NOTES ON THE GEOGRAPHICAL VARIATION OF SOME BRITISH EAST AFRICAN BUTTERFLIES

PART I.

By Rev. K. St. Aubyn Rogers, F.E.S.

The Ethiopian region, which includes all Africa south of the Sahara, and the southern part of Arabia, is quite well marked. The fauna is related to that of the neighbouring part of the Oriental region, but is abundantly distinct.

The insects as a whole exhibit also some relationship with that of other regions, as is generally the case.

As regards butterflies there are numbers of genera and some larger groups confined to the region, though there are many genera, and indeed some species, which are also found in India and other parts of the Orient, and there are a few genera and species which are related to the fauna of other regions.

The larger groups referred to are the Lycænids of the sub-family *Lipteninæ* and the Nymphalines of the group which Aurivillius has called *Nymphalidi*, including *Euphœdra*, *Euryphene*, *Harma*, and their allies.

It is true that the Oriental *Liphyra brassolis* has been generally referred to the *Lipteninæ*, but recent investigations indicate that this reference is erroneous, though some West African species, which have also been wrongly placed in the *Lipteninæ*, are nearly related to it.

Both these groups are very large, containing something like 200 species each, divided into a large number of genera, and are for the most part confined to the forest region of West Africa, and being but scantily represented in the east and south, whilst the *Lipteninæ* have no representative in Madagascar, and the *Nymphalidi* but one.

Besides these two large groups many genera are peculiar to the region, e.g. *Amauris* (*Danainæ*), *Gnophodes*, *Leptoneura*, *Physcœnura*, *Neocœnyra*, &c. (*Satyrinæ*), *Planema* (*Acræinæ*), *Pardopsis* (usually placed in the *Acræinæ*, though Dr. Eltringham, who has carefully examined the structure, says it has

nothing to do with this sub-family), *Lachnoptera, Salamis, Crenis, Euxanthe,* &c. (*Nymphalinæ*), *Lachnocnema, Myrina, Iolaus, Capys, Zeritis, Axiocerces,* &c. (*Lycænidæ*), *Mylothris Herpænia, Calopieris, Argeronia* and the aberrant *Pseudopontia* (*Pierinæ*), *Abantis, Cœnides, Rhopalocampta,* &c. (*Hesperidæ*).

Moreover, *Acræa* and *Teracolus* are mainly African, though they have spread into the adjoining parts of India.

Besides its primary relationship to the contiguous Oriental region, there can be no doubt that some genera of butterflies are not distantly related to the fauna of South America. The genus *Crenis,* which has no allies farther east, belongs to a Neotropical group of Nymphalines, and the nearest allies of *Acræa* are the butterflies of the South American genus *Actinote,* whilst the butterflies now referred to the genus *Antanartia* were until recently in the South American genus *Hypanartia,* to which they are very closely allied.

Moreover, a few species of Palæarctic genera have succeeded in spreading into Africa, i.e. *Argynnis* (four species), one only being found in British East Africa; *Heodes* (*Chrysophanus*), represented in British East Africa by *H. abbotti*; *Synchloe,* represented in British East Africa by *S. johnstoni,* and *Colias electra,* hardly separable from the European *C. edusa.* All these are confined to areas of considerable elevation, and it is a curious fact that *Colias, Argynnis,* and *Heodes* have spread into India and along the Andes to South America, whilst the last-named is even found in New Zealand.

Geographical Sub-Regions

I do not propose to discuss the vexed question of the relationship of the fauna of Madagascar to that of the mainland of Africa. So far as butterflies are concerned the relationship is very close, most of the Madagascar species belonging to Ethiopian genera, and some even being conspecific with those from the mainland. It is true that there are a few species showing decided Oriental affinities, but it is probable that these are due to transoceanic immigration, and this seems to be still proceeding, the widespread Oriental *Hypolimnas bolina* having reached the island during the last few years, and having already become abundant in some localities.

In his great work on the 'Geographical Distribution of Animals,' Dr. A. R. Wallace divided the mainland of the Ethiopian Region into three sub-regions. The first of these comprised the greater part of Africa, extending from the northern part of the west coast right across the continent to Abyssinia, and thence south to the tropic of Capricorn, and again reaching the west coast in Angola. The second sub-region comprised the tropical forests of West Africa, but reached as far east as the Nile basin. The third was confined to extra-tropical South Africa.

Of these sub-regions the second, as far as butterflies are concerned, is by far the most typical and peculiar. A great many of the most characteristic genera and species are either entirely confined to this sub-region or chiefly represented in it, more especially the Nymphalines of the group *Nymphalidi* and the Lycænids of the sub-family *Liptenincæ,* as already mentioned.

The third sub-region is more closely connected with the first, some of the most characteristic South African genera crossing the tropic, whilst a large number of the South African species are found as far north as the Equator.

In his splendid work on 'South African butterflies,' Trimen recorded 21 Satyrines, 6 Acræines, 20 Nymphalines, 75 Lycænids, 28 Pierines, 7 Papilionines, and 35 Hesperids, as peculiar to South Africa ; but at that time (1888) the butterflies of eastern tropical Africa were little known, and a large proportion of these have been since found to inhabit the southern part of the eastern tropics, and even British East Africa. Moreover, Trimen recorded six genera, *Meneris, Cœnyra, Capys, Arrugia, Durania,* and *Deloneura,* none having more than three species, as endemic in South Africa, but of these *Capys* is now known to extend as far as the Dar-es-Salaam-Ujiji railway, whilst *Deloneura* crosses the Equator in the Kavirondo province of British East Africa. As would naturally be expected, the first region, with its immense extent, is very much richer than South Africa, and the more tropical parts of it, where well watered, are very much richer than any part of South Africa except, perhaps, the coast of Natal and the country to the north of it. I should say that Trimen

overestimated the number of species found in South Africa, especially in the *Pierinæ* and the genus *Precis*, owing to the fact that in his day the extraordinary seasonal variation was but little appreciated, but, on the other hand, further exploration of the country has resulted in the discovery of several additional species, so that the total number recorded is probably not far from correct.

In British East Africa the number of species to be found in the coast district is somewhere in the neighbourhood of 250, and the Taita district has produced about the same number, the genera *Acræa* and *Teracolus* being particularly well represented in this latter. The environs of Nairobi probably produce about 200 species, but the low-lying country near Victoria Nyanza is much richer, owing to the spread of many western forms through the forests of Uganda.

Danainæ

Danaida chrysippus.—All forms of this species occur, but the *Dorippus* form, which lacks the black and white tip in the fore-wing, is predominant, and I should estimate that to the east of the Rift Valley 80 per cent. are of this form, and even in the lake region the large collection made by Dr. C. A. Wiggins contained about 50 per cent. of this form and *Albinus*, which only differs from it in having the greater part of the hind wing white. In the Oriental region the type-form is found almost exclusively, and the same is true of South Africa, whilst in West Africa the only form found in many parts is the *Alcippus* form, which differs from the type-form as *Albinus* differs from *Dorippus*. As the *Dorippus* form is predominant from Mombasa to the Rift Valley, without regard to the differences in climate and rainfall, the suggestion that this form is due to drought seems untenable. The *Dorippus* form is probably common throughout the recently conquered territory to the south, and in the Mpapua district I should estimate that between 60 per cent. and 70 per cent. were of this form, but farther south it seems to become much rarer.

Danaida formosa.—This species is not rare in most parts of East Africa, and I found it plentiful in the Mpapua district. In Uganda it is replaced by *D. mercedonia*, which differs from

it in the considerable reduction of the bluish-white spots in both wings. It is true that the red-brown areas are more extensive in *D. mercedonia,* but they are so much darker, almost maroon instead of bright fulvous, that they do not detract from the prevalent darker colouring of the species. In West Africa there is another species, *D. morgeni,* which is darker still. As Aurivillius has pointed out, this difference is characteristic of the East African butterflies in many families, and it seems highly probable that it is due to climatic causes, and is produced by the comparative dryness and possibly excess of sunshine in the East, but it is quite likely that the fact that West Africa is pre-eminently a forest region compared to East Africa is at least a contributory cause.

Amauris niavius.—The eastern form is known as *Dominicanus,* and is rightly regarded as a subspecies ; the lake region, where the two forms meet, producing numerous intergrades, as has been pointed out by Mr. S. A. Neave. *Dominicanus* is found throughout tropical East Africa and extends to Natal, though it is usually uncommon there. It differs from the type-form in the great increase of the white areas in both wings, and is also appreciably larger. This is a characteristic example of the change that takes place in the pattern of butterflies in passing from west to east in Africa, and the increase in size is also frequently met with.

A. echeria and *A. albimaculata.*—These two species, which are almost indistinguishable on the wing, are east and south in their distribution, though they extend throughout Uganda. Neave has pointed out that the white spot in the cell is considerably larger in specimens from British East Africa than in those from South Africa, and that there is a further increase in the size of this spot in the western part of the range, though perhaps his material from the eastern part of British East Africa was hardly sufficient to establish this last part of his argument. He further argues that this increase in the size of this spot is due to the influence of the western *A. Psyttalea.* However, so far as I know, this last does not cross the Rift Valley, and the difference in the size of this spot in specimens caught in Taita and those in Uganda is small. In Taita *A. albimaculata* always has the large patch in the centre of the

hind wing very pale ochreous, but this is not the case with those I have seen from Nairobi and the Kenia district. Personally, I have found *A. echeria* very much rarer than its congener, which, moreover, does not usually have the large patch in the hind wing paler than in southern specimens. I have examined scores of *A. albimaculata* in Taita and they are singularly uniform.

Acræinæ

A large number of red and black species of the genus *Acræa* have different forms in East and West Africa, and these forms are sufficiently constant to be ranked as subspecies. Moreover, the differences are in almost every case of the same character. The eastern species are distinguished by the increase of the red and orange areas and the diminution of the black markings, and are quite parallel to the case of *Amauris niavius*. Amongst other species which exhibit this character the following may be mentioned: *A. Areca*, the eastern form of *A. Egina*; *A. acara*, compared with the western type, *A. zetes*; *A. natalica*, compared with its western form, *A. pseudegina*, and the central form, *A. abadina*, *A. thesprio*, and the western type, *A. perenna*; *A. pharsaloides*, compared with the type *A. pharsalus*; all these bear a considerable resemblance to each other, though they do not all belong to the same group. There are also other species which differ in exactly the same way, e.g. *A. neobule*, compared with its form *A. seis*, *A. rosa*, the eastern form of *A. quirina*, and even *A. rubescens*, the eastern form of *A. asboloplintha*, though the two forms of the last are only separated by the Rift Valley.

The western *A. Lycoa* has a series of subspecies in the intervening parts of the continent, and in East Africa is found in the forms *A. kenia* and *A. fallax*, which are much alike and differ from the type in that the pale markings are much more definite, but much more restricted. In this case it is probable that the species has been affected by mimicry of the commonest form of *A. Johnstoni*, which is always found with it and does not occur in West Africa. Another species which has a number of subspecies is *A. acrita*. The general tendency of these

subspecies proceeding from the north-east to the south-west is for a gradual increase in the size of the subapical black, and also of the median row of spots, so that the British East African *A. pudorina* looks utterly unlike the Angolan *A. Bella*.

In the district near Mpapua, some 200 miles west of Bagamoyo, I found two very different forms, or subspecies, of *A. acrita* flying on the same ground. By far the commonest of these was *A. acrita manca*, which is much like *A. acrita pudorina*, but has a discal row of spots on the fore-wing more or less well developed, and in the wet season has the central row of spots more pronounced. The other form was *A. acrita ambigua*, which has a south-western distribution, and in which there is a very pronounced black tip to the fore-wings and the subapical or discal row of spots is absent and the central row somewhat reduced. The females differ even more, as the ground colour of *A. acrita manca* is pale brown, and that of *A. acrita ambigua* almost black with a conspicuous white subapical bar, at any rate in the wet season; the dry season form of *A. acrita manca* is much more like its male, and I did not find *A. acrita ambigua* at that time. The species has not been recorded from any part of the western forest region, Angola not really belonging to the equatorial forests in which the western fauna is chiefly developed.

Another species which may be mentioned is *A. pseudolycia*, of which the type form, a whitish butterfly with black spots and other markings, is found in Angola. The British East Africa form, named *A. astrigera*, is a red and black insect and looks very different, greatly resembling *A. zetes acara*, to which it is indeed very closely allied. However, intermediate forms exist, and Dr. Eltringham has no doubt that they are conspecific.

The genus *Planema* has but two real East African species, *A. montana*, and *P. quadricolor*, the former is little more than a form of the southern *P. esebria*, the pale markings being of a deeper colour and more extensive.

Typical *P. quadricolor* is found at considerable elevations on Kenia and Kilimanjaro; it has, however, two subspecies, i.e. *latifasciata*, which occurs in Kavirondo and Uganda, and *itumbana*, which I found not uncommon near Mamboya,

some 150 miles west of Bagamoyo. These two forms resemble each other very closely, and have a much broader orange subapical bar than the type.

(*To be continued.*)

NOTES ON TORTOISES COLLECTED IN EAST AFRICA 1915–1919

By Arthur Loveridge

Cinixys belliana (Gray)

Specimens of Bell's Hinged Tortoise were collected at Longido West (19/12/16), Ngoga (24/5/16), Kerogwe (6/7/16), Morogoro (9/4/18), and Lumbo (10/10/18). The last-mentioned specimen was a very large female, 207 mm. in length, the ovaries contained a mass of ovules from the size of a pea up to some measuring 28 mm. in diameter; there were about fifteen of these very large ones.

Testudo pardalis (Bell)

The Leopard Tortoise was met with at Ruwira (1/11/19), Namanga (19/1/16), Moshi-Arusha veldt (24/3/16), and Kerogwe (6/7/16). This is the very large box-tortoise, which is not uncommon on the Athi Plains and elsewhere. A shell which I found in Arusha measured 14 inches long, 9 inches broad, and 8½ inches in height. This was a male. The sexes may be readily told in this species by the turning down of the terminal shield (caudal) of the upper shell (plastron) in the male, and the reverse in the female.

Testudo Loveridgii (Blgr.)

This new species, recently described by Mr. G. A. Boulenger, was obtained at Dodoma, G.E.A., on December 8, 1918, and two subsequent days. Eight specimens were obtained. When I procured these specimens I took them for the rare *T. tornieri* Sieb., of which only three specimens are known (Njoro, B.E.A.; Russisi and Lindi, G.E.A.). *T. tornieri*, which is its nearest ally, however, never loses its ribs, is not so broad, and lacks the groove on the under-surface of the caudal shield.