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## BEHAVIOUR

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### Butterfly activity patterns in Kibale Forest

#### Abstract

Butterfly activity is closely related to climatic conditions, and in this study, conducted in Kibale Forest, the effects of light intensity, temperature, and humidity on butterfly activity patterns were assessed, by using a line transect method. The numbers of individuals and species were recorded along 4 transects during the day, over a period of 5 days. Temperature seemed to be more important for butterfly activity than light intensity and humidity. There were no significant differences in activity patterns between species, although significantly different species were observed in an open area and a forest interior. The order of appearance and disappearance of butterflies varied between the open and the forest

Amber Clutton-Brock, University of Cambridge, UK

Pedro Miguel Lourenco, University of Lisbon, Portugal

Nayuoh Ngong Lesi, University of Ibadan, Cameroon

2001

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### Model and mimic associations in mud puddling butterflies

#### Abstract

Aposematic colouration can be used to advertise the distastefulness of chemically defended butterflies. Some species, however, do not possess this chemical defence and yet are warningly coloured. These so called Batesian mimics reduce predation without the high cost of synthesising noxious compounds. Mimetic theory suggests that mimics associate with models in space. This study finds that models and mimics associate when mud puddling, and that a positive correlation exists between the numbers of models and mimics in mud puddling groups. It is also noted that models and mimics share behavioural characteristics distinct from other mud puddling butterflies.

Zeinab Adam Mohammed, University of Khartoum, Sudan

Lisa Adelskold, University of Stockholm, Sweden

Edgar Turner, University of Cambridge, UK

2001

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### Agonistic interactions between fruit-feeding butterfly species at Kanyawara site in Kibale Forest

#### Abstract

The fighting ability of 21 fruit-feeding butterfly species was investigated in Kibale Forest National Park. Rotting, fallen fruits are located in discrete, localised patches and can therefore be considered as a defensible resource. This study found that some species initiated agonistic interactions more frequently than others on patches of fermenting banana visited by up to 10 individuals at any one time. Differences in levels of aggression and success of these interactions could not be attributed to

differences in size between the species however they may be due to sexual dimorphism or different resource holding strategies.

Sibylle Aschwanden, University of Berne, Switzerland

Judith Hamilton, University of Glasgow, UK

2002

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### **Does camouflage explain rest site selection for moths? Observation and experiments in Kibale National Park**

#### **Abstract**

Observations on forty different species of moths were made at Makerere University Biological Field Station (Kibale National Park, Uganda), to examine whether camouflage could explain their rest site selection. This work found no evidence that a correlation exists between moth pigmentation and their rest site selection. This might mean that camouflage protects the moth from predation without the necessary need of picking an appropriate background to settle.

Barbara Riemer, University of Vienna, Austria

Rikke Hagstrøm Bucholtz, University of Århus, Denmark

2002

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### **Factors involved in puddle-visiting by butterflies**

#### **Abstract**

Butterfly species feeding on mud-puddles were investigated, by observing and recording the number of species, abundance and sex ratio of the butterflies visiting the mud-puddle at 15-minute intervals over three day period in August 2002. Temperature of mud and time of day were also recorded. Of all the individuals of 30 species identified, only one female was found. Numbers of butterflies were found to vary with the temperature. Manipulation experiments were carried out to determine why some mud patches were preferred. Arrangement of dead butterflies had no significant attractant effect, but addition of 0.1M NaCl solution to previously unfavoured mud-puddles significantly increased numbers of visiting butterflies.

Flora Stephano, University of Dar es Salaam, Tanzania

Sami Saeed Mohammed, University of Khartoum, Sudan

2002

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### **Kibale Forest: A very small world through butterfly eyes**

#### **Abstract**

Networks can be used to assess the resilience of a system to disturbance, and butterflies are common bioindicators. This study compares the butterfly diversity in logged and unlogged forest, and constructs a network of the interactions. Kibale is a small world, where most species are very closely connected and disturbance will travel quickly through such a system. No difference in diversity was detected between the two sites, but species composition was not assessed. The nectar feeding guild is almost certainly under-represented due to the sampling methods, which may partially account for the continuing rise in species accumulation. The network follows a scale-free distribution and species accumulation takes place through preferential attachment, so the probability of interaction is proportional to the number of interactions.

Vicki Fishlock, University of Edinburgh, UK

Frank Owusu Mensah, University of Science and Technology, Ghana

2002

### **Differences in behavioural patterns: A comparison between five types of butterflies**

#### **Abstract**

This study was carried out to examine whether behaviour of five different types of butterflies changed during the course of the day and to investigate whether there is a difference in the behaviour patterns between the butterflies. We found that there is overall change in activity pattern throughout the day but the activity patterns of different types of butterflies do not differ greatly from each other. The study also examined whether butterflies return to the same feeding points on consecutive days, and this was found not to be the case.

Victor Ng'ang'a, Kenya Forestry Research Institute, Kenya

Jenny Whilde, Trinity College, Ireland

Brechtje Zwanenburg, Leiden University, The Netherlands

2005

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### **How effective is Batesian mimicry? Looking at the effectiveness of Batesian mimicry in butterflies by testing the behavioural responses of a range of predatory species**

#### **Abstract**

This experiment aimed to test the responses of different predators when presented with aposematic unpalatable butterflies (models) and palatable mimics of these models. The predators included praying mantids and ants (invertebrates), amphibians, birds and potto (vertebrates). The results showed a clear difference in behaviours between invertebrate and vertebrate predators. Both praying mantids and ants showed almost no discriminative behaviour between models and mimics, whereas the vertebrates i.e. the birds and potto either avoided just the model or both the model and the mimic. Most vertebrates preferred a cryptic palatable control. Amphibians showed no rejection behaviour towards the two models commonly used within this experiment but did show an adverse response when a more noxious model was later used. The findings from this experiment support the view that Batesian mimicry in butterflies is an adaptation to prevent predation by vertebrates and therefore suggests that such predators exerted a great selective pressure during the evolutionary history of the species studied.

Ben Garrod, Anglia Polytechnic University, UK

Ylva Hanell, Lund University, Sweden

Luís Valente, University College London, UK

2005

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### **Mud puddling behaviour in butterflies: sodium versus nitrogen?**

#### **Abstract**

The purpose of the study was to assess whether mud-puddling behaviour in butterflies is attributed to need for nitrogen and/or sodium. We concurrently investigated the preference of butterflies' species to rotten fish and banana as bait whilst comparing the most important nutrient for puddling butterflies in a choice experiment involving nitrogen, sodium, calcium and water. We tested mean species difference between bait types and species preference for nitrogen as opposed to the other nutrients and employed multivariate analysis in displaying the relationship between species composition in the banana and fish baited traps. Results show no significant difference in mean species numbers between fish and banana-baited traps. Rather species composition differed remarkably between banana and fish baited traps. We conclude that nitrogen is equally important

nutrient for puddling butterflies. We recommend further investigation to confirm or deny whether nitrogen was the main stimulus for species that visited the fish baited traps.

Caleb Ofori Boateng, Kwame Nkrumah University, Ghana

Paul Hatanga, Nature Uganda, Uganda

Urszula Grzech, Jagiellonian University, Poland

2007

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### **Feeding decisions in butterflies: competitors or indicators?**

#### **Abstract**

Efficient foraging should be the ultimate goal of a feeding individual. In order to accomplish it, animals can use information from their environment to locate and evaluate the patch quality as well as the safety. Here, we relate results on interactive behaviour of foraging fruit-feeding butterflies in Kibale Forest, Uganda; more specifically how these butterflies influence each other's foraging decisions. We observed no such influence on decision-making, which indicates that butterflies do not perceive others as competitors or indicators of patch quality in high quality patches.

Pernilla Borgström, Lund University, Sweden

Tina Cornioley, University of Fribourg, Switzerland

2010

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## **DISTRIBUTION**

### **Comparative study on butterfly species richness and abundance between the logged and unlogged areas in Kibale National Park**

#### **Abstract**

The study was carried out in the logged and unlogged areas of Kibale Forest National Park, to investigate whether logging influences the butterfly composition of the studied areas. The results show that species abundance and the number of species are higher in the logged area compared with the unlogged area. However, a Shannon- Wiener diversity index showed that the unlogged area has a higher diversity of species relative to the logged area. All these results suggest that logging influences the butterfly composition even though the event happened three decades ago.

Noteila M. Khalid, University of Khartoum, Sudan

Stephen Liseki, Njiro Wildlife research Institute, Tanzania

Mari Carmen Diaz Villanueva, University of Valencia, Spain

1998

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### **The effect of gap size on Lepidoptera diversity in Kibale Forest, Kibale National Park**

#### **Abstract**

The study was aimed at determining the effect of gap size on the diversity of forest butterflies and compare to compare their diversity in gaps of logged and unlogged in Kibale forest. Eight gaps of varying size, ranging from 88 to 880 sq. m. were randomly selected from the two forest types. With the aid of a sweep net diurnal lepidoptera were collected from the gaps within a 5 m radius of the

sampler by hand-netting for a period of an hour. Shannon - Weiner diversity indices were calculated for each of the gaps. Results revealed no significant correlation between gap size and Lepidopteran diversity ( $Z = 0.189$ ;  $P = 0.8501$ ). Also no significant relationship was observed between Lepidopteran diversity and forest types.

Byamukama Biryahwaho, Makerere University, Uganda  
Oyekunle Oyewole, Nigeria Conservation Foundation, Nigeria

1998

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### **Fruit-feeding butterfly diversity in three different habitats in Kibale Forest National Park, Uganda**

#### **Abstract**

East African forest areas are very variable in their butterfly biodiversity. Kibale Forest National Park is in itself a mosaic of different habitats surrounded by farmland. We compared three different habitats within the park in their fruit-eating butterfly species variety and abundance using banana-baited traps. We found several species restricted to forest or open bush habitats as well as a number of species, which were found in both. Hardly any canopy butterflies were collected. Our results show that some butterflies use different habitats whereas others are restricted to certain environments. This should be considered in National Park management issues and protection of endangered and vulnerable species.

Caroline Deimel, University of Vienna, Austria

2005

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### **Tea plantations and mixed cultivation: Barriers to forest butterfly dispersal?**

#### **Abstract**

Animal dispersal in a fragmented landscape is important in maintaining gene flow, metapopulation dynamics, allowing recolonisation of habitat patches, and for species to shift their ranges in response to global change. We surveyed butterflies in three habitats at the edge of Kibale Forest National Park, to investigate whether the dispersal of butterflies from secondary forest is reduced across adjoining tea plantations and areas of mixed subsistence cultivation. Significantly fewer species and individuals were recorded in tea compared with forest. Some forest species were not recorded at all in open habitats, or no more than 20m from the edge, while others were frequently seen at some distance from the forest edge. There were fewer species in the cultivated area than in adjacent forest, but no significant difference in the number of individuals. This was probably because the cultivated area was rich in sources of nectar, and also home to butterflies adapted to disturbed habitats. Our results suggest that both tea plantations and cultivated areas act as barriers to the movement of some forest butterfly species, while others are relatively unimpeded, at least over short distances. Butterflies can be seen as an indicator for other invertebrate species, though many of these are less mobile, and are likely to be even less able to disperse across agricultural habitats.

Adrian Baumeier, Department of Biology, University of Fribourg, Switzerland

Ben Phalan, British Antarctic Survey/Trinity College Dublin, Ireland

2005

## MORPHOLOGY

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### **Differences in wing coloration and morphology among butterflies in different light environments in Kibale tropical rainforest**

#### **Abstract**

Among species of butterflies, there is great variation in both wing size and coloration. This high diversity in wing characteristics may reflect ecological adaptations to, for example, different environmental conditions or differences in the predator spectrum in different habitats. In this study, we investigated whether light environment may explain part of the variation in wing characteristics observed among different species of butterfly in a tropical rainforest. We found that butterflies in gaps (high light conditions) were smaller and more colourful than butterflies in the forest (low light conditions). Furthermore, during cloudy weather, the active butterflies were fewer in both light conditions, but no differences were found in the colour distribution. We discuss our results in relation to the four main functions of wing area and wing coloration in butterflies (i) flying (ii) thermoregulation (iii) protection and (iv) communication.

**Thijs van Overveld, University of Groningen, The Netherlands**

**Laure Grima, University of Paris Sud, France**

**2004**

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