

## BUTTERFLIES AND HILLTOPS IN EAST AFRICA

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In *The Lepidopterists' News*, vol. 8, no. 5, 1954, are two contributions on the subject of "Butterflies on Hilltops". The first records observations on Kenesaw Mountain, Georgia, U. S. A., and the second, on Basses Pyrénées, France.

In the course of extensive butterfly collecting in Kenya and Uganda, over many years, particular attention has been paid to hill-top associations; in fact it has become almost a routine in all areas visited. It soon became evident that certain species, unobserved in the surrounding country, could be obtained here with comparative ease. In fact, there was a concentration of these specialties, together with numerous other species difficult to come by in the savannah.

The "hilltops" vary considerably, and I should like, first of all, to describe briefly some of the types. Type a) has relatively small rock outcrops consisting of huge boulders with a few large trees growing around the crown and rising abruptly to about 50-100 feet above the grass land or scrub and surmounted by a single huge flat-topped bare rock. Type b) is a larger edition of a), rising to 200-300 ft. with more sloping, boulder-strewn sides and with some stunted vegetation on top as well as larger trees; these rock outcrops, called *koppies* in South Africa, induce a limited concentration of butterflies such as a few *Charaxes*, *Papilio*, and *Acræa*. Type c) is a solitary boulder-strewn hill with coarse grass and some bush on its slopes with short grass and taller trees on the crown. Type d) is a low rocky range with one or two high points, covered in bush and rank grass on its slopes but with large boulders and taller trees on the "points". Type e) may be one of several hills forming a range and rising to 1000 ft. or more with rank grass and scattered trees on its slopes but with an area of short grass on the crown, some large rock slabs and taller trees right on top. Another type f) may be an immense rock formation with vertical face rising several hundred feet on one side and steep slopes on the others, covered in rank grass and tangled scrub but having a few dwarfed trees and short grass on the crown. Type g) is not a "hilltop" in the strict sense but it has the same effect; in many parts of the Great Rift in Kenya, which was produced by tectonic action, there are scarps of varying height, sheer on one flank where subsidence has taken place, and gradually sloping ground on the other as though the land block had tilted; the edge of the scarp is rugged and broken, and many points stand out along the rocky edge and most of these are sparsely tree-clad and form "points of attraction" for many species of butterflies.

All these hilltops have one thing in common...height above the surrounding grassland, bush, or savannah, combined with a few bushes or trees on the crown, which make suitable sunning and flight perches.

We have found that the hill *par excellence* is one that stands alone or juts out as a spur from a low range of hills and rises to about 200 feet above

the surrounding savannah. One flank will be rather precipitous, the others with an easier gradient, boulder-strewn and with rock outcrops, and covered in rank grass, scattered trees, and bush. The crown of the hill will be flattish and covered with sparse short grass between large rock slabs and boulders and here and there a few bushes and stunted trees, the whole crown not more than  $80 \times 100$  feet. So much for the general topography; we may now consider items which contribute to the general environment. The crown of the hill by reason of its exposure will be bathed in sunshine throughout the day, and because of the rock formations, which become very hot, considerable heat will be given off by radiation producing a warm up-current. The temperature on the hill top will be greater than that of the surrounding country. On a cloudless day, the rock slabs and boulders become so hot that it is unpleasant to sit on them! Moreover, since the "butterfly season" coincides more or less with the onset of rains, a great deal of moisture is retained between the surface soil and the rock formation below, and the atmosphere is steamy.

The butterfly population varies with the type of country and the district, but on most hilltops there is definite association or combination of species to be seen: a few papilios, a few acraeines, nymphalines, and the odd lycænid and hesperid. The population is not static. Individuals of certain species may remain on a hilltop for days on end, appearing when the sun is shining and retiring to the shelter of trees when dull or at night, but the majority appear on the hilltop during the course of the day, but only if the sun is bright. A dull day produces no movement, and even when the sun is temporarily "black-ed out" by a heavy cloud the insects previously on the move just disappear. They sit tight on tree, shrub, or long grass until the sun appears again. When the butterflies are on the wing they spend most of the time chasing each other and sunning themselves on vantage points of leaf or twig awaiting the opportunity to drive off all and sundry who may come too near their particular "perch". The majority of all the species are males, and if a female happens along she is at once chased and if pairing takes place the couple fly down the hillside out of sight. On many occasions we have visited hilltops early in the morning before the sun is hot. A few of the "residents" would be noted perched or flying sluggishly, but as the sun became hotter an influx of visitors would become apparent and the "flight play" commenced. No particular "point of entry" was ever noted which could be co-ordinated with prevailing breeze, inclination of hillside, or vegetation.

We have observed a definite periodicity for some species, and though the morning may have been bright and sunny from dawn onwards they would not appear until 10 a.m., when the rocks were already hot and radiated heat which could be felt. The majority of these species belong to various genera of Lycænidæ such as *Aphnæus*, *Spindasis*, *Argiolaus*, *Epamera*, *Myrina*, *Virachola*, and *Egumbia*, the great majority being males. As they arrived they would take up positions on certain favoured trees or bushes, giving chase to any which attempted to oust them from a favoured stance. The flight of *Egumbia* was always short, perhaps a couple of hours, and they would disappear down to the plains. *Aphnæus* remained until noon. *Argiolaus* and

*Epamera* had a main flight in the morning from about 10 to noon and then again between 3 p.m. and 5, but one species of the latter appeared only in the afternoon. There are other lycænids of the genus *Lepidochrysops* which keep to the ground and short grass, and though some of these seemed to remain on the hilltop as "residents" their numbers were augmented by flights mostly during the morning. Most hilltops have their quota of *Acræas*, distasteful insects which sail slowly around flaunting their conspicuous colours or perhaps sit on some exposed twig with wings expanded.

The *Papilio* population is not numerous; the ubiquitous *P. demodocus* Esper is usually present but it does not appear in flights, in fact most can be called resident. *P. leonidas* F. and *P. angolanus* Goetz. contribute to the concentration, and the former by its leisurely flight is conspicuous. On some hills, *P. rex* is present.

Nymphalines are numerically strong, and some of these by reason of their size, conspicuous colours, and strong flight attract attention. Such are *Charaxes epijanius* Reiche, *Ch. castor* Cr., *Ch. achæmenes* Fld., and *Ch. viola* B. They have a strong, swift flight and are pugnacious; they chase each other hither and thither and often fight over a favoured exposed twig on which to sun themselves. When they fight over such a perch they beat each other with clips of the fore wing, and the noise is audible at quite a distance. The population is 100% male. There are usually two or three species of *Precis*, together with the ubiquitous *Hamanumida dædulus* F., and these content themselves with chasing each other around the rocks and bushes.

Amongst the smaller, but never-the less typical, hilltop visitors of interest are two species of Skippers of the genus *Abantis*, *A. paradisea* B. and *A. tettensis* Hopp. They too are very aggressive and jealously keep guard of a favourite stance, usually a bare twig. Their flight is extremely rapid and strong, and as they dart about it is almost impossible to follow them. Another Skipper usually plentiful along the edge of the crown of the hill is the common *Cæliades forestans* Cram., which may be seen basking in the sun or chasing any intruder out of its particular territory. One or two species of Satyrines are usually present; most are "residents", but still, they too go toward the general make-up of the hilltop fauna. Many day-long visits to hilltops has shown that even on a continuously sunny day there is a lull in activity toward noon till about 3 p.m. when "flight play" is again indulged in up to about 5 p.m., when the majority of insects disappear. I have occasionally stayed on a hilltop until almost sunset and then gone the round of the hilltop beating bushes and shaking trees to ascertain if any of the company were sheltering for the night, but seldom with result; the insects seem to descend to the surrounding country. Very few Pierines are seen on the hilltops, and those that do appear pass on after a very brief stay.

Although the hilltop population is a shifting one there is evidence that individuals of a species will visit a hilltop day after day for no other apparent purpose than to play around. The same individual will sit on a twig he occupied day after day; another caught up will be recognised by a break as one taken on two previous days and released, and so on.

Having observed this definite concentration of species on hilltops, one naturally seeks for some possible explanation. The insects don't come up the hill to feed, for there is no evidence of this; they don't choose this spot as a mating ground, for females seldom appear; they don't come up because the larval food plant is around, and there is a chance that a female may emerge; they just seem to delight in the freedom of uninterrupted sunlight and in flight play. KNUDSEN (1954) suggests that the insects are involuntarily carried up the hill by a warm up-current and that they are carried down by a cooling current; thus the population is ever changing. This suggestion, in my view, is highly unsatisfactory. I am inclined to the belief that the phenomenon is due to phototropic urge; the insects are attracted to a point of uninterrupted sunlight. Combined with this there would be, by reason of mass rock formation, a concentrated area of heat by radiation once the sun had raised the rock temperature beyond that of the surrounding country. There is no doubt that butterflies are strongly attracted to light and warmth. This can be seen frequently in the forest. Many species, and especially the male sex, will congregate in sunlit clearings of quite small size such as where a giant forest tree has fallen and cleared a passage in the dense growth; there will be a similar concentration in artificial clearings and along forest paths and roadways; the majority of insects are there to bask in the sun and display. This is surely a case of phototropism!

During a recent visit to the Teita Hills I visited a small stand of Eucalyptus trees which I knew to be heavily infected with borers. Wherever the workings were fresh a gentle ooze of fermenting exudate resulted, and this liquid proved most attractive to many insects including several Nymphalines, especially *Charaxes*. Most of the exuding wounds were 40-50 feet up the trunks, and both male and female *Charaxes* came to feed in considerable numbers. When the females were satisfied, they flew along the forest edge to rest or find their food plants on which to lay eggs. The males on the other hand, when full fed, congregated on the tops of two of the tallest trees at the edge of the forest and here they sunned themselves or chased each other round and round the tree tops. Returning to feed after a while, they would again resort to these same two tall trees as their chosen "playground". Why did they choose these two tallest flat-topped trees standing well above other sunlit trees? I suggest the same phototropic influence was exhibited here as in the case of hilltops: a high uninterrupted brightly lit area with plenty of flight room around it.

In the spring of 1954 we visited the West Nile district of Uganda, and in the Metu area had experience of hilltops of quite a different character to any previously described. About two miles from the camp there was a low chain of very rocky hills with considerable tree growth. With binoculars we could see that the entire range was made up of huge boulders, many as big as a fair-sized house, piled up one on top of the other, with lesser boulders supporting. There were several spurs or promontories along the range which looked promising. By the aid of the binoculars we noted that the entire chain was thickly covered by quite a heavy forest of a curious mixed type. Many of the trees were species associated with savannah, but here they grew

to a large size and we noted considerable stands of Bamboo. From top to base, huge boulders showed up between the trees. It seemed obvious that the soil in crevices and pans amongst the boulders was very rich and that a quantity of water was held up amongst the rocks. We knew that the rainfall in the area was fairly considerable too. We eventually found that many species of butterflies associated with heavy forest were here in considerable numbers, but their presence was only made known when we investigated the peaks and "hilltops".

On our investigation of the range we examined the layout from about a mile distant and selected a couple of spurs, one for my friend and one for myself, about half a mile apart. Having walked to the base of the hills we were met by an almost impenetrable barrier of thorny bush and creepers and large boulders along the fringe of the forest. We walked up and down looking for a reasonable point of entry but found none. We then decided to force a way by hacking through the tangle and making our way up to the peaks as best we could. First of all we took a bearing between sun and the position of the spurs, and each went his way.

There was no easy gradient up to the peaks, for after we got through the fringing barrier, it was a case of scrambling between huge boulders, making use of roots and saplings in rock crevices for hand and foot hold, often jumping from rock to rock or having to make detours around unclimbable boulders, then scrambling up almost vertical rock faces. After almost two hours of really hard going one eventually came toward the top of the spur to find that one had the choice of two likely "hilltops", one a huge domed rock 20-40 feet across, or three huge boulders with flattish tops, but with deep open crevices in between and about a yard across. The surrounding forest trees reached to 6-20 feet above the crown of the rocks, and from crevices in the rocks a few bushes and creepers grew in the debris; otherwise the rock top was open to the sky. The only way to get on top of the boulders was to climb an adjacent tree trunk, get into its branches, and jump. On the next visit to my rocks I took a local native who showed me a wellworn track up the hill; the gradient was not any less difficult than the path I had forced, and it was a bit longer, but one didn't get caught up in thorny creepers nor reach a blank wall of rock necessitating a withdrawal to seek a new path. There was one compensating factor in the rock climb, and that was the shade of the forest canopy.

Once on top, it was interesting to note that these great rock-tops, open to the sky, acted in just the same way as a hilltop. There was a concentration of butterflies consisting of *Charaxes* of half a dozen species, a few *Precis*, a species of *Euxanthe* and other nymphalids, two or three species of Hesperids, four species of *Acræa*, and several genera of Lycaenids but predominantly *Argiolaus* and *Epamera*. All these behaved just as they would on a hilltop; they sat and sunned themselves on leaves and twigs or dashed after each other in the sunlight. Some of them consistently perched high, and one had to use a twenty foot pole to reach them. But there was an added interest to these rock-tops surrounded by heavy tree growth at their very edge, in that females

of practically all the species encountered were present at some time or other. This was due to the fact that in many instances the surrounding trees, or parasitic *Loranthus* on them, were the foodplants of the species concerned. As in the case of hilltops here too we noted that the first flush of insects was about 10 a.m. when the top of the rock was in full sunlight and beginning to warm up. There was also the noon lull followed by a very distinct afternoon session, particularly of *Argiolaus* and *Epamera* which came in between 4 and 5 p.m. We were able to induce an even greater number of female visitors by means of using baited traps for *Charaxes* and by judicious "planting" of bunches of *Loranthus*, for *Epamera* and *Argiolaus*, on convenient trees. The sprays of flowering *Loranthus* had to be renewed daily as they withered in a few hours. The female lycænids visited the *Loranthus* to lay eggs. In this way we were able to capture many females which would not have been obtained otherwise.

On return to camp each evening, my friend and I compared notes and experiences. It was interesting to find that our respective hills had produced the same combination of species with one or two notable exceptions. His rock-top had a species of *Virachola* (Lycænidae), which I never encountered on mine and he took them in some numbers and all were males. The larvæ of most members of this genus feed inside fruit, large berries, and seed-pods, and there was no doubt that somewhere in the vicinity of his rock the food-plant existed. My specialty was a species of *Charaxes*, first recorded from S. Abyssinia, then in Sudan, but still very rare and only once taken in N.E. Uganda. The larvæ feed on Bamboo and I had a stand of this at one end of my second rock, so I took a nice series of males and females.

It was not all sunshine on the rock peaks; nearly every day a rain-storm swept over. We kept an eye on the rain clouds as they moved over one hill after another, but we had a warning of their near approach, for every butterfly previously circling around disappeared. As the rain fell we scrambled down our rocks and took shelter under cover of overhanging rocks, sharing the protection with bats and Rock Hyrax.

The Sanctuary, Ngong, KENYA COLONY

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#### THE NEW NOMENCLATURE RULES

A temporarily valuable pamphlet, "An unofficial interpretation of the International Rules of Zoological Nomenclature as amended by the XIII International Congress of Zoology, Paris, 1948, and by the XIV International Congress of Zoology, Copenhagen, 1953", has been issued by W. I. FOLLETT, of the California Academy of Sciences, San Francisco, Calif., U.S.A. Any lepidopterist concerned with the technical aspects of nomenclature who has not already received this pamphlet will perhaps be able to obtain a copy by writing the author. It is a synthesis of the 1948 and 1953 amendments to the International Rules and will of course be replaced by the publication of the official revision of the Rules now in preparation. The 1948 and 1953 actions have been officially reported in painstaking detail by the Secretary of the International Commission, but these are not in a form one can easily use for rapid consultation.

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