Travel destination specialist that was established in 2005 with a strong passion for responsible travel. We aim to minimise the negative impact of tourism in the locations we visit with our main area of expertise being birdwatching and wildlife tours of Ghana. We also offer a multitude of additional travel packages that include Cultural, Historical, Heritage, Educational, Hiking and Biking, Eco and Volunteer programmes of Ghana and other West African countries. Our services also extend to vehicle rental and the planning, organising and logistical management of conferences, business meetings and events. Ashanti African Tours have also registered a charity (Ashanti African Tours Welfare) with the aim of providing non taxable donations from our company and other donor groups specifically to be used in conservation, education and community development initiatives within Ghana. Ashanti African Tours aim to establish partnerships with like minded organisations with the intention of implementing these initiatives for the benefit of West African Conservation, education and development.
Under the Convention on Biological Diversity (CBD), which came into force in 1993, states have the sovereign right to exploit their own resources – that is, since 1993 states ‘own’ their biodiversity and can require permission is sought by others to collect it or carry out research on it. One of the 3 elements of the CBD is Access & Benefit-Sharing (ABS), covering ‘fair and equitable access to the benefits of the Genetic Resources of Biodiversity’. This has been elaborated under the Bonn Guidelines (2002) and more recently under the Nagoya Protocol (2010). The Nagoya Protocol allows for ‘streamlined access’ to collecting permits for non-commercial research. Many permits stipulate that holotypes or unique specimens be returned to the Provider Country. There is a potential conflict with the ICZN Code, Section 72.10 regarding the value of name-bearing types “They are the international standards of reference that provide objectivity in Zoological nomenclature and must be cared for as such. They are to be held in trust for science by the persons responsible for their safe keeping.” Specimens collected before 1993 present no problems. Regulations are becoming stricter which may make life difficult for those working in the Afrotropical region.

Researchers may need to bear in mind:

a) Major institutions may refuse to accept specimens unless it can be demonstrated they have been collected “legally”.
b) Journal editors may in future reject papers unless specimens referred to in them have been collected with permission.

It is necessary therefore to keep a “paper trail” of permissions with any collection.
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