226 LARSEN, T. B. 1995. Butterflies in Kakum National Park, Ghana. Part 1: Papilionidae, Pieridae & Lycaenidae. *Bulletin of the Amateur entomological Society*, 54:3-8, Part 2: Nymphalidae, Hesperiidae., *ibid*. 54:43-46. (WA 11)

# BUTTERFLIES IN KAKUM NATIONAL PARK, GHANA

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## Introduction

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

Kakum National Park consists of about 350 km¸ of tropical rainforest in good condition, though parts were selectively logged not that long ago. It is one of the most important conservation areas in West Africa, where rainforest has been lost at an alarming rate throughout this century. Perhaps the largest indicator of the continuing health of the forest is the presence of the small forest elephant, a well-differentiated subspecies of the savannah elephant, so shy that its habits and social organization are still only poorly understood. The Park has become something of a 'conservation flagship' in Ghana since it is readily accessible by tarmac road from Cape Coast, a town some 150 km west of the capital, Accra. Cape Coast was for long a slaving centre and the coastline is dotted with forts (Potuguese, English, Dutch, Danish) which stand as living testimonials to one of the worst examples ever of the human capacity for inhumanity. The Park is being developed by the Ghana Wildlife Department with technical support from *Conservation International* and financial support from *USAID*.

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

## The biogeographical setting

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

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

**The butterflies of Kakum**

I have spent some 60 days in the field (35 field days, defined as 5 hours' collecting a day in good weather conditions) at Kakum on numerous occasions over the past 18 months. In the course of this I have established the presence of almost 440 species of butterflies - half the Ghana total and nearly two-thirds of Ghana's forest butterflies. However, many remain to be discovered and I would expect the total to be somewhere between 550 and 600. To place these figures in perspective, the highest published figures from elsewhere in West Africa are around 380 (Olokemeji, Gambari, and Agege in Nigeria (Larsen, Riley & Cornes 1980, Riley & Cornes 19710, Hopkins 1970). The most detailed faunistic study yet of butterflies in West Africa is the review of the Liberian fauna by Fox *et al*. (1965). At that point only 475 were known with certainty from Liberia. During their many years of collecting, Fox and his wife caught far fewer species in Liberia than I have personally found at Kakum.

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

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

* present totals about 3650, 870, and 441

**A short walk in Kakum National Park**

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

Papilionidae

There are at least 17 swallowtails (Papilionidae) at Kakum. The giant emperor swallowtail (*Papilio menestheus* Drury) is the most common, together with *Papilio cyproeofila* Butler; the males of both patrol along open paths. Occasionally, the huge *Papilio horribilis* Butler will swoop down from the canopy with the wings held a third open. There are three of the brilliant, green-banded swallowtails of the *Papilio nireus*-group, often joining the long-tailed swordtail *Graphium policenes* Cramer at damp patches. An occasional flash of emerald, hurtling along at prodigeous speed, announces the rare *Graphium tyndaraeus* Fabricius - one of the most beautiful of all African butterflies. So far neither of Africa's largest and most spectacular butterflies (*Papilio zalmoxis* Hewitson and *Papilio antimachus* Drury) have been sighted at Kakum, but they may well be there. Both are remarkably scarce, local, and seasonal in West Africa.

## Pieridae

The whites and yellows (Pieridae) of Africa are very similar to those of Asia and the Neotropics - indeed *Appias* and *Eurema* are pan-tropical genera, and *Belenois* is well represented in Asia. Among the most prominent is the forest grass yellow (*Eurema senegalensis* Boisduval); on old logging roads, where the sensitive plant (*Mimosa pudica*) has penetrated, the common grass yellow (*Eurema hecabe* Linné) of open habitats may also be found. The two normally never fly together. The most prominent of the whites are four members of the genus *Leptosia*, flying everywhere with what must be among the weakest flights of any butterflies. On warm days large numbers of *Belenois* and *Appias* come to damp sand. Some of the Pierid females show a remarkable degree of dimorphism which has not been systematically studied; they seem to be mimics of *Mylothris*. Many of the African Pieridae (not least the *Colotis* and related genera) are savannah butterflies and these never penetrate the forest, though several of them invade cleared agricultural land. There are only 25 Pieridae at Kakum and few remain to be discovered. Still missing is the ghost (*Pseudopontia paradoxa* Felder), the only member of the subfamily Pseudopontiinae, with its transparent wings and amazing venation. Just possibly Kakum is not wet enough, but it seems to be generally rare in Ghana, and during my extensive collecting I have taken just two in Ankasa National Park.

## Lycaenidae

The Lycaenidae are by far the largest group of African butterflies with about 40 percent of the total fauna, but they are a very mixed lot indeed. The most unusual are the African subfamily Lipteninae. These are small white, yellow, red, orange, or black butterflies - often with beautiful patterns - that are strictly limited to the proximity of *Crematogaster* ants which build large paper nests on tree-trunks. There seems to be no real symbiosis - the larvae have no honey glands - but no ants ... no butterflies. The Lipteninae are so bizarre that many were originally described as Pieridae or Acraeinae. They are not at all numerous at Kakum and need looking for. They gather in little clusters on twigs or tendrils, especially those of Marantaceae which have extra-floral nectaries. They never visit flowers and their proboscis is reduced in length compared with flower feeding Lycaenidae. My favourites are the almost clearwing *Ornipholidotos*; I was particularly pleased to find a colony of *Ornipholidotos larseni* Stempffer, which I never saw again since finding one of the types in Nigeria in 1967! The largest of the Liptenines is *Mimacraea darwinia* Butler, a stunning mimic or co-mimic of *Acraea epaea* Cramer. Some 30 of these species have been recorded, but there must be many more. The *Epitola* section of the Lipteninae are usually blue on the upperside, and therefore rather less unusual. The huge genus *Epitola* probably has some 30 Ghanaian species, but I have only taken three or four at Kakum. They seem to live high up, just below the canopy, and are only seen when they come down to display on their chosen parade ground. Each species has its own display time, lasting less than an hour. On three separate occasions, within a few minutes of 11.30, I have taken a single male *Epitola carcina* Hewitson in exactly the same spot. It will be a long time before all the *Epitola* and related genera in Kakum have been recorded, but the largest of them (*Hewitsonia boisduvalii* Aurivillius) is fortunately there. *Conservation International* is planning to construct a canopy walkway which may help in pinning down the habits of these particular butterflies. I shall certainly spend many days on the walkway with a long-handled net. So far only ten members of the *Epitola*-group have been found; there must be at least 20 more.

There are a few members of the subfamiles Miletinae and Liphyrinae, the truly carnivorous species, which feed on Homoptera or ants. Of these, only *Megalopalpus zymna* Hewitson is tolerably common. I took a single female of the moth butterfly (*Euliphyra mirifica* Holland), which feeds on the early stages of the vicious tailor ants (*Oecophylla*); I had no idea what it was till I took it out of the net! The Aphnaeinae and Theclinae are numerous and mostly rather similar to Oriental species, and many would not look out of place in the Neotropics. Most are quite scarce, however. For instance, there are some 25 of the beautiful *Iolaus* in Ghana, but I have only taken four or five at Kakum. The rarest are members of the *Pseudaletis*, about which Denis Owen (1991) recently wrote; my total is a single battered male of *Pseudaletis leonis* Staudinger which dropped out of the canopy. One species that is common is the false-head butterfly, *Oxylides faunas*. Not only does it have the amazing false-head, but it has an extra twist - it turns 180□ a fraction of a second before landing in order to improve the effect. I pointed out this phenomenon to a group of Wildlife Department staff during my first visit to Ghana and word has spread. Now I keep being told the story in other parks by staff who do not know me - an interesting example of how effective informal communication channels can be. I have about 30 members of this group so far, but there must be amost twice as many. And there are new species to be found; I have just described *Diopetes kakumi*, a beautiful new Theclinae. Apart from *Anthene* and related genera, the Polyommatinae are poorly represented in the forest zone. The most evident are the snow-white members of the *Oboronia*, including by far the easternmost colony of *Oboronia liberiana* Stempffer. The Polyommatine tally so far comes to 35. Only two Riodininae of the genus *Abisara*, well represented also in Asia, are known from West Africa. They seem to be restricted to the very highest points of West Africa (700 m +) and may well be genuinely absent from Kakum. The only African mainland Libytheid, *Libythea labdaca* Westwood is usually absent, but then occasionally turns up as a migrant by the million. Since it is found only in the forest zone, it is difficult to fathom why these large-scale movements take place.

Nymphalidae

The Danainae are poorly represented in Africa, but all six Ghanaian species have been recorded. However, *Danaus chrysippus* Linné only occurs as a stray in the forest proper and always looks distinctly uncomfortable; it is very common in the open agricultural lands surrounding Kakum. About 30 Satyrinae have so far been found, and they behave just as Satyrinae usually do in the tropics. More than half belong to the genus *Bicyclus* and I am beginning to be able to guess which species are where. Many live only in dense undergrowth and are best lured out by fruit bait - this is especially true for the huge blue-banded *B. hewitsoni*. Other species frequent more open forest, some are on swampy ground, and a few are found only along paths and in clearings. The Charaxinae are among the jewels of African butterflies and can nearly only be caught by the use of traps. I have not been overly diligent in this respect, and have taken only 20 so far. Now that I have a vehicle it will be easier to set traps and procure bait, so the total will rise to over 30 - perhaps including the rare *Charaxes hadrianus* Ward which I have taken futher down the coast. Now come the African forest butterflies *par excellence*, the genera *Euryphura* (two in Kakum), *Euriphene* (twelve in Kakum). *Bebearia* (sixteen), *Euphaedra* (sixteen), and related genera (six). They are all hooked on fermenting fruit, and where monkeys and hornbills have dislodged lots of figs, the forest floor is carpeted with these spectacular butterflies. The *Euphaedra* are among the most beautiful butterflies in Africa. My favourite is the rare and very shy *Euphaedra perseis* Drury which is a phenomenal mimic of a

day-flying moth, and which has adapted its flight pattern accordingly. They may not look that similar in a box, but I am hard put to tell them apart in nature. The beautiful *Cymothoe* have seven representatives in Kakum. They are also fruit-feeders, but less tied to the forest floor. I found a lovely new species there, only to discover that it had already been described as *Cymothoe aubergeri* Plantrou from Côte d'Ivoire as recently as 1977 and never referred to since. There should be six of the related *Euptera* and *Pseudathyma* in Kakum, but they are extremely scarce, and I have only one. Four or five *Pseudacraea* are found in the park, and as the name implies, they are among the finest mimics of *Acraea* that can be imagined. There is disagreement over whether some species are polymorphic and breeding experiments are called for. I believe them to be strongly polymorphic and under the same sort of genetic control as swallowtails such as *Papilio memnon* Linné and the female of *P. dardanus* Brown, but it could be that several species are involved. Here is a splendid topic for a postgraduate thesis. So far no less than sixteen of at most twenty species of *Neptis* have turned up - as many as twelve species in a single day. How males and females in this genus establish their respective *bona fides* I cannot say - several are almost impossible to tell apart under the microscope, but they obviously manage well in the field! *Neptis nysiades* Hewitson is perhaps the the world's most variable butterfly - or perhaps not, since I suspect it may be a complex of six to ten distinct species. The remaining Nymphalinae (some 25 species) tend to be species of clearings and paths, often large and very visible. The African Oakleaf (*Kallimoides rumia* Doubleday) dive-bombs any passing butterfly. The mother-of-pearl (*Salamis parhassus* Drury) circles lazily overhead, occasionally picking a fight with a neighbouring male. The beautiful Diadem (*Hypolimnas salmacis* Drury) adds a splash of blue of almost morpho-like intensity. Finally, two of the few African Argynnini (*Phalanta eurytis* Doubleday & Hewitson and *Lachnoptera anticlia* Hübner) add their bright cinnamon to the scene. The Acraeinae are rarely much in evidence, though there may be a time during the dry season when they are more common than I have yet seen them. Several species do have sudden population explosions at odd times of the year. Nonetheless, more than 25 species have already been recorded and there are probably no more than another five to be found. The subfamily is rather poorly represented in West Africa. The most interesting and complex species annd groups are from the montane forests and the denser Zambesian savannahs. There are only 40 in all of West Africa, but twice as many in Kenya.

Hesperiidae

Some 90 skippers have so far been recorded, and there are more to come, since getting a complete representation of skippers depends on a lot a trudging along forest paths catching large numbers of the common species to check for the scarcer ones. Few skippers are common and many are exceedingly rare. Thus, I have seen but one *Celaenorrhinus rutilans* Mabille, a large and most evident species, and three rare *Celaenorrhinus* that should be present have not yet been seen. Members of the *Katreus* and *Calleagris* are almost 'once-in-a-lifetime' events - on my last trip I saw *Calleagris lacteus* Mabille for the first time after spending more than a hundred days in suitable forests. The paradise skippers of the genus *Abantis* are almost impossible to come across in West Africa; one of the most characteristic (*Abantis eltringhami* Jordan) is still known only from the holotype. The most spectacular skipper in Africa is the giant skipper (*Pyrrhochalcia iphis* Drury), the archetype of a forest butterfly. Its slow, buzzing - but far from clumsy - flight in the semi-twilight of the dense forest is a familiar sight. It came as a real surprise to me that it was common right in the centre of Cape Coast township as well. That kind of ecological tolerance is genuinely

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

## Conclusion

There are probably nearly 600 butterfly species in Kakum, and up to 150 of them can be seen on a good day's walk. This is interesting and important on its own. I shall have more to say about the composition, ecology, and biodiversity of Kakum butterflies when I have studied them further. But butterflies, being relatively well known, can also be looked at as a proxy for wider arthropod biodiversity. Only about one percent of all described arthropods are butterflies, so the 600 butterflies probably act as proxy for an absolute minimum of 60,000 other arthropod species. But most other arthropods are much less studied than butterflies, where 90 % or more are known (I have only found a dozen new species in Ghana so far). Only between 15 and 35 percent have been formally described, so it is a safe bet that the Kakum butterflies are a proxy for 200,000 to 400,000 other arthropods. That is the treasure house which Kakum National Park protects. The Ghana Wildlife Department, with the support of outside donors like the IUCN, Conservation International, and bilateral donors, is doing a good job with a minimum of resources, conserving the last remaining patches of unspoilt habitats. And while Ghana does have a genuine self-interest in ensuring the conservation of its original biodiversity and natural resources, the rest of the world does as well. So, please join me in three cheers for Kakum National Park. It is one crucial link in an all too fragile chain of nature reserves that protect the last remnants of the forest ecosystems of West Africa, the study of which has hardly begun.

## Acknowledgements

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

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