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# The Journal

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## EAST AFRICA AND UGANDA

### NATURAL HISTORY SOCIETY

and September, 1928.

Nos. 33 & 34.

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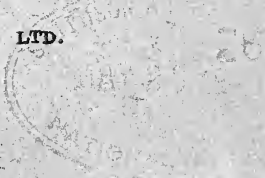
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FRONTISPIECE.

PLATE LXXVII.



*Photo: Dr. van Someren.*

Larvae and pupae of *Charaxes azota*.  
See Journal 31-32, page 127.



PLATE LXXVIII.



*Photo: Dr. van Someren.*

Larva of *Ch. brutus*.

Larva of *Ch. guderiana*.

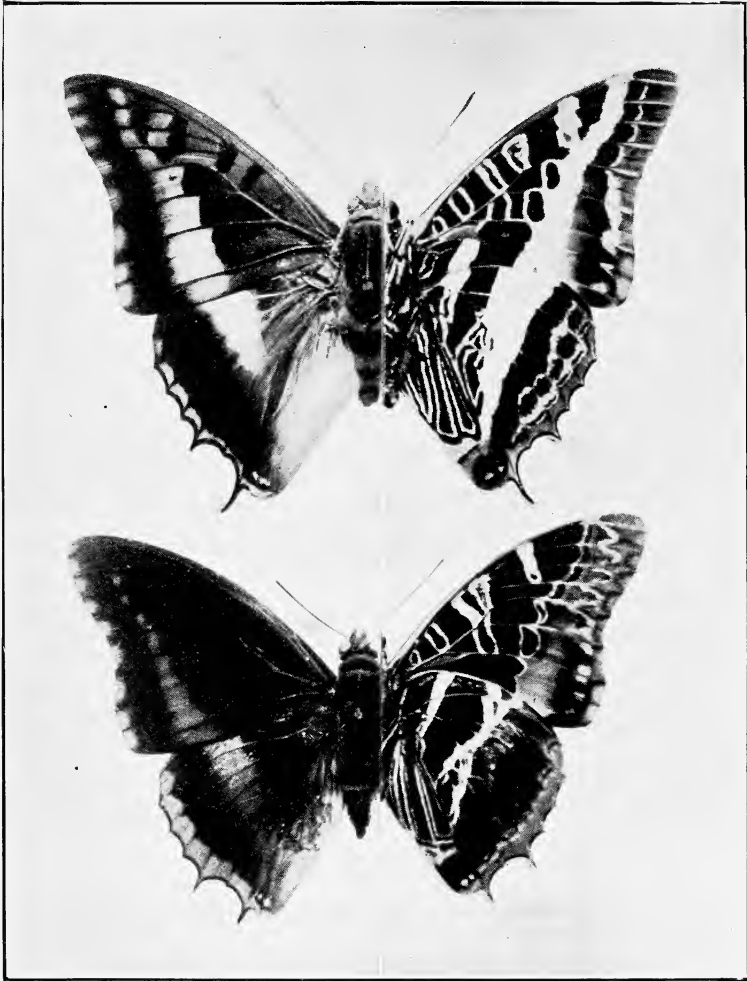
Larva of *Ch. pollux*.

See Journal 31-32, pages 146 and 149.





PLATE LXXIX.



♂

♂

*Photo. Dr. van Someren.*

Upper surfaces.

Under surfaces.

*Charaxes druceanus proximans.*

*Charaxes eudoxus cabeçus.*

# THE BUTTERFLIES OF KENYA AND UGANDA.

## PART VIII.

By

V. G. L. VAN SOMEREN, F.E.S., F.L.S. etc.,

and

REV. K. ST. ROGERS, M.A.; F.E.S.

### *CHARAXIDI (Continued).*

#### PREFACE.

This paper forms the eighth article dealing with the Butterflies of Kenya and Uganda, and the second devoted exclusively to the *Charaxidi*. This group should be completed in one more article. Although these papers are issued under a joint authorship, owing to unfortunate circumstances, only one of us (van Someren) is responsible for Parts 3 to 8.

#### *CHARAXES DRUCEANUS PROXIMANS*, Joic. and Talb. Pl. LXXIX.

Expanse: Male 80-84 mm. Female 84-90 mm. General colour orange-red with black marginal border. Sexes unlike.

Male: F.-w. Basal triangle red-brown distally bordered in 1b-4 with black spots increasing in size up to 4. Cell paling towards apex and crossed in this area by a rectangular black spot; extreme apex with a black rectangular mark. Mid-ala line orange-red distally bordered with rich brown-black carrying on the margin a series of large orange-red spots from 1b to apex. Mid area of 5-7 distally and proximally ornamented with contiguous black spots, the inner ones parallel to the mark at apex of cell, the outer series confluent and parallel to the margin of apex of wing.

H.-w.: Basal area red-brown bordered by ala-line of light orange-red, distally bordered with darker orange-red; outer margin of wing with a broad black border, ornamented on the margin with crescentic orange marks from 2 to 6; margin of 1c with a bluish-green line, internal to which is a series of three spots of a bluish colour. Veins 2 and 4 with tails, that on 2 being twice as long as the other. Extreme edge of fore and hind-wing with narrow white scaling at mid-internervular areas. Inner fold of hind-wing strongly "haired" and orange-ochreous in colour. Thorax and abdomen red-brown.



#### UNDERSIDE:

F.-w.: Cell, costa and bases of 3—8 reddish-chestnut; cell crossed by three black bars outlined with silvery-white, with a triangular black mark at the apex, outlined with silvery-white. There is a large black spot sub-basally in 1b and 2; two rectangular black spots sub-basal in 3 and one in 4. On the distal side of these spots is a silvery-white ala bar which extends from the mid-point in 1a in gradually decreasing width up to the costa at vein 9. A series of three silvery rectangular contiguous spots cross the sub-bases of 6—8, forming an angle with the upper end of the ala bar. The distal border of the wing is orange-brown, lighter at the hind-angle, and carrying a series of black crescentic marks at the mid-line, outlined distally with silvery-grey; in 1b and 2 the spots are large with triangular silvery-grey marks outwardly. The distal portion of the veins in this border are silvery-grey with an expansion of this colour at the extreme margin. The bases of 1a—2 are greyish-brown.

H.-w.: Ground colour reddish-chestnut; ala bar silvery-white, broadest at the costa and narrowing rapidly to 2 and inclining inwards to the inner fold at 1c. On the distal side of this bar there is a series of sub-marginal confluent silvery-grey rings outlined in black, those of 3-8 enclosing the chestnut ground colour, those of 1c and 2 being purple-grey inside, the former with two bluish-purple spots distally. External to this series of spots is a narrow orange border distally edged with a black marginal line outlined with silver. The basal area of the wing is traversed by a series of lines: a broad silver line starts at the sub-base of 8 continues through the base of 7 and extends through the sub-base of the cell and is carried down in three loops with angled bases in 1a—1c. In 8 and 7 the line is uniform silver but throughout the rest is black internally. A further line, silver and black internally, crosses the apex of the cell and extends into 1c where it joins with the first series. Two black lines cross the bases of 2 and 4.

#### FEMALE:

Somewhat like the male but the ala bar on both fore and hind-wing very much wider and paler. The marginal spots on both wings large and pale. Underside as in the male but duller.

#### EARLY STAGES:

This species lays its eggs on the undersurfaces of the leaves of a creeping shrub, *Eugenia* sp. (*Myrtaceæ*) and on *Bersama abyssinica*, Fresen. (*Melanthaceæ*). They are spherical and glossy, with a slight concavity on top. Fine radial lines pass from the edge of the depression, converging towards the centre, where they become obsolescent.



When first laid, the egg is yellow, but in twenty-four hours the upper part becomes streaked with pinkish lines; still later the upper third of the egg is overspread with pinkish-brown. The larva emerges in about eight days and straight away devours the egg shell. The newly hatched larva is pale apricot in colour, 4 mm. long and tapering slightly towards the posterior end. The head is pale-brown with darker markings and a rugose surface. Two pairs of horns are present, one at the highest point on each side of the head and the other about one-third down. The former pair diverging at an angle of about ninety degrees and strongly curved backwards, are almost as long as the height of the head, while the latter are about half as long as the other pair and curve upwards and slightly backwards. There are two minute spinous processes between each upper and side horn. A pair of brown, white-tipped, blunt processes, directed upwards in a slight curve and diverging nearly at a right angle, is present on the anal segment. The length at the end of the first stage is 9 mm. and the general colour greenish with a brown spot on the sixth segment. At the first moult the larva becomes grass-green, with paler green dots, each bearing a minute short hair.

The upper half of the head is dark purplish-brown, the lower pink-brown. The horns are crimson, with paler tips. The anal spines are crimson with pink tubercles. A well-marked spot on the sixth segment is in shape somewhat semi-circular, with a straight edge directed forwards, while that on the eighth is circular and somewhat obscure. Both spots are purply-brown, the front one having a green dot towards the front edge. The length at this stage is 12 mm. The head is first cast and then the skin gradually shed. Growth in the third stage is rapid, but the colour hardly changes except that the head is now green with a purply suffusion at the upper half. The dorsal spots on the sixth and eighth segments become well defined and more purply, with a dotted outline of blue at the circumference. This general colouration is maintained throughout the final stage; but the larva is 45 mm. long when ready to pupate. The pupa is pale green, 30 mm. long, and rather broad, 15 mm. at the angle of the wing scutae. It resembles that of *Ch. pollux* but is rather more bluish and the white marbling on the wing cases is more pronounced. The spiracular spots are red with a central longitudinal dark line and with a brown outline. The angle of the dorsum of the thorax is white and from this, wavy whitish lines run to the bluntly bifurcated head-shield. The cremaster is orange—consisting of a long pedicle with on either side a well-pronounced bilobed process and anterior to each pair is a further bilobed projection on segment 2.

The pupal stage lasts three weeks as a rule, but some carry over for a much longer period.

#### DISTRIBUTION AND HABITS :

This species is nowhere common but most specimens have been recorded from the high country of the Mau to Mt. Elgon. It however has been taken on the Kikuyu Escarpment and Mt. Kenya but is rare. It occurs in the Teita Hills, but in this area it apparently approaches the race *kivuensis*. Very few specimens have been recorded and much remains to be learnt regarding its distribution. There is little variation in general colouration; there is however a tendency to paleness of ground colour in some specimens and this results in a greater definition of the black markings.

#### MIMETIC ASSOCIATIONS :

There would appear to be no very close resemblance between this species and others of the genus, but nevertheless there is an undoubted superficial resemblance between it and *Ch. saturnus*, especially so in the case of the pale forms of *druceanus* mentioned above. There is again a resemblance to *Ch. eudoxus* and *Ch. lucretius*, when the insects are in flight.

It is well to mention here that the form of *Ch. druceanus* found in the districts north and to the east of Mt. Elgon show a marked difference to the race *proximans* and probably represent a distinct form. We have already noted that the form which is found in Teita on the Dabida Hills resembles the race *kivuensis*, but more material is needed to definitely place these insects.

#### *CHARAXES EUDOXUS CABECUS*, Jord. Pl. LXXIX., fig. 2.

Expanse: Male 76-78 mm. Female 80-84 mm. Sexes unlike, though close. General colour, red-brown and black.

#### MALE :

F.-w. : Basal triangle red-brown to almost apex of cell and basal half of costa. Remainder of the wing rich brown-black with an orange-red ala bar widest at 1a and rapidly diminishing in width and continued as discreet spots to 6. Margin with large orange-red spots at mid-point between veins, double in 1b, and reaching 9.

H.-w. : Basal area red-brown with black scaling at bases of 4-6, followed by an ala bar of orange-red paler towards the costa and outwardly bordered by a black bar widest in 6 and 7 and narrowing to the anal angle where it is ornamented with two purplely-blue spots in 1c. Distal to this is an orange border of confluent spots, edged on the extreme margin with a black line with white scaling in the mid nervular point. Thorax and abdomen red-chestnut.

#### UNDERSIDE:

Basal two-thirds of wing except 1a and 1b, reddish-chestnut; the cell and area 2, each with two black spots outlined with silver sub-basally and near mid-point; the cell with a third silver bar almost at the apex; while at the apex, is a black bar outlined with silver and contiguous with the inner bar in 2. Area 3 with two spots, a silver one at the base and a black one outlined with silver at mid-point; from this a faint silvery line passes up to the costa parallel to the margin of the wing, in a series of crescentic loops. A further silver line crosses the distal end of the basal third of areas 5-7. The basal areas of 1a and 1b are purply-grey the latter with a large black spot at mid-point. The ala bar of the upper side is indicated by an ochreous-orange bar traversed in areas 3-7 by a series of faint silvery loops with bases formed by the lines in 4-7. Distal to this bar is a series of black suffused confluent marks in 1a to 2 decorated with purply spots and represented in areas 3-6 by black dots in the loops in these areas. The marginal border is orange-ochreous intersected at the veins by blackish triangles with greyish centres.

H.-w.: Ground colour reddish-chestnut, paler in the area corresponding to the ala bar above, which however is distally darkened and bordered outwardly with dull chestnut outlined with greyish-silver and black. The marginal border is reddish-orange narrowly edged outwardly with black. The anal angle carries a greenish spot outlined in black. The basal chestnut is traversed by silvery lines as follows: a broad line running through the sub-bases of 3, 7, and cell and continued down into 1a to 1c in a series of three long black-lined loops; a second double line from the costa in 8 passes through 7, converging in 5 and dividing again in the apex of the cell to reach the descending arm of the loop in 1b.

#### FEMALE:

Very like the male but the fore and hind ala bars are wider and of a paler orange, the spots in the fore-wing being more pronounced and expanded laterally. The marginal spots of both fore and hind-wings larger and paler. The underside has a paler chestnut ground colour but the distribution of the markings is as in the male, though less silvery.

#### EARLY STAGES:

We have not reared this species nor is there is published description of the egg or larva. Seitz describes the pupa as "unicolourous green, with yellowish spiracles and orange-yellow creamaster." No food plant is given.

#### DISTRIBUTION AND HABITS :

This species is found in Uganda and the Nandi-Lumbwa districts of Kenya. It is exceedingly rare and difficult to capture as it flies very swiftly. Males are taken at bait but the females are seldom seen. In the country north-east of Mt. Elgon is found a form which is described below.

#### MIMETIC ASSOCIATIONS :

We have already noted the association of this species with *Ch. lucretius* and *Ch. druceanus*, but we would draw attention to the description of the form to be described hereafter which not only bears a strong likeness to *lucretius* on the upper side, but also below.

*CHARAXES EUDOXUS*. Sub. sp. nov.? Unfigured.

Male. Expanse 76-78 mm. Female 80-86 mm. Sexes unlike though somewhat similar.

General colour above as in *Ch. eudoxus cabecus*. Both sexes however differ from the typical form and other described races, in that practically all trace of the silvery-white lining on the underside is lost, thus strongly resembling *Ch. lucretius*. In addition, there is a marked reduction in the size and alteration of the shape of the spots in areas 1b and 2; thus in the male, there are two separate black spots in each of these areas, and in the female the spot in 1b is L-shaped. The hind-wing in the male is almost unicolorous chestnut.

#### DISTRIBUTION :

North-east of Mt. Elgon to the Cherangani Mts.

#### TIRIDATES GROUP.

*CHARAXES VIOLETTA*, Gr.-Smith. Pl. LXXX., figs. 1 and 2. and Pl. LXXXI.

Expanse: Male 80-82 mm. Female, 84-98 mm. Sexes unlike.

#### MALE :

General colouration black with blue markings.

F.-w.: Ground colour rich blue-black, with the basal area deep blue. Areas 1a and 1b with large light violet-blue marks at the base of the distal half, continued up through the other areas as two divergent rows of blue spots; the inner row of 5 large elongate spots passing through the sub-base of 2 and 3 and thence across the apex of the cell; the outer row, 6 spots of diminishing size, follow the contour of the wing up to 5, thence curve inwards to mid-point in 7.

PLATE LXXX.



*Photo: Dr. van Someren.*

Upper surfaces.

*Charaxes violetta.*

Under surfaces.





PLATE LXXXI.



Photo: Dr. van Someren.

*Charaxes bipunctatus* feeding on excrement.

Larvae of *Charaxes violetta*.





The last two spots are white. Some specimens have a series of small blue spots at the margin of the wing at each vein, while the extreme edge at these points is white.

H.-w.: Base, costa and border of wing blue-black, enclosing a large violet-blue area which shades to greyish at the inner fold. Area 7 carries two blue spots at mid-point. A sub-marginal row of small blue spots, double in 1c are placed at the mid-point in 2-7; each of these areas with the exception of 7 is distally margined with pale blue edged outwardly with black and with white scales at the extreme edge. Thorax and body black. Margin of wing serrate with sharply pointed tails at vein 2 and 4; the latter being the longer.

#### UNDERSIDE:

General colour of ground, olive. Basal half of wing decorated with black marks outlined with white as follows: the cell with one transverse at sub-base, followed by two at proximal side of mid-third and a transverse line on distal side; this last continued through the sub-base of 2 and sub-base of 1b; a further line outwardly shaded with white crosses the apex of the cell, to be continued through 2 where it is joined to the sub-basal line and then is represented in 1b by a crescentic line widely shaded with white outwardly especially along vein 1. Areas 1b and 2 each with sub-marginal "eye" mark, black outwardly, olive ochreous inwardly; this olive-ochreous colour extends up into areas 3-5 as a diffuse sub-marginal bar and represented in 6 and 7 by white spots corresponding to those of upper side.

H.-w.: Ground colour olive. The wing is traversed by a white line which starts at the mid-point of the costa and is continued across to the base of 3 thence down and inward to the fold of the wing just above the anal angle. A further line crosses the sub-base of 8 then divides into two, crossing the sub-base of 7 and the middle of the cell. External to the ala line is an irregular ochreous-olive line faintly outlined in black which ends at the anal angle in an incomplete circle. The marginal border is ochreous-olive from the upper angle of the wing to vein 4 when it becomes shaded with green. Internal to this border is a series of whitish-purple spots accentuated with black outwardly, placed at mid-point in each area extending from 7-1c where the spot is duplicated. The extreme margin of the wing is black with white scales between the serrations.

It should be noted here that the white ala line of the hind-wing is continuous with the white line of the fore-wing, and these form a distinctive "field" character for distinguishing this species from *Ch. cithaeron kennethi*, which it greatly resembles.

#### FEMALE:

F.-w.: Mostly brown-black with a bluish suffusion at the base; ala bar very broad and nearly pure white, extending from just internal to the mid-point of the costa, distal to the apex of the cell, in a wide curve to the hind-margin where it expands to fill most of 1a and 1b. In these areas it is slightly tinged internally with violet scaling which shows up the line of the underside markings. There is a series of sub-apical white spots of graduated size, set in an outward curve, extending from mid-point in 7 and reaching mid-point in 3.

H.-w.: Basal area blackish shading to greyish at the inner fold, followed by a wide white distal bar, flushed with violet, especially distally, and with a very serrate distal margin; the white area bisected by the dark ground colour of the underside showing through. Border of wing broadly purply-black, carrying a sub-marginal row of small purply-white spots double in 1c and reaching to 7, and a marginal series of lines of the same colour with extensions along the veins at each serration. Veins 2 and 4 with tails of 4 and 7 mm. long respectively.

#### UNDERSIDE:

F.-w.: With a broad white discal bar and white spots as above; general ground colour ochreous-olive; basal area with black lines as follows: cell with one sub-basal, two at proximal end of mid-third, with a long wavy one at distal end, and extending into 1b and 2, each outlined with white. A further wavy black line along the inner edge of the white bar. There is a sub-marginal ochreous bar following the contour of the wing and joining up with the two sub-apical white dots. Distal to this line there are two black sub-marginal marks in 1b and 2, both indented distally with bluish white.

H.-w.: Basal half ochreous-olive sharply defined from the almost straight ala bar by a narrow black line; decorated with a double black and white line which crosses the sub-base of 8, 7 and the mid-area of the cell; the apex of which is outlined with black. The distal edge of the white ala bar is not sharply defined and is at its upper part bordered by ochreous, which colour extends down the wing following the general contour to the anal angle. It is internally edged with black in areas 1c to 5. Beyond this border the wing is ochreous olive with ill-defined whitish spots accentuated distally in 1c and 3 by greenish scaling containing black dots. The edge of the wing carries a narrow ochreous-orange wavy line relieved at each vein by purply-white and accentuated internervularly with a narrow black line.

## EARLY STAGES :

*Ch. violetta* lays its eggs on the upper or underside of the leaves of *Mizuru* ( ) a common tree in the forests of the Coast. The eggs are at first creamy white, but in twenty-four hours they begin to turn brown at the top. They are spherical with a slight flattening at the top, this area rather coarsely fluted with radiating lines from the central point. Within a day the top becomes concave and the rays stand out more prominently. At the Coast these eggs hatch in six days, but in Nairobi they carry over ten days. The newly emerged larva is olive, with a black head carrying two pairs of short brown horns decorated with black knobs. The anal end has a bifid tail also brown in colour. The larva first eats the egg shell and then feeds on the edge of the leaf. The first moult takes place on the fourth day. The body colour turns into a dull green but the head remains brown except for two greenish patches on either side above the mouth-parts. No dorsal spot is present; these appear at the second moult when the larva becomes grass-green; if only one spot is present, it is on the sixth segment, but usually there are two, the second being on the eighth. These dorsal spots are white with a narrow brown outline; the anterior one is somewhat heart shaped with the apex flattened, and with a small lobe between the two lateral ones. The second spot is a simple shield with the top angled at the centre. The ground colour of the body segments is grass-green, with paler green on the ventral surface with a white line separating the two colours. The head is now green with an ochreous margin. There are two pairs of long tapering horns, with internal to each, a short spine. The horns are pinkish with white tips, and covered with short tubercles. The outer pair project outwards very considerably and then curve up at the tips; the central pair project up and slightly outwards then curve inwards. This stage lasts about a week. In the final stage the larva is 45-50 mm. long, bright grass-green in colour covered with very fine yellow irrorations, with the spiracular line well defined as small contiguous pale yellow spots. The dorsal spots are of the same shape as before but the outline is now a series of bright blue spots on a darker blue ground, enclosing a purply-buff or brick-red area. The head is now much squarer while the horns are not so long in comparison with the facial disc. The lateral pair are less divergent, while the central pair are almost vertical, curving in very slightly at the tips. All the horns are pinkish-violet or purple; the marginal line is yellowish and passes over the black mouth-parts. The posterior-lateral aspect of the facial disc is strongly pectinate as are also the bases of the horns.

The pupa is rather long and slender, pale green in colour, with slight bluish-white marbling on the dorsum and wing-cases. The spiracles are pinkish ovals and carry a small dark dot at the lower

end. The wing-scutae have two parallel black lines at the angles and these are characteristic. There may be a further black spot midway along the antennae sheaths and two small ones on either side of the thoracic ridge.

#### DISTRIBUTION AND HABITS:

This species is found over a limited area in the Coastal forests and in the Teita country. There are no records of its having been taken in the Highlands of Kenya or in Uganda. It is a forest species which emerges into the broken scrub area at the edge of the forests if food trees in this zone are oozing sap.

Males are attracted to bait but the females are usually taken when feeding on fruit or tree juices. It is nowhere very common, but if one gets to know its habits one can usually count on securing specimens. The flight is strong and swift.

#### MIMETIC ASSOCIATIONS:

This species is remarkable in that both sexes exhibit a strong superficial resemblance to the two sexes of *Ch. cithaeron kennethi*, furthermore both are closely mimicked by two forms of females of *Ch. theocles*, and two forms of females of *Ch. ethalion*. There is another species of *Charaxes* which in the male sex resembles the male of *violetta*, this is *Ch. blanda kenya*, which is only known from the forests at the Coast where the model is present in equal numbers with *Ch. cithaeron kennethi*.

We have already drawn attention to the distinguishing character by which the male of this species can be told from the male of *cithaeron*, but it would be well to note here that the two females can be distinguished when at rest by the presence of the white ala bar which crosses both fore and hind-wing in *violetta* and only the hind-wing in *cithaeron*. The fore-wing bar on the upper side in *violetta* is always wider than in *cithaeron*. The sexes of the other *Charaxes* in this association are always much smaller than their models.

*CHARAXES CITHAERON CITHAERON*, Feld. Pl. LXXXII.,  
figs. 1 and 2.

Expanse: Male 86-90 mm. Female 90-102 mm. Sexes unlike.

#### MALE:

General colouration, black with blue markings and white patch on hind-wing.

F.-w.: Blue-black inclining to brown-black towards the apex. Costa basally brownish. Two rows of purplish-blue spots cross the wing; the inner row starts at the apex of the cell as two spots and continues through 3 and 2, sub-basally and merges into a double spot



PLATE LXXXII.



*Photo: Dr. van Someren.*

Upper surfaces.

*Charaxes cithaeron.*

Under surfaces



in 1b which is contiguous with a large blue spot in 1a; the outer row starts as two white spots in 7 and 6 at about mid-point then curves by a series of submarginal blue spots in 5-2 and is then represented in 1b by a large blue spot which touches the long blue mark in 1a. Very often there is a series of small golden marginal spots on the outer order of the wing, double in 1b. The extreme edge is white-scaled between the veins.

H.-w.: Basal area and upper part of inner fold black, with the costa and wing border more blue-black and enclosing a large whitish area occupying the basal two-thirds of 1c-4 and represented in 5 and 6 by a blue spot and streak. The margin of this white patch is bluish, with on the lower edge, and internal to the blue margin, a faint golden line. The black outer border carries a row of blue spots with white centres, double in 1c and extending up to 7 and 8. Along the margin is a further row of double triangular golden spots placed on either side of the veins from 6 to 2 and represented in the anal angle by greenish. The extreme edge of the wing is whitish. Margin bluntly serrate, with vein 2 and 4 prolonged into tails of 3 and 4 mm. length. Thorax and abdomen black.

#### UNDERSIDE:

F.-w.: Ground colour olive slightly darkening towards the bases of 1a and 1b and rather tinged with ochreous in the cell. The double row of spots of the upperside are represented below, the inner by a series of angular ochreous-olive marks accentuated proximally by combined black and white lines, the outer by a series of ill-defined spots, the upper two of which are white, the remainder orange-olive, and represented in 1b and 2 by stronger orange marks, that in 1b outwardly supported with two triangular black spots on a violet-grey ground, thus forming an "eye" spot; and that in 2 with a single black spot distally.

The cell is traversed by three black lines, outlined with white, one straight sub-basally, two wavy on either side of the mid-third, and a further black line at the apex. The sub-bases of 1b and 2 each have a black crescentic mark proximally lined with bluish-white.

H.-w.: Olive with narrow wavy black lines accentuated with white crossing the sub-base of 8, two in 7, and two in the cell. A mid-ala series of zigzag lines outwardly lined with white extends from about mid-point in 8 to a point above the anal angle; these lines are shaded with ochreous-olive distally. Distal to this is a second series of ochreous-olive crescentic spots, those in 1c, 2, 3, and 4 outlined narrowly with black. There is a marginal row of triangular golden olive spots on either side of the tips of the veins from 2-7, and internal to these a sub-marginal row of violet and white spots, double in 1c

and extending to 7. These spots in 1c are distally accentuated with black dots.

#### FEMALE:

General colour black with a white curved bar.

F.-w.: Brown-black with a purple reflection, especially at the base. Basal half of the costa brownish. A broad ala bar of contiguous white spots extends in a curve from a point on the costa just anterior to the apex of the cell, in gradually increasing width through the sub-base of 3, the mid area in 2 and then to 1a and 1b just beyond the mid-area. In the last two areas the bar is tinged with pale violet scaling proximally, and with ochreous distally. This ochreous colour is continued up the wing in a series of very indistinct spots in 2-5 conforming to the contour of the wing then as large distinct white spots with an inward curve in 6 and 7. In many specimens the extreme margin is ornamented at the mid-internervular point with faint ochreous spots which become clear and double in 1b.

H.-w.: Basal area brownish-black, followed by a wide ala bar of white with purple tinge, extending from the mid-point on the costa to about the mid-area on the inner fold, where it takes on an ochreous tint, especially above the anal angle. The outer margin of this bar is irregular and shades into the wide brownish-black border of the wing. This border carries a series of submarginal triangular violet spots with white centres extending from 7 to 1b where the spot is double; beyond this and just within the edge is a golden-ochreous line of double contiguous spots, with projections along the veins, which is shaded with green at the anal angle. Veins 2 and 4 are extended in the form of tails 3 and 5 mm. long.

#### UNDERSIDE:

F.-w.: Very similar to that of the male, but with the curved white ala bar clearly defined below, and the "eye" spots at the posterior angle more pronounced; in fact there is an indication of an ocellate spot, submarginal in each cellule up to the apex. The hind-wing is like the male but ornamentation less clear. The absence of a white line on the hind-wing below is a negative character which helps to distinguish this species from *violetta* and *nandina* when the insects are seen feeding with closed wings.

#### EARLY STAGES:

It is of interest that this species, within its Highland distribution, selects no less than five species of trees, belonging to three distinct families, on which to lay its eggs. Thus in the Nairobi district it lays on the mature leaves of *Colo* sp. nr. *laurifolia*, Mast. (*Sterculiaceae*); on the leaves of *Crabia elliotti* Dunn., *C. brownii*



Dunn. (*Leguminosæ*) and the tough leaves of *Chaetacme microcarpa* Rendle (*Ulmaceæ*); this last a thorny tree of medium size, up to 30 feet, very given to branching, the branches pendent and trailing and carrying long thorns. The leaves are dark green, terminal and laterally spined. It bears hard round ochreous fruit. It forms the principal food plant. In the Meru district it lays on a tree called *Muturo*. The eggs are deposited on the upper surfaces of the leaves and when first laid are a beautiful, translucent cream-colour. They are large, measuring 1.75 across and almost spherical; the upper surface is slightly flattened and fluted, the rays being very narrow at their central meeting-point, but widening towards the margin of the cupping. The usual brownish line appears at the upper part of the egg as development proceeds and the whole turns a greyish-brown just before the larva is due to emerge. The egg stage lasts for eight days. When the young larva has eaten its way out it devours the remains of the shell. It is greyish-olive in colour, with a black head which shows slight indications of horns which lengthen during the first 24 hours. The anal segment carries two long brownish "tails." As the larva matures it turns greenish-yellow, and at the third instar becomes sage-green, papillated with white-tipped tubercles, and decorated with four lines of white spots which extend the length of the body. These spots are more thickly placed towards the front of each segment and those along the side of the body are larger than the rest, thus forming a broken line which separates the greyish-green underside from the sage-green above. The dorsal spot on the sixth segment is clearly indicated at this stage; it is a curious compound spot of three sections—anteriorly a three-quarter circle followed by a long transverse oval, and this by a smaller oval, the whole being a dirty-grey outlined with dark blue, the border itself decorated with glistening sky-blue stippling. The spot resembles a pot with a knobbed lid on the top. The head presents the outline of a truncated cone, apex towards the mouth, while the upper side or base carries the four horns; each lateral pair separated by a single spine, with two between the central pair. The horns are much tubercled, black-tipped and with a triangular black mark at the front of the base. A yellowish-white line extends down the outer aspect of the lateral horns and is continued along the outline of the face. In the final stage the larva becomes more uniform dark green but the dorsal spot persists and is more distinct. The head becomes less angular and the horns more robust and shorter in proportion to the size of the facial disc; the basal black disappears so that the whole head, with the exception of the marginal streak which is still yellowish-white, is now green.

The pupa is of the usual *Charaxes* type, pale translucent green over the head and thorax, and darker green on the abdominal

segments. The abdomen is markedly convex, so that it projects further than the thorax. Ornamentation is limited to a row of blackish spiracular lines on the abdomen; two diffuse white areas on the wing-cases; and three whitish-blue oblique thoracic marks which meet along the mid-dorsal line, forming acute angles which point toward the head. The pupal stage lasts eighteen days, as a general rule, but some carry over for even six months.

#### DISTRIBUTION AND HABITS:

The description given ante is of the form of *Ch. cithaeron* which is found throughout the Highlands of Kenya, including Mt. Kenya and districts (though in this latter region there is a strong tendency towards a distinct geographical form), and north to the Nandi area. The race inhabiting the Coastal forests and the Teita Hills is described later. A further geographical form occurs in the eastern parts of Uganda, but we have insufficient material to warrant separation at this juncture.

Schultz has described a *Charaxes* under the name *brevicaudatus* which from the description agrees well with the Highland form of *cithaeron*; the distribution given is East Africa.

*Cithaeron* is one of the common *Charaxes* in the Nairobi area, being quite plentiful in the forests thereabouts. The males are attracted to bait and droppings of carnivores and to fermenting exudates from trees, whilst the females are attracted to the last only. It is by no means an uncommon sight to see perhaps a dozen *Charaxes*, mostly *Cithaeron*, feeding on the juices of some wounded tree, particularly *Albizia* and *Croton*. Both males and females are very quarrelsome and fight one another, using their fore-wings with great force. Males are noted fighters, and where a selected territory has been occupied by one individual, not another *Charaxes* of any species is allowed within the zone. They are fond of sailing about the open sunny glades in the forest, always high up out of reach of a net, and seen thus, appear bright royal blue, with a glistening white patch in the hind-wing.

#### MIMETIC ASSOCIATIONS:

Attention has already been drawn to the association of this species with certain forms of females of *Ch. etheocles* and *Ch. ethalion*, along with *Ch. blanda kenyaec*. There is in addition a very marked similarity between the males of this species and those of *Ch. nandina* both above and below and between the undersides of the females of the two.



PLATE LXXXIII.

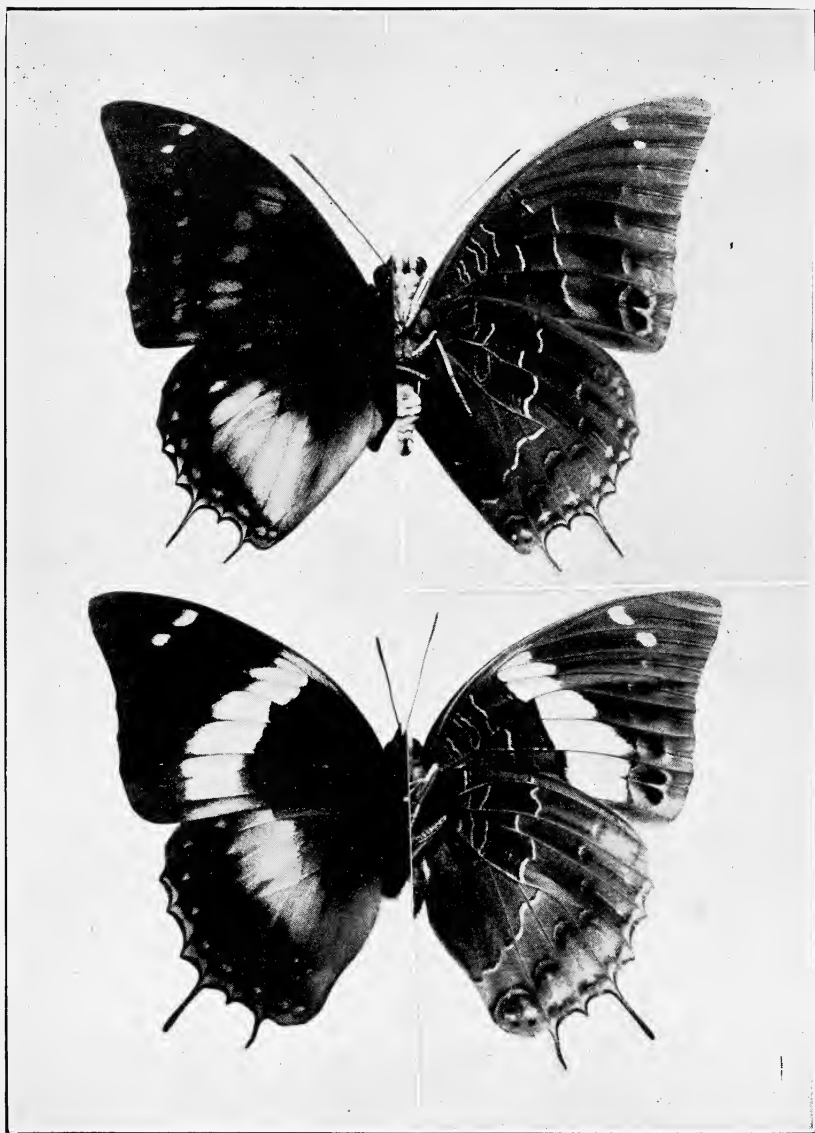


Photo: Dr. van Someren.

Upper surfaces.

Under surfaces.

*Charaxes cithaeron kennethi.*

*CHARAXES CITHAERON KENNETHI*, Poulton. Pl. LXXXIII.

Expanse: Male, 88-90 mm. Female, 90-98 mm.

MALE:

General colour blue-black with blue markings. Thus somewhat like the typical race but differing in the following particulars:

F.-w.: The sub-marginal row of blue spots from 1b to 6 is an almost straight line, thus conforming to the straighter outer margin (less concave than in the upcountry form). The double spots in 1b are discreet and seldom fused into that of 1a. The general tone of the spots is bluer, less tinged with purple; and the ground-colour is more blue.

H.-w.: The sub-marginal row of spots much reduced and bluer; the marginal golden line narrower and more sharply defined; the light ala patch suffused with bright blue; the anal angle more prolonged while veins 2 and 4 carry much longer "tails," 5 and 8 mm. respectively.

UNDERSIDE:

The ground colour is a stronger olive with less ochreous tinge; with all the marks considerably accentuated, in particular, the wavy black and white transverse line.

FEMALE:

This sex differs in much the same way as does the male. The bar is less irregular and is tinged with blue in 1a; and on the ala white bar innerside in 1b. The light patch in the hind-wing is strongly suffused with blue; the sub-marginal spots are small and strongly blue; and the tails on veins 2 and 4 are very long and slender, 8 and 11 mm. The underside is strongly olive and all the lines and marks are accentuated.

EARLY STAGES:

This race of *Cithaeron* lays its eggs on *Afzelia cuanzensis*, Welw. (*Leguminosæ*) a medium to large timber tree, found in the coastal forests and known to the Swahili as "M'bemba-kofe." The eggs do not differ from those of the typical form, but the larvae show constant differences, especially after the second instar. The greatest divergence from the typical is found in the head; the lower edge is not so straight but is much more curved, nor are the lateral angles of the facial disc so acute, nevertheless the lateral horns are thicker at the base, are longer and more curved upwards; the central horns are longer and stronger while neither the outer nor the inner are black at the bases. The intermediary spines are much longer and stronger.

The horns are yellowish with greenish margins; and the lateral facial line is ochreous. The horns of the mature larva preserve these same characteristics but of course are shorter and stronger in comparison and are uniform green. Four black dots are present at the lower angles, posterior to the facial line. The dorsal spots on the sixth and eighth segments are distinct and brick-red. The pupa is rather more slender than that of typical *cithaeron*; the white marbling is much more distinct and defined.

#### DISTRIBUTION :

The coastal forests of Kenya and along the Tana River. They intergrade with the Highland form in the Teita and Ukamba districts.

#### MIMETIC ASSOCIATIONS :

Males and females are very like the two sexes of *Ch. violetta*. Both sexes act as models for certain forms of *Ch. etheocles* females and for females of *Ch. ethalion*.

*Ch. pythodorus nesaea* is an outlying member of this association.

#### CHARAXES SMARAGDALIS ORIENTALIS, Joic. and Talb. Pl. LXXXIV.

Expanse: Male, 88-90 mm. Female, 100-102 mm. Sexes unlike.

#### MALE :

General colour black with purply-blue markings.

F.-w. : Blue-black with a curved bar of purply-blue spots extending across the wing from the apex of the cell to a point sub-marginal at the posterior angle of the wing. The large spots in 1a and 1b are not clear-cut and are fused with the double spot in 1b, part of a series of sub-marginal blue spots which follow the contour of the wing through 2-5 and then represented in 6 and 7 by white sub-apical spots.

H.-w. : Purply-blue-black, with a wide purply-blue bar extending approximately from the distal half of 7 across the wing past the apex of the cell and ending at the posterior angle. The marginal border is black, carrying a series of purply-blue spots with white centres, from the anal angle to area 7. There is also a marginal series of purply-blue lines following the contour of the serrate margin. Veins 2 and 4 are prolonged into short " tails," 2 and 3 mm. long.

#### UNDERSIDE :

F.-w. : Dark olive, with the basal area, olive-ochreous outlined distally by a more ochreous bar which corresponds to the ala bar above; this is edged proximally by bluish-white and black, the latter



PLATE LXXXIV.

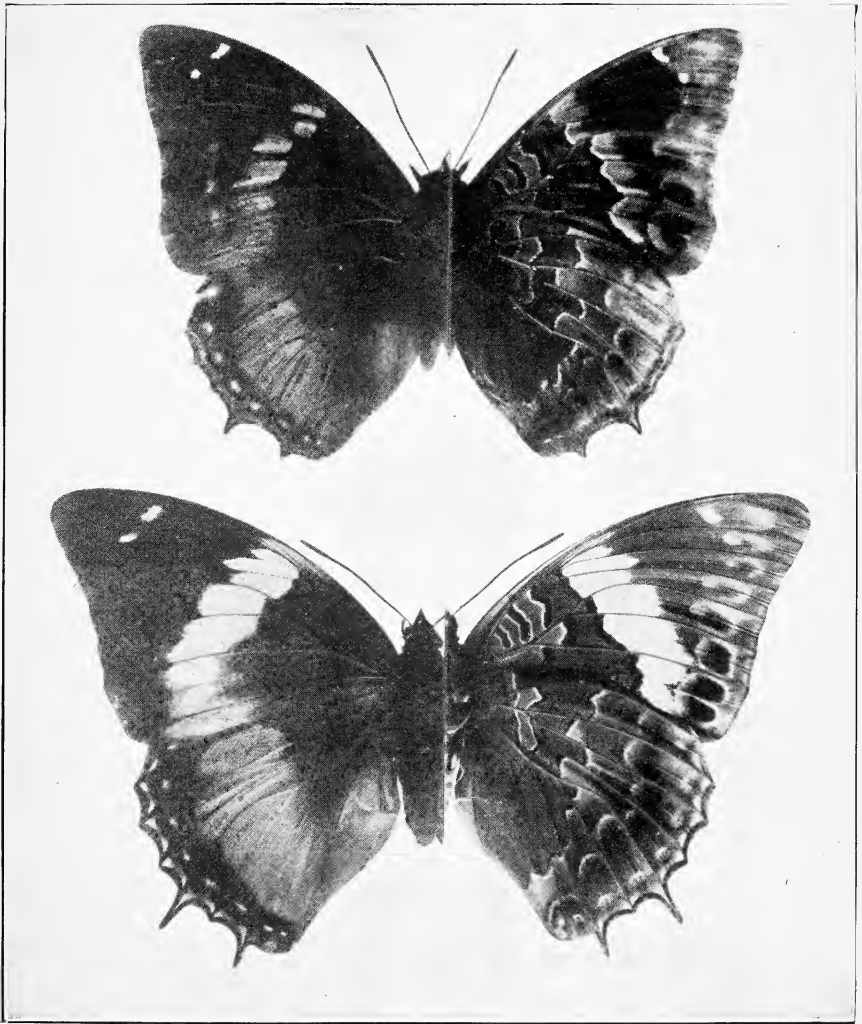


Photo: Dr. van Someren.

Upper surfaces.

Under surfaces.

*Charaxes smaragdalis orientalis.*





predominating. The sub-base of 1b and 2 each have a wide black spot, while the cell is crossed by three wide black lines bordered with white. The end of the cell is also outlined in black. The sub-marginal spots of above are represented by ochreous olive spots which are crescentic in 1b and 2, and enclose large blue-black spots which form "eyes." The sub-apical white spots are represented. The margin of the wing is ochreous-olive.

H.-w.: Dark olive with an ochreous-olive bar, outlined in black crossing the base of 8, the sub-base of 7 and obliquely through the cell. A zigzag black and white line crosses the wing from the mid-point in 7 to just above the anal angle; this line is distally shaded with ochreous-olive. Between this and the margin is a series of white and olive lunules, terminating at the anal angle in one outlined in black and containing the double purple and white spots, part of the series of sub-marginal spots which extend along the wing to 7. The margin of the wing is olive-green especially at the anal angle to vein 4.

#### FEMALE:

Apical half and posterior angle with sub-apical white dots in 6 and 7; basal triangle, olive-black with strong bluish-green iridescence, with between the two a wide white ala bar extending from the costa to 1a, with a strong suffusion of greenish-blue scaling in 1a and 1b.

H.-w.: Basal area greenish-black, marginal border blue-black, with a wide area in between of pale greenish-blue; marginal border ornamented with a row of diamond-shaped light-blue spots and with a marginal row of double triangular bluish-white marks. Inner fold of wing, greyish-ochreous. Veins 2 and 4 with tails 3 and 5 mm. long.

#### UNDERSIDE:

Olive, with the white bar of above represented, but without bluish scaling. Ala bar proximally edged with black. Cell crossed by three white-edged black lines; sub-bases of 1b and 2 with a black and white bar. Sub-apical white dots present and in series with ochreous-olive spots and lines which are placed proximally in a series of sub-marginal ocellate marks, those of 1b and 2 with blue-black centres and white outer borders.

H.-w.: As in the male, but in addition, it carries a blackish edge to the margin.

#### EARLY STAGES:

Unknown to us, nor is there a published description of either eggs, larvæ or pupæ.

#### DISTRIBUTION AND HABITS:

This *Charaxes* is found throughout Uganda to Nandi and Sotik. It is a forest species which is never common. In eastern Uganda it is rare and occurs as a straggler in the Nandi country. We found it commoner in Sotik, and in the forests on the Tanganyika border. Males are very much more in evidence than females.

#### MIMETIC ASSOCIATIONS:

The males of this species associate with and bear a superficial resemblance to *Ch. xiphares nandina*, and may be regarded as an outlying member of the *Cithaeron* group. The female when in flight is somewhat like the female of *Cithaeron*, but is bluer in the hind-wing; the superficial resemblance is there however. Again, we find female *smaragdalis*, in the northern limits of *Bohemani*, the two showing a strong resemblance, but the similarity here appears to be purely fortuitous.

#### CHARAXES XIPHARES NANDINA, Rothsch. Pl. LXXXV.

Expanse: Male, 90-92 mm. Female, 100-110 mm. Sexes unlike.

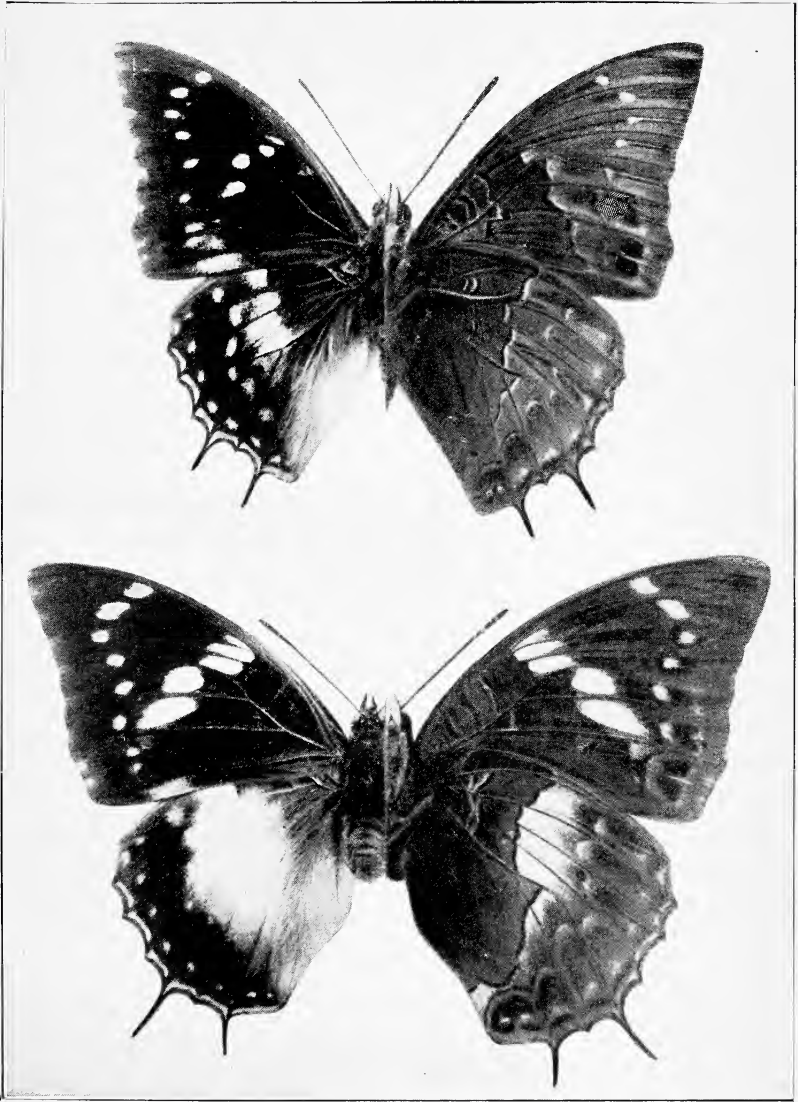
#### MALE:

General colour, purply-black with purple-blue spots.

F.-w.: Purply-black with small golden spots at the mid point on the margin of each area, double in 1b. Two series of white spots; one, sub-apical and sub-marginal extends from the mid-point in 7, then following the contour of the wing ends in 2; the other, starts below the costa at the apex of the cell and is represented in 3 and 2 sub-basally; both series are represented in 1b by rather ill-defined purple-blue spots and in 1a by a long purple spot just beyond the mid-point. There is sometimes a purple spot in the cell.

H.-w.: Ground colour purple-black, rather duller at the base, and greyish at the inner fold; ala bar represented by a purple and white spot at mid-point in 7 and by large purple marks sub-basal in 6, 5, the apex of the cell, the base of 3 and 2. This bar is followed by a series of purple spots, upper ones white internally, starting in 7 and extending to 2, the spot in 6 placed more internal. The purply-black wing-border carries a sub-marginal row of small purple spots from 7-1c, and a marginal line of golden marks conforming in shape to the serrations of the wing. Veins 2 and 4 carry "tails" of 5 and 8 mm. long. Margin of wing with small golden spots at mid-inter-venular point. Thorax and abdomen black.

PLATE LXXXV.



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*Photo: Dr. van Someren.*

Upper surfaces.

Under surfaces.

*Charaxes xiphars nandina.*

THE UNIVERSITY OF CHICAGO

1954

#### UNDERSIDE :

F.-w. : Ground colour ochreous-grey with slight olive tinge. Sub-marginal row of white spots present, corresponding to spots above and ending in 1b and 2 in two " eye " spots, golden and black, lined internally with black and externally with violet-grey. Inner discal row of spots white, with a black line proximally. Areas 1b and 2 each with a black and white bar sub-basally; cell with three transverse black and white lines and a black line at apex.

H.-w. : Ground colour as fore-wing, basal area with a wavy black line crossing the base of 8, sub-base of 7 and sub-base of cell, and parallel to this another line proximally edged with white, crossing 7 and the cell. A third long wavy, zigzag black line, distally bordered with white, crosses the wing from the mid-point in 8 to just above the anal angle. In this line the black and white colours are of equal width; it is an important character which distinguishes this species from *Cithaeron* if the insect be seen with closed wings. Distal to this line is a series of golden and white spots, rather ill-defined, and becoming elongate in 1c and 2 and following the same series of the upper-side. The sub-marginal row of spots of above are reproduced below as pale lilac, crosses the wing from the mid-point in 8 to just above the anal angle. In this line the black and white colours are of equal width; it is an important character which distinguishes this species from *Cithaeron* if the insect be seen with closed wings. Distal to this line is a series of golden and white spots, rather ill-defined, and becoming elongate in 1c and 2 and following the same series of the upper-side. The sub-marginal row of spots of above are reproduced below as pale lilac, crosses the wing from the mid-point in 8 to just above the anal angle. The margin is decorated with golden crescentic lines as above.

#### FEMALE :

F.-w. : Brown-black with greenish sheen at base. A similar arrangement of spots as in the male, but all much larger, especially the inner series, with a reduction in 1b; all are white except that in 1a, this is ochreous with a slight violet tinge. Marginal spots reduced to small white edges with ochreous shading inwardly, excepting the two in 1b, these are golden and sharply defined.

H.-w. : Ground colour brown-black with a large ochreous central patch extending from costa but not reaching the inner fold; distally bordered by ochreous spots, often contiguous, extending from 8-2. Sub-marginal row of spots small, ill-defined and purplish; double in 1c. Marginal series of lines following wing serrations golden-ochreous, except those in 1c where they are tinged with olive. Veins 2 and 4 with long tails, 7 and 10 mm.

#### UNDERSIDE :

Mostly olive, with a slight ochreous tinge in the cell and base of 1b and 2. White spots and marks of upperside clearly reproduced below but larger, the outer series tending to form ocellate marks in 1b, 2, and 3. these latter being heavily marked with black outwardly and with golden-ochreous inwardly, with lilac edging on distal side.



The inner edge of the broad white ala bar outlined in black. Black bars cross the sub-bases of 1b and 2, while three black lines outlined in bluish-white cross the cell. The whole of 1a and most of 1b purply-grey.

H.-w.: Basal area and most of the wing-fold ochreous-olive, distally bordered with a black line which extends from a spot midway in 8 and extending to just beyond the apex of the cell at the junction of veins 3 and 4 and thence continued from a point sub-basal on vein 4, to above the anal angle. A large white area follows the first part of this line through 4 to 7, then in a very reduced form in 3 and 2, to appear again just above the "eye" of the anal angle. The distal edge of the white patch is softened by olive scaling and contains the series of ochreous spots indicated on the upper side, but below, they become crescentic especially in 1c to 4, and are margined with black which distally shades into the olive of the wing border. The sub-marginal spots of above are here indicated but larger and ill-defined, but made conspicuous in areas 1c to 4 by a black distal edge, doubled in 1c. The marginal golden border-line is present but is greenish in 1c to 3. The basal lines seen in the male are present in the female also. The white bar on the underside of the hind-wing in this species enables one to differentiate it in the field from female *Cithaeron*, if seen with wings closed.

#### EARLY STAGES:

We have not succeeded in breeding this species, but we have seen the females laying on *Craibia brownii* and *elliotti*, Dunn. (*Leguminosæ*). On one occasion quite late in the afternoon we detected a female laying on a very tall *Craibia*. As we were unable to collect the eggs that evening, we visited the spot the following afternoon, well armed with ropes and tackle. A rope was made fast to the top third of the tree and then carried to a pulley on a near-by tree. The *Craibia* was cut through and gently lowered. Several eggs were found but all failed to hatch as they were already parasitised. We obtained nothing but a series of minute *Hymenopterons* for all our trouble!

#### DISTRIBUTION AND HABITS:

This species is rare throughout its distribution. We have taken it in the forests round Nairobi and on the Kikuyu Escarpment and on the Nandi Hills and seen specimens procured in the Sotik Forest. It is of interest to note that the typical *xiphares* is a South African species, but so far as our information goes there seems to be a considerable gap between it and the northern race. Males are sometimes taken at bait but both sexes are more often captured when





PLATE LXXXVI.



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Photo: Dr. van Someren.

Upper surfaces.

*Charaxes bohemani.*

Under surfaces.

imbibing the fermenting juices of some wounded tree. We have seen no less than five species of *Charaxes*, including four examples of *nandina*, at one spot of exudate. They are usually difficult to capture, but if the fermenting exudate is particularly potent, the insects become so intoxicated as to allow one to pick them off with the fingers.

#### MIMETIC ASSOCIATIONS:

We have already drawn attention to the remarkable resemblance of the underside of this species in both sexes to the two sexes of *cithaeron*, also to the superficial resemblance of the upper surfaces of the males; the female however is unique, in that it is the only *charaxes* which mimics a *Danaine*, namely *Amauris albimaculata* and *echeia jacksoni*, and in this it is associated with the *cenea* female form of *Papilio dardanus*. Typical *xiphares* is mimetic of *Amauris echeia* in the Durban district, and Prof. Poulton has recently drawn our attention to a new race of *xiphares*, which has its own *Danaine* model, in the Drakensburg Mts.

#### CHARAXES BOHEMANI, Feld. Pl. LXXXVI.

Expanse: Male, 90 mm. Female, 104-106 mm. Sexes unlike.

#### MALE:

General colour blue and black. Basal half of F.-w. light greenish-blue, extending from the distal end of the cell to just within the posterior angle. Remainder of the wing blue-black paling towards the apex; extreme edge of wing white with white dots at the margin of mid-point in each area. Two large white spots sub-apical, in 6 and 7, followed by two small dots in 5 and 6.

H.-w.: Nearly the whole of the wing bright blue, inner fold ochreous-grey; marginal border blue-black, carrying a series of small blue sub-marginal spots, from 7-1c and a marginal series of blue lines following the serration of the wings; the ends of these lines white, and at the anal angle tinged with green. Vein 2 and 4 carry tails 3 and 7 mm. long.

#### UNDERSIDE:

Ground colour greyish-brown with in the f.-w. an olive tinge in the cell and bases of 1b and 2. The sub-apical and sub-marginal spots of above here represented by golden-orange spots extending from 7 to the hind angle, the spots in 1b and 2 crescentic and continuous with pale lilac curves on the distal side and so forming circles with blue-black interiors; the "eye" in 1b being very decided. A rather ill-defined olive-ochreous bar conforming to the outer edge of the

basal blue above crosses the wing. It is bordered internally with a black and white line. Three similar lines cross the cell and one each sub-basally in 1b and 2.

H.-w.: All marks rather indistinct; a whitish line crosses the sub-bases of 8, 7, and the cell, and the line parallel to this, crosses 7, the sub-base of 6 and the sub-apex of the cell. A third zigzag whitish line crosses the wing from the mid-point in 8 and curves inward to just above the anal angle. Between this and the sub-marginal row of whitish spots with black distal dots, is a series of crescentic olive-ochreous lines.

Marginal lines are present in 7 to the anal angle; they are ochreous along the upper part of the wing but become olive in area 2 and 1b. Thorax and abdomen bluish-grey.

#### FEMALE:

F.-w: Basal triangle bright blue, distally bordered by a wide white ala bar which stretches from the costa just beyond the cell, to the lower edge of 1b sub-marginally. The apex of the cell and the extreme base of area 3 are black with a sharp distal edge but suffused inner margin. Two large white spots are present in 6 and 7 sub-apically, and very often purple-blue spots are present in 4 and 5, sub-marginally.

H.-w.: As in the male but blue less intense; marginal lines rather whiter. Tails on vein 2 and 4 long, 5 and 9 mm.

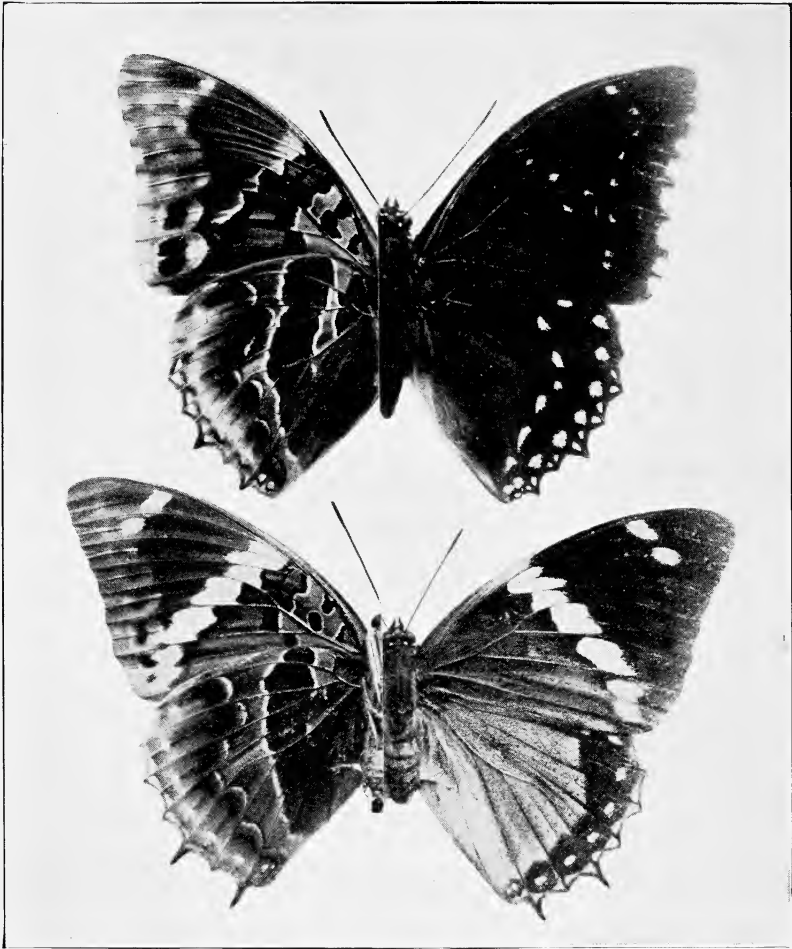
#### UNDERSIDE:

Much as in the male, but white bar of upper side present and clearly defined distally and along the proximal edge bordered by black. Basal lines as in the male, but second line in cell often divided into two spots. H.-w. as in the male.

This species lays its eggs on the upper surfaces of the old leaves of *Azalia cuanzenis* (*Leguminosae*). They are large, measuring 2 m. x 2½ mm., pale yellow in colour, slightly flattened on top and faintly fluted in this area. In twelve hours, the eggs turn red-brown, then black, just before the larva hatches. The young larva eats the remains of the egg-shell before feeding on the leaves. Its colour is at first olive, with black head and whitish tail. The first moult takes place in three days. The larva is now an olive brown, with a white bifid tail and greenish head. The full fed larva is 45 mm. long, of an ochreous-olive colour, each segment with latero-dorsal lines of yellowish running obliquely forward. There are also two vertical rows of greenish spots along the fore part of each segment. The sixth segment is ornamented with a circular dark green mark, most heavily lined laterally and enclosing an olive fore area. The spiracular



PLATE LXXXVII.



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Photo: Dr. van Someren.

Under surfaces.

*Charaxes numenes.*

Upper surfaces.

line is slightly indicated by a broken series of yellowish dots. The underside of the body is light greenish ochreous. The general appearance of the body is therefore "dead-leaf" like. The head is almost rectangular, pale fawn with a slight olive tinge and with a marginal ochreous line, forming a triangle above the black mouth parts. The horns are very short almost as in *numenes*. The outer ones (2 mm. long) are directed up and slightly out and then incline inwards; the upper pair are equally short and are almost vertical. The whole surface, including the horns is coarsely papillated.

The pupa is very large, measuring 31 x 15 mm. It is pale apple green with a bluish tinge on the margin of the wing scutæ. The spiracular spots are ill defined, but the whole pupa is decorated with bluish-white; the abdomen carries seven oblique horse-shoe lines, most marked dorsally; the wing cases are traversed by a broad line sub-apically and by a more diffuse one along the marginal ridge. The antennal line is white while the thorax carries a white oval. The cremaster is composed of a short-stalk bounded by lateral ovoid lobes with rugose surfaces and in front of these are two other semi-quadrate lobes—all ochreous in colour. The pupal stage lasts from 10 to 18 days.

#### DISTRIBUTION AND HABITS :

This insect is rare within its distribution in Kenya. We have taken it in the forests of the Coastal belt and in the Sotik. These areas must represent its northern limits.

#### MIMETIC ASSOCIATIONS :

Owing no doubt to its rarity, it appears to have had little influence on other species of *Charaxes*. In its southern distribution however, both sexes are mimicked by two female forms of *Ch. etheocles* (T.T., N. Rhodesia, and Angola), *phaeus* and *manica*; two forms of females which do not occur in Kenya or Uganda.

#### CHARAXES NUMENES NUMENES, Hew. Pl. LXXXVII.

Expanse: Male, 90-94 mm. Female, 95-100 mm. Sexes unlike.

#### MALE :

General colour blue-black with small blue spots and golden margin.

F.-w.: Blue-black, the blue more pronounced at the basal triangle. Margin of wing with large golden-ochreous spots, increasing



in size from apex to hind-angle, double in 1b. A sub-marginal row of small purple-blue spots, double in 1b follow the contour of the wing extends from 1b to 7; in the last area the spot is white and set in slightly. A further row of four small blue spots crosses the wing from just beyond the cell to the mid-point in 2.

H.-w.: Blue-black, inclining to dull black at the wing-fold. There is a sub-marginal row of triangular spots, blue with white centres, extending from the upper angle to the anal angle; internal to this a further row of blue spots extending from 6 and in an almost parallel series to the anal angle. The extreme edge of the wing is bluntly serrated and with golden scaling between the veins; the margin is decorated with small double triangular golden spots from 6 to anal angle. Veins 2 and 4 with short blunt tails, 1 and 2 mm. long. Thorax and abdomen black.

#### UNDERSIDE:

Ground colour olive with ochreous tinge, most decided in the cell and the bases of 1b and 2 and marginal border of wing. Cell with a black spot at base, a double black mark in the centre of the ochreous olive area, a wavy line sub-apical and a thin line at the apex. Areas 1b and 2 with large black sub-basal spots bordering the olive-ochreous base. A further irregular black line distally shaded with white, crosses the wing from just beyond the apex of the cell and ending at the proximal side of the "eye" spot in 1b. All area 1a and most of 1b dark purple-grey-brown. Distal end of areas 1b and 2 with faintly indicated ocelate spots, slightly visible in the other areas up to the apex. Two white spots are present at about mid-point in 6 and 7.

H.-w.: Olive-brown; basal area with a black line in 9, one at base of 7, continuous with one sub-basal in cell; a further line outlined proximally with white crosses the sub-base of 8, sub-base of 7 and passes obliquely across the cell; between these lines, an ochreous-olive zone. Upper part of apex of cell black. A well marked alar white line edged with black proximally crosses the wing from just internal to the mid-point in 8 to end in a gentle curve above the anal angle. Beyond this is a series of double crescentic, irregular black marks with white shading distal to the inner row, starting at the distal end of 7 and ending at the anal angle. The marginal border is ornamented with a series of white transverse marks with lilac shading round each, stretching from 7 to the anal angle where the spot is double; these spots are distally accentuated with a narrow black line in 1b, 2 and 3. The margin of the wing is greenish-olive bearing whitish triangular marks as above.

#### FEMALE:

Apical half of fore-wing blue-black, with two large sub-apical spots in 6 and 7. A wide bar of white spots stretching from the costa to the hind-angle base of the apical black thus separating the golden olive of the basal half from the apical black. The white marks in 1b to 3 are strongly suffused with ochreous. The distal margin of 1b carries a double ochreous spot.

H.-w.: Most of the wing golden-olive, with a wide marginal border of black carrying a series of lilac spots with white centres; the extreme edge of the wing golden between the serrations, and internal to this a series of double triangular golden-olive marks, base to base on either side of the veins. Veins 2 and 4 with "tails" 1 and 3 mm. long.

#### UNDERSIDE:

F.-w.: Ground colour olive-grey-brown; basal markings as in the male; sub-apical spots large and white. Mid ala bar white and placed as above and merging into the "eye" spot on the posterior angle. Rest of marks as in the male.

H.-w.: Ground colour as fore-wing. White ala line distinct, and post-discal row of crescentic lines clearer than in the male; remainder as in male.

#### EARLY STAGES:

This species lays its eggs on the upper surfaces of the leaves of at least four species of trees, *Erythrina tomentosa*, R.Br. (*Leguminosæ*) known to the Baganda as "Ekerikiti," a forest tree called by the Baganda "Nkuzayana"; and three species of *Grewia*, *G. mollis*, Juss, *G. nyanzæ*, Drum., with blue flowers, and *G. forbesii*, Harr., with yellow to orange flowers (*Tiliaceæ*). The egg is canary-yellow in colour, 1.5 mm. in diameter and deeply cupped, but with only slight fluting in the depression. The first indication of germination is the appearance of a brownish tinge to the upper ring, and when the egg is mature it turns a brown-black. As soon as the larva has eaten its way out of the egg it eats the remains of the shell. It is of a dull olive colour with black head and white "tail." At the third instar, the larva turns green, and a white spot appears on the sixth segment. The mortality at this stage is very high, as the species is rather more delicate than most and is a fastidious feeder.

The final stage is reached within a fortnight; the mature larva is a dull-green colour, finely papillated, and is 6 cm. long. The tail remains whitish, and each segment of the body bears four bluish-white spots at the anterior edge, two dorsal, two lateral, arranged

in four lines along the body. Most specimens have two dorsal spots, one on the sixth and one on the eighth; both are pale buff with a purply tinge. The anterior spot is a three-pointed crescent, the posterior is hexagonal; both have two distinct black dots in their centres. Sometimes these dorsal spots are brick-red, but they fade to a greyish-green when the larva curls prior to pupation, and within six hours they disappear almost entirely. The head as seen from the front is rather convex, quadrilateral in outline, but rather narrower at the mouth. Two pairs of short, very rugose horns arise from the upper angles and the centre of the top edge; between the central pair are two short spines, and one on either side. These spines are nearly as long as the horns so that the upper side of the head looks somewhat like a comb. The ground colour of the disc is green, with a bluish tinge, the posterior-lateral aspect, paler. The pupa is of the usual form, pale translucent apple-green, with no spots or marbling, except two black dots at the wing-angles. The cremaster is long-stalked, the base bilobed and in front of the stalk, are two kidney-shaped marks, tapering rather, at one end. The spiracles are only just indicated as brown marks.

#### DISTRIBUTION AND HABITS :

This species is rather common in Uganda, especially central and east, and extends into Kenya as far as the Nandi Hills and Sotik. Females are rare compared to males and keep more to the forest undergrowth or they fly high along the tree-tops. One seldom sees them unless one is on the lookout for a laying female; and then only in patches of forest where the larval food is plentiful. They are sometimes seen in banana shambas at the edge of a forest; they seem to like the shade and here they associate with various species of *Euphaedra*. Males are much in evidence on leopard and hyaena droppings, along open roads or forest paths. They can usually be attracted by decaying fish entrails or any such equally smelly bait.

#### MIMETIC ASSOCIATIONS :

We have already mentioned that females of this species associate with species of *Euphaedra* especially *losinga inaequabilis*, Thunberg, *spatiosa*, Mab., and *pruissi olivacea*, Grunb., the first two species being particularly common. There appears little doubt but that these *Euphaedra* are the models for the very distinctive type of colouration assumed not only by the female of *numenes*, but by *tiridates* and *bipunctatus* and by two forms of female of *etheocles*: *cedreatis* and *protecedreatis*. Although one usually associates great power of flight with species of *Charaxes*, yet when one sees a gravid female *numenes* intent on seeking out its food plant amongst the forest undergrowth the chances are that one would confuse it with the *Euphaedra*,



PLATE LXXXVIII.



*Photo: Dr. van Someren.*

*Charaxes bipunctatus.* ♂  
Upper and under surfaces.

the fluttering and alternate gliding is most deceptive. The similarity between the two is seen at its best when both insects happen to be gliding about a sun-lit banana shamba; the deep shade alternating with patches of dazzling sunlight, enhance the resemblance to a marked degree. Quite recently, both my head "dudu" boy and myself were so deceived that on one occasion when I told my boy to capture a passing *numenes* he replied "Surely you don't want that 'ground butterfly'?" meaning *Euph. spatiosa*. Again when I said "Go after that one," it turned out to be *Euphaedra* and not *numenes*, as I had thought. There are heaps of Shrikes and Drongos in these banana patches, but I have never seen them attack *Euphaedra*. The males of this species belong to the group centring round *Ch. tiridates*; all the species are blue-black with blue spots; most are large and powerful. The resemblance is above, and below also.

*CHARAXES BIPUNCTATUS BIPUNCTATUS*, Rothsch. Pl. LXXXVIII.

Expanse: Male 90-100 mm. Female 100-102 mm. Sexes unlike.

MALE:

General colour rich blue-black with golden border.

F.-w.: Iridescent blue-black, darker towards the margin and apex; outer margin with golden border broken only by the tips of the veins, rest of wing almost devoid of spots except two, sub-apical in 6 and 7, the former white, the other blue, and a row of two sometimes three crossing the wing, just beyond the cell.

H.-w.: Blue-black, inclining to dull black at the fold. Two large blue spots decorate the upper part of the wing at about mid-point in 6 and 7. There is a sub-marginal row of very small bluish dots, double in 1b and extending up to 7. At the extreme edge of the wing is a series of crescentic golden lines between the veins, and just internal to this and separated by a narrow black line is a series of large golden spots, whose outer edges follow the wing contour, while the inner are slightly impressed at a point opposite each sub-marginal blue dot.

The contour of the wing is only very slightly dentate, the tails on veins 2 and 4 being extremely short,  $\frac{1}{2}$  mm. and 1 mm. respectively. Thorax and abdomen black.

UNDERSIDE:

F.-w.: Ground colour olive-brown, with the bases of 1b and 2 and  $\frac{3}{4}$  cell olive-ochreous; the former two with large black spots distal to the olive area, and the cell with three black, white-margined lines, one at base, and one on either side of the mid-third. The apex of the cell is indicated by a narrow black line, and beyond this are two



lines distally shaded with ochreous-olive. Three angled black lines cross 1b, 2 and 3, each is bordered with white distally and then shaded with olive. Area 7 carries a white spot at mid-point, while areas 6 to the hind angle have sub-marginal ocellate marks, faint in the upper four but clearly defined in 1b and less so in 2. The margin of the wing is shaded with ochreous and divided by the ends of the veins. The whole of area 1a and most of 1b are purply-grey.

H.-w.: Ground colour olive-brown, rather more ochreous basally; basal area with black lines as follows: one oblique in 9, one sub-basal in 8 continued through sub-base of 7 and across the cell; a further parallel line crosses 7, the base of 6 and then obliquely through the cell, to root of vein 2. A third irregular line crosses the wing from the mid-point in 8 to just above the anal angle. These lines are edged with white distally. There is a series of double crescentic post-discal lines, with ochreous-olive between, faintly indicated in 7-4 and reaching the anal angle, and clearly indicated in 1b-3. The margin of the wing is golden-ochreous inclining to olive at the anal angle, with a very narrow edging of olive, and internal to this is a sub-marginal series of small lilac spots with black dots distally, double in 1b.

#### FEMALE:

Very like the female of *tiridates* and *numenes*, but differs from both in that the mid-bar of the fore-wing extends further to the hind-angle, and the three lower spots yellower. In the hind-wing, the distal margin of the golden olive area is sharply angled at vein 5 and is pale though not broken into crescentic marks as in *tiridates*.

#### UNDERSIDE:

As in the male, with the cell containing the same diagnostic marks which differentiate the species.

#### EARLY STAGES:

We have been unsuccessful in rearing this insect from the egg stage, and there is no published record available.

#### MIMETIC ASSOCIATIONS:

The association of this species with *tiridates*, *numenes*, and certain *Eurphaedra*, and with certain female forms of *etheocles*, has already been mentioned.

#### DISTRIBUTION AND HABITS:

This species ranges throughout Uganda and passes eastward into the Nandi-Elgon area but not further. It is a forest species, and males are much in evidence on every collection of droppings, especially





PLATE LXXXIX.

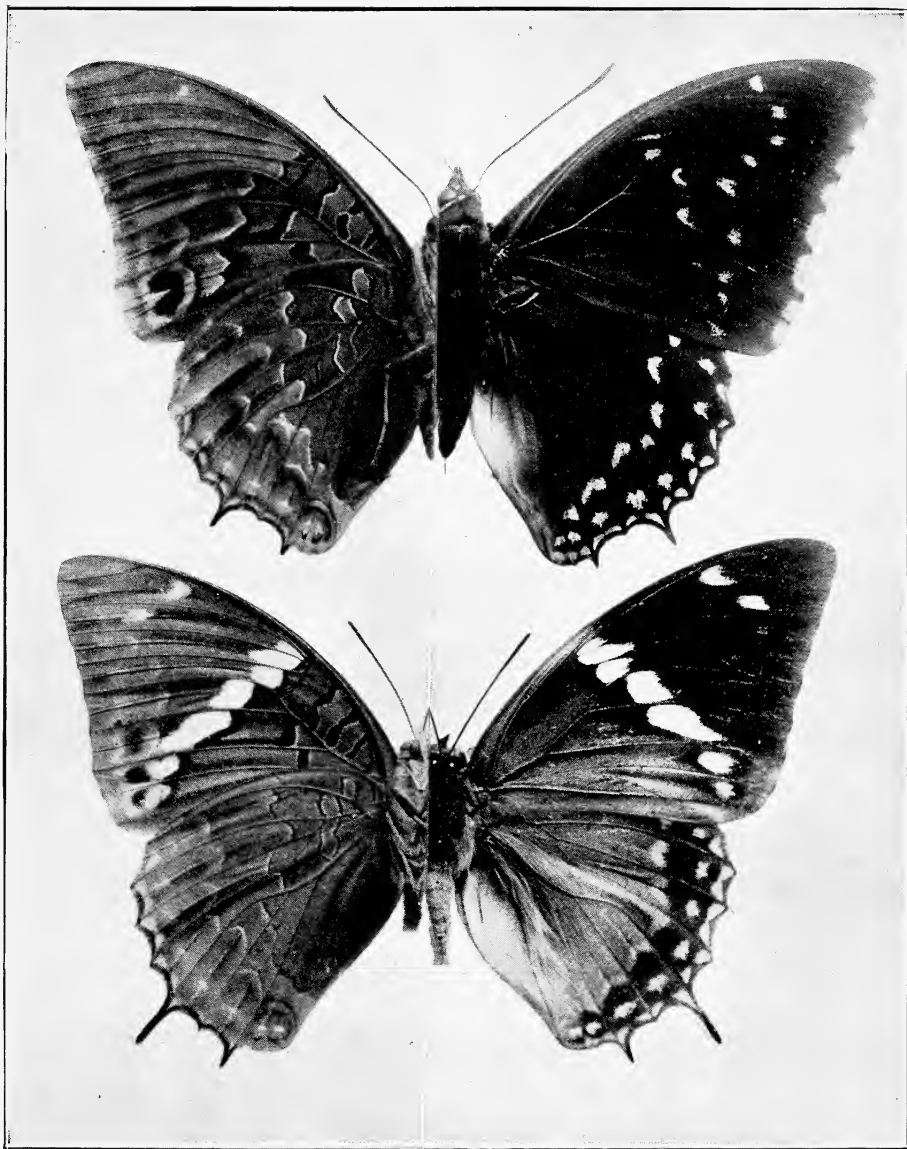


Photo: Dr. van Someren.

Under surfaces.

*Charaxes tiridates.*

Upper surfaces.

♂

♀

of carnivores, on roads and paths which traverse well-wooded areas. Females are occasionally seen and taken when sucking up the fermenting exudate from some injured tree, or when they are hunting about the forest undergrowth for their food plant.

*CHARAXES TIRIDATES TIRIDATES*, Cram. Pl. LXXXIX.

Expanse: Male 110-114 mm. Female 112-114 mm. Sexes unlike.

MALE:

F.w.: Deep blue-black, with purple-blue sheen; outer margin with conspicuous golden-orange border intersected by dentate extensions of the ground colour along the veins, spot in 1b double. A white sub-apical spot is present in 7 and blue spots are present in the other areas, the upper four arranged in a curve, the remainder in a straight line. There is a further series of blue spots distal to the apex of the cell and reaching 2.

H.w.: Ground colour blue-black, inclining to black at the wing-fold. Two rows of blue spots decorate the wing border; the inner row of somewhat crescentic spots starts in 7 and extends to just above the anal angle, the spots in 2 and 6 set slightly more in than the rest. The second line is sub-marginal and the spots angular, extending from 7 to the anal angle where the spot is double. The extreme edge of the wing is ochreous internervularly, and just internal to these marks are double triangular orange spots. Veins 2 and 4 carry "tails" 1 and 4 mm. long. Thorax and abdomen, black.

UNDERSIDE:

Ground colour olive-brown, rather browner towards apical half. Basal area of 1b and 2 and  $\frac{3}{4}$  of cell ochreous-olive, the former two bounded distally with black bars, white edged proximally, the latter with a black bar at sub-base, two bars at mid-point and another at distal end of mid-third; these lines edged with white. Apex of cell indicated by a narrow black line. A series of angular black marks cross the wing, the first, distal to the cell, angle directed outwards; those in 3 and 2 and a double one in 1b, angles inward; all lined with white and shaded with ochreous-olive distally. The sub-marginal area of the wing carries a series of long oval ill-defined ochreous marks, from 7 to 3, and represented in 2 and 1b by more circular marks enclosing black centres, the lower "eye" bisected by a bluish white line, part of the outer segment. The margin of the wing is ochreous-olive, divided by the dark tips of the veins. Lower half of 1b and the whole of 1a, purple-grey.

H.w.: Ground colour olive-grey-brown; area 9 with a black line; base of 8 with an ochreous-olive area outlined in white and black; base of 7 with a similar mark which extends obliquely across the cell,

An interrupted ala line of black, edged with white and distally shaded with ochreous-olive, stretches from the mid-point of 8 to above the anal angle. Between this series and the sub-marginal row of lilac-spots, is a series of ochreous-olive spots shaded white proximally extending in two curves from the distal end of 8 to the mid-point in 5, and from the mid-point in 4 to the anal angle where the spot becomes crescentic and clearly lined with black, forming a half ring round the double lilac spots in the angle. The margin of the wing carries crescentic ochreous-olive lines.

#### FEMALE:

F.-w.: Basal half of wing golden-olive, distally shaded with black especially in the upper-distal end of cell; apical half of wing blue-black to brown-black basally bounded by a transverse series of large white spots extending from below the costa at the base of 6 to the mid-point in 2 and then by two smaller spots in 1b. The sub-apical area of wing with two large white spots and an indication of a third.

H.-w.: Mostly golden-olive, with a blue-black border separated from the olive, by a series of ill-defined crescentic marks stretching from 8 to above the anal angle. The sub-marginal row of large lilac to purple spots with white dot, extends from 7 to the anal angle where the spot is doubled and blue. Each internervular area on the margin of the wing carries a double triangular golden spot. Veins 2 and 4 carry tails, 4 and 8 mm. long.

#### UNDERSIDE:

Ground colour rather darker and more greyish-brown than in the male, with a lack of olive-ochreous at the base. All other markings as in the male but in addition the two sub-apical white spots are clearly defined and the white bar of above is present and carried through to the "eye" spot at the posterior angle.

H.-w. as in the male.

#### EARLY STAGES:

This species lays its eggs on the yellow-flowered *Grewia forbesii*, Harr. (*Tiliaceae*), called "Nkoma koma" (Luganda) on *Hibiscus calycinus*, Willd. (*Malvaceae*), known to the Baganda as "Kinsambwe" and on "Nkuzayana" this last also the food of *numenes*, and so far undetermined. The eggs are large, 2 mm. in diameter and slightly less in depth; the cupping on top being marked and well-fluted. As soon as the young larva has emerged from the egg, it devours the remains of the egg-shell. In this stage it is dull olive-brown in colour, with a black head. At the first moult it becomes greener and

the head becomes mottled with white and light brown; at the third instar it turns leaf-green and a whitish spot develops on the sixth segment. The full-fed mature larva is a rich dark-green with finely papillated surface; the sixth and eighth segments are each dorsally ornamented with a purply-buff or whitish spot, that on the former having a crescentic or trident outline with a pointed projection in the centre of the concavity, that on the eighth being somewhat hexagonal (thus very like *numenes*). In some richly coloured examples the spots are brick-red. Each segment has a series of three to four whitish or bluish spots towards the fore-part of the lateral surface, and these form a somewhat broken spiracular line along the entire length of the body, with the exception of the first thoracic segment. The head is markedly convex and rather quadrate in outline; the lower edge is almost straight as are the sides but the top is rounded. The two pairs of horns are strong and owing to their large bases appear shorter than in reality. The lateral horns are equal in length to the central pair and arise obliquely to the side, are directed up and out and then curve in slightly at the tips; they are strongly rugose and spined, especially on the outer and anterior aspects. Below each is a short spine. Between the lateral and central horns are strong spines and between the central horns are two robust branched spines inclining inwards. The central horns project up and slightly out, then curve inwards. The whole facial disc is dark leaf-green and strongly rugose. There is no facial line, but two black spots are present at the baso-lateral corners.

The pupa is of the predominant type, with close-set head, well developed angles to the wing cases and marked convexity of the dorsum of the abdominal segments. There is little or no ornamentation of the pale green ground colour, except a double black spot at the angle of the wing scutæ.

#### DISTRIBUTION AND HABITS :

*Ch. tridates* is the largest species of this group, and is well distributed and common throughout Uganda and the Nandi country. Males are much more in evidence than females, in fact the latter are seldom seen except in the forest undergrowth and on the edges of clearings. One sometimes sees them circling high with a male in pursuit, but they are not common. All droppings of carnivores prove an attractive bait to the males of these insects, and it is no uncommon sight to see three or perhaps four of these huge *Charaxes* feeding alongside one or two other species of *charaxes*, not to mention the numerous *Crenis* and *Lycaenids* which hang about these smelly morsels.



## MIMETIC ASSOCIATIONS:

Owing to the size of the species and their great strength, *tiridates* is considered the centre round which the lesser fry are grouped, these including *numenes*, *bipunctatus*, and the two females of *etheocles*, *cedreatis* and *protocedreatis*; all having as their model the *Spatiosa-losinga* group of *Euphaedra*. These last are particularly plentiful throughout the distribution of the *Charaxes* and there appears little doubt but that these insects are distasteful to their natural enemies.

We have no records of any of these *Euphaedra* being taken by birds or reptiles though both enemies are abundant in forests where the insects occur. The above remarks referring to colour scheme apply, of course, to the female sex of the *charaxes* mentioned; there is the other form of protection, which is the outcome of a recognition of colour combined with strength and not necessarily with unpleasant taste. Swynnerton has shown that the larger *Charaxes* enjoy an immunity from attack, as their enemies have learnt by experience that, quite apart from the strong and tough integument possessed by these insects which renders them difficult to break up, the fight put up by them, by the assiduous use of their powerful wings, is often sufficient to make a bird let go of a would-be victim.

## CHARAXES AMELIAE AMELIAE, Doumet. Pl. XC.

Expanse: Male 100-102 mm. Female 104-106 mm. Sexes unlike.

### MALE:

General colour deep blue-black with blue spots.

F.-w.: Deep blue-black, with blue scaling along the base of the costa; and blue spots and marks as follows: a large, long triangular patch at the basal-upper part of cell, followed by a large spot just beyond the cell, and another at the base of 6. A long "club" streak is present at the lower part of the base of 1b, with often a very small line extending into 1a; there are two sub-apical spots in series with a sub-marginal row of increasing size, extending across the wing to 1a; the margin is ornamented with small mid-internervular spots, double in 1b and opposite each, the extreme edge is white-scaled.

H.-w.: Ground colour blue-black, inclining to black and then greyish at the inner fold. Centre of wing with a triangular blue bar of four spots extending from the sub-base of 6, 5, the apex of the cell to the base of 2. A sub-marginal row of large blue spots follows the contour of the wing closely, from almost the mid-point in 7 to the anal angle where there are two spots; areas 5 to 1c are narrowly margined with blue, and the extreme edge of the wing is white-scaled. The wing margin is only slightly dentate; veins 2 and 4 with short tails 1 and 3 mm. long. Thorax and abdomen green-black.

PLATE XC.

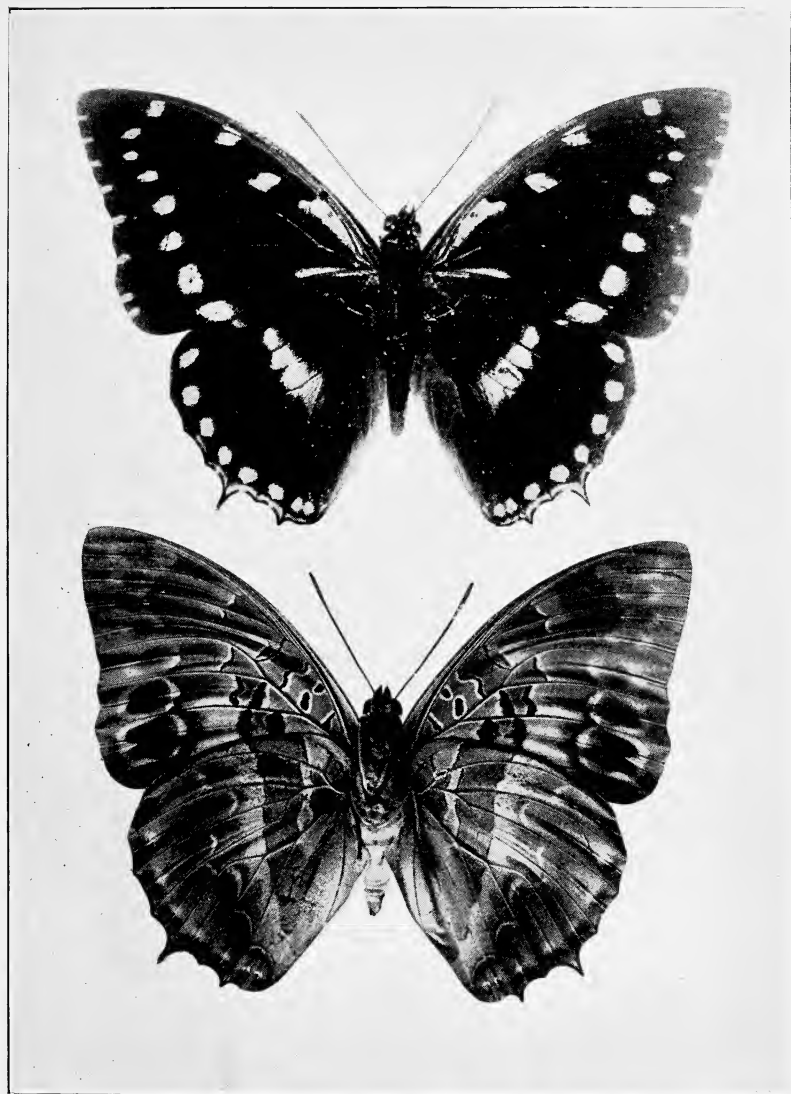


Photo: Dr. van Someren.

*Charaxes ameliae ameliae*. ♂

Upper surface.

Under surface.





#### UNDERSIDE :

F.-w. : The whole underside has the appearance of " watered or shot silk " silvery-greyish with an iridescent greenish tinge. Greater part of cell and bases of 1b and 2, greenish-ochreous. The cell contains a black line outlined with white at the sub-base, two white-outlined black spots at centre, and a wavy line at distal edge of mid-third, and a narrow black line at the apex. This is followed by a line at the base of 4 and a line each, sub-basal, in 5 and 6 and 3, the last in series with a line in 2, and this with one in 1b which is frequently joined with a sub-basal one in the same area and so forming a loop or U. Area 2 also carries a sub-basal line. Beyond the U-shaped mark in 1b the ground colour is light bluish-grey, shading to dark grey near the " eye " spot in 1b and in almost the whole of 1a. The sub-margin of the wing is ornamented with ill-defined lilac ovals or ocelli, containing a greenish tinge extending from 7 to 1b, the marks in 1b and 2 being more defined and inwardly shaded with ochreous-olive and bluish and proximally lined in black, and containing black centres, that of 1b being almost rectangular and indented on the distal side, these two forming conspicuous " eye " spots on the posterior angle.

H.-w. : This has the same " shot silk " appearance as the fore-wing, the predominant colour being a silvery-grey with greenish tinge. The base of the wing is traversed by a whitish bar outlined with black, which passes through the base of 8, the sub-base of 7 and then obliquely across the cell; a further whitish ala bar proximally edged with black crosses in almost a straight line from the mid-point in 8 to just above the anal angle; the distal edge of this bar is not sharp but shades off into the ground colour. This is followed by an irregularly placed series of greenish-ochreous ocelli extending from 7 to 2 and replaced in 1b by a crescentic ochreous line outlined in black and partly surrounding two black dots proximally edged with lilac, at the anal angle. The margin is tinged with ochreous either in the form of a continuous line or interrupted by the tips of the veins. Between this marginal border and the ocelli is a greenish-pink area edged distally with ill-defined whitish spots.

#### FEMALE :

F.-w. : Brown-black, with markings much as in the male but white or creamy, the cell is however without a mark. The median band of the hind-wing is longer and wider and is continuous with the spots in the fore-wing at 1a and 1b.

#### UNDERSIDE :

Much as in the male but white ala bar more defined and wider. The black spots at sub-base of 1b are either coalescent or discreet.

#### EARLY STAGES: \*

We have not bred this species nor can we find a published description of the early stages.

#### DISTRIBUTION AND HABITS:

*Ch. amelia* is a western species which extends into Uganda as far east as Mt. Elgon. It is a forest insect which is certainly not common, and is one of the handsomest of the genus. The curious silvery underside makes it a conspicuous insect when seen feeding at bait. We have only once seen and captured a female; it is rare.

#### MIMETIC ASSOCIATIONS:

\*Professor Poulton has written on the mimetic relationship of this insect, and has cited it (the female) as a secondary model for the *etheocles* female form of *etheocles*, with *brutus* as the central model; with these must be included the white-barred form of female *etesipe*.

#### CHARAXES PYTHODORUS PYTHODORUS, Hew. Pl. XCI.

Expanse: Male 90-94. Female 94-100 mm. Sexes unlike.

#### MALE:

General colour black with light-blue bar.

F.-w.: Ground colour black, rather browner at the base; a blue-ringed white spot distal to the apex of the cell, followed by two like-coloured spots sub-basal in 5 and 6 and one sub-basal in 3 and represented in 1a to 2 as a large triangular blue mark, base to hind-margin. Two blue spots at sub-apex and continuous with a series of sub-marginal blue spots, more or less parallel to the outline of the wing and meeting the large blue spot in 1b.

H.-w.: Extreme base black, but most of the wing taken up by a large light blue patch, shading to white at the upper part of the fold and to greyish distally. The marginal border is black, bearing a series of very small blue spots, double in 1b. This area also has a narrow blue line at the margin. The extreme edge is white between the ends of the veins. The edge is only very slightly dentate, with hardly any projection of veins 2 and 4. Thorax blackish shading to grey posteriorly; abdomen white.

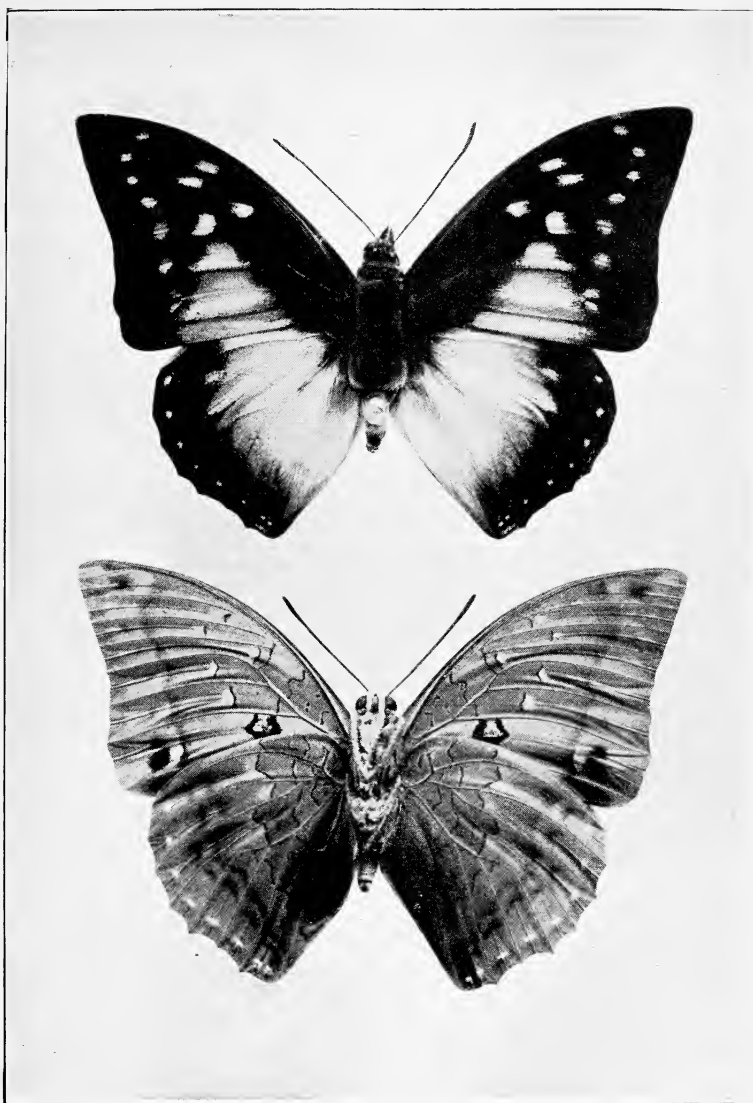
#### UNDERSIDE:

The whole of the underside is naples-yellow with a slight olive tinge. The markings are black and very fine with the exception of the U-shaped mark at the sub-base of 1b and the partial "eye" spot

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\* Poulton, Internatioaler Entomologen-Kongress, Zurich, July, 1925. Band 11.

PLATE XCI.



*Photo: Dr. van Someren.*

Upper surfaces.

Under surfaces.

*Charaxes pythodorus pythodorus.* ♂



at the sub-margin of this same area. The cell is crossed by a sub-basal line, then by two short lines, and by a double-curved line at the distal edge of the mid-third. The spots of the upper side are indicated by ill-defined ochreous ones, each with an angular narrow black line proximally. The distal end of 1a is purply-grey.

H.-w.: Ground colour as in fore-wing. There is a fine black line in 9; and a parallel series crossing the sub-basa of 8, 7, and the cell. A further zigzag line crosses the wing from just internal to the mid-point of vein 8 to the sub-base of area 3 when it turns inward to end above the anal angle. There is a further parallel series of very ill-defined olive lines almost converging at the anal angle and reaching the sub-margin of 7. There is a sub-marginal row of very small lilac spots extending from 7 to the anal angle.

Underside of thorax and abdomen Naples-yellow.

#### FEMALE:

This is unknown to us, and is not described in Seitz.

#### DISTRIBUTION AND HABITS:

This species ranges through Uganda and extends into the forests of Nandi and Maragoli, but has not been seen or taken on the higher ranges such as the Mau; it however does occur in the Sotik and Kisii forests. This distribution is interesting in that there is a very considerable stretch of diversified country between the habitat of the typical form and the geographical race which is found in the forests of the Coastal belt (see later).

This is not one of the common *Charaxes*, in fact it can be considered rare. It is a forest species which keeps to the higher trees and only descends when attracted to various animal droppings, especially faeces of Carnivores. Males are very fond of basking in sunlight and may often be seen sitting with out-spread wings on some projecting branch of a high tree in a forest clearing.

#### EARLY STAGES:

Unknown.

#### MIMETIC ASSOCIATIONS:

There would appear to be no very marked similarity between this species and any other except as already stated when discussing *Ch. cithaeron* (males).

*CHARAXES PYTHODORUS NESAEA*, G.-Smth. Unfigured.

MALE:

Expanse: 76 mm. Very like the typical form but very much smaller; the sub-marginal row of blue spots very small and the blue area in the fore-wing and that of the hind-wing much bluer, the latter with a purply tinge at the outer margin. The sub-marginal spots in the hind wing are also very small, but the edge is ornamented with a narrow blue line, extending from 1b to 7.

UNDERSIDE:

The ground colour is richer than in the typical form but all the lines are less distinct; the sub-marginal lilac spots in the hind-wing are however larger.

EARLY STAGES:

Unknown to us.

DISTRIBUTION AND HABITS:

The distribution of this race in Kenya is the forests of the Coastal belt. It is very uncommon and little is known of its habits.

MIMETIC ASSOCIATIONS:

There is a very decided resemblance on the upperside between the male of this species and those of *Ch. cithaeron kennethi*, and *Ch. violetta* with the male of *bohemani* as an outlying member.

*CHARAXES KAHLDENI KAHLDENI*, Homeyer. Pl. XCII., fig. 1.

Expanse 56-60 mm. General colour creamy, with orange-yellow margins.

MALE:

Basal half of F.-w. pale creamy-green with a satin lustre; apical half light orange-yellow with darker margin and a sub-marginal row of spots following the general wing contour. The apex of the wing is square-cut and the outer margin incised.

H.-w.: Almost entirely creamy-green with a marginal border of orange-yellow extending from 4 to the anal angle where the colour changes to brownish-grey with two ocellate spots. Vein 2 is produced to form a long club-shaped "tail" greyish-brown in colour.

UNDERSIDE:

Orange-brownish with a decided greenish tinge. Fore and hind-wing traversed by a bar, Y-shaped in the latter; the stalk dividing at the origin of vein 2, the inner arm running to the base of the wing.



PLATE XCII.

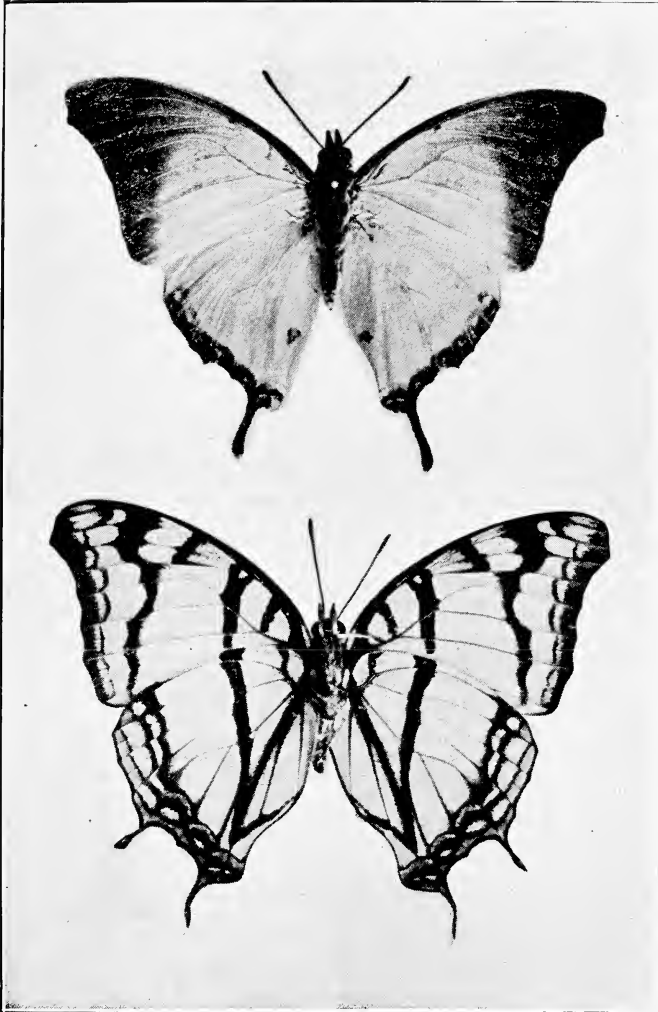


Photo: Dr. van Someren.

*Charaxes kahldeni*. ♂

*Charaxes zoolina*, under surface. ♀



the outer passing through the base of vein 8 and continued across the fore-wing in a line with the apex of the cell. This bar is greyish-brown distally, followed by greyish and margined with silvery-white on the inner edge of the arms.

FEMALE:

Very like the male in general colour.

EARLY STAGES:

Unknown to us.

DISTRIBUTION:

This species is a West African one which just extends into the western borders of Uganda. In its eastward distribution it is not plentiful.

*CHARAXES ZOLINA* f. *ZOLINA*, West. Pl. XCIII., figs. 1 and 2. Pl. XCII., fig. 2.

Expanse: Male 50 mm. Female 60-62 mm. General colour pale cream with a greenish tinge and black apex and margins.

MALE:

Costa, apical half and outer border black; with an extension of the black into the apex of the cell. Basal half of wing cream-coloured with a greenish tinge; base of wing shaded with brownish. The black apex carrying creamy spots, a sub-marginal row of large spots in 3, 4, and 6 with white spots at about mid-point.

H.-w.: Mostly creamy with greenish tinge; marginal border widely black carrying a marginal line of orange, tinged with green at the anal angle; and a sub-marginal row of white spots extending from 7 to the anal angle where the spots are purple. Vein 2 extended into a long clubbed tail.

UNDERSIDE:

Pale greenish-cream rather greener than above; black areas of above present as blackish-brown, with in addition a black bar sub-basal in the cell and with the black bar at the apex of the cell carried down to the mid-point in 1b. Three white spots are present in the post-discal area and a series of large sub-marginal whitish spots follow the contour of the wing from the apex to the posterior angle. Very often there is a series of smaller white spots distal to the sub-marginal series.

The hind-wing is pale greenish-cream with a brownish marginal border ornamented with a double row of sub-marginal whitish spots, the distal ones large and bordered outwardly with ochraceous to as far as the "tail" where it turns olive. The spots, from the anal angle

to 2 are lined with black. The disc of the wing is traversed by a Y-shaped brownish line, stem extending from the "tail" at vein 2, bifurcating before the apex of the cell, the outer arm passing to the mid-point in 8, while the inner arm passes to the base of the wing and thence to 9. There is a curved line extending from the base of the stem and crossing 1c and 1b. The tail is mostly black.

#### FEMALE:

Somewhat like the male, but with a greater extent of greenish-creamy ground, and consequent reduction in the black areas; the basal area of the apical half of the wing is taken up by a series of large spots extending from the hind-angle, in increasing size, up to the post-discal area, all narrowly edged proximally, with black. There is a single large whitish sub-apical spot.

H.-w.: Ground colour as in fore-wing; marginal border black, outwardly edged with orange-ochreous, and inwardly bordered with a wavy whitish line with in between these, a series of whitish spots, largest in 7 and diminishing in size as the anal angle is reached. Veins 2 and 4 are prolonged into club-shaped "tails."

#### UNDERSIDE:

As in the male, but with a reduction in the blackish areas.

*CHARAXES ZOOLINA* f. *NEANTHES*, Hew. Pl. XCIII., figs. 3 and 4.

This is a seasonal form of the preceding. It is characterised by the replacement of all the whitish areas by tawny-orange; and the black areas, by reddish-brown. The apical dark areas and the margin-border of the hind-wing are more broken up by the larger size of the tawny-orange spots.

#### UNDERSIDE:

In this form, the lower surfaces are either almost uniform tawny, with a slight dusting of darker scale and ill-defined dark lines; or with a single dark line inwardly lined with silvery-white crossing both wings.

#### EARLY STAGES:

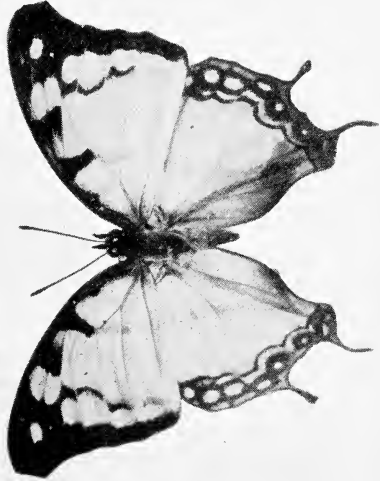
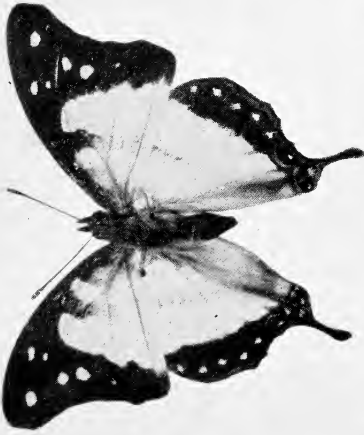
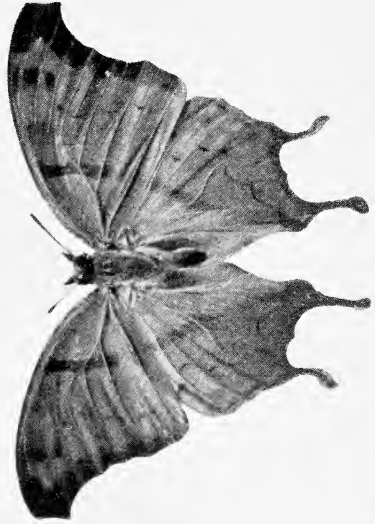
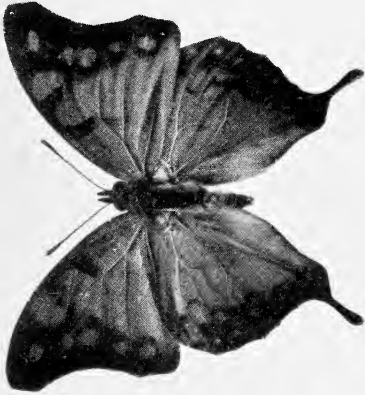
The eggs of this species are laid on the upper side of the fine leaflets of *Acacia pennata* (*Mimosaceae*) known to the Baganda as "Kauli."\* The food-plant is a very thorny creeper with short close-set recurved spines.

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\* The name *Kauli* is a group name which is applied to several species of climbing *Acacias*.

♂

♀



♂

♀

Photo: Dr. van Someren.  
*Zoolina* form.

*Charaxes zoolina*.  
Upper surfaces.

*Neanthes* form.





PLATE XCIV.



Photo: Dr. van Someren.

Pupae and larvae of *Charaxes cithaeron kennethi*.

Larvae of *Charaxes zoolina*.



When first deposited the eggs are pale creamy, but turn yellow within twenty-four hours. They are 1 mm. high and 1 mm. in diameter, and very slightly flattened on top, and finely fluted in this area. The young larva is first olive, with a brownish head, but at the first moult it turns greenish and by the second moult, the characteristic oblique segmental lines appear and the head becomes green. The green of the body becomes brighter as the last stage is reached but the oblique become almost pure white so that the caterpillar appears boldly striped. These lines pass from the posterior dorso-lateral aspect of one segment to just above a very narrow spiracular line and thence on to the posterior lateral area of the segment in front. A central dorsal line of yellow extends from the 2nd to the anal segment. Although these lines are clearly seen on close inspection, yet, when the larva is resting on the fine leaves of the food plant, they completely break up the outline and render the insect extremely like the fine leaves. The head is pale-green in colour with dark-green outer-margin and two dark-green vertical lines arising from a common point just external to the mandibles and extending to either side of the inner long horns. A further line arises above the centre of the mandibles and divides the facial disc. The postero-lateral aspect of the disc carries a comb of well-marked spines and just above this the outer pair of horns arise; these are directed obliquely outward and then slightly upward. The inner long horns arise from the apex of the lateral segments of the disc, pass upwards with a slight divergence and then become more wide-spread, then incline slightly inward and backward. The posterior-lateral aspects of all the horns are heavily spined.

The pupa is small, and pale green in colour with a faint dusting of white on the wing scutae. These wing-shields are markedly angled laterally; and the "shoulders" are prominent. The spiracular dots are whitish. The cremaster is bifid where it joins the last segment and each side is composed of two contiguous pear-shaped lobes with a couple of divergent pear-shaped lobes in front.

The head is obtusely rounded while the ventral surface of the thorax and abdomen form an almost straight line.

#### DISTRIBUTION :

Although the two forms of this insect are so markedly different, it has been definitely proved by breeding that they are one and the same species and represent seasonal phases which correspond to the wet and dry forms found in other groups of butterflies, more particularly the *Precis*.

In countries where the "rainy" season is sharply marked off from the "dry," the two forms are seldom taken during the same

season, but in Kenya, where the seasons tend rather to merge, it is no uncommon thing to find both forms equally dominant. The species is common and extends from the Coastal areas throughout the inland regions (except at high altitudes over 7,000 ft.) into Uganda. It is more particularly an insect of the warm countries, frequenting the open forests and savannah forests, and acacia-fringed rivers.

The *neanthes* form is an outlying member of the mimetic association centred round the *Attella phalantha* group.

These insects are not very often taken at bait, but appear to be very partial to exudates from trees and to flower juices.

*CHARAXES EUPALE DILUTUS*, Rothsch. Pl. XCV., fig. 3.  
Pl. XCVI., fig. 4.

Expanse: 60 mm. Sexes alike. General colour greenish-cream and olive.

#### MALE:

Distal half of fore-wing light olive-green with an irregular basal border; rest of wing pale greenish-cream, slightly more yellow-tinged at the base, and with a satin lustre. A small olive spot at the upper part of the apex of the cell, and a series of minute dots dividing the apex of the wing longitudinally, are the only ornamentation.

H.-w.: As basal area of fore-wing with a narrow margin of olive, and a series of blackish-olive sub-marginal spots, double at the anal angle and extending to 6. Margin of wing slightly serrate. Head brownish; thorax dark-green with light pubescence; abdomen light green.

#### UNDERSIDE:

Pale green with a silvery lustre more particularly marginally. The cell carries a large transverse silvery spot with a red-brown centre. Areas 2 and 3 with reddish-brown irregular marks accentuated distally with black and internally with silver. The hind-wing is traversed by a very narrow brownish ill-defined line, bordered internally with silver.

A sub-marginal row of minute brown dots surrounded by silvery scales extends from the anal angle to area 7, and internal to this is an irregular row of crescentic silvery lines.

#### EARLY STAGES:

The eggs of this species are small, measuring 1 mm. in diameter, pearly white in colour, with the fluted cupping on the top of the egg not very well marked. They are laid singly on the upper surfaces of the leaves of a thorny tree known to the Baganda as "Kirobo"

*Scutia commersoni*, Brongn (*Rhamnaceæ*). It is a tree which grows along the margins of forest and in the scrub country. The first sign of development appears around the edge of the cupping as a brown ring and as the egg matures it turns blackish. The egg stage lasts seven days. The young larva devours the egg shell and throughout the first instar is an olive-yellow colour with a black head. It is by no means easy to rear, due in part to the fact that it will only eat very fresh leaves, and the food plant withers rapidly soon after gathering.

The mature larva is 40 mm. long with a very finely pailated body of a dull grass-green colour. The markings vary in appearance. As the beginning of the last instar, each segment bears four rings of fine white stippling; which later on becomes yellowish. There is a spiracular line of fine yellow dots starting at the second segment and extending to the tail. There are no dorsal marks in the specimens we have reared, but occasionally found examples have a faint V mark on the sixth segment.

The head as seen from the front resembles a somewhat egg-shaped disc with the broad part uppermost, surmounted by four long thin horns, the central being 4 mm. and the lateral 3 mm. in length. All four are finely spined and uniform grass-green in colour as is the head itself. There is no central line or border to the facial disc.

The pupa is pale green with a glossy surface, strongly ornamented along the angle of the wing-scutæ with a clear yellowish line which extends round the margin of the head-shield. The second and third abdominal segments are dorsally decorated with two convergent white lines, while the fifth segment is almost entirely white or yellowish, the white not reaching the anterior dorsal edge but extending to the sub-lateral area of segment four. The spiracles are indicated by red-brown dots. In the ventral area the abdominal segments are very coalescent with the result that the margin of the wing-cases almost reach the cremaster. The cremaster is long-stalked and arises from two lateral lobes of uneven size, the posterior lobe being the larger, and in front of these are two other lobes oval in outline placed at right-angles to the lateral ones. The whole surface of the pupa, though glossy, is punctured with very fine pits.

#### DISTRIBUTION :

This beautiful species is widely distributed in Uganda and ranges into the boundaries of Kenya to the line of the Mau, but its southern range is not known. It is said to occur at Nairobi along with the next species.

It is so confusingly like the next species that without dissection it is almost impossible to distinguish them. Talbot has reviewed and



described the various races of both species in Bull. Hill Museum, Vol. 1, No. 1, October, 1921.

It is a most remarkable fact that females are seldom taken or even seen; males on the other hand are extremely common, and indeed might with safety be classed along with males of *Charaxes etheocles* as the commonest species of *Charaxes* in Uganda. Every bit of animal excrement lying on path or roadway through forest country will have two or more examples of *Eupale* feasting on it. So intent will they be on this evil smelling bait that one may lift the insects up between thumb and finger.

*CHARAXES SUBORNATUS MINOR*, Joicey and Talbot. Pl. XCV., fig. 4.

Expanse 60 mm. Sexes much alike. General colour light greenish-cream with olive tip to fore-wing.

MALE:

The whole of the hind-wing and the greater part of the fore-wing very pale greenish white with a satin lustre at the base, more restricted than in *eupale*; apical portion of fore-wing light olive green also rather more restricted than in *eupale*, and carrying five small whitish dots at about mid-line. Hind-wing with a varying number of small brownish sub-marginal dots, largest at the anal angle.

UNDERSIDE:

Much as in *eupale*, but silvery marks in fore-wing wider and the sub-marginal white dots more distinct; the post-discal bar on the hind-wing wider and more centrally placed; and the whole surface flecked with silvery scales.

EARLY STAGES:

Unknown.

DISTRIBUTION:

Through Uganda east to Kenya and south to as far as Nairobi. (Vide remarks under previous species.)

*CHARAXES JAHLUSA KENYENSIS*, Joicey and Talbot. Pl. XCV., figs. 1 and 2. Pl. XCVI., fig. 8.

Expanse: Male 50 mm. Female 66 mm. General colour orange with black spots.

MALE:

F.-w.: Apex produced and outer margin incised; ground colour bright reddish-orange over the greater part, with the apical third blackish, which colour extends down the sub-margin of the wing in a series of contiguous lunules to the hind-angle, each crescent enclos-



PLATE XCV.

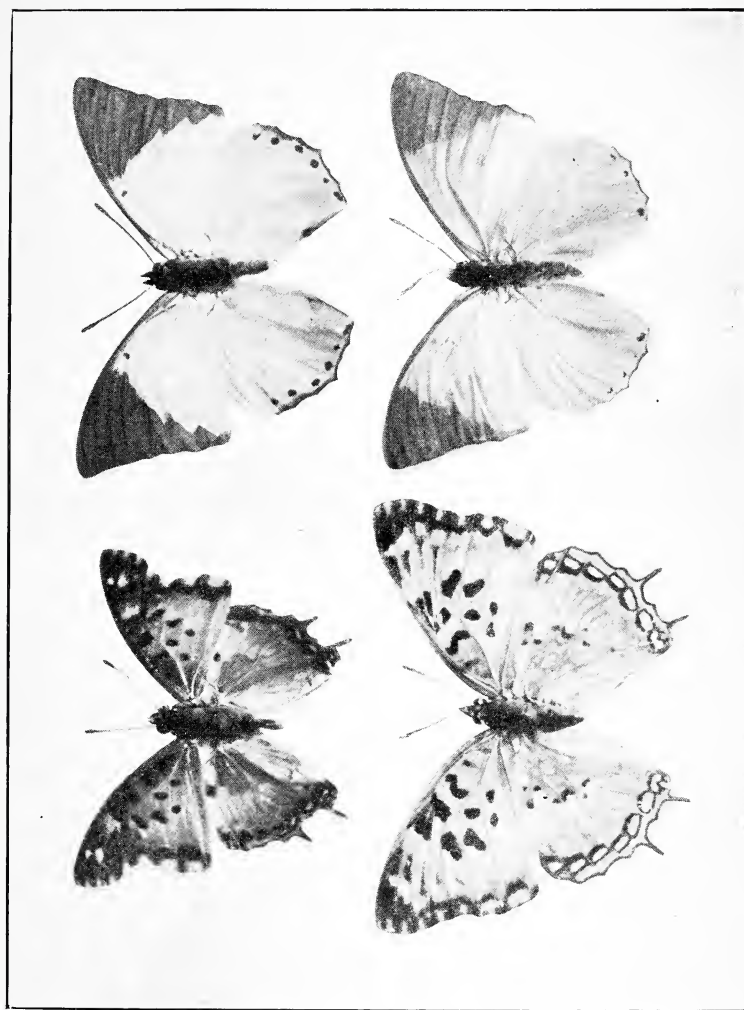


Photo: Dr. van Someren.

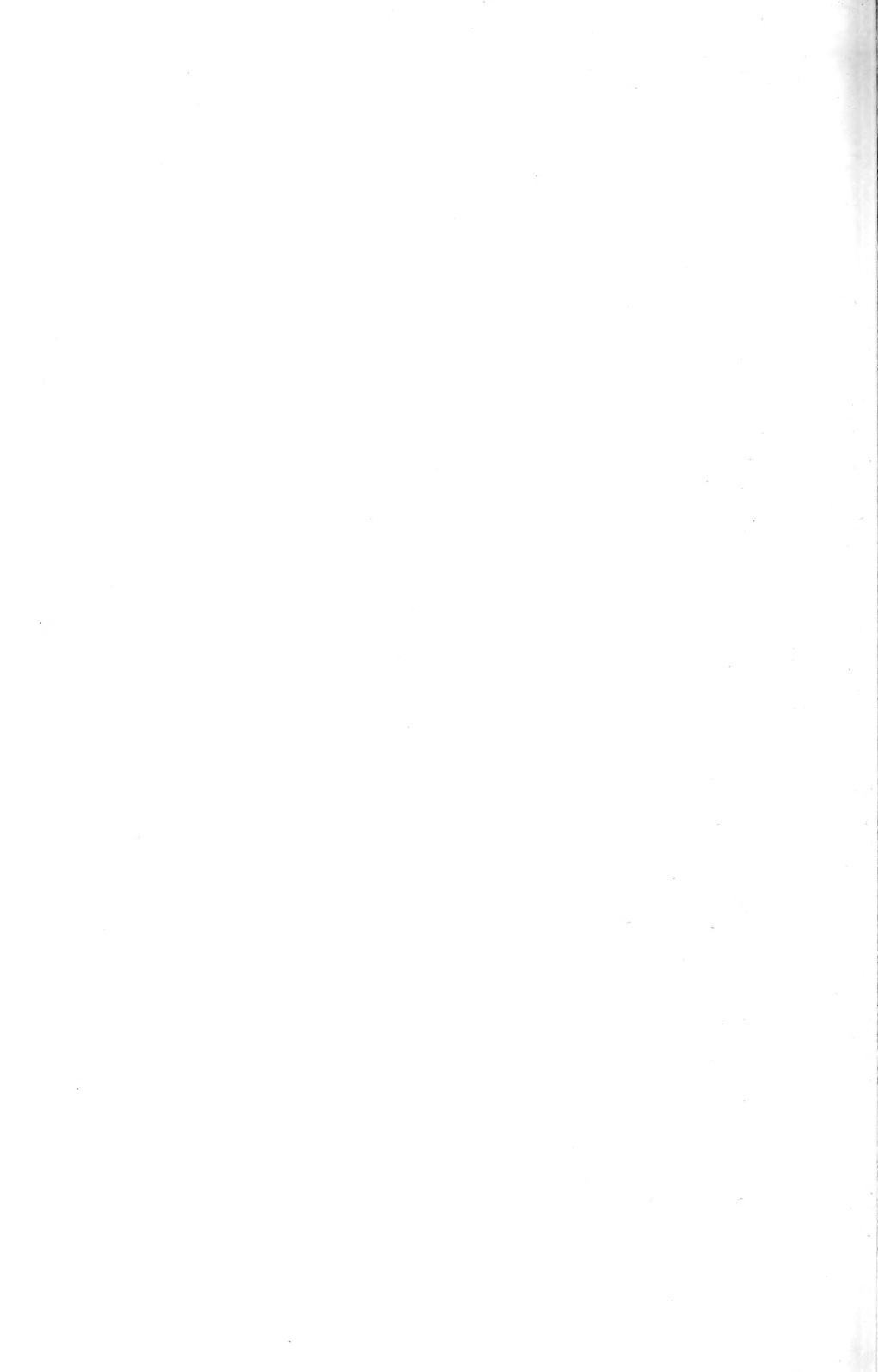
*Charaxes jahlusa kenyensis.*

*Charaxes jahlusa kenyensis.*

*Charaxes eupale dilutus.*

*Charaxes subornatus minor.*

Upper surfaces.



ing an orange mark. The sub-apical area with a series of orange spots largest in 7 and 8 and small in 5 and 6. The cell contains a black transverse line just beyond the mid-point and a further black mark at the apex. Areas 1b, 2 and 3 each with a black mark internal to the mid-point, the first two with an additional mark sub-basally.

H.-w.: Reddish-orange, with most of the cell, and most of 2 more tawny, distally accentuated by black more particularly in areas 6 and 7. The extreme margin is black edged with white scales internervularly, and at the anal angle. Sub-marginally there is a series of ocellate black spots, thicker internally and containing orange spots. Veins 2 and 4 produced to form acute "tails," the former internally shortened by the rounded projection of the anal angle.

#### UNDERSIDE:

The basal portion of the fore-wing is a delicate pinkish to salmon; apical portion silvery grey with radiating blackish lines internervularly; light spots of above represented by pinkish to white; black mark as above but more defined and with an additional spot at base of cell. H.-w.: Silvery grey intersected with black veins and dark internervular rays; basal area with an irregular brownish mark outlined with black which starts at the mid-point in 7 and base of 6 and covers most of the cell and the greater part of 1a to 1c. The cell contains a large silvery spot. The wide marginal border presents a marbled appearance produced by a double series of diffuse ochreous spots with greyish and black in the interstices.

#### FEMALE:

F.-w.: Outer margin not deeply incised. The general scheme of markings as in the male, but the whole ground colour much paler more orange-ochreous; the black at the apex and along the outer margin narrower, while the marginal yellowish spots are more discreet. The marginal ornamentation to the hind-wing consists of long ovoid contiguous black rings enclosing yellowish-ochreous spots.

#### UNDERSIDE:

As in the male but more ochreous.

#### EARLY STAGES:

Unknown to us.

#### DISTRIBUTION:

This handsome little *Charaxes* is an inhabitant of the warmer districts of Kenya and is most frequently found in the acacia and thorn-bush country. It occurs in the coastal forests, though not in

the densely wooded parts. The area where we have found it most abundant is in the Kibwezi district, where it may frequently be taken feeding on the gummy exudate of the acacia trees.

#### MIMETIC ASSOCIATIONS:

This species enters the *atella* centred mimetic group.

*CHARAXES LICHAS BEBRA*, Rothsch. Pl. XCVI., figs. 5—7.

Expanse: 55-60 mm. General colour tawny orange with black tip.

#### MALE:

Hind-margin and outer margin almost rectangular; apical angle acutely pointed and recurved.

F.-w.: Bright tawny-orange, slightly darker at base; apex purple-black with an extension of this colour down the margin of the wing to 2, but intersected by orange veins. Areas 1b to 4 with sub-marginal row of brown-black spots. Apex of cell with a small blackish spot followed by two post-discal spots in 5 and 6.

H.-w.: Bright tawny-orange with two brownish spots in 7 and very small brownish sub-marginal dots in the other areas. Vein 4 produced to form a long tail; no tail at 2, but the anal angle markedly pointed.

#### UNDERSIDE:

Fore and hind-wings reddish-brown with ochreous marbling and a curious greyish lustre; both wings traversed by a red-brown line outlined with ochreous, extending from just before the apex to just above the anal angle. The dark spots of above faintly indicated below.

#### FEMALE:

Very like the male but paler throughout.

#### EARLY STAGES:

Has not been bred by us, and there appears to be no published record.

#### DISTRIBUTION:

This species is found in the wooded and forest areas of Uganda and ranges east to the Nandi Hills. It is frequently taken when feeding on damp mud or on animal excrement. Females are by no means common.

The species probably lays on one of the creeping acacias.

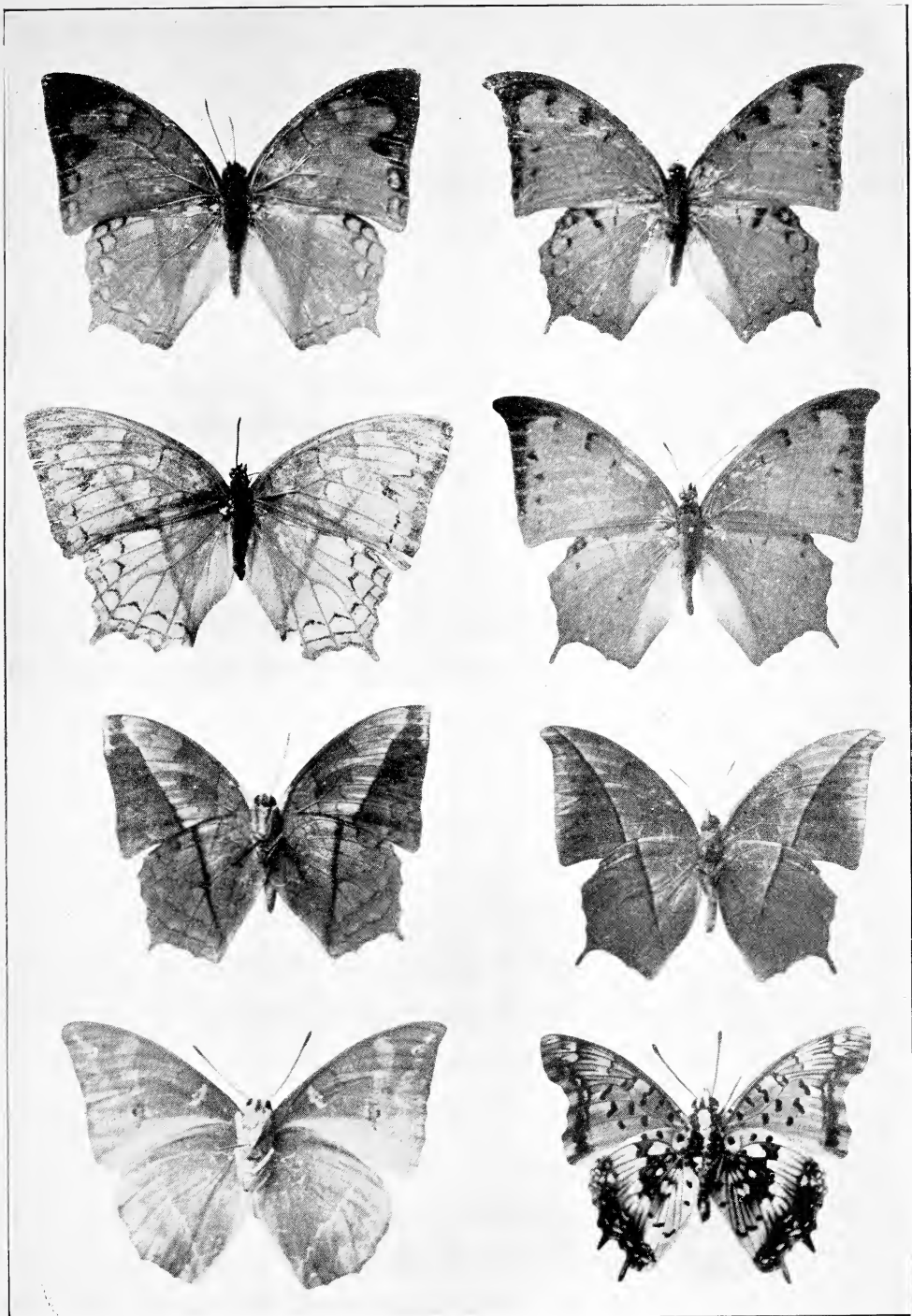


Photo: Dr. van Someren.

1. *Charaxes paphianus*.
2. *Charaxes paphianus*.
3. *Charaxes paphianus*, underside.
4. *Charaxes eupale dilutus*,  
underside.

5. *Charaxes lichas bebra*.
6. *Charaxes lichas bebra*.
7. *Charaxes lichas bebra*, underside.
8. *Charaxes jahlusa kenyensis*,  
underside.



*CHARAXES PAPHIANUS SUBPALIDA*, Joicey and Talbot. Pl. XCVI., figs. 1—3.

Expanse: 54-60 mm. Sexes somewhat alike. General colour reddish-orange with black tips.

**MALE:**

F.-w.: Outer edge almost straight, but posterior angle produced. Mostly reddish-orange, with a slight darkening distal to the cell. Hind-margin concave distally. Apex purple-black with the basal margin deeply indented in 4, with an encroachment of the black in area 3, thence carried down the outer margin as ovoid blackish rings more heavily black outwardly.

H.-w.: Ground colour reddish-orange slightly darker at base and before inner fold. Border with a sub-marginal row of somewhat triangular ill-defined brownish marks containing orange, extending from 7 to the anal angle. Vein 4 with a tail; margin of wing slightly serrate.

**UNDERSIDE:**

Basal triangle ochreous-orange sharply defined from the more greyish-brown triangular central area which possesses a curious lustre and a sharply defined distal marginal line of brown. Outer triangular portion of wing orange-ochreous with a double row of wavy lines following the wing contour.

H.-w.: Distal half ochreous-orange ornamented with a double sub-marginal row of wavy lines following the contour of the wing; proximally bordered by a defined brown line which crosses the wing from the mid-point in 7 to the anal angle. Internal to this the wing is darker brown with a greyish-lustre, and the base of the wing is ochreous-orange.

**FEMALE:**

Larger than the male, very much paler throughout, more yellowish-orange; with the dark markings of the male indicated though very faintly as brownish lines and marks; the sub-marginal lines however rather clearly defined on the pale ground.

**UNDERSIDE:**

Much as in the male but paler.

**EARLY STAGES:**

This species oviposits on the upper surfaces of the fine leaves of a thorny creeper called Kauli by the Baganda. It is an *Acacia* near the species *goetzii*, Harms. The insect also lays on an allied species as yet unidentified. The egg is pearly-white in colour with the usual fluted cupping on the top poorly defined. The eggs hatch in seven days. The newly-emerged larva does not eat all the egg shell, but



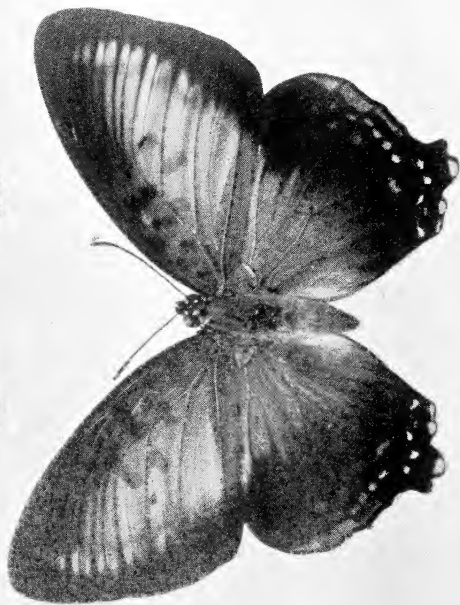
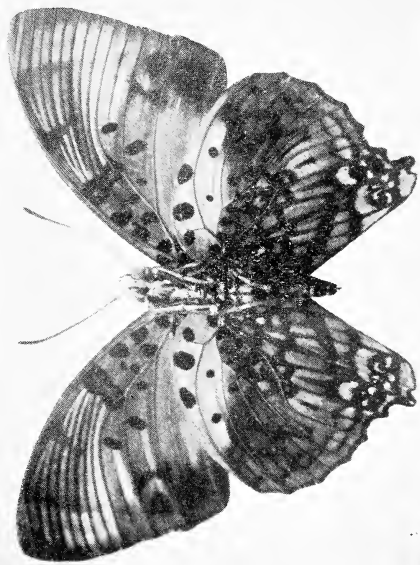
very soon commences to feed on the leaf. The colour is at first olive-yellow with the head black. In six days it has passed the second moult and assumed the greenish tint and indications of the oblique lateral lines characteristic of the species. The full-grown larva is 35 mm. long. The body is finely papillated and of a dark green colour with striking black segmental stripes running obliquely across each segment. Under a low magnification each mark is seen to consist of a long oval area enclosed by a fine black line, the enclosed area being light green along the anterior side, and black posteriorly. These lines do not meet on the mid-dorsal line of segments one to eight but they gradually approximate until at the tenth they unite and form a crescent. The black lines on segments four to seven are the widest, those before and after gradually diminishing in width towards head and tail. The head is most characteristic, resembling the outline of a truncated cone, base upward, surmounted by two long central horns (5 mm.) slender and green in colour with black tips, and two shorter (3 mm.) lateral horns uniform green in colour. The facial disc is light green, covered with fine papillae and divided by six dark green nearly black lines, which, arising from the bases of the horns, pass downwards and converge above the mouth. Of these lines, two arise from the base of each central horn, and one from each lateral.

The pupa is light green, similar in form to that of *Ch. anticlea*, and is without marks or spots. The cremaster is long-stalked and consists of two lateral lobes, with two oval lobes, widely separated, in front. The imago emerges in fourteen days. In common with all *Charaxes* larvae these caterpillars lie up during the day time on an area of a leaf or leaves which has been spun over with silk. As the leaves of the food plant in this particular case are so very fine and delicate the larva rests on the mid stalk with the fine leaflets extending out on either side. In such a position one sees the value of the dark oblique lateral lines; they break up the general outline of the insect in such a way as to make it harmonise with the leaf spray.

#### DISTRIBUTION :

This species is found in the forests of Uganda, more particularly along forest roads and internal clearings where the food plant has grown up amongst the secondary growth. They are hardly attracted to the baits beloved by most *Charaxes*, and one frequently sees them settled on some prominent twig, in the full rays of the sun. If disturbed they fly off, but usually return to the same twig time after time.





*Charaxes zingha.*  
Under surface.  
*Charaxes etesiae.*

PLATE XCVII.

*Charaxes zingha.*  
Upper surfaces.

Photo: Dr. van Someren.

*CHARAXES ZINGHA*, Stoll. Pl. XCVII., figs. 1—3.

Expanse: 84-92 mm. Sexes somewhat alike; general colour black with tawny-red bar.

MALE:

Fore and hind-wing black, the former with a large orange-red triangular area filling the body of the wing from the base of the cell and the proximal two-thirds of the hind margin and ending in a point in the sub-apical region. Hind-wing with the basal triangle red-orange; the margin decorated with orange-red lines in areas 2-5, and with two ochreous spots at the anal angle; internal to these a sub-marginal row of double spots in areas 1b to 4.

UNDERSIDE:

Greater part of the cell and most of the apical half of the fore-wing greyish-brown intersected by blackish rays and veins; remainder of the wing pinkish-orange. Areas 1a-2 with large black areas at the distal end, the last traversed by a black line and carrying two black spots sub-basally. A further black spot is present sub-basally in 3. A black spot is present at the base of the costa, while the cell contains one at the base, a double spot at the proximal end of the mid-third and a further double spot at its distal end; followed by a double line at the apex. There are two equidistant diffuse brownish line between the apex of the cell and the apex of the wing.

H.-w.: Ground colour greyish-pink particularly along the costa. Area 9 with two large black spots; areas 7 and 8 each with two, those in 8 being large. The remainder of the wing ornamented with a network of black. Ground colour along the inner fold and at the anal angle yellowish. The anal angle produced in the form of a rounded projection and vein 2 into a short blunt "tail."

FEMALE:

Upper surface much as in the male but the light areas more tawny orange, which colour fills most of the cell of the fore-wing. The hind-wing marginal and sub-marginal spots larger and followed by an additional inner row in areas 1c-5. Underside as in the male.

EARLY STAGES:

Unknown.

DISTRIBUTION:

This striking and curious *Charaxes* is limited in its distribution to the larger forests of Uganda, more particularly those of the west and south-west. We have not seen it feeding at animal excrement but only on exudates from wounded trees and at flowers. Females

are rare. The habits of the species recall those of the Euxanthes; they are fond of settling on some prominent twig or leaf in the full rays of the sun and resting with half-open wings. If disturbed they close the wings and so expose the very acraea-like undersides; doubtless using this curious pattern as a warning. The upper surface brings the insect into the *Pollux* mimetic association and though not by any means such a powerful insect as its model it nevertheless puts up a gallant fight when tackled.

*CHARAXES ETESIPE ETESIPE*, Godt. Pl. XCVIII., fig. 1. Pl. XCIX., figs. 1 and 2. Pl. XCVII., fig. 4.

Expanse: 80-82 mm. Female 90-100 mm. Sexes unlike. General colour of male black with blue marks.

#### MALE:

F.-w.: Rich blue-black, rather bluer at the base. Cell with a white spot at the apex; areas 2, 3 and 6, with white spots sub-basally followed by a series of sub-marginal spots following the wing contour from 7 to 1a, those in 1a to 2 being blue, the remainder white; the spot in 1b double.

H.-w.: Blue-black, carrying a post-distal row of large blue spots from 1c to 7, followed by a sub-marginal row of white spots from 7 to the anal angle where the white line is crescentic and encloses two blue dots distally bounded by olive-green, forming an ocellus. The extreme edge is white-scaled internervularly. Veins 2 and 4 are prolonged to form long pointed tails, each accentuated by a blue longitudinal mid line.

#### UNDERSIDE:

Ground colour creamy with a strong suffusion of grey on the distal portions of 1a and 1b and 5 and 6. The basal areas of 1a and 1b almost entirely greyish-black. The cell is decorated with three transverse chestnut bars outlined with black; while similar lines traverse the base of 1b, 2 and 3, 4, 5, and 6; those in 1b and 2 in duplicate. The mid-portion of 4, 5, and 6 with black club-shaped rays, on a grey ground. There is a sub-marginal row of black spots of increasing size stretching from 7 to 1b, followed by a faint sub-marginal blackish line especially marked in 1b and 2.

H.-w.: Costal margin and the whole of area 8 and most of 9 creamy with an extension of this colour into 7 at about mid-point, followed by a series of sub-basal white spots in 6-3. Ground colour of the remainder of wing olive-grey. The base of 7 with two chestnut bars outlined in black, followed by a single similar bar at the bases of 6, 5, 4, 3, 2 and 1c. The cell is traversed by three such bars. The post-discal area of the wing is traversed by two series of black



PLATE XCVIII.



Photo: Dr. van Someren.

Upper surfaces.

Under surfaces.

*Charaxes etespie etesipe.*

*Charaxes etesipe tavetensis.*





spots of varying shape. The margin of areas 5-7 are reddish-chestnut internally bordered by a series of ochreous lines which extend to areas 4-1c, these latter bordered distally by black. The marginal border of 1c-3 olive-ochreous, rather greener at the anal angle and margined externally with a narrow black line which extends along the margins of the "tails." The green of the anal angle carries two blue spots distally outlined with black.

#### FEMALE:

There are two distinct types of this sex, both mimetic of other species of *Charaxes*. The first form mimics *Charaxes brutus*, and is black with a white bar crossing both wings. F.-w. black with a green-blue sheen at the base. Cell with a white spot at the apex; followed by four spots in sub-bases of 2-6, those of 2 and 3 sometimes contiguous to the large white spots in these areas, part of the wide white ala bar which traverses the wing from the mid-third of 1a and with gradually reduced width reaches the sub-apical area in 7. This bar in 1a and 1b laterally margined with bluish.

H.-w.: Blue-black, rather greyer at the base, with a white bar margined with blue which is continuous with the bar of the fore-wing and passes from the mid-third of 8 to just above the anal angle. The border of the wing carries a sub-marginal row of white spots, double in 1c, while the margin of areas 5-7 is chestnut. The edge of areas 1c to 3 are white with an extension of this colour down the long tails which are present on veins 2 and 4.

The second form is similarly marked but the light areas are replaced with ochreous-yellow; the bar of the hind-wing margined with greenish. This form mimics *castor* and has been given the name *castoroides*, Poult.

#### UNDERSIDE:

As in the male, but with a greater amount of white and a reduction in the olive-greyish ground colour.

#### EARLY STAGES:

The eggs of this species are large, measuring just over 2 mm. in diameter. They are laid indiscriminately on the upper or under surfaces of the leaves of the castor-oil plant *Ricinus communis* L. (*Euphorbiaceae*), found growing on the outskirts of forests in native cultivations. There are two species of castor-oil grown by the natives, one with a greenish or white stem, the other with a reddish stem. It is on the former that the butterfly lays. Both plants have been identified as the same species by the authorities at Kew, but they appear to be chemically different if not specifically so; and it is worthy of note that the Baganda declare them different species. Leaves of

the red-stemmed plant fed to larvae are refused absolutely, the catapillars preferring to die rather than eat abnormal food. *Etesipe* also lays on the leaves of a fine tree the *Phyllanthus meruensis*, Pax., *Phy. guinensis*, Pax., also belonging to the *Euphorbiaceæ*. As many as 12 to 18 eggs have been counted on one castor-oil leaf. The egg is of the usual form, a sphere with a slight depression on top with radiating rays from the mid-point. When first deposited the egg is white but as development proceeds it becomes yellow then dark brown. The larva emerges in eight days. The young larva hardly ever eats the egg-shell, but commences to devour the margin of the leaf on which the egg was deposited. It is at first pale olive in colour with a black head on which the horns are slightly indicated. By the second day the horns are well pronounced. Growth is rapid and the first moult takes place on the third or fourth day. During the second stage the body is green while the tails are brownish and the tips of the horns black. The mature larva is 60 mm long with a dull bluish-green body covered with fine papillæ with white points. A distinct spiracular line is present from the second to the anal segment; it consists of white stippling in continuous series. This line separates the green of the dorsal surface from the pale greenish-white of the undersurface. The dorsal aspect of the sixth and eighth segments is usually ornamented with a conspicuous grey spot varying in shape but most frequently resembling a three-pointed crescent or less commonly a figure or quadrilateral shape. These spots are outlined with small blue-black dots. The spot on the eighth segment is sometimes absent, or very faintly indicated.

The head is somewhat hexagonal in outline and is surmounted by two central tubercles on either side of which are two pairs of horns. The inner pair, which are long (4 mm.) thick and finely spined, arise from the upper corners, while the outer ones are slender and arise from the outer corners. The general colour is green, with the tips of the horns blue. There is no distinct facial line. When the larva curls just prior to pupating, the colour changes—the dorsal spots disappear and the body becomes translucent. In twelve hours bold lines appear and these persist as ornamentation on the pupa. The larval skin is shed within another twelve hours.

The pupa is one of the most beautiful in the *Charaxes* group. It is a deep green with bold white or yellow marks and lines arranged in a regular pattern (see coloured plate Jrl. 32).

#### DISTRIBUTION :

*Charaxes etesipe* is one of the commoner species throughout its distribution in Uganda, but it becomes somewhat rare in its south-east range which includes the Nandi-Lumbwa areas. Its place is

taken by a very distinct geographical race in the more southern areas of Kenya. (Vide post.)

As with most *Charaxes*, this species is usually represented by a predominance of the male sex. They are strongly addicted to evil smelling baits such as excrement of Carnivores and will come readily to a bait consisting of decaying fish entrailles. It is a forest species which is most in evidence in the region of its food-plant and as has already been noted these plants occur on the outskirts of forests and forest clearings. It is in such localities that one comes upon the females as they hover round the food plants.

#### MIMETIC ASSOCIATIONS:

We have already mentioned that the two forms of females described are mimics of two distinct species. Many other forms are found but all are transitional to the two main types. The males act as models to the *carpenteri* form of female *Etheocles*.

*CHARAXES ETESIPE TAVETENSIS*, Rothsch. Pl. XCVIII., fig. 2.

Expanse: Male 75 mm. Female 80 mm. Sexes unlike.

#### MALE:

Very like *etesipe etesipe*, but with larger and more pronounced sub-marginal blue spots in the fore-wing, all these spots being nearer the margin than in the typical form. Margin with blue internervular spots, double in 1b. Outer margin of wing incised so that the apex is more acute. H.-w. with a more pronounced blue edging in areas 1b to 4, and with the post-discal blue in the form of a wide bar which is whitish at the inner fold and represented in 6 as a separate spot. Area 8 is white in the mid-area and this colour extends slightly into 7. The "tails" on vein 2 are outwardly curved.

#### UNDERSIDE:

Much as in the typical form but ground colour clearer creamy and the markings rather bolder and more defined.

#### FEMALE:

Two distinct forms occur, both similar to the typical ones but having the basal areas decidedly tinged with green.

#### EARLY STAGES:

The eggs of this form are indistinguishable from those of the typical race. They are however deposited on the young trees of *Afzelia cuanzensis*, Welw. (*Leguminosæ*) known to the Swahili as "M'bembakofi." It is of interest that the larvae of this race show

a marked difference to those of the Uganda form. The body colour is similar, but the dorsal spot on the sixth and eighth segments are brick-red surrounded with a grey line outwardly edged with a series of minute black dots. The head shield is different, in that the central horns are longer and more tapering and are black on the front surfaces at the tips while the lateral horns are black along the upper edge. The facial line is yellow.

**DISTRIBUTION:**

This race is confined almost entirely to the forests. It occurs in the Taveta-Teita districts and in the coastal zone.



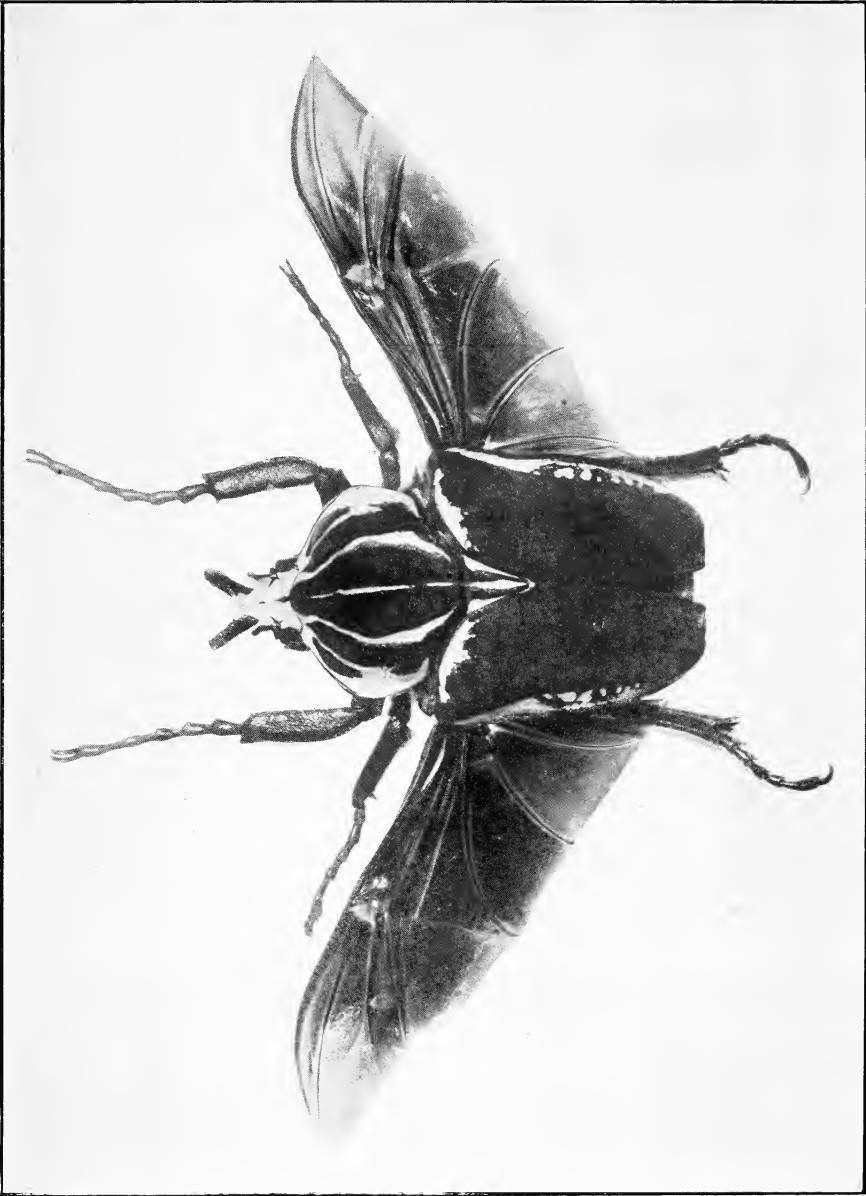


Photo: Dr. van Someren.

*Goliathus giganteus*. ♂ N.S.



NOTES ON EAST AFRICAN *CETONIINÆ* (COLEOPTERA,  
*Scarabæidæ*). Pls. A. and B.

By A. F. J. GEDYE, F.Z.S., F.E.S.

GENERAL INTRODUCTION.

The *Cetoniinæ* form a sub-family of the great family *Scarabæidæ*, which is one of the best defined of the families of beetles, and can be readily recognised by their lamellate or folding antennæ. The "Rose Chafer" of Great Britain is a well-known example. The sub-family is poorly represented in Europe and is specially abundant in the warmer regions of the earth, more particularly in Africa and the Oriental region. About four or five hundred species have been described from the African Continent. When Eastern Africa has been properly worked for the group there is little doubt that this number will be found to exist there.

One of the chief features of the *Cetoniinæ* is, in very many species, the remarkable beauty of their colouration. They are also conspicuous for large horns and projections arising from the head and thorax. Many species are adorned with intricate patterns, these usually taking the form of an arrangement of white or light-coloured spots and bands. They are mostly large or moderately sized insects, oblong-ovate, and slightly convex in shape. Numerous species are metallic, shining, and entirely glabrous and these, where the primary colour appears to be green, show great variation. Green passes into fiery gold, red and purple in one species. Colour is therefore of little specific importance. Very many species are covered with a close, powdery substance which gives them a dull, velvety appearance. Others are densely pubescent and have, on the wing, great resemblance to certain bees which occur in the same locality.

One group contains the well-known Goliath beetles which are the largest coleopterous insects occurring in Africa (Pl. A.). Another, the *Cremastochilina*, contains small, compact, sombre-coloured insects inhabiting the nests of ants and termites. Their appearance is probably due to their mode of life and crepuscular habits, unlike the great majority of the *Cetoniinæ* which are strictly diurnal.

As pointed out by Arrow\*, the sub-family judging by its exuberant colours and by its mode of life may be considered a dominant one, of comparatively late evolution, and enjoying at the present time the maximum of vigour and prosperity.

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\* Faun. Brit. India Col. *Cetoniinæ*, 1910, p. 24.



## STRUCTURE.

The exo-skeleton is very hard, compact, and chitinous. The abdomen consists of six ventral segments and the whole body is capable of great muscularity. The front of the head is well developed and it is from this and not from the pronotum that the large appendages in the male usually arise. The pronotum fits very closely to the base of the elytra and the scutellum is often concealed wholly or in part. The elytra fit closely to the body and are often much reduced at the sides thereby exposing the lateral portions of the back. The species fly freely and instead of the elytra being prominently raised as in most *Coleoptera*, they are only slightly elevated and the wings are slipped out between their lateral edges. This accounts for the general consolidation of the parts of the body. The wings are usually pigmented dark brown or blue-black. The femora are normal, but the tibiæ are usually toothed externally at least in the female. Tarsi five-jointed. Antennæ 10-jointed, of which the club consists of the last three. Eyes large and prominent. The mouth is only adapted for very soft or liquid food, except in the *Cremastochilina* in which the mandibles are strong and adapted for biting.

A very excellent Monograph on the internal anatomy of the common European Cockchafer, *Melolontha vulgaris*, was published in 1828 by Strauss-Duckheim and to this we would refer the interested reader, as there are few points of difference between the internal morphology of the *Melolonthinæ* and the *Cetoniinæ*.

## SEXUAL DIMORPHISM.

The males in genera such as *Dicranorrhina* and its allies bear upon the head a horn or complicated projection, which is absent in the females. A more constant sexual difference is to be found in the structure of the legs. The anterior tibiæ of the female are always toothed externally and are used for digging purposes. In the male the tibiæ are more slender and the teeth are reduced or absent. Colour constitutes a sexual distinction in some genera, the male being brightly coloured while the female is dull and obscure.

The use or function of the various cephalic processes found in the males is very largely a matter of speculation. Certain observations have been recorded where males have been seen in battle with the antlers interlocked. In many genera, however, this would be impossible as the horns are either curved backwards or in such a manner as to render futile their use as weapons. These insects must find such appendages a definite impediment in their normal functions and very probably a negative factor in the struggle for existence. Darwin's views (Descent of Man)



PLATE XCIX.



Photo: Dr. van Someren.

*Charaxes etesipe.*

Female form *castoroides*.

Female form *etesipe*.

in regard to sexual selection are now largely rejected and it is possible that these appendages are only the result of a certain cell stimulus. An analogy may be found among the *Dinosaurs* and other enormous prehistoric reptiles which perished in the past owing to their great specialisation and their corresponding unfitness to compete in the struggle for existence.

Head and thoracic armature show an even more remarkable development in some other groups of *Scarabæidæ*, particularly among the dung-feeding *Coprinæ* and in the *Dynastinæ*. In some genera these structures are not limited to the males but are found in a lesser form among the females. These facts rather strengthen the view that the *Cetoniinæ* are of more recent evolution than the remainder of the *Scarabæidæ*.

#### HABITS AND METAMORPHOSES.

In the Journal of this Society (No. 19, 1924) Dr. van Someren and the Rev. J. Wesley Hunt have given a full and very interesting account of the life history of *Diplognatha silicea*, McL. This is one of the commonest of East African *Cetoniinæ* and the shining black beetle is a familiar pest of roses in Nairobi gardens. Unfortunately this is the only complete life-history of an African species known to me. Various European species have been studied and Fabre has published (*Souvenirs Entomologiques*, Vol. VIII.) detailed and careful accounts of the early stages of *Cetonia*, *Protatia*, and *Oxythyraea*.

In most genera the female appears to burrow into vegetable debris or the accumulations of decaying leaves and there deposit her eggs. The larvæ are inactive, sluggish, and move on their backs. They live concealed, often underground, where they feed upon rotten wood or vegetable refuse. Some species, *Protatia* and most *Cremastochilina* deposit their eggs in ant's or termite's nests. The ensuing larvæ appear to have no special modification of structure and are apparently unmolested by the ants. They lead a secluded life feeding upon the woody material composing the nest.

The larval life is a long one, and after two or three years a cocoon is constructed from the food materials cemented together by an internal secretion of the intestine. Two or three months are passed as a pupa. The cocoon is then broken, the perfect insect emerges, makes its way above ground and commences to feed and live an active existence.

*Cetoniinæ* do not appear to be of much economic importance, pests of cultivated crops being found in the allied sub-families of *Melolonthinæ*, *Rutelinae*, and *Dynastinae*. As stated above *Diplognatha silicea*, and also various species of *Pachnoda* and *Rhabdotis*, as perfect insects, are disagreeable pests of roses. They feed upon the young flowers often destroying them before they have a chance to bloom.

So far there are no records of *Cetoniine* pests of cereals or crops and if these are subsequently discovered it will probably be in the larval and not the perfect stage that they are found to be harmful.

#### DISTRIBUTION.

It is difficult to say very much about the distribution of *Cetoniine* in East Africa until more collecting has been done over a very much wider area. It is only in the *Lepidoptera* that systematic collecting has been done and in no other group of insects can one speak with anything like finality. In the *Cetoniinae* the same general conditions seem to obtain as in other groups of animals. The fauna of the forest areas of the West Coast stretches across the Congo, into Uganda, penetrates Kenya through Kavirondo and the Nandi Forests and comes to an abrupt halt along a hypothetical line drawn east of Kapsabet, roughly corresponding to the natural barrier of the Elgeyo-Mau Escarpment.

The fauna of Tanganyika west of Lake Victoria is also distinctly West African. East of the Mau Escarpment, in the Rift Valley, the fauna changes and remains more or less constant up to but not including the coastal belt. The range of the same insects is bounded in the South by the Usambara Mountains. South of this mountain range the fauna again changes and a strong South African element is introduced.

The East Africa and Uganda Natural History Society will be very glad to receive specimens of *Cetoniinae* from any part of East Africa, as it is only by the examination of large collections from all parts of our area that we can form any adequate idea of the distribution of these interesting insects.\*

#### CLASSIFICATION.

The classification of the *Cetoniinae* has always presented great difficulties owing to the similarity among the species of important morphological characters. The result of this has been the multiplicity of genera, some writers having shown a tendency to erect a new genus for every new species they encountered. Sexual dimorphism and variation in colour have been the major causes of this confusion. Important characters are found in the male genitalia but these are not as useful as in some families of *Coleoptera*.

The following key, adapted from Arrow (loc. cit. p. 23) will serve to distinguish the *Cetoniinae* from the more closely allied sub-families of the *Scarabaeidae*. It may be mentioned, however, that an acquaintance with the general facies of the insects will usually cause them to be readily recognisable.

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\* Specimens should be addressed to the writer, Box 216, Nairobi, and they will be deposited in the collection of the Nairobi Museum.

FAMILY SCARABÆIDÆ.

- Posterior spiracles situated in the dorsal part of the  
chitinous ventral segments.....*PLEUROSTICTI*  
(*Cetoniina*, etc.)
- Posterior spiracles situated in the membrane  
between dorsal and ventral segments.....*LAPAROSTICTI*  
(*Coprina*, etc.)

*PLEUROSTICTI.*

Labrum membranous, not exerted.

Mandibles not visible externally; front coxæ vertical.

Mesosternal epimera dilated above and usually  
reaching the dorsal surface; base of the pronotum  
not meeting ridges upon scutellum and elytra.....*Cetoniina*

Mesosternal epimera not dilated nor reaching the  
dorsal surface: base of the pronotum meeting  
ridges upon scutellum and elytra.

Hind coxæ widely separated.....*Valgina*

Hind coxæ contiguous.....*Trichiina*

Mandibles partly visible externally; front coxæ  
transverse .....*Dynastina*

Labrum chitinous and visible externally.

Posterior spiracles placed in strongly diverging  
lines: claws movable, unequal.....*Rutelina*

Posterior spiracles placed in scarcely diverging  
lines: claws generally fixed and equal.....*Melolonthina*

The *Cetoniina* are divided by Arrow into two sections dis-  
tinguished as follows:—

Mandibles thin and not sharp-pointed nor adapted for  
biting, furnished with a free membranous inner  
lobe .....*Cetoniina*

Mandibles strong and sharp, without a free mem-  
branous inner lobe.....*Cremastochilina*

The *Cetoniina* contain the majority of the sub-family. Sub-  
division of the section is rendered very difficult owing to the great  
similarity of its members in all essential points of structure. In the  
following list the species are grouped under the tribes enumerated by  
Schenkling (*Catalogus Coleopterorum*, pars 72, 1921), but it is impos-  
sible to give a useful key until we have a fuller knowledge of the  
number of species and extent of the group in East Africa.



The *Cremastochilina* form a well-defined group owing to their homogeneous appearance. They are mostly small insects and sombre and obscure in their coloration. The mouth parts are strongly formed and adapted for biting. Most species are known to be termitobious or myrmecophilous. They apparently live in a state of harmony with their hosts but extremely little is known of their habits and any further observations will be of great interest.

The following list in no way pretends to be exhaustive or even representative but it has been thought advisable to collate what little knowledge we possess as a future basis for investigation. All the species enumerated have been examined and determined by the writer in the British Museum and care has been taken to obtain correct nomenclature.

Only those species in the collection of the Nairobi Museum (with the addition of a few in the writer's collection) have been listed. Others are recorded in the collections of the Entomological Divisions at Kampala and Kabete but, as it has been impossible away from Europe to check the synonymy, these have not been included. Thanks are due for the gift and loan of specimens to Mr. H. Hargreaves, Entomologist to Uganda, and Mr. C. B. Williams, of the Amani Research Institute, Tanganyika. As only a few species of the allied sub-families, *Trichinae* and *Valginae*, have been yet discovered within our faunistic limits these have been added to the list.

#### SUB-FAMILY CETONIINÆ.

##### Section 1. CETONIINA.

##### TRIBE 1. GOLIATHINI.

- Genus: 1. *Goliathus giganteus*, Lamarck.  
*Syst. Anim. sans Verteb.*, p. 209 (1801).  
Uganda and Western Kenya as far as Rift Valley.
- Genus: 2. *Stephanorates dohertyi*, Jordan.  
Kenya (Uplands, Rabai Hills).
- Genus: 3. *Brachymitra thomasi*, Kolbe.  
Tanganyika, Kenya.
- Genus: 4. *Bettonia mutabilis*, Waterhouse.  
Kenya (Lumbwa, Rongai).
- Genus: 5. *Chelorrhina polyphemus*, F.  
*Spec. Ins.* 1, p. 14.  
Uganda (Mawakota), N.W. Kenya.
- Genus: 6. *Dicranorrhina micans*, Drury.  
*Ill. Exot. Ins.* II., p. 59.  
Uganda, Kenya (Kaimosi).



PLATE B.

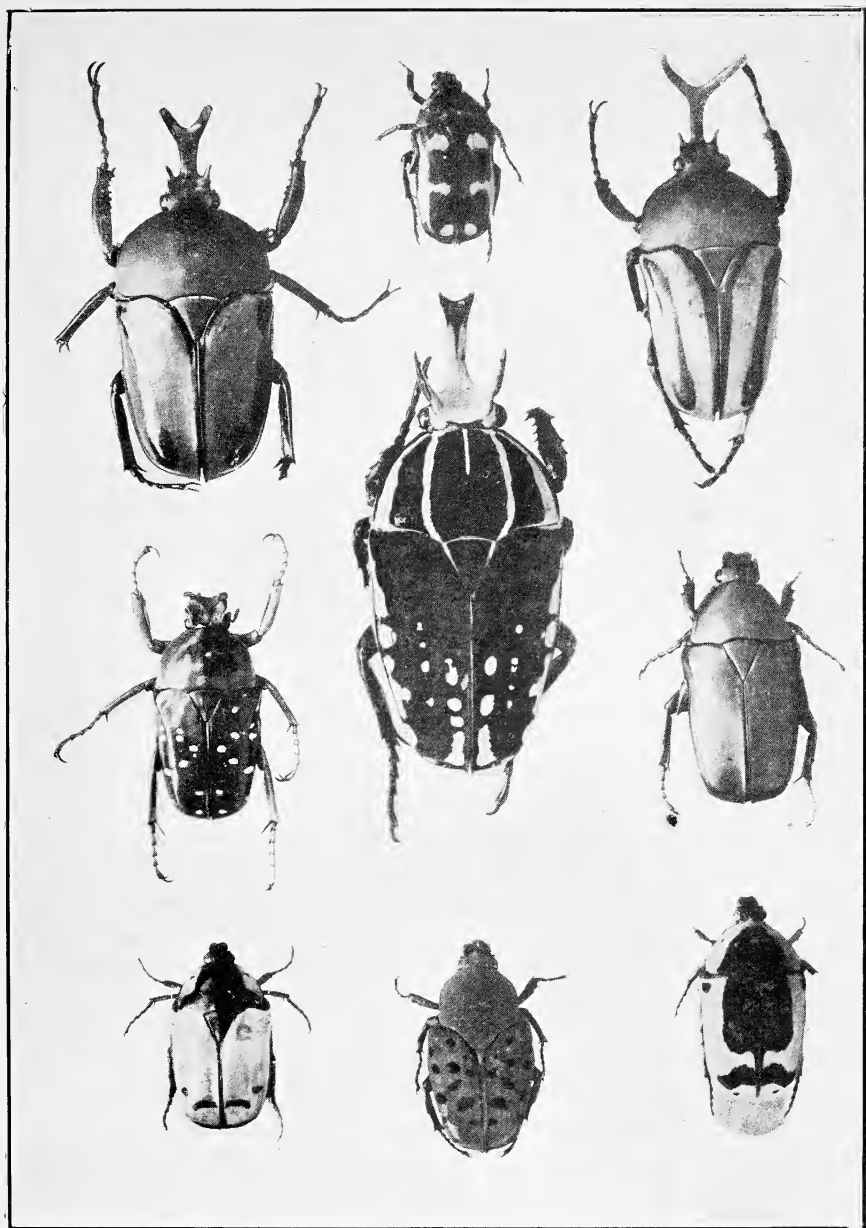


Photo: Dr. van Someren.

*Plaesiorrhina mhondana*, Oberth.

*Eudicella euthalia*, Bates.

*Eudicella gralli*, Bug.

*Stephanorrhina adelpha*, Kolbe.

*Eccoctocnemis barthi*, Har.

*Chelorrhina polyphemus*, F.

*Pachnoda divisa*, Gerst.

*Pachnoda sinuata*, F.

*Conradtia principalis*, Kolbe.



- Genus: 7. *Dicranorrhina oberthuri*, Deyr.  
*Bull. Soc. Ent. Fr.*, 1876, p. 82.  
 Kenya (Rabai), Tanganyika.
- Genus: 8. *Eudicella smithi*, McLeay.  
*Ill. Zool. S. Afr.*, p. 34.  
 Tanganyika.
9. *var. immaculata*, Heath.  
 Kenya (Nairobi, etc.).
10. *Eudicella euthalia*, Bates.  
*Ent. Mo. Mag.*, Vol. 18, p. 156.  
 Tanganyika.
11. *Eudicella gralli*, Buquet.  
*Ann. Soc. Ent. France*, p. 201 (1830).  
 Uganda, Kenya (N.W.).
12. *Eudicella cupreosuturalis*, Bourg.  
 Kenya (Yala R. Kakumega). Gedye Coll.
- Genus: 13. *Neptunides stanleyi*, Janson.  
*Entom. XII.*, p. 40.  
 Uganda, Kenya (Kakumega), Tanganyika (Bukoba).
14. *Neptunides polychrous*, Thomson.  
*Bull. Soc. Ent. Fr.*, p. 106 (1879).  
 Tanganyika.
- Genus: 15. *Ranzania splendens*, Bert.  
*Mem. Ac. Bologn. VI.*, p. 420 (1855).  
 Tanganyika.
- Genus: 16. *Taurhina longiceps*, Kolbe.  
 Uganda, Kenya (N.W.), Tanganyika (Bukoba).
- Genus: 17. *Coelorrhina cornuta*, Heath.  
 Kenya, Tanganyika, generally distributed.
18. *Coelorrhina sclene*, Kolbe.  
 Uganda, Kenya (Kakumega).
19. *Coelorrhina loricata*, Janson.  
*Cist. Ent. II.*, p. 141 (1877).  
 Uganda, Kenya (Kakumega).
- Genus: 20. *Chorodera quinquelineata*, F.  
*Spec. Ins. I.*, p. 56.  
 Uganda (Mawakota).
- Genus: 21. *Stephanorrhina adelpha*, Kolbe.  
*Die Kafer Deut-Ost-Afrikas*, p. 182 (1897).  
 Uganda, Kenya (Kakumega), Tanganyika (Bukoba).
22. *Stephanorrhina guttata*, Olivier.  
 Uganda.

23. *Genyodonta flavomaculata*, F.  
*Ent. Syst. Suppl.*, p. 129.  
 Kenya (Mombasa).
- Genus: 24. *Plæsiorrhina recurva*, F.  
*Syst. El. II.*, p. 138.  
 Uganda, Kenya (N.W.).
25. *Plæsiorrhina cinctula*, var. *ugandensis*, Heath.  
 Uganda, Kenya (N.W.).
- Genus: 26. *Plæsiorrhina cinctuta*, Voet.  
 Tanganyika (Bukoba), Uganda. Gedye Coll.
27. *Plæsiorrhina mhondana*, Oberth.  
*Bull. Soc. Ent. Fr.*, 1880, p. 119.  
 Kenya (Rabai), Tanganyika.
28. var. *flavipennis*, Kolbe.  
*Sitz. Gesell. nat. Fr. Berlin*, 1892, s. 64.  
 Tanganyika.
- Genus: 29. *Pedinorrhina subænea*, Harold.  
*Mitth. Ent. Ver. Munchen II.*, s. 103 (1878).  
 Uganda (Entebbe).
- Genus: 30. *Dyspilophora trivattata*, Schaum.  
*Anal. Entom.*, p. 41.  
 Kenya (Rabai), Tanganyika.
- Genus: 31. *Smaragdesthes africana*, Drury.  
*Ill. Exot. Ins. II.*, p. 54.  
 Kenya, Uganda, Tanganyika, generally distributed.
- Genus: 32. *Ptychodesthes gratiosa*, Ancy.  
*Le Naturaliste*, III., p. 509.  
 Kenya (Teita), Tanganyika.
33. *Ptychodesthes schenklingi*, Moser.  
 Kenya (Kakumega). Gedye Coll.
- Genus: 34. *Taniosthes specularis*, Gerstæcker.  
*Arch. f. Naturgesch* 33, Jahrg. I., s. 33.  
 Kenya (Makindu), Zanzibar.
- Genus: 35. *Dymusia nitidula*, F.  
*Ent. Syst. I.*, p. 146.  
 Uganda (Wanga).
- Genus: 36. *Gnathocera trivattata*, Swed.  
*Vet. Akad. Mya. Handl. III.*, p. 190 (1787).  
 Uganda, Kenya (Kakumega).
37. *Gnathocera afjelli*, Swed.  
*Syn. Ins. I.*, p. 50.  
 Uganda, Kenya (Kakumega).

38. *Gnathocera legrosi*, Janson.  
Uganda, Kenya, Tanganyika, generally distributed.
39. *Gnathocera trivialis*, Gerstaecker.  
*Mitth. Natur. Ver. Greifswald*, s. 25 (1882).  
Uganda (Maragoli).
- Genus: 40. *Tmesorrhina pectoralis*, Moser.  
Uganda, Kenya, generally distributed.
- Genus: 41. *Eccoptycnemis barthi*, Harold.  
*Mitt. Münh. Ent. Ver. II.*, p. 102 (1878).  
Uganda, Kenya (Kakumega).
- Genus: 42. *Eccoptycnemis relucens*, Bates.  
*E.M.M. XVIII.*, p. 157 (1881).  
Kenya (Rabai, Nairobi).
- Genus: 43. *Hypsclogenia corrosa*, Bates.  
*E.M.M. XVIII.*, p. 156 (1881).  
Tanganyika.
- Genus: 44. *Hæmatonotus hauseri*, Kraatz.  
*Deutsch. Ent. Zeit.*, s. 371 (1896).  
Kenya (Machakos).

#### TRIBE 2. GYMNETINI.

- Genus: 45. *Stethodesma strachani*, Bainb.  
*Proc. Ent. Soc. Lond.*, p. 6 (1840).  
Uganda, Kenya (Kakumega).
46. *Stethodesma servillei*, White.  
*Proc. Zool. Soc. XXIV.*, p. 15 (1856).  
Tanganyika (Moshi), Zanzibar.

#### TRIBE 3. CETONIINI.

- Genus: 47. *Pachnoda sinuata*, F.  
*Syst. Ent. App.*, p. 819.  
Kenya, generally distributed.
48. *var. flaviventris*, G. & P.  
*Mon.*, p. 182.  
Uganda, Kenya (N.W. only).
49. *Pachnoda marginata*, Drury.  
Uganda.
50. *Pachnoda petersi*, Harold.  
Kenya (Nairobi, Naivasha).
51. *Pachnoda rufa*, De Geer.  
*Mem. Ins. VII.*, p. 640.  
Kenya (Kabete).

52. *Pachnoda divisa*, Gerstaecker.  
*Jahrb. wis. Anstalten*, I., s. 47 (1884).  
 Kenya (Naivasha), Tanganyika.
53. *Pachnoda inscripta*, G. & P.  
 Kenya (Kaimosi).
54. *Pachnoda postica*, G. & P.  
*Mon.*, p. 181.  
 Uganda, Kenya (Kakumega).
55. *Pachnoda marginella*, F.  
*Syst. Ent.*, p. 46.  
 Uganda, Kenya.
56. *Pachnoda cordata*, Drury.  
*Ill. Exot. Ins.* II., p. 59 (1775).  
 Uganda, Kenya (Nairobi).
57. *Pachnoda viridana*, Blanch.  
*Cat. Coll. Ent.* p. 2 (1850).  
 Uganda, Kenya (Kericho), Tanganyika (Bukoba).
58. *Pachnoda rubrocincta*, Hope.  
*Trans. Ent. Soc. Lond.* V., p. 33 (1847).  
 Tanganyika (Bukoba). Gedye coll.
- Genus: 59. *Rhabdotis aulica*, Olivier.  
*Entom.* i., 6, p. 15.  
 Kenya, Tanganyika.
60. *Rhabdotis sobrina*, G. & P.  
 Uganda and Kenya, generally distributed.
- Genus: 61. *Elaphinis adspersula*, Gerstaecker.  
*Jahrb. wis. Anstalten Hamb.* I., s. 461 (1884).  
 Kenya and Tanganyika, generally distributed.
- Genus: 62. *Phonotania balteata*, De Geer.  
*Mem. Ins.* VII., p. 642.  
 Uganda and Kenya, generally distributed.
63. *Phonotania sanguinoleata*, Oliv.  
*Ent.* 1, 6, p. 49.  
 Uganda (Jinja).
64. *Phonotania scalaris*, G. & P.  
*Mon.* p. 249.  
 Uganda.
- Genus: 65. *Tephræa sternalis*, Moser.  
 Uganda, Kenya (Kakumega, Kaimosi).
- Genus: 66. *Polystalactica punctulata*, Olivier.  
 Kenya (Rabai, Kisumu), generally distributed.



- Genus: 67. *Homothyrea helencæ*, Schaum.  
*Trans. Ent. Soc. Lond.* V., p. 71 (1848).  
 Kenya (Kibwezi).
- Genus: 68. *Stichothyrea picticollis*, Kraatz.  
*Deutsch. Ent. Zeit.*, s. 74 (1882).  
 Uganda, Kenya (Kericho).
69. *Stichothyrea densata*, Kolbe.  
 Kenya (Kakumega), Uganda (Kigezi).
- Genus: 70. *Mausoleopsis amabilis*, Schaum.  
*Ann. Soc. Ent. France.*, p. 408 (1844).  
 Kenya (Rabai, Nairobi, etc.).
- Genus: 71. *Leucocelis plebejus*, Kolbe.  
*Stett. Ent. Zeit.*, p. 290 (1895).  
 Uganda, Kenya (Kakumega).
72. *Leucocelis elegans*, Kolbe.  
*Stett. Ent. Zeit.*, s. 291 (1895).  
 Kenya, generally distributed.
73. *Leucocelis hæmorrhoidalis*, F.  
*Syst. Ent. App.*, p. 819.  
 Uganda and Kenya, generally distributed.

#### TRIBE 4. DIPLOGNATHINI.

- Genus: 74. *Diplognatha silicea*, McLeay.  
*Ill. Zool. Afr.* II., p. 22.  
 Kenya, Uganda, Tanganyika, and Zanzibar, generally  
 distributed.
75. *Diplognatha montana*, Kolbe.  
*Sitz. Ges. naturf. Fr. Berlin*, 68 (1892).  
 Kenya, Uganda, Tanganyika, generally distributed.
76. *Diplognatha viridichalcea*, Kolbe.  
*Die Kafer Deut-Ost-Afr.*, p. 192 (1897).  
 Uganda, Tanganyika (Bukoba).
77. *Diplognatha gagates*, F.  
*Syst., Ent.*, p. 49.  
 Uganda, Tanganyika.
78. *Diplognatha striata*, Janson.  
*Cist. Ent.* II., p. 263.  
 Kenya (Rabai), Tanganyika, Zanzibar.
- Genus: 79. *Conradtia principalis*, Kolbe.  
*Sitz. Gesell., naturf. Fre. Berlin*, s. 69 (1892).  
 Tanganyika.

- Genus: 80. *Charadronota acutangula*, Arrow.  
*Ann. Mag. Nat. Hist.*, p. 529, IX. (1922).  
 Kenya (Maragoli), Uganda.
81. *Charadronota quadrisignata*, G. & P.  
 Uganda (Entebbe).
- Genus: 82. *Poecilophila maculatissima*, Boh.  
*Oefers. Vet. Ak. Handl.*, s. 120 (1860).  
 Kenya (Rabai), Tanganyika, Zanzibar.
83. *Poecilophila tessellata*, Moser.  
 Kenya (Machakos).
- Genus: 84. *Porphyronota cinnamomea*, Afzel.  
*Schönherr's Synom. Ins. I.*, 3, App., p. 48.  
 Uganda.
- Genus: 85. *Eriulis variolosa*, G. & P.  
 Uganda (Namasagali). Gedye Coll.
- Genus: 86. *Niphetophora carncola*, Burmeister.  
*Hand. d. Entom. V.*, p. 559 (1847).  
 Uganda, Kenya (Kaimosi).
- Genus: 87. *Pseudoprotatia pilicollis*, Kraatz.  
 Kenya (Makindu).
- Genus: 88. *Pseudinca robusta*, Janson.  
 Uganda, Kenya.
89. *Pseudinca vitticollis*, Bourg.  
 Uganda.
90. *Pseudinca fischeri*, Kolbe.  
*Stett, Ent. Zeit.* s. 281 (1895).  
 Uganda (Entebbe).
91. *Pseudinca admixta*, Hope.  
 Uganda (Entebbe).

## Section 2. CREMASTOCHILINA.

- Genus: 92. *Cymophorus rubronotatus*, Pering.  
*Trans. S. Afr. Phil. Soc.* III., p. 99 (1885).  
 Kenya (Wanga, Kaimosi).
- Genus: 93. *Cymophorus undatus*, Kirby.  
*Zool. Jrn. III.*, p. 271.  
 Kenya, Uganda, Tanganyika, and Zanzibar, generally  
 distributed.
- Genus: 94. *Coenochilus glabratus*, Boh.  
*Ins. Caffr. II.*, p. 50 (1857).  
 Kenya (Nairobi, Wanga).

- Genus: 95. *Plagiochilus angustatus*, Westwood.  
Uganda, Kenya (Kavirondo).
96. *Macroma cognata*, Schaum.  
*Germ. Zeit.* iii., 1841, p. 278.  
Uganda (Jinja, Entebbe).

SUB-FAMILY TRICHIINÆ.

TRIBE 1. OSMODERMINI.

- Genus: 1. *Incala calabarina*, Westwood.  
Kenya (Maragoli).
2. *Incala lincola*, Westw.  
*Arcana Ent.* I., p. 187.  
Uganda.

TRIBE 2. TRICHIINI.

- Genus: 3. *Polyplastus ovatus*, Waterhouse.  
Kenya (Rabai, Nairobi).
4. *Polyplastus bicolor*, Kolbe.  
Uganda (Kampala).
5. *Trichius sobrinus*, Arr.  
*Am. Mag. Nat. Hist.*, Vol. 9, p. 529, 1922.  
Uganda (Mabira).

SUB-FAMILY VALGINÆ.

- Genus: 1. *Comythovalgus fasciculatus*, Gyll.  
*Sch. Syn. Ins.* I., 3, p. 43  
Kenya (Nairobi).
2. *Comythovalgus sansibaricus*, Kolbe.  
*Entom. Nachr.*, s. 10 (1896).  
Kenya (Rabai), Zanzibar.
- Genus: 3. *Ischnovalgus albosquamosus*, Fairm.  
*Ann. Soc. Ent. France*, p. 133 (1887).  
Kenya (Nairobi), Tanganyika.

## FOOTLESS HYAENA.

TO THE EDITOR, *E.A. & Uganda Natural History Society Journal.*

Dear Sir,—

I am taking the liberty of submitting the enclosed photograph of a Hyaena, which was shot in the Naivasha district last September, as it exhibits certain points of interest. About the end of July, 1927, I had a calf mauled; it showed teeth marks only, and no claw marks. This appeared rather strange and rather a mystery until in September the original of the photograph put in an appearance and was "bagged." The animal was a well-nourished full-grown beast and exhibited the most extraordinary mutilation of the feet.

Practically the whole of the pads and all the toes were entirely missing and the right hind-foot was absent exposing the leg bone for some inches. The bone had become smooth with wear. How had the beast become mutilated? The only thing I can suggest is that the damage was done by fire. About the first week of June a Kuke hut was burnt and nearby a lot of papyrus was set afire too. The papyrus went on smouldering at the roots for ages, and the chances are that the hyaena passing that way scented some toothsome morsel amongst the ashes. In he went and got his toes burnt; he must then have got panicky and the further he floundered about the smouldering stuff, the more his extremities suffered, until they got properly burnt. Nature did the rest.

Can any of your readers put forward an alternative suggestion as to cause?

Yours truly,

B.

PLATE C.



Mutilated Hyaena.





## A PARROT TRAGEDY.

TO THE EDITOR, *E.A. & Uganda Natural History Society Journal.*

Dear Sir,—

The following incidents may be of interest to members who study the bird life of the districts they live in.

A new forest station has lately been built at the Rongai River on the north slope of Kilimanjaro. The spot is at an altitude of 7,000 feet and close against high cedar forest.

The Forester, Mr. A. T. Reid, in occupation at Engare Rongai, is a keen naturalist and was particularly anxious to catch alive some specimens of the green forest parrot, of which there are large numbers all over this part of the mountain. His first success in securing a live bird was when he dropped an adult parrot at long range by a luck shot with No. 5. The bird was stunned but otherwise showed no signs of injury. In a fortnight this full-grown parrot had become perfectly tame and used to walk about at large. It became too tame in fact and allowed itself to be killed by a puppy.

Shortly after this Mr. Reid found a nest in a large cedar behind the house and used constantly to observe the movements of the parent birds. A Chagga boy used to ascend the tree, in itself no mean feat as the hole was at least 120 feet from the ground, and lower the three young parrots in a bag for inspection the while the parent birds sat in the crown of the tree and uttered loud shrieks of protest. They never deserted the young ones however in spite of the latter having many times been lowered in full view of them.

Eventually the three young parrots were nearly fledged and Mr. Reid took them to the house and kept them in a box. He wrote as follows: "I got all three young ones safely from the nest and had them about a week. They were feeding nicely from a spoon. I put them outside in the sun. The parent birds came one day and fed them and before night time one died. Another died next day. I then set a trap with two cages and caught the parents alive, but the remaining young one died that afternoon and the parents next day. I think they poisoned the young ones when they saw they could not get them away and swallowed some of the poison themselves in their rage at being caught. The food they fed the young on was very tiny white seeds. I found the seeds on the bottom of the cage, but do not know what they are. I lost a nest-full of Goldfinches many years ago in the same manner by their parents feeding them and was told by an Italian bird fancier that the parents poisoned the young if they could not set them free."

Now I would like to hear some expression of opinion from ornithologists as to the probability of this poisoning being intentional. It is a pity the seeds were not kept and analysed.

Yours faithfully,

D. K. S. G.



## REPORT, 1926-1927.

The period under review covers the years 1926 and 1927. Owing to a series of circumstances it was found impossible to call an Annual General Meeting in 1927. During the latter part of 1926 the Hon. Secretary was on leave and the duties of the office were carried on by Mr. A. F. J. Gedye, as were also those of the Hon. Treasurer when this officer proceeded to England in 1927. The Committee wish to place on record their appreciation of these services.

### PROPAGANDA.

During the early part of 1926, the Society obtained from the Zanzibar Government the loan of the educational films on Malaria and Hookworm. These films were exhibited to the public for three successive nights and on one afternoon, this last being a free exhibition to natives. An officer of the Medical Department, and Canon Burns explained the film to the natives. The exhibition of these films was conducted at a loss, but the deficit was kindly made good by Mr. R. F. Mayer, to whom the thanks of the Society are due.

During 1926 lectures on Natural History subjects, illustrated with lantern slides, were given to the pupils of Kenton College, with the idea of stimulating interest in Natural History, and in 1927 sections of the Martin Johnson Game Film were shown. On all occasions the pupils showed a keen appreciation of the subjects dealt with.

### PUBLICATIONS.

Four Journals were issued in 1926 and two in 1927, the remaining two parts for 1927 will appear early this year.\* The series of papers dealing with the Birds and Butterflies of Kenya and Uganda have now reached part VI. Owing to the large number of half-tone plates in each number, the cost of the Journal has been very high, and in the hope of being able to continue these illustrations, the Committee invite the attention of members to the special illustration fund, the contributions to which are strictly used to reducing the charges under this head, from general revenue.

### LECTURES.

Three public lectures were arranged during the period reviewed. All were well attended and appreciated.

### ACCESSIONS.

Several collections of insects have been studied and named by the authorities attached to the Imperial Bureau of Entomology, by Prof. Poulton of Oxford and Dr. Jordan of Tring. This material is

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\* Journal 31 and 32 appeared in June, 1928.

being incorporated in the study collections and will be available shortly. Large and important additions have been made to the loan collections of *Coleoptera*, while equally valuable and representative series of *Lepidoptera* have also been added; these last include almost all the recorded species of *Lycanida*, *Hesperida*, *Charaxes*, and *Acraea* of Kenya and Uganda.

Four groups of game-birds have been mounted and placed on exhibition, and amongst Mammals received and mounted, special mention should be made of a pair of Giant Hogs, the boar presented by R. E. Dent, Esq., and the sow by Mervyn Jones, Esq. In addition various species of smaller buck, presented by Mr. Dent, are mounted and ready for exhibition.

Numerous smaller donations have been received from time to time, from members and the public and the Committee take this opportunity of thanking these donors for their gifts.

Towards the latter part of 1927 the Society received from L. Graham, Esq., through Mr. Dent, a fine and representative collection of lake fish taken during the recent "fish survey" of Lake Victoria. These specimens are now in store and will be placed in the study collections as soon as suitable jars have been obtained.

As hitherto, the duties of curator have been shared by Mr. A. F. J. Gedye and the Hon. Secretary.

#### LIBRARY.

During 1926 and 1927 several important and valuable exchanges of Journals and publications were arranged with Scientific Societies in America and elsewhere. Through the kindness of Professor Poulton and the Committee of the Entomological Society, a very large number of coloured and half-tone plates of East African insects have been secured to illustrate forthcoming Journals. These plates will add greatly to the interest and value of our publications.

#### FINANCIAL.

A financial statement has been prepared by the Hon. Treasurer and is presented herewith. It shows that the expenditure is equal to the income, allowing of no money being put to reserve. Our main item of expenditure from general revenue is in respect of the cost of Journals; any increase in the provision of show cases is met from the special Government Grant the use of which is governed by certain restrictions.

The special illustration fund has received little support from members and as has already been indicated under the heading "publications," subscriptions are urgently needed.

The Committee take this opportunity of placing on record their appreciation of the gift of £200 donated by Admiral Lynes, during his recent visit to the country. The sum is for a special purpose to be decided on by the Committee and not placed to general revenue.

#### MEMBERSHIP.

The number of members has remained steady, and stands at just under 250. It is hoped that under the new organisation there will be a considerable increase.

#### GENERAL.

The general progress of the Museum has been greatly hampered by the uncertainty of tenure of the present museum site resulting from certain town planning proposals; and by the unfortunate policy adopted in regard to the Coryndon Memorial.

The relationship which the Society is to bear to the Coryndon Memorial has yet to be clearly defined. The matter is receiving the close attention of the Committee and the interests of the Society are being safe-guarded in every way possible.\*

The want of study and laboratory accommodation is acute and the securing of these facilities will form the basis of negotiations with the Coryndon Trustees in the event of the Society transferring its entire activities to the Coryndon Memorial.

During the last two years, a member of the Society, Mr. L. S. B. Leakey, has been carrying out important and valuable research work in connection with prehistoric man in Kenya. His discoveries are of extreme anthropological and ethnological importance. It is to be regretted that the work could not be undertaken by a properly constituted "team" so that the geological side of the investigation could have been carried out simultaneously.

Of equal interest is the work being done by the Swedish Geological Survey. The finding of a complete fossilised buffalo in the Morandat area is of great zoological interest.

The rich deposits of fossils on the Gordan estate at Koru are being investigated by Dr. Parkinson on behalf of the British Museum.

It is regrettable that all the material collected by these investigators should be taken out of Kenya with little chance of any being returned to our local Institution. We would suggest to Government that such work should be encouraged by the giving of grants *through the Society* so that some of the material collected or exact replicas, could be secured for the Museum.

---

\* The Coryndon Memorial is now under construction on the plot known as Ainsworth Hill. The Society has obtained a 99 year lease of the buildings.—Editor.

RECEIPTS.

By Balance at Bank 31/12/26 ...	460 89	To Upkeep and Expenses ...	388 65
Cash in hand ...	83	Wages to Boy ...	312 00
Subscriptions and Entrance Fees ...	5,827 17	Rent ...	70 00
Donation by Admiral Lynes ...	3,954 80	Cost of Journals ...	4,063 50
Sale of Journals ...	588 15	Postages ...	166 85
Visitors to Museum ...	350 00	Light ...	28 00
Government Grant ...	6,000 00	Exchange, cheques ...	3 55
		Hire of Chairs ...	100 00
		Insurance ...	141 00
		Government Grant ...	6,000 00
		*Balance, Bank 21/12/27 ...	5,881 46
		Cash in hand ...	26 83

Shs. 17,181 84

Shs. 17,181 84

\* This balance includes special donation from Admiral Lynes, the remainder being sum outstanding against cost of Journal No. 30, July, 1927.

A. F. J. GEDDYE,

*Acting Hon. Treasurer.*



506.67

The Journal  
OF THE  
EAST AFRICA AND UGANDA  
NATURAL HISTORY SOCIETY



January and June, 1929.

No. 35.

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Dr. V. G. L. van Someren.

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# East Africa and Uganda Natural History Society.

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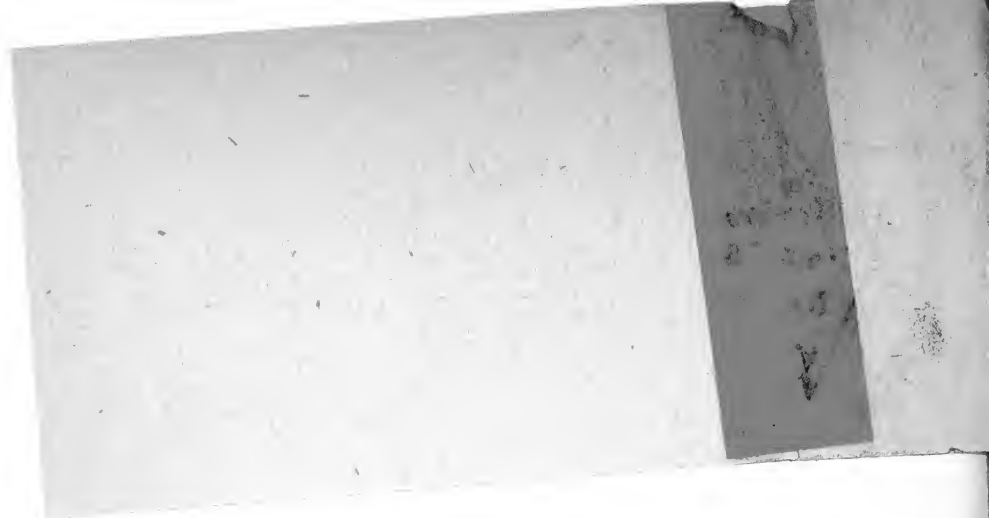


Frederick J. Jackson.

## **NOTICE.**

**The pagination of Journal No. 35 should be from page 75-146, and not as numbered.**

**Journal No. 37 completes Vol. 9 of this series.**



pp should be 13-175

# The Journal

OF THE

## EAST AFRICA AND UGANDA

## NATURAL HISTORY SOCIETY

January and June, 1929.

No. 35.

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## FREDERICK JOHN JACKSON.

*(Founder and First President of the E.A. and U. Natural History Society.)*

It is with deep sorrow that we have to record the death on 3rd February, 1929, at Beaulieu-sur-Mer, on the French Riviera, of our Vice-President\*, Sir Frederick Jackson. Since his retirement in 1917 his health had been far from robust, and he had to spend most of his life in the south of France, only visiting England for a few months in the summer.

A great sportsman, naturalist, and administrator, his name will always be remembered in British East Africa and Uganda, where he served so long and where he took so prominent a share in the historical development of what are now the familiar Kenya Colony and Uganda Protectorate.

Jackson was a Yorkshireman and was born at Oran Hall in that county in 1860, his father being the late John Jackson, of Oran. He was sent to Shrewsbury School and afterwards to Jesus College, Cambridge, where in 1880 he rowed number 5 in the College boat, which finished head of the river both in the Lent and May races. In December of the same year he gained his C.U.B.C. trial cap, rowing number 2 in the losing trial boat, and in 1881 also rowed for his College, which was again head of the river. He first went to Africa on a shooting trip in 1884, when he joined Mr. J. G. Haggard, H.B.M. Consul at Lamu. He explored the coast-lands of what is now Kenya Colony, the Tana River, and the slopes of Kilimanjaro, collecting birds and butterflies in the intervals of shooting big game. In 1885 the Anglo-German Treaty was signed delimiting the British and German spheres of influence, and Jackson soon afterwards joined the service of the Imperial British East Africa Company, which had been founded by Sir William Mackinnon, to take over and administer the British sphere.

In 1889 Jackson was appointed the leader of an expedition organised by the Company to open up the regions then hardly known between Mombasa and Lake Victoria, and to try to obtain news of Emin Pasha and of Stanley's relief expedition. Leaving Mombasa in the summer of that year he reached Kavirondo, when he received a letter from King Mwanga of Uganda. There, owing to the religious-political troubles between the rival Christian factions, matters were in great confusion. While waiting for further news from Mwanga,

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Jackson went north and explored Mt. Elgon and the country beyond. On his return to Kavirondo he found that the notorious Carl Peters had passed him and hoisted the German flag at Mumias and Mengo. This he pulled down, and then proceeded to Uganda himself and found that the Baganda were in two minds whether to accept the administration of the Company or not. Shortly afterwards Jackson returned to the coast, and about the same time the question of annexation was settled in Europe and the "Heligoland" Treaty of 1900 was signed which gave Uganda to Great Britain.

When the British Government took over the administration of British East Africa and Uganda in 1894 Jackson became an official, and he remained in the Colonial Service until his retirement in 1917, having served as Lieutenant-Governor of the East African Protectorate from 1907-1911 and finally Governor of Uganda from 1911-1917. For his services during the mutiny of the Sudanese troops in Uganda in 1898 he was awarded a C.B., together with the Uganda Mutiny medal and two clasps. Later on, for his administrative services he was created C.M.G. in 1902 and K.C.M.G. in 1913.

Jackson joined the Union\* in 1888, and in *The Ibis* of the same year appeared a paper, prepared with the help of Captain Shelley, on the birds obtained on his earliest visit to East Africa in 1884-1886. During the Uganda Expedition of 1888-1891 he again collected assiduously and his very large collection was worked out by Dr. R. B. Sharpe and published with Jackson's own field-notes in a long paper which appeared in five parts in *The Ibis* during 1891-1892. Numbers of new species were described and figured in these and other papers, in *The Ibis* and in the Bulletin of the B.O.C. during the period between 1890 and 1917. Perhaps the most important of these was one which appeared in *The Ibis* for 1899-1902 in three parts on the birds obtained by him in British East Africa and the Equatorial Region from 1892 to 1898, and also one in *The Ibis* for 1906 on a collection of birds made by his nephew, Mr. (now Sir Geoffrey) Archer, during a journey to the Ruwenzori Range; this expedition was made in 1902, and was the first one to collect any of the Ruwenzorian birds.

On the foundation of the East Africa and Uganda Natural History Society in 1910 Jackson was elected President, and contributed a paper on the game-birds of East Africa which ran through several numbers of the Journal. Jackson also wrote nine out of the nineteen chapters of the first volume of "Big-Game Shooting," published in the Badminton Library series under the editorship of Clive Phillips-Wolley in 1897, dealing with shooting and Big Game in East Africa. He also contributed a number of articles on the

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\* British Ornithologists' Union.

larger game-animals of Kenya and Uganda to Rowland Ward's "Great and Small Game in Africa," edited by H. A. Bryden and published in 1899. During his time of service in Africa, and more particularly since his retirement, he also prepared a complete history of the Birds of East Africa and Uganda. This unfortunately has never yet been published, and remains in typescript. He had hoped to put the finishing touches to what he regarded as his life-work before leaving Beaulieu this year. It would be deplorable if such a vast store of observation and knowledge should be lost, and it is hoped that means may be found to publish this work at some future date†. In 1929 he was able to arrange for the publication of the portion dealing with the game-birds, including the Sand-Grouse, Pigeons, Snipe, Bustards, and Ducks.

All Jackson's spare time in Africa was devoted to collecting and making observations on the habits of Mammals, Birds, and Butterflies, and his collection of bird-skins contained over 12,000 specimens, representing 774 species. At the same time, he was most generous to the Natural History Museum, South Kensington, to which he presented all the types of his new species, at least one hundred in number, as well as examples of many rare forms not represented in the Museum collection. His own valuable collection is unfortunately now being dispersed, but the Natural History Museum has, through the generosity of Mr. Spedan Lewis, secured the series of Owls, Nightjars, and Turacos.

Sir Frederick Jackson married in 1904 Aline, daughter of Mr. William Wallace Cooper, of Dublin. She accompanied her husband to Africa and remained there with him until he retired, sharing his life to the full. Of late years he was in a very delicate state of health, chiefly owing to the fact that during the suppression of the Sudanese Mutiny he was badly wounded by a bullet which entered his lung. A man of extreme modesty and great unselfishness, Jackson was much beloved by all those with whom he came in contact, both in Africa and at home. He was an excellent observer and a most sympathetic administrator and ruler, and a very firm friend to the native races as well as the white settlers in Kenya Colony and Uganda. Although by no means an enthusiast for the white colonization in East Africa, and viewing with distress the ever increasing immigration of white settlers into his favourite hunting-grounds, nevertheless he realized that progress in this direction was inevitable. It speaks volumes for his character and personality that in a country where strong views and partisanship prevail, his well-known sentiments never lost for him the highest esteem and friendship of the British community.

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† Arrangements have now been completed for the publication of the entire work.

## TO THE FOUNDER OF OUR SOCIETY.

SIR FREDERICK JOHN JACKSON, K.C.M.G., C.B. BORN 1860, DIED 1929.

### *A personal tribute.*

If only for the reasons expressed above it is fitting that a tribute should be made in the Journal to this well-beloved comrade on the occasion of his much-regretted death and I have been asked to attempt this sad task.

In the early part of 1909 an informal but memorable meeting took place at which was afterwards known as the Treasury bungalow where Mr. Jackson, at that time Lieutenant-Governor of British East Africa, lived. It was quite a small gathering and it is not easy to be precise as to those present, but apart from our host I seem to remember Blayney Percival, the late R. J. Cuninghame, Battiscombe and the late John Sergeant, but there may have been a few more. Our object was the foundation of a Natural History Society and so the E.A. and U.N.H.S. was born. From that small beginning it has steadily grown and our founder maintained to the end the greatest interest in its progress.

Of his work as an administrator this is not the place to speak, and I desire to here refer to his gifts as a field naturalist, for in this rôle he had few peers, the study of wild life great and small was his absorbing passion.

His career in Africa started as long ago as 1887 when he made his first shooting trip to the Kilimanjaro region; and East Africa then obtained a grip which was never relaxed. Many of his experiences with the bigger game were embodied in a section of the Badminton Library published in 1894 and well worth reference to-day for its vivid picture of the old hunting grounds.

As years went on and as official duties circumscribed his wanderings, the study of birds became the one pursuit of his leisure and it is his contributions to ornithological science which will carry his name down to posterity. Although not normally a very systematic person, his devotion to accuracy in regard to the habits of birds forced him to make meticulous notes on this subject and the careful records by such an acute and conscientious observer cannot fail to be of the greatest scientific value.

The dream of his declining years was to make accessible to ornithologists the observations of a lifetime and in 1926 he published a monograph on the Game Birds of East Africa which work must be of great value to all field naturalists in Kenya and Uganda. The MSS. of his work on the other birds was well nigh completed before he died, and awaits publication.

It is a poignant and difficult task to write about a dear friend whom one has known for nearly forty years and who by his unselfishness and by his simple, generous and upright character endeared himself to all with whom he came into intimate contact. His impatience with all who did not come up to his ideals of conduct, his absence of side, his loyalty to his old colleagues, all went to constitute a character of unparalleled personal charm. Bwana Jackson's death leaves an irreparable gap.

C. W. HOBLEY.

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### JACKSON MEMORIAL FUND.

By the death of Sir Frederick Jackson, East Africa has lost one of the early pioneers to whose enterprise and work East Africa was secured to the British Crown.

Jackson first came to what is now Kenya in the year 1884. From early boyhood he exhibited a keen sense of observation, and all branches of Natural History made a strong appeal to him.

Though his first two visits to East Africa were ostensibly to indulge his passion for "big game" hunting, yet the mass of material of general zoological interest which he collected and brought home, bears ample testimony that the collecting of "lesser game" had occupied a very considerable proportion of his time.

Jackson's first visit was in the early days of the East African Company, and as a result of his knowledge of the country he was later offered, and accepted, the appointment of British representative during that historical race between British and German interest to secure Uganda. Jackson's conflict with, and success over, Karl Peters is an historical achievement which reads like a romance; we, however, cannot do more than mention the fact in passing.

Jackson held several appointments under the East Africa Company, and subsequently under the British Government when East Africa and Uganda were declared Protectorates under the British Crown. He was Deputy Commissioner, East Africa Protectorate, from 1902 to 1907; Lieutenant-Governor from 1907 to 1911; and Governor of Uganda from 1911 to 1917.

Jackson's interest in Natural History never flagged throughout the arduous task of administrative duties. His collections, now deposited in the British Museum of Natural History, bear ample testimony to his outstanding ability as a naturalist and field-worker; indeed, these same collections form the bulk of the East African material in the National Collection.



Jackson was not content to play a lone hand in exploring the almost virgin field which East Africa presented. Wherever he went he awakened an interest in Natural History amongst those with whom he came in contact. This interest culminated in the formation of the East Africa and Uganda Natural History Society, with Jackson as the founder and first President, 1910.

The Society has flourished and now possesses a very large collection, with Jackson's typical series as the backbone. The collections are housed in the Coryndon Memorial, a very large building which has been handed to the Natural History Society as a Museum. The committee is very desirous of commemorating in some adequate and useful manner the name of its Founder, a very gallant gentleman of outstanding ability and a pioneer of Empire. We are, therefore, appealing to all friends and admirers of the late Sir Frederick Jackson to support this fund, so that Jackson's name will go down to posterity as the "Father of East African Zoologists," one to whom the Empire owes a debt of gratitude.

It is suggested that subscriptions to this fund should be utilised in purchasing fittings and cabinets for the new Museum, each to bear the inscription "Jackson Memorial."\*

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\* Subscriptions to the fund may be sent to the Hon. Secretary, P.O. Box 658, Nairobi.

## RECORDS OF BUTTERFLY MIGRATION IN EAST AFRICA.

By C. B. WILLIAMS, M.A., F.E.S.

(Late Entomologist to the East African Agricultural Research Station, Amani, Tanganyika.)

The following records relating to butterfly migration have been sent to me in the course of the last two years and I am taking this opportunity of putting them on record so that they can be available for all students of this subject. No general discussion of the records is given as they will all be dealt with in my forthcoming book on the subject.

I once more ask all readers who have at any time seen flights of butterflies, dragonflies or other insects such as are described below, and who have not put them on record, to publish a full account as soon as possible, or else to let me have the notes for incorporation in a future series of collected records.

Accounts of migration should include the locality, date, and direction of flight, and should always when possible, be accompanied by specimens of the insects themselves. This is particularly important in the case of the small white butterflies in East Africa as there are two or more species which take part in the flights, and they are almost indistinguishable in flight. Each may have their own seasons and routes and unless specimens are available for exact determination much of the value of the record is lost.

In addition to the above information, which is most essential, records should include when possible the direction of the wind, the height and approximate speed of the insects, some ideas of the numbers concerned (*i.e.* dozens, thousands or millions), the time of the day and duration of the flight, and any general note on the weather at the time.

As many specimens as possible should be captured as it is only possible to estimate accurately the proportion of the sexes if a fair number are available. The specimens should be as little damaged as possible, but a single damaged specimen or even a single detached wing is better than nothing at all.

My thanks are due to all who have sent in the records below.

### (1) BUTTERFLY MIGRATING IN NYASALAND IN NOVEMBER, 1927.

Mr. Fadyen informs me that in November, 1927, near Kongeni, Nyasaland, he saw a very big flight of butterflies coming from an easterly direction and travelling west. They rested on avenues of *Cedrella Toona* trees for a short time and then continued their flight



to the west. He writes: "The butterfly was a dull red colour being about  $1\frac{1}{4}$  inches from tip to tip across the wings. It is a very common one," but unfortunately no specimens were sent.

(2) MIGRATION OF WHITE BUTTERFLIES AT MOSHI, N.E. TANGANYIKA.

Mr. C. R. Musson informs me that while living at Old Moshi, about 3,000 feet above sea-level on the eastern slopes of Kilimanjaro, N.E. Tanganyika, in either January or February of both 1926 and 1927, he saw large flights of pale yellowish butterflies flying towards the south-east. On one occasion they were flying by thousands high in the air about seventy feet above the ground from about 9-30 to 11-15 a.m.

In January and February, 1926, *Belenois mesentina* was migrating in great numbers to the S.E. in Nairobi, so that it is very probable that the record in 1926 refers to this species.

(3) WHITE BUTTERFLIES (? *Belenois sp.*) MIGRATING AT MOSHI, TANGANYIKA, IN MARCH, 1928.

Mr. A. E. Haarer reports that about March 24th, 1928, with conditions of drought, the same white butterflies as were migrating in February, 1926 (*Belenois sp.*) were migrating from north-west to south-east but fewer in number and only for about three or four days.

(4) SMALL MIGRATION OF PALE YELLOW BUTTERFLY (? *Catopsilia florella*) IN UGANDA.

Mr. Gerald W. Williams informs me that on August 18th, 1927, at Kowanji, on the north side of Lake Mohasi in South Uganda, he saw a considerable number of "White Brimstone" butterflies (like the English *G. rhamni* but even more pale than the female of that species) steadily crossing the lake at a rate of about six per minute. The lake was at this point about 1,000 yards wide. Several were caught but the flight was very rapid. The flight was limited to a quarter of a mile as they followed the course of a large valley. He observed the flight for three hours but it ceased as soon as the clouds covered the sun, although it was then only 2-30 p.m. The early morning had been dull and overcast. During the flight the wind was gusty and from the N.N.E.

From the description it is very probable that the species was *Catopsilia florella*, but unfortunately no specimens have been received.

(5) MIGRATIONS OF BUTTERFLIES AT KILOSA, TANGANYIKA.

Mr. C. Gillman, Chief Engineer of the Tanganyika Railways, informs me that he saw a migration of white butterflies at Kilosa in

Central Tanganyika in April, 1909. The butterflies were going towards the south-east, against the south-east trade wind which had recently set in. Tens of thousands of them passed during several days.

When shown specimens of *Belenois* spp. and *Catopsilia florella*, which are the only migrants in East Africa which could be described as "whitish," Mr. Gillman said they were undoubtedly the latter, but it is best to recognise that the identification is uncertain after the long lapse of time.

(6) *C. florella* AND *B. mesentina* NEAR KITALE IN FEBRUARY, 1928.

Mr. H. B. Stoneham tells me that near Kitale, Trans-Nzoia, Kenya, from the 1st to 24th February, 1928, there was a migration of *C. florella* to the north, more or less strong, passing in twos and threes. During the last three days, *B. mesentina* was also migrating north in fair numbers.

(7) *B. subeida* (?) NEAR KITALE IN APRIL, 1928.

Mr. Stoneham informs me that near Kitale, Trans-Nzoia, Kenya, there was a migration of *P. subeida* (?) to the north from 8th to 15th April, 1928, in considerable numbers although at times quite leisurely.

(8) *H. misippus* NEAR KITALE IN MAY, 1928.

Mr. Stoneham informs me that near Kitale, Trans-Nzoia, Kenya, there was a migration of *H. misippus* from the 8th to 14th May, 1928, going to the north. After a few days' rest this restarted again on the 28th May.

(9) *C. florella* NEAR KITALE IN MAY, 1928.

Mr. Stoneham informs me that near Kitale, Trans-Nzoia, Kenya, there was a migration of *C. florella* to the south from the 23rd to the 28th May, 1928, in fair numbers.

(10) *Belenois* AT SIKONGE, TANGANYIKA.

Dr. A. J. Keevil informs me that at Sikonge, about forty-six miles due south of Tabora, he saw a migration of "small white butterflies" in 1927 "towards the end of the rains (probably about April)." The migration lasted two, possibly three days and was exactly from east to west.

(11) *Belenois* AT NAKURU, KENYA, IN MAY, 1928.

Mr. A. S. Evans informs me that "on May 24th, 1928, at Alphega, Nakuru, Kenya, white butterflies passed from 10 a.m. to

4 p.m. possibly longer, heading N.5°W.—as far as one could see in all directions, flying low, about 10-15 miles per hour and at a rough guess about four hundred to the acre.”

(12) *C. florella* NEAR MOSHI IN MAY, 1916.

Mr. H. B. Stoneham informs me that in May, 1916, he saw a considerable migration of *C. florella* between New Moshi (foot of Kilimanjaro, N.E. Tanganyika) and Same on the Tanga Railway. The direction was due south.

(13) *B. mesentina* NEAR KITALE IN JANUARY AND FEBRUARY, 1926.

Mr. H. B. Stoneham sends me the following details of the large migration of *B. mesentina* in January and February of 1926. The point of observation was twelve miles west of Kitale, Trans-Nzoia, Kenya (to the east of Mount Elgon).

“The migration commenced about mid-day on Saturday, 9th January and proceeded till sundown in a westerly direction. Wind: North to north-west. Besides *B. mesentina* which were in large numbers there were also *C. florella* and possibly other species.

“Soon after dawn on Sunday, 10th January, the migration recommenced and proceeded all day, many thousands of specimens passing, all going in the same direction as before, *i.e.* west. Wind strong from east most of the day. In the evening, I caught several specimens mostly newly emerged and many in copulation. On 1st February, the migration continued. I went to Kitale, twelve miles to the east, and the migration was very noticeable there. Towards evening, the numbers increased so that at times it looked like driven snow flakes. On 2nd February the migration subsided. During the afternoon of 3rd February, a return migration was noted, individuals streaming back in an easterly direction.

“On 4th February, the return migration of *B. mesentina* increased in numbers and continued till sundown. Direction at first S.E. but during the afternoon the general direction changed to N.E. Wind as before and no rain. On the 5th February, the migration was in full swing all day, but between 2 p.m. there were such millions of them that they looked like falling snow. Later, direction changed to north and then to N.W. Wind as yesterday, but for a short time from north and south. No rain and warmer.

On 6th and 7th, migration continued, but numbers fewer. On 8th, migration was scarcely noticeable. Still no rain and wind as before, but direction turned last day from north to north-east.”

(14) *Hypolimnas misippus* NEAR KITALE IN FEBRUARY, 1926.

Mr. Stoneham informs me that during the first three days of February, 1926, *i.e.* during the migration of *B. mesentina* described above (No. 13), there was "a migration, not very strong, of *Hypolimnas misippus*. Direction north, wind moderate to strong from east, turning to west in evening. No rain."

(15) WHITE BUTTERFLIES AT MOMBASA.

Dr. Shircore informs me that about 1916 he saw a flight of white butterflies at Mombasa going to south-east for two days. He estimates from memory that there was about one butterfly to five hundred cubic feet of air space over a belt of perhaps one hundred and fifty to two hundred yards wide. The flight was low, within say fifteen feet of the ground. It was sunshiny breezy weather, and the largest numbers were present during the brightest hours of the day.

It was probably one of the two common species of *Belenois*.

(16) WHITE BUTTERFLIES AT NAKURU, KENYA, IN 1925 AND 1926.

Mr. H. J. Lock informs me that about the end of February or early March, 1925, there was a flight of butterflies, "for the most part white though there were some tinged with yellow mixed with them," at Nakuru flying from about S.E. to N.W. which direction he thought was due to the prevailing wind blowing this way. The flight was not very noticeable for more than two or three days generally between noon and 3 p.m.

In 1926, there was a similar migration about the same time, but in this case from west to E. or S.E. He does not recollect the wind during this flight but notes that a wind in this direction is unusual at this time of year. The days were hot with broken clouds and inclined to thunder.

In 1927, although he kept a look out there was no such flight at Nakuru.

(17) WHITE AND YELLOW BUTTERFLIES AT MOSHI, TANGANYIKA.

Mr. Henry C. Brett of Kibosho, near Moshi, N.E. Tanganyika, informs me that on several occasions during March and April of 1928 he observed butterflies "of fairly large size," of two kinds, one white and one yellow, travelling from west to east across his estate. They passed in very large numbers for hours on end.

The description would well fit *C. florella*.

(18) WHITE BUTTERFLIES AT ARUSHA, T.T. IN DECEMBER, 1925, AND JANUARY, 1926.

Mr. I. J. Anderson of Arusha, Tanganyika, sends me the following notes:—

“ During November and December of 1925, we had very heavy rains but towards the end of December right on through January, except for a few days, we had bright sunny weather. As soon as this latter started we noticed an unusual number of the ordinary white butterflies with dark line markings on it flying towards a point a little west of south. Day after day their numbers increased until about the first week in January they formed a perfect cloud. It reminded me of the enormous flocks of parakeets which one sometimes sees migrating in the dry areas of Australia, but of course their flight was much slower. This dense cloud lasted about three days when it became gradually less, but all through January and February a few stragglers continued in the same direction as the main body. The width of this flight is difficult to tell, but it must have been several miles from east to west. Although many were flying close to the ground the great majority were so high that they were practically invisible with x16 binoculars. They came from a northerly direction and over Mondul Mountain, which is close on 9,000 feet. They showed no inclination to settle, nor did any of us notice any appreciable quantity dying by the roadside.”

(19) WHITE BUTTERFLIES AT NAKURU, KENYA.

Dr. M. Martin of Entebbe tells me that he saw a migration of white butterflies at Nakuru in September, 1923. It lasted practically the whole day and one of the planters told him that it was quite a common occurrence.

(20) MIGRATION OF BUTTERFLIES AT MOA, NORTH-EAST TANGANYIKA ABOUT MARCH, 1926.

According to a letter from Mr. T. L. Priestnall about March, 1926, there was a flight of butterflies seen at Moa, on the coast north of Tanga, Tanganyika, by a Mr. Roberts and several others. The flight was first noticed about 4-30 p.m. and was going straight out to sea (*i.e.* to the east) and was still passing when it was quite dark.

(21) WHITE BUTTERFLIES AT KINANGOP, KENYA, IN JULY, 1927.

Mr. G. G. Gabbett informs me that at the end of June, 1928, he saw hundreds of white butterflies flying more or less to south at Kinangop (about 20 miles from Naivasha) in Kenya.



(22) SMALL WHITE BUTTERFLIES IN ATHI PLAINS, KENYA.

Colonel Meinertzhagen informs me that on one occasion (date uncertain) in the Athi Plains, near Nairobi, he saw a migration of small white butterflies flying from the south-east for nearly a week and so dense that he was able to approach big game behind the screen that they made. The flight was not over 20 feet from the ground.

(23) WHITE BUTTERFLIES IN CENTRAL TANGANYIKA IN JUNE, 1925.

Mr. Andrews informs me that in June, 1925, he saw countless millions of small white butterflies going due east on the Central Line of the Tanganyika Railways about 200 miles from the Coast between Tabora and Dodoma. For about 50 miles the train passed through the swarm.

(24) WHITE BUTTERFLIES AT TUKUYU-RUNGWE, S. TANGANYIKA, IN 1926.

Mr. J. M. Dawson, Government Veterinary Officer, informs me that a flight of white butterflies passed through Rungwe Mission, near Tukuyu [in old maps Neu Langenburg] just north of Lake Nyasa in South-West Tanganyika, early in 1926. He believes that this was part of the big flight that passed through the Nairobi district at the beginning of February, 1926, as the date at which they passed Rungwe "coincided with the date on which they were noticed at Nairobi and the time that might have been taken *en route*."

As far as he can recollect the butterflies were passing from early morning until dusk, but for not more than three days.

(25) WHITE BUTTERFLIES NEAR AMANI, SEPTEMBER 23RD, 1928.

Capt. E. Nicholl, Manager of Kwamkoro Coffee Estate about five miles south of Amani informs me that on September 23rd, 1928, large numbers of small white butterflies had been flying in groups of thirty or more from east to west past his house. He considers that they were the same species (*B. severina*) that was passing in numbers at the end of August, but unfortunately was unable to catch any specimens.

(26) WHITE BUTTERFLIES AT NYERI, KENYA.

Mr. F. J. Briggs informs me that on his estate at Nyeri, Kenya Colony, at an altitude of 6,100-6,800 feet, white butterflies fly in numbers towards the south nearly every year about December, January, or February. Then, with or without a break they reverse direction and return about March towards the north. This is usually taken to indicate the approach of the rains.

(27) WHITE BUTTERFLIES IN SUK DISTRICT IN JULY, 1928.

Mr. P. Booth of the Agricultural Department, Kenya, informs me that on about 21st July, 1928, he saw thousands of white butterflies flying to the S.W. (*i.e.* towards Uganda) in the Suk district of Kenya. They were flying steadily all day at a height of 4-6 feet above the ground just above the bushes.

(28) WHITE BUTTERFLIES NEAR VOI, KENYA, IN 1921.

Mr. D. M. Drury informs me that vast quantities of white butterflies passed from north to south continually between 16th and 18th February, 1922, over Wundanyi Estate near Voi, Kenya, in the Teita Hills at an altitude of about 5,000 feet. On the latter day the direction changed to the reverse, *i.e.* south to north, but he has no record as to how long the reverse flight continued.

(29) WHITE BUTTERFLIES NEAR LEMBENI, TANGANYIKA, IN JULY, 1928.

Mr. C. H. Pook informs me that he saw millions of white and brown butterflies flying along the railway between Same and Lembeni (Tanga Line, N.E. Tanganyika) about 3-4 p.m. on 5th July, 1928, apparently travelling along the line in the direction of Tanga, *i.e.* more or less to S.E., in bright sunny weather. From the fact that *B. severina* was recorded from Moshi late in June and was migrating in numbers in Amani about the 10th July it is almost certain that this is the species concerned.

(30) WHITE BUTTERFLIES NEAR NAIVASHA, KENYA, IN JULY, 1928.

Mr. Pienaar tells me that in early July, 1928, about eight miles from Naivasha on the road to Gilgil about midday he saw hundreds of small white butterflies flying approximately to the east near the ground.

(31) WHITE BUTTERFLIES AT MAKTAU, KENYA, IN DECEMBER, 1928.

Mr. C. E. Dunman informs me that on the 5th December, 1928, he saw a flight of white butterflies passing over Maktau Railway Station (between Voi and Moshi). They were flying approximately from north-east to south-west and were all high in the air, several hundred feet up he estimates, and none down below. Thousands were seen for about 15 minutes between about 2-30 and 3 p.m. and they may have been passing both before and after.

They were seen flying over the top of a small hill and were scarcely visible from down below.

The wind was south-east or east, diagonally with the flight.



(32) WHITE BUTTERFLIES IN UGANDA ON AUGUST 20TH, 1928.

Dr. E. J. Wayland informs me that he saw a flight of butterflies on August 20th, 1928, on the Kampala-Lake Albert Road, Uganda, between Matabi and Kakumiro (that is approximately in latitude  $0^{\circ} 40' N.$  and longitude  $E. 31^{\circ} 10'$  and  $31^{\circ} 20'$ ). The butterflies were flying from east to west along the road against a slight wind and avoiding the bush on either side of the road.

He considers that the species concerned in the flight were the same as those that he saw in a previous flight on June 25th, 1928, but was unable to get any specimens to confirm this.

(The species in the previous flight were *Pinacopteryx sp.* near *vidua* and *Pieris solitucis*).

(33) *C. florella* AT SIKONGE, TANGANYIKA, IN NOVEMBER, 1928.

Dr. A. J. Keevil informs me that a migration took place at Sikonge 46 miles south of Tabora, in Central Tanganyika at the end of November, 1928. The flight commenced on November 24th, increased till the 26th and 27th, the numbers then becoming fewer until the 30th, when no more were noticed. On the 7th December there were still many butterflies about but not travelling in any fixed direction. The main migration was almost exactly due east and the weather was fine and sunny with an occasional light shower.

Dr. Keevil sent me three specimens which were all males of *Catopsilia florella*.

(34) *C. florella* IN KENYA IN JANUARY, 1926.

According to Mr. H. Wilkinson, Asst. Entomologist to the Department of Agriculture of Kenya, a correspondent reported that *C. florella* was migrating at Gilgil, Kenya, on 26th January, 1921. The direction was not given but it was said to be "against the wind." The specimens were identified by Canon Rogers.

(35) POSSIBLE IMMIGRATION OF *Synchlœ glauconome* IN KENYA.

Dr. V. G. L. van Someren informs me that in June, 1922, *Synchlœ glauconome* appeared in numbers at Nairobi and about 40 specimens were captured in his garden in one week. He had never seen this species in the district either before or since.

(36) *Belenois mesentina* AND *C. florella* AT KILOSA, CENTRAL TANGANYIKA, IN JANUARY, 1929.

Mr. T. M. Revington sends me the following information from Kilosa, about 150 miles from the coast on the Central Railway line of Tanganyika Territory.

" At noon to-day (25th January, 1929) at Kilosa a great number of common white butterflies, together with a smaller number of yellow butterflies commenced to travel through a gap in the hills through which the railway passes. They appeared to be travelling from the west-north-west to the south.

The yellow butterflies were greatly outnumbered by the white ones but seemed to be travelling with them. There were also other kinds but only a few of them.

The gap in the hills mentioned is the only pass in the mountains, which run roughly north and south. The ' safari ' (travelling) continued until after 2-30 p.m. and then slackened."

Mr. Revington sent three specimens, two of which, the common white species referred to above, were *Belenois mesentina*, both males, and one yellow female of *Catopsilia florella*, presumably the yellow butterfly referred to above.

The direction, to the S.E. quarter, appears to be the usual direction for *Belenois mesentina* in this country but during the whole of January *C. florella* at Amani in N.E. Tanganyika was moving towards the N.E.

In a later letter he adds: " The migration continued for three or four days at approximately the same hours and from the same direction. None flew at a greater height from the earth than about 40 feet and the majority under twenty."

(37) MIGRATIONS OF *C. florella* WITH OTHER SPECIES IN CENTRAL TANGANYIKA IN DECEMBER, 1928, AND JANUARY, 1929.

Mr. H. Musk of the Department of Agriculture of Tanganyika kindly sends me the three following records:—

(1) On 8th December, 1928, near Gwao, about 25 miles south of Singida in Central Tanganyika he passed in a car through a flight of millions of butterflies from 11 a.m. till after 1 p.m. They were flying fast towards the E.S.E. mostly about three feet from the ground. The wind was westerly and mild, the weather sultry, near rain.

He sent four specimens, all of which were males of *Catopsilia florella*.

(2) On 16th January, 1929, at Ishora, about 33 miles west of Singida, he passed through a flight of even greater numbers than the above, from 9 a.m. to 2 p.m. and perhaps later, flying towards the S.E. 6-10 feet above the ground and rather more slowly than the previous record. The wind was mild from S.S.W. and the weather sultry after rain.

The specimens sent to me were three *Catopsilia florella*, two rather small males and one full-sized female; two *Terias* sp., one male and one female, and one wing of a male *Belenois mesentina*.

(3) On the following day, 17th January, 1929, at Singida there was a small flight of a few butterflies towards the N.E., seen from 3-4 p.m., but possibly going on before that. The flight was fast and from 1-3 feet above the ground. The wind mild N.W. and the weather sultry but dry. No specimens were sent but he states that they were the same species as the previous two flights but without the small yellow species, i.e., the *Catopsilia florella* without the *Terias*. He suggests that it was probably part of the flight seen the previous day which is very likely.

(38) *Catopsilia florella* NEAR ARUSHA, TANGANYIKA IN JANUARY, 1929.

Herr von Dechend kindly gives me the following record:—

“ From Sunday the 27th January, to Thursday the 31st, I observed a strong migration of many white and a few yellow (lemon coloured) butterflies crossing the Moshi-Arusha road between “ Maji ya chai ” and Thelmi River and flying due north towards the east side of Meru Mountain.

On 100 yards I counted sometimes as many as 100 per minute. The migration started about 9 a.m. and lasted up till about 5 p.m. Type of country plantations, forests and dry thorn bush country.”

I showed him specimens of the chief East African migrants including *Belenois* spp. and *C. florella* and he unhesitatingly identified the latter insect as the one in question, noting the larger size, the presence of the yellow variety, and in addition the very rapid flight.

(39) WHITE BUTTERFLIES AT SIMBA, UGANDA, IN 1922.

Mr. F. R. Buckle informs me that in April or May of 1922 when at Simba, about 40 miles north of the Kagara River in Uganda he met during one morning a flight of hundreds of thousands of small white butterflies moving slowly but steadily more or less to the south. Vast numbers were flying close to the ground and many could be killed by waving a stick in the air. He did not notice the wind direction or to what height in the air the flight reached.

The insect concerned is almost certainly a species of *Belenois*.

(40) *Belenois* sp. IN KENYA IN JANUARY, 1924.

Mr. R. L. Harger gives me the following record: “ In January, 1924, I went by ox wagon from Kijabe, down the Kedong Valley, over the Mau Escarpment and past Narok to the Lolgorien goldfields. On reaching the Southern Uasin-Nyero a few fore-runners were

noticed. A couple of days later there was a continuous flight for days of countless millions which continued over part of the Loita plains and while I traversed the Mara Valley and Sureya Escarpment and Plateau. I was travelling slowly at ox pace. It was again *Belenois* apparently coming from the N.E. and going roughly S.W. In the Southern Loita and Mara areas I noticed very many in copulation and have often wondered in what range of country the eggs were deposited."

(41) WHITE BUTTERFLIES NEAR MOUNT ELGON, UGANDA, IN JUNE, 1928.

Mr. R. C. Fisher, Veterinary Officer, informs me that about 2 p.m. on 10th June, 1928, he noticed what seemed to be a constant stream of butterflies moving in a south-westerly direction from the neighbourhood of the hills below Sifi, Mount Elgon, Uganda, towards the Siroko River. The flight appeared to be somewhat erratic, but the above was the general direction. The wind was in general blowing in a westerly direction although not strong or constant. The weather previously had been very wet but about the time of the flight there had been several dry days.

The butterflies were mainly white with some light green ones and other varieties in small percentage. The flight appeared localised to a somewhat narrow area and unfortunately he was not able to obtain any specimens. It was estimated that about 20 to 100 butterflies were passing per minute.

(42) *C. florella* IN KENYA IN FEBRUARY, 1929.

Mr. Chiappido Rebuffo informs me that on the 9th February, 1929, when he was travelling by train from Voi, Kenya to Moshi, Tanganyika, the train passed for about one hour through thousands of white butterflies which appeared to be moving approximately to the N.E. The time was about 11 a.m., and the flight had ceased before the train reached Maktau Station which is about half way between Voi and Moshi.

When shown specimens of *C. florella* and *Belenois* spp., Mr. Rebuffo unhesitatingly identified them as belonging to the former species.

(43) WHITE AND YELLOW BUTTERFLIES IN NYASALAND IN JANUARY, 1919.

Mr. E. H. Lilford reports as follows from Karonga, Nyasaland:—

"On the 26th January, 1929, I saw fair numbers of white butterflies and a few yellow ones going S.W. by west. A slight wind of force 2 was coming from the N.W. Again on the 29th there were some more stragglers going south with a slight wind from the S.E. This is on the Misahui district, North Nyasa."

(44) *Belenois mesentina* AT LUSHOTO, TANGANYIKA, IN MARCH, 1929.

Mr. T. L. Priestnall informs me that a flight of white butterflies passed through Lushoto (in old maps Wilhelmstal) in the West Usambara Hills, N.E. Tanganyika. He first noticed them on 9th March at 11 a.m. "flying very high." On the 10th they were lower and in much larger numbers. The flight was from "N.E. to S."

Four specimens were sent, two captured on the 9th and two on the 10th. They were all *B. mesentina* and all males.

(45) WHITE BUTTERFLIES AT GILGIL, KENYA, IN FEBRUARY, 1929.

Mr. S. W. Greenway informs me that on the 6th February, 1929, at Gilgil, near Naivasha in the Rift Valley, Kenya, he saw a flock of some thousands of small white butterflies going to the S.S.E. between 10 and 11 a.m. The flock was noticed passing for ten minutes but may have continued longer. They were flying mostly low but a few up to 50 feet from the ground. The day was hot and dry and almost calm, in the middle of the dry season.

No specimens were obtained but the insect concerned is almost certainly a species of *Belenois*.

(46) *Catopsilia florella* AND PERHAPS OTHER BUTTERFLIES NEAR ARUSHA, TANGANYIKA, IN JANUARY-FEBRUARY, 1929.

Mrs. E. G. Fotheringham informed me on 27th January, 1929, that a migration of butterflies was taking place at Ngare Nairobi, on the west slopes of Kilimanjaro.

The direction of the flight was from S. to N. and was at its maximum at noon, but usually all had disappeared by 2 p.m. She describes the butterflies taking part in it as follows: "The majority the ordinary white ones, cream, large black and yellow, black and blue and large orange colour."

Later (15th February) she added that the flight was in thousands and lasted from 27th January to 8th February. On the 15th they were fighting again. The wind was from the east.

Nine specimens were enclosed and said to be "from the flight." They were as follows:—

4 *Catopsilia florella*, 1 pale male, 2 yellow females, 1 pale but too damaged to determine sex.

1 *Belenois severina* male.

1 *Mylothris rupelli*.

1 *Danais chrysippus alcippus*.

1 *Papilio demodocus*.

1 *Junonia clelia*.



From this it is almost certain that the main migration must have been *C. florella*. The other species may have been taking part, but until more definite information is obtained it would be safer to look upon their presence as accidental.

(47) *Belenois* sp. NEAR BOMBO, UGANDA, IN MARCH, 1928.

Mr. N. S. Haig informs me that at Bukalasa, near Bombo in Buganda, a Province of Uganda, and about 36 miles due north of Kampala, he saw large numbers of white butterflies passing in a westerly direction. This appeared to continue for some days and, as far as he can recollect, took place at the beginning of March, 1928 (writing in May, 1928). The weather was then dry, as the rains were late in coming this year. The prevailing wind was from E. to W., with the flight.

The species concerned was certainly a *Belenois*, as he says it was the same species as that concerned in the flight at Mbale in May and this was definitely *B. severina*.

(48) *Catopsilia florella* AND OTHERS AT DODOMA, TANGANYIKA, IN JANUARY, 1929.

Mr. D. R. Grantham, of the Geological Survey of Tanganyika Territory, sends me the following observations made at Dodoma in the central part of that country.

" I noticed a flight some days previous to our making notes, probably on the 9th January [1929], but did not pay special attention to it.

" During the 12th January, there was a continuous flight from the time the morning wind died down, about 9 a.m., till dusk. The butterflies were scattered and not in close flights. They were travelling eastwards without any sign of stopping or settling, while the wind was light and easterly, *i.e.* against them.

" I estimated that about 10,000 passed between my house and a point 200 yards north of it during the day. Dr. Teale's estimate was very considerably higher. Over what area they were thus travelling I cannot say; we observed at least half a mile in width and presumably it was many miles.

" On the 13th the flight started again when the wind died down. Fewer and more other colours, but whites predominating. Flight more erratic, more hovering and settling. Occasionally the wind was not east, but the direction of flight was not varied. I have no notes for several days as the flight was not so distinct, though many butterflies were on the move in the same general direction.



17/1/29: Flight continued but direction southwards.  
18/1/29: Flight steady eastward in fair numbers.  
20/1/29: Eastwards from 11 a.m. to 4 p.m. rather fewer.  
21/1/29: Flight less but continuing.

After this it gradually died out, some days a few would be seen going eastward."

Mr. Grantham sent the following specimens:—

2 *Catopsilia florella*.  
2 *Telacolus evenina*, Wallgr.  
2 *Herpaenia eriphia*, Godt.

The two latter species were identified by Mr. N. D. Riley.

(49) WHITE BUTTERFLIES AT MOMBASA, KENYA.

Mr. F. B. Butler informs me that on several occasions in the last few years he has seen small white butterflies passing in thousands over the island and harbour of Mombasa. The flights are nearly always towards the south and are usually about the end of February, which is the season that he goes fishing for a fish locally known as "Felussi." The last occasion on which he saw them was in February, 1929, when they were passing in hundreds over the water from just above the surface to a height of about one hundred feet, all in a southerly direction.

The insect referred to is almost certainly a species of the genus *Belenois* and probably either *B. mesentina* or *B. severina*.

(50) WHITE BUTTERFLIES NEAR KITALE, KENYA, IN MARCH, 1929.

Mr. G. H. Hunt informs me that he saw two flights of white and yellow butterflies on the slopes of Mount Elgon, in the Kitale district of Kenya. The first was on the 8th March, 1929, when they were flying in hundreds about midday to the N.W. mostly low down and not very fast. This was at "Jackson's Farm," about 20 miles west of Kitale.

The second flight was on the 29th March at "Hunt's Farm" about 15 miles N.W. of Kitale. This direction was more or less the same but the numbers were fewer.

I showed Mr. Hunt specimens of *Belenois* and *Catopsilia florella* and he thought that it was the latter species but could not be certain.

(51) *Catopsilia florella* AT KILINDINI IN MARCH, 1912.

Mr. Simmonds kindly gives me the following record: "I remember another flight, mostly of *Catopsilia florella*, across the creek at

Kilindini in East Africa. I think from south to north, about the end of March, 1912. I was on the "Carisbrook Castle" at the time. They were being attacked by swallows and bee-eaters."

(52) *Belenois* sp? AT MOROGORO IN MARCH, 1929.

Mrs. C. J. Ruggles-Brise kindly gives me the following record from Morogoro, Tanganyika Territory: "I observed an almost daily migration during March [1929] of the common white butterfly. It is very similar in general appearance to the British Cabbage White. They always flew west to east."

NOTES ON THE BIRDS OF  
JUBALAND AND THE NORTHERN FRONTIER, KENYA.

By V. G. L. VAN SOMEREN, M.B.O.U., C.F.A.O.U., C.M.Z.S.

INTRODUCTION.

This report is based on a collection made in 1920-23 in the Northern Frontier Province and Jubaland. The collection was made under considerable difficulty, and had it not been for the kind assistance of various Officers of the King's African Rifles and Dr. J. O. Beven, late of the Medical Service, the series would not be as comprehensive as it is.

The area embraced in the report extends from north of the Northern Guasso Nyiro, to Marsabit, then west to Karoli and Kulal, and thence along the southern Abyssinian border to the head-waters of the Juba River and down the river to Kismayu. From the junction of the Juba with the Doua River a brief visit was paid to Wajhier and the Lorian.

This collection can be taken as representative of the bird fauna of the districts visited, and it includes at the same time, a few species which are either rare or recorded for the first time. Now that a large area of the country has been ceded to the Italians, and collecting thus made difficult, the collection made has an added value.

*LARIDÆ.*

1. *Larus hemprichi*, Burch. Hemprich's Sooty Gull.

A common species all along the Coast and at the mouth of the Juba River. Specimens were obtained at Kismayu, October, 1923. ♂ 2, ♀ 1, Juv. 1.

*ANATIDÆ.*

2. *Erismatura maccoa*, Eyton. Red Diving Duck.

These stiff-tailed duck were found on both Koroli and Marsabit Lakes. They appear to be identical in size and colour with South African examples. Koroli Lake, ♂ 3.

3. *Nyroca erythrothalma*, Weid. African Pochard.
4. *Anas capensis*, Gm. Pink-billed Teal.

Examples of these two species were obtained on Lakes Koroli and Marsabit in July, 1923.

5. ***Alopochen aegyptiacus***, L. Egyptian Goose.

Amongst the examples obtained are several young birds in down. It would be of great interest if records of the breeding seasons of Ducks and Geese in the Marsabit area were collected, as all information on these points is of great value.

These birds were especially plentiful on Koroli Lake, July, 1923.

*PLEGADIDÆ.*

6. ***Threskiornis aethiopicus***, Lath. Sacred Ibis.

None of the specimens obtained are in full plumage. ♂ 2, ♀ 1. Jebeir, March, 1923.

7. ***Hagedashia hagedash erlangeri***, Neum. Somali Great Glossy Ibis.

This eastern race is easily distinguishable from the form inhabiting Uganda, in being paler, and very much smaller. Culmen, 122-126. Wings, 310-325. Tarsi, 60-63. Serenli, March, 1923 and July, 1922.

8. ***Platalea leucorodia leucorodia***, L. African Spoonbill.

9. ***Platalea leucorodia alba***, Scop. African Spoonbill.

Examples of the European and the African Spoonbill were procured on the Juba River. Lugh, July, 1922.

*ARDEIDÆ.*

10. ***Ardea goliath***, Cretz. Giant Heron.

These fine birds were met with from time to time in suitable localities on the Juba, and specimens were procured at Lugh, July, 1922.

11. ***Butorides striatus atricapillus***, Afz. Little Green-backed Heron.

This species was very common. Dolo, February, 1923; Neboi, January, 1923; and Unsi, January, 1923.

12. ***Nycticorax nycticorax***, L. Night Heron.

♂ Jebeir, March, 1923. All records of this bird should be carefully preserved, special note being made of the plumage condition and the time of year.

*SCOPIDÆ.*

13. ***Scopus umbretta bannermani***, C. Grant. Eastern Hammerkop.

♂ Marsabit, August, 1923; ♀ Unsi, December, 1922.

CICONIIDÆ.

14. *Dissoura episcopus microscelis*, Gr. White headed Stork.
15. *Leptoptilos crumeniferus*, Less. Marabou Stork.
16. *Ibis ibis*, L. Pink Wood Ibis.

These three species were seen in fair numbers and specimens of each obtained at Jebeir, May, 1922, and July, 1922.

CHARADRIIDÆ.

17. *Glareola pratincola fülleborni*, Neum. East African Pratincole.

Flocks were met with on Koroli Lake, but of those procured, none are in full plumage, and two are in first, speckled dress. Koroli, July, 1922.

18. *Cursorius cursor littoralis*, Erl. Kenya Grey-naped Courser.

Throughout the whole Northern Frontier and N. Jubaland small flocks and odd pairs were seen. There is some slight variation in plumage due to age and wearing.

♂ 2, ♀ 2, Chanlers Falls, ♂ and ♀ Koroli, ♂ Wagheir, November, 1920, June, 1922, and July, 1923.

19. *Rhinoptilus cinctus cinctus*, Heugl. Three-banded Courser.

These birds occupy the same territory as the preceding species, and are rather more common. Young birds differ from adults in being darker greyish, less sandy brown on the back; while the crown of the head is blackish. The lower breast band is hardly developed. Birds from West Rudolf tend to develop rather darker V marks on the neck. Specimens were shot in January, March, April, June, July and December. ♂ 5, ♀ 2. Juv., N. Guasso, Mandaira, Unsi, and Jebeir.

20. *Squatarola squatarola squatarola*, L. European Grey Plover.

The specimens obtained were shot in October and range from birds in complete winter plumage to those in half summer dress. Kismayu, October, 1923.

21. *Charadrius marginatus tenellus*, Hartl. Pale-backed Sand Plover.

These Plover require careful comparison with typical Madagascar birds. Common along the coast. ♂ 2, ♀ 3, Kismayu, October, 1923.

22. *Charadrius varius varius*, Vieill. African Sand Plover.

The common Sand Plover extends from the Coast inland along the Juba wherever suitable localities are found. They occur in numbers in the N. Guasso District and on Koroli Lake. ♂ 2, ♀ 1, Dolo on the Juba; and Lake Koroli, June, July, 1922 and 1923.

23. **Charadrius dubius coronicus**, Gmel. Little Ringed Plover.  
 These birds are apparently regular migrants to East Africa, being found as plentifully along the coast as on inland waters, such as the larger rivers and lakes.  
 Specimens were obtained at Lake Koroli July, 1923, and along the Jubæ at Unsi, Dolo, Serenli, and Kismayu, December, 1922, and January, February, March, and October, 1923.
24. **Charadrius tricollaris tricollaris**, Vieill. Three-banded Plover.  
 Koroli Lake, July, 1923.
25. **Stephanibyx coronatus**, Bodd. Crowned Lapwing.  
 A common species distributed throughout the whole of East Africa, and apparently not differing from the southern birds. A nestling obtained in June is, like most young plover protectively coloured, being sandy brown on the crown and back, mottled with blackish; a white band encircles the neck, and this is separated from the dark crown by a line of black. The underside is white, except in the region of the breast, which is greyish-brown outlined below with a few dark feathers.  
 ♂ 3, N. Guasso, December, 1922 and June, 1923. Juv. June, 1923.
26. **Hoplopterus spinosus**, L. Egyptian Spur-winged Plover.  
 Plentiful in suitable localities.  
 ♂ 3, ♀ 4, N. Guasso, December, 1920; Chanlers Falls, December, 1920, June, 1923; Koroli, July, 1923; Dolo, December, 1922; Lugh, June, 1922.
27. **Sarciophorus tectus latifrons**, Rehw. White-fronted Wattled Plover.  
 The Wattled Plovers inhabiting the districts along the Juba and the Lower Tana Rivers are referable to this race, which is undoubtedly an excellent geographical form. The series obtained shows conclusively that the broad white forehead is a constant feature as also is the general paler plumage. Wing measurements show also that this race is a smaller bird, thus five males vary from 174-180 mm., females 163 mm. compared with 190-198 in the northern race.  
 ♂ 5, ♀ 3, Serenli, August, 1922; Kismayu, January, 1923.
28. **Burhinus capensis affinis**, Rupp. Somali Spotted Stone Curlew.  
 The Stone Curlews obtained in the Northern Frontier districts undoubtedly belong to the northern race of *capensis*, whilst those obtained in South Ukamba and in the Kilimanjaro area are not separable from southern birds.  
 ♂ 2, ♀ 1, Chanlers Falls, November, 1920; Marsabit, July, 1923.



29. **Burhinus vermiculatus vermiculatus**, Cab. African Stone Curlew.  
 ♀ 3, Dolo, December, 1922; Jebeir, April, 1923; Hellesheid, July, 1922.
30. **Haematopus ostralegus ostralegus**, L. Oystercatcher.  
 ♂ 2, Kismayu, October, 1923. Common on migration.

DROMADIDÆ.

31. **Dromus ardeola**, Payk. Crab Plover.  
 ♂ 4, ♀ 2, Kismayu, October, 1923. Common along the Coast.

SCOLOPACIDÆ.

32. **Himantopus himantopus himantopus**, L. Stilt.  
 ♀ 2, Koroli Lake.
33. **Numenius phaeopus phaeopus**, L. European Whimbrel.  
 ♀ Kismayu, October, 1923. Dr. Lowe, in B.B.O.C., xli., p. 110 has described a race of the Whimbrel from East Africa as *alboaxillaris* in which the axillaries, underwing, and undertail coverts and rump are pure white. The two specimens have these areas barred and speckled with blackish, so I am compelled to place them as typical *phaeopus*.
34. **Terekia cineria**, Guld. Grey Terek Sandpiper.  
 This species occurs on migration along the coast and inland in suitable localities, but they are not common.  
 ♀ Dolo, December, 1922; ♂ Kismayu, October, 1923.
35. **Tringa nebularia**, Gunn. Green-shank.  
 The specimens obtained were in winter plumage.  
 ♂ Dolo, December, 1922; ♀ 2, Serenli, February, 1922.
36. **Tringa ochropus**, L. Green Sandpiper.
37. **Tringa glareola**, L. Wood Sandpiper.
38. **Tringa hypoleucos**, L. Common Sandpiper.  
 These migratory Sandpipers are common on the coast and inland waters; there are several examples of each in the collection. Merile, June, 1923; Dolo, December, 1922; Serenli, February, 1923; Kismayu, October, 1923.
39. **Crocethia alba**, Pall. Sanderling.  
 Among the flocks of small waders which find their way to the coast of East Africa during the winter, the Sanderling is found in fair numbers. When once they have settled in their winter quarters, the various species sort themselves out and are easy to determine.  
 Amongst the birds obtained are one or two still in summer plumage. Kismayu, October, 1923.

40. **Arenaria intrepes**, L. Turnstone.  
 Examples were shot from a small flock and all are in full winter plumage; many are young birds of the previous summer. Kismayu, October, 1923.
41. **Capella stenura**, Bp. Indian Pin-tail Snipe.  
 A fine male in full plumage was shot on the Juba. It is quite the most interesting bird in the collection and has not been obtained in Africa before. Its appearance on the Juba would seem to be accidental, and is even more remarkable in view of the fact that few Snipe visit this river.

RALLIDÆ.

42. **Crex crex**, L. Land Rail.  
 Fair numbers occur on migration. Kismayu, October,
43. **Fulica cristata**, Gm. African Coot.  
 Young in down and adults. Marsabit Lake, July, 1923.

HELIORNITHIDÆ.

44. **Podica sp.** Finfoot.  
 This is a small bird with wings of 178 mm. The foreneck is white while the whole of the undersurface is buffy. It appears adult. It differs from birds from Moshi, which are larger and which have the underside pure white. Wings 194. Lack of material prevents me from assigning this bird to any particular species, but it is probably *Petersi*. Dakatch, September, 1923.

PTEROCLIDÆ.

45. **Pterocles decoratus ellenbecki**, Erl. Somali Bridled Sand Grouse.  
 The Bridled Sand-Grouse of the Northern Frontier and the Juba must be referred to the Northern race as above. They differ from the typical *decoratus* in being generally paler and rather smaller.  
 ♂ 4 ♀ 2 Marsabit 6/23, Serenli 8/22.
46. **Pterocles lichensteini hyperythrus**, Erl. Barred Sand-Grouse.  
 Without material for comparison I am unable to venture an opinion on the validity of this race. C. Grant, *Ibis*, 1915, p. 33, states that south Somali birds do not differ from more northern specimens. There is a certain amount of variation in this small series. ♂ 5, ♀ 3, Dolo, June, 1923; Lokesheid, September, 1923.

47. *Pterocles senegalensis ellioti*, } Bog. Somali Pin-Tailed  
 Sand-Grouse.  
 ,, ,, *somalicus*, } Hart. Somali Pin-Tailed  
 Sand-Grouse.

The birds obtained at Lugh are referable to the Somali race and are paler than those from the N. Guasso and south of Rudolf. The crown and back of neck, hardly different in colour to the side of the neck. ♂ 3, Lugh, June, 1922. Wings, 172-175 mm.

48. *Pterocles senegalensis olivaceus*, Hart. Kenya Pin-tailed Sand-Grouse.

These birds are much darker than the birds mentioned above and agree better with the birds from Simba, type locality of *olivaceus*. They are however not so dark in the region of the innermost secondaries and in this respect they agree better with birds from the Turkwell River. C. Grant identifies birds from 30 miles north of Baringo, as *ellioti*, but my specimens from further north, at Koroli, are not so pale as this race.

This series shows a variation in wing measurements as follows: 164-180 mm., N. Guasso, April, 1922 and November, 1920; Lasamis, August, 1923; Koroli, July, 1923. ♂ 9, ♀ 4.

#### PHASIANIDÆ.

49. *Numida meleagris somaliensis*, Neum. Somali Tufted Guinea fowl.

The Guinea-fowl inhabiting the country of the upper Juba certainly belong to this form. They are small and have profuse nasal tufts of fine white bristles, and short conical helmets. ♂ 3, ♀ 3, Juv., Mandaira, July, 1923; Bajaka, December, 1922.

50. *Numida meleagris macroceras*, Erl. } Rendili Tufted Guinea-fowl.  
*Numida rendilis*, Lonn. } Rendili Tufted Guinea-fowl.

♂ 3, Chanler's Falls, November, 1920. These specimens are distinct from those mentioned above.

51. *Arcyllum vulturinum*, Hardw. Vulturine Guinea fowl.

Kauro, June, 1923. The series includes young birds in nestling plumage and others in first moult.

52. *Guttera pucherani*, Hartl. Scrub Black-crested Guinea-fowl.

Chapin has recently reviewed the Crested Guinea-fowl in *Revue Zool. Africaine*, Vol. XI., 1923, and gives a map showing the distribution of the species with their several races. He however does not include Jubaland within the distribution of *pucherani*. This is to be regretted because the specimens from Jebeir are of interest in that they are smaller than birds from

Kilimanjaro and from Pangani and have crests of a different formation, in fact very like that of *G. e. sclateri* figured on page 6 op. cit. The plumes are very graduated, being very short at the nostrils and increasing in length to the occiput.

In colouration these birds are paler and more finely spotted. A further series is required. It is possible that these form a distinct geographical race. ♂ 1, ♀ 1, Jebeir, May, 1923.

53. **Pternistes lenceopus muhamed-ben-abdullah**, Erl. Lorian Orange-throated Spurfowl.

These birds are from a locality intermediate between the typical *leucocephus* and the race above-named, but they conform more to the Lorian race. ♂ 1, ♀ 4, Mandaira, July, 1923.

54. **Francolinus sephaena**, Sb.-sps. Red-legged Bush Francolins.

In recording these birds I have followed the review on the Genus by Mackworth-Praed in *Ibis*, 1922, p. 112 and on. According to this division of the *Sephaena* group there are represented the following:—

*Sub. Sp.* 3. ♂ 2, ♀ 2, Marsabit, July, 1923.

Wings 143-147, and 138. Unfortunately my birds do not support Praed's statement that this is the palest race. They have no spots or lines on the breast. My typical *F. s. granti* are paler birds.

*Sub. Sp.* 4. ♂ 4, ♀ 1, Serenli, July, 1922; Waregta, July, 1922; Neboi, June, 1922.

Wings 143-154. Two specimens have marked chestnut stripes on the breast and flanks, but the others are not so marked. Apart from the two birds with these markings, the series does not differ much from the specimens above.

The Waregta birds ought to be the race *jubaensis*, Zedl.

55. **Francolinus hildebrandti helleri**, Mearns. Northern Speckled Francolin.

I have examined three examples of this race from Matthew's Range, obtained by Capt. Caldwell. It appears to be a good form and certainly separable from typical *hildebrandti* and *altumi*.

56. **Francolinus africanus? ellenbecki**, Erl. Northern Red-winged Francolin.

I am indebted to Capt. Caldwell for allowing me to examine examples of what I take to be this race. There is no question as to the value of this race when compared with *uluensis*. I have followed Praed in placing this as a race of *africanus*. Dolo, June, 1923.

57. **Ptilapachus petrosus florentiae**, Grant. } Kenya Rock Francolin.  
*Ptilapachus keniensis*, Mearns. } Kenia Rock Francolin.

I have compared these birds with material from Suk and the Kerio River and Mt. Moroto, and find that there is really no constant difference. Further *keniensis* must be reckoned a synonym of *florentiae*, as both come from the same district.

58. **Coturnix coturnix coturnix**, L. European Quail.

I have now obtained several records of this species in Kenya and Uganda, but the data available is insufficient to hazard an opinion as to migration routes. Personally I have never met with these Quail in large coveys and it would appear as though the birds, which do find their way down here, are strays which have over-shot their usual winter quarters.

Records, accompanied by actual specimens, are urgently needed. ♂ 2, Unsi, January, 1923. Wings 110 mm.

59. **Coturnix delagorguei**, Hartl. Delagorgue's Quail.

♀ 3, Kasut, June, 1923.

#### OTIDIDÆ.

60. **Lophotis gindiana**, Oust. Yellow-tufted Bustard.

The specimens collected are of interest as they are rather smaller than examples of the species taken further south at the mouth of the Tana. Wings 248-253 as against 269-273 mm. Bills 28 mm. as against 35. ♂ ♀ 2, Karoli, July, 1923; El Wak, May, 1922.

61. **Neotis heuglini**, Hartl. Somali Bustard.

♂ Lugh, June, 1922.

#### COLUMBIDÆ.

62. **Vinago waalia**, Gml. Yellow-bellied Fruit Pigeon.

There is a marked difference in colour between these birds and specimens from N.W. Uganda. The Juba birds are richer below and darker on the head, breast, back and flanks; more greenish on the first two areas and more golden on the mantle.

♂ 4, Beila Majedda, January, 1923; Unsi, January, 1923.  
 ♀ 3, Beila Majedda, Unsi, and Mandaira, July, 1923.

63. **Columba guinea**, L. } Hackled-neck Pigeon.  
*Columba guinea longipennis*. } Rchw.

♂ 3, Lasamis, August, 1923. ♀ 2, Archer's Post, November, 1920.



64. ***Streptopelia reichenowi***, Erl. Juba Grey-headed Dove.  
 This very distinct species is rare in collections, owing to its somewhat restricted distribution.  
 ♂ 6, ♀ 4, Mandaira, October, 1922; Dolo, June, 1922; Serenli, August, 1922.
65. ***Streptopelia capicola somalica***, Erl. Somali White-bellied Dove.  
 The various races of this bird, at the extremes of distribution, are remarkably distinct, but as the species has a very wide range, intergrading of geographical forms follows.  
 ♂ 4, ♀ 2, Mandaira, November, 1922; Lasamis, June, 1923; August, 1923.
66. ***Streptopelia decipiens elegans***, Fisch. & Rehw. Pink-breasted Dove.  
 The red-eyed Doves of Kenya require careful revision, and additional material is urgently required.  
 ♂ 2, Lasamis, August, 1923.
67. ***Streptopelia semitorquata semitorquata***, L. Grey-vented Dove.  
 There are certainly two races of this dove in the series taken within the area dealt with in this paper. The birds from the N. Guasso, Marsabit and Kulal are large and dark while those taken on the Lower Juba are pale and smaller, and are kept apart as below. ♂ 2, ♀ 1, Marsabit, November, 1923.
68. ***Streptopelia semitorquata minor***, Erl. Coastal Grey-vented Dove.  
 I have no hesitation in recognising this as a good race. My series, including examples from the type locality, amply supports it. ♂ 3, ♀ 2, Kismayu, November, 1923.
69. ***Stigmatopelia senegalensis aequatoralis***, Erl. Speckled-neck Dove.  
 The specimens obtained at Mandaira are markedly darker than Kenya examples. ♂ 6, ♀ 3, Mandaira, November, 1922; Dolo, January, 1923.
70. ***Turtur chalcospilos somalica***, Erl. Somali Emerald spotted Dove.  
 The small series obtained go to show that these birds should be considered a good race.  
 ♂ 2, ♀ 2, Unsi, January, 1923; Mandaira, October, 1922.
71. ***Oena capensis***, L. Long-tailed Ground Dove.  
 The Serenli birds are paler than those taken further south and in Kenya, especially is this the case in females.  
 ♂ 11, ♀ 6, Serenli, August, 1922; Lasamis, August, 1923; N. Guasso, June, 1923; August, 1923; December, 1920.



72. *Tympanistria tympanistria fraseri*, Bp. White-breasted Dove.  
♂ 2, ♀ 1, Marsabit, July, 1923.

ÆGYPTIDÆ (VULTURIDÆ).

73. *Neophron percnopterus*, L. Egyptian Vulture.

Three stages are represented in this series, varying from the young in speckled plumage, to fully mature birds. The species is plentiful in the Northern Frontier districts.

Koroli, Mandaira, July, 1923; October, 1922.

74. *Necrosyrtes monachus pileatus*, Burch. Common Brown Vulture.

This small Vulture is by far the commonest species in Kenya and Jubaland. From the material available for comparison it would appear that the Jubaland birds are distinctly smaller and darker. There is as much as 50 mm. difference in wing measurements between these specimens and examples from Nairobi and Kisumu. These differences are equally constant in both sexes. ♂ 2, Hellesheid; ♀ 3, September, 1922.

75. *Trigonoceps occipitalis*, Burch. White-headed Vulture.

This small series shows very well the sequence of plumages according to age. The youngest bird in first plumage has the feathering of the crown and crop brown, and the fore part of the neck a dirty white, without any signs of warty growths.

The Koroli specimens have the secondaries grey, the Mandaira specimens, pure white. The largest warty growths are found in the Koroli birds.

♂ 3, Koroli, July, 1923; Mandaira, October, 1922. ♀ 2, Juv., Mandaira, October, 1922; June, 1923.

FALCONIDÆ.

76. *Circus macrourus*, Gml. Pallid Harrier.  
Neboi, January, 1923.

77. *Melierax poliopterus*, Cab. White-rumped Chanting Hawk.

The most recent review on the *Melierax* group is that of Kirk-Swann in *Ibis*, Vol. 5, 1923, pp. 607-10. In this paper he suggests that the birds hitherto known as *metabates* and *poliopterus* should be reckoned as races of *musicus*. Hartert in V.P.F., pt. 9, p. 1166, accepts the name *canorus* for the group. It is a pity that Swann did not give the exact localities of the birds examined and assigned to the several races as this would no doubt have assisted in placing doubtful examples. The range of *poliopterus* is given as E. Africa, from Somaliland to Kilimanjaro, that is, following a south-westerly course. Specimens

from Baringo and N. Uganda are, according to Swann, referable to the race *mechowi*, Cab., a form which extends from Angola to Nyassaland Uganda and the northern area of Kenya. *Metabates* ranges across Africa from N. Somaliland to Gambia, between the 5 and 13 N. Lat.

It will be realised then, that in a species with a very wide range, three forms of which more or less converge on Kenya and Uganda, one is bound to find examples which might with justification be referred to either of two races.

The specimens under discussion, coming as they do from N. Jubaland, should undoubtedly be referred to the race *poliopterus*, but of the four examples obtained, one has barred upper-tail-coverts and is dark, and approaches *metabates*. A specimen obtained in the Kerio-Turkwell district is undoubtedly *metabates*!

♂ 3, Mafudu, Lugh, Mandaira, February, 1922; September, 1923; October, 1922. ♀ Mandaira, October, 1922.

\*Sclater treats *musicus*, *poliopterus*, and *metabates* as distinct species.

78. **Melierax gabar gabar**, Daud. White-rumped Sparrow Hawk.  
♂ Dolo, December, 1922.
79. **Astur badius sphenurus**, Rupp. Pale-breasted Sparrow Hawk.  
♂ 4, Serenli, August, 1922; Mandaira, January, 1923; Dolo, December, 1922; Kasut, August, 1923. ♀ Merile, August, 1923.
80. **Circaetus pectoralis**, Sm. Black-breasted Harrier Eagle.  
♂ Jebeir, March, 1923.
81. **Hieraetus ayresi**, Gurney. Speckled Hawk-Eagle.  
♂ Serenli, January, 1923.

This is an interesting specimen as illustrating the change from immature to adult plumage. It however, does not support Davis's remarks, *Ibis*, 1919, p. 174. This bird has a whitish forehead and white cheeks and earcoverts. There is a distinct rufous line round the neck. Very few feathers of the breast have black shaft streaks and the tarsi are all but immaculate. The wing measures 350 mm. The secondaries are barred on the outer web as is also found to be the case in some of the fully adult specimens in my collection.

This specimen therefore possesses some of the characters of both species, *ayresi* and *spilogaster*, cited by Davis as distinguishing the two.

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\* Sclater's *Systema Avium Æthiopicarum*, pt. 1, 1924.

82. **Aquila rapax raptor**, Brehm. Northern Tawny Eagle.  
 This bird is plentiful in the area dealt with in this paper. The youngest specimen in the series is in the pale isabelline plumage, with rectrices, primaries, and secondaries dark brown.  
 ♂ 4, Mandaira, June, 1922 and July, 1923; October, 1922; Lugh, July, 1923. ♀ 2, Neboi, June, 1922; Serenli, June, 1922.
83. **Terathopius ecaudatus**, Daud. Bateleur Eagle.  
 Common. ♂ Lollsheid, September, 1922. ♀ Kombirra, December, 1923.
84. **Gypaetus barbatus meridionalis**, Keys and Blas. Lammergeyer.  
 ♂ Mandaira, October, 1922.  
 This is a young bird in intermediate plumage.
85. **Cuncuma (Haliaetus) vocifer**, Daud. White-headed Fish-Eagle.  
 ♀ Hellesheid, July, 1922.
86. **Poliohierax semitorquatus castanotus**, Heugl. } Northern Pigmy  
*Poliohierax semitorquatus homopherus*, Oberh. } Falcon.  
 ♂ 6, Serenli, August, 1922; Mandaira, September, October, and November, 1922. ♀ 3, Mandaira, September and October, 1922; Dolo, December, 1923.  
 Wings 108-115 mm.
87. **Kaupifalco monogrammicus**. Lesser Whistling Hawk.  
 ♀ Jebeir.  
 I have deliberately omitted to indicate the race to which this bird belongs. Taking the characters, as given by Swann in his synopsis of the *Accipitres*, differentiating the geographical forms, it is evident that in Kenya and Jubaland one frequently obtains birds which might quite readily be assigned to either the northern or southern forms.  
 The character of the barring on the underside is variable as is also the position and width of the bar on the rectrices.

STRIGIDÆ.

88. **Bubo lacteus**, Temm. Milky Eagle Owl.  
 ♂ Mandaira, January, 1923.
89. **Scotopelia peli fischeri**, Zedl. Rufous Fishing-Owl.  
 The male is rather richer in colour than the female, especially on the wings and back. Wings 420 mm., thus rather larger than the measurements given by Reichenow.  
 ♂ Waibo, September, 1923. ♀ Jebeir, September, 1923.
90. **Bubo africanus africanus**, Tem. Lesser Grey Eagle Owl.  
 Juv., Neboi, June, 1922.

91. **Otus senegalensis**. Pigmy Owl.

♂ Neboi, 8/6/22.

This is a very small specimen with wings of 112 mm. The first primary equal in length to the seventh, thus approaching to the southern *O. s. capensis*, but it is quite a different looking bird. Until I have the opportunity of further comparison I refrain from assigning it to any particular race.

92. **Glaucidium perlatum**. Pearl-spotted Owl.

♀ Dolo, December, 1922.

PSITTACIDÆ.

93. **Poicephalus rufiventris simplex**, Rehw. Salmon-bellied Parrot. and intermediates to Somali race, *pallidus*, van Som.

These birds have smaller wings and bills than specimens of true simplex. Wings 139-155 mm. against 150-165 mm., and those from Serenli and Mandaira are paler on the head and neck. ♂ 8, Waghier, June, 1922 and May, 1922; Neboi, June, 1922; Serenli, August, 1922; Mandaira, July, 1923; N. Guasso, July, 1923. ♀ 4, Serenli, Mandaira, and N. Guasso.

MUSOPHAGIDÆ.

94. **Turacus fischeri**, Rehw. Fischer's Red-headed Plantain Eater.

♂ 2, Jebeir, March, 1923. ♀, March, 1923.

95. **Corythaixoides leucogastra**, Rupp. White-bellied Plantain Eater.

♂ 2, Serenli, July, 1922. ♀ 2, Serenli, August, 1922; Kasut, September, 1923. Smaller than Kenya specimens, with wings 200-204 mm.

CUCULIDÆ.

96. **Centropus superciliosus intermedius**, van Som. Hackled-neck Cuckoo.

♂ 2, Jebeir, March, 1923; Marsabit, July, 1923.

Wings 136-147. The examples of this Cuckoo from the coast up the Juba and the Northern Frontier belong to the small dark race, which I recognise. I might add that specimens from N. Kavirondo and Uganda tend towards the Angolan form.

97. **Clamator jacobinus**, Bodd. Black-backed Crested Cuckoo.

Neboi, June, 1922; Jebeir, June 1922.

98. **Coccytes serratus albonotatus**, Shell. Black Crested Cuckoo.

Jebeir, March, 1923. Wings 165 mm.

99. **Chrysococcyx klaasi**, Steph. White-bellied Emerald Cuckoo.

♂ 2, ♀ 2, Serenli, August, 1922.

INDICATORIDÆ.

100. **Indicator exilis erlangeri**, Zedl. Somali Little Honeyguide.  
♂ 2, Serenli, February, 1923. ♀ 2, Unsi, January, 1923.  
Wings 77-81 mm.

CAPITONIDÆ.

101. **Lybius melanopterus**, Sbp. Juba White-bellied Red-headed  
Barbet

♂ 4, Jebeir, March, 1923 and April, 1923.

These specimens are of interest as they possess certain characters which cause them to differ from typical *melanopterus*. They are paler on the breast, without a darkening of the lower breast feathers to form a distinct breast band. The white of the abdomen is less in extent and there are no white bases to the feathers of the cheeks and sides of the neck.

102. **Tricholaema melanocephala stigmatothorax**, Cab. Brown-throated Barbet.

The type of this bird came from Ndi, and from this locality I have a large series. The birds from the N. Guasso agree with this race, but there is a tendency in one specimen to approach the Somali form. Wings 6-70 mm.

N. Guasso, Archer's Post, June, 1920, November, 1920, June, 1923, June, 1920.

103. **Tricholaema melanocephala blandi**, Phil. Somali brown-throated Barbet.

These differ from the preceding examples in being smaller (wings 60-65 mm.), and in having the brown patch on the throat and breast markedly speckled, with whitish tips and pale shafts streaks. Serenli, Mandaira, February, 1923; July, 1922; August, 1922; and September, 1922. Seven specimens.

104. **Barbatula (Pogonilius) pusilla nr. affinis**, Rehw. Red-fronted Pigmy Barbet.

Comparison shows that these birds are smaller than examples taken in Kenya (wings 47-50 as against 53-57 mm.). They agree better with specimens from Lamu and Manda.

♂ 3, Jebeir, Serenli, August, 1922. ♀ 3, Jebeir, Serenli, Neboi, April, 1922; June, 1922; August, 1922.

105. **Trachyphonus d'arnaudi bohmi**, Fisch. Rehw. Bohm's Waxy-headed Barbet.

Paler on the underside than Kenya specimens and averaging smaller in wing measurements: 70-75 mm. as against 75-81 mm.



106. **Trachyphonus erythrocephalus shelleyi**, Hartl. Lesser Red-headed Waxy Barbet.  
 The examples obtained are distinct from the race mentioned below. They are very much smaller, and richer in colour. It would be of interest to ascertain in what area the two forms meet. ♂ 2, Mandaira, Neboi, 2, June, 1922; October, 1922. ♀ 2, Mandaira, October, 1922.

107. **Trachyphonus erythrocephalus erythrocephalus**, Cab. Red-headed Waxy Barbet.  
 ♂ 3, ♀ 2, Marsabit, July, 1923.  
 I was surprised to find that these specimens belong to the large typical race and not to the above.

PICIDÆ.

108. **Thripius namaquus schoensis**, Rupp. White-faced Black-breasted Woodpecker.  
 ♂ 3, Neboi, June, 1922; July, 1922.
109. **Campothera nubica nubica**, Gm. Red-headed Spotted Woodpecker.  
 ♂ 2, ♀ 3, Archer's Post, June, 1923.
110. **Campothera nubica pallida**, Sharpe. Red-headed Barred Woodpecker.  
 ♂ 7, ♀ 4, Neboi, Serenli, Mandaira, Lugh, June, 1922; July, 1922; August, 1922; December, 1920.  
 In this series the majority conform to the pale race though one or two show a transition to the typical form.
111. **Dendropicos fuscescens hemprichi**, Ehr. } Syn. Pale-barred  
*Dendropicos fuscescens albicans*, Zedl. } Little Woodpecker.  
 ♂ 2 ♀ 2, Serenli and Mandaira, August, 1922; October, 1922.
112. **Dendropicos fuscescens massaica**, Neum. Small Barred-back Woodpecker.  
 ♂ 4, ♀ 2, Archer's Post, N. Guasso, November, 1920; June, 1920; June, 1923.
113. **Colius striatus marsabit**, Jackson. Marsabit White-cheeked Coly.  
 This recently described form of which I have specimens from the type locality, can be admitted as a barely recognisable race, when compared with birds from N. Kenia, but how do they differ from *C. l. hilgerti*?

When Jackson described this race from Marsabit he stated that he could not appreciate the differences as recorded by me between birds from Kikuyu and Chagwe, Uganda. I cannot understand this because the material on which I founded my



observations, and specimens collected subsequently, with a view to verification, amply substantiate my statements!

♂ 2, ♀ 1, Marsabit, Kulal, July, 1923.

114. **Colius striatus hilgerti**, Zedl.

**Colius striatus erlangeri.**

♂ 2, Dolo, December, 1922.

Owing to paucity of material I am unable to identify these birds satisfactorily.

115. **Colius leucocephalus turneri**, van Som. Grey-headed Coly.

♂ 1, ♀ 2, Kauro, August, 1923.

Several examples of these Colies were obtained and all conform to the type.

116. **Colius (Urocolius) macrourus nr. pulcher.** Blue-naped Coly.

♂ 5, ♀ 6, Serenli, Neboi, Mandaira, Merile, Kauro, February, 1923; June, 1923; August, 1922; September, 1922; August, 1923.

These birds are nearer to *pulcher* than to the birds obtained at the Coast; indeed these latter are very distinct. The distribution of *C. macrourus* through its races is very interesting. Dr. Hartert, reporting on these pale coastal birds, states that he cannot separate them from typical *macrourus* from Senegal!

When I discussed these birds in *Nov. Zool*, xxix, 1922, I admitted the race *syntactus*, Oberhl., pp. 71-72, as distinct from the Senegal birds, and the birds of Rudolf and Eastern Uganda as intermediates between these and *pulcher*. These intermediates as I have now indicated extend further east to S. Somaliland. They meet with *pulcher* in Ukambani and N. Kenya. Along the coast we find a very pale bird which cannot be confused with *pulcher*, and yet which, according to Hartert is the same as the Senegal race. We thus have two pale races, without known lines of communication differing in no way, and apparently separated by a richly coloured form. The explanation of this is at present obscure.

Claude Grant in *Ibis*, 1915, p. 405, lumps all the birds from Senegal to Somaliland as *macrourus*, and gives as the range of *pulcher*, Baro River Lado, greater part of Kenya to Lake Nyassa, and omits consideration of the birds of Lake Albert Edward and Kivu and those of the Coast of Kenya, both of which are not *pulcher*!

TROGONIDÆ.

117. **Apaloderma narina.** Crimson-breasted Trogon.

♂ 2, Jebeir, ♂ 1, Jebeir, March, 1923. Wings 117-125 mm. Tails 155-160 mm.

Chapin has recently reviewed the races and species of the White-tailed Trogons, but unfortunately does not indicate to which race birds inhabiting Jubaland and Somaliland, belong.

An examination of the material from Jubaland and the coast of Kenya, reveals the fact that the former birds are smaller than coast examples, and that these latter are also smaller than the measurements given by Chapin for typical *narina narina*, viz.: Wings 129-144 mm. Tails 160-200 mm. Kenya examples give as a maximum 130 mm., the majority 125 mm., while Coast and Juba birds vary from 117-125 mm. in wing measurements, and tails of 155-160.

They thus come within the limits of the race *aequatoriales*, but they have the cheek patch divided as in *narina*. Further investigation is required.

#### CORACIIDÆ.

118. **Coracias caudatus lorti**, Shelley. Lilac-throated Roller.  
♂ 6, ♀ 3, Mandaira, Neboi, Dolo, Jebeir, Serenli, April, 1923; June, July, August, and October, 1922; November, 1923.  
I have retained this as a race of *caudatus*, but would mention that both typical *lorti* and *caudatus* do occur together in certain areas, but whether they do so all the year round or whether they overlap during migration has not yet been ascertained.
119. **Coracias naevius**, Daud. White-naped Roller.  
Dolo, June, 1923. A young bird with pale underside and olive green crown.
120. **Eurystomus afer suahelicus**, Neum. Eastern Yellow-billed Roller.  
♂ 2, Jebeir, Serenli, March, 1923. Wings 160-170.

#### BUCEROTIDÆ.

121. **Lophoceros erythrorhynchus erythrorhynchus**, Tem. Red-billed Hornbill.  
♂ N. Guasso, June, 1923.
122. **Lophoceros flavirostris flavirostris**, Rupp. Yellow-billed Hornbill.  
♂ Mandaira ♀, September, 1922.  
The male has an abnormal bill; the upper edge is laterally compressed for almost half an inch in depth along practically the entire length, thus rendering the bill very deep.
123. **Lophoceros deckeni**, Cab. Pied Hornbill.  
♀ 1, Mandaira, July, 1923.
124. **Lophoceros nasutus nasutus**, L. Black-billed Grey Hornbill.  
♂ Jebeir, April, 1923. Wings 235 mm. Bill 125 mm.

ALCEDINIDÆ.

125. **Halcyon leucocephalus centralis**, Neum. Brown-bellied Kingfisher.  
♂ 6, ♀ 4, Unsi, Dolo, Serenli, Jebeir, January and April, 1923; June, July, and August, 1922.
126. **Halcyon albiventris erlangeri**, Neum. Lesser Buff-breasted Kingfisher.  
♂ 3, ♀ 3, Serenli, Jebeir, February, 1923; April, 1923.  
A very good race. Wings 90-93 mm. Twelve examples of *albiventris orientalis* from Dar-es-Salaam give 101-107 mm. This reduction in wing measurement and the shortness of the tail are constant features. Granvik in J.f.O. February, 1923, p. 104, records his Mombasa birds as *erlangeri*. I think this a mistake, for my 18 birds from Mombasa and adjacent areas are all large and agree with more southern examples, Dar-es-Salaam. *Orientalis* and *erlangeri* do not occur side by side.
127. **Halcyon chelicuti chelicuti**, Stanley. Striped Kingfisher.  
♂ 3, Marsabit, August, 1923.
128. **Ceryle rudis**, L. Pied Kingfisher.  
♂ 3, Serenli Jebier, February and April, 1923. ♀ 2, Jebeir, Dolo, March, 1923; December, 1922.
129. **Ispidina picta**, Violet-eared Kingfisher.  
♂ 4, ♀ 3, Serenli, Dolo, February and March, 1923; July and December, 1922. Wings 43-50. Kenya and Uganda specimens give the following: 55-57 mm.

MEROPIDÆ.

130. **Melittophagus revoilii**, Oust. Buff-breasted Blue Bee-Eater.  
♂ 6, ♀ 5, Unsi, January, 1923; Kasut, Karoli, Archer's Post, November and December, 1920; July, 1923.
131. **Melittophagus pusillus cyanostictus**, Cab. Little Blue-eyebrowed Bee-Eater.  
♂ 9, ♀ 4, Lugh, Dolo, Serenli, N. Guasso, July, August, and December, 1922; February and March, 1923.  
There is a marked tendency for the birds from Serenli and Lugh to develop breast-bands of a decidedly deep blue, not black.
132. **Acrops albicollis major**, Parrot. White-throated Long-tailed Bee-Eater.  
♂ 3, ♀ 2, Mandaira, September, 1922; Merile, August, 1923.

133. *Merops superciliosus superciliosus*, L. Brown-throated  
Long-tailed Bee-Eater.  
Unsi, January, 1923. These birds are very dark, with the  
green shaded with brown.
134. *Merops nubicus nubicus*, Gm. Crimson Longtailed Bee-Eater.  
♂ 3, ♀ 3, Neboi, Dolo; Unsi, Mandaira, June, August, and  
December, 1922.

UPUPIDÆ.

135. *Upupa epops epops*, L. European Hoopoe.  
♂ 2, ♀ 1, Mandaira, September, 1922; Dolo, December, 1922.  
These specimens undoubtedly belong to the European race,  
and are early migrants.
136. *Upupa epops somaliensis*, Salvin. Somali Hoopoe.  
♂ 1, ♀ 1, Mandaira, September, 1922. Dark rufous birds  
with no white band on the crest.
137. *Upupa epops africana*, Bechst. African Hoopoe.  
♂ 3, N. Guasso, June, 1923.

PHÆNICULIDÆ.

138. *Phoeniculus damarensis granti*, Neum. Purple-headed Red-billed  
Woodhoopoe.  
♂ 2, Kauro, August, 1923.
139. *Phoeniculus somaliensis*, Grant. Somali Black-billed Wood-  
hoopoe.  
♂ 3, ♀ 3, Mandaira, October, 1922; Dolo, June, 1922.
140. *Rhinopomastus minor somaliceps*, Erl. Yellow-billed Wood-  
hoopoe.  
♂ 5, ♀ 5, Mandaira, Serenli, Neboi, Lugh, February, 1923;  
June, July, and August, 1922.

In this series there are two birds with light earth-brown  
breasts, and greyer cheeks, and yellowish bills. The plumage  
is in fresh condition. At what age do the birds assume this  
dress? It is apparently not the first plumage, for in this stage  
the cheeks, throat, and breast are dull blackish; the bill brown-  
black, with yellow gape.

The type of *cabanisi* came from Khartoum, and unfortunately  
I have not been able to compare typical birds.

Birds from Uganda and Kenya give the following wing  
measurements: 7 ♂♂, 106 mm., 2 ♂♂, 105 mm., 2 ♀♀ 92 mm.  
Those from the Juba, ♂ 90-96 mm., majority 92 mm., ♀♀ 82-

83 mm. It will thus be seen that the Juba birds are considerably smaller; the bills and tails show correspondingly small measurements, there being 15 mm., difference in the bills and 28 mm. in tail length.

- 140a. **Rhinopomastus minor cabanisi**, Defil.  
5 ♂♂ and 3 ♀♀ were taken in the N. Guasso district, November, 1920 and June, 1923. They are all of the large form, agreeing in size and colour with Kenya examples.
141. **Rhinopomastus cyanomelas schalowi**, Neum. Black Scimitar-billed Hoopoe. Jebeir, April, 1923.

#### CAPRIMULGIDÆ.

142. **Caprimulgus donaldsoni**, Sharpe. Little desert Nightjar.  
♂ 2, Serenli, February, 1923. ♂ 2, Langaia, August, 1923.  
The Serenli birds are immature and are in the golden-rufous dress; the other two are adult and represent the rufous and grey varieties.
143. **Caprimulgus inornatus**, Heugl. Plain-backed Nightjar.  
♂ 1, ♀ 2, Koroli, Marsabit, July, 1923.
144. **Caprimulgus clarus clarus**, Reich. Little Pale Nightjar.  
♂ Jebeir, March, 1923. ♀ Serenli, April, 1923.
145. **Caprimulgus keniensis**, van Som. Kenya Nightjar.  
♂ N. Guasso, November, 1920.

#### MICROPODIDÆ.

146. **Micropus affinis abessynicus**, Streubl. Square-tailed White-rumped Swift.  
♂ 3, ♀ 2, Humbale, June, 1923; Chandler's Falls, December, 1920.
147. **Tachynantes parvus parvus**, Leht. Palm Swift.  
♂ 4, ♀ 5, Mandaira, July, 1923; N. Guasso, June, 1923.  
These birds show intergradation to the race *myochrus*.

#### HIRUNDINIDÆ.

148. **Hirundo aethiopica**, Blanf. Red-fronted Swallow.  
♂ 2, ♀ 2, Serenli, April, 1923.
149. **Hirundo smithi smithi**, Leach. Wire-tailed Swallow.  
♂ ♀, Neboi, June, 1923, Serenli, April, 1923.
150. **Hirundo abyssinica abyssinica**, Guer. Northern Stripe-breasted Swallow.  
N. Guasso, June, 1923.

MUSCICAPIDÆ.

151. *Melaeornis edolides schistacea*, Sharpe. Somali Black Flycatcher.

These birds are readily distinguishable from *ugandae* by the white inner webs to the primaries and secondaries.

152. *Bradornis griseus erlangeri*, Reich. Somali Grey Shrike-Flycatcher.

♂ 7, ♀ 4, Serenli, February, July, and August, 1923; Neboi, June, 1922; Mandaira, September and October, 1922. Wings 69-82 mm.

153. *Bradornis griseus griseus*, Rehw. Large white-throated Shrike-Flycatcher.

♂ 3, ♀ 1, N. Guasso, June, 1923.

These birds agree with examples from Kitui and Simba and are nearer to *griseus* than any other race.

154. *Bradornis pallidus* intermediate to *subalaris*.

♂ 6, ♀ 5, Serenli. March, 1923; July and August, 1922. Wings: ♂ 80-83, av. 81 mm. ♀ 74-77, av. 75, thus smaller than *subalaris*, which gives (40 skins) 80-88, av. 87.

The races of these Greyish Flycatchers are extremely difficult to define with any exactness. From observation in the field and study of specimens in my collection and those at Tring and elsewhere, I am led to suggest that there are two main groups, *Pallidus pallidus* and *Griseus*, both with several geographical race. I would include in the *pallidus* group, the birds known as *murinus*, and its supposed races. In this I should be endorsing Reichenow's views to a certain extent.

Within Kenya and Uganda boundaries, we find races of both these species, and the specimens naturally fall into these two groups as follows:—

- B. p. pallidus*, Mull. N. and N.W. Uganda. Wings 80-81 mm.
- B. p. suahelicus*, v. S. Kenya, inland to N. shores V. Nyanza.
- B. p. subalaris*, Sharpe. Coast belt, Kenya. Wings 80-88, av. 87 mm.
- B. p. intermediate* form Juba River, Serenli. 80-83, av. 81 mm.
- B. griseus griseus*, Rehw. Masai country to S. Kavirondo. 85-90 mm. (Birds from Simba and Ukamba intermediate.)
- B. gr. pumilus*, Sharpe. Karomoja, Turkana, W. Rudolf.
- B. gr. erlangeri*, Achw. S. Somaliland to Jubaland and Tana-land.

These two species can be distinguished by the colour of the inner webs of the wing feathers, *pallidus* having these



decidedly pink-buff, and *griseus*, greyish to white. From the very large series at my disposal it would appear that none of the so-called *murinus* overlap the *pallidus* group and as there is a close resemblance and affinity between these it is not unreasonable to suggest that all are races of the one species *pallidus*.

155. **Aleornax murinus**, Sb.-sp. Little Brown Forest Flycatcher.

I have before me a good series of birds from Kilimanjaro, type locality of *murinus*. These, when laid out with examples from Nairobi, north to Elgon, and west to Masindi and Buddu, show that there are undoubtedly three races, and with the specimens from Marsabit, possibly a fourth: ♂ 3, ♀ 1, Marsabit, July, 1923.

In my paper in *Nov. Zool.*, XXIX, 1922, p. 96, I remarked that as I had no Kilimanjaro specimens for comparison, I provisionally placed my Nairobi birds as *murinus*—I now have no hesitation in keeping them distinct. Typical *murinus* are much darker, ashy-brown, with this colour extending to the breast and flanks, giving to the abdomen a paler greyish appearance. Birds from Nairobi to Nandi are more brownish ashy-grey, with paler underside. Marsabit examples are more like Uganda specimens but greyer on the back, with rump and upper tail-coverts brownish, and the underside paler.

156. **Aleornax coerulescens cinerea**, Fisch.—Hartl. Coast Grey Flycatcher.

♂ 1, ♀ 1, Jebeir, Hellesheid, March, 1923; July, 1923.

Similar to the coast birds which differ from the inland race.

157. **Batis orientalis somaliensis**, Neum. Somali Brown-barred Puff-back Flycatcher.

♂ 2, ♀ 2, N. Guasso, Waghier, June, 1923.

158. **Batis minor (bella) minor**, Erl.

♂ 3, ♀ 2, Serenli, March, 1923; July and August, 1922.

I have no birds from the type locality of *bella*, Elliot, Le-Gud, Somaliland, and cannot say whether *minor*, Erl., is identical. cf. Sclater and Praed, *Ibis*, 1918, p. 798.) In my paper in *Nov. Zool.*, XXIX., 1922, p. 100, I erroneously stated that these authors considered *minor* a synonym of *bella*. They state that *minor* belongs to the same group as *bella*. I take it that they admit *minor* as a race of *bella*\*

Neuman, in his review, used *minor* as the parent form and gave several races, and I was inclined to uphold his views; but as *bella* is the older name and if Sclater and Praed are right,

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\* See Sclater, *Systema Avium Ethiopianum*, Pt. II., p. 423.

it (*bella*) should be used for the group. Within Kenya and Uganda boundaries we would thus have:—

*Batis bella minor*, Erl. S. Somaliland, Juba to Tanaland.

*Batis bella suahelica*, Neum. Coastal belt from Tana River to Pangani and inland to Taru and Teita.

*Batis bella nyanzae*, Neum, Uganda, Kavirondo to Nandi, and the N. Loita.

159. **Platystira peltata peltata**, Sund. Kilimanjaro Black-banded Wattle-eyed Flycatcher.

♂ Serenli, March, 1923.

160. **Tchitrea viridis ferreti**, Guer. } Brown Paradise Flycatcher.  
*Suahelica*, Reich. } Syn.

♂ 11, ♀ 5, Marsabit, July, 1923; Neboi, June, 1922; Serenli, July and August, 1922; Dolo, December, 1923; Jebeir, July, 1922.

These birds would appear to assume the full white-backed plumage at a much earlier date than do Uganda ones or even those from Kilimanjaro.

#### CAMPEPHAGIDÆ.

161. **Campephaga phoenicea**, Lath. Red-shouldered Cuckoo-shrike.  
♂, ♀, Serenli, August, 1922.

162. **Coracina caesia pura**, Sharpe. Grey Cuckoo-Shrike.  
♂, ♀, Marsabit, July, 1923.

#### LANIIDÆ.

163. **Eurocephalus rupelli**, Os. White-headed Shrike.  
♂ 8, ♀ 5, Serenli, July and August, 1922; March, 1923; Dolo, December, 1922; Neboi June, 1922; Mandaira, September, 1922; N. Guasso, June, 1923; November, 1920; December, 1920.

This series is very uniform in colour and shows no difference in shade by which they can be kept apart from Kenya birds. The wing measurements 120-124 mm. are similar to those of birds from the Coast up to Kechileba, viz., 120-125 mm., indicating that size is of no importance, so far as Kenya is concerned.

164. **Prionops melanoptera vinaceigularis**, Richd. Kilimanjaro Helmeted Shrike.

♂ 7, ♀ 5, Mandaira, September, 1922; Dolo, December, 1922; Neboi, June, 1922; Serenli, July and August, 1922; Jebeir, March, 1923.

I have been compelled to place all these birds as the southern race, as 10 out of 12 have white edges to the outermost secondaries, further they are not larger than birds from Tsavo.

I fail to find any difference in colour. Shelley includes the Lower Juba within the distribution of typical *melanoptera*, but I can find no bird in this series which could be placed as this race.

165. *Nilaus minor erlangeri*, Neum. } Somali brown-flanked Shrike.  
? *minor minor*, Sharpe. }  
♂ 7, ♀ 6, Serenli, March, 1923; July and August, 1922; Mandaira, September and October, 1922. ♂ 4, ♀ 3, Kasut, August, 1923; Marsabit, August, 1923; N. Guasso, December, 1920.

In this large series there is variation in the white feathers of the back and wings. Some have these pure white, others decidedly tinged with buff. Measurements of the wing give 70-74 mm., those from N. Guasso 73-75, while Teita birds give 74-84 mm.

166. *Tchagra senegala catholeuca*, Neum. Red-winged Scrub Shrike.  
♂ 5, ♀ 2, Serenli, Jebeir, July, 1922; February and April, 1923.  
These birds are nearest to the race *orientalis*, but are paler on the back and wings, but similar on the under-surface. Wings 82-86 mm., majority 84.

167. *Tchagra jamesi nr. kismayensis*, Neum. Stripe-headed Bush Shrike.  
♂ 9, ♀ 3, Serenli, July and August, 1922; Mandaira, September and November, 1922; Neboi, July, 1922. ♂ 4, ♀ 3, N. Guasso, December, 1920.

These birds are really intergrades between the pale coast form and true *jamesi*, having the pale heads of the former, but are darker on the under-surface. The N. Guasso birds and those from Mandaira and Neboi are nearer to typical *jamesi*.

168. *Nicator chloris gularis*, Hartl. & Fisch. Brown-throated Nicator.  
♂ 2, Jebeir, March, 1923.

169. *Rhodophoneus cruentis hilgerti*, Neum. Southern Red-throated Desert Shrike.

♂ 10, ♀ 6, Unsi, 1923; Dolo, June, 1922; Serenli, August, 1922; Marsabit, July, 1923; Kasut, August, 1923; Archer's Post, November, 1920; N. Guasso, November, 1922.

There is still some evidence in the birds from the N. Guasso of the influence of the more southern form, *cathemagmenus*, as shown by the presence of some black on the throat of one male.

- The very young bird shot August, 1923, has no breast spot, no pink wash on the head and mantle, and very faint pink wash on the centre of the breast.
170. **Laniarius funebris degener**, Hilgert. Lesser Grey-black Shrike.  
 ♂ 6, ♀ 6, Mandaira, September, 1922; Dolo, June, 1922; Serenli, March, July, and August, 1922.  
 These I take to be true *degener*. The characters distinguishing this race from *funebris* are: The much bluer-grey back and rump, and the decidedly grey breast and abdomen. The blue-black of the throat is clearly defined from the grey of the breast. Wings 84-90 mm.
171. **L. f. degener**, intermediates.  
 The birds referred by me to this race, in my paper in *Nov. Zool.*, XXIX., 1922, p. 117, are intermediate between this form and *funebris*. Such intermediates as these occur in the Northern Frontier at Matthew's Range, December, 1920; Marsabit, July, 1923; Ngombe Crater, December, 1920. 13 specimens.
172. **Laniarius nigerrimus nigerrimus**, Rchw. } Coast Black Shrike.  
**Laniarius nigerrimus erlangeri**, } Syn. ?  
 ♂ 5, ♀ 2, Jebeir, March and July, 1922; Mufudu, April, 1923.  
 These birds come from the type locality of the race *erlangeri*. In the paper quoted under the last species, I doubted the validity of the race. Now that I have topotypical specimens of the two supposed races, I have to admit that they are identical.
173. **Laniarius ferrugineus ambiguous**, Mad. White-shouldered Pied Shrike.  
 ♂ 2, ♀ 4, Marsabit, July, 1923. Juv. July, 1923.
174. **Laniarius ferrugineus somaliensis**, Rchw. South Somali Pied Shrike.  
 ♂ 4, Juv. 1, ♀ 2, Jebeir, March and April, 1923.  
 A very small race of *aethiopicus*, which apparently is constant. Wings 85-87 mm.
175. **Laniarius ruficeps kismayensis**, Erl. Crimson-naped Shrike.  
 ♂ 2, Kismayu, October, 1923.  
 These birds have a dull crimson nape patch, not red, as in the birds from further north on the Juba.
176. **Laniarius ruficeps rufinuchalis**, ?. Red-naped Shrike.  
 ♂ 3, ♀ 1, Warega, July, 1923; Odda, May, 1922.  
 One would have expected these birds to belong to the race *kismayensis*, Erl., but they agree very much better with the

birds I named *cooki*, from Tsavo. I would not be surprised to find that when the distribution of these several races has been worked out, the Tsavo birds will prove to be merely the extreme form of *ruficeps*.

177. **Dryoscopus gambensis**. Large Grey-winged Shrike.

♂ 3, ♀ 3, Marsabit, July and August, 1923.

These birds are nearest to the race *nyanzae*, Neum., but differ from that form by having the heads decidedly darker than the mantle, both these areas being darker than in *nyanzae*; the upper surface thus resembles the race *erythrae*, but the underside is as dark as in *nyanzae*. These specimens are intermediate between the two forms.

178. **Dryoscopus pringlii**, Jackson. Desert Grey-winged Shrike.

♂ 4, ♀ 2, Mandaira, November, 1922; Archer's Post, December, 1920. These localities extend the known range of this bird. It has hitherto only been obtained in the Taru country.

179. **Dryoscopus (cubla) affinis**, Gray. White-shouldered Puff-back Shrike.

♂ 4, ♀ 2, Serenli, July, 1922; March, 1923.

180. **Malaconotus poliocephalus approximans**, Cab. Mombasa Giant Yellow Shrike.

♂ 8, ♀ 5, Neboi, June, 1922; Dolo, December, 1922; Mandaira, September, 1922; Jebeir, March and April, 1923; Serenli, February and March, 1923; August, 1922.

These birds agree best with the above race described from Pangani. The wings vary from 105-115 mm., majority 108, thus agreeing with birds from Lamu, which in my paper in *Nov. Zool*, 1922, I kept apart from true *approximans* on account of their smaller size and paler colouration. Typical *approximans* have wings of 108-120, mostly 115-118.

181. **Malaconotus poliocephalus nr. blanchoti**, Stp.

♂ 2, ♀ 2, Marsabit, July, 1923.

These birds agree in most respects with specimens from Kenya Highlands, which in the above-mentioned report I referred to as *blanchoti*. They are not the race *schoanus*, Neum.

These giant Shrikes vary to such a degree as to make it almost impossible to give accurate descriptions of forms. The species is wide-spread and there appears to be considerable overlapping.

182. **Lanius collaris humeralis**, Stanl. White-shouldered Fiscal Shrike.

♂ Marsabit, July, 1923.



183. **Lanius dorsalis**, Cab. Saddled Fiscal Shrike.  
 ♂ 5, ♀ 4, Serenli, July and August, 1922; Kulal, October, 1923; Isiola, April, 1922; N. Guasso, June, 1923; December, 1920.  
 These birds do not differ from specimens from Ndi and Tsavo, type locality of the species.
184. **Lanius autinorii mauritii**, Neum. Koroli white-rumped Saddled Shrike.  
 ♂ 4, ♀ 2, Juv. 3, Koroli, July, 1923; Marsabit, July, 1923.  
 These specimens are topotypical and agree with birds taken at Meuressi. The young in first plumage, unlike most shrikes of this group, is not heavily barred on the crown and mantle, but is almost uniform grey-brown, with very small pale tips to the feathers of the lower back; the coverts and inner secondaries are widely margined with brown, and the longest secondaries and primaries are white tipped.  
 The undersurface is white from chin to vent, with a greyish wash on the sides of the breast, and feint barring.  
 The uppermost feathers of the ear-coverts are dark ashy, while the lower ones are white. The cheeks are markedly white.  
 The rump and upper tail-coverts are white, the latter showing very slight barring. The centre rectrices are tipped with dirty white or brownish, the outermost pair pure white, the next two pairs with diminished amounts of white at the ends.  
 In the following plumage the young bird becomes grey on the head and mantle, slightly darker on the former area.
185. **Lanius minor minor**, Gm. European lesser Grey Shrike.  
 ♂ 2, ♀ 4, Jebeir, March, 1923.  
 Common on migration.
186. **Lanius cullurio cullurio**, Linn. European Red-backed Shrike.  
 ♂ 5, ♀ 6, Jebeir, March and April, 1923; August, 1922; Archer's Post, November, 1920.
187. **Lanius cristatus isabellinus**, Hemp. Ehrn. Isabelline Shrike.  
 ♂ 2, ♀ 1, Matthew's Range, December, 1920.
188. **Lanius cristatus phoenicuroides**, Schl. Brown-capped Red-tailed Shrike.  
 ♂ Jebeir, March, 1923.

#### DICRURIDÆ.

189. **Dicrurus adsimilis ? lugubris**. Drongo Shrike.  
 ♂ 8, ♀ 5, Dolo, December, 1922; Neboi, June, 1922; Mandaira, October, 1923; Serenli, July and August, 1922; June, 1923.



Bannerman has recently reviewed the African *Dicruridae* but does not discuss the validity of *lugubris*, but states that the birds from East Africa and Uganda, Abyssinia, Somaliland, and Sudan are similar to the Senegal bird, *i.e. divaricatus*. Comparing the Jubaland birds with a very big series from Kenya it is quite obvious that the former are smaller and that the tails are of a different shape. The outer rectrices are not so outwardly curved and the fork not so deep.

It seems to me that one is not justified in placing these birds as *divaricatus*. Wings 112-125 mm., majority 118.

190. **Dicrurus ludwigi ludwigi**, Sm. Little square-tailed Drongo.  
♂ 3, ♀ 3, Kismayu, April, 1923; Jebeir, July, 1923; and Tana River (Caldwell Coll.).

According to Hartert these birds cannot be distinguished from typical Natal birds. Erlanger obtained examples on the Juba River. They apparently extend up the Coast, but do not penetrate inland.

#### CORVIDÆ.

191. **Corvus corax edithae**, Phil. Somali Raven.  
♂ 2, ♀ 1, Mandaira, October, 1922; Neboi, June, 1922.  
There is quite a marked difference in the colour of these three birds. Two are bronzy brown on the head and neck, the other one blue-brown. Wings 335-340 mm.

#### ORIOOLIDÆ.

192. **Oriolus oriolus**, Linn. European Oriole.  
♀ 2, Mandaira, October, 1922.
193. **Oriolus auratus notatus**, Rehw. South African Golden Oriole.  
Jebeir, Serenli, July, 1922.
194. **Oriolus monacha reichenowi**, Zedl. Coast Black-headed Shrike.  
♂ 7, ♀ 4, Neboi, June, 1922; Dolo, June, 1922; Mandaira, September, 1922; Serenli, July and August, 1922; Hellesheid, July, 1922.

These birds have wings of 120-130 mm., majority 127 mm., av. 124, and come within the size of the race *reichenowi*.

Meinertzhagen has reviewed the Genus *Oriolus* in *Ibis*, January, 1923. He has united the highland Kenya birds, named by me *Kikuyensis*, with the Nile birds, *rolleti*. Additional material from both localities go to show that the Kenya birds are always larger. He also places *lactior* as a race of *monachus*, yet himself shows that *lactior* and *rolleti* occur together in Uganda: Two races of the same species inhabiting the same country.

It is possible that Meinertzhagen is not aware that both are resident breeding birds in Uganda; further, that the young are totally different in character.

### STURNIDÆ.

195. **Creatophora carunculata**, Gm. Wattled Starling.  
♂ 4, ♀ 5, Marsabit, July, 1923; Chanler's Falls, November, 1920.
196. **Spreo superbus**, Rupp. White-banded Glossy Starling.  
♂ 7, Dolo, November, 1922; Mandaira, April and September, 1922; Archer's Post, April and June, 1923. Wings 115-120.
197. **Spreo fischeri**, Reichw. Fischer's Grey Glossy Starling.  
♂ 5, ♀ 4, Archer's Post, November, 1920; Serenli, June, July, and August, 1922; March, 1923; Mandaira, September, 1923.
198. **Speculipastor bicolor**, Reichw. Pied Glossy Starling.  
♂ 3, Neboi, June, 1923.
199. **Lamprocolius corruscus mandanus**, van Som. Black-bellied Glossy Starling.  
♂ 4, ♀ 3, Jebeir, July, 1922; April, 1923; Serenli, July, 1922.  
In the *B.B.O.C.*, XLI., p. 124, I separated off the Kenya coastal bird as a race, owing to the fact that all my specimens were so much smaller than the material from Natal. Further specimens from Sokoke Forest suggest that the small size does not hold good in birds from south of the Tana; the Juba birds however are small, having wings of 97-107.
200. **Lamprocolius corruscus**, Sbsp. Kenya Black-bellied Glossy Starling.  
♂ 3, ♀ 2, Meru, Embu, Kenya, September, 1920.  
I was very surprised to find examples of this bird from Mount Kenya, as I had always associated the species with the Coastal Belt and the Lower Tana. These birds evidently extend up the Tana. The only difference that I could find apart from a generally brighter colouration, between Coast birds and these examples is in the wing measurements, the Kenya specimens working out at 115-121 mm. Reichenow gives the measurements of typical specimens as 103-110 mm.  
Further material is required.
201. **Lamprocolius chalybeus**, Ehrenb. Ehrenberg's Green Glossy Starling.  
♂ 3, ♀ 2, Dolo, December, 1922; Kulal, July, 1923; Marsabit, July, 1923. Wings in ♂♂ 148-153; ♀♀ 135-138.

202. **Lamproctornis purpuropterus**, Rupp. Green-headed Long-tailed Starling.

Jebeir, March, 1923; Serenli, July, 1923.

These birds have not got such a decided purple collar as is found in Uganda specimens

203. **Cosmopsarus regius regius**, Rchw. Golden Long-tailed Glossy Starling.

*Cosmopsarus regius donaldsoni*, van Som. Syn.

♂ 8, ♀ 5, Serenli, July and August, 1922; March, 1923; Jebeir, March, 1923; Neboi, June, 1922; Daus River, June, 1922; Mandaira, September and October, 1922; Langai, August, 1923.

This is a very uniform series and shows very well the characters on which I based the supposed race *donaldsoni*. I had accepted the Kilimanjaro birds as typical *regius*; in this I was mistaken as the type came from *Massabubu* on the Tana. The Tana birds are the same as those from South Somaliland and the Northern Frontier, and it is the Kilimanjaro birds which ought to be recognised as a race. This race has now been described, and the error rectified.\*

204. **Galeopsar salvadorii**, Sharpe. Salvadori's Helmeted Red-winged Starling.

♂ 4, ♀ 4, Lasamis, August, 1923; Isiola, December, 1920; Fanwek, September, 1922.

This curious bird has now been taken by my collectors through the country stretching from the N. Guasso to Marsabit and westwards to Suk and West Rudolf.

#### PLOCEIDÆ.

205. (**Textor**) **Bubalornis albirostris intermedius**, Cab. Kenya Coral billed Buffalo-Weaver.

♂ 6, ♀ 9, Lugh, June, 1922; Koroli, July, 1923; Merile, June, 1923; Chanler's Falls, November and December, 1920.

206. **Dinemellia dinemelli**, Rupp. White-headed Giant Weaver.

♂ 5, ♀ 4, Serenli, July, 1922; Neboi, June and September, 1922; Mandaira, October, 1922; Koroli, July, 1923; Archer's Post, June, 1923.

In this series there are two birds which are almost complete albinos; the red on the wings and the rump are, however, normal.

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\* *B.B.O.C.*, XLIV., p. 71, 1924.

207. **Plocepasser donaldsoni**, Sharpe. Somali Grey Sparrow Weaver.  
♂ 12, ♀ 6, Archer's Post, Chanler's Falls, November and  
December, 1920.

This species is particularly common in the above districts.

208. **Plocepasser mahali melanorhynchus**, Rupp. Black-crowned  
Sparrow Weaver.  
♂ 10, ♀ 5, Isiola, Lasamis, April, 1922; October, 1923;  
Mandaira, October, 1922; Archer's Post, November, 1920.

209. **Plocepasser pectoralis propinquatus**, Oust. Shelley. Speckled  
breasted Sparrow Weaver.

♂ 5, ♀ 2, Waregta, July, 1922; Kismayu, October, 1923.

Apparently a rare bird, judging from published records. The  
pale bill described as a character of the race, is merely an  
indication of non-breeding condition. I have specimens which  
were breeding, and all have black bills. Both pale and dark-  
billed birds were shot together. There is no doubt that this  
bird is distinct from *P. mahali melanorhynchus*.

It is of interest that in the case of the distribution of  
*pectoralis* we have an almost parallel example to that of  
*Dicrurus ludwigi*, i.e. a southern African bird extending up the  
Coast of Kenya to South Somaliland.

210. **Anaplectes jubaensis**, van Som. Crimson Weaver.

♂ ♀ Waregta, July, 1922.

211. **Anaplectes melanotus**, Lafr. Black-cheeked Red-headed Weaver.

♂ 2, ♀ 1, Archer's Post, November, 1920.

212. **Symplectes kersteni**, Finsch. Coast Black and Yellow Weaver.

♂ 2, ♀ 2, Jebeir, March, 1923.

Although not differing in colour to birds from Mombasa and  
the Tana there is an appreciable difference in length of wing  
and size of bill. Juba birds give 84-8 mm. as compared to  
90-95 mm. in Mombasa specimens. Young birds are very like  
adults, but the colours are duller, with the throat yellowish  
grey.

213. **Phormoplectes insignis**, Sharpe. } Chestnut-headed  
**Phormoplectes insignis ornatus**, Granvik, } YellowSyn.

♂ 4, ♀ 3, Marsabit, July, 1923.

I was greatly surprised to find this bird at Marsabit, isolated  
as this forest is from any Highland forests. The species has  
hitherto been associated with forests of high altitudes 5,000-  
10,000 feet. Marsabit is not more than 4,000 feet.

A careful comparison of these birds with typical examples does not reveal any constant differences. There is however a decided tendency for Marsabit specimens to develop a deeper chestnut crown and a more slender bill. I have no doubt that in years to come, a good race will be evolved.

214. **Otyphantes reichenowi reichenowi**, Fisch. Reichenow's Black and Yellow Weaver.  
♂ 2, ♀ 1, Marsabit, July, 1923.
215. **Xanthophilus bojeri bojeri**, Fisch. Coast Golden Weaver.  
♂ 3, Jebeir, March, April, and July, 1923.  
Birds from the Juba River have a richer chestnut throat-band than examples from Mombasa.
216. **Xanthophilus castaneiceps**, Sharpe. Brown-naped Golden Weaver.  
♂ 3, Isiola, December, 1920.  
These are large birds with wings of 80-83 mm. Typical examples 74-78.
217. **Hyphantornis spekei**, Heugl. Spekes Masked Weaver.  
♂ 4, ♀ 3, Isiola, April, 1923; April and September, 1922.
218. **Hyphantornis intermedius intermedius**, Rupp. Abyssinian lesser Black-faced Weaver.  
♂ 5, ♀ 4, Mandaira, September and October, 1922; Neboi, June, 1922; Lugh, June, 1922; Serenli, August, 1922.  
These agree with specimens from West Rudolf and are referable to the Abyssinian form.
219. **Hyphantornis intermedius littoralis**, van Som.  
♂ 5, Chanler's Falls, December, 1920.  
These specimens are intermediate between the typical form and the coastal race, but conform more to the former.
220. **Hyphantornis vitellinus**, Lcht. Northern Little Masked Weaver.  
♂ 7, ♀ 9, Dolo, June, 1922; Mandaira, September, 1922; October, 1923; Serenli, February, 1923; August, 1922.  
The males differ from the race *uluensis*, Neum, of which I have several topotypes, by having the chestnut of the crown less in extended backwards, there being a bright yellow hind-neck band.  
The undersides are a brighter yellow. The females differ more markedly, being brownish olive on the mantle, not olive-green.

221. **Hyphantornis dichrocephalus**, Salvad. Somali Black-headed Weaver.  
 ♂ 10, ♀ 4, Dolo, Serenli, Hellesheid, July and December, 1922; March, 1923; July, 1922.  
 This series is of great interest as showing a possible affinity between this species, *X. castaneiceps* and *H. dimidiatus*.  
 There are two males in which the head is chestnut, not black-brown, and another in which the amount of chestnut is only slightly in excess of that found in *X. castaneiceps*. *H. dimidiatus* might quite easily be the extreme form of the group.  
 The present generical division of the Weavers, is far from satisfactory.
222. **Hyphantornis rubiginosus**, Rupp. Black-headed Chestnut Weaver.  
 ♂ 8, ♀ 5, Mandaira, October, 1922; Marsabit, July, 1923; Langaia, August, 1923.
223. **Pseudonigrita cabanisi**, Fisch., Rchw. Black-headed Sociable Weaver.  
 ♂ 24, ♀ 17, Mandaira, November, 1922; El Wak, May, 1922; Lasamis, August, 1923.  
 The plumage of the young bird is as follows: Upper surface yellow-brown, slightly mottled on the head, more mottled on the mantle; upper ear coverts dark brown, lower paler; under surface white, yellow washed on the breast, a few black feathers in this region. Bill brownish horn, legs flesh with brown tinge.
224. **Amadina fasciata alexanderi**, Neum. Cut-throat Finch.  
 ♂ 10, ♀ 8, Lugh, June, 1922; Serenli, August, 1922; Marsabit, July, 1923; Isiola, April, 1922; Chanler's Falls, December, 1920.
225. **Quelea quelea aethiopica**, Lund. Northern Masked Weaver-Finch.  
 ♂ 15, ♀ 10, Kismayu, October, 1923; Marsabit, August, 1923.
226. **Quelea cardinalis**, Hartl. Red-headed Weaver-Finch.  
 ♂ 3, Marsabit, July, 1923.
227. **Pyromelana diademata**, Fisch., Rchw. Little Orange-crowned Bishop.  
 ♂ 11, ♀ 5, Chanler's Falls, December, 1923.
228. **Vidua macroura**, Pallas. Common Pied Whydah.  
 ♂ 5, ♀ 5, Serenli, August, 1922.



229. **Vidua hypocherina**, Verr. Blue-black Whydah.  
 ♂ 5, ♀ 4, Juv. 3, Kinya, August, 1923; Odda, May, 1922; Serenli, August, 1922.  
 The young of this bird is a uniform dull grey-brown on the back slightly paler on the under-surface, and with a well-marked black spot in front of the eyes.  
 Jubaland birds should be compared with typical examples.
230. **Linura fischeri**, Rehw. Straw-tailed Whydah.  
 ♂ 3, ♀ 3, Odda, March, 1922.
231. **Odontospiza caniceps**, Rehw. White-rumped Silver-billed Finch.  
 ♂ ♀ Kinya, August, 1923.
232. **Aidemosyne cantans meridionalis**, Mearns. Abyssinian scaly-headed Silver-billed Finch.  
 ♂ 3, ♀ 3, Marsabit, August, 1923.
233. **Granatina ianthinogaster inanthinogaster**, Rehw. Chestnut and Blue Waxbill.  
 ♂ 4, ♀ 3, Archer's Post, November, 1920; El Wak, May, 1922; Neboi, May, 1922; Mandaira, Serenli, November, 1922; August, 1922.  
 Specimens from the three last localities are intergrades to the Somali race *hawkeri*.
234. **Uraeginthus cyanocephalus mulleri**, Zedl. Pale Blue-headed Blue Waxbill.  
 ♂ 1, ♀ 2, Lasamis, June, 1923.  
 The females are rather paler, and have less blue on the throat than typical birds from Kilimanjaro. A larger series is desirable for comparison.
235. **Pytelia nr. kirki**, Shelley. Fire-throated Finch.  
 ♂ 12, ♀ 6, Serenli, March and July 1922 Jebeir, March and July, 1922; Neboi, June and October, 1922; Dolo, June, 1922.  
 These birds are not typical *kirki*, but come close to this species. The females are paler below, with the white more extensive. Wings 56 mm.
236. **Estrilda charmosyne pallidior**, Jacks. Pale-bellied Black-faced Grass Finch.  
 ♂ 2, Archer's Post, November, 1920.  
 Said by Selater to be similar to the next race.
237. **Estrilda charmosyna charmosyna**, Rehw. Pink-bellied Black-faced Grass Finch.  
 ♂ 2, ♀ 2, Serenli, August, 1922.  
 This is evidently a variable species which splits up into several good races.

238. *Estrilda rhodopyga centralis*, Kothe. Uganda Buff Grass Finch.  
♂ 2, Marsabit, August, 1923.

FRINGILLIDÆ.

239. *Passer (Sorella) emini guasso*, van Som. Kenya Chestnut Sparrow.  
♂ 8, ♀ 5, Juv. 3, Marsabit, July, 1923; Archer's Post, November, 1920.  
This first locality extends the range of this race a bit further north.
240. *Passer castanopterus*, Blyth. Somali yellow-breasted Sparrow.  
♂ 4, ♀ 5, Juv. 4, Marsabit, July, 1923.  
It is of extreme interest to find this species so far south and west, and indicates how closely related this district is to South Somaliland.  
The female is somewhat like the male, but lacks the chestnut of the crown, nape and coverts, and has the underside buffy, slightly richer on the throat. There is a distinct rich buff supercilium. There is a figure of this species in Shelley's B. of Africa, but my specimens do not agree very well with this plate. They are possibly a race.
241. *Passer griseus swainsonii*, Rupp. Abyssinian Grey Sparrow.  
♂ 9, ♀ 3, Unsi, January, 1923; Mandaira, September and October, 1922; Marsabit, July, 1923.  
These are not true *abyssinicus* but are intermediate between this race and *gongonensis*, Oust.
242. *Petronia pyrgita massaica*, Neum. Yellow-throated Sparrow.  
♂ 9, ♀ 7, Serenli, March, 1923; July and August, 1922; Mandaira, October, 1922; El Wak, May, 1922; Marsabit, August, 1923; Archer's Post, June, 1923.  
The wings vary from 85-87 mm., but a specimen from Meuressi measures 94 mm.
243. *Polispiza striatipectus*, Sharpe. Stripe-breasted Grey Serin. Matthew's Range (Caldwell Coll.).
244. *Polispiza reichenowi*, Salvad. Yellow-rumped Grey Serin.  
♂ 10, ♀ 3, Marsabit, July, 1923.
245. *Serinus donaldsoni donaldsoni*, Sharpe. Somali thick-billed Serin.  
♂ 2, ♀ 1, Archer's Post, November, 1920; Marsabit, July, 1923.  
The presence of the yellow centre to the rump, and the well-marked superciliary stripe distinguish this bird from *buchanani*, Hartert, from Taru and Kilimanjaro.

246. **Serinus maculicollis nr. taruensis**, van Som. Taru White-bellied Serin.  
♂ 2, ♀ 2, Juv. 3, Archer's Post, June, 1923. Wings 70-72 mm.
247. **Serinus maculicollis harterti**, Zedl. South Somali White-bellied Serin.  
♂ 2, ♀ 1, Mandaira, November, 1922. Wings 66 mm.
248. **Emberiza tahapisi**, Sm. Brown Rock Bunting.  
♂ 3, ♀ 2, Marsabit, July, 1923; Chanler's Falls, November, 1920.
249. **Emberiza polioleura**, Salvad. Mottled-back Yellow Bunting.  
♂ 9, ♀ 6, Marsabit, July, 1923; El Wak, May, 1922; Neboi, June, 1922; Mandaira, September and October, 1922; Serenli, August, 1922.

*ALAUDIDÆ.*

250. **Eremopteryx signata**.  
♂ 6, ♀ 4, N. Guasso, December, 1920.
251. **Eremopteryx leucopareia**, ? Sb. sp., Nov. Red-capped Finch-Lark.  
♂ 4, ♀ 1, N. Guasso.  
There is no doubt that the Kenya birds are distinct from typical Tanganyika specimens. They are darker above and the males have a distinct black collar.
252. **Mirafra poicilosterna poicilosterna**, Rehw. Pink-breasted Singing Lark.  
♂ 7, ♀ 4, Serenli, July and August, 1922; Neboi, June, 1922.  
♂ 3, ♀ 1, Archer's Post (intermediate) to *massaica*, Rehw., November, 1920.  
The very young bird is buffy white below, richer on the breast, which is spotted with blackish; mantle and crown blackish brown with large pale sandy tips to the feathers. Wings black-brown with wide pale sandy tips and edges to outer webs.
253. **Mirafra hypermetra hypermetra**, Reich. Great Black-breasted Lark.  
♂ 4, Isiola, June, 1920; Archer's Post, November, 1920; Chanler's Falls, December, 1920.  
Six birds from the N. Guasso area are not typical. They are decidedly brownish above and richer below, not greyish as in Lower Tana birds (topotypes, 4). A series from both localities will no doubt show these differences to be constant.

254. *Mirafra cautilaus marginata*, Hawk. Pale White-tailed Lark.  
♂ 4, ♀ 2, Juv., Chanler's Falls, November and December, 1920; July, 1923.
255. *Mirafra africanoides intercedens*, ?.  
♂ 3, ♀ 2, N. Guasso, June, 1923.  
These birds agree with my Marich and Turkana specimens in being paler than typical *intercedens*. Further comparison will help to place these birds more correctly.
256. *Mirafra rufocinnamomea*, Salvad. Cinnamon Rufous Lark.  
♂ Marsabit, July, 1923 (Caldwell Coll.).  
This bird is a very rich rufous chestnut on the crown and back, the feathers having very slight shaft stripes. It is quite unlike the larks referred by me to *torrida*, Shelley. In contrast to the very rich upper surface, the underside is paler than in *torrida*, more as in *kavirondensis*, mihi.
257. *Aethocorys personata*, Sharpe. Large Rufous capped Lark.  
♂ 5, ♀ 2, N. Guasso, December, 1920.  
This locality extends the southern range of this bird considerably. Wings 85-92 mm.
258. *Galerida cristata*, Sub. sp. Crested Lark.  
♂ 2, Koroli, July, 1923; Juv., August, 1923.  
These specimens are probably *somaliensis*, but, owing to lack of material for comparison, they cannot be placed with certainty.

#### MOTACILLIDÆ.

259. *Tmetothylacus tenellus*, Cab. Golden Yellow Pipit.  
♂ 8, ♀ 3, Mandaira, July, 1923; Serenli, August, 1923; Marsabit, July, 1923.
260. *Anthus sordidus longirostris*, Neum. Long-billed Mottled Pipit.  
♂ 2, N. Guasso, June, 1923.
261. *Anthus campestris*, Vieill. European Tawny Pipit.  
♂ 2, Unsi, January, 1923.
262. *Motacilla aguimp vidua*, Sund. African Pied Wagtail.  
♂ 3, ♀ 2, Serenli, July and August, 1922.
263. *Motacilla alba alba*, Linn. European White Wagtail.  
♂ 3, ♀ 3, Mandaira, November, 1922; Unsi, January, 1923; Dolo, December, 1922.
264. *Motacilla flava thunbergi*, Billberg. Grey-headed Wagtail.  
♂ 2, Dolo, December, 1922.

PYCNONOTIDÆ.

265. **Pycnonotus dodsoni dodsoni**, Sharpe. Little Somali Yellow-vented Bulbul.  
 ♂ 13, ♀ 7, Serenli, March and August, 1922; Mandaira, September and October, 1922.  
 Typical birds extend to the Juba River and in the Marsabit area and N. Guasso they meet with the form which I have named *teitensis*.
266. **Pycnonotus dodsoni teitensis**, van Som. Taru Little Yellow-vented Bulbul.  
 ♂ 5, ♀ 3, Juv. Marsabit, July, 1923; N. Guasso, December, 1920.
267. **Chlorocichla flaviventris mombasae**, Shelley. } Coast Large  
 } Reich Yellow  
 } Bulbul.  
*Chlorocichla flaviventris contralis*,  
 ♂ 2, Jebeir, April, 1923.
268. **Chlorocichla flaviventris meruensis**, Mearns. Kikuyu large Yellow Bulbul.  
 ♂ 2, Matthew's Range, November, 1920.  
 This is doubtfully distinct from the last form.
269. **Andropadus insularis somaliensis**, Rehw. Somali Lesser Yellow Bulbul.  
 ♂ 12, ♀ 8, Serenli, July and August, 1922; February, 1923; Dolo, December, 1922.  
 This race is recognisable; being darker and duller than *subalaris*. The three forms, *insularis*, *i. subalaris*, and *i. somaliensis*, when laid out side by side are quite distinct.  
 There is no doubt that where *subalaris* and *somaliensis* meet, there will occur intermediates.
270. **Phyllastrephus strepitans nr. pauper**, Sharpe. Brown Scrub Bulbul.  
 ♂ 27, ♀ 14, Serenli, February and March, 1923; July and August, 1922, Hellesheid, July, 1922; Jebeir, March and April, 1923; July, 1922; Unsi, January, 1923; Dolo, December, 1922; Neboi, June, 1922; Mandaira, September, 1922; Marsabit, July, 1923.  
 This large series taken in conjunction with a big series from the type locality of *strepitans* shows extremely well the gradual transition from one form to another in a species of wide distribution.  
 Typical *strepitans* has the throat pure white, not creamy or with a buffy tinge, and in marked contrast to the olive washed



breast, especially at the sides of the lower throat. As we pass up the coast to Kismayu and the Juba, this contrast is gradually lost until at Serenli, Jebeir, and Dolo we find a bird with a buffy-white throat, not sharply differentiated from the breast which is a few shades deeper and washed with brownish olive. These birds are typical *pauper*. Further N. west at Mandaira and Koroli, and Marsabit the birds become similar to those found on west Rudolf, and referred by me to *pauper* in my former report, *Nov. Zool.*, XXIX., 1922. They are however, not the same as *pauper*, but at the same time are quite distinct from *strepitans*. The name *fricki*, Mearns, was founded on a bird from the Lower Tana, and is no doubt a synonym of *strepitans*, the type of which came from Malindi.

#### ZOSTEROPIDÆ.

271. **Zosterops virens garguensis**, Mearns. } Marsabit White-eye.  
*Zosterops virens kaffensis*, Neum. } Syn.  
 ♂ 3, ♀ 2, Marsabit, July, 1923.  
 I have had the opportunity of seeing other specimens than those enumerated above and all are constant and show that this is a good race of *virens*.
272. **Zosterops flavilateralis fricki**, Mearns. Pale Scrub White-eye.  
 ♂ 2, Archer's Post, November, 1920.

#### NECTARINIIDÆ.

273. **Nectarinia nectarinoides beveni**, sb. sp., Nov. Northern Lesser Red-breasted Wedge-tailed Sunbird.  
 ♂ 4, ♀ 2, Neboi, Dolo, June and December, 1922.  
 This race is very like the typical *nectarinoides*, but differs in having no marked yellow bar separating the red tips from the dark bases of the breast feathers, and further in having no yellow feathers on either side of this breast band.
274. **Cinnyris mariquensis osiris** Finsch. Abyssinian Black-bellied Sunbird.  
 ♂ 4, ♀ 3, Marsabit, July, 1923; Archer's Post, November, 1920.  
 I have provisionally placed these birds under this race, as I have no typical examples for comparison. I am however inclined to think that these Northern Frontier birds will be found to differ from Abyssinian examples.
275. **Cinnyris habessinicus turkanae**, van Som. Little Purple-banded Sunbird.  
 ♂ 4, ♀ 4, Unsi, January, 1923; Mandaira, November, 1922; Lugh, June, 1922.



276. **Cinnyris bifasciatus tsavoensis**, van Som. Little Purple-banded  
Dark Sunbird.  
♂ 4, Serenli, July and August, 1922.

277. **Cinnyris kirki**, Shelley. Purple-throated Black Sunbird.  
♂ 6, ♀ 3, Marsabit, July, 1923; Mandaira, November, 1922;  
Serenli, July, 1923; Jebeir, March, 1923.

278. **Cinnyris venustus blicki**, Mearns. Little Buff-bellied Sunbird.  
♂ 5, ♀ 3, Juv., Marsabit, July, 1923; Kauro, August, 1923;  
Koroli, August, 1923.

These birds are typical *blicki*, and I find that the birds recorded under this race in my Report *Nov. Zool.*, XXIX., 1922, are in reality quite distinct, though agreeing with the published description. The female is a true *blicki*, but the males are not. True *blicki* is very like *albiventris* but with a yellow tinged abdomen.

The Kerio birds, possessing white abdomens and vents in contra-distinction to the yellow colouration of these areas in *venustus falkensteini* suggests that they are intermediates influenced by *blicki*. These white-bellied birds are said by Sclater—*Op. cit.*—to be identical with *fazolensis*, Heugh.

279. **Cinnyris albiventris**, Strickl. White-bellied Sunbird.  
♂ 3, ♀ 2, Serenli, July, 1922; Mandaira, October, 1922;  
Neboi, June, 1922.

It would be of great interest to ascertain at what point this species meets with *blicki*, and whether there is any intergrading.

280. **Chalcomitra hunteri**, Shelley. Hunter's Red-breasted Black  
Sunbird.

♂ 25, ♀ 10, Waregta, July, 1923; Serenli, July, 1922; March, 1923; August, 1922; Lugh, June, 1922; Dolo, December, 1922; Mandaira, September, 1922; Marsabit, July, 1923; Archer's Post, August, 1923.

281. **Anthreptes orientalis neumanii**, Zedl. Somali Purple Sunbird.  
♂ 11, ♀ 6, Serenli, Lugh, August, 1922; July, 1922; June, 1922; Mandaira, June, 1922; October, 1922.

282. **Anthreptes orientalis orientalis**, Hartl. Green-rumped Purple  
Sunbird.  
♂ 4, ♀ 7, N. Guasso, June and July, 1923.

PARIDÆ.

283. **Anthoscopus musculus**. White-breasted Penduline Tit.  
 ♂ 4, ♀ 3, Archer's Post, November, 1920; June and August, 1923.  
 These birds cannot be placed accurately without comparison with typical birds.
284. **Parus afer fricki**, Mearns. Kenya White-checked Tit.  
**Parus afer barakae**, Jackson ? Syn.  
 ♂ 3 ♀ 3, Archer's Post, November, 1920.  
 A doubtful race. Wings 65-70 mm. Four males and two females from Mandaira have the black of the throat and breast less extensive. Wings 60-64.
285. **Parisoma bohmi somalicum**, Friedman (1928). Black-collared Tit-Warbler.  
 ♂ 3, ♀ 3, Archer's Post, November, 1920.  
 Not so richly coloured as birds from Kilimanjaro, especially so on the flanks, which are very pale buff, not deep buff; and are nearer *somalicum* than typical *bohmi*.

SYLVIIDÆ.

286. **Cisticola juncidis perennia**, Lynes. Little Barred-tail Warbler.  
 ♂ 2, Marsabit, July, 1923.
287. **Cisticola aridula tanganyika**, Lynes. Little Grey-backed Warbler.  
 ♂ 2, ♀ 1, N. Guasso, Marsabit, June and August, 1923.
288. **Cisticola cinereola schillingsi**, Reich. Streaky Grey Scrub Warbler.  
 ♂ 6, ♀ 5, N. Guasso, June, 1923; November and December, 1920.
289. **Cisticola galactotes nr. haematocephalus**.  
 ♂ 3, Jebeir, April, 1923.
290. **Cisticola cheniana bodessa**, Mearns.  
 ♂ 2, Jebeir. ♂ 1, ♀ 1, Dolo.  
 These birds are distinct from *cheniana ukambuz*, Lynes; and agree with the South Abyssinian form above.
291. **Prinia somalica intermedia**, Jack. } Pale Wren-Warbler.  
*Prinia somalica erlangeri*, Reich. } Syn.  
 ♂ 4, ♀ 2, N. Guasso, August, 1923; December, 1920.
292. **Dryodromus rufifrons smithii**, Sharpe. Juba Red-fronted Wren-Warbler.  
 ♂ 4, ♀ 3, Mandaira, October, 1922; Neboi, June, 1922.

293. **Dryodromus rufifrons, intermediate rufidorsalis smithii.**  
 ♂ 4, ♀ 2, N. Guasso, Chanler's Falls.
294. **Euprinoides cinerea cinerea**, Sharpe. Brown-headed Grey Forest Warbler.  
 ♂ 2, ♀ 2, Marsabit, July, 1923.  
 As with *Phormoplectes insignis*, I did not expect to find this forest Warbler in an isolated forest such as Marsabit, separated as it is from all high-lying forest country.
295. **Eremomela friseoflava flavicrissalis**, Sharpe. Little Yellow-vented Scrub Warbler.  
**Eremomela friseoflava erlangeri**, Reich.  
 ♂ 3, ♀ 1, June, 1922, Lugh.  
 These would be typical *flavicrissalis* or *erlangeri*, if that race can be upheld. They are quite distinct from the birds mentioned below, having the yellow of the vent of a deeper shade and more extensive.  
 Five males from the N. Guasso and Marasbit, have the yellow of the vent very pale indeed and limited in extent. As all are constant in this respect it is more than likely that the race will have to be recognised. Wings 49-50.
296. **Sylvietta isabellina erlangeri**, } ? Somali Pale Crombec.  
*Sylvietta isabellina isabellina*, } Elliot.  
 ♂ 2, Mandaira, October, 1922.  
 Very like the birds from Tsavo and named by me *macro-rhyncha*, but paler below and also smaller. 54-56 mm.
297. **Camaroptera brevicaudata griseigula**, Sharpe. Teita Green-winged Warbler.  
 ♂ 3, ♀ 1, Marsabit, July, 1923.
298. **Calamonastes simplex**, Rehw. Sooty Scrub Warbler.  
 ♂ 6, ♀ 4, Serenli, July and August, 1922; N. Guasso, November, 1920.
299. **Acrocephalus arundinaceus arundinaceus**, Linn. Great Reed Warbler.  
 ♂ 3, Jebeir, March, 1923.
300. **Acrocephalus griseldis**, Hartl. African Great Reed Warbler.  
 ♂ 1, Kismayu.
301. **Hippolais pallida elaeica**, Lind. Little Olive-grey Reed Warbler.  
 ♂ 3, Dolo, December, 1922; Mandaira, November, 1922.
302. **Sylvia nisoria nisoria**, Bchst. European Barred Warbler.  
 ♂ 1, Jebeir, April, 1924.  
 Although taken in April, this bird had not developed the barred plumage, and is probably a bird of the previous year.

303. **Agrobates galactotes familiaris**, Menetr. Barred-tail Scrub Warbler.  
 ♂ 6, ♀ 4, Serenli, February, 1923; Jebeir, March, 1923; Mandaira, October, 1922; Archer's Post, November, 1920.
304. **Agrobates galactotes syriacus**. Lesser Barred-tail Scrub-Warbler.  
 ♂ 5, ♀ 3, Mandaira, November, 1922; Dolo, December, 1922.
305. **Agrobates, sp. ? minor**, Cab.  
 A very small bird which does not agree with either of the above.

*CRATEROPIDÆ.*

306. **Turdoides (Crateropus squamulata)**, Shell. Coast Scaly Babbling Thrush.  
 ♂ 4, ♀ 2, Hellesheid, July, 1922; Serenli, February and July, 1922.
307. **Argya rubiginosa rubiginosa**, Rupp. Northern rufous Scrub Chatterer.  
 ♂ 9, ♀ 7, Marsabit, July, 1923; N. Guasso, December, 1922; June, 1923.  
 Wings 85-90 mm. Tails 98-115, most 112.
308. **Argya rubiginosa sharpei**, O. Grant. Great Rufous Scrub Chatterer.  
 ♂ 5, ♀ 3, Neboi, June, 1922; Dolo, June & December, 1922.  
 Wings as follows: ♂♂ 94, 95, 96, 96, 96; 91, 92, 92 mm.  
 Tails as follows: ♂♂ 115, 119, 116, 118, 120; 125, 126 mm.  
 126 mm.

It is of interest to compare the measurements of these two series with birds from elsewhere in Kenya and Uganda: Moroto and Kerio, 87-89 mm.; 110-116 mm. Simba, Masongoleni, 83-85 mm. 105-109 mm.

It will be seen that Moroto and Kerio birds agree best with those from Marsabit so far as size is concerned and it is of interest to note that in colour also there is no difference. The birds I have placed under *sharpei*, although also agreeing in colour are very much bigger, while the series from Simba are smaller, especially in tail length, and are also richer in colour.

Dr. Hartert has recently published a note disagreeing with me in regard to these Rufous Babblers, but with the above additional material I am only strengthened in my opinions.

309. *Cichladusa guttata guttata*, Heugl. Northern Speckled Babbler.  
♂ 7, ♀ 3, Marsabit, June, 1923; Merile, June, 1923; Neboi,  
June, 1922; Dolo, July and December, 1922; Mandaira, Sep-  
tember, 1922. Wings 80-90. Tails 75-88.
310. *Cichladusa guttata rufipennis*, Sharpe. Coast Speckled  
Babbler.  
♂ 3, ♀ 2, Serenli, March, 1923; July, 1922. Wings, 78-82.  
Tails, 74-78.
311. *Erythropygia leucoptera leucoptera*, Rupp. Northern Scrub  
Chat.  
♂ 8, ♀ 5, Serenli, February, July, and August, 1922; Man-  
daira, October, 1922; El Wak, June, 1922; Neboi, May, 1922.
312. *Erythropygia leucoptera nr. vulpina*. Grey-streaked Scrub Chat.  
♂ 4, ♀ 2, N. Guasso, June, 1923; November and December,  
1920.
313. *Erythropygia quadrivirgata erlangeri*, Rehw. Juba Buff-  
breasted Scrub Chat.  
♂ 3, ♀ 1, March and April, 1923. Wings 73-84 mm. This  
is a doubtful race.
314. *Turdus tephronotus*, Cab. Pale Grey-backed Thrush.  
♂ 5, ♀ 3, Mandaira, September and October, 1922; Neboi,  
June, 1922; Dolo, December, 1922; Serenli, August, 1922.
315. *Turdus olivaceus polius*, Mearns. Marsabit Rufous-bellied  
Thrush.  
♂ 3, ♀ 3, Juv., Marsabit, July, 1923.  
These birds require careful comparison with Abyssinian  
examples.
316. *Monticola saxatalis*, Linn. European Rock Thrush.  
♂ 4, ♀ 3, Mandaira, Jebeir, October, 1922; March, 1923.
317. *Lucinia lucinia*, Linn. Sprosser Nightingale.  
♂ 2, ♀ 1, Jebeir, March, 1923; Archer's Post, November,  
1920.
318. *Lucinia megarhyncha golzi*, Cab. African Nightingale.  
♂ 3, Marsabit. ♂ 2, ♀ 1, Neboi.
319. *Irania gutturalis*, Guer. White-throated Chat.  
♂ 2, Archer's Post, November, 1920.
320. *Cossypha natalensis*, Smith. Grey-winged Rufous Cossypha.  
♂ 5, Jebeir, March, 1923; Serenli, February, 1923.  
Wings 89-90. I cannot find any difference between these  
birds and others from Kenya and Uganda. *Intensa* and

- garguess*, Mearns, would appear to be individual variations which can be matched by examples from far removed localities.
321. **Cossypha heuglini**. White-eyebrowed Cossypha.  
♂ 2, ♀ 2, Marsabit, July, 1923. Wings 100-104 mm. in males, 95 mm. in females.
322. **Cossypha heuglini intermedia**, Cab. Coast White-eyebrowed Cossypha.  
♂ 5, ♀ 3, Serenli, February and March, 1923; Jebeir, August, 1923. Wings 78-95 mm. in males, 75-85 in females.
323. **Oenanthe vittata**, Hemp. Ehr.  
♂ 2, Jebeir. This is, according to Sclater (*Op. cit.*), merely a mutation of *leucomela (pleschanka*, Auct.).
324. **Oenanthe leucomela leucomela**, Pall. Pied Chat.  
♂ 8, ♀ 5, Mandaira, September and October, 1922; Unsi, January, 1923; N. Guasso, October, 1920.
325. **Oenanthe isabellina**. Isabelline Wheatear.  
♂ 5, ♀ 4, Serenli, March, 1923; Jebeir, April, 1923; Mandaira, October, 1922; N. Guasso, December, 1920.
326. **Oenanthe oenanthe oenanthe**, Linn. Common Wheatear.  
♂ 2, ♀ 2, Chanler's Fall, December, 1920.
327. **Oenanthe piliata albinotata**, Neum. East African Banded Chat.  
♂ 2, Juv., June, 1923, N. Guasso.
328. **Cercomela fuscicaudata turkana**, van Som. Sooty Desert-Chat. Chat.  
♂ 9, ♀ 4, Koroli, July, 1923; Marsabit, July, 1923; N. Guasso, June, 1923; November, 1920.  
These birds are all considerably darker than *turkana*, mihi, and are nearer to *fuscicaudata*. All the November birds are much abraded and thus browner than full fresh-plumaged birds.
329. **Phoenicurus phoenicurus phoenicurus**, Linn. Redstart.  
♂ Jebeir, April, 1923.  
An adult male in full plumage. This is a rare migrant to Jubaland, or Eastern Africa.





# The Journal

OF THE

## EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY

October, 1929.

No. 36.

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PLATE A.

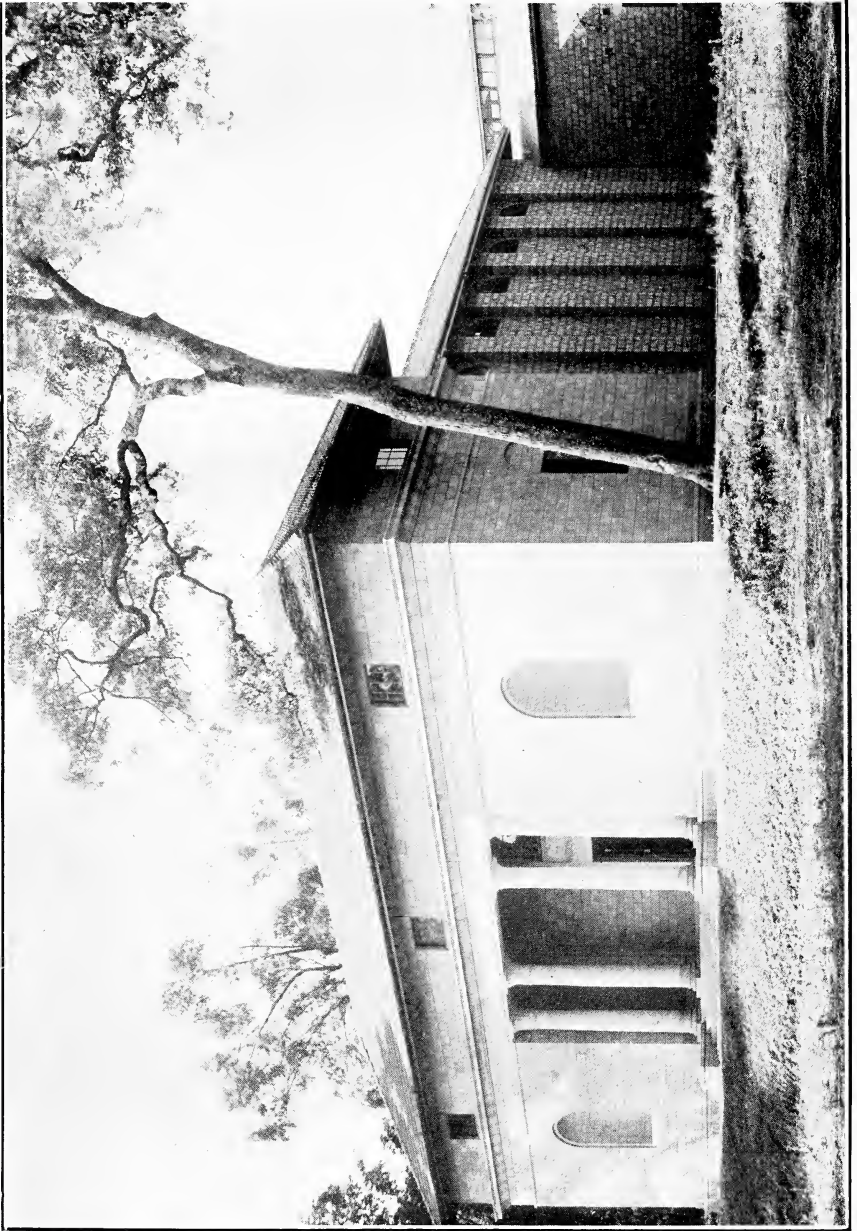






PLATE B.

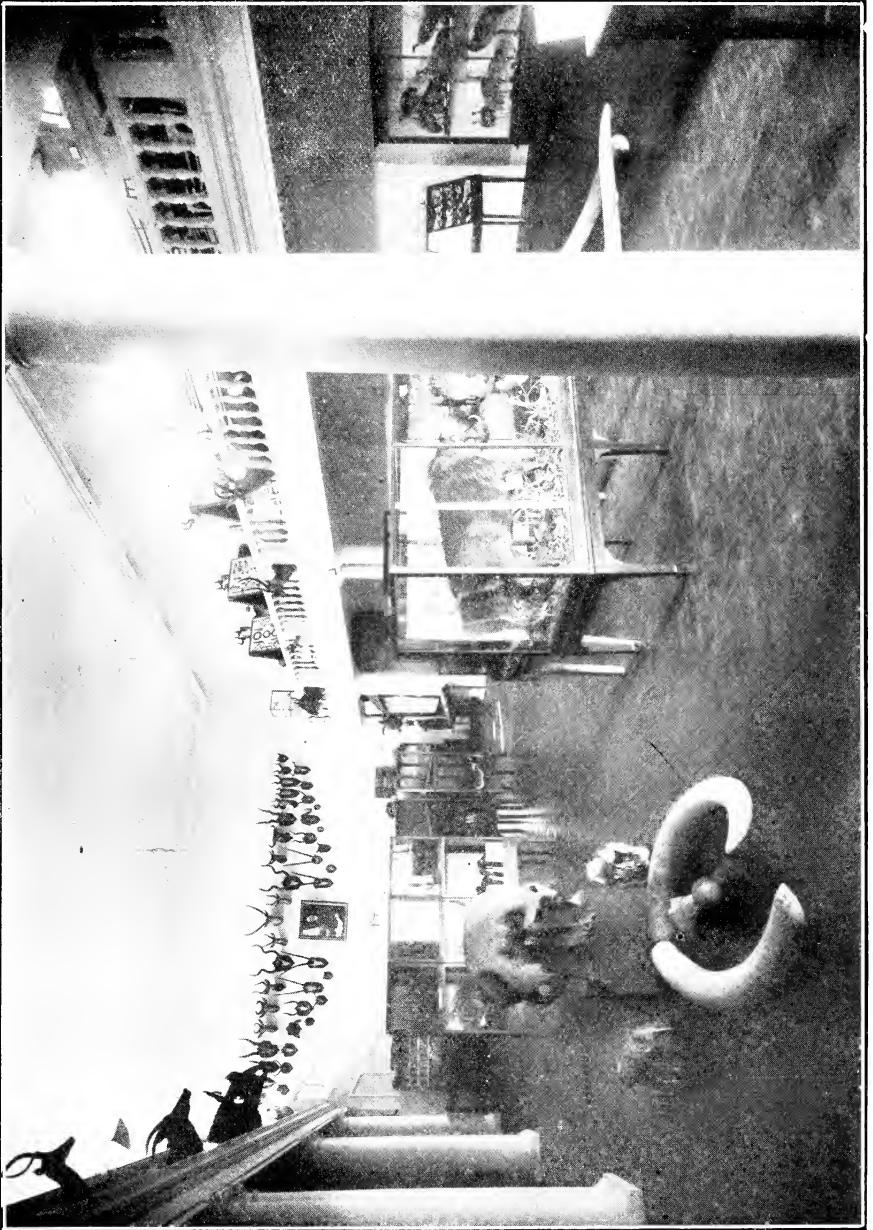






PLATE C.





PLATE D.





PLATE E.





“ COMING OF AGE ” OF THE  
THE EAST AFRICA AND UGANDA NATURAL HISTORY  
SOCIETY, 1909-1931.

In the month of March, 1909, a small gathering of enthusiasts met in the house of the then Lieut.-Governor, Frederick Jackson, to discuss the possibility of forming some sort of organisation to co-ordinate the efforts and stimulate the interests of those keen on probing into the wonders of Nature so lavishly distributed throughout East Africa. This meeting saw the birth of the Natural History Society of East Africa and Uganda, nearly twenty-one years ago!

From this small and unobtrusive beginning, there has now developed a large organisation, recognised throughout the civilised world.

Slow and steady advancement has marked the progress of the Society through years of hardship and plenty.

The Society has not only concentrated on the accumulation of material and data for the use of members, but has had before it at all times, that wider field for the dissemination of knowledge—the establishment of a Museum which would be available to the public of Eastern Africa.

The first Museum was a small rented room which soon became far too small, and in 1920 the Society erected its own building on Kirk Road. This too, rapidly became little short of a huge store of accumulated material, with no facilities for its proper preservation and systematic work was out of the question.

Succeeding Governors, recognising the educational value of the Society's activities, have taken a personal interest in the work; but it is to the late Sir Robert Coryndon, who identified himself with the Museum scheme and was instrumental in obtaining a yearly Government grant towards cost of maintenance, that we owe a special debt of gratitude.

Sir Robert's untimely death deprived the Society of an enthusiastic supporter; when, however, it was decided to erect a memorial to Sir Robert Coryndon's sterling services to the Colony, the representative meeting of Kenya citizens rightly decided that no more fitting memorial could be decided on than a Museum and Research Institution which would for ever be associated with the name of a great Statesman.

This Memorial Building is now the “ Home ” of the Society.

The original intention of attaching the memorial to the Society's building on Kirk Road was abandoned for reasons of town planning and the wider scope of the Society's activities.

The Executive Committee wisely decided to accept the position and to work in with the Coryndon Memorial Committee in establishing the first portion of what will eventually become the central Research Institution for Eastern Africa.

Government having agreed to acquire the Society's building and land, the Society placed the compensation monies at the disposal of the Executive, provided proper Laboratories and study room accommodation was arranged.

The site of the Memorial could not have been a happier one as it is in the very heart of Nairobi crowning the top of a small rise in a most commanding position. Nearly 15 acres of land have been reserved and here the first block of a future extensive building has been erected.

Although the building and land have been vested in a Board of Trustees, the Natural History Society is given the right of occupancy of the entire Memorial.

The present building consists of a simple but imposing loggia which carries side wings containing the Library and necessary administrative offices. The loggia gives access to a well-proportioned hall, 90 feet long by 50 wide, with a ten foot gallery on three sides, supported by double ornamental pillars and approached by a wide and imposing stairway. At the far end of the Hall, access is obtained to the series of spacious Study Rooms and Laboratories.

The task of organising the Museum and initiating research work within this building confronts the Society of the future. Members of the Society and the public are asked to co-operate in supplying specimens and data relative to the wonderful fauna, flora, geology, archaeology, etc., etc., of the East African Territories.

The cost of equipping the Museum in an adequate manner will be very great and cannot be undertaken at once; funds are urgently needed, and it is pleasing to record that the public through the Government has assisted in making a capital grant of £1,000 for 1930 for this purpose. Other generous donations have been made, including a gift from His Royal Highness the Prince of Wales; but members of the Society must realise their responsibility in the matter and contribute what they can towards this equipment fund.

With the increased facilities now provided, it is to be hoped that members of the Society will take advantage of them and assist the Committee in getting together a really comprehensive series of the fauna, flora, insects, etc., etc., of this wonderful country.

The existing large study collections are available to any member who wishes to consult them, and the Museum staff will at all times be willing to assist in the determination of material and giving advice to those interested. Instruction in the collecting of material will be gladly given.

It therefore behoves us all to give whatever help we can, so that the institution so closely connected with the name of one of Kenya's greatest benefactors, Sir Robert Coryndon, may fulfil in every way the ideals of a great Statesman.

EDITOR.

## SPIDERS: THEIR DEVICES FOR CONCEALMENT AND PROTECTION.

BY MAJOR R. W. G. HINGSTON.

*(The sketches illustrating this paper were drawn rapidly from memory in order to illustrate a lecture given before the Society. They are therefore not exact in the minutest details and must be regarded as purely diagrammatic.)*

Concealment devices for securing protection are widespread throughout Nature. Insects, especially, supply numerous examples. We have stick-insects, and leaf-insects and moss-insects and bark-insects all of which closely resemble their environment. We have caterpillars which make themselves look like venomous snakes, innocent grasshoppers that look like dangerous ants, flies that mimic poisonous wasps. The variety of these similitudes is so immense that it seems to have no end. But in almost all these examples which we find among insects the creatures themselves have been passive in the business. They have taken no part in the manufacture of their concealment. The stick insect, for example, lives in sticky surroundings, but it has taken no part in the fashioning of those surroundings. Nature has made it stick-like and has given it a stick-like environment to live in. It is the same with almost all these insect devices. Nature has made the creature of a special pattern and has placed it in surroundings that will suitably protect it.

But there is another class of instances, hitherto much neglected, in which we find a different plan of defence. In this case the animal makes its own concealment. Nature does not put it into surroundings that match with it. It manufactures for itself an artificial surrounding specially designed to conceal it from view.

These creatures are the orb-weaving spiders, the species that make those cart-wheel snares which are common in every field and garden in all parts of the world. Their great enemies are the parasitic wasps which carry them off to their mud nests. It is in order to protect themselves from these marauders that they make the series of protective devices which I briefly describe in the following notes.

### THE STRING OF PELLETS. (Fig. 1.)

In this case the spider makes a string of pellets along one of the diameters of its snare. The pellets are made of bits of insects bound together with silk threads. They are the same size, shape and mottled colour as the spider. The spider sits at the centre of the

snare. It huddles itself up into a pellet-like shape, and, being exactly like the pellets it has manufactured, it becomes perfectly concealed. Unless one knows that the spider always sits at the centre, it is impossible by ordinary inspection to pick it out from the pellets in the string. Here then we have a clear illustration of an animal manufacturing its concealing device.

#### THE PELLETS WITH HUB.

In this instance the spider goes one better. It again makes pellets as in the previous instance. The pellets are the same size, shape and colour as itself, and they serve to conceal it efficiently. But the creature is not content with this. It makes an additional improvement. Around its seat at the centre the snare has a close-wound spiral thread; it is the hub which in the cartwheel snare binds the radiating spokes together at the point where they all meet. Now the spider makes an attempt to mimic this hub in the case of each of its pellets. It spreads around each of them a loose skein of threads. It has not the same neat spiral arrangement as has the hub round the spider at the centre. A spiral can be made only where spokes diverge. Thus the spider cannot make a true spiral round its pellets. But it makes the best attempt it can at a spiral, which is the loose skein of threads.

#### THE BUNDLE OF PACKETS.

This device is made by one of the *Gasteracantha* spiders met with in the Andaman Islands. The spider is black in colour and sharply angulated. Rounded pellets would not, therefore, serve to conceal it. What it requires is irregular shaped lumps. It manufactures these from its captured insects. Each capture it rolls up in a little packet of silk, and then collects the packets into blackish irregular shaped clusters which it hangs in different parts of its web. The clusters are the same colour and size as the spider and something of the same irregular shape. Their number is usually 2 to 4, no doubt varying with the number of the captures taken. Their function is to act as a decoy. When a parasitic wasp approaches the web it is just as likely to strike at a cluster of packets as it is at the actual spider. When a cluster is touched then the web vibrates, and the spider, immediately it feels the vibration, drops to the ground and escapes. The spider's safety will be in proportion to the number of its decoys. If the decoys are two in number, then it has a 2 to 1 chance of escape. If the decoys are four in number, then its chances of escape become 4 to 1.

#### PELLETS AND CONFUSING DEVICE. (Fig. 2.)

There is a Himalayan species which, in addition to pellets, puts in its snare a set of oval bands which has the effect of confusing the enemy and thus increasing the chances of escape. The pellets, some

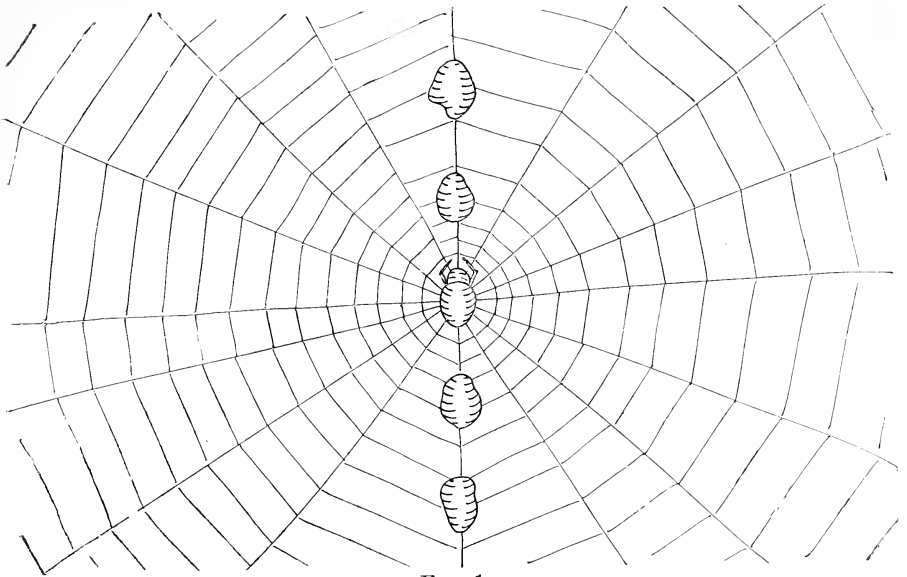


FIG. 1.

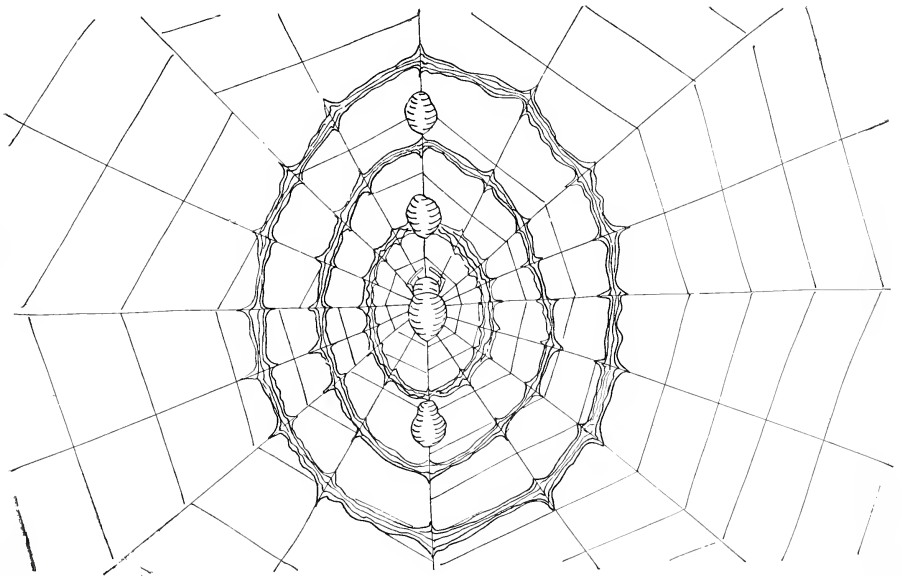


FIG. 2.







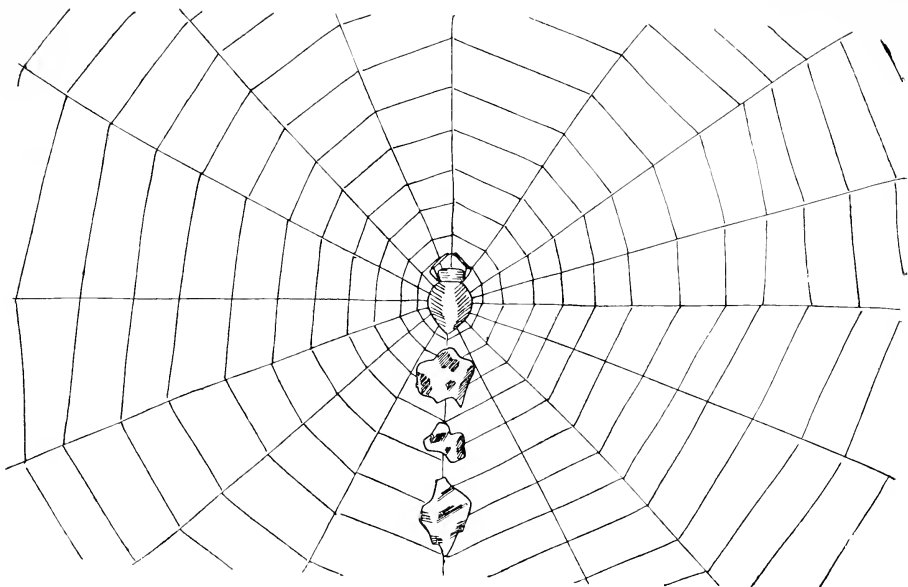


FIG. 3.

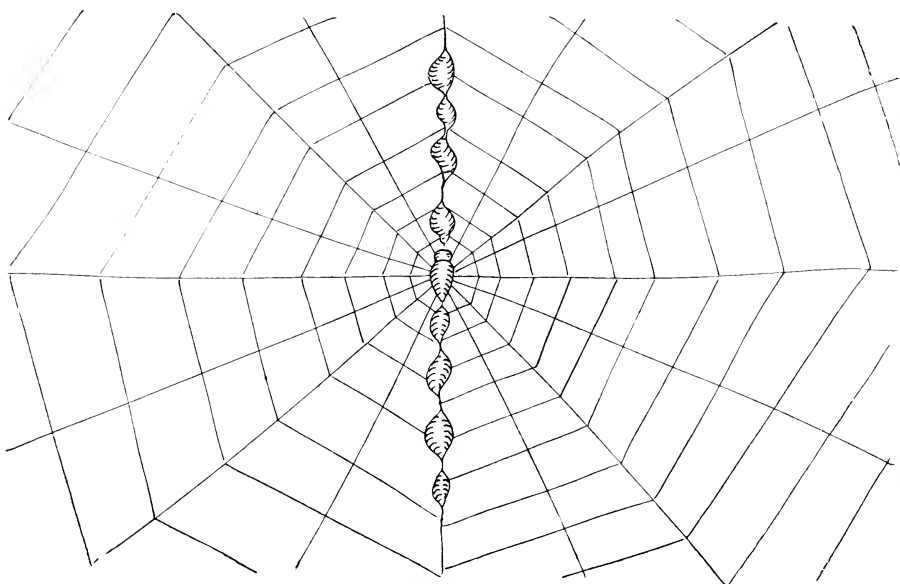


FIG. 3a.

six to eight in number, are aligned along one diameter of the snare. The spider huddles up at the centre where it looks exactly like one of the pellets. In addition it places round the whole string of pellets a series of conspicuous white bands. There are usually three, one inside the other. When the web is inspected they attract immediate notice, being far more conspicuous than the ordinary threads of the snare. Their purpose is to confuse the enemy through their attractiveness, draw its attention away from the centre and thus increase the spider's chances of escape.

#### **BITS OF BARK. (Fig. 3.)**

This species comes from Guiana. It places its snare between the spreading buttresses that occur at the bases of tropical trees. The snare is set close against the bark, and the spider cuts off small pieces of bark and strings them along the upper vertical radius of its snare. The bits of bark are the same colour as the spider and about the same size and shape. The spider sits at the centre of the snare where it looks exactly like one of the pieces of bark.

#### **STRINGS OF COCOONS. (Fig. 3a.)**

Another species, instead of fixing pellets or bits of bark, makes a string of its cocoons in order to fulfil the same end. The cocoons are silken bags stuffed full of eggs. They are strung along the vertical diameter of the snare. The spider sits at the centre in a gap in the string where it is mistaken for one of its own cocoons.

#### **SPIDER DIFFERING IN COLOUR FROM ITS PELLETS. (Fig. 4.)**

In all the instances hitherto mentioned the colour of the spider is the same as that of its device whether it be pellet, bark or cocoon. Clearly this is of the first importance, for if the spider were not identical in colour with its device then the concealing effect would fail. But in one instance from British Guiana I met with a pellet-making species which was totally different in colour from its pellets. The pellets were mottled brown and the spider was conspicuously black and white. This was an extraordinary exception, and for the moment it seemed difficult to fit it in with the protective principle involved. But a brief investigation explained the anomaly. For when the snare was approached, and especially when the leaf that suspended it was touched, the spider went through an extraordinary performance which had the effect of making it the same colour as its pellets. It raised itself from the snare on the tips of its legs, threw its body into an extremely delicate vibration, a fine rapid rhythmical tremor. This rapid tremulating movement changed its white and black colour into brown. What happened, so far as one's eye was concerned, was that the rapid rhythmical tremor brought the black colour and the white colour alternately within the vision. The two colours, therefore,

appeared to become fused with the result that black and white was changed into brown. Thus we see here a delightful modification. The spider makes not only an artificial device, but in addition throws its body into a tremor in order to give itself the colour of its device. By the combination of the two processes perfect concealment is brought about.

#### DIAMETRICAL BAND. (Fig. 5.)

Other species, instead of going in for pellets, make diametrical bands in their snares. The band is composed of silk with little bits of insects included. It is aligned along the snare, usually in its vertical diameter, and a gap is left in the middle of the band in which gap the spider sits. The spider exactly fills the gap. Its body is the same width as the band and its colour is identical with that of the band. Thus the spider appears to be just part of the band and is efficiently hidden from view.

#### BAND AND PELLETS. (Fig. 6.)

A species from Guiana makes an improvement on the band. It places pellets in addition in its snare. The pellets are usually two in number, each being situated half an inch from the ends of the diametrical band. The spider as before sits at the centre, occupying a gap in the middle of the band, and becoming to all appearances a mere part of the band. The pellets supply an additional defence. For the pellets have a more spider-like appearance than has the real spider which is just part of a band. Hence when the parasitic enemy approaches it is more likely to strike at a pellet than it is at the actual spider. And the moment it touches a pellet the spider drops instantly from the centre and gets lost in the undergrowth beneath the snare.

#### CRUCIATE BANDS. (Fig. 7.)

In this case the bands have a cruciate arrangement. One is in the horizontal and one in the vertical diameter. The bands are thin, whitish in colour, made altogether of fine silk, and drawn out at their edges into angulated points. A gap is left at the centre of each band, and the spider sits in the space made by these gaps. The spider exactly fills this place; it therefore becomes part of the cruciate arrangement, being no longer a spider, but just a bit of a cross. It will be noted that the gap left in the vertical band is longer than the gap left in the horizontal band. These differences are adapted to the spider's dimensions. Its length fits into the vertical band which must therefore possess a long gap; its breadth fits into the horizontal band which must therefore have a smaller gap. It indicates the little points of neatness that go to make up these concealment schemes.

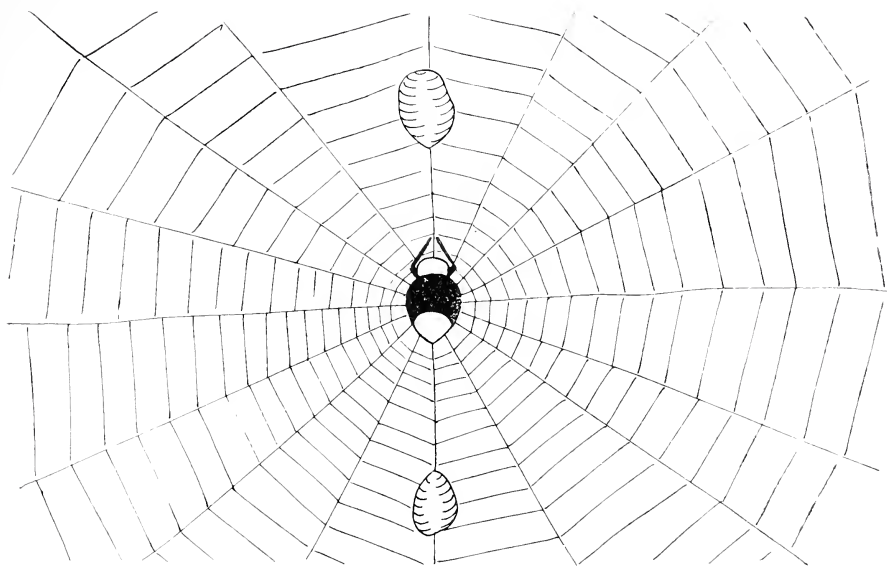


FIG. 4.

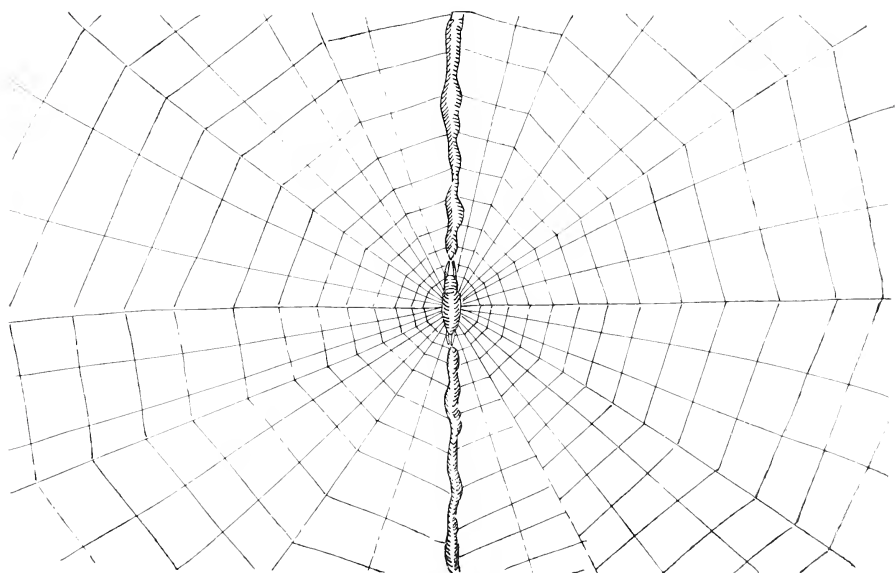


FIG. 5.





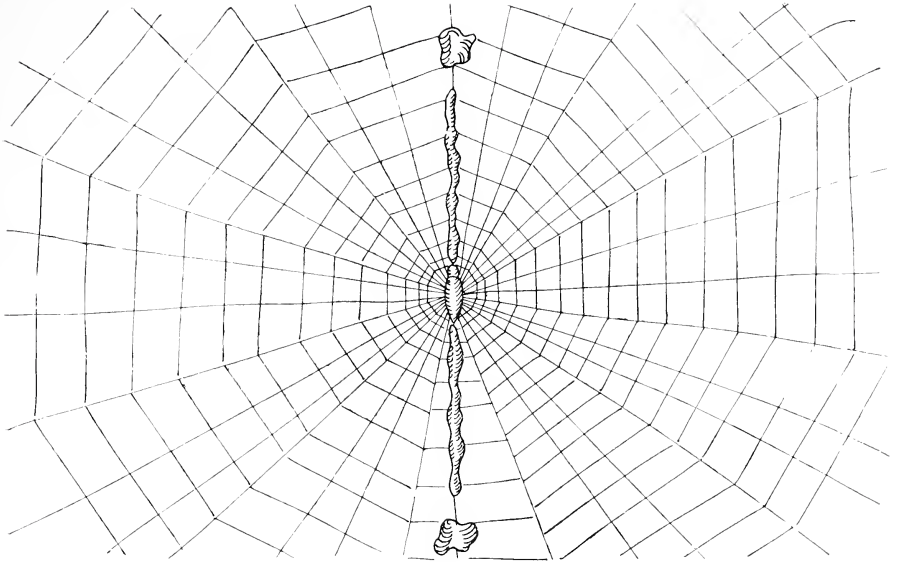


FIG. 6.

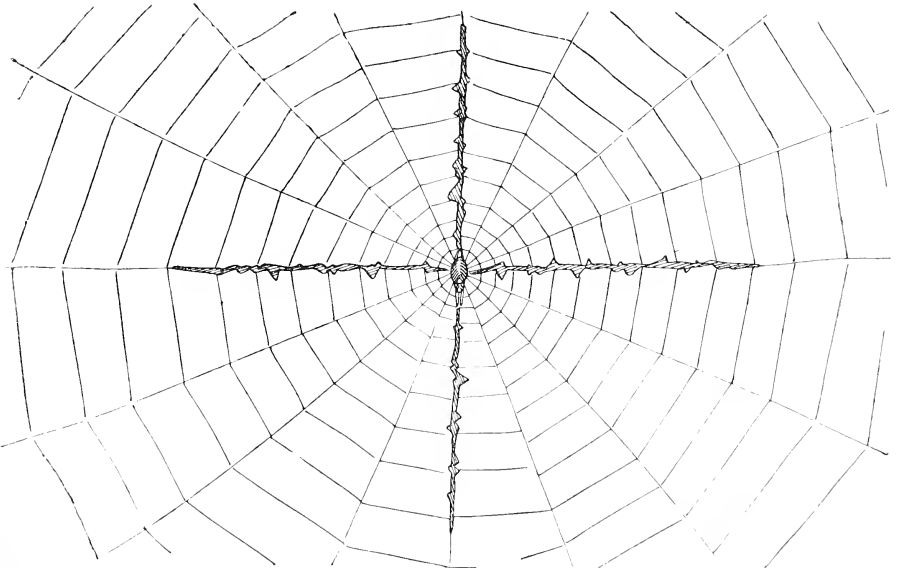


FIG. 7.





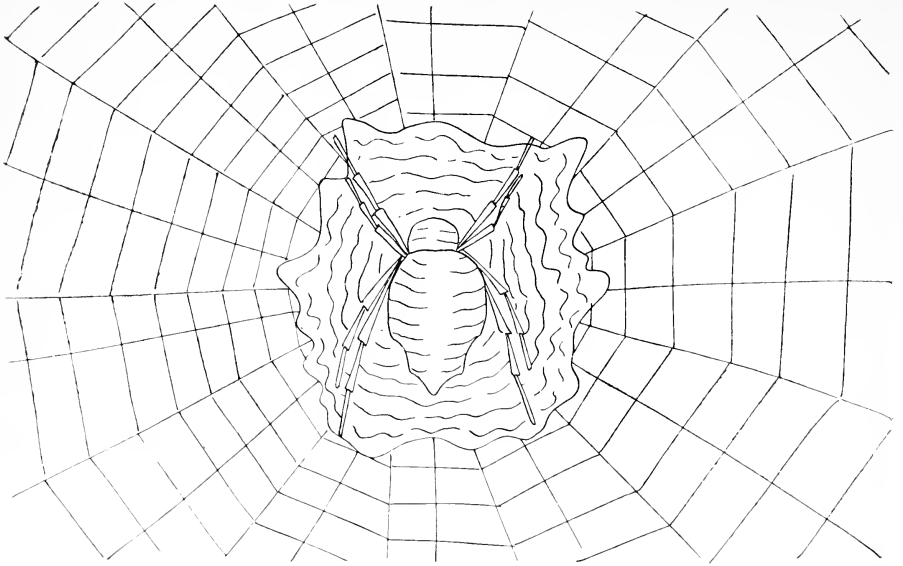


FIG. 8.

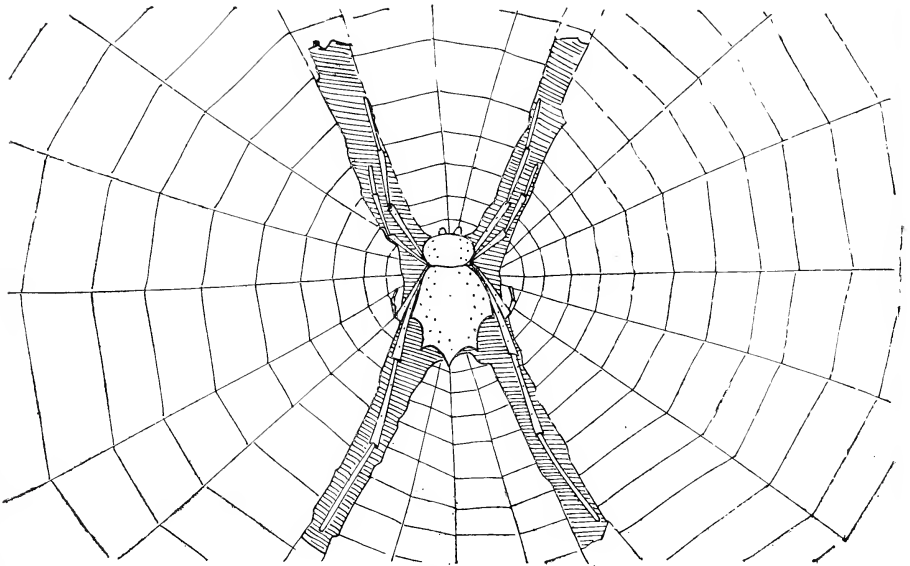


FIG. 9.

#### DIAMETRICAL BAND WITH CONFUSING DEVICE.

We saw that in the case of the pellet-making species there was one which, in addition to pellets, made a series of oval bands which had the effect of increasing the protection by producing a confusing effect. We find exactly the same in the band-making species. The spider makes the usual vertical band and fills a gap in the band with its body. But in addition it makes two or three oval bands, one within the other, around the snare centre. These confusion bands are whitish in colour and attract more attention than does the vertical band. Their effect is to confuse the enemy and draw its attention away from the spider when it is engaged in searching the snare.

#### CENTRAL SHEET. (Fig. 8.)

A simple, but not very usual form of device, is a sheet of silk at the centre of the snare. The sheet is white, either translucent or opaque. It forms a background against which the spider blends. The spider itself is silvery in colour and harmonises with the silk sheet.

#### SHEET IN FORM OF A CROSS. (Fig. 9.)

A modification of this simple form was met with in the Game Warden's garden at Nairobi. The sheet is not merely a central sheet; it is rather a cross-shaped carpet, broad at the centre on which rests the body of the spider, and with wide arms spread crosswise against which rest the spider's outstretched legs. The cross is white, almost opaque. The spider's body is in the main silvery and blends with its artificial cross.

#### CROSSED BANDS.

A rare species from the Nicobar group of islands puts two bands crosswise in its snare behind which it manages to hide itself. This cross is different from the last example. It is not a blending cross, but one which puts a barrier in front of the spider; it is a shield behind which the spider hides. The snare is spun against the bark of a tree, and the spider fits itself behind the cross, that is between the cross and the bark. Its body lies behind the centre of the cross and its outstretched legs behind the cross arms. The spider is therefore fully protected, by the cross on one side and the bark on the other.

#### SPIRAL THREAD. (Fig. 10.)

Several species put in their snares a conspicuous spirally arranged thread. The thread is quite distinct from the ordinary snare-threads. It is thicker, opaque, white and conspicuous. It is usually arranged in a somewhat wavy spiral around the body of the snare. The spider is small and inconspicuous and holds the usual seat at the snare centre. This spiral is one of the confusing devices. It is the thing

in the snare that most attracts attention. When the enemy approaches, it is attracted by the spiral, becomes confused by its wavy outline, and in this confusion the spider drops and escapes.

#### SPIRAL THREAD AND PELLETS. (Fig. 11.)

Another species improves on this spiral thread by supplying in addition a few decoy pellets. The thread is, as in the previous example, a white conspicuous confusing device. The pellets are usually two in number, one near each end of the spiral thread. The spider is small and inconspicuous and sits in the usual seat at the centre. In this instance the enemy is not only confused, but in addition is decoyed away by one or other of the artificial pellets. They are more spider-like than the spider itself, and the confused wasp is no doubt more tempted to strike at them than it is at the inconspicuous spider. Thus again we have the combination of confusion device and decoy.

#### CENTRAL ZIGZAGS.

Other kinds of spiders go in for zigzag manufacture. One species makes a complicated system of zigzag threads all over the central area of its snare. The threads are white and very conspicuous. They are arranged in an outer circle of zigzags with a transverse series of zigzags inside it. They are closely packed with some of them overlapping. They give a confused appearance to the central area of the snare in the middle of which the spider sits. These zigzags partly confuse the enemy and partly conceal the spider by supplying a background with which it can to some extent blend.

#### DIAMETRICAL ZIGZAG. (Fig. 12.)

This is made by a large *Argiope* found in the gardens of Baghdad. A very conspicuous silvery zigzag ribbon is stretched along the vertical diameter of the snare. It is very vivid and attracts immediate attention, and is by far the most striking feature in the snare. In the middle of this zigzag ribbon is a gap in which the large spider sits. It aligns itself along the gap with its legs spread out in pairs crosswise around it. Its colour is uniform silver which makes it blend with the silvery zigzags. In addition the edges of its body are angulated and these angulations fit in with the angulations of the zigzag ribbon. The whole construction is of protective significance. The spider, by sitting at the gap in the ribbon, makes itself part of a diametrical zigzag. It has no longer the appearance of a spider. It is just part of a weird silvery zigzag and has no longer the significance of a living thing.

#### CRUCIATE ZIGZAGS.

Another kind of *Argiope* from the Himalaya makes these zigzags on a more elaborate system. It places them in the form of the arms



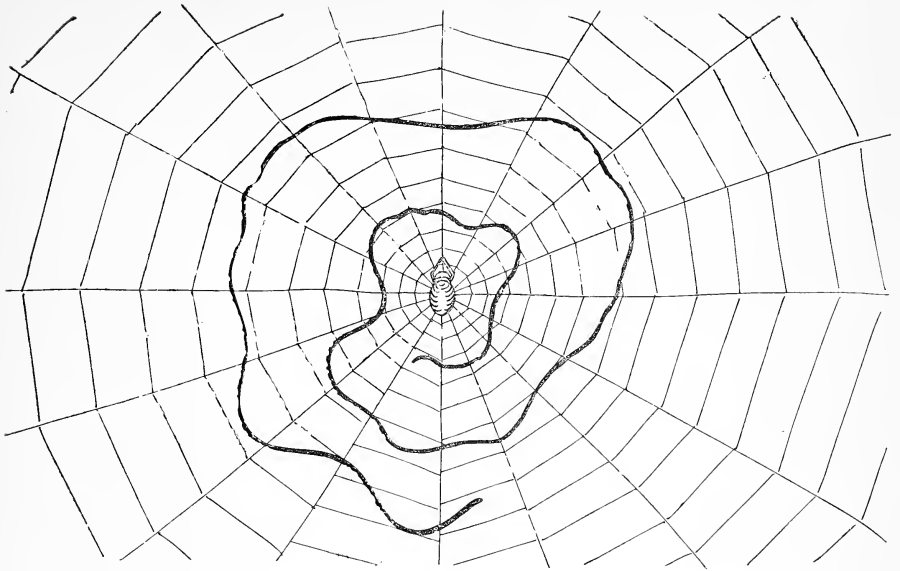


FIG. 10.

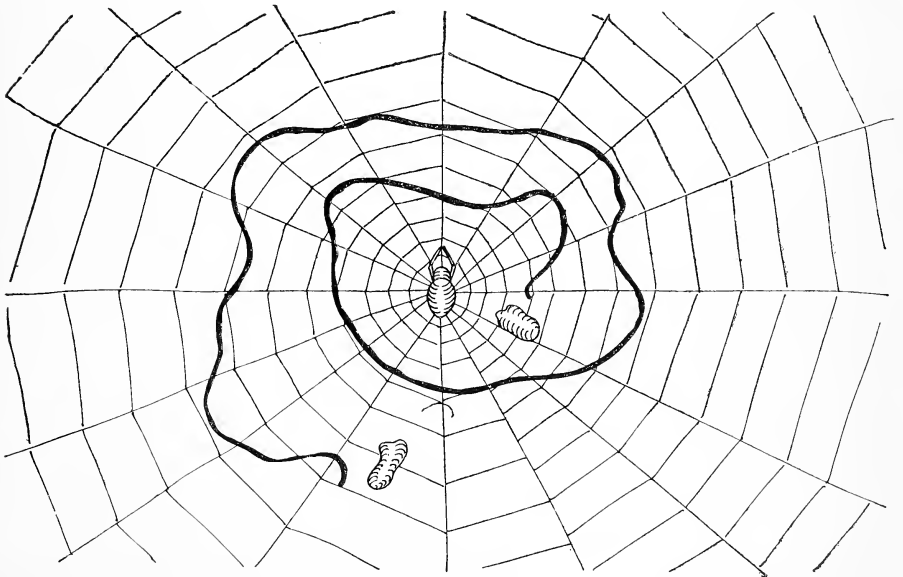


FIG. 11.





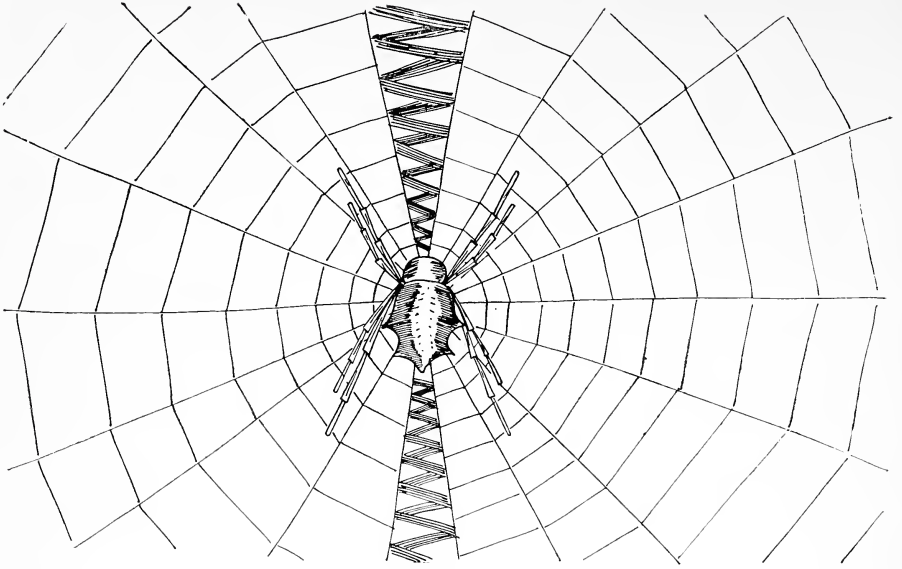


FIG. 12.

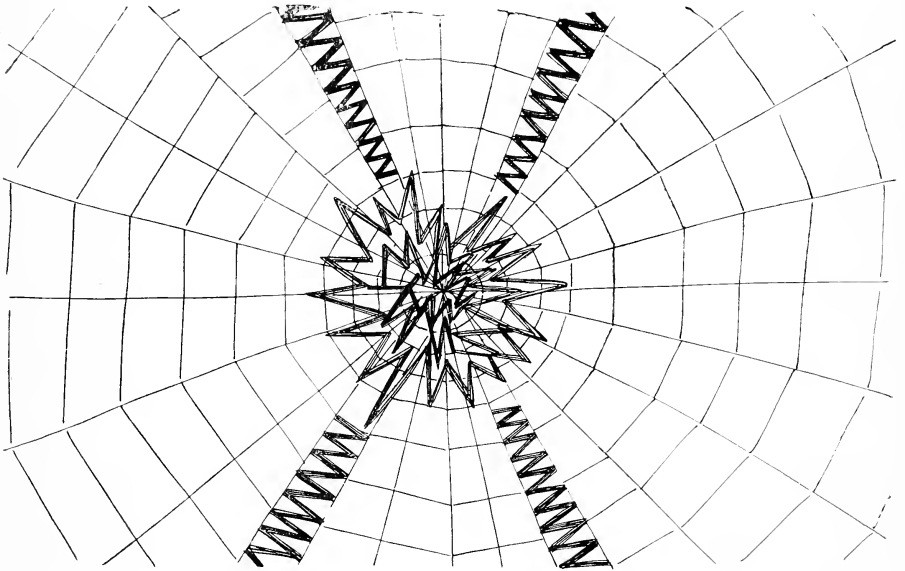


FIG. 13.



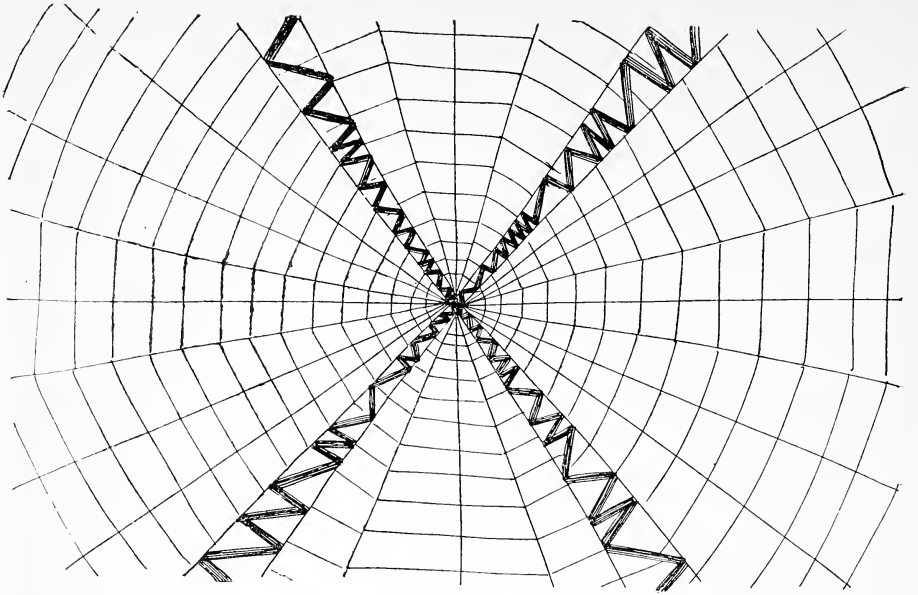


FIG. 14.

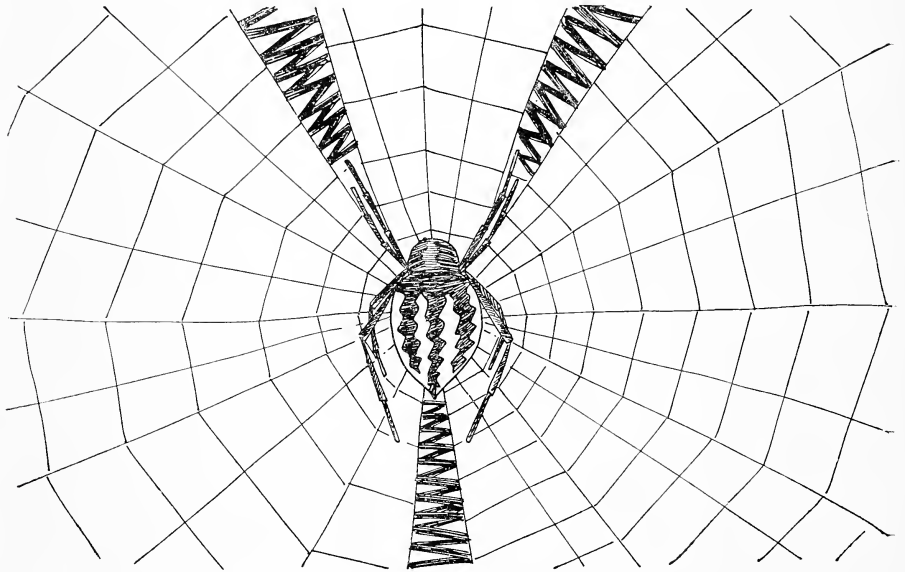


FIG. 15.



of a cross, leaving out the centre of the cross and filling the space with its own body. It stretches out its legs crosswise so that they are continuous from its body out into the arms of the cruciate zigzag. The body and the legs of the spider are silvery. Consequently the spider together with the zigzags forms a complete St. Andrew's Cross spread conspicuously through the snare. The result is that the spider looks no longer like a spider: it is just a bit of a silvery cross.

#### CRUCIATE ZIGZAG WITH CENTRAL ZIGZAG. (Fig. 13.)

Another kind from Central America elaborates the device a little further. It makes the cruciate arrangement as in the last example. But in addition it places at the centre a somewhat circular-shaped seat of zigzags. Again it becomes part of a St. Andrew's Cross, but in addition it has a silvery seat which helps to conceal it from view. It endeavours to hide itself behind this seat, and when danger happens to approach on one side it jumps across to the opposite side of the seat.

#### CRUCIATE ZIGZAG RIGHT ACROSS CENTRE. (Fig. 14.)

Another modification of this cruciate arrangement is the manufacture of a complete cross. In the previous instances the cruciate system consisted only of the cross arms. But a Central American species carries the arms of the cross right into the centre of the snare and thus perfects the cruciate arrangement.

#### TRIRADIATE ZIGZAGS. (Fig. 15.)

A species from Burmah is particularly instructive. Instead of making the zigzags diametrical or cruciate it spreads them in a triradiate system. A gap is left in the centre and the spider sits in the gap. Then the spider makes itself a part of the triradiate system of silvery zigzags. But the point of special importance is this: the spider's body is itself decorated with a triradiate silvery pattern. Its cephalothorax and the front of its abdomen are uniformly coloured silver. On the rest of the abdomen there are three irregular bands, one down the middle and one down each side. The silvery decoration is thus triradiate, and this triradiate adornment fits in well with the triradiate system of zigzags. The middle of the silvery abdominal bands appears continuous with the silvery zigzag that runs through the snare from the tail of the spider. The silvery bands on the sides of the abdomen appear continuous through the spider's front pairs of legs with the zigzags that stretch out from the head end of the spider. It indicates how these zigzag arrangements have essentially a colour significance and are designed for the purpose of protecting the spider.

#### CONCLUSION.

Thus it is clear that this group of creatures goes in for many kinds of artificial manufacture in order to conceal themselves and guard

themselves from attack. Small pellet-like globular forms make globular pellets exactly like themselves. Others make pellets to serve as decoys. Others use cocoons, others, bits of bark, others, bundles of packeted insects, all with the same definite object of putting in the snare artificial materials which as closely as possible resemble themselves. The others of a more elongated structure make bands of different kinds and hide themselves by becoming part of these bands. Others add different kinds of confusing devices, such as circular ribbons or spiral threads, which serve to disperse the enemy's attack. Then others make sheets against which they blend, others, bands behind which they hide, others, a strange variety of zigzags with which their silvery colours harmonise and destroy their spider-like shape.

When we consider all the peculiar variety of these contrivances, all the labour that is involved in their manufacture, all the expenditure of precious silk, all the wonderful elaboration of instinct that has been developed, we can get some dim idea of the struggle that these little creatures have to face in order to survive in the battle of life.

## NOTES ON THE MANGROVE SWAMPS OF KENYA.

By R. M. GRAHAM.

It is estimated that the Mangrove Swamps in Kenya cover an area of about 180 square miles. All have been gazetted as Forest Reserves. Since only four creek systems have been surveyed, it is obvious that the area given is only approximate, but the composition of the gazetted areas does not vary very much.

Judging by the four swamps that have been surveyed, it seems probable that only about two-thirds of the total area can be classed as merchantable forest. The remainder consists of scrub mchu, lilana and undersized mkandaa. Of the merchantable forest, probably 70% consists of well-grown mkoko, with scattered muia and mkandaa, and 30% of badly-shaped mkandaa which, however, finds a market as fuel.

### THE FLORA.

Few species are recognised in the Kenya swamps. Whether this is because only a few species are actually represented, or because no one has worked over the area systematically, I do not know, but I imagine that (a) there are more species in Malay and the Philippines than there are in Kenya, and (b) some of the Kenya species still remain to be identified. It is unfortunate that botanical specimens from the swamps are almost always very difficult to preserve, owing to their somewhat succulent nature. Atmospheric conditions also are usually against quick drying out, in the swamps.

The following are the principal species recognised:—

	NATIVE NAME.
1. RHIZOPHORACEÆ.	
<i>Rhizophora mucronata</i> , Lam.	Mkoko (Swa.).
<i>Bruguiera gymnorrhiza</i> , Lam.	Muia (Swa.).
	Msindi (Swa.).
	Mrifu (Swa. Lamu).
	Mchofi (Swa. Gazi).
	Mkandaa (Swa.).
<i>Cerriops candolleana</i> , Arn.	
2. SONNERATIACEÆ.	
<i>Sonneratia acida</i> , Linn.	Mlilana (Swa.).
	Mpia (Swa.).
3. VERBENACEÆ.	
<i>Avicennia officinalis</i> , L.	Mchu (Swa.).
	Mtu (Swa. Vanga).
	Mutu (Bajun).

#### SUBSIDIARY SPECIES.

4. CASUARINACEÆ.  
*Casuarina equisetifolia*, L. Mvinji (Swa.).
5. COMBRETACEÆ.  
*Lumnitzera racemosa*, wild. Kikandaa (Swa.).  
Mnyanywa (Swa. Vanga).
6. LYTHRACEÆ.  
*Pemphis acidulata*, Forst. Mnyinyuwa (Swa. Vanga).  
Mnyanywa (Swa. Vanga).
7. MELIACEÆ.  
*Carapa obovata*, Bl. Mkomafi (Swa.).  
Mronga (Swa. Vanga).
8. STERCULIACEÆ.  
*Heritiera littoralis*, L. Msikundazi (Swa.).  
Mkukushu (Swa. Vanga).  
Mkokoshi (Swa. Vanga).  
(Aleni Island).

Apart from these a few small shrubs, herbs and grasses, and one fern-like plant found at Vanga can live on land which is occasionally covered by salt-water for a short period, but they are quite negligible.

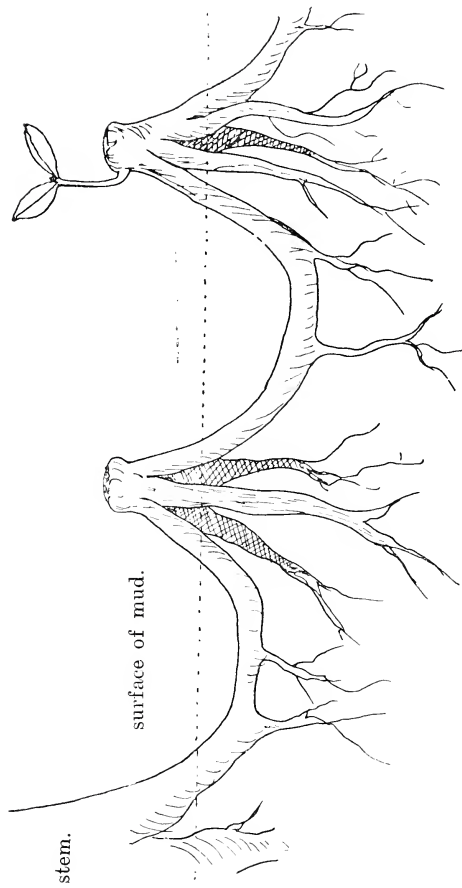
#### FOREST CHARACTERISTICS.

*Rhizophora mucronata*.—This is the commonest tree of the swamps and is by far the most important. It forms about ninety per cent. of the stock in good mud. It grows to a height of about 60 ft. with a diameter of about 15 inches, though it is rarely that one can find stands of trees of this size nowadays, owing to the fact that the large trees have mostly been felled for their bark. Further, few young trees are allowed to grow beyond the pole size before they are felled.

When grown in close stands in good mud, Mkoko has a straight cylindrical bole. The leaves are about six to seven inches long, with a small but pronounced mucro. The bark is somewhat rough on old trees, and resembles crocodile leather. It is easily stripped from the stems.

The most striking point about the species is its stilt roots. These appear about the second or third year a few inches up the stem, and grow down into the mud. Well-grown trees have roots starting about three feet or more up the stem, though by that time the lower part of the stem, together with the roots first formed, has disappeared. As a matter of fact, the lower part of the stem does not develop a diameter of more than two to three inches before it becomes unnecessary to the tree, and rots away. Young roots are fairly smooth, brown, soft, cylindrical, easily broken, and are capped with a distinctive black root cap, which can easily be detached from a root which





Knee-roots of *Bruquiera* and *Ceriops*. (Diagram.)

NOTE.—*Bruquiera* sometimes grows twigs from the knee-roots.  
*Ceriops* does not do so.



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OF THE

## EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY

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October, 1929.

No. 36.

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has not yet reached the mud. Old roots are tough and woody, very gnarled-looking, and sometimes branched. Roots may be sent down from the stem or from branches as much as twenty feet up, but they never, as far as I know, take root in the mud under these circumstances. Such roots are usually to be seen growing from trees in the most exposed positions, and probably require light and possibly wind for their development.

The flowers are yellowish-white, and pleasantly scented, the scent resembling that of nutmeg. The seeds germinate on the trees, the resulting embryos being usually about 15 inches long, and  $\frac{3}{4}$  in. in diameter before they fall, though specimens over 2 ft. in length can be found. They are pointed at the base, and are somewhat thickened for a few inches above this point, so that when they fall they automatically plant themselves in the mud if the tide is out. At high tide they fall into the water, and float away vertically, with not more than  $\frac{1}{2}$  in. of the plumule showing above the surface of the water. They can probably retain their vitality for many weeks in salt water, and are carried considerable distances by the tides and ocean currents.

The embryos are normally olive-green in colour, but very pale yellow specimens can sometimes be found. In good mud roots will be sent out below the surface about 15 days after planting, shortly followed by the appearance of a pair of leaves from the plumule. In sandy mud, however, roots may not appear for three or four weeks, and in pure sand they may fail to grow at all.

Mkoko is a hardy tree, and can be found growing in the most unlikely localities, on coral out-crops, etc., but such trees are stunted and deformed. Very large old trees do not seem to set many seed, or the seed may not be fertile, so that good stands of big trees have practically no undergrowth. Trees about 25 feet high, however, are, in good mud, always surrounded by dense masses of regeneration. Three year old trees have been observed flowering, but they probably do not set fertile seed until the fourth or fifth year. Most of the embryos fall between March and June, but flowers and fruits can always be found on odd trees. Mkoko does not coppice when it is felled.

*Bruguiera gymnorhiza*.—This is the largest of the Kenya Mangroves. It grows to a height of about 80 feet, though large trees are almost always stag-headed. The bark is dark and rough. The leaves are very like those of Mkoko, but have no mucro. There are no stilt roots, but the tree is buttressed at the base and it also throws up "knee-roots." It does not coppice when felled, but leafy shoots will sometimes grow from the exposed portion of the knee-roots. Whether these shoots ever develop into large trees or not, I do not know; nor have I seen this appearance mentioned in any work on mangroves.

The flowers are usually red and scentless, but there is also a yellow-flowered variety, which may be *B. eriopetela*. The embryos are only 6 in to 8 in. long, thick and smooth.

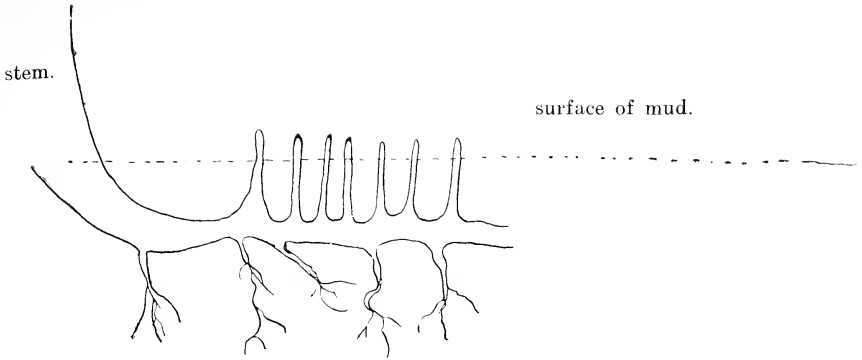
This is not such a common tree as Mkoko, but it may sometimes be found in pure stands. It seems to be able to thrive in drier areas than Mkoko. Like that species, it will flower and set fruit while it is still very young.

*Ceriops candolleana*.—Often described as a scrub, but actually, under optimum conditions, it will grow into a fair sized tree, yielding poles which are said to last better than those of Mkoko or Muia. The bark is reddish, fairly smooth and rich in tannin. Mkandaa has no stilt-roots, but it is buttressed and has knee-roots like Muia. The flowers are small, numerous, white, scentless. The leaves are about  $2\frac{1}{2}$  ins. long, roundish, and somewhat crowded at the ends of the twigs. The embryos are usually 10 ins. to 12 ins. long, thin and distinctly ribbed. Plants not more than two to three feet high may be found flowering and fruiting freely.

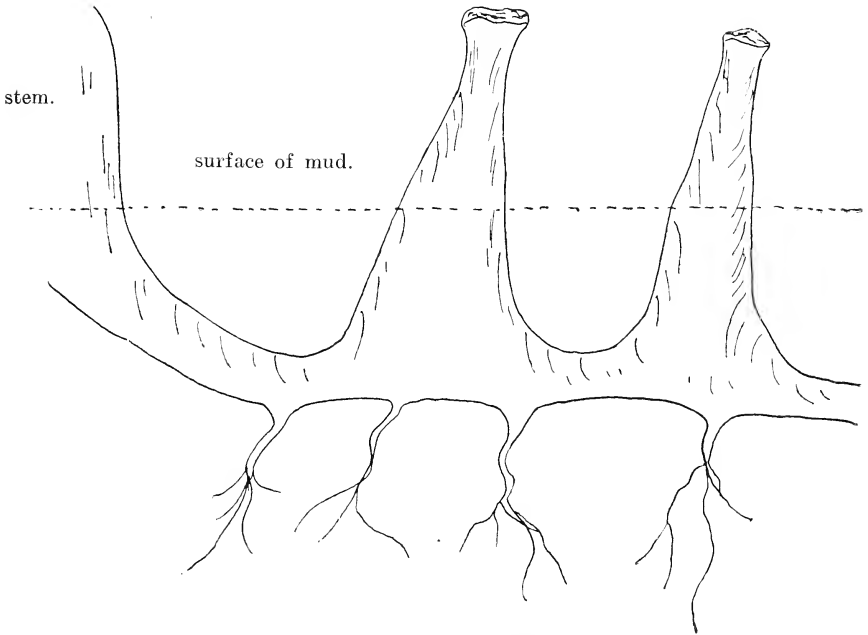
*Avicennia officinalis*.—Mchu is by far the commonest swamp tree, apart from the tree mangroves (*Rhizophoraceæ*). It covers an area of about 30% of the swamps, and will grow in any land which is ever covered by salt water, provided that it is not covered for more than about 20 hours a day. In optimum conditions it can be a fine, well-shaped tree, but normally it is very branchy. The bark is smooth yellow and somewhat powdery, and the leaves are about  $2\frac{1}{2}$  in. x  $\frac{3}{4}$  in. The undersides are often covered with salt crystals. The flowers are very small, brownish, with a sweet and somewhat sickly scent. The seeds germinate on the tree, and fall when they are about lin. in diameter, flattish, and about  $\frac{1}{2}$  in. thick. The roots send up numerous asparagus-like pneumatophores, about as thick as a pencil, which protrude as much as 15 in. above the level of the mud, where they are frequently covered by tidal water. When this is not the case, they frequently do not protrude at all in sandy soil. These pneumatophores consist of a layer of spongy substance surrounding a thin fibrous core.

It is the most accommodating of all the swamp species, and will sometimes form a complete fringe round a creek on the landward and seaward sides. It is a handsome tree when well-grown, resembling a willow, and its light green foliage shows up very well against the dark green of the *Rhizophoraceæ*. The timber is soft, white, with a peculiar criss-cross grain. Big stems have a dark brown centre, but they are usually rotten. It is possible that there are two or more species of *Avicennia* in Kenya, but only one is recognised at present. The trees will often coppice when felled.

*Sonneratia acida*.—Usually a small tree of no importance in itself. Its chief claim to fame lies in the fact that it can exist on land less frequently exposed to the air than any other tree of these swamps.



Pneumatophores of *Avicennia*. (Diagram.)

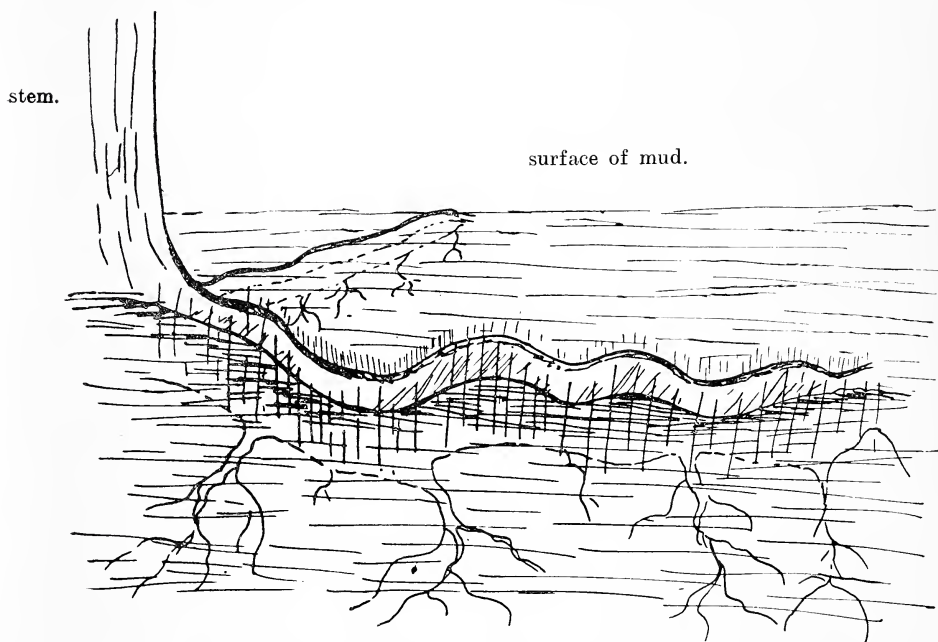
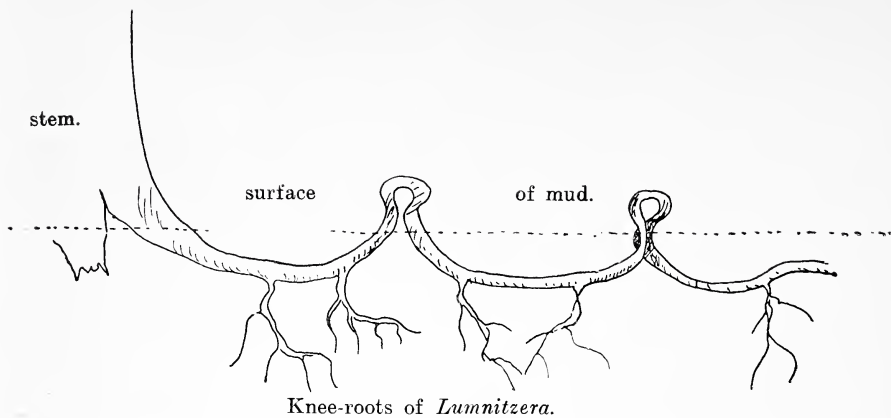


Pneumatophores of *Sonneratia*. (Diagram.)









Ribbon root of *Carapa* or *Heritiera* running along surface with the upper edge exposed to the air. (Diagram.)

It is usually found forming a fringe along the edge of the deep water in the creeks, and performs a useful service by raising the level of the mud. In the Vanga swamps, however, where it is very common, it grows into quite a large tree.

The leaves are about 3 inches in diameter, and roundish, and the white flowers are large and showy. The fruits are  $1\frac{1}{2}$  in. in diameter, round, flattened, with a small point or peg above. The name *mpia* is given, because *pia* means a top, and the fruits rather resemble one. The seeds are very small. There are no stilt-roots, but very large pneumatophores are formed, which may be 10 inches in diameter at the base, and  $2\frac{1}{2}$  feet high. They are formed of a light corky material, and are used locally as floats for fishing nets.

*Pemphis acidulata*.—A scrub of no importance growing to a height of about 12 feet—usually 6 feet—on barren coral outcrops covered only by spring tides. It is very common round the Vanga swamps, and I have seen one specimen at Mida. The flowers are white, delicate,  $\frac{3}{8}$  in. in diameter. The leaves are succulent,  $\frac{1}{2}$  in. x  $\frac{1}{4}$  in., pubescent. Bark rough, dark grey.

*Carapa obovate*.—A small tree occurring in most swamps, but particularly common at Vanga. It grows usually some distance up the creeks where it can get a certain amount of fresh water, as well as sea water. The flowers are yellowish, pink at the base, small. Leaves about 3 in. x 2 in., somewhat rounded at the apex. The fruits are about the size of a small football, and weigh about 12 lbs. They split up into large angular bodies which are the seed-covers. These float for long distances in the sea, and apparently retain their vitality for many months. The bark is smooth and yellowish. The roots are vertically flattened ("ribbon-roots") and the upper edges protrude above the mud.

*Heritiera littoralis*.—A fine tall straight-growing tree, much in demand for use as dhow-masts, for which reason it is seldom found growing near Mombasa. The base of the stem is buttressed, and the bark is smooth. It throws out ribbon-roots like *Carapa*, and is found in similar localities, except that it likes a greater admixture of fresh water. The flowers are small, and the keeled, brown, woody fruits, 3 in. to  $3\frac{1}{2}$  in. long, can float for great distances in the sea.

*Lumnitzera racemosa*.—Normally a straight-growing shrub, 6 to 9 feet high, of no importance, but in the Vanga swamps growing sometimes into a fair-sized tree, providing useful poles and firewood. The flowers are white and scented, and the leaves about  $1\frac{1}{2}$  in. long. At first sight the plant can easily be mistaken for a *Mkandaa*. The bark on small specimens is smooth and red, but on large trees it is dark and rough.

*Casuarina equisetifolia*.—This tree occurs in places growing in pure sand just above high tide level. It is thus not a true swamp species,

but neither can it be included in the description of any of the inland forests. It is straight-growing, and if it were more plentiful, it would be a useful species. It appears to be spreading, and may be a comparatively recent arrival in Kenya.

#### ECONOMIC ASPECTS.

The most important item produced in the swamps is poles. In 1929, about 470,000 were sold, and about 40,000 issued free to natives for housebuilding. About 30,000 headloads of withies also came from the swamps. Of the poles, nearly 300,000 were exported to Arabia and India.

Mangroves seed very freely, but blank areas are treated by the Forest Department, and in 1929, about 1,300,000 embryos of Mkoko were planted out. The vast majority of poles and withies are obtained from Mkoko, though Muia and Mkandaa supply a few. The Government royalty on poles is from cents 73 to Shs. 1/50 per 20, according to size, and for withies, cents 10 for 20 (one headload). It costs about Shs. 3/50 to plant an acre of Mkoko (*i.e.*, 1,120 embryos).

The most important item is firewood, of which 446,000 stacked cubic feet were sold in 1929. Of the *Rhizophoraceæ*, Mkandaa provides the most popular household fuel, followed by Mkoko, and then Muia. Mchu is not used as a household fuel at all, but on the other hand, it is always used in the manufacture of lime from coral.

Formerly, large quantities of Mkoko bark were sold for the sake of its tannin, but since trees under 6 ins. in diameter produce bark of no value, and since practically all stands of large Mkoko have been cut out, very little revenue is obtained from this source nowadays. Bark from Muia and Mkandaa is rich in tannin, but finds no sale.

The timber of the three species of *Rhizophoraceæ* is hard, heavy, and dark-brown in colour. A small quantity of timber from Muia and Mkoko is still used for dhow-building, chiefly at Lamu, but otherwise there is no sale for it as timber.

Milana produces a few poles in the Vanga area, and occasionally a tree is cut for timber. Mkomafi has a pinkish timber, easily worked, which is used a little. It would be more popular if large trees were commoner. Msikundazi timber is said to be very good, but large trees are few and scattered. Poles of this species are much used for dhow masts. Poles of Mvinji are also used for dhow masts, but the timber is not used.

#### GENERAL CHARACTERISTICS.

Except during heavy rains, the water in the swamps is quite clear. When travelling by boat up the creeks, one is almost invariably faced by a fringe of Mchu or Milana where the soil is sandy.

Where there is good mud, however, Mkoko grows right down to the edge of the channels. In among the Mkoko are scattered Muia and Mkandaa, but the Mkoko are the commonest trees and hold the eye more because of their tangled stilt-roots. Dense patches of young seedlings are normally present under the parent trees. In places usually far up the creeks, one notices a few Mkomafi, and still further up, one may find Msikundazi.

On the landward side, there are frequently fringes of palms—*Hyphaene*, or south of Mombasa, *Borassus sp.*, mixed with the "toothbrush tree" (*Salvadora persica*—Msuaki) and *Sideroxylon diospyroides* (Mkoko-bara), etc., etc. These come down to within a yard or so of high-water mark. Next, if the ground is level, there will be a strip varying from 10 yards to half a mile in width, of scrubby Mchu, and finally one reaches the *Rhizophoraceæ* in the swamps proper. Normally the Mkoko are separated from the Mchu by a belt of small Mkandaa.

#### FAUNA.

In the creeks, many birds, such as Kingfishers white and blue Herons, Kites, Curlew, Sandpipers of different sizes, Fish-eagles, etc., are common. Oriels and a few other land-birds are also found, and in the wide shallow sandy-bottomed reaches at the mouths of many creeks, one meets with pelicans, flamingoes, ducks and large stork-like birds. Stone-curlew (Dikkop) and several species of francolins live just on the edges of the swamps in some places, and provide fair sport.

On the landward side countless small crabs, each with one disproportionately large red or blue claw, seem to do the work normally done by earthworms. Another larger crab, up to 6in. to 7in. across, with bright red claws, is common. This is the species which is responsible for some damage to Mkoko seedlings. It feeds on green vegetation, and is particularly fond of Mchu leaves. The small variety mentioned above seems to feed on decaying organic matter. The large edible crab is found in fairly deep holes in good mud which is covered by the tide daily, and can be caught by means of a hooked stick which is thrust down into the hole, and quickly withdrawn. Many fine fish enter the creeks and large edible prawns are common. The natives catch these, and the fish, by means of nets, fishtraps of various sorts, as well as by using the ordinary hook and line. Sometimes pools are poisoned with the juices extracted from various plants, and the fish are taken as they float away in a stupefied condition.

Manitu ("Mermaids") probably occur in most creeks, and are sometimes caught. Amphibious mudfish are common, and two or three Chinamen make their living in the creeks by catching and exporting bêche-de-mer. Stilt-roots of Mkoko and pneumatophores of Mlilana are often found with small oysters which, however, the

natives do not eat, though in Vanga they collect quantities of "tiger-shells" and eat the occupants.

Small green tree snakes are often seen well inside the swamps, and jackals, genets, civets, mongoose spp. and probably cats come down at night and hunt for crabs and fish.

Many species of buck, such as topi, a gazelle-like Granti (probably Petersi), waterbuck, lesser kudu, greater kudu (north of Malindi), roan antelope, duiker spp., sable antelope (Vanga), bushbuck, etc., come down at night to eat salt earth, or to browse on Mchu leaves, which contain much salt. They do not venture into the mud, but stay on the mchu-covered sand-ghats. Zebra, elephant, rhino, leopard and lion also come down to these flats at night, while troops of baboons are commonly found there by day. At the mouths of the creeks there are often small islands covered with Mvinji and scrubby growth, and on these live many dik-dik. They feed on succulent leaves, and do entirely without fresh water.

Crocodiles are found in many of the creeks, living in salt water, though they are more plentiful higher up where there is often a slight flow of fresh water as well.

Very few insects seem to eat the leaves of the swamp trees, but mosquitos are numerous, commonly living in crab-holes at low tide, and retiring to the leaves of Mchu, etc., at high tide. Fire flies are present, but are not very numerous.

#### SPECIAL FEATURES OF SWAMP TREES.

Most swamp trees differ from the land-flora in two respects:

- (a) The seeds of some, *i.e.*, the *Rhizophoraceæ* and *Mchu* germinate on the trees, so that they waste no time in taking root once they fall.
- (b) Their roots (with the exception of *Mvinji* and *Pemphis* which do not grow in mud) have special adaptations in order to secure aeration.

*i.e.*, Mkoko keeps a great part of its roots out of the mud altogether.

Muia, Mkandaa, and Lumnitzera have knee-roots.

Mililana and Mchu have pneumatophores.

Mkomafi and Msikundazi have ribbon-roots.



NOTES ON THE FAUNA AND FLORA OF NORTHERN  
BUGISHU AND MASABA (ELGON).

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*Assistant Entomologist, Department of Agriculture;*

and

W. W. SOUNDY, B.A., *Science Tutor, Makerere College, Uganda.*

DESCRIPTION OF THE COUNTRY.

Northern Bugishu is the hill country lying north-west of Mount Elgon latitude  $1.1^{\circ}$  N. long.  $34.5^{\circ}$  E., and of the peaks of this mountain the easiest to reach is Jackson's summit, or Masaba (Pl. VI., fig. 1), which latter peak gives its name to the whole mountain, the majority of Africans in Uganda being completely ignorant of the name Elgon. Stanley (1875), p. 185, uses the name Marsawa, and Hobley (1897, p. 185) writes:—

“Curiously enough none of the tribes on or surrounding the mountain have any knowledge of the popular name for the mountain (Elgon), and I believe this to have been derived in some confused manner from the name of the tribe on the south side, the El-Gonyi. The Wa-Kitosh call the mountain Masawa; the Wa-Lako Masawa Tukul; and the tribes on the west side use the name Ruteka. Masawa is the name which is the most widely known.”

Thomson (1887, p. 274) writes “Elgon or Masawa,” but on p. 298 calls the mountain Elgon and states that Masawa is Kitosh of the Masai. On his map he places the district Masawa south of Elgon. The Uganda Protectorate lies for the most part nearly 4,000 feet above sea level; the highest point of Elgon is Somi, 14,120 feet, Jackson's summit being 13,650 feet, and a third peak Vihi (Pl. VI., fig. 2) being 13,800 feet. A good road runs to an excellent rest camp at Budadiri in the Siroko Valley, 4,120 feet, and it is an easy walk through forest, bracken, and heath to the mountain top.

The Makerere holidays and a fortnight's local leave enabled us to make a number of observations on the entomology of the district during the month of August. The main object of the tour was to collect freshwater insects; to note whether the prevalence of mosquitos in these regions showed any indication of being controlled by any biological factors; to ascertain what limits altitude puts to mosquito breeding; and to investigate the fauna of the bamboo forest and of the alpine zone, including the small lake near Jackson's summit. In such a short time it was obviously impossible to reach any final conclusions, but the notes accumulated may not be without interest.

The first week was devoted to rock-holes and to the streams in Northern Bugishu beginning from the Siroko river and crossing the ridges and valleys from Butandiga, 7,010 ft.\* to Sipi (about 6,500 ft.) with its fine view from the camp overlooking the falls (Pl. IV., fig. 1) and the dense forest vegetation illustrated on Pl. 1, fig. 2. The second week was occupied by the ascent from Butandiga and our return through Budadiri to our headquarters, Kampala. Further material, including some interesting mosquitos, was collected in January, 1930, by Mr. Hargreaves (Government Entomologist), who has allowed us to include his records, and part of a collection made by Dr. G. D. H. Carpenter in December, 1928, has also been available for examination.

From Budadiri the hills appear covered with banana plantations and a wide grass path leads to within about 600 feet of Butandiga, reached finally by a steeper rocky ascent. Butandiga itself is situated at an altitude of 7,010 feet at the end of one of the many ridges (Pl. II., fig. 1) which radiate from the mountain, and along which runs the path to the summit. The wide paths of short turf, closely grazed, are characteristic of the mountain; goats, sheep and cattle being grazed even in the alpine zone. Patches of "bulo" (a small millet, *Eleusine* sp.), and small plots of healthy coffee (*C. arabica*) are seen at intervals among the banana cultivation and scattered in the herbaceous or shrubby vegetation in which many Labiates occur, including a fragrant leafed *Coleus* with a spike of dark blue flowers, and where later in the year the mauve flowers of a big *Vernonia* (COMPOSITAE), which stands about 15 feet high, dominate the vegetation. The slopes below Butandiga are also famous for onions which are grown in considerable quantities. Some of the plots indicate an attempt at terracing, although this appears to be due to weeds being pulled down hill and allowed to accumulate at the bottom of the plots. Nicholson (1930 (b), p. 11) mentions that bananas are also planted along the contours.

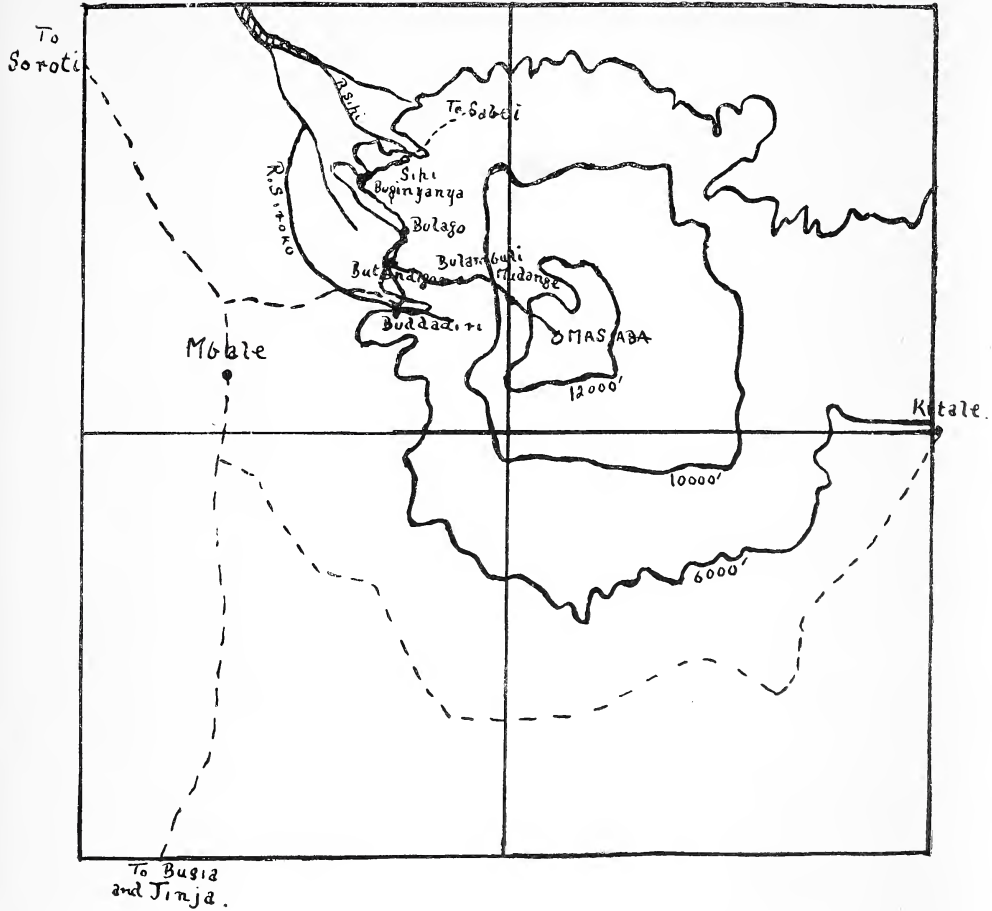
#### ROCK HOLES.

In pot holes in many of the rocks both near streams and higher up on the hillsides were collections of rain water and at Buginyanya camp (about 6,500 feet) water was found seeping out under the turf and flowing over rock into a tiny water hole. In very many of these were found larvae of the mosquitos, *Culex vansomereni*, Edw. var. †

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\* Mr. Gibson of the Survey has given us the heights of Budadiri, Butandiga, and Jackson's summit. Other heights were taken by boiling point and averaged an error of about 1° C. or 1,000 feet too low. After allowing for this it is probable that heights given are within 500 feet. The survey of the mountain will not be complete for some months.

† Mr. F. W. Edwards states that these specimens agree closely with *C. vansomereni*, Edw. Mr. G. H. E. Hopkins has not seen larvae of *C. vansomereni* from the type locality but finds the writers' material to differ but slightly from *C. draconis*, Ingram and de Meillon (= *vansomereni*, Edw.).



— Track taken on the mountain.

... Motor roads.



and *Culex andersoni*, Edw., usually accompanied by numbers of Chironomid larvae (blood-worms), and sometimes by small beetles (*Bidessus ovoideus*, Reg. and *Bidessus geminus*, Fabr., var. *capensis*, Reg.); in most cases the mosquitos were very abundant, but in the tiny water hole at Buginyanya there were only two or three specimens and in addition to eight small *Bidessus* two specimens of *Agabus raffrayi*, Shp. and three Hydrophilids of about the same size were taken. Mr. Hargreaves obtained larvae of *Anopheles garnhami*, Edw. from a rock pool at the edge of the stream at Sipi in dense forest shade. In a neighbouring rock pool deeply shaded by foliage and overhanging rock he obtained larvae of *Culex andersoni* and *Culex ? triflatus*, Edw. In an open rock pool, bare of all vegetation, larvae of *Aedes vittatus*\* were collected. Near Bulago (about 7,000 feet) a number of small *Ostracod* Crustacea (at present unidentified) were found in one of these rock holes. In one hole at Butandiga a small water bug ?*Anisops* sp. (very young) was found and many had a number of *Microvelia* sp. on their surface.

#### STREAMS.

After passing the few streams which were examined near Budadiri there was one change which was striking. While specimens of the genus *Gerris* were common in these regions and specimens of *Velia* sp. or spp. occurred, no *Velia* and only a single *Gerris* were found at the higher levels. The genus *Metrocoris*, while represented at the lower levels, was very abundant in all streams in Bugishu. A single winged specimen of a *Metrocoris* was taken in a tiny stream after crossing the ravine from Buluganya on the road to Bulago. Specimens belonging to the genus *Anisops* occurred in the streams at low levels only; none were found in the streams at higher altitudes. Characteristic and dominant of all these streams were hosts of Ephemeropterid larvae which would appear to afford ample food for fish which, according to native report, do not occur in the Bugishu streams except near the edge of the plains. The frequent falls would preclude the possibility of any fish coming up from lower levels. A very large black Ephemeropterid larva (3.5-4.5 cm. long) occurred in mid-stream at Bulago and Sipi under rocks. With the exception of a single black species of which a solitary specimen was found resting near a tiny brook, it was only in one place that EPHEMEROPTERIDAE were noticed on the wing, despite the number of larvae in all the streams. It is therefore probable that the flights of these insects are seasonal. Stone-fly, dragon-fly, and Simuliid larvae occurred in moderate numbers. A fair number of GYRINIDAE ("whirligig-beetles") were taken and these included *Aulonogyrus flaviventris*, Reg., *A. caffer*, Aubé, *A. virescens*, Reg., and *Orectogyrus assimilis*,

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\* Mr. G. H. E. Hopkins informs us that these larvae are inseparable from the description of *A. vittatus*, but in view of the number of undescribed *Aedes* larvae these records should be considered as needing confirmation.

Reg. At the edges of the streams in slack water a large species of NOTONECTIDAE (*Enithares v-flavum*, Reut.)\* occurred and often numbers of the little Dytiscid beetle *Yola* sp. near *Bicrista*, Shp., and some minute *Micronecta* (CORIXIDAE). Tadpoles abounded and sometimes fairly large crabs were seen. Mosquitos were very uncommon and with one exception, a stream below Buluganya, where two larvae (undescribed) of a *Culex* were found, none were encountered. Mr. Hargreaves obtained one *Culex annulioris*, Theo. from a larva collected at the edges of a stream near Bulago. In a small swamp near Butandiga with a little stream running through it were found larvae of *Anopheles kingi*, Christ. (adults were bred later from further material obtained in the same spot by Mr. Hargreaves). These larvae occurred in gently flowing water among the roots of *Cyperus dicroostachyurus*, Hochst. In this swamp water beetles were most unexpectedly rare, the following being captured after a thorough search: seven *Aulonogyrus virescens*, Reg.; three *Bidessus ovoideus*, Reg.; two small brown Hydrophilids and a larger black Hydrophilid; water bugs included two *Micronecta* and two *Metrocoris*.

Observations were made on the temperature of the streams. The Siroko river was 17°C. and the streams from Butandiga to Sipi varied from 12.8°C. to 14°C. Ground temperatures were also taken at sunset and about sunrise, the following records being made: Butandiga 14.7°C. (sunset), 9.7°C. (sunrise); Bulago, 18.5°C. (sunset), 11°C. (sunrise); Buginyanya, 14°C. and 15.2°C. (sunrise); Sipi, 14.8°C. (evening), 13.5°C. (morning); Buluganya, 12.8°C. (sunrise). At higher altitudes the records were: Bulambuli, 9.4°C. (sunset), 5.6°C. (sunrise); Mudange, 5.7°C. (sunset), 4.4°C. and -3°C. (sunrise) (white frost).

#### THE BAMBOO AND HIGHER FORESTS.

The walk from Butandiga to Bulambuli was very beautiful; the path follows the crest, which at times narrows almost to a knife edge from which very steep paths descend to the villages below, the roofs of which can be seen among the banana trees (c.f. Pl. II., fig. 2), which extend up the steep slopes of the valleys. After crossing the knife edge the path ascends steeply through a forest of large trees, which in some cases were heavy with a lichen resembling an *Usnea*; among the herbaceous vegetation was seen the large balsam (*Impatiens elegantissima*, Gil. Johnston, H.H., 1902, pp. 47 and 324 as *I. ehlersii*) found only in swampy places at the lower levels and the big dark blue mountain *Acanthus*, standing about 8 feet, and which, though possessing fewer flower spikes than the common pink species of Uganda illustrated by Johnston (1902, p. 46), is a grander plant.

\* Det. by the writers *ex. descr.* Of eight examples none are less than 11.5 mm., most specimens being 12 mm. (c.f. Hutchinson, G. E. *Ann. S. Af. Mus.* XXV., p. 370, 1929.)



From the forest the path passes through bracken and then through an area dominated by a composite with an unpleasant aromatic leaf. The first tree heather and bamboo (*Arundinaria alpina*, K. Schum.) were here seen together at about 8,000 feet. Associations of bamboo and tree heather occur at the height of Bulambuli, 9,000 feet (Pl. II., fig. 2, and Pl. III., fig. 2); at 10,000 feet, after a final short steep climb, the forest gives way suddenly to open alpine country mostly dominated by various grasses and by tree heathers. All along the path below 10,000 feet may be seen violets (*Viola abyssinica*, Steud), an element reminiscent of Europe and contrasting sharply with a valley filled with tree ferns which was passed below Bulambuli just before entering the true bamboo forest zone.

The fauna of the bamboos was perhaps the most interesting element met. In open bamboos, where water had collected, larvae of *Culex hancocki*, Edw. (MS.) were found; if the top was broken and decayed with the weevil *Phloeophagus marginatus*, Mshl. (MS.) feeding, and the water smelling foul, no larvae occurred. Many of the bamboos had been bored and the larvae of *Conicofrontia* sp. (NOCTUDÆ) were found feeding in the wood. If holes made by this larva were at some distance above a node, water and sap collected and formed a somewhat viscous, white, rather sweet-smelling habitat for the same mosquito. It was however found difficult to keep larvae alive as, on removal, the liquid rapidly became foul. Comparison by Mr. G. H. E. Hopkins (Medical Entomologist) between the larvae found in the open and bored bamboos showed no significant differences and it is interesting to note the wide range of habitat of the species. The long anal gills of *C. hancocki* described by Hopkins (1930, MS.)† were very conspicuous in the living larva. Temperatures taken at Bulambuli in open bamboos were 14°C., in the sap in bored bamboos 10°C.\*

The boring *Conicofrontia* larva appears to be parasitised to some extent, small Braconid parasites being found in the bored stems and

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† Mr. Hopkins' paper, which is appearing in the *Bull. Ent. Res.*, has not yet been received.

\* Dr. A. Lutz of the Instituto Oswaldo Cruz has most kindly given us some interesting information on the subject of the Brazilian forms and it was a previous suggestion of his which led to the above observations. He informs us that in Brazil five genera of mosquitoes breed in bored bamboos, viz.: *Megarhinus*, *Bancroftia* (= *Orthopodomyia*), *Culex* (*Corrollella*), *Tricoproson*, and *Wyeomyia* (= *Dendromyia*), and that the trees are bored by weevils of the family CHULIDÆ, the mosquito larvae being found in what he terms a "pathological effusion" within the stems. The weevils often cause a ring of perforations round the bamboo which then breaks, larvae thus being sometimes found in open bamboos but not in collections of rain water; he considers the water in the open bamboos always to be the product of a reaction of the tree and to contain little or no rain water. The habitat of *C. hancocki* in bored bamboos could well be included in the term "pathological effusion." In the open bamboos, however, larvae were found in what appeared to be rain water.

investigating the openings made by the larvae. These openings were however often covered with sticky sap and may have attracted the parasites to feed. A pair of the Ichneumon, *Campoplex* sp. (OPHIONINAE)\* was bred from two of the larvae which arrived safely at the laboratory in Kampala. Under the sheathing bracts at the nodes were found the red legged weevil *Amphimetes planicollis*, Mshl. ssp. *elgonensis*, Auriv., perhaps feeding on the buds which grow out at this point as the trees grow older; these specimens closely resemble those from the type locality, Ruwenzori, but differ more from specimens collected on the plains of the Eastern Province. A specimen of *Pimpla spectabilis*, Szep., was taken in the bamboo region and these metallic Ichneumons seem to be associated with this altitude and vegetation; *P. calliphora*, Morl., occurs in the Bwamba pass, Ruwenzori, among the bamboos which flourish there. As few African ICHNEUMONIDAE other than those groups revised by Morley (Revision of the Ichneumonidae, I-IV., British Museum, 1912-1915) have been even roughly classified, no attempt was made to collect this group, which, from Dr. Carpenter's collection of insects, appears comparatively more numerous in this region than in the plains.

Leaving Bulambuli the path continues through the bamboo forest to a stream (Pl. III., fig. 2), in which it was possible only to find specimens of the ubiquitous genus *Microvelia* and the usual may-fly larvae; a few adult may-flies were also taken. Around the stream were growing a large water hemlock, clumps of *Begonia* sp., *Epilobium cordifolium*, A. Rich., and the recently-described *Oenostachys dicroma*, Bullock, which resembles a gladiolus; beyond were tree heathers among which bright scarlet "red hot poker" (*Kniphofia snowdenii*) grew and little white-flowered *Sysimbrium* and CRUCIFERAE, including the cuckoo flower *Cardamine pratense*, L. The abundant little fritillary butterfly, *Argynnis hanningtoni*, Elw., was the only butterfly seen here except a few Lycaenids *Cacyrius palemon fracta*, Grunb., an occasional *Terias* (*T. regularis*, Butl., and *T. zoe*, Hoppf.), and "painted lady" (*Pyrameis cardui*, L.). Mr. Hargreaves found *A. hanningtoni* below Bulambuli at about 8,000 feet, and one of us (G.L.R.H.) has taken it at about 6,500 feet on Mount Nkokonjeru. By the lake near the summit one Hesperid (? *Rhopalocampta* sp.) was seen but eluded capture. Passing up again from this isolated community of plants of the heather association through further bamboos, two little Balsams, one a small pink flowered species and higher up a

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\* Dr. A. Roman has most kindly examined the specimens which belong to an apparently undescribed species and draws attention to the fact that, with the exception of *C. binghami*, Morl. from India, no other species of the genus has the long ovipositor and suggests that this may be found to be correlated with the habitat of the host which is such that only a species with a long ovipositor could lay her eggs within the borings. He adds that these specimens would fall into the "genus" *Trophocampa* as defined by Schmiedeknecht.

little bright red species, were, with the forget-me-not (*Cynoglossum lanceolatum*), the little buttercup, *Ranunculus pinnatus*, Poir., and the bright pink Orchid, *Disa stairsii*, conspicuous objects beside the path which gradually passed into a different type of forest including *Polyscias kikuyuensis*, emerging at about 11,000 feet on to the true alpine plateau.\*

#### THE ALPINE ZONE.

A considerable amount of attention was given to this area up to and beyond Mudange camp (Pl. V., fig. 1) (12,000 feet) as far as Jackson's summit, 13,650 feet. A list of plants is given by Sir Harry Johnston (1 c., p. 327) and a complete list of species collected by us is given in appendix B.

This alpine zone contained a number of conspicuous plants; in the path just before leaving the forest were the yellow flowers of *Landtia Rueppellii*, Benth. and Hook (COMPOSITAE), the flowers becoming almost sessile in the alpine zone. In a little boggy patch were the minute bright blue flowers of *Lobelia inconspicua* lying on a green cushion of moss and these were found again near the lake (Pl. V., fig. 2) below the summit; a little further along the path were noted an Anemone (*A. thomsonii*, Oliv.) and the delicate pink pendent flowers of *Dierama vagum*, N. E. Brown (IRIDACEAE). In this region too were the tiny common grey gentian *Swertia crassiuscula* (which occurred also on the patch of grass at Bulambuli camp), a flower like a crocus (*Romulea ramiflora*) and numbers of yellow and red *Kniphoffias*, presumably the same species (*K. Snowdenii*) as occurred near Bulambuli. In two places in boggy ground was an absolutely sessile buttercup, *Ranunculus oreophytus*, Delile. The giant groundsels (*Senecio Johnstoni* and *S. Elgonense*, F. Fries (Pl. V., fig. 2), the tree heathers, and the large lobelias were the most striking plants. According to Gregory (1921, p. 150) these plants were widely distributed in earlier ages when the climate of this part of Africa was more temperate; they have long survived on the mountains where isolation has in many cases been followed by the formation of distinct species. In discussing the mountain flora, Chipp (1930, p. 140) writes:—

“It does not appear correct, in the light of our new knowledge to regard the areas occupied by this montane vegetation as a ‘no man’s land’ over which representatives from the north and south temperate regions have migrated. The connections which it establishes makes one almost hesitate to differentiate what is Mediterranean and what is South African when one sees so much which is common to both in the intervening area.”

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\* Granvik (1923) distinguishes the heather zone as sub-alpine and the *Senecio* and *Lobelia* zone as Alpine. There is considerable overlapping on West Elgon and we include both these flora under the term alpine.

Two lobelias were common, one a very hirsute species *L. telekei* appearing to have a woolly flower spike and above Mudange a larger and more glabrous form *L. Elgonense* (Pl. IV., fig. 2). A number of Umbellifers occurred, the blue flowered Scabious (*S. columbaria*), and a beautiful claret coloured *Swertia* (GENTIANACEAE); a green and a white species were found of the Orchid genus *Habenaria* (*H. decorata*, Hochst., and *H. splendens*) on some rocky ground which preceded the descent immediately before the final ascent to Mudange, and one single flower was found on the bushes of St. John's wort, *Hypericum lanceolatum*, above Mudange camp. Mention is made by all travellers of the various species of *Helichrysum* (everlasting flowers). Comparatively few species were collected in flower, but it is clear that many others flower at a different season; Mr. Hargreaves noted large numbers in flower at and below Bulambuli in January, and three other species were collected by Mr. A. E. Wilson in December, 1929. The little sweet pea *Lathyrus imtricata* and *Arabidopsis thalianum* complete the list of the obvious plants other than the grasses and sedges though a number of minute or rarer plants were found besides the many COMPOSITAE.

Much valuable material has been collected from this area by Mr. J. D. Snowden, Agricultural Officer, and we are indebted to him for the names of many of the species seen; the rest have been named by the kind assistance of the Royal Botanic Gardens, Kew, and we wish especially to thank Messrs. Cotton and Bullock for the trouble they have taken with very scanty material. We can find no published account since the last given by Sir Harry Johnston and there is a great opportunity for any botanist to contribute an account of the plant ecology of this area. In his account of the flora of Kilimanjaro, some comparative notes are given by Cotton (1930).

At Mudange it was very cold, and it was necessary to sit by a roaring fire of heather logs in the evenings in order to obtain any measure of comfort; and it was as the logs burned that we were able to obtain specimens of an undescribed longicorn beetle driven out of them by the heat.

During the ascent a number of holes were noticed in the leaves of the arborescent *Senecios* and a large black weevil, *Seneciobius loveni*, Auriv. was found making these. Bryk (1927) refers to this species only from the flowers. Two smaller species, *Xestorrhinus brevirostris*, Auriv., and *Parasytates hancocki*, Mshll. (MS.), were abundant at the bases of the leaves but could not be associated with any definite damage.

Two saw-flies, *Athalia* spp. were also taken with these weevils; it was noticeable that the saw-flies were less rare in Bugishu than in most parts of Uganda.

It was only above 12,000 feet that *Lobelia Elgonense*, R. E. Fries, was found. The young plants were found full of a viscid liquid in



which pieces of ice were floating, and of which the temperature was  $-2^{\circ}\text{C}$ . This water was inhabited by numbers of larvae of a Chironomid (?*Metriocnemus* sp.), and under the decaying leaves were numbers of *Xestorrhinus lobeliae*, Auriv. (CURCULIONIDAE) originally recorded from this habitat by Bryk; *Trogosipalia hancocki*, Bernh. (STAPHYLINIDAE) were also found in this habitat together with some caterpillars which could not be bred out, and of which some had fallen into the water; this water is an excellent trap for insects, as has been recorded previously by Bryk.

At about 12,500 feet a large pond or small lake (Pl. V., fig. 2) is situated which is apparently fed by a spring, and although a cold wind was blowing over it our temperature record showed it to be comparatively warm,  $10^{\circ}$ — $11^{\circ}\text{C}$ ., whereas the temperature of a small stream just below was  $8.2^{\circ}\text{C}$ .

ALGAE and CRUSTACEA abounded in the water of this lake but no insects were to be found.

In this alpine region three species of CARABIDAE were found running on the path: *Calosoma alinderi*, Braun; *Scarites aberdarensis*, Allaud; and *Scarites* sp. near *hutchinsi*, Allaud. These have also been collected by Dr. G. D. H. Carpenter in another part of Bugishu in similar country. The little brachypterous grasshopper *Paracomacris elgonensis*, Uv., was also not uncommon in this area, but no other grasshoppers were noted.

On returning to camp we immediately got into as many clothes as we could and huddled round our fire of heather logs, and we were quite pleased to return to the cold and damp comforts of Bulambuli and Butandiga on the next day.

The conditions on the alpine region appeared to us to be drier than those at lower altitudes and the whole time storms could be seen and heard below (cf. Nicholson, 1930 (a), p. 21). A further very considerable influence which must affect the flora and fauna of this region is the annual burning of the grass which is carried out in the early months of each year.

It is remarkable that a locality of such interest and so easy of access has been almost entirely neglected by British biologists. It has been left to the Swedish Expedition to survey this area (Lovén, 1920 and 1921); and collections of insects have also been made by Allaud and of plants by Dummer (1919) and others. Granvik (1923) draws attention to the various faunistic elements which meet on this mountain. The western side no doubt contains more of the West African forms in the forest zone than are to be found on the eastern plateau.

A few remarks may be of help to any one who may be thinking of making a trip on the mountain and who may consider making Budadiri their starting point; the road to Budadiri is excellent and there is

room for two cars under the shelter at the foot of the ridge which one climbs to reach Butandiga. The cost of porters to Butandiga is 45 cents\* per porter, and from Butandiga to the top and back 50 cents a day for each porter. The writers took 14 porters, but it would be advisable to increase this number to 20, in order that a tent and paraffin stove could be taken up in addition to one's everyday kit, as the cold is likely to be very unpleasant during the stay at Mudange.

Food is cheap and easily obtainable at Butandiga and can be taken on up to Mudange; eggs are 2 cents each, chickens 50 cents each, milk 10 cents a bottle, "matoke" 10 cents a bunch, and all sorts of European vegetables at similarly low cost.

It should be remembered that one is certain to meet with heavy rain at one time or another during the march and care should be taken to see that waterproofs are in good condition, and that changes of clothes are easily obtainable.

In conclusion we wish to express our indebtedness to Mr. J. Omer-Cooper, who stimulated us to undertake the excursion, and undertook the identification of many of the water beetles; also to Mr. G. H. E. Hopkins, Medical Entomologist, for investigating the mosquito material; and to the following specialists who have assisted by identifying specimens: Mrs. J. Omer-Cooper, Mr. F. W. Edwards, Mr. D. S. Wilkinson, Sir Guy A. K. Marshall, Mr. B. P. Uvarov, Dr. Banniger, Dr. Bernhauer, Dr. V. G. L. van Someren, Mr. A. D. Cotton, Mr. A. A. Bullock, Prof. R. E. Fries, and Dr. A. Roman.

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\* The East African shilling is equivalent to the English shilling and is divided into 100 cents; 10 cents therefore representing a little over a penny.

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Fig. 1. Stream below Buluganya.  
PHOTO : W. Soudy.



Fig. 2. *Lobelia Gibberoa* in forest above Sipi Falls.  
PHOTO : J. M. Wallace.



PLATE II.

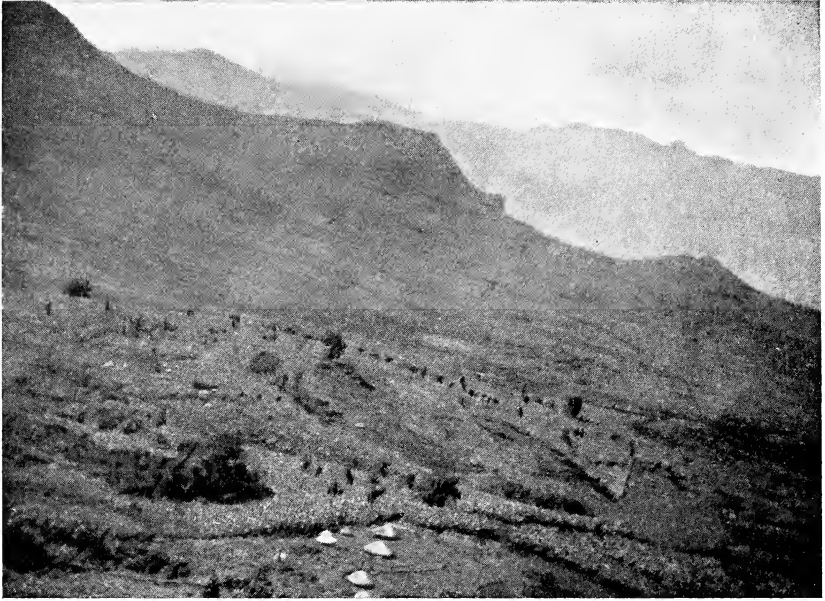


Fig. 1. Lower Slopes from below Butandiga.  
PHOTO : W. Soundy.



Fig. 2. Two Tree Heathers at Bulambuli.  
PHOTO : W. Soundy.





PLATE III.



Fig. 2. The stream through the bamboo forest above Bulambuli.  
PHOTO : W. Soundy.

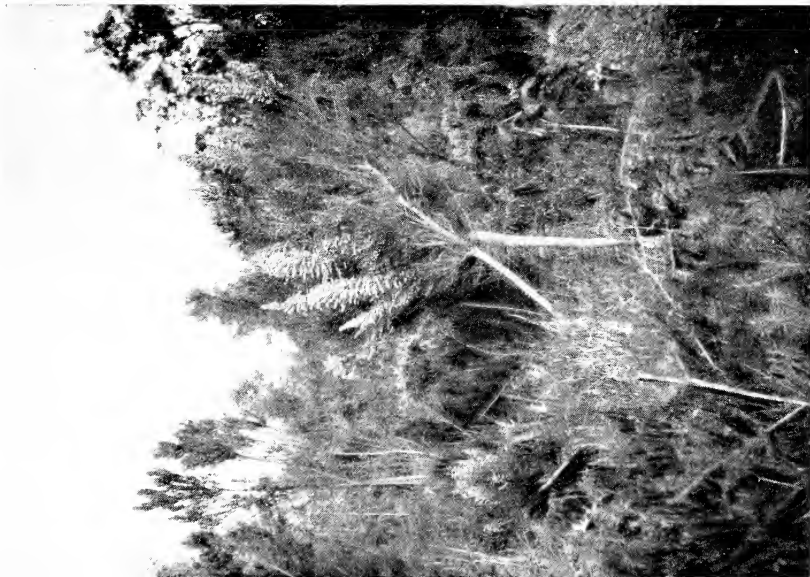


Fig. 1. Tree Heather, *Erica arborea*, at Bulambuli.  
PHOTO : W. Soundy.





PLATE IV.



Fig. 1. The Falls seen from Sipi Rest Camp.  
PHOTO : W. Soudy.



Fig. 2. A giant *Lobelia elgonensis*.  
PHOTO : W. Soudy.



PLATE V.



Fig. 1. Small hill of rocks with tree heathers, Mudange Camp.  
PHOTO : W. Soundy.



Fig. 2. The lake below Jackson's Summit, with *Senecio elgonensis*.  
PHOTO : W. Soundy.





PLATE VI.



Fig. 1. Jackson's Summit or Masaba.

PHOTO : W. Soundy.



Fig. 2. Vihi Peak.

PHOTO : A. E. Wilson.





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## APPENDIX A.

### LIST OF INSECTS COLLECTED IN BUGISHU.

This is by no means a complete list, and in some groups no attempt has been made to obtain identifications.

Unless otherwise stated, insects were collected by the writers during August, 1929. Those marked H.H. were collected in Northern Bugishu in January, 1930, by Mr. H. Hargreaves, unless another locality is given; those marked G.D.H.C. were collected during December, 1928, and January, 1929, by Dr. G. D. H. Carpenter, between 6,500 and 9,000 feet. Insects marked "Nkoko" were collected on a neighbouring mountain Nkokonjeru, from 6,000 to 7,000 feet, by one of the writers (G.L.R.H.) during December, 1926.

### RHOPALOCERA.

#### PAPILONIDAE.

*Papilio mackinmoni*, E. M. Sharpe. Sipi.

#### PIERIDAE.

*Catopsilia florella*, F. Butandiga, Buginyanya, Budadiri; Buhugu (H.H.).

*Pieris raffrayi*, Oberth. Sipi; Nkoko.

*Leptosia medusa ab immaculata*, Auriv. Buginyanya.

*Mylothris rueppeli*, Kirby. Butandiga, Buluganya, Buginyanya; N. Bugishu (H.H.).

*Mylothris yulei*, Butl. Buginyanya. (det. Bryant.)

*Mylothris sagala knutsoni*, Auriv. (G.D.H.C.).

*Belenois severina*, Cram. Sipi.

*Belenois victoria*, Drury. Sipi, Bulago, Bulambuli; Nkoko.

*Teracolus evenina*, Wallgr. (dry season form). Butandiga.

*Terias regularis*, Butler. Butandiga, Buginyanya, Bulambuli, Sipi.

*Terias zoë*, Hoppffm. Bulambuli, Sipi, Buginyanya.

*Terias senegalensis*, Bdv. Below Butandiga.

*Terias hapale*, Mab. Buginyanya.

*Colias electo*, L. 8,500 feet (H.H.).

*Coleas electo ab. aurivilius*, Kef. Buginyanya.

#### SATYRIDAE.

*Ypthima albida*, Btlr. (G.D.H.C.); Butandiga.

*Mycalesis dentata*, E. M. Sharpe. (G.D.H.C.); Nkoko.

*Neocoenyrta gregorii*, Butler. Budadiri.

NYMPHALIDAE.

- Danais chrysippus*, L. Budadiri, Butandiga, Sipi.  
*Acraea oreas*, E. Sharpe. (G.D.H.C.); Buginyanya.  
*Acraea zetes*, L. Below Butandiga.  
*Acraea caecilia*, F. Sipi, Buginyanya.  
*Acraea asboloplintha*, Karsch. (G.D.H.C.); Nkoko.  
*Acraea sotikensis*, E. Sharpe. (G.D.H.C.); Butandiga (H.H.);  
 Nkoko.  
*Acraea melanoxantha*, E. Sharpe. (H.H.); (G.D.H.C.).  
*Acraea bonasia*, F. Butandiga (H.H.).  
*Acraea disjuncta*, Gr. Sm. Nkoko.  
*Acraea ansorgei conjuncta*, Gr. Sm. Nkoko.  
*Planema quadricolor*, Rog. Nkoko.  
*Precis pelarga*, F. Butandiga.  
*Precis archesia pelasgis*, Godt. Below Butandiga.  
*Precis octavia sesamus*, Trim. (wet season). Budadiri, Butandiga;  
 Buhugu (H.H.).  
*Precis terea*, Drury. Buginyanya.  
*Precis sophia infracta*, Rog. Butandiga, Bulago; 6,000 ft. (H.H.).  
*Precis tugela aurorina*, Butlr. Bulago.  
*Pyrameis cardui*, L. Buginyanya.  
*Argynnis hanningtoni*, Elw. Bulambuli; below Bulambuli, 8,500  
 feet (H.H.).  
*Byblia lithyia badiata*, Grunz. 8,500 feet (H.H.).  
*Antanartia hippomene*, Hbn. Buluganya.  
*Antanartia schaeneia*, Trim. Buginyanya.  
*Charaxes ansorgei*, Roths. (G.D.H.C.).  
*Charaxes varanes vologenses*, Mab. Budadiri.  
*Charaxes candiope*, Godt. Below Butandiga.  
*Ergolis pagenstecheri*, Suff. Buginyanya.  
*Neptis agatha*, Stoll. Budadiri.  
*Neptis incongrua*, Butlr. (G.D.H.C.).  
*Vanessula milca*, Hew. Sipi (H.H.).

LYCAENIDAE.

- Uranotharuma delatorum*, Heron. (G.D.H.C.); Buginyanya.  
*Cupido aequatorialis*, Gr. Sm. (G.D.H.C.); Buginyanya.  
*Cupido crawshayinus*, Auriv. (G.D.H.C.).  
*Cupido antinorii*, Oberth. (G.D.H.C.).  
*Cacyrius palemon fracta*, Grunb. (G.D.H.C.) Bulambuli.  
*Castalius margaritaceus*, E. M. Sharpe (Uganda form). Butandiga.  
*Cyclyrius stellatus*, Trim. (G.D.H.C.); Nkoko.  
*Cyclyrius sharpei*, Butlr. Nkoko.  
*Zizera lysimon*, Hubn. Nkoko.  
*Zizera gaika*, Trim. Nkoko.

## HESPERIDAE.

- Acleros mackeni*, Trim. Buluganya.  
*Serengesa lugens*, Roth. Sipi, Buluganya.  
*Cyclopides midas*, Butl. 6,000 feet (H.H.).  
*Celanorhinus galenus*, Fabr. 6,000 feet (H.H.).  
*Eagris ochreana*, Lathy. Elgon, 1924 (G.D.H.C.).

## HETEROCERA.

- Tortrix endopyrrha*, Meyr. (TORTRICIDAE). Bamboo forest.  
*Trisophista doctissima*, Meyr. (HYPONOMENTIDAE). Butandiga,  
Buhugu, Nkoko.  
*Hyponomeuta strigillata*, Zell. (HYPONOMEUTIDAE). N. Bugishu,  
7,900 ft. (G.D.H.C.).  
*Platyptila molopia*, Meyr. (PTEROPHORIDAE). Bugishu, 7-9,000 ft.  
(G.D.H.C.).  
*Trichoptilus wahlbergi*, Zell. (PTEROPHORIDAE). Bugishu, 7-9,000  
ft. (G.D.H.C.).  
*Catolbistis thrasymedes*, Meyr. (LAMPRONIADAE). Elgon, 11,000 ft.

## COLOEPTERA.

### CURCULIONIDAE.

- Amphitmetus planicollis*, Mshll., sub. sp. *elgonensis*, Auriv.  
Bulambuli.  
*Phleophagus marginatus*, Mshll. (MS.). Bulambuli.  
*Seneciobius loveni*, Auriv. 11-13,000 feet.  
*Xestorhinus lobeliae*, Auriv. 12,500-13,000 feet.  
*Xestorhinus costatus*, Mshll. (MS.). Bulambuli.  
*Xestorhinus brevirostris*, Auriv. 11-?13,000 feet.  
*Parasystates hancocki*, Mshll. (MS.). 11-?13,000 feet.

### GYRINIDAE.

- Aulonogyrus flaviventris*, Reg. Sipi.  
*Aulonogyrus caffer*, Aube. Sipi.  
*Aulonogyrus virescens*, Reg. Butandiga.  
*Orectogyrus assimilis*, Reg. Sipi, Bulago, Budadiri.  
*Orectogyrus bicostatus*, Boh (= *suturalis*, Reg). Budadiri.

### DYTISCIDAE.

- Hydaticus galla*, Guerin. Bulago.  
*Hydaticus flavolineatus*, Boh. Budadiri.  
*Agabus raffrayi*, Shp. Buginyanya.  
*Yola* sp. near *bicrista*, Shp. Bulago, Buginyanya, Sipi.  
*Bidessus ovoides*, Reg. Bulago, Buginyanya, Sipi, Butandiga.  
*Bidessus geminodes*, Reg. Between Budadiri and Butandiga.  
*Bidessus geminus*, Fabr. var. *capensis*, Reg. Buginyanya.

*Scarites oberdarensis*, Allaud. (CARABIDAE). 11,000 feet.  
*Scarites* sp. near *Hutchinsi*, Allaud. (CARABIDAE). 11,000 feet.  
*Calosoma alinderi*, Braun. (CARABIDAE). 11,000 feet.  
*Trogosipalia hancocki*, Bernhauer (STAPHYLINIDAE). 12,500-13,00 ft.  
*Anthicus quadrillum*, Laf. var. (ANTHICIDAE). Butandiga.  
*Anthicus bottegoi*, Pic. (ANTHICIDAE). Butandiga.  
*Dorcasmus gigas*, Auriv. (CERAMBYCIDAE). Bulago (H.H.), N.  
 Bugishu, 6,000 feet (G.D.H.C.), Nkoko.  
*Monolepta haematura*, Fairm. (GALERUCIDAE). Bugishu  
 (G.D.H.C.), 7-9,000 feet.  
*Ceralces natalensis*, Baly. *ab sansibarensis*, Wise (CHRYSOMELIDAE).  
 Bugishu, 7-9,000 feet.  
*Haltica pyritosa*, Ex. (HALTICIDAE). Bugishu, 6,000 feet.  
 (G.D.H.C.)  
 (Determinations of COLEOPTERA and HETEROCERA incomplete.)

## DIPTERA.

### Mosquitoes.

(Specimens collected by the writers and Mr. Hargreaves are included here with the approximate altitude observed. The mountain records (a) are separated from the low level records (b).)

#### (a) MOUNTAIN.

*Anopheles garnhami*, Edw. 6,500 feet.  
*Anopheles kingi*, Chr. 7,000 feet.  
*Culex andersoni*, Edw. 6,500-7,500 feet.  
*Culex vansomereni*, Edw. var. 6,500-7,500 feet.  
*Culex trifilatus*, Edw. 6,500-7,000 feet. Butandiga.  
*Culex annulioris*, Theo. 6,500 feet.  
*Culex hancocki*, Edw. 9,000 feet.  
*Aedes ? dentatus*, Theo. 6,500 feet.  
*Aedes ? vittatus*, Big. 6,500 feet.

#### (b) FOOT HILLS (about 4,000 feet).

*Anopheles gambiae*, Giles (*costalis*, Loew.) Budadiri.  
*Anopheles funestus*, Giles. Bulicheki.  
*Anopheles mauritanus*, Grp. Bulicheki.  
*Culex annulioris*, Theo. Bulicheki.  
*Taeniorhynchus fuscopennatus*, Theo. Bulicheki.  
*Mimomyia plumosa*, Theo. Bulicheki.



## APPENDIX B.

List of plants collected during August by the writers, except where otherwise stated. The numbers placed after the names refer to the writers' numbers in the Kew Herbarium. The list does not include plants which were noted but not collected. Special attention was paid to the bamboo forest zone and to the alpine zone where, with the exception of grasses, only the very conspicuous plants were omitted from the collections. The specimens were named by the Royal Botanical Gardens, Kew, and by Mr. J. D. Snowden—when by the latter, his initials are added in brackets.

- Ranunculus pinnatus*, Poir. 9,500-11,000 feet (det. J.D.S.).  
*Ranunculus oreophytus*, Del. Marshy ground, 11,000-13,000 ft. No. 20.  
*Thalictrum rhyhocarpum*, Dill. & Rich. Above Bulambuli. No. 42.  
*Anemone Thomsonii*, Oliv., 11,000-12,000 feet. No. 72.  
*Fumaria Abyssinica*, Hum. Above Bulambuli. No. 76.  
*Arabidopsis Thalianum*, Hegnh. 11,000-12,000 feet. No. 39.  
*Brassica leptopetala*, Sond (or very near). Bulambuli. No. 47.  
*Sisymbrium falcatum*, Fourn. Bulambuli, beyond stream. No. 51.  
*Nasturtium officinale*, R. Br. ?Bulambuli. No. 53.  
*Nasturtium indicum*, D.C. ?Bulambuli. No. 54 and 55.  
*Cardamine hirsuta*, L. ?Bulambuli. No. 56.  
*Cardamine obliqua*, Hochst. ?10,000 or 11,000. No. 97.  
*Viola Abyssinica*, Steud. Butandiga to below Bulambuli.  
*Tillaea aquatica*, L. Mudange. No. 86.  
*Cerastium africanum*, Oliv. Bulambuli. No. 7.  
*Cerastium glomeratum*, Thuill. 9,000-12,000 feet. Nos. 64 and 65.  
*Rumex nepalensis*, Spreng. Bulambuli. No. 58.  
*Polygonum near glabrum*, Wild. Bulambuli.  
*Geranium simense*, Hochst. Forest 10,000 feet (det. J.D.S.).  
*Geranium aculeolatum*, Oliv. Sipi (coll. J. M. Wallace).  
*Impatiens papillionaceae*, Warb. Forest above 10,000 feet. No. 101.  
*Impatiens near hochstetteri*, Warb. Sipi falls (coll. J. M. Wallace).  
*Epilobium cordifolium*, A. Rich. Bulambuli stream. No. 15.  
*Begonia Annobonensis*, A. DC. Sipi (coll. J. M. Wallace).  
*Begonia* sp. Bulambuli stream. No. 106.  
*Hypericum peplidifolium*, Rich. Bulambuli. No. 60.  
*Hypericum lanceolatum*, Lam. Above Mudange (det. J.D.S.).  
*Sparmannia Abyssinica*, Hochst. Bulambuli (det. J.D.S.).  
*Malvastrum spicatum*, A. Gray. Bulambuli. No. 8.  
*Cluytia robusta*, Pax. Bulambuli stream (det. J.D.S.).  
*Euphorbia Wellbyi*, N.E.Br. 11,000 feet. No. 17.  
*Alchemilla argyrophylla*, Oliv. 11,000-13,000 feet. No. 69.  
*Rubus Steudneri*, Schw. (det. *ex Descr.*). Bulambuli. No. 103.  
*Rubus Volkensii*, Engl. Bulambuli. No. 105.

- Ltathyrus intricatus*, Baker. 11,000-12,000 feet (det. J.D.S.).  
*Indigofera arrecta*, Hochst. Butandiga. No. 3.  
*Trifolium Johnstonii*, Oliv. Above Bulambuli, 11,000 ft. (det. J.D.S.)  
*Rhynchospora repens*, Hochst. Sipi falls (coll. J. M. Wallace).  
*Rytidhiza* sp. Sipi falls (coll. J. M. Wallace).  
*Gymnosporia gracillipes*, Welw. Buluganya (det. J.D.S.).  
*Ferula Erythraeae*, Schweinf. Bulambuli. No. 6.  
*Peucedanum* near *altum*, Hiern. Bulambuli stream. Nos. 28A & 52.  
*Anthriscus sylvestris*, Hoffn.  
*Umbelliferae*. 11,000-13,000 feet. Nos. 27 and 31.  
*Erica arborea*, L. Below Bulambuli to 12,000 feet. No. 4.  
*Philippia Johnstoni*, Engl. Mudange. No. 63.  
*Galium stenophyllum*, Baker? Bulambuli, No. 10.  
*Galium* sp. (Dowson 587, Stolz 2282). No. 81.  
*Dipsacus pinnatifidus*, Steud. 11,000-12,000 feet. No. 26.  
*Scabiosa Columbaria*, L. 11,000 feet to Mudange.  
*Cineraria Kilimandscharica*, Engl. 11,000 feet (det. J.D.S.).  
*Sonchus* probably *Schweinfurthii*, O. & H. Bulambuli. No. 18.  
*Conyza* Sp. No. 21.  
*Helichrysum Hochnelii*, Schweinf. (coll. A. E. Wilson).  
*Helichrysum adenocarpum*, DC. var. *alpinum*. (det. J.D.S.) 11,000-12,000 feet.  
*Helichrysum* near *Volkensii*, O. Hoffm. (coll. A. E. Wilson).  
*Helichrysum elegantissimum*, DC. 11,000-12,000 feet (det. J.D.S.).  
*Helichrysum* sp. (coll. A. E. Wilson).  
*Helichrysum globosum*, Sch. Bip. 11,000-12,000 feet. No. 33.  
*Anthemis cotula*, L. 10,000-13,000 feet (det. J.D.S.).  
*Coreopsis* sp. 11,000-13,000 feet. No. 29.  
*Senecio caryophyllus*, Mattf. 11,000-13,000 feet. No. 30.  
*Senecio Snowdenii*, Hutch. 11,000-12,000 feet. No. 35.  
*Senecio rhamnophyllus*, Mattf. 11,000 feet. No. 57.  
*Senecio* sp. (J.D.S. considers same as his 482 of 1916). No. 36.  
*Echinops Hochnelii*, Schweinf. Bulambuli stream (det. J.D.S.).  
*Landtia Rueppellii*, B. & H. 11,000-13,000 feet (det. J.D.S.).  
*Synara amplexicaulis*, O. & H.  
*Swertia crassiuscula*, Gilg. Bulambuli to 13,000 feet. No. 78.  
*Swertia* Sp. near *crassiuscula*, Gilg. Butandiga. No. 90.  
*Swertia* sp. 12,500 feet. No. 100.  
*Plantago palmata*, Hook. f. Sipi. (coll. J. M. Wallace).  
*Canarina Eminii*, Aschers. Buginyanya and below Bulambuli (det. J.D.S.).  
*Wahlenbergia arabidifolia*, Brehun. Near Mudange. No. 85.  
*Lobelia inconspicua*, A. Rich. *ex descr.* 11,000-13,000 feet. No. 87.  
*Lobelia Schimperii*, Hochst. Sipi (coll. J. M. Wallace).  
*Lobelia gibberoa*, Hemsl. Sipi (coll. J. M. Wallace).  
*Cynoglossum* sp. 11,000 feet. No. 11.

- Cynoglossum* sp. Butandiga to Bulambuli. No. 95.  
*Cynoglossum* sp. Bulambuli. No. 98.  
*Solanum* sp. Bulambuli. No. 14.  
*Hebenstretia dentata*, L. 11,000 feet.  
*Bartsia decurva*, Hochst. 13,600 feet. No. 37.  
*Bartsia Kilimandscharica*, Engler. 11,000-13,000 feet (det. J.D.S.).  
*Bartsia Petitiana*, Hemsl. 11,000-12,000 feet. No. 70.  
*Celsia scrophulariaefolia*, Hochst. Bulambuli. No. 50.  
*Veronica abyssinica*, Hook. f. (det. J.D.S. his 238 and his 427).  
*Clerodendron Ugandense*, Prain (det. J.D.S.).  
*Stachys aculeolata*, Hook. f. Bulambuli. No. 12.  
Near *Wurmbea tenella*, Benth. Mudange. No. 83.  
*Commelina* near *triangulispatha*, Mildbr. Butandiga to Bulambuli.  
No. 96.  
*Oenostachys dichroma*, Bullock. Bulambuli stream. No. 34.  
*Dierama vagum*, N. C. Brown. (det. J.D.S. as *cupuliflorum* but name  
on his material in Kew Herbarium altered to *vagum* by  
Brown). 11,000-12,000 feet.  
*Dierama* sp. near *cupuliflorum*, Klatt (but a much smaller, erect  
species). Bulambuli Camp. No. 99.  
*Romulea ramiflora*, Ten. 12,000-13,000 feet. No. 82.  
*Habenaria decorata*, Hochst. 11,000 feet. No. 22.  
*Habenaria splendens*, Rend. 11,000 feet. (det. J.D.S.).  
*Habenaria* probably *bractiosa*, Hochst. Bulambuli. No. 104.  
*Disa Stairsii*, Kraenzl. Forest 10,000 feet. No. 102.  
? RESTIONACEAE. No. 77. Clumps round little lake below Jackson's  
summit.  
*Cyperus dicroostachyus*, Hochst. Butandiga. No. 1.  
*Mariscus Kerstenii*, C.B. Cl. No. 9.  
*Koeleria convoluta*. Hochst. 10,000-12,000 feet.  
*Luzula spicata*, D.C. var. *simensis*, 10,000-12,000 feet.  
*Osmonda regalis*. Sipi (coll. J. M. Wallace).



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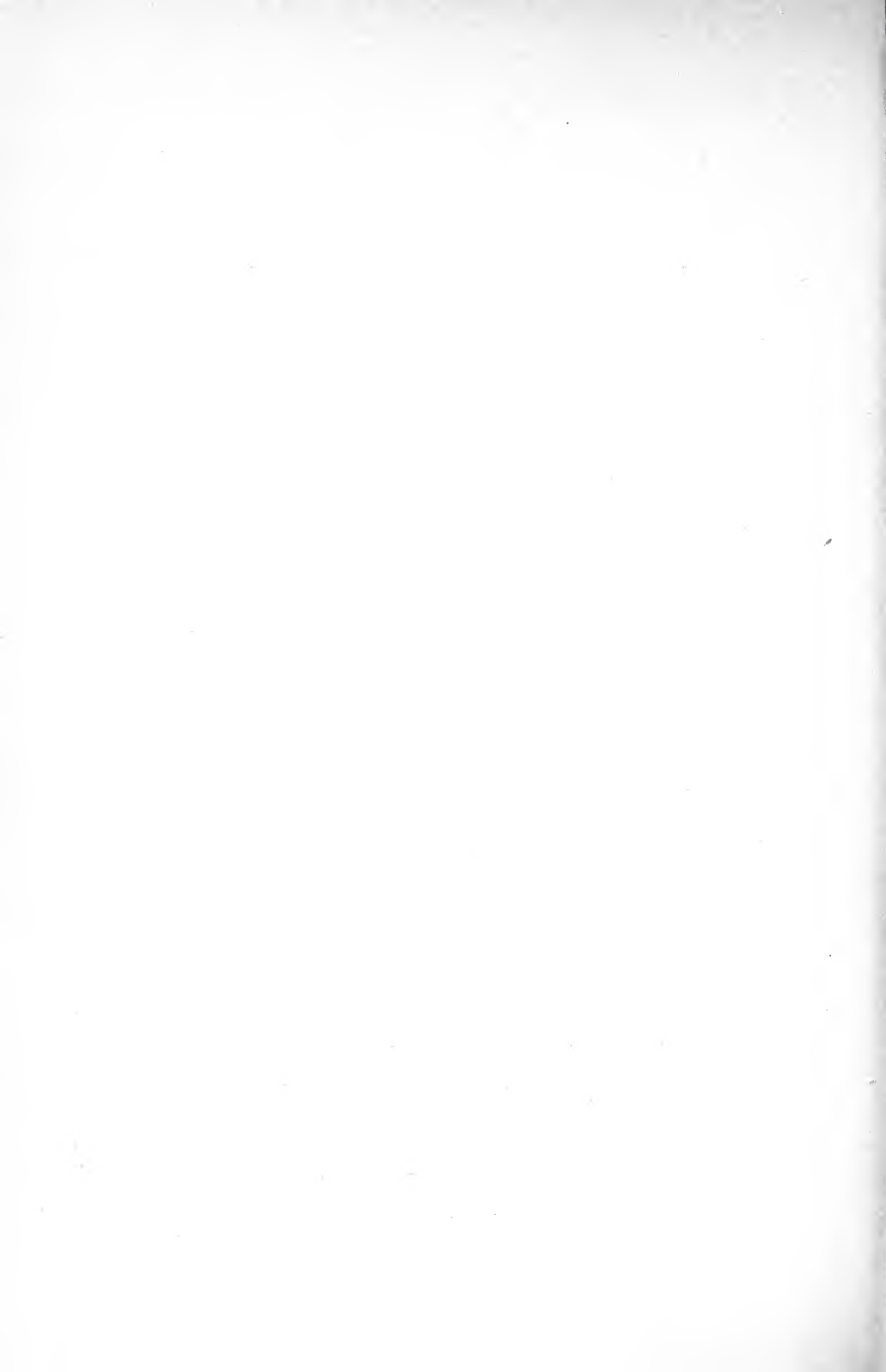
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# THE GEOLOGY OF PART OF THE USONGO AREA, TABORA PROVINCE, TANGANYIKA TERRITORY.

BY MESSRS. C. GRACE AND G. M. STOCKLEY.

## INTRODUCTION.

The following account consists of a brief description of a part of the Usongo Area in the Nzega District of the Tabora Province of Tanganyika Territory. Mr. Grace carried out the mapping of this area while he was working for a Belgian Syndicate, and acknowledgement is made to Dr. Parsons for permission to publish. Mr. Stockley had the opportunity of examining part of the area in particular the Bone Bed at Tinde, the outcrop near Ibologera, and the hills near Assalolo, north of the Ndoma School, north of Nzega. He has also examined Mr. Grace's collection of rocks which are described in some detail in Section 5 and this paper is thus the outcome of the combined efforts of the above observers.

## 2. PHYSICAL FEATURES.

The Usongo area is west of the Nzega administration station (Boma) and the Tabora-Mwanza road, and the part described comprises an area of about three thousand square miles. The western boundary is thus the Shinyanga-Tabora road, the northern is just south of the Tinde Hills, and it stretches for sixty miles east of that main trunk road with Nzega Station approximately central.

The country is a rolling plateau belonging to the old peneplain and is much covered with overburden. Small lines of hills occur as ribs breaking the plain level. Their general direction is N.W. to S.E.; some of which have a general direction almost at right angles. Two-thirds of the area of this country consists of mbuga or clay plains, the rest having a more sandy soil. Most of the drainage is to the north and east, the valleys are mature; water flows only during the rainy season.

## 3. THE WORK OF PREVIOUS OBSERVERS.

Very little work has been done in this area previously; the chief worker was Kuntz as the result of his examination of the Sekenke gold deposits (J. Kuntz, 1909. *Beitrag zur geologie der Hochlander Deutsch-Ostafrikas mit Besonderer Berucksichtigung der Goldvorkommen Zeitsch. F. prakt. Geol.* 17, S. 205-232, 1909), and recently the area was approached by Mr. F. B. Wade of the T.T. Geological Survey and reference may be found in Short Paper No. 1 (Outlines of Geology of the Regions adjoining the South-Eastern Shores of Lake Victoria). Kuntz noted the presence of rocks which he assigned to the Witwatersrand, consisting of quartzites, ironstones (itabirites) and shales. He further realised the fact that the granite was intrusive

into these sediments, giving rise to mica schist, phyllitic schist, clay schist and quartz schist.

#### 4. THE GEOLOGY.

As is shown on the Geological Map there are principally three formations; the oldest are a sedimentary series, the Usongo beds, which have been intruded by granite. Above these are superficial deposits, partly old lake deposits, partly aeolian and partly eluvial. The eluvial deposits vary from clays to sandy loams and can be correlated with the underlying rocks. A granite gives rise to sandy loams and the dyke rocks and some of the members of the Usongo beds give rise to clays and clay loams.

The Usongo beds consist of an upper division of quartzites, ironstones, and shales; the lower beds are hornfels, siliceous sandstone, and silicified amygdaloid. There are some greenstones, chiefly epidiorites which may belong to these rocks or are intrusive. In the former case they would represent a basic igneous flow.

These sediments usually dip away from the granite mass at high angles and their general structure indicates steep isoclinal folding. It is impossible to give a continuous section as the outcrops are scattered and broken, but the observations prove that these rocks are highly folded and it may be the movement accompanied intrusion. The outcrops of the Usongo beds are really monadnocks or *inselberge* on the Central African peneplain.

The question of age of the Usongo beds is a difficult one, as there are no outcrops to show the relation of these rocks to any other formation with the exception of the Tinde Lake beds. It is shown (section 6) that these are no older than pleistocene, and as the Usongo sediments are quite unfossiliferous it is very probable that they belong to pre-Cambrian age. Kuntz considered them equivalent to the Witwatersrand which are undoubtedly of pre-Cambrian age. They are lithologically similar and the resemblance to the topography of the Transvaal is close. The question of distinguishing the age of unfossiliferous sediments in isolated outcrops is extremely difficult, and so far no means have been evolved where the principle of super-position does not apply. It is suggested that the degree of metamorphism does indicate within certain limits the age of these sediments. If the assumption that all unfossiliferous sediments are pre-Cambrian is conceded then the conception that the degree of metamorphism is proportional to the age may be useful in placing these rocks in the upper series of the pre-Cambrian. It is suggested that the rocks of the Swaziland consisting of marbles, quartzites, amphibolites, and ortho- and para-schists, are much older than the Usongo beds, which are intruded by granite and which are only metamorphosed close to the periphery of the granite. The Swaziland rocks on the other hand are usually almost completely metamorphosed, both thermally and

dynamically. The rocks that are interbedded with gneisses, and overlie the gneiss in age are considered in Tanganyika to be Swaziland, that is, the oldest sediments of geological time.

##### 5. PETROGRAPHICAL NOTES ON ROCKS FROM THE USONGO AREA.

The notes contained in this section are based on certain observations of the author's in the field and the examination of some 200 specimens of which some 50 thin sections have been sliced. They form the combined collections that both Mr. Grace and Mr. Stockley made in this area. They have been divided into petrological groups, firstly the igneous rocks, chiefly the granites and their apophyses, the dolerites and greenstones; secondly the sediments, consisting of hornfels, quartzites, shales, ferruginous sandstones and jasper rocks.

The results of the work may be summarised as follows:—

- A. Outline of the petrography of the Usongo area.
- B. The intrusive igneous rocks and greenstones:
  - 1. Granites and rocks.
  - 2. Microgranites, felsites and aplites.
  - 3. Dolerites.
  - 4. Greenstones (chiefly altered diorites) and epidiorites.
- C. The sediments, and intercalated lavas:
  - 1. Hornfels.
  - 2. Quartzites, shales, ferruginous sandstones, and jasper rocks.
- D. The Tinde bone-bed.

##### A. OUTLINE OF THE PETROGRAPHY OF THE USONGO AREA.

The rocks naturally fall into the above groups, the largest outcrop being the granite which is evident from its top feature which characterises the southern and western part of the area. It is rolling country with wide shallow valleys, the topography belonging to the original peneplain. It can compare very easily with Southern and Central Transvaal. The sediments form a fringe surrounding a quadrant of the granite mass. They outcrop in low hills rising two to three hundred feet above the plane level, and their north-eastern extensions are hidden under great thicknesses of *Mbuga*. An *Mbuga* is the East African equivalent to the South African "Pan."

The granites are usually coarsely crystalline rocks with large feldspar phenocrysts. In the foliated types granulitic structures are evident around the feldspars, the edges being smashed and granulated. The feldspars are microcline and oligoclase. These rocks approximate very closely to the foliated microcline granites and to the non-foliated biotite-hornblende granites of the Iringa area described by Dr. D. R. Grantham in last year's Annual Report of the Tanganyika Geological Survey. They differ chiefly in their coarser crystalline character.

In the granite abundant small dykes are seen, and these are usually either microgranites, felsites and aplites with a few pegmatite veins. The microgranites are pinkish fine-grained rocks, the chief feldspar being microcline. These grade into felsite with the absence of mica. The aplites are very often epidotised and become epidosites. Epidote-quartz veins are not uncommon.

The dolerites are the common unaltered ophitic augite-labradorite dyke rocks so commonly seen throughout the Territory and are probably of Karroo age. The greenstones vary from true epidiorites, in which augite has simply changed over to amphibole, the original structure and feldspars of the dolerites remaining intact, to silicified dolerites and diabases. Some of the epidiorites are derived from basaltic and andesitic rocks, the original glass or pyroxene has changed over to hornblende, and the small feldspar laths are intact, some of which have predominant andesine. In the silicified dolerite practically all of the original feldspars have been obliterated, though their outline is still evident. Epidote chlorite and quartz together with actinolite complete the rock. The altered diorites have original hornblende, secondary actinolite and chlorite and much altered feldspars, the alteration products being sericite and epidote. The amount of the alteration is variable, some having their feldspars completely filled with secondary minerals while others are only partly altered.

The hornfels are either fine grained greenish or whitish grey quartz hornfels rocks weathering to a rusty red. The former are all hornblende quartz rocks, the amphibole linearly arranged making 90% of the rock. Some of them may be of sedimentary origin but a few are undoubtedly basic lavas thermally metamorphosed and silicified. They thus represent intercalated lavas. Another rock though purely of siliceous composition is an amygdaloid highly silicified. The thin section shows only calcite infiltrated and silica rendered opaque with ferruginous material. These rocks are interbedded with a series of quartzites and ferruginous sandstones. Some of the latter and the jasper rocks are highly contorted and the movement is apparently intra-formational. The white-grey hornfels are thermally metamorphosed siltstones, the metamorphism giving rise to very fine grained quartz-orthoclase-biotite rocks. They contain small crystals of glaucophane.

## B. THE INTRUSIVE IGNEOUS ROCKS AND GREENSTONES.

### 1. *Granites and associated rocks.*

GR. 59.  $4\frac{1}{2}$  miles E.N.E. Kigonho. A coarsely crystalline dark rock, having a doleritic appearance. It consists of green hornblende and some secondary actinolite, with plagioclase feldspars chiefly oligoclase to andesine. This has a doleritic composition and was considered a dyke rock in the field.



GR. 121. Nungo. A fresh porphyritic hornblende and felspar rock with a Plutonic crystallization. It is of syenitic composition with hornblende and basic oligoclase forming the major constituents and the accessory apatite.

GR. 128. Ngogo river, three miles north-west of Ngaya. Grey felspathic coarse porphyritic gneissose or foliated granite. The chief felspars are microcline and oligoclase with rubbed or granulitised borders. It contains hornblende, secondary biotite and sphene.

GR. 148. Six miles east of Itundu. This is a grey obviously granulitised granite. The felspars are microcline, orthoclase and oligoclase, and there is a little biotite.

GR. 149. Eight miles east of Itundu. This is one of the pinkish-grey variety; but its composition is exactly like the foregoing.

GR. 151.  $3\frac{1}{2}$  miles west of Maragano. A coarse grey granite.

SN. 18. Ibologera. A coarse crystalline granite with large phenocrysts of microcline. It contains both hornblende and biotite with accessories apatite and sphene.

SN. 36. 1.5 miles north-east of Ibologera. Similar to the last but orthoclase takes the place of microcline.

SN. 39. 1.1 miles from Nzega on Bukene road. A coarse pinkish porphyritic biotite granite. Both apatite and sphene are accessories.

## 2 *Microgranites, felsites and aplites.*

GR. 5.  $\frac{1}{4}$  mile from Igunga. A sheared microgranite, containing microcline and orthoclase as characteristic felspars with some oligoclase. Some biotite is present.

GR. 60. Rise west of Kigonho River. A fine grained pink microgranite; chief felspars are microcline and oligoclase.

GR. 131. Ngaya  $1\frac{1}{2}$  miles east of.

SN. 40. 1.5 miles from Nzega near the Bulindi road. Both of these are similar to the above, having microcline and oligoclase with orthoclase as the dominant felspars.

GR. 1. 15.5 miles from Nzega on road to Sakamaliya. A typical quartz felspar rock with graphic structure with practically no mica.

SN. 19. 0.25 miles from Ibologera. Similar to the above but with a little more biotite.

GR. 130. Ukoko.

GR. 150. Three miles south-east of Mkiwa. These are quartz-epidote rocks, and are probably veins in the granite.

## 3 *Dolerites.*

GR. 39.  $\frac{1}{2}$  mile west of Wasimba. This a perfectly normal olivine dolerite, the olivine being accessory; the ophitic texture not being too well developed.

GR. 122.  $7\frac{1}{2}$  miles south of Nungo. No olivine occurs in this dyke rock but there is the doubtful presence of orthoclase.

SN. 22. 2.675 miles from Ibologera in an easterly direction. A boulder picked up and is a straight dolerite.

4. *Greenstones (chiefly altered Diorites) and epidiorites.*

GR.14. Ukoko. A heavy black greenish-black diabase looking rock. It is a silicified and epidotised rock possibly a diorite but the complete obliteration of the feldspars renders origin indeterminable.

GR.32. One mile south of Banassu Hill. Microscopically has the appearance of a dolerite. It is a silicified and metamorphosed diorite as some of the feldspars are oligoclase. Basaltic hornblende forms cores to a pale green hornblende, which is obviously secondary. In addition there is secondary actinolite and granular oligoclase probably secondary.

GR.35. Four miles due north of Asalolo. This is a highly altered igneous rock whose origin is hidden. Large crystals of hornblende are seen in an opaque mass which under the high power show a felt of sericite, epidote, chlorite and fibres of actinolite. Quartz forms a background to the felt.

GR. 74. River west of Ngrube. This is a hornblende quartz rock with opaque and highly altered feldspars, which have changed to epidote and sericite.

GR. 98. Usuli Hill. This is an epidotised diorite; the feldspar is chiefly oligoclase.

GR. 106. Ibologera and Nanga. Chiefly hornblende with ophitic feldspar. This appears to have been of basaltic origin and has been metamorphosed to an epidiorite.

GR. 118. Tinde. This occurs as float on the mbuga area and is of interest because of its amygdaloidal nature. It is a vesicular epidiorite which has become epidotised.

SN. 25. 4.875 miles from Ibologera in an easterly direction;

SN. 46. Two miles from Ndomo School to Ududu Hill;

SN. 47 and SN. 51. Are all epidiorites derived from basaltic and trachy-andesitic rocks.

SN. 52. Was originally a quartz-dolerite.

C. THE SEDIMENTS AND INTERCALATED LAVAS.

SN. 50. 2.23 miles from Ndomo School towards Ududu Hill. This is a silicified amygdaloid, consisting of quartz and iron ores with vesicles containing calcite and secondary silica.

GR. 24. W. ridge of Banassu Hill. This is a hornblende hornfels with intercalated bands of quartz injected. These rocks weather to a rusty red colour and they represent the complete thermal metamorphism of a basic lava.

SN. 41 and 42. About 1.75 miles from Ndomo School to Ududu Hill. These are similar to the above, the hornblende being linearly arranged.

GR. 67. E. end of Bunassu Hill.

GR. 69. Lusu Hill. These are quartz hornfels with glaucophane. These are the most interesting rocks of the region as this is the first time that glaucophane has been recognised in this Territory. The slice reveals fine granular quartz and orthoclase felspar with flakes of biotite and occasional small prismatic crystals of glaucophane. The pleochroism of the latter is from lavender-blue to lavender colour. These rocks are obviously fine siltstones which have been subjected to thermal metamorphism.

## 2. Quartzites, shales and ferruginous sandstones.

The most interesting of this group are two siliceous grits, and SN. 30, 5.9 miles from Ibologera *en route* to Makingi Hill; and consist of subangular to angular chips of quartz in an opaque siliceous cement. In one case the quartz fragments are fractured and have been subjected to shearing.

## D. THE TINDE BONE-BED.

During his exploration of the district Mr. Grace discovered a bone-bed, which is situated near the village of Tinde, which is 54 miles from Nzega on the Sakamaliwa and Sekenke road. It is found at the base of a small bluff or cliff which forms a continuous feature for a few miles from the newly cleared road to Sakamaliwa. The old road climbs the bluff about 3.8 miles from Tinde. The bone-bed is 1.4 miles from the road where there is a break in the continuity of the bluff and the occurrence lies in the gap. The cliff provides a section whereby the nature of the containing rocks may be studied. In order to determine the exact position and relationship of the bed several pits were dug, three on the western side and two on the eastern. These beds are conveniently called the Tinde beds and they consist of stiff greenish clays and nodular limestones and tufas. The clays contain rusty-coloured spots and small calcareous concretions and films of Manganese dioxide. Small fragments are included sporadically in the clays and are found on the plateau surface or rolled down from the cliff face. They consist chiefly of quartz, jaspery rocks, epidiorite, black hornblende schists and granite. The pits on the western side proved bands of nodular limestone alternating with stiff green clays. The bones were found only in one of these bands and it was found impossible to augment the collection by excavation because all the bones are so brittle and fragmentary and the containing rocks so hard. The best material is found on the ground surface, having weathered out from the fossiliferous band, and the best finds are limited to the gap and the adjacent cliffs for a distance of not more than 100 yards to the east and the west. The author searched along the bluff as far as the meeting with the Sakamaliwa road but the only sign of any fossiliferous remains was one broken internal cast of what is probably a *Viviparus*. This search was

not exhaustive and it is possible that there are other places where fossils may be found.

The fauna from the gap near Tinde consists of:

1. Large knuckle bones.
2. Small vertebrae, probably of fish.
3. Teeth, large belonging to Ungulates and smaller ones of unknown origin.
4. Fragments of chelonias and reptilia.
5. Fragments of bones, chiefly mammalia-ungulates.

The British Museum has examined these specimens and considers that the age of these deposits is not older than the Kaiso beds found on the shore of Lake Albert, which are of Plio-Pleistocene age.

## NEW RACES OF BIRDS FROM EASTERN AFRICA.

By V. G. L. VAN SOMEREN, C.M.Z.S., M.B.O.U., C.F.A.O.U., etc.

During a recent revision of the Birds of Kenya and Uganda several races of birds were found to be un-named; I have accordingly proposed names for these, and indicated the salient features on which these races are differentiated. The known distribution of each will be dealt with in my forthcoming work on the Birds of Kenya and Uganda.

The following new races of Kenya and Uganda birds are here described for the first time.

*BARBATULA PUSILLUS LOLLESHEID*, Subsp. Nov. Juba  
Red-fronted Pigmy Barbet.

Very like *pusillus affinis*, but paler below, less washed with buff on the flanks and abdomen, these areas being creamy-yellow. The frontal patch is uniformly more extended and rounded. This race is constantly smaller. Wings 46-50 mm.

Type, male, Serenli, 8/22, north corner of Juba River, in my collection.

Comparative material: 16 *affinis*, 7 *lollsheid*.

I had already drawn attention to these birds in my paper, *Journal E.A. and U. Nat. Hist. Soc.*, No. 35, March, 1930.

*ISPIDINA PICTA JUBAENSIS*, Subsp. Nov. Juba Violet-eared  
Kingfisher.

The birds from the Juba River, as recorded by me in my paper *Op. cit.* are constantly smaller than any from Kenya or Uganda, and are recognisable as a small race. Wing variation, 43-50 mm. as against 52-57 mm. Tails, 17-20 mm. as against 23-28 mm. These differences constitute sufficient grounds on which to establish a geographical race.

Type: Male, Serenli, 7/22, in my collection.

Comparative material: 10 Juba birds; 20 from Kenya and Uganda.

Distribution: The mid reaches of the Juba River, from Dolo to Waregta.

Observations: The birds from the lower Tana are intermediate but nearer the Uganda form. Specimens from the Ganda forest and Vanga are very close to the southern form *natalensis*.

*ALSEONAX MINIMUS MARSABIT*, Subsp. Nov. Marsabit Little  
Brown Flycatcher.

Sclater states that the typical *murinus* of Kilimanjaro, extends to Marsabit; but in this he is wrong. The Marsabit birds differ in being smaller, wings 56-63 mm. mostly 56-57 mm. and in being much more

ashy-brown above, and are richer, more ochreous-brown below, without the greyish wash to the breast. They thus resemble the race *pumilus* to a certain degree.

Type: Male, Marsabit, 2/7/23 in my collection. Specimens available, 8.

*ALSEONAX MINIMUS INTERPOSITUS*, Subsp. Nov. Kenya  
Little Brown Flycatcher.

This race differs from true *murinus* of Kilimanjaro in being less dark greyish above, more brownish, and not so greyish on the breast.

In size the races are almost identical. I refer to this race all the birds from the Kenya highlands, Nairobi, Kenia, Aberdares, Mau to Elgon.

Type: Male, Molo Forest, 8/7/18 in my collection.

Observations: Out of a series of twenty odd skins from the range of this race there is only one which approaches the typical *murinus*.

*TROCHOCERCUS BIVITTATUS KIKUYUENSIS*, Subsp. Nov.

In comparing the highland birds with the nominate race from the lower Tana River, it is at once noticeable that the former are larger and the females are more strongly streaked on the breast. This character is not to be confused with dark appearance of the breasts of young of the nominate form.

A comparison of the wing measurements gives the following:

*T. bivittatus*: ♂♂, 62-70 mm. ♀♀, 62-68 mm. Tails, 68-76 mm., 65-70 mm.

*T. b. kikuyuensis*: ♂♂, 71-75 mm. ♀♀, 68-70 mm. Tails, 75-81 mm., 75-80 mm.

Type: Male, Kyambu Forest, 27/12/16, in my collection.

Comparative material: 19 of the new race; 24 of the nominate form.

Range: Nairobi and Ngong, Meru and Mt. Kenia, Aberdares, Mau.

*PARISOMA BÖHMI MARSABIT*, Subsp. Nov.

Differs from the races *P. b. bohmi* and *somalicum*, in being much paler fulvous on the abdomen and flanks and sides. Selater writes of these birds, when comparing *somalicum* with the nominate form: "Birds from northern Kenya are intermediate, or perhaps may be separated." I had already noted the differences in my notes published in the *Journal E.A.U. Nat. Hist. Society*, No. 35, p. 66, and having a good series of the three forms I name the Marsabit bird as above.

Type: Male, Marsabit-Lasamis, 4/8/24, in my collection.

Friedmann compared his Somali material with the birds I have named and noted the paleness of the north Kenya form.



*ANTHREPTES COLLARIS JUBAENSIS*, Subsp. Nov.

This race is nearest to *elachior* of Mearns, but differs from that race in being much clearer yellow below, in both sexes, with only the very slightest trace of olive wash on the flanks in the males; in the females, the whole of the underside is canary-yellow with no greyish tinge to the throat.

Types, male and female: Hellesheid, Juba River, upper waters, July, 1922, in my collection.

Range: The mid and upper waters of the Juba River, Serenli to Dolo.

*EREMOMELA SCOTOPS KIKUYUENSIS*, Subsp. Nov.

Having obtained a good series of the nominate race from the coastal regions of Kenya, I am now able to state definitely that the up-country birds are a distinct race. They are larger, having wings of 60-66 mm. Tails, 46-48 mm. compared with 51-56 mm. and 34-40 mm. respectively. The bills of the upcountry birds are 2-3 mm. longer.

Type male: 22/3/16, Nairobi (breeding) in my collection.

Comparative material: 10 of this new form; 11 of the nominate race.

Range: The highland forests of Kenya from Kikuyu district to Mt. Kenia, Aberdares and the Mau.

*BRADYPTERUS ALTUMI MITONI*, Subsp. Nov.

Similar in size and general characteristics to *altumi* from Molo and Mt. Kenia, but considerably darker on the upper and lower surface.

Type, male. Lumi River, 10/7/20, in my collection.

*APALIS MELANOCEPHALA MOSCHI*, Subsp. Nov.

Most nearly allied to *melanocephala* but distinguishable from that species in both its forms by being paler above, the grey of the crown and the mantle being of the same shade without an olive wash on the latter area and without decided darker earcoverts. In size, these birds are intermediate between *A. m. melanocephala* and the highland form *A. m. nigrodorsalis*, Granvik. Breast and throat buff-cream; paler on abdomen and grey tinge in flanks.

Type: Male adult, Moschi, June, 1920, in my collection.

Observations: Of this bird, Selater writes: "Distinctly more ashy coloured and not so dusky as Moreau's bird (*melanocephala*) and they cannot, I consider, be regarded as identical." This view coincides with mine. I possess a series of typical *melanocephala* and also the highland race; they are easily separable.

*GEOKICHLA GURNEYI CHUKA*, Subsp. Nov.

This very distinct bird is not to be confounded with *G. piaggiae keniensis*, Mearns, which is found in the same locality. It differs from

*otomitra* and *usambarae* by being much larger and differently coloured. Wings 123-126 mm. against 107-112 in *otomitra* and *usambarae*.

Crown slightly darker than the mantle which is dark olive; ear-coverts greyish, with an oblique buff line crossing it; ring round the eye, white, interrupted by a black mark on the upper lid and another correspondingly placed on the lower lid; a slight black moustachial streak; a narrow rufous preorbital line; throat and breast and flanks light orange with slight olive tinge on sides of the breast abdomen, vent, and under tail-coverts pure white. Bill long and strong, much more so than in *G. piaggiae keniensis*, 25 mm. Wings dark olive, with paler outer webs to the primaries; greater and first row lesser coverts darker and with triangular white mark at tips.

Type: Male, Chuka, 15/1/21, in my collection, shot feeding young.

Observations: The young of this bird is totally different to that of *G. piaggiae keniensis*, and should not be confused with it at any stage. This bird has been submitted to Sclater and Stresemann who both agree that it is a new race.

#### *ERYTHROPYGIA HARTLAUBI KENIA*, Subsp. Nov.

Differs from the nominate race in being darker above, and having the breast spots larger and more distinct; the amount of red in the tail is greater. The distribution is from Mt. Kenya to Kikuyu and Aberdares.

Type: Male, Mt. Kenia, Feb., 1919, in my collection (10 specimens).

#### *TURDOIDES SQUAMULATA JUBAENSIS*, Subsp. Nov.

The birds from the Juba River differ from the typical race in being lighter olive-grey above, this colour extending up to the crown at a line with the posterior angle of the eyes; the ear coverts are not black, but dark greyish streaked at the lower border with white. Only the fore-part of the crown is streaked with black, this colour being limited to the centre of the feathers which are edged with olive-grey. The whole of the underside is lighter than in the nominate form.

Type: Male, Serenli, July, 1922, in my collection.

Range: The upper waters of the Upper Juba, from Dolo to Serenli.

Comparative material: Seven of the new form and 12 of the nominate race.

#### *DICRURUS ADSIMILIS JUBAENSIS*, Subsp. Nov.

Most nearly related to *divaricatus*, but differing from that race by being smaller, with a much less forked tail; the inner webs of the wing feathers are pale, not black; the gloss on the body is a greenish-blue-black. This bird is not to be confused with *D. ludwigi*. Wings 110-120, av. 115.7 mm. Tails, 102.5 mm. Comparative measurements are: Kenya highlands, 120-135, av. 131½ mm. Tails, 114 mm. Fifteen examples.

Type: Male, Juba River, upper reaches, in my collection.

*AMYDRUS WALLERI KENIENSIS*, Subsp. Nov.

This race differs from that found on Mt. Elgon, by being considerably larger. The wing measurements are: Males, 135-140 mm.; females, 128-132 mm. Elgon birds: Males, 120-125 mm.; females, 115-123 mm.

The bills of the Mt. Kenia birds are longer and heavier, and there is a difference of 10-18 mm. in tail measurements of the two races. Type: Male, Meru Rd. 1920, in my collection.

I have submitted typical examples of this new race to Sclater, who confirms my view and submits measurements of the material in the British Museum which substantiate the differences.

*LAMPROCOLIUS CURRUSCUS JOMBENI*, Subsp. Nov.

Differs from the race *mandanus*, mihi, of the coastal zone of Kenya by being more brightly coloured although the scheme is similar, and by being considerably larger. Average wing length of the coast form is 105 mm.; that of the form existing on the Jombeni Range, ♂ 121 mm., ♀ 116 mm.

Type: Male, Jombeni, N.E. of Mt. Kenia, 20/12/20, in my collection.

*EURILLAS VIRENS SHIMBA*, Subsp. Nov.

Differs from the race *marwitzi* of Kilimanjaro in being smaller and in having the breast and flanks washed with a greyish tinge. Wings, 76-81 mm. This race is alluded to by Bannerman, *Rev. Zool. Afr.* 1924, p. 25 as ? subsp.

Type: Male, Ganda Forest, Kenya coast, 3/24, in my collection.

Range: Limited to the coast from Vanga, Shimba hills to Tana River (lower).

*PHYLLASTREPHUS FISCHERI MARSABIT*, Subsp. Nov.

The birds from the isolated mountain of Marsabit (2,000-2,500 feet) cannot be united with the race *placidus* (of which *keniensis* is a synonym).

They differ by having the crown of the head scarcely darker than the colour of the mantle, both of these areas being olive-green, purer than in *placidus*; the upper tail coverts are paler, not so reddish; the underside is more whitish, due to the bases of the feathers being less dark grey.

Type: Male, Marsabit, 14/7/23, in my collection.

In type of colouration this race is intermediate between *fischeri* and *f. placidus*.

Comparative material: Ten of this new form; 28 *placidus*, including 18 from Mt. Kenia, and a series from Kilimanjaro.

# INTRODUCTORY NOTE ON VIRUS DISEASES OF PLANTS IN KENYA.

BY RICHARD H. LE PELLEY.

A very large number of serious diseases affecting man, domestic animals, birds, insects and plants belong to the great group now known as Virus diseases. It is the object of the present note to mention the importance of virus diseases of local crops and to describe some of their characteristics, especially those that indicate interesting lines of observation that may be made in this country. Although a detailed study of one or more of the virus diseases is a work necessitating an elaborate apparatus and entailing many years of devoted work, yet there are a number of lines of observation, such as the insect fauna of plants, and the weed flora of plantations, which may immediately be made in this country and which should prove interesting and important.

A number of economic plants in Kenya are affected by one or more virus diseases. The mosaic disease of sugar cane is well known and has received attention, but there are present a number of other important diseases. These include the streak disease of maize, the mosaic disease of tobacco, the rosette disease of ground nuts, the curly-leaf disease of cassava, and a number of different diseases of the potato.

The causal agent of virus diseases, unlike that of diseases due to fungi and bacteria, has never been isolated or cultivated on artificial media. It is ultra-microscopic and is usually able to pass through a filter capable of retaining the smallest bacteria. As its causal agent cannot be cultivated on artificial media it is necessary to study a virus disease by its effect on the host. Virus diseases are infectious in varying degrees. Some are known to be so infectious that they may be conveyed in the field by mechanical inoculation during such a process of cultivation as pruning. The greater majority however are conveyed from diseased to healthy plants in the field by insects. In some cases one disease may be transmitted by several different species of insects, while often one species only is able to transmit the disease. In such a case where, though several species of insects feed in a similar manner on the plant, only one of them conveys the disease, it is possible that the virus may have to undergo some necessary change in the body of the insect and is dependent for this on some physiological peculiarity of the particular insect.

The mosaic disease of sugar cane has been shown by Brandes<sup>1</sup> to be transmitted by *Aphis maidis*; while Storey<sup>2</sup> has shown that the vector of streak disease of maize is the leaf-hopper *Cicadulina mbila*. Apparently this disease of maize is transmitted only by this insect and in no other way. It is interesting to notice that the vector occurs in



Kenya, and has also been found by Storey in the other East African territories.

Since the potato is an important crop in this country and is the host of a number of virus diseases, and further that several points of general interest in the study of these diseases are well exemplified in the potato, a short description of some of the potato diseases and their peculiarities will be given.

The most common is mosaic, the symptoms of which are a mottling of the leaves and a very slight puckering. In England this disease and a number of other potato virus diseases have been shown by Smith<sup>3</sup> to be conveyed by the aphid *Myzus persicae*. The vector of these diseases in this country is not known, and in this connection a detailed study of the insect fauna of the potato plant would be of great interest.

The potato disease known as crinkle was first described by Murphy<sup>4</sup>. The plants are dwarfed, typically they are paler than healthy plants, and there is a pronounced puckering and downward curving of the leaves, usually with a marked mottling due to the presence of yellowish areas over the leaves. Another disease which though in certain varieties is similar in appearance to crinkle, is distinct in its reactions, was discovered by Dr. R. N. Salaman and the writer<sup>5</sup>. The reactions of this disease called para-crinkle will be described in some detail because several interesting general facts may be thereby introduced. It has already been remarked that virus diseases have to be studied by their effect on the host, and a difficulty of such studies becomes evident in this case where these different diseases crinkle and para-crinkle have almost identical symptoms in one potato variety, and on the other hand one disease para-crinkle has an entirely different effect on different varieties. Potato virus diseases are readily conveyed experimentally by grafting a portion of a diseased plant to a healthy one. Crinkle produces strongly-marked symptoms on President, Arran Victory, King Edward, Arran Chief and other varieties. Para-crinkle in Arran Victory and Arran Chief is a well-marked disease; but no symptoms whatever are produced in the varieties President and King Edward by grafting them with a scion diseased with para-crinkle. Nevertheless these plants although apparently healthy contain the pathogen of para-crinkle, and this can be shown by grafting a shoot from them to Arran Victory, which induces the disease with all its symptoms in this variety.

Varieties which contain the pathogen of a disease without showing any symptoms are known as "carriers." Such varieties are necessarily a danger to neighbouring susceptible varieties. This raises also another point of interest, which is that certain weeds have been shown to be carriers of virus diseases of economic plants. Thus in England the black nightshade *Solanum nigrum* has been shown by Smith<sup>6</sup> to be an almost symptomless carrier of one or more potato virus diseases.

The potato can become infected with the disease by *Myzus persicae* feeding on it after feeding on the carrier weed. In this country there are a large number of solanaceous weeds any one of which might be a carrier of a potato virus disease. A study of such weeds would be of much interest.

Two other potato diseases are streak and leaf-roll. Streak shows its presence in the plant by the occurrence of streaks and lesions in the leaves and stem, and is often lethal, killing the plant completely in a few weeks. In leaf-roll the leaves are harsh and rolled and the whole plant is severely stunted. The yield of tubers is very reduced in plants suffering from this disease.

All the potato virus diseases mentioned occur in this country in which they cause a marked loss. As happens if potatoes are grown year after year from their own "seed" in the South of England so it appears to happen here, that the stocks gradually become increasingly severely affected with virus disease, their yield drops markedly, and frequent and constant re-importations of "seed" tubers are necessitated.

By growing stocks of potatoes known to be free from virus disease, as far as possible in isolation, attempts are now being made to maintain their health and high yielding qualities.

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## DESCRIPTION OF MASAI SHIELDS AND SPEARS.

By D. STORRS-FOX.

The patterns of shields vary according to the following groupings :

- (a) Circumcision age.
- (b) Sectional.
- (c) Marks of bravery.
- (d) Ornamentation.

Each generation may divide into a right hand age and a left hand age. This matter has been fully explained elsewhere, so I will refrain from doing so again. Most of the shields in the museum are of the right hand but there are two specimens of the left hand.

The general type of right hand circumcision marking consists of black and red serrated arcs on the upper half of the shield (fig. 1).

There is one red stripe, then three complete black stripes and another which is mostly hidden by the chain pattern. The red mark just below the chain pattern across the middle, is common to both right and left hand circumcisions. The stripes are called *Osambu*. They should be made thin; thick ones are considered vulgar and ostentatious.

An alternative pattern for a right hand shield is to have a broad blue-grey band in place of a stripe (fig. 2). The type of left hand shield is as in fig. 3 or alternatively as in fig. 4, which is called *Ol Lemutoroki* from a supposed resemblance to the Crested Crane. It has a broad red edge to the top half.

There are no specimens of figs. 2 and 4 in the museum.

The section patterns are common to certain groups of sections, i.e.

- (i) Purko, Kakonyuki, Il Dalalogotok have a pattern common to all three and are indistinguishable from one another. All the specimens in the museums are of this group.
- (ii) Il Damat.
- (iii) Kabutei, Matapato, Lodokilani, Loita, Siria and Laitayok.
- (iv) Loitokitok.

The broad red mark just below the middle of the shield in figs. 1 to 4 is typical of the Purko and Kakonyuki and Il Dalalogotok sections.

The Il Damat have this red mark and in addition a black mark on the top half. Fig. 5 shows an Il Damat shield of the right hand circumcision. For a left hand circumcision shield the three black stripes would be omitted. In Kabutei, Matapato, Lodokilani, Loita and Siria the black and red cross over the centre (fig. 6). These sections have not had a left hand circumcision within the last 20 years.

The Loitokitok markings are similar to the Il Damat (fig. 5) except that the broad band which is black in Il Damat is blue-grey in Loitokitok. There has been no recent left hand circumcision in Loitokitok.

## MARKS OF BRAVERY.

Fig. 7 shows the highest mark of bravery. It is a red mark with a serrated black line round it on the bottom edge of the shield.

The small red and black mark depicted on the top edge of fig. 1 is a mark of bravery of a lesser degree. The rosette on the lower half of fig. 2 is another sign of bravery equivalent to that in fig. 1.

## ORNAMENTATION.

The red and black chainlike marks across the middle of the shield are for ornament. Red must come next to black and vice versa. The number of links depends on the number of stitches which are fastening the wooden backbone of the shield to the hide.

An optional ornament is formed by two parallel vertical serrated lines on the lower half of the shield (see fig. 5). There are specimens of all the bravery and ornamentation marks in the museum.

## COLOURS.

The black is made of the charcoal obtained from burning calabashes of *Acrocanthera* (Ol Moricho). This charcoal is powdered and mixed with some ox blood. Red is made from a powdered red stone called Osindi mixed with ox blood.

White is burnt ox bone mixed with water.

Blue-grey is the burnt femur of an ox mixed with water.

## SPEARS.

Long ago the spears of the Masai warriors were leaf shaped. The long bladed spear was probably introduced about sixty years ago, when the Laimer age, of whom very few now survive, were warriors. Their spears were much broader than the modern ones. There is very little to distinguish one type of modern warrior spear from another. The Purko and Kakonyuki have a rather narrower blade than the rest, with smaller lugs at the base of it, but there is nothing sufficiently distinctive to indicate by drawing. The cuts on the socket of the butt end of the spear are customary ornament and have no other significance. The giraffe hair commonly found at the socket of the blade is also ornament.

Old men and boys carry lighter spears with short and unpolished blades.

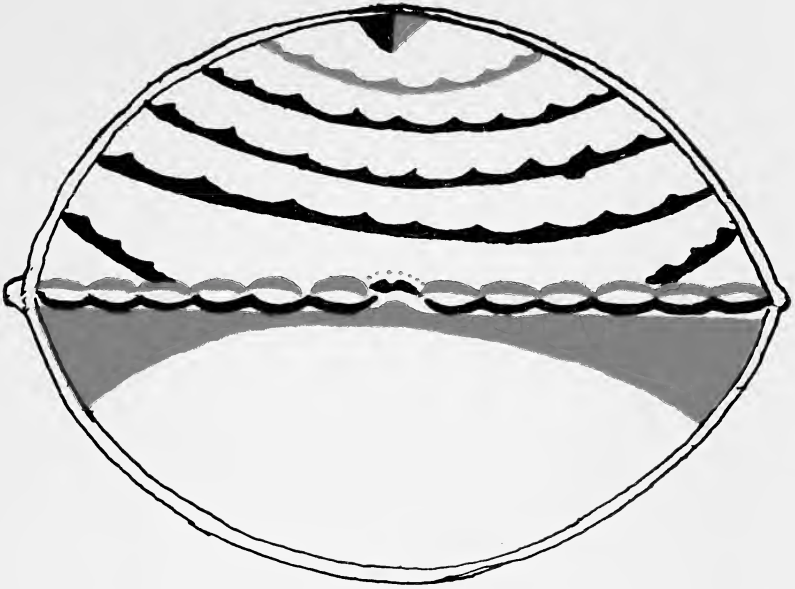


Fig. 1.

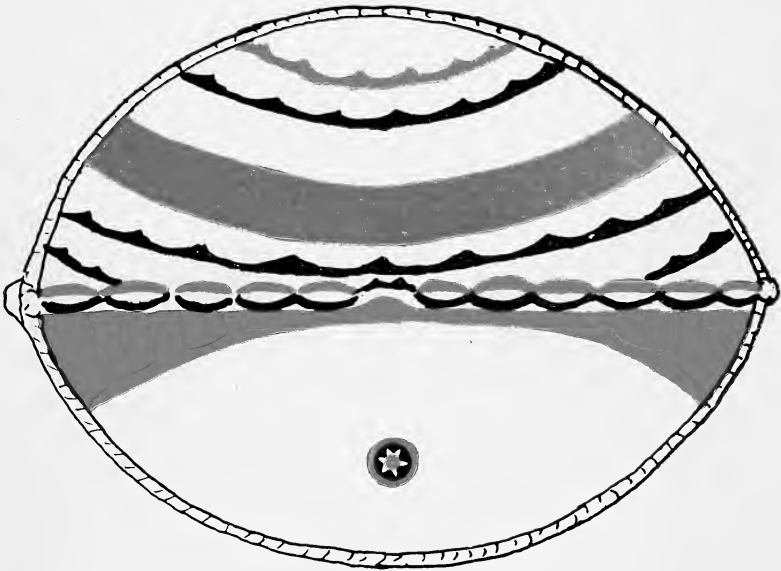


Fig. 2.



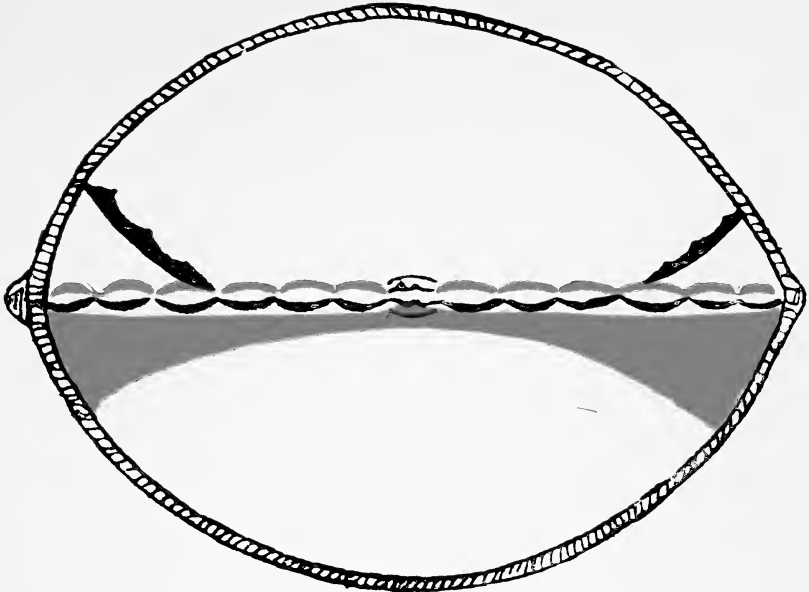


Fig. 3.

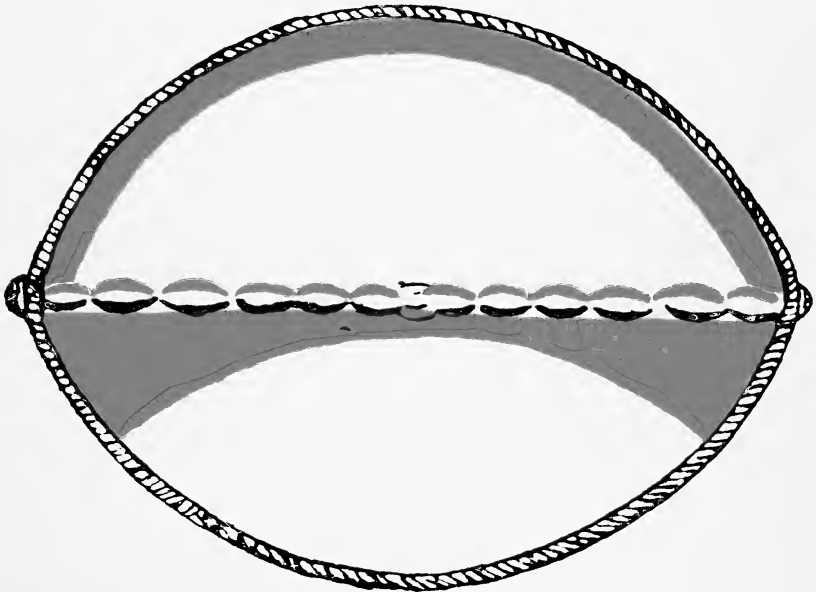


Fig. 4.





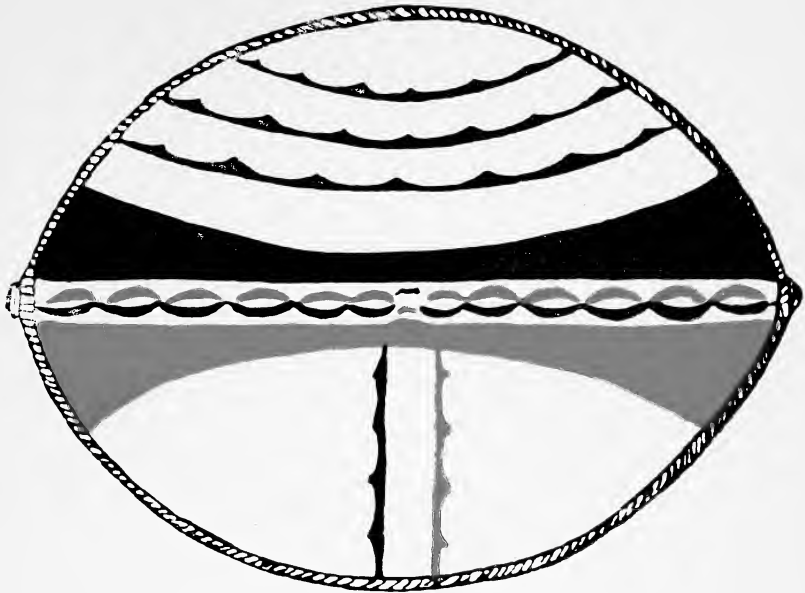


Fig. 5.

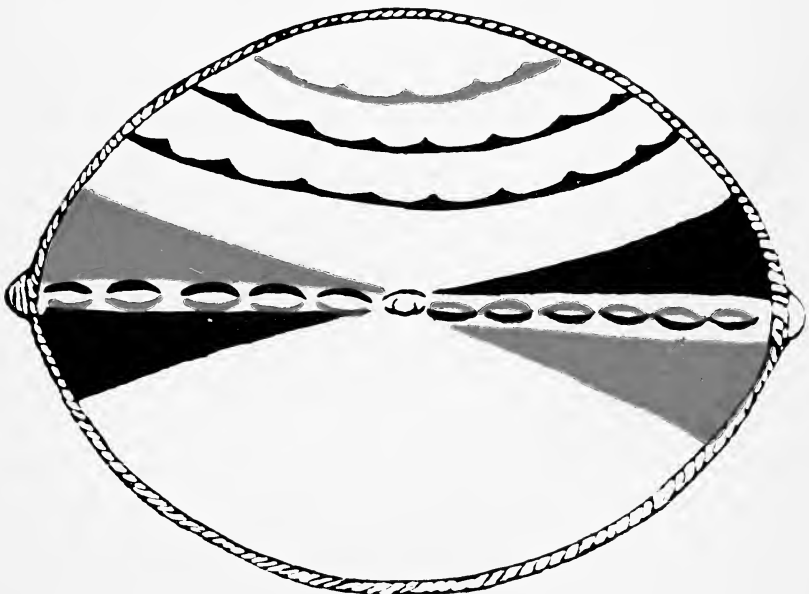


Fig. 6.



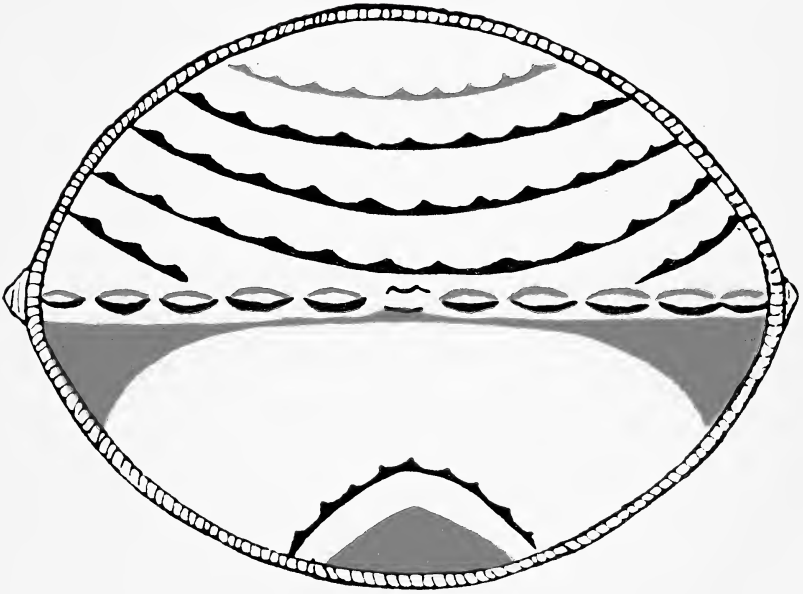


Fig. 7.



## REPORT OF PROGRESS, 1928-1930.

### GENERAL.

The last report of the progress of the Society was for the years 1926-27, and the period now under review covers the years 1928-30.

These years have included the transition stages during which negotiations were being conducted with the Executive of the Coryndon Memorial Committee with regard to the Society's future relationship to the Coryndon Memorial Trust and the Memorial building.

For town-planning and other reasons, it was found inadvisable to erect the Coryndon Memorial as part of the Society's existing building in Kirk Road, and as the ultimate success of the memorial largely depended on the active co-operation of the Society equitable arrangements had to be made regarding the transference of the Museum to the Memorial; and with Government, with regard to compensation for relinquishing our Kirk Road plot and buildings.

These negotiations were satisfactorily settled and the interests of the Society safeguarded.

As the sum of money collected from public sources was insufficient to erect a building containing adequate study-rooms and laboratory accommodation, your Committee decided to donate a sum of £2,000, out of compensation money, towards the cost of providing this essential accommodation.

Although the Society was the largest individual contributor toward the Coryndon Memorial Fund, the Society does not own any part of the building nor is it represented on the Board of Trustees. The Society has been given a lease of the Memorial for 99 years.

The general structure of the memorial was completed in September, 1929, and the collections of the Society were transferred in November of the same year.

### COLLECTIONS.

Owing to the general unsettled state of affairs in 1928 and 1929 no work of outstanding importance was undertaken in connection with the exhibition section, but a large amount of systematic work was accomplished, more particularly with the reference entomological collections.

A donation of importance received during 1929 was the large collection of small Mammals made by A. B. Percival and presented to the Society by the owner. This collection is of special value as it has from time to time formed the basis of several scientific papers on the Mammals of Kenya. Our grateful thanks are here recorded.

With the provision of greater facilities as the result of the transfer to the Coryndon Memorial in 1930, a large amount of work has been done, not only to the systematic collections but also to the exhibited material. The entire exhibited collections have been re-arranged and

added to. During the progress of this latter work, much valuable help was rendered by Mr. H. J. Allen Turner during his short visits to Nairobi, and by Mr. R. L. Harger, during the early part of the year, more particularly in connection with the geological and osteological sections. To these gentlemen we tender our thanks. Mr. Harger has also deposited on loan an instructive series of economic minerals and geological material.

Increase in the amount of exhibited material has necessitated the provision of additional cases, and these have been constructed in the Museum workshops at practically no expense to the Society.

In the Entomological section an innovation has been made; the bulk systematic collections are now transferred to the entomological study rooms and a series of cases have been installed, containing typical examples of the various groups of insects. In the case of the butterflies, typical species of the several groups or families have been arranged so as to show their complete life-histories, from egg to mature insect, each species grouped on its food plant.

Sections have been provided for the display of economic insects, such as locusts, mosquitoes and insects destructive to timbers; other groups will be added as material is obtained. Outstanding phenomena such as polymorphism, mimicry, and protective resemblance have been demonstrated by suitable material. The gradual evolution of mimetic patterns from primitive forms is strikingly exhibited.

The Ethnological section has been added to by the inclusion of the very valuable material collected by Sir Frederick Jackson and presented to the Society by Lady Jackson. Mr. C. M. Dobbs has also contributed largely to this section.

Stone-age culture is demonstrated by an instructive exhibit of local material. This exhibit will be augmented by the material collected by Mr. L. S. B. Leakey and deposited on loan by the Kenya Government.

A series of fish illustrating the economic species of Lake Victoria has now been displayed by Capt. R. E. Dent, while the spirit material of reptiles and amphibia is gradually being replaced by accurately coloured plaster casts, largely the work of Mr. Allen Turner.

A few bird groups have been added to the ornithological section and a few small mammals have been mounted. The initial "habitat group" of the Red Duiker has proved a great attraction.

The study-collections have been augmented in all branches. A valuable series of small mammals from the Kenya highlands has been presented by Capt. Dent as also an exceptionally fine complete skin and skeleton of a male bongo. Capt. Dent has taken over charge of the small mammal collections and is engaged on systematic work thereon.

The study collection of birds has been rendered more accessible by being arranged in special cabinets of drawers and has been aug-



mented by an exceedingly large loan collection which is representative of the avifauna of Kenya and Uganda. This bird collection is the finest of its kind in any museum.

The economic and general collections of Insecta have received a considerable amount of attention and large additions have been made by Capt. Dent, Mr. Allen Turner, Mr. McArthur and Mr. Gedye, while additional accommodation has made possible the incorporation of a very large and valuable loan series of Coleoptera, Lepidoptera, Diptera, Hymenoptera, and other orders. Mr. Gedye has been in charge of certain sections of the insects and has rendered valuable service. Much appreciated assistance has been given by overseas institutions in the naming of insects; special thanks are due to Sir Guy Marshall and staff of the Imperial Institute of Entomology, Professor Poulton of Oxford, Mons. Thery of Morocco, Mons. Allaoud of the Paris Museum, and to the authorities of the British Museum. Mr. Arthur Loveridge very kindly revised the collection of reptiles and amphibia during his brief visit to Kenya in the early part of the year.

#### BOTANICAL.

With the inception of work in the new Museum in 1930, a special section was created to deal with the botany of the country. This work was made possible by the generous provision of funds by Mr. Ernest Carr. The services of Miss Napier as a full-time Botanist have been secured for a period of three years. The Botanist's report is appended hereto, but we should like here to record our thanks to the staff of the Kew Herbarium for much kind help in identifying specimens and assisting in other ways. Thanks are due to the Forestry Department for the provision of timber and botanical specimens. Mr. Graham of this Department has added greatly to our knowledge of the botany of the Coastal districts and has supplied valuable field notes.

A valuable botanical collection relative to the food plants of Lepidoptera has been placed at the disposal of the section.

#### LIBRARY.

In anticipation of the transference of the library to new quarters, a full range of standard steel library shelving was obtained and installed in a special room of the Museum. Large and important additions have been made, and the Library now contains several thousand volumes. Several additional exchanges have been arranged with other scientific bodies and about 80 institutions now send us their publications as issued.

The importance of a general and subject card index of the library has necessitated the engagement of a full-time Librarian and the work so far accomplished gives every indication of facilitating the labour of reference hunting. Thanks are due to Mr. A. F. J. Gedye who up to recently has acted as Honorary Librarian.

## EQUIPMENT.

The provision of furniture and equipment for the laboratories and study-rooms is a matter of some anxiety; the minimum requirements were obtained with the balance of the compensation money, but further apparatus and equipment is urgently required.

The proper furnishing of the main exhibition Hall has received careful consideration and detailed plans and estimates have been obtained. As it is impossible for the Society to meet this outlay, and as the Museum is now of considerable educational value to the country and Nairobi, representations have been made to both Government and the Municipality. These requests have been sympathetically received, and in recognition of the services of the Society, Government and the Municipality have made considerable grants during 1930, the former contributing a capital grant of £1,000, the latter £500.

The initial order has been placed and the cases will be installed early in the year.

The estimated cost of a complete range of modern cases is in the neighbourhood of £9,000. A special equipment fund had been started and donations are solicited. Certain monies have already been contributed, and in this connection we wish to record our appreciation of the enterprising show which was staged in Nairobi by Dr. H. L. Gordon and his Kenya "Mummers" on behalf of this Fund.

## PUBLICATIONS.

Five Journals were issued during the period covered by this report, but the date of publication is still six months in arrears. A much greater effort on the part of members in supplying Mss. is required to bring the issues up to date.

## PROPAGANDA AND LECTURES.

Throughout the period under review, opportunity for active propaganda has hardly existed, owing largely to the unsettled affairs of the Society during 1928-29.

Lectures on Natural History subjects, and exhibition of nature films have been given to the two preparatory schools in Kenya. The original Martin Johnson film and the more recent one produced by the Carlisle-Clarke expedition have given great pleasure and instruction to the two schools named. The gift of the latter film by Mr. Carlisle is appreciated and thanks are here recorded. Mr. Martin Johnson has again shown his interest in the Society by presenting to it, a complete edition of his latest film "Simba."

Advantage was taken of the visit of members of the British Association, to arrange a series of lectures by distinguished delegates. Several of the lectures were delivered under the auspices of the Society. Mr. L. S. B. Leakey addressed a meeting of members and the public in the early part of the year on the subject of stone-age culture in Kenya; and in July last Major Hingston kindly delivered a lecture on

the devices for concealment adopted by spiders. Both lectures were well attended.

#### MEMBERSHIP.

The nominal membership figure stands at just under 280, but considerable difficulty is experienced in collecting outstanding subscriptions. An increase of 50 new members is recorded for the last year.

#### VISITORS.

Owing to an unfortunate series of circumstances it was found impossible formally to open the new Museum until September of this year. The opening ceremony was carried out by His Excellency Sir Edward Grigg, before a large gathering of citizens who had gathered to pay tribute to the memory of Robert Coryndon, one of Kenya's greatest benefactors, and a staunch supporter of the Society.

It is gratifying to record that well over 500 visitors have made use of the Museum during the last three months. This figure includes pupils from the Government School at Parklands and members of the Public Schools tour.

#### STAFF.

The staff at present engaged in museum work consists of a Curator, an Asst. Curator, a Botanist, and a Clerk-Librarian, and in addition an essential retinue of African subordinates. Much valuable help has been given by the honorary scientific workers, Messrs. Dent and Allen Turner.

#### FINANCIAL.

Certain aspects of the financial position have already been referred to in the foregoing notes and are set out in detail in the Treasurer's report. The income of the Society from ordinary sources was barely sufficient to meet the growing needs of the Society during 1928 and 1929 and the Government grant of £300 was expended in accordance with the restrictions imposed. In anticipation of the greater activities and concurrent expenditure for 1930 consequent on the removal to new and larger quarters, Government and the Municipality were asked to make contributions towards recurrent expenditure.

A strong case was put forward resulting in an increase of £400 on the Government recurrent grant and a sum of £500 being provided by the Municipality. This money has been economically expended in the initial work of museum organisation. We wish here to record our grateful thanks to Government, the Municipality and all private individuals who have contributed to the finance of the Society.

The special " Sir Frederick Jackson Memorial Fund " opened in June, 1929, has unfortunately met with little response and donations thereto are urgently required. To commemorate the founder of our Society, a special memorial number of the Journal was issued on the anniversary of his death. It is hoped that the appeal contained therein will be responded to.

## REPORT OF THE BOTANICAL SECTION OF THE CORYNDON MEMORIAL MUSEUM.

As the result of a generous donation from Mr. Ernest Carr, work was started in the botanical section of the Coryndon Memorial Museum in the middle of February, 1930. An outline of the objective of this department is shortly as follows:—

(1) The formation of an herbarium. This is essential for the classification and determination of specimens, and when completed should be of great service to the agriculturist, horticulturist, and the naturalist; also a matter of interest to the public and the school children.

(2) To produce classified coloured illustrations of the flora of Kenya, and subsequently to find English names for them, so as to enable children and the general public to recognise them and take some interest in them.

The officials of the Forest Department, Nairobi, have assisted substantially in the formation of the herbarium, by presenting the Society with over 450 named specimens. They have also kindly lent books and given permission to refer to their herbarium at any time.

Generous gifts of named specimens of the flora of Kenya and Uganda have also been received from Kew.

Officials of the Game Department, Scott's Laboratory, a few members of the Natural History Society, Capt. and Mrs. Tryon, and Mrs. Bulteel have contributed botanical specimens. Dr. and Lady Muriel Jex-Blake have also brought in wild flowers and generously given permission to visit their gardens at any time, in which are many indigenous plants from all over the Colony.

Officials of the Scott Laboratory have kindly lent a complete copy of the "Flora of Tropical Africa" and given permission for access to their herbarium.

As a result of the above helpful contributions the nucleus of a large herbarium has already been formed since March, consisting of nearly 2,000 named specimens which have been mounted, listed, and indexed.

Miss Gordon also has been of great assistance in suggesting English names for the flowers.

The general work carried out since the end of February has consisted chiefly in the building up of the herbarium, i.e., poisoning, mounting, indexing of the donated specimens; in making and mounting illustrations of 75 of the local flowers (a few photos. have also been taken); and in making reference drawings of about a dozen other specimens.

Several people have referred to us for information and identification of plants, to whom we have been able to supply what was necessary.

About 500 specimens have been collected of which 260 have been identified by Kew and mounted and classified here.

When it is stated that the collection of more than 500 specimens was the result of a few hours' collecting at Kima, Mbagathi, and in the Nairobi district, it will be realised what a vast field there is to be dealt with, and it is to be hoped that members of the Society and the general public will help materially by sending in specimens from other parts of the Colony.

REVENUE AND EXPENDITURE, 1930.

RECEIPTS.		EXPENDITURE.	
Botanist A/c. ....	7,000 00	Botanist A/c. ....	6,903 01
General donations :—		Curator's Honoraria .....	14,000 00
Government Grant .....	14,000 00	Furniture and Fittings .....	32,610 53
Municipality .....	10,000 00	Publication of Journals .....	1,293 74
Ernest Carr .....	2,000 00	Librarian's Salary .....	800 00
Capital Grant :		Subs. to Journals, etc. ....	660 42
Government .....	26,000 00	Bank Exchange .....	23 85
Sundry donations .....	1,420 00	Boys' Wages .....	1,009 00
Proceeds "Kenya Mummies" .....	2,619 70	Electric Light .....	580 83
Sales of Journals .....	347 50	Interest on overdraft .....	3 50
Visitors to Museum .....	518 75	Upkeep and Miscellaneous Expenses .....	2,558 16
Interest on £500 on deposit, 1929 .....	400 00	Balance on hand .....	10,701 08
Subscriptions and Entrance Fees .....	6,838 17		
	<hr/>		<hr/>
	Shs. 71,144 12		Shs. 71,144 12

31st December, 1930.

A. F. J. GEDYE,  
Hon. Treasurer.

I hereby certify that I have examined the books and accounts of the Society for the year ending 31st December, 1930, and that, with the exception of the items below mentioned, I have been furnished with all the vouchers and information and explanations which I have required: and that the above statement is in my opinion properly drawn up so as to exhibit a true and correct view of the Revenue and Expenditure of the Society for that year according to the best of my information and the explanations given to me, and as shown by the books of the Society, subject to acceptance of the items below mentioned.

NOT PRODUCED :—

- (a) Cancelled cheque for Shs. 79/- payable to Messrs. Gailey & Roberts Ltd.
- (b) Vouchers for the following payments :—  
 Sundry Journal and Magazine payments totalling Shs. 364/08.  
 Refund to Dr. Van Someren for outlay on furniture in England (cheque dated 19/3/30), Shs. 262/75.  
 General Expenses : To F. A. Head (cheque dated 1/5/30), Shs. 25/-.  
 Botanist A/c. : Payment to H.M.E.A. Dependencies (cheque dated 28/10/30), Shs. 69/67.  
 Certain recent payments in England in respect of which vouchers have not yet been received.

HUMPHREY SLADE,

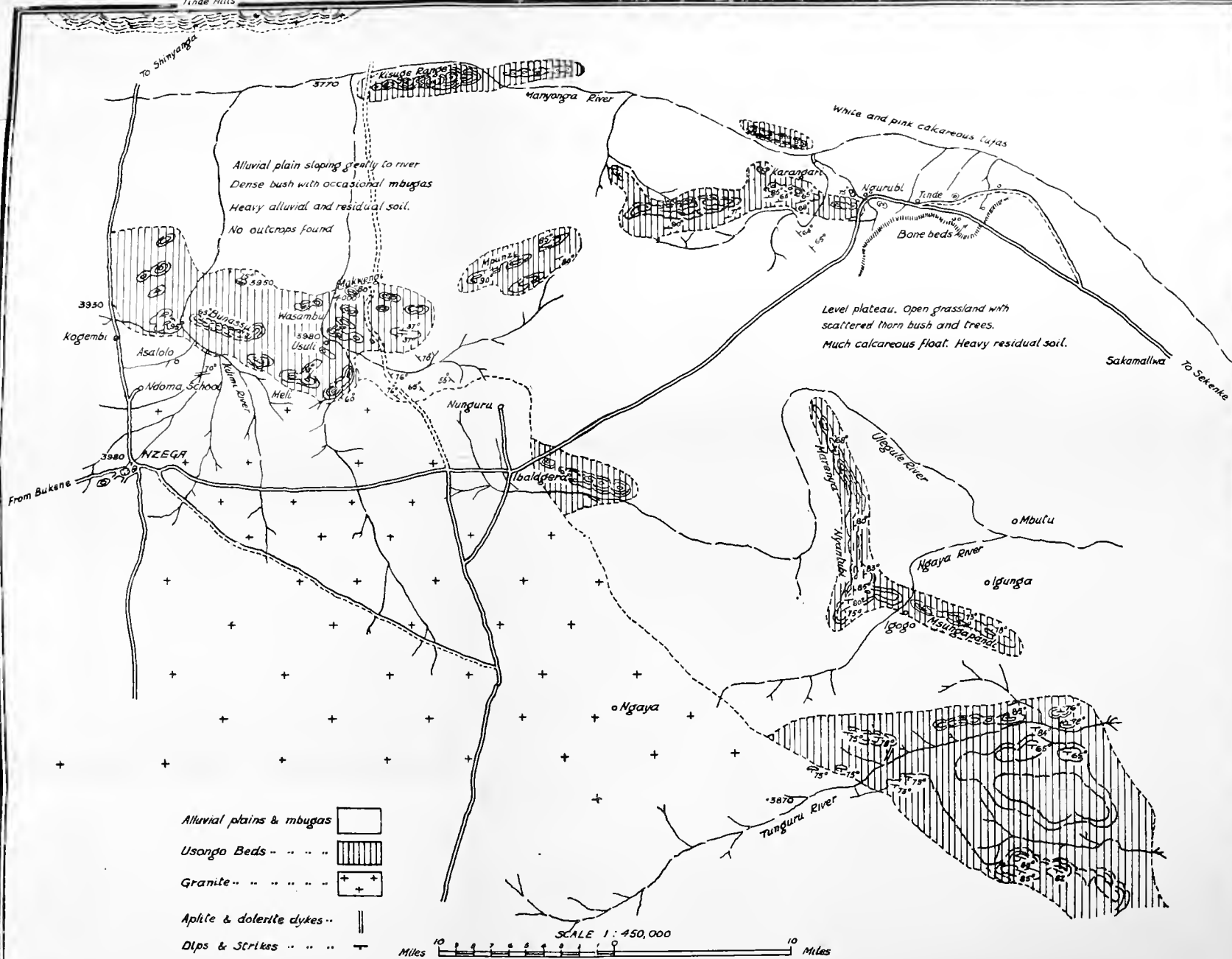
Solicitor,

c/o. Messrs. Hamilton, Harrison, and Mathews.

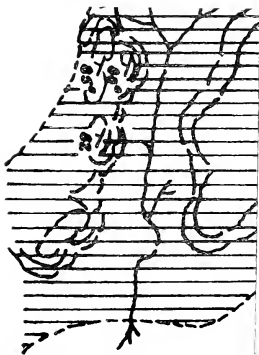
Nairobi, 6th January, 1931.











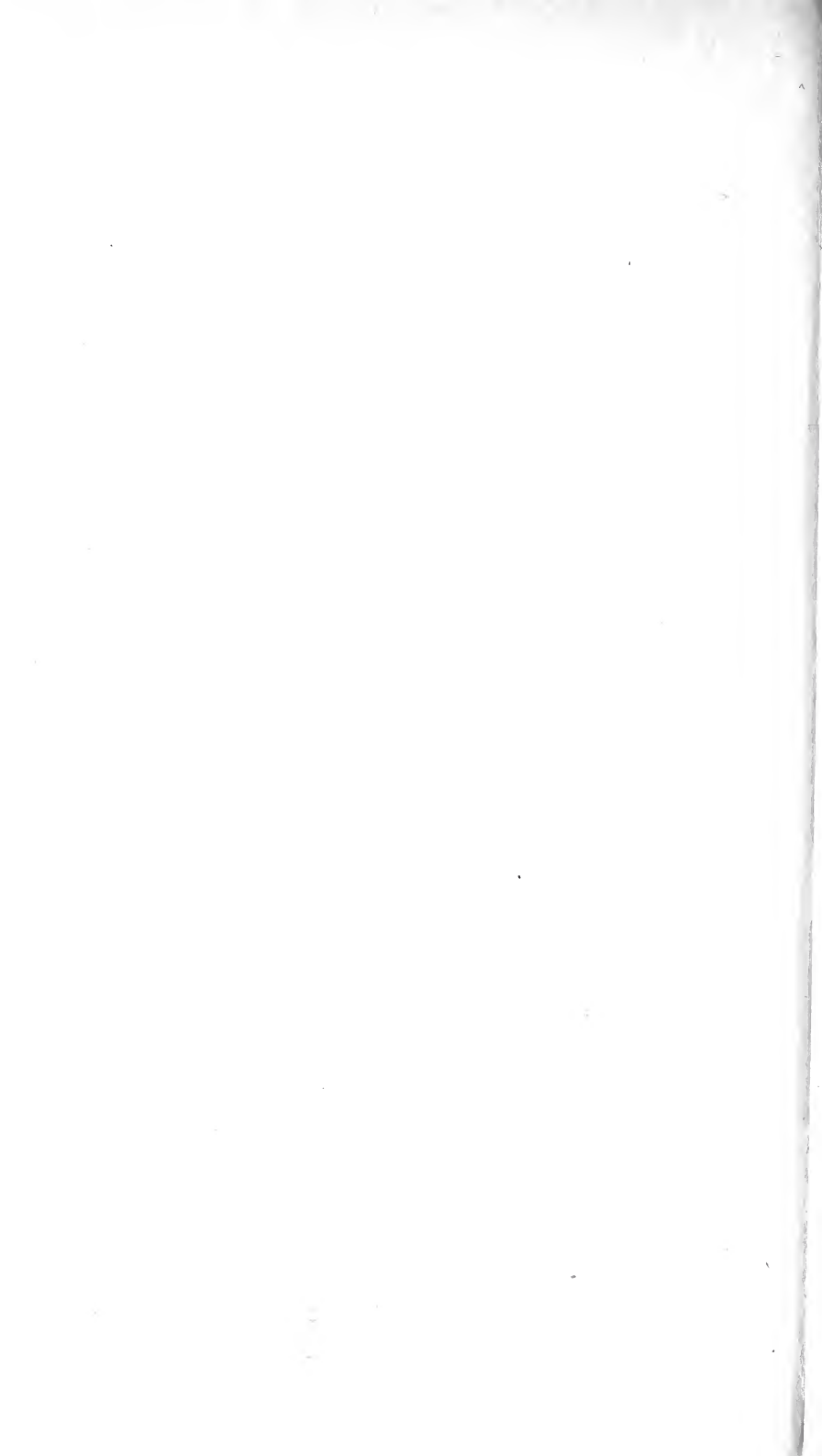
C. Grace 1929



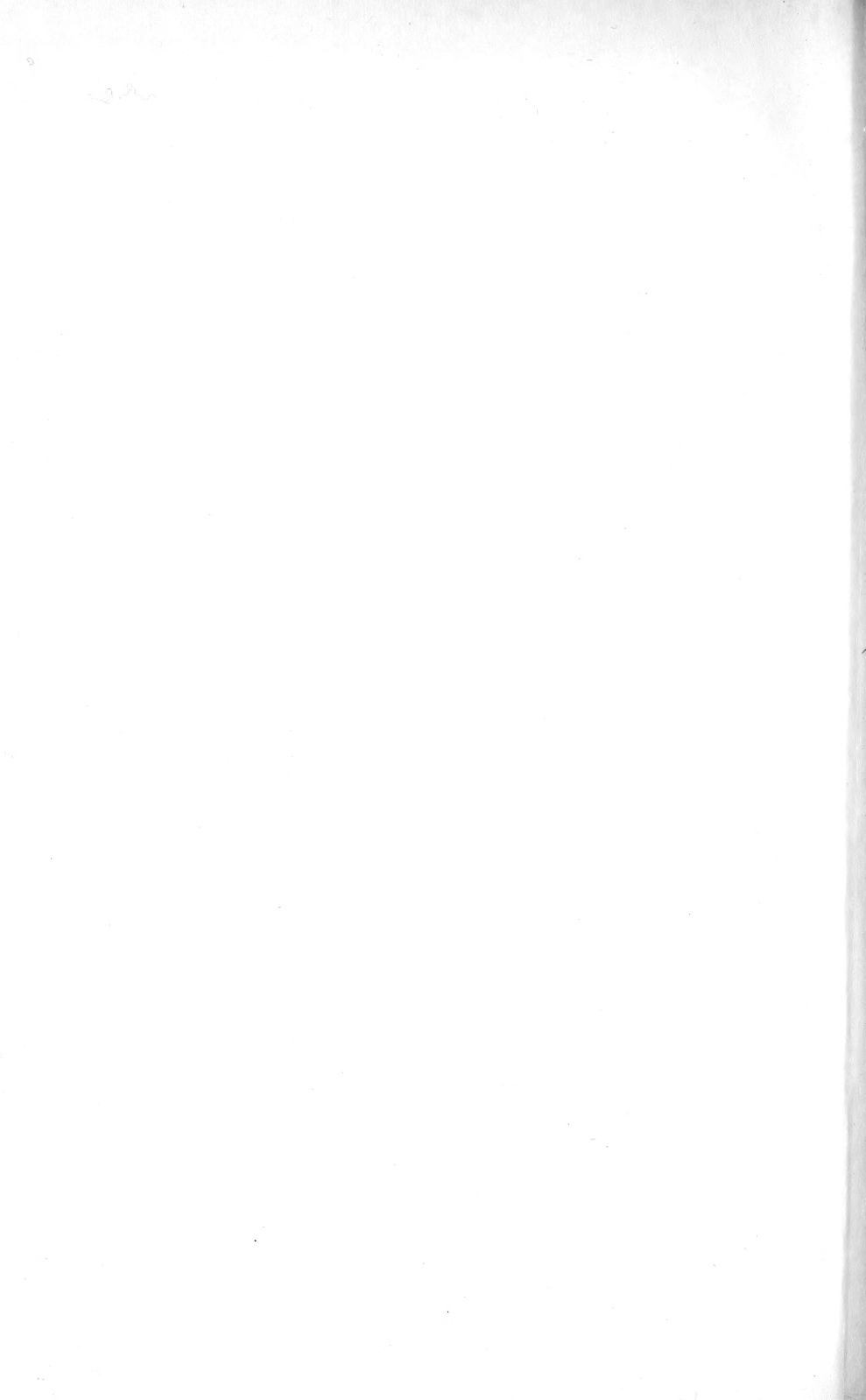








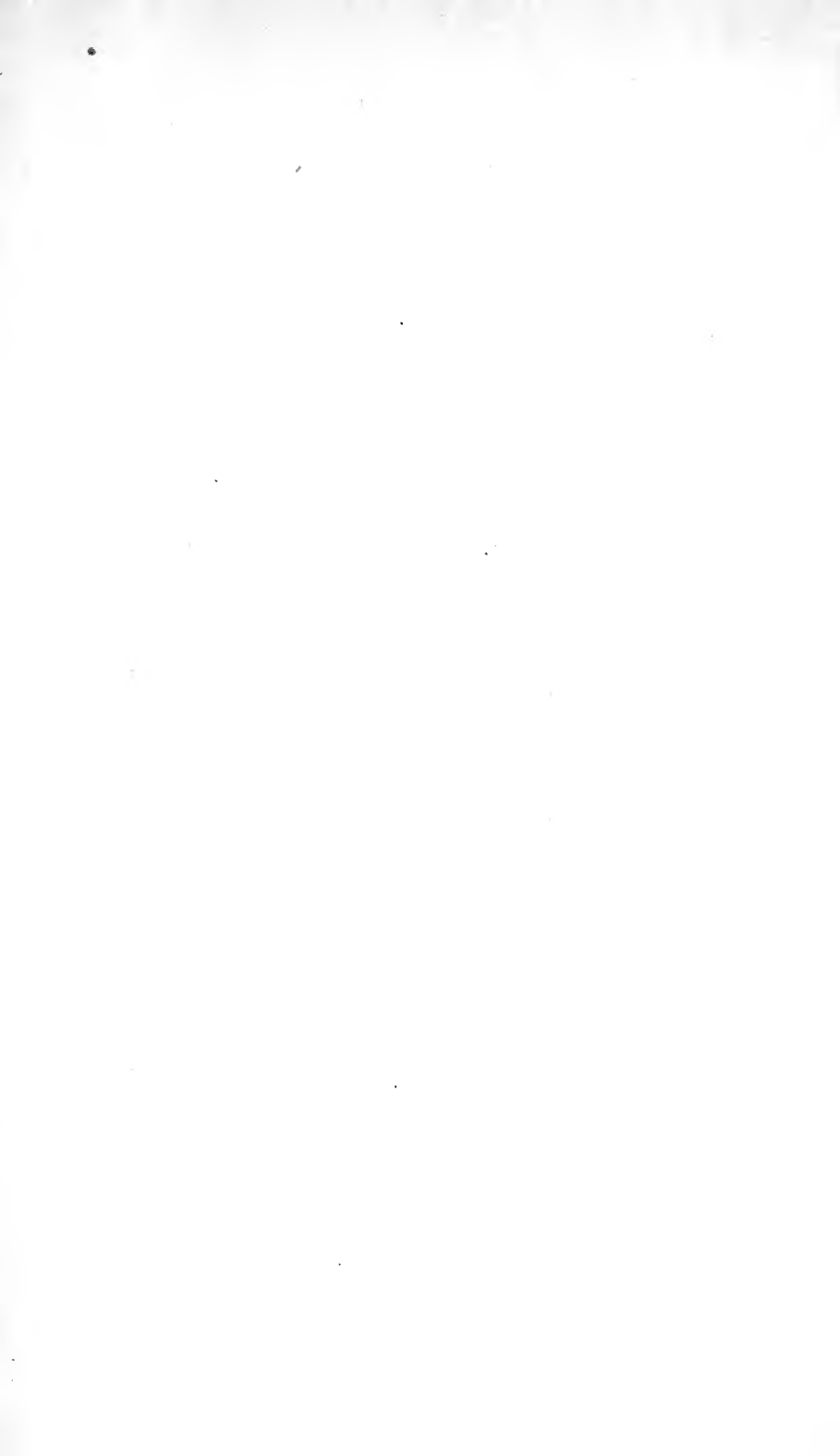












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