

VARIATION IN EAST AFRICAN BUTTERFLIES 31

Mention must also be made of the profuse numbers of belemnites to be seen on the caravan track which runs north of Serenli at Mata Warseisa. They are of a sulcate form.

CONCLUSION

On the completion of the identification of the various fossils found, the exact age of this large development of sedimentary rocks should be determined.

For the moment it is submitted that the narrow coastal strip of sediments broadens out and extends to at least $40\frac{1}{2}^{\circ}$ long. E. These run northward across the Daua River, probably without interruption, through Italian Somaliland to British Somaliland. The writer visited the latter place about a year and a half ago and was much struck by the similarity in lithological features of the Bihendula and Daua limestones. There was also a marked similarity in the sulcate ammonites found.

Economically these rocks might prove of value as a source of oil, but this would seem to depend largely on the results of the investigations recently carried out at the Daga Shabell oilfield in British Somaliland. It is noteworthy that the Shabell sandstones have been identified as Jurassic age.

GEOGRAPHICAL VARIATION IN EAST AFRICAN BUTTERFLIES. PART II

BY K. ST. A. ROGERS, F.E.S.

NYPHALIDÆ

Most species of *Precis* are more interesting for seasonal than for geographical variation. It is true that the African forms of *P. orithyia* and *P. hierta* differ to some extent from the Oriental species, and form races of those species which are generally smaller and darker, but that is only to be expected. There is, however, one species, *P. elgiva* in East Africa, which is a form of the western *P. terea* which has some

interest. The former has a narrower, central fulvous band across both wings than the latter, whereas, in most cases, the western forms differ from the eastern forms in their more extended dark markings. *P. terea* reaches as far as Londiani, but in Nairobi *P. elgiva* is found, and shows no tendency to approach the type form. It seems, therefore, that this is another case in which the Rift Valley forms the boundary between the two races.

Hypolimnas (Euralia) dubius is particularly interesting from the point of view of geographical variation. The western form exists under two forms, *H. dubius*, with black, white-spotted fore-wings, which mimics *Amauris*, such as *A. psyttalea*, and *H. anthedon*, with large, white patches on the fore-wings, which mimics *A. navius*. These have been proved by breeding to belong to one species, though the models are perfectly distinct. In East Africa, also, the species exists under two forms similar to the two western forms, namely *H. mima*, corresponding to *H. dubius*, and *H. wahlbergi*, corresponding to *H. anthedon*. The latter has very much larger, white patches in both wings than *H. anthedon*, precisely as *A. dominicanus*, the eastern subspecies of *A. navius*, has larger patches than its western representative. However, *A. psyttalea* only extends into the Nyanza province of Kenya, and in the rest of the country there are two other species of *Amauris*, i.e. *A. echeria* and *A. albimaculata*, which resemble each other so closely that they can only be separated on close examination, and both extend to the western parts of Uganda. In both these species the white spots on the fore-wing are much smaller than in *A. psyttalea* and its allies, and it is a remarkable fact that *H. dubius mima* also has the spots on the fore-wing much smaller than in *H. dubius*; so that the two forms of the same species on coming into East Africa vary in exactly the opposite direction, one by an increase in the white markings and the other by a decrease. In the region around Victoria Nyanza all forms seem to be found and no doubt intermediates occur; but in the forests near Nairobi the eastern forms alone are found, though they are not common, and they also occur together in the Ukamba and Teita countries, but in the coast district,

during many years collecting, I never met with the *mima* form, though the *wahlbergi* form was much commoner than elsewhere in the colony; and it is significant that the model of this form, *A. albimaculata*, is also absent from this district, and that as soon as it is found, i.e. in the Teita district, *H. mima* also appears. I do not think that it will be of importance to go into the small differences which exist between the races of several other butterflies of this group, as they require careful comparison in order to be appreciated. However, the genus *Pseudacræa* contains species in which the difference is marked. *Ps. boisduvalli* is a red and black species which is a well-known mimic of the western *Acraea egina*. The eastern form *Ps. trimeni* does not, however, resemble *A. areca*, the eastern form of *A. egina*, so closely as it resembles *A. acara*, the eastern form of *A. zetes*; in both species the eastern forms are characterised by the greatly extended red markings, but in *A. acara* there is a conspicuous subapical orange bar, not present in *A. areca*, which is generally found in *Ps. trimeni*. At the same time it should be remarked that the latter is very variable in East Africa, and some specimens approach the western form somewhat closely. The eastern form extends only as far as Nairobi, and is often less rare than the western form.

Charaxes pollux.—The eastern form *gemimus* differs from the type form in the presence of yellow submarginal lunules on the hind wing. It is to be found on the Taita hills and on Kilimanjaro, whereas the type form persists unchanged from the west coast as far as Nairobi.

Charaxes protoctea occurs as far east as Kavirondo, and is replaced in the coast district of Kenya by *Ch. azota*, which has a wider marginal border of orange in the male, and a much broader white central band in the female.

The western *Libythea laius* also reaches Nairobi, but is replaced on the coast by the very similar *L. labdaca*.

LYCÆNIDÆ AND PIERINÆ

Many of the Lycænidæ run very close together, and seldom exhibit much geographical variation as regards western and

84 VARIATION IN EAST AFRICAN BUTTERFLIES

eastern forms. However, *Telipna carnuta*, which is found as far east as Uganda, is replaced in the coast district by *T. rogersi*, with more extensive orange-brown markings, and *Myrina silenus*, which reaches Kavirondo, is replaced at Nairobi by *N. ficedula*, which is a common species as far as the east coast and also South Africa.

The Pierinæ are more remarkable for local and seasonal variation than for geographical races, and there is also a great deal of individual difference, so that with our present knowledge it is not easy to recognise geographical variation in most cases. Perhaps the clearest case is that of *Mylothris narcissus* of the Taita hills, which is replaced at Nairobi by *M. jacksoni*.

PAPILIONIDÆ

Papilio rex of Nairobi is replaced in Uganda by the form *mimeticus*, which is darker, and on the west by the form *schultzei*, which is quite without the red mark at the base of the fore-wing. In Kavirondo there occur intermediates.

P. dardanus is very interesting from the point of view of geographical variation as it is for its mimetic forms. There are forms with non-mimetic females in Madagascar and Abyssinia. Besides these the races recognised are *cenea* from South Africa, *tibullus* from the east coast (hardly separable from *cenea*), *polytrophos* from the escarpment in Kikuyu, and *dardanus* from Uganda westward. At Nairobi the form is *tibullus*, probably influenced by intermixture with *polytrophos*. The western males have only two or three large submarginal black spots on the hind wing, but those from the coast of Kenya have a very wide black submarginal band, which is much less pronounced at Nairobi, though it is very variable. On the other hand the *Hippocoon* females have the outer half of the hind wing black on the west coast, but on the east coast the black band is very greatly reduced, following the model *Amauris niavius*.

This is one of the clearest cases known, as it is most improbable that climatic conditions should result in less black in one sex and more black in the other sex of the same species.

It will be noted that in the large majority of the species

mentioned there is a progressive diminution of the black or fuscous markings from the west to the east, but there is much difference in the distance penetrated by the western forms, some stopping at the lake and others reaching Nairobi.

DEATH'S-HEAD MOTH IN BEEHIVE

(To the Editor)

The following notes may be of interest to members. A swarm of bees have taken up their abode in my house, which is a wood and iron building. The bees have got in between the wooden wall of the dining-room and the outside iron. Exactly opposite the nest is a sofa, where I usually sit and read in the evenings. From my seat I can distinctly hear all that is going on in the bees' nest; the bees keep up a buzzing sound, which ranges from a high-pitched squeak to a booming roar. One night a most unusual noise started up under the eaves and proceeded to the nest. At first I was unable to guess what it was—it sounded like a bat or large moth fluttering about. This noise started every night at 7.30 p.m. and had been going on for a week. I put a strong light outside, shining on to the wall, and waited till the visitor came out, which I found it did in a place where I might, with luck, catch it. After a short wait I could hear it coming; then, as it came out, a lucky sweep with the butterfly net got him; it was a ♂ death's-head hawk moth. Shortly after the ♀ came out and I got her too. Both specimens were nearly perfect, in spite of the knocking about they had received in struggling up and down in the narrow partition in the wall. On opening their bodies I found they contained about a teaspoonful of honey each. I showed these moths to a native bee fundi, who said at once that he knew it, and that it fed on bees. His idea was that it 'caught the bees and ate them,' and he explained 'that the moth eats half the bees in the hive, then the other half fly away and leave the hive.'

One thing seemed very curious, and that was that the bees appeared to be frightened and made no noise while the moths were feeding on the honey.—R. E. DENT.