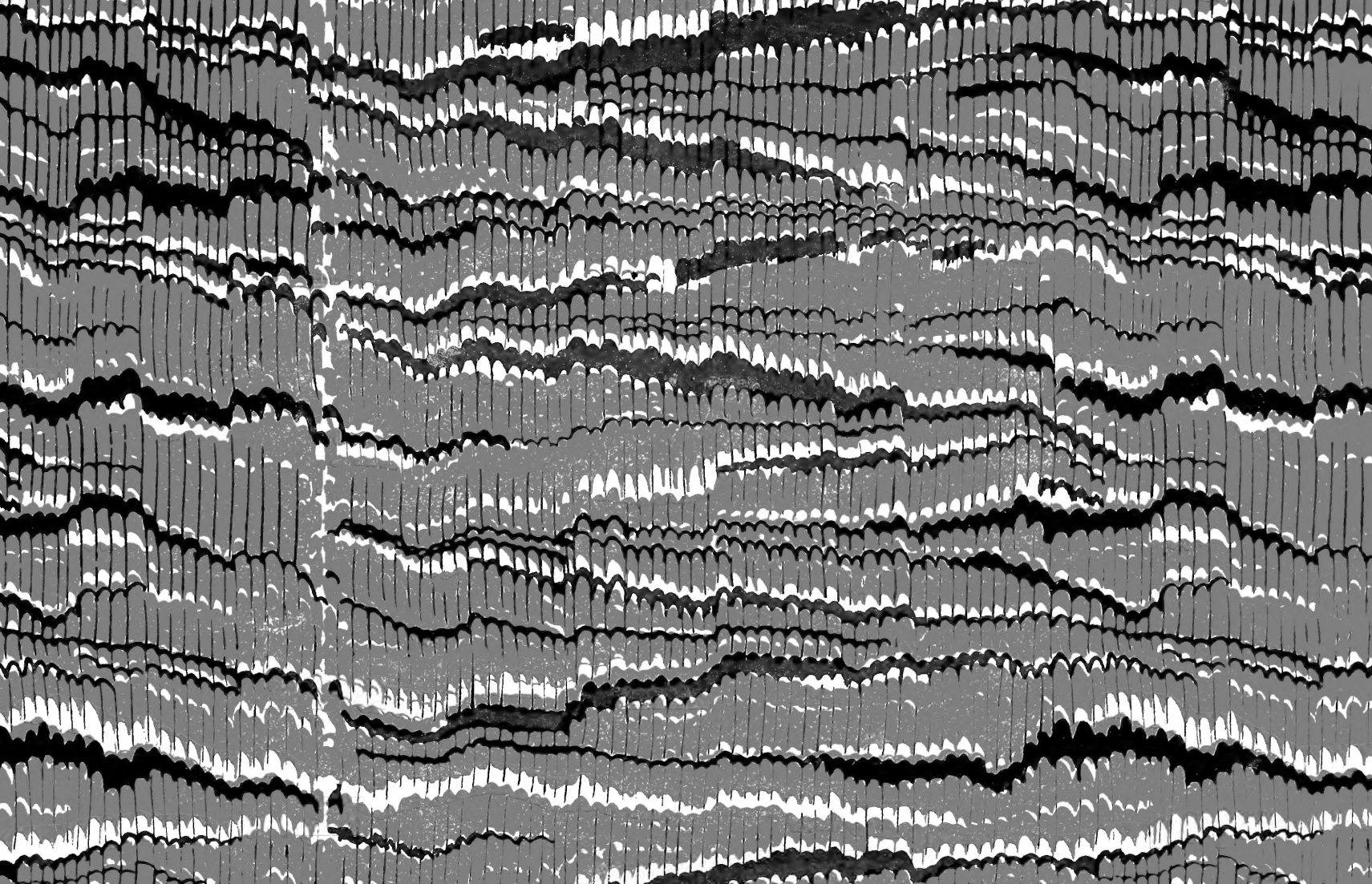

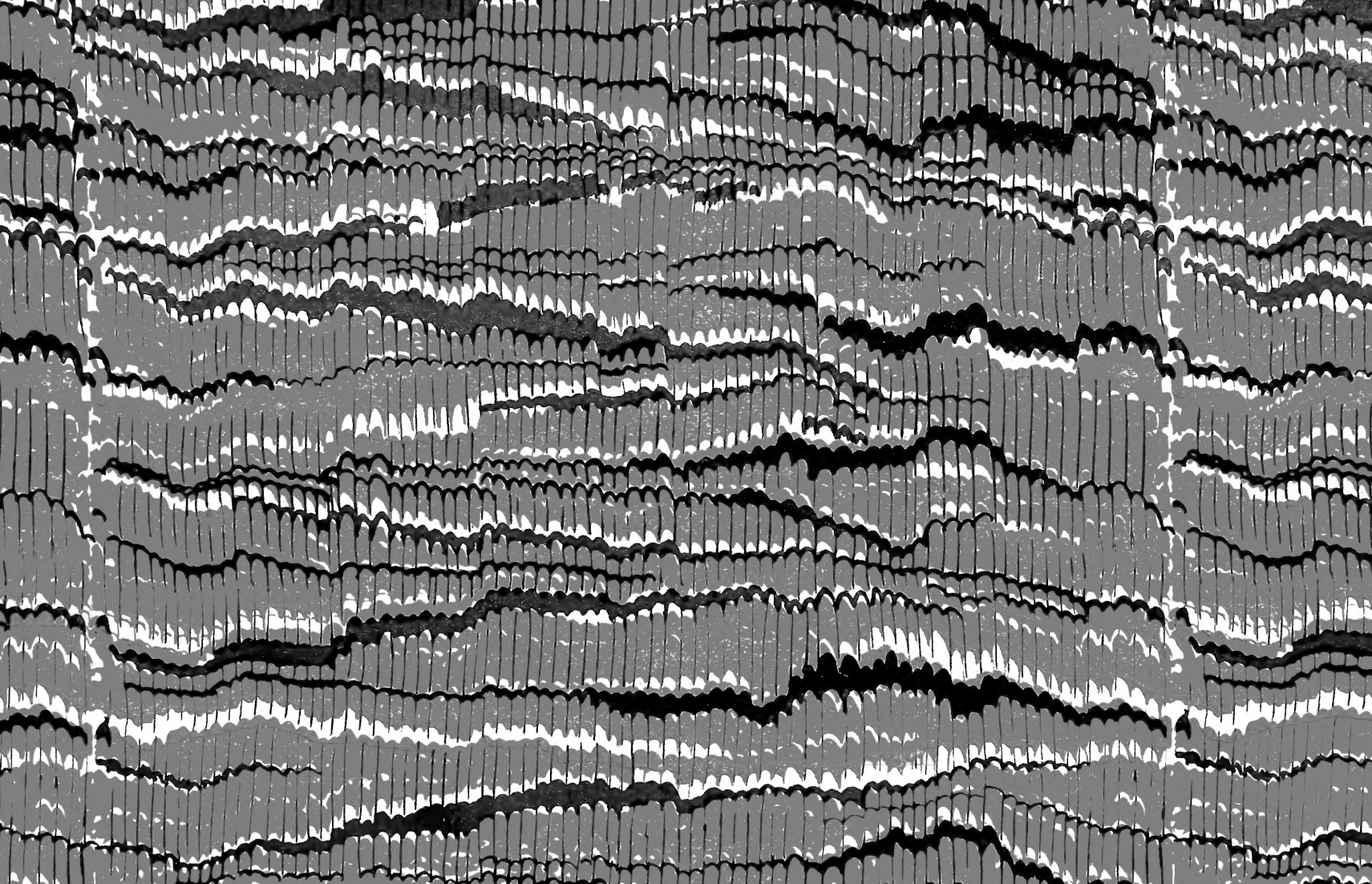

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XXV

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LIST OF CONTRIBUTORS.

INDEX OF NEW FAMILY AND GENERIC NAMES INTRODUCED IN THIS VOLUME.

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INDEX OF PLATES.

INDEX OF GENERIC NAMES.

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VOLUME XXV.

1. *Contributions to a Knowledge of the Fauna of South-West Africa.*—By R. F. Lawrence, B.A.

V. Arachnida.

(With Plates I–IV.)

The following paper deals with the results obtained by the Museum's expedition to Ovamboland in 1923. The region covered by collectors on this occasion was mainly Ovamboland and a small part of Northern Damaraland; the expedition started from Tsumeb, and, skirting the Etosha Pan, cut north-westward through Ovamboland to the Kunene River; here several points were visited and most of the material obtained. It is hoped next year to publish the results of an expedition to the Kaokoveld in 1925, and as the results of successive years follow, it is hoped that a more or less comprehensive survey of the fauna of South-West Africa will be obtained.

The Arachnid fauna of the northern parts of South-West Africa and Ovamboland in particular has been hardly touched by previous authors, although forms from the more southerly portions have been dealt with by various authors; it is hardly strange, then, that about three-quarters of the Araneae are new. With regard to the better-known and more widely distributed group of Scorpiones, the case is different.

At this point, and with many important links of evidence missing, it would be premature to draw conclusions of any value with regard to distribution; it can, however, be said that the fauna of Ovamboland seems more or less isolated from that of the regions to the south,

which, again, have affinities with the north-western parts of the Cape Province; forms found near the Kunene River especially seem to possess more in common with Rhodesia, and East Africa as far as Somaliland, than with any other regions excepting perhaps Angola, of which hardly anything is known.

The following table shows the proportion of new to known species recorded in this paper :—

Species.	N. sp.	N. var.	Known sp.
Araneae . . 95	70	1	24
Solfugae . . 4	2	..	2
Scorpiones . . 8	..	1	7

In this paper it may be found that overlapping has taken place and that species have been described which are already known. This in certain cases is unavoidable owing to the absence of a complete literature in South Africa and to the obscurity and lack of figuring which characterises descriptions of some of the known species. The author has therefore decided rather to err on the side of redescribing and figuring a certain number of known forms, trusting to authors in possession of a fuller literature to put right synonymies where necessary; with this in view, figures have been given as often as possible and descriptions of immature specimens avoided. The figures have been drawn free-hand and not to any fixed scale.

Family AVICULARIIDAE.

Gen. Ceratogyrus, Pocock.

Ceratogyrus bechuanicus, Purcell.

A large number of both sexes taken from Sandup to Ongandjera agreeing with the description and measurements of Purcell. The shape of the horn varies a little in different specimens and is most pronounced in the males.

Gen. Idiops, Perty.

Idiops mafae, n. sp.

1 ♀ (B 5882). Mafa.

Colour.—Cephalothorax and legs reddish yellow, tarsus of palps, metatarsus, and tarsus I with some brown stripes, metatarsus and tarsus II lightly infuscated; sternum and coxae olive-yellow, abdomen

olive, labium and chelicerae reddish brown ; hair on parts of the legs and coxae black or blackish brown.

Carapace.—Length slightly exceeding tibia+metatarsus IV, equal to patella, tibia+slightly less than $\frac{1}{2}$ metatarsus I.

Eyes.—Ocular area wider than long, its width $\frac{1}{5}$ less the length of metatarsus I. Anterior median eyes very little more than a diameter apart, anterior laterals larger than the medians and less than a diameter apart ; seen from above the laterals are situated on the anterior sides of tubercles which are roughly creased and converge posteriorly where they are very close together. The visual axis in a horizontal plane directed at an angle of about 30° from the median line ; posterior median eyes $1\frac{1}{2}$–2, as far apart as their distance from the laterals ; the laterals as far from the anterior edge of the carapace as from one another, posterior row procurved but not strongly so. Eyes otherwise as in *Gorgyrella namaquensis*, Purcell, Trans. S.A. Phil. Soc., vol. xi, p. 350. The band of purplish pigment in front of the anterior lateral eyes with a recurved posterior margin and more clearly defined than in *G. namaquensis.*

Chelicera.—Dentition consisting of 4 outer and 6 inner teeth, the outer ones being generally the larger.

Labium evidently longer than broad and armed with 5 stout teeth near the anterior margin.

Coxae of the pedipalps spined throughout except on their posterior edges, those of the legs characterised by a complete absence of spinules and clothed with fine blackish hairs especially on those of the third leg.

Pedipalps.—As in *G. namaquensis.*

Legs.—Tibia I subequal to metatarsus+tarsus I, metatarsus IV equal to distance between anterior median eyes and fovea ; metatarsus III with a band of about 6 spinules along both anterior and posterior edges, 3 pairs of setiform spines below, the apical pair much the largest ; tibia III with a pair of similar but broader bands of 16–18 anterior, 17–19 posterior spines ; patella III with an anterior row of about 16 spines, 5–6 of these bordering its anterior distal edge, 3–4 similar spines on its posterior distal edge ; metatarsus IV with an irregular band of 8 infero-anterior spinules ; patella IV with a band of about 47 spinules occupying its whole length anteriorly ; tibia IV below with 2 apical followed by an outer row of 3 long setiform spines, the apical pair the stoutest, a row of very much weaker setae on the inner side ; 4 small basal spines anteriorly. Legs otherwise as in *G. namaquensis.*

Sigilla.—Two pairs of small submarginal sigilla opposite coxae I and

II, the posterior larger than the anterior pair; posterior pair about their own width from, the anterior pair nearer to, the margin of sternum.

Measurements.—Length of cephalothorax, 8·5 mm.; breadth 7·1 mm. Total length, 20·5 mm.

Family ERESIDAE.

Gen. Stegodyphus, Simon.

Stegodyphus gregarius, Cambr.

Many immature and a few mature females were taken, but no males. (B 5918.) Sandup. (B 6141.) Kunene River.

Stegodyphus deserticola, Purcell.

13 ♀♀ (B 5908) were taken from one nest at Sandup.

Stegodyphus canus, Purcell.

2 ♀♀ (B 6145). Kunene River.

These two specimens agree with Purcell's description and in the shape of the vulva. They have, however, more reddish hair on the face; the markings of the legs, especially those of the fourth, are more sharply distinct. In the one specimen the coxae and sternum are much darker in colour than in the type specimen.

Stegodyphus dumicola, Pocock.

5 ♀♀, 1 ♂ (B 6305). Onoolonga.

4 ♀♀ (B 5901). Ongandjera.

Vulva.—As in fig. 1.

Measurements.—Length of carapace, 4·6 mm. Total length, 9·8 mm. The form of the vulva differs slightly in some specimens, due probably to contraction of the skin of the abdomen. The four females from Ongandjera are larger and have slight differences in the shape of the vulva, but are otherwise conformable to this species.

♂.—The palp agrees with Pocock's figure in A.M.N.H. (7), vol. ii, pl. viii.

Measurements.—Length of carapace, 2·9 mm. Total length, 7 mm.

Stegodyphus filimaculatus, n. sp.

1 ♂ (B 6144). Kunene River.

This single specimen is remarkable in differing very strongly in coloration from any other of the females of *Stegodyphus*.

Colour.—Carapace with snow-white hairs on and a little way behind the ocular area, on the broad stripes along the lateral margins of the carapace as far as the insertion of the pedipalps anteriorly and not quite meeting posteriorly. The rest of the carapace clothed with deep velvet-black hairs; the face with a triangular patch of black hairs, except for a few white ones between the median eyes and a border of white hairs along the clypeal margin; mandibles entirely covered with velvet-black hairs.

Abdomen above with a clearly demarcated median leaf-shaped marking along its entire length clothed with snow-white hairs. The marking composed of 4 divisions connected by narrow constrictions. The first division longer than wide, the remaining 3 divisions wider than long, their width successively decreasing in the third and fourth; the first just excluding the first pair of sigilla, the second and third each just including a pair of sigilla within their posterior borders; remainder of dorsal surface of abdomen with deep black hairs, a few longer black setose hairs among them; ventral surface with white hairs except on the spinners, a roundish patch above the cribellum, and the area on and between the spiracles, which are all black. Sternum clothed with white hairs, coxae of legs with white hairs and some small patches of black ones. Femur I wholly infuscated with black hairs except for a basal ring of white hairs and a few scattered ones at its apex; patella covered with white hairs; tibia infuscated except at base and apex (a less strongly infuscated median band), covered entirely with stout blackish hairs except for a few white ones at apex; metatarsus with fewer but longer brownish spiniform hairs, some white ones proximally, especially below; tarsus thickly covered with brownish spiniform hairs.

Carapace equal to tibia+$\frac{1}{2}$–$\frac{2}{3}$ metatarsus I.

Legs I, IV, II, III; the anterior pair much the longest and stoutest; metatarsus I with a pair of stout apical spines below.

Pedipalp.—Palpal organ as in fig. 56. Seen from the inner side.

Measurements.—Length of carapace, 3·7 mm. Total length, 7·3 mm.

This species is near to the male of *S. gregarius*, which, according to Cambridge, P.Z.S., 1889, p. 42, differs markedly in colour from the female. This specimen does not agree entirely with the male described by Cambridge, and until both sexes can be taken together I have described it as a new species.

Gen. Dresserus, Simon.

Dresserus murinus, n. sp.

1 ♀ juvenile (B 5892). Mafa.

Colour.—Carapace and legs uniform light brown covered with dark hairs; mandibles reddish covered with stout black hairs, especially apically; abdomen olivaceous, clothed with greenish black hairs; coxae and mouth-parts yellowish brown, sternum a little darker.

Carapace.—Cephalic portion but little raised above the fovea; from the posterior lateral eyes to the anterior margin of the clypeus a gentle declivous slope.

Eyes.—Area enclosed by the four laterals slightly wider behind than in front, its posterior width a little less than 3 times its length. Posterior medians about $1\frac{1}{2}$–2 their diameter apart and about twice as large as the anterior medians; the latter a diameter apart with their centres below a line touching the anterior margins of the posterior medians and less than their own radius from the latter; anterior laterals a little larger than the anterior medians and distant from the posterior medians a little less than 3 times the diameter of the latter; the edge of the clypeus in front of anterior median eyes produced into a cone-shaped rostrum.

Chelicera with a large blunt granular tooth at the inner apex of the inferior margin.

Legs IV, I, II, III; the fourth pair much stouter than the others, with the patella and tibia together longer than those of the first pair. All tibiae with their inferior distal edges fringed with a ring of long setiform hairs; metatarsi inferiorly at their apices with I, 0, II, 3, III, 4–6, IV, 4 spines.

Calamistrum consisting of a line of strong black curved spiniform hairs on the distal $\frac{5}{6}$ of the posterior surface of metatarsus IV.

Measurements.—Length of carapace, 3·2 mm.; length of abdomen, 4·4 mm. Total length, 7·3 mm.

Family SICARIIDAE.

Gen. Loxosceles, Lowe.

Loxosceles simillima, n. sp.

2 ♀♀ (B 5925). Andoni.

1 ♀ (B 6281). Namakunde.

This species agrees very closely with Strand's description of *L.*

bergeri, Wiesbaden Jahrb. Ver. Natk., vol. lix, p. 26. The colouring is in general the same, and the main distinction consists in the relative disposition of the eyes.

Carapace.—As in *L. bergeri*, the thoracic portion differing from the cephalic portion in being distinctly granular, while the latter is reticulate. The cephalic portion with rows of stout spines from the bases of the eyes to the fovea ; one row from between the bases of the medians and a row from each of the bases of the lateral eyes converging slightly towards the middle. These rows consisting of 5–6 long stout spines, their interspaces filled up with double rows of very much smaller spines.

Eyes.—The medians contiguous, their inner edges straight, giving them a slightly triquetrous shape ; medians distant from anterior laterals about their own radius ; posterior laterals distant from anterior laterals by a little less. A line joining the anterior margins of the anterior laterals passing just in front of the centres of the medians ; otherwise as in *L. bergeri.*

Sternum with an irregular olivaceous patch in the centre. Abdomen below uniform yellow, except for the opercula which are white. Claws of legs as in *L. bergeri*, the onychia provided with long plumose hairs, some of which extend beyond the claw.

Measurements.—Length of carapace, 3·4 mm. ; breadth, 3·2 mm. ; length of abdomen, 4·9 mm. ; femur I, 5·9 mm. ; patella+tibia I, 6·9 mm. ; metatarsus+tarsus I, 7·5 mm.

Gen. Scytodes, Latr.

Scytodes tertia, n. sp.

4 ♀♀, 2 ♂♂ (B 6250). Ongandjera.

Colour.—Cephalothorax yellow with markings as in fig. 72, seen from above.

Clypeus seen from in front with the narrow median stripe passing through the median eyes and joining a transverse slightly procurved band just before the clypeal edge ; mandibles with irregular black markings antero-laterally occupying about $\frac{3}{4}$ their length. Maxillae bordered on the distal $\frac{2}{3}$ of their external edges by a black stripe, labium with a basal band sometimes broadly Λ-shaped and a lighter spot on each side near the apex ; sternum yellowish white, with roughly wedge-shaped markings at its edges at the base of each coxa, except the first where it is a little above it ; coxae of legs with incomplete apical bands ; trochanters with a round spot near their bases.

Legs (seen from below).—All femora with a black subapical band; I and II with irregular basal bands, III with incomplete basal band, IV with a basal spot; IV only with distinct median band; I and II strongly marked, III lightly marked, IV spotted between the bands. All patellae with a black apical band; all tibiae with basal and apical bands, III and IV with median bands in addition; I and II instead with a narrow longitudinal stripe above occupying less than $\frac{1}{2}$ in I, about $\frac{1}{3}$ in II of the median portion. All metatarsi with apical bands and narrow longitudinal stripes above, stronger in I and II than in III and IV.

Abdomen dirty white, without pattern, but indistinctly blackish purple above in the centre shading off towards the sides and rear. Below there may be some scattered black granules or not.

Vulva.—As in fig. 2.

Measurements.—Length of carapace, 2·6 mm. Total length, 4·6 mm.

Scytodes quarta, n. sp.

1 ♂ (B 6198). Kunene River.

Colour.—This species is closely related to *S. tertia* and the markings of the carapace are in general similar. The markings are lighter, the central stripe is a little broader but hardly discernible just behind the eyes, becoming more distinct posteriorly. The lacunae formed by the markings are throughout much larger, especially the pair situated in the middle of the carapace bordering the central stripe. Markings of the sternum less definite than in the preceding species, those on the mouth-parts absent; coxae and trochanters inferiorly with apical spots.

Legs (seen from below).—Femora of all legs lacking definite basal spots or bands, markings below the apical band fewer, anterior and posterior femora being about equally marked; metatarsi I and II only, with narrow longitudinal stripes above.

Palpal Organ.—Flagellum is proportionately longer than in *S. tertia.* The narrowed distal portion of flagellum is longer in proportion to the whole than in the above species (fig. 57).

Measurements.—Length of carapace, 2 mm. Total length, 3·8 mm.

Scytodes quinqua, n. sp.

1 ♀ subadult (B 6302). Tsumeb.

Colour.—Carapace as in fig. 73, resembling *S. bergeri*, Strand, Wiesbaden Jahrb. Ver. Natk., vol. lxviii, p. 88, in the scheme of the

markings and in lacking a central stripe along the back. There is a short central stripe just behind the eyes which is continued in front of the eyes to the edge of the clypeus. Mandibles marked as in *S. tertia,* maxillae having a faint marking on their internal edges opposite the apex of the labium; coxae and trochanters without markings, except the first coxa which has an indistinct apical stripe; margins of the sternum with a pair of crescentic markings a little above the first coxae, with their convex surfaces facing anteriorly; markings otherwise absent. Legs seen from below; femora of I and II with an indistinct basal, a median, and an apical band, III and IV with irregular spots and blotches throughout; all patellae with bands on their distal halves distinct in I and II, indistinct in III and IV; all tibiae with basal, median, and apical bands, longitudinal stripes above absent. Abdomen dirty white to grey, without pattern, having only a few black granules above, in the centre, at the back, and sides.

Measurements.—Length of carapace, 2 mm. Total length, 3·8 mm.

Family PRODIDOMIDAE.

Gen. Prodidomus, Hentz.

Prodidomus reticulatus, n. sp.

2 ♀♀ (B 6246). Namakunde.

Colour.—Carapace dark red, with dark reticulate infuscations more especially towards the lateral margins. Abdomen above purplish with a transverse dirty-white band just above the spinners, slightly exceeding the width of the superior spinners; the latter with a basal yellow patch laterally. Abdomen below dirty grey in the centre, light reddish-purple at the sides and towards the spinners; anterior legs reddish brown, posterior ones deep orange; first leg with trochanter and patella dark reddish-purple, femur dark red, tibia, metatarsus, and tarsus, with successively lighter shades of red.

Eyes.—Posterior medians their long diameter apart; anterior medians about $\frac{3}{4}$ their own diameter apart and subcontiguous to the anterior laterals; median quadrangle wider behind than in front and longer than broad; a line joining the anterior borders of the anterior laterals would pass a little in front of the centres of the anterior medians; ocular area wider than long.

Legs comparatively hairless; trochanter IV longer than its coxa, shorter than coxa I and about equal to trochanter I; tibiae and metatarsi of III and IV with a pair of inferior apical spines.

Vulva.—As in fig. 3.

Measurement.—Total length, 7 mm.

Prodidomus hirsutus, n. sp.

1 ♂ (B 6266). Ongandjera.

Colour.—Carapace light red, granular, with a few fine white hairs. Some faint irregular markings and a faint central stripe from behind the posterior median eyes to the posterior margin. Abdomen light purple with an indistinct white patch above the spinners. Legs and sternum light reddish brown; sternum with infuscated margin and some irregular fuscous markings in the centre, coarsely pitted and clothed in the centre with a few fine white hairs, with some stronger fuscous ones on its margins.

Eyes.—As in *P. reticulatus*, except that the posterior medians are a little closer together; sternum proportionately broader than in the latter.

Legs hairy, with short light hairs on the proximal segments and longer darker ones on the distal ones; spined as in *P. reticulatus*.

Pedipalp.—Palpal organ as in fig. 58.

Measurement.—Total length, 4 mm.

Family DRASSIDAE.

Gen. Platyoides, Cambr.

Platyoides unidentatus, n. sp.

1 juvenile ♀ (B 6622). Ongandjera.

Colour.—Carapace yellow with darkened rim, dark infuscations behind the eyes; abdomen greyish green above, dirty white below; sternum, coxae, and legs yellow, sternum with dark narrow border.

Eyes.—Anterior row equally spaced by a little less than the diameter of a median eye, laterals a little larger than the medians; posterior row wider than the anterior and straight to lightly recurved; the medians are not visible and are represented by two oblong fuscous patches which diverge anteriorly.

Carapace a little longer than broad, length subequal to tibia+$\frac{1}{2}$ patella II; breadth equal to tibia+about $\frac{2}{3}$ patella I.

Chelicera with 1 tooth on the superior margin.

Legs not spined; claw of fourth leg with 4 small teeth near the base, apex of tarsus IV with some long plumose hairs as in fig. 55.

Measurements.—Length of carapace, 2 mm.; breadth, 1·8 mm. Total length, 4·9 mm.

Gen. Upognampa, Tucker.

Upognampa ctenipalpis, n. sp.

1 ♀ (B 6261). Ongandjera.

Colour.—Carapace brown, the margins bordered with black, cephalic area bordered near the edge of carapace by a dark stripe not reaching the fovea, the latter short, dark; legs olive-brown; abdomen above deep olive, with a pair of parallel longitudinal fuscous stripes anteriorly followed by a pair of transverse bars, and behind these an indistinct procurved fuscous marking above the spinners; below uniform deep olive; sternum and mouth-parts brown, thickly clothed with black hairs.

Eyes.—Median eyes in both rows smaller than their laterals and nearer to them than to each other; anterior medians a little more than a radius apart and subcontiguous to the laterals; posterior row wider than the anterior row, straight to slightly procurved, medians about a diameter apart; laterals smaller than anterior laterals; median quadrangle as long as wide, slightly wider behind than in front; clypeus a little more than the diameter of an anterior lateral eye.

Legs I and II without spines, clothed with stiff, short black hairs; femora III and IV above with a long spiniform, sub-basal hair, remaining segments except the tarsi with very large stout spines, tibiae and metatarsi also spined below.

Pedipalps.—Tarsus of palp with a sub-basal circle of very large, blunt, tooth-like spines, which are as long or longer than the tibia; seen from above the row of 5 spines near the base is arranged transversely like a comb, while distally to these there are numerous similar spines.

Vulva.—As in fig. 5.

Measurements.—Length of carapace, 2·3 mm. Total length, 5·8 mm.

Gen. Asemesthes, Simon.

Asemesthes lineatus, Purcell.

1 ♀ (B 6635). Namutoni.

Colour.—Carapace, sternum, and legs yellow, margin of carapace darkened, fovea dark and narrow, a faint infuscated stripe anteriorly

to it not reaching the eyes ; the lateral cephalic margins bordered by wavy lines of dark hairs, which broaden and diverge slightly posteriorly. Abdomen yellowish grey above, with a pair of light brown spots on the anterior half, a leaf-like median marking of the same colour bordered laterally with some white spots on the posterior half, a row of light brown spots along the sides of the abdomen ; below uniform yellowish grey.

Carapace.—Length equal to $\frac{2}{3}$ patella+tibia IV, equal to metatarsus IV.

Eyes.—Anterior row from in front straight to slightly procurved, from above recurved ; medians a little less than a diameter apart and subcontiguous to the laterals, than which they are $1\frac{1}{2}$–2 smaller ; posterior row strongly recurved, medians much smaller than the laterals and nearer to them than to each other ; median quadrangle longer than wide, and wider in front than behind ; the laterals on each side about the diameter of an anterior lateral apart ; ocular area distinctly wider than long ; clypeus 2–3 times the diameter of an anterior lateral eye.

Legs irregularly spined, the posterior with more numerous and longer spines than the anterior ones ; apex of metatarsus IV with a verticillus of 6 spines consisting of 1 superior pair, 1 lateral pair, and a smaller inferior pair.

Spinners.—Inferior spinners with 3 apical fusules.

Vulva.—As in fig. 6.

Measurements.—Length of carapace, 2·1 mm. Total length, 6·2 mm.

Asemesthes kunenensis, n. sp.

1 ♀ (B 6172). Kunene River.

Colour.—Carapace brown with darkened margin, a pair of infuscated patches behind the fovea ; fovea dark and distinct, with some indistinct radiate lines not reaching the margin of carapace ; femora of legs dark mahogany brown with some lighter patches anteriorly, remaining segments brown, the patellae a little lighter ; abdomen cinereous, with an indistinct blackish median marking above ; inferior spinners dark mahogany brown ; sternum brown, with a marginal border of dark hairs.

Carapace.—Length equal to tibia+a little more than $\frac{1}{2}$ metatarsus I, subequal to metatarsus IV.

Eyes.—Anterior row recurved and wider than posterior row, anterior laterals $1\frac{1}{2}$–2 the size of the medians, which are about their own radius

apart and subcontiguous to the laterals; posterior row strongly recurved, the medians about their diameter apart and a little less from the laterals; median quadrangle considerably longer than wide, and wider in front than behind; ocular area a little wider than long; clypeus 2–3 times the diameter of an anterior lateral eye and provided with a procurved row of long spines.

Legs irregularly spined, all tarsi below with a double row of small spines, strongest in III, weakest in II, femur IV below with a row of 6–7 long setiform hairs on its proximal $\frac{2}{3}$.

Spinners.—Inferior spinners with 3 apical fusules.

Vulva.—As in fig. 7.

Measurements.—Length of carapace, 2·8 mm. Total length, 8·3 mm.

Asemesthes sinister, n. sp.

1 ♀ (B 6131). Ongandjera.

Carapace.—Yellowish brown, ocular area except the neighbourhood of the posterior median eyes infuscated, margin infuscated, giving off some narrow dark lines towards but not reaching the fovea, cephalic portion margined by distinct lines which diverge posteriorly forming irregular sinuous bands not reaching the posterior margin, two straight fuscous lines diverging posteriorly from the fovea to posterior border of carapace, carapace clothed with feather-like hairs anteriorly; legs light brown, apex of femur and whole of tibia in III and IV a little darker than the rest, more so in IV than III; abdomen much rubbed, clothed with strong spiniform hairs.

Carapace.—Length equal to metatarsus IV, equal to metatarsus+$\frac{1}{2}$ tarsus III.

Eyes.—Anterior row from in front lightly procurved, from above both rows recurved, the posterior a little more strongly than the anterior one, anterior medians about $\frac{2}{3}$ their diameter apart, subcontiguous to the laterals and a little smaller than them; posterior medians considerably smaller than their laterals, oblong, a little less than their short diameter apart and about the same distant from the laterals; posterior laterals smaller than anterior laterals and slightly nearer to them than are the posterior medians to the anterior medians; median quadrangle longer than wide, a little wider in front than behind; clypeus equal to 3 times the diameter of an anterior lateral eye.

Legs.—Apex of metatarsus IV with 2 inferior and 2 longer lateral spines, whole of tarsus I inferiorly with short club-shaped hairs, tarsus

II on its distal $\frac{3}{4}$, III and IV with spiniform hairs only, IV with 3 long club-shaped hairs extending between the claws.

Vulva.—As in fig. 8.

Measurements.—Length of carapace, 2·9 mm. Total length, 8·6 mm.

Gen. Setaphis, Simon.

Setaphis quadrativulva, n. sp.

6 ♀♀ (B 6213). Oncka.

Colour.—Carapace reddish brown with a broad irregular infuscated margin, sparsely clothed with white hairs, more numerous near the margins; legs deeply infuscated, except anterior tarsi and metatarsi, patella and distal segments of III, and tarsus IV. Abdomen above fuscous, darker at its anterior apex, a pair of white spots anteriorly, a second transverse white pair in the middle diverging posteriorly and joining a pair of roughly parallel elongated spots on the ventral surface; sternum reddish brown.

Carapace equal in length to tibia+about $\frac{5}{6}$ metatarsus IV, and to patella+tibia+$\frac{2}{3}$ metatarsus II.

Eyes.—Anterior row slightly procurved, medians black, situated on a small tubercle, a little less than their diameter apart and subcontiguous to the laterals which are white and considerably larger than the medians; posterior row slightly procurved, medians white, oblong, about their long diameter apart and a short diameter or slightly less from the laterals, than which they are smaller; median quadrangle a little longer than wide, and wider behind than in front; clypeus a little less than the diameter of an anterior lateral eye.

Chelicera.—Superior margin with 4 teeth, inferior margin with 1 apical granule.

Legs.—Anterior legs not spined; tibia III with 3 inferior and 2 lateral pairs, metatarsus III with 1 inferior and 2 lateral pairs of spines, tarsus IV with long claws, their proximal $\frac{2}{3}$ with 5 teeth.

Vulva.—As in fig. 11. In some specimens the quadrate opening is more rounded, and the two darkened spheres at its base diverge anteriorly.

Measurements.—Length of carapace, 2·3 mm. Total length, 6·1 mm.

Setaphis omuramba, n. sp.

2 ♀♀ (B 6254). Ongandjera.

Colour.—Carapace reddish with a narrower infuscated border than in *S. quadrativulva*, all legs light yellow, except femur, patella, tibia I,

and femora and patellae II and IV which have some dark infuscations; abdomen as in *S. quadrativulva* but a little darker, the white patches being coalesced in the one specimen.

Eyes.—Anterior medians a diameter apart, contiguous with the laterals which are much larger; posterior medians oblong, a little less than a long diameter apart, a little less than a short diameter from the laterals, than which they are smaller; median quadrangle as wide as long, and wider behind than in front; posterior laterals less than their own diameter from the anterior laterals; clypeus less than the diameter of an anterior lateral eye.

Chelicera.—Superior margin with 4 teeth, apical one much smaller than the others which are about equal; * inferior border with an apical granule.

Legs.—Anterior legs spineless, tarsi with club-shaped scopular hairs; distal $\frac{3}{5}$ of metatarsus I and distal $\frac{1}{3}$ of metatarsus II with similar hairs. Posterior legs spined, tarsi with sparse bristles.

Spinners.—Inferior spinners with 3 apical fusules.

Vulva.—As in fig. 12.

Measurements.—Length of carapace, 2·4 mm. Total length, 6·2 mm.

Gen. Trichothyse, Tucker.

Trichothyse subtropica, n. sp.

2 ♀♀ (B 6143). Kunene River.

This species is very near *T. hortensis*, Tucker, Ann. S. Afr. Mus., vol. xix, pt. 2, p. 332, fig. 53.

Colour.—Carapace brown, some fuscous hairs on the sides and posteriorly, legs light brown, tarsi and metatarsi darker; abdomen fuscous, covered with fine white ramose and black spiniform hairs; sternum and mouth-parts brown, coxae light brown.

Carapace equal in length to patella+tibia+about $\frac{1}{2}$ metatarsus I, and to tarsus+metatarsus+about $\frac{2}{5}$ tibia IV.

Eyes.—Anterior medians about $\frac{1}{3}$ their diameter apart and almost touching the laterals; posterior medians about equal to posterior laterals, about 1–1$\frac{1}{2}$ times their diameter apart, a little less from the laterals; clypeus equal to the long diameter of an anterior lateral eye.

Chelicera.—As in generic description.

* *Note.*—In this paper when the margins of the chelicera are armed with 2 or more teeth, the one nearest the fang is called, for purposes of discrimination, the *apical* tooth, while that furthest from the fang is the *basal* tooth.

Legs.—Femora with 3 rows of spines above as follows :—I, 1, 3, 0 ; II, 2, 3, 0 ; III, 2, 3, 2 ; IV, 1, 3, 1. Tibia I below with 1 inner apical, metatarsus with 2 basal spines. Tibia II below with 1 inner apical, 1–0 inner median, metatarsus with 2 basal spines. Legs scopulated as in *T. hortensis*.

Vulva.—As in fig. 15.

Measurements.—Length of carapace, 4·4 mm. Total length, 12 mm.

Gen. Echemus, Simon.

Echemus erutus, Tucker.

1 ♀ (B 6180). Oncka.

Gen. Zelotes, Giste.

Zelotes demonaica, n. sp.

1 ♀ (B 6197). Ongandjera.

7 ♀♀ (B 5886). Mafa.

Colour.—Carapace, mandibles, sternum deep mahogany brown to black, legs dark olivaceous, abdomen dark slate-grey above, lighter below, opercula light brown.

Carapace.—Length equal to tibia, metatarsus+about $\frac{2}{3}$ tarsus I, and to tibia+$\frac{2}{3}$–$\frac{3}{4}$ metatarsus IV, breadth equal to tibia+about $\frac{2}{3}$ metatarsus I, and to metatarsus+$\frac{1}{2}$–$\frac{3}{5}$ tarsus IV.

Eyes (from above).—Anterior row straight to slightly procurved ; posterior row straight to very slightly recurved ; anterior medians about $1\frac{1}{2}$ diameters apart, smaller than their laterals and nearer to them than to each other ; posterior medians oblique, converging anteriorly, smaller than their laterals and slightly nearer to them than to each other ; median quadrangle a very little broader than long ; posterior laterals smaller than the anterior laterals and nearer to them than are the posterior medians to the anterior medians.

Clypeus equal to or slightly more than the diameter of an anterior lateral eye.

Chelicera very long, their inner margins oblique, superior border with 3 large blunt teeth well below the apex and separated from each other, the distal one the largest, the proximal the smallest ; lower margin with a blunt tooth-like tubercle opposite the largest tooth.

Maxillae long and broad, deeply incised above the middle ;

labium almost rectangular, reaching the inner apices of the maxillae ; depressed at the sides, forming a cone-shaped elevation in the middle ; sternum not produced.

Legs.—Posterior legs only with large stout irregular spines, I and II with club-shaped scopular hairs mixed with spiniform hairs on their tarsi and distal $\frac{1}{3}$ of metatarsi, III and IV without scopular hairs, but thicker spiniform hairs ; metatarsus IV with a fine brush of black hairs fringing its distal inferior border.

Spinners.—Inferior spinners with 5–6 apical fusules.

Vulva.—As in fig. 9.

Measurements.—Length of carapace, 3·9 mm. ; breadth, 3 mm. Total length, 8·9 mm.

Zelotes ovambensis, n. sp.

1 ♀ (B 6634). Ongandjera.

Colour.—Carapace and sternum black to blackish brown ; tarsus I and II brown, posterior surface of femur I light brown below, legs otherwise blackish brown ; abdomen cinereous above with some black patches, darker below, the whole clothed with fine black hairs.

Carapace equal to metatarsus+$\frac{2}{3}$ tarsus IV, and to patella+tibia I.

Eyes.—Seen from in front, both rows distinctly and equally procurved, and about equal in width ; from above anterior row recurved ; medians of both rows not much smaller than their laterals and nearer to them than to each other, especially those of the posterior row ; anterior medians situated on a small tubercle and diverging anteriorly, about 1–1$\frac{1}{2}$ times their diameter apart. Median quadrangle longer than wide, and parallel or a little wider behind than in front. Clypeus equal to or slightly less than the diameter of an anterior lateral eye.

Chelicera.—Superior margin with 4 teeth, inferior margin muticous.

Legs.—Posterior legs irregularly spined.

Spinners.—Inferior spinners with 4 apical fusules.

Vulva.—As in fig. 4.

Measurements.—Length of carapace, 2·5 mm. Total length, 6·2 mm.

Gen. Diaphractus, Purcell.

Diaphractus muticus, n. sp.

1 ♀ (B 6264). Ongandjera.

Colour.—Carapace light reddish brown, darker anteriorly, covered with yellow racemose hairs, mandibles darker reddish brown, legs

yellow, extremities of anterior legs light reddish brown, sternum with a marginal border of stout filamentous hairs, some racemose hairs in the centre ; abdomen fuscous, darker above than below.

Carapace subequal to tibia+metatarsus IV, equal to patella+tibia +a little more than $\frac{1}{2}$ metatarsus I.

Chelicera.—As in *D. leipoldti.*

Eyes.—From above anterior row recurved, posterior row slightly procurved ; anterior medians $\frac{1}{2}$–$\frac{3}{4}$ their diameter apart, about $1\frac{1}{2}$ times the size of the laterals ; posterior medians a little larger than posterior laterals, a little more than their greatest diameter apart and twice their diameter from the laterals ; median quadrangle a little longer than wide and wider in front than behind, laterals on each side the diameter of an anterior lateral apart ; clypeus equal to the short diameter of an anterior lateral eye.

Legs.—Metatarsus I scopulate, tibia I with a few scopular hairs on its inner inferior apex, both muticous ; metatarsus II below with 1 basal inner spine, tibia II below with an apical pair of spines.

Vulva.—As in fig. 13.

Measurements.—Length of carapace, 3·4 mm. ; abdomen, 4·2 mm.

This species closely resembles *D. assimilis*, Tullgren, but differs in the disposition of the eyes and in having the second tibia spined.

Gen. Xerophaeus, Purcell.

Xerophaeus aridus, Purcell.

1 ♀ (B 6291). Namutoni.

Colour.—Carapace and legs yellow ; sternum light brown with a darkened border, yellowish hairs in the centre and dark fuscous ones along the margins ; abdomen dirty white to grey with some stout black hairs.

Carapace equal in length to a little more than tibia+patella II, subequal to tibia+metatarsus I.

Eyes large, especially the anterior medians ; anterior row procurved, the medians a little more than their radius apart, and much nearer to their laterals, than which they are about $1\frac{1}{2}$ times larger ; posterior row more strongly procurved than the anterior row, medians oblong, subangular, diverging anteriorly and close together at their bases ; they are considerably larger than the laterals and less than a long diameter from them ; laterals on each side the diameter of a posterior lateral apart ; clypeus equal to the long diameter of an anterior lateral eye.

Chelicera.—Inner margins oblique, superior border with 3 medium-sized teeth, the middle one the largest; inferior border with a denticle opposite the middle tooth.

Maxillae fairly short and stout, broader apically than basally, their outer margins with a regular curve; labium not much longer than broad, not reaching the inner apices of the maxillae.

Legs.—All tarsi and metatarsi scopulate except metatarsus IV; tibiae I and II below with 1 inner median and an apical pair of spines, metatarsi I and II with a basal pair of spines.

Vulva.—As in fig. 14.

Measurements.—Length of carapace, 4·1 mm.; breadth, 2·9 mm. Total length, 11·1 mm.

Gen. Theuma, Simon.

Theuma longipes, n. sp.

1 ♂ (B 6170). Kunene River.

Colour.—Carapace dark brown edged with black; fovea distinct, anteriorly to it a faint darkened line reaching the eyes; femora and patellae of legs olive-brown, remaining segments and sternum brown, abdomen dark olivaceous above, lighter below.

Carapace.—Length subequal to metatarsus I.

Eyes.—From above both rows slightly recurved, anterior medians about a radius apart and less from the laterals which are a little larger; posterior medians the largest of the eyes, oblong, pearly white, diverging anteriorly, less than a short radius apart at their bases and about a long diameter from their laterals; posterior laterals smaller than the anterior laterals and further from them than are the posterior medians from anterior medians; median quadrangle slightly longer than wide, and wider behind than in front; clypeus equal to the diameter of an anterior lateral eye.

Chelicera provided near the base of the fang with two long, plumose hairs curved inwardly in a semi-circle; the longer of the two stout, covered with fine filaments and much longer than the fang, the other is similar but considerably shorter. Superior margin with 4 medium-sized teeth, inferior border with 3 small indistinct granules.

Legs.—Anterior ones very long, the first leg (including coxa) about 5 times the length of carapace, metatarsus I below with a double row of small spines, a large submedian and subapical spine, metatarsus II similar but with smaller spines.

Pedipalp.—Tibia 1½–2 the length of patella; tarsus and bulb as in fig. 59.

Measurements.—Length of carapace 2·7 mm.; first leg, 13·3 mm. Total length, including spinners, 6·4 mm.

Theuma ovambica, n. sp.

1 ♀ (B 6639). Kunene River.

Colour.—Carapace yellow with a patch of greyish hairs between the fovea and the posterior margin, legs and sternum yellow, abdomen above light yellow, clothed with flattened grey-green hairs, dirty white below.

Carapace equal in length to patella+¾ tibia IV, equal to tibia +about ⅔ metatarsus I.

Eyes.—Anterior row from above slightly recurved, medians ½–¾ their diameter apart, laterals about 1½ times the size of the medians; posterior row from above slightly recurved, the medians slightly oblong, about a short diameter apart, subequal to their laterals and about 1½ times their long diameter from them; posterior laterals smaller than anterior laterals and further from them than are the posterior medians from the anterior medians; median quadrangle as long as wide, and wider behind than in front; clypeus equal to the long diameter of an anterior lateral eye.

Chelicera.—Superior margin with 4 teeth, the basal one the smallest; inferior margin with 3 small teeth.

Legs IV, I, III, II; tibia I below with 4 inner and 3 outer spines, metatarsus I with 1 basal pair, its distal ⅔ with club-shaped scopular hairs, tarsus thickly scopulate; tibia II as in I with 3 lateral pairs of spines in addition, metatarsus II with a lateral pair of spines in addition to inferior pair and sparsely covered with club-shaped hairs, tarsus scopulate. Legs III and IV with more numerous and stronger spines, metatarsi with none, tarsi with a few scopular hairs.

Vulva undeveloped.

Measurements.—Length of carapace, 3·4 mm.; fourth leg, 10·8 mm. Total length, 7·8 mm.

Theuma andonea, n. sp.

1 ♀ juvenile (B 5929). Andoni.

Colour.—Carapace, legs, and sternum yellow, abdomen cinereous above, a little lighter below.

Carapace.—Length equal to metatarsus+$\frac{1}{2}$–$\frac{2}{3}$ tarsus IV, and to a little more than patella+tibia II.

Eyes.—Anterior row slightly recurved; medians about a radius apart and much less from their laterals; posterior row recurved, medians round, white, a little more than a radius apart and about a diameter from the posterior laterals; the latter further from the anterior laterals than are the posterior medians from the anterior medians; median quadrangle as long as wide, and wider behind than in front; clypeus equal to or a little less than diameter of an anterior lateral eye.

Chelicera.—Superior margin with 5 distinct teeth, inferior margin with 4.

Legs.—Tibiae I and II with 3 pairs of spines below, II with a lateral pair in addition, metatarsi with 1 basal pair, both metatarsi with scopular hairs more dense on I than II, tarsi scopulate; no scopular hairs on metatarsus IV, those on the tarsus sparse except at the apex. Third leg missing.

Measurements.—Length of carapace, 2·6 mm. Total length, 6·8 mm.

Theuma recta, n. sp.

1 ♀ (B 6640). Namutoni.

Colour.—Carapace light yellow with some blackish pubescence between the fovea and posterior margin, sternum and legs light yellow, abdomen above dirty yellow covered with greenish-grey pubescence and some darker patches anteriorly.

Carapace slightly exceeding patella+tibia II, equal to metatarsus+about $\frac{3}{5}$ tarsus IV.

Eyes.—From above anterior row straight, medians about a radius apart and distinctly smaller than their laterals; posterior row straight, medians round, their diameter apart and distant $1\frac{1}{2}$ times their diameter from the laterals which they exceed; laterals about the diameter of an anterior lateral eye from the latter and much further from them than are the posterior medians from the anterior medians; median quadrangle considerably wider than long, and wider behind than in front; clypeus a little more than the diameter of an anterior lateral eye.

Chelicera.—Superior border with 4 moderate teeth, the basal one much smaller than the remainder which are equal in size. Inferior border with 4 small equally spaced teeth.

Legs.—Tibia I with 3 inferior pairs of spines and 1 basal anterior

spine ; metatarsus I with 2 inferior basal pairs ; tibia II with 3 inferior pairs, 1 inferior apical spine and 3 anterior spines, metatarsus II similar to I ; tarsi with a double row of club-shaped scopular hairs in I and II, replaced by some sparse bristles in III and IV.

Measurements.—Length of carapace, 3·3 mm. Total length, 7·4 mm.

Family PALPIMANIDAE.

Gen. Diaphorocellus, Simon.

Diaphorocellus biplagiata, Simon.

1 subadult ♂ (B 5910). Sandup.

This specimen agrees with Simon's description, except that the shape of the posterior median eyes is roughly quadrangular rather than triquetrous.

Diaphorocellus albooculatus, n. sp.

3 subadult ♂♂ (B 6641). Kunene River.

Colour.—Carapace, sternum, and mouth-parts bright red, fovea darkened ; first pair of legs bright orange, coxae and bases of femora reddish below, remaining legs yellow ; abdomen blackish purple above, a small whitish spot above the spinners, a large elongate ill-defined patch anteriorly, dirty white below.

Eyes.—Anterior row from above recurved, medians large, white, a radius or a little less apart, a little further from the laterals ; posterior row procurved, medians pearly white, pear-shaped, subcontiguous, less than $1\frac{1}{2}$ long diameters from the laterals ; laterals on each side contiguous, the posterior ones considerably smaller than the anterior ones.

Legs.—Tibia I a little shorter than patella I, metatarsus I shorter than tarsus I but broader ; club-shaped scopular hairs on distal $\frac{5}{6}$ of femur I thinning off towards the base, on whole of metatarsus I and proximal half of tarsus I ; metatarsus II with a thick brush of black hairs on its distal $\frac{1}{2}$, similar but sparser hairs on whole of tarsus II ; metatarsus III with brush on its distal $\frac{2}{5}$, tarsus III similar to tarsus II.

Epigastric scutum.—As in fig. 54. This differs markedly from that of *D. biplagiata*, Simon.

Measurements.—Length of carapace, 3·3 mm. Total length, 8 mm.

Gen. PALPIMANUS, Dufour.

Palpimanus aureus, n. sp.

1 subadult ♂ (B 6304). Mafa.

Colour.—Carapace, sternum, and mouth-parts red, anterior pair of legs orange, remaining legs yellow; abdomen dull golden, thickly covered with fine black hairs.

Eyes.—Anterior row strongly procurved, medians large, golden, a radius or a little more apart, a little less from the laterals; posterior row from above slightly recurved, medians oblong, white, resembling those of *Diaphorocellus*, less than a short diameter apart and $1\frac{1}{2}$–2 long diameters from the laterals; median quadrangle much longer than wide, and wider in front than behind; clypeus more than the diameter of an anterior lateral eye.

Legs.—Tibia I seen from below longer, from above shorter, than patella I and provided with club-shaped scopular hairs thinning off towards the base; metatarsus and median $\frac{1}{3}$ of tarsus I with club-shaped scopular hairs; metatarsi of remaining legs with an apical brush of black hairs below.

Epigastric scutum.—As in fig. 53.

Measurements.—Length of carapace, 2·5 mm. Total length, 6·3 mm.

Palpimanus spiculosus, n. sp.

1 juvenile ♀ (B 6293). Namutoni.

Colour.—Carapace light red with large scattered granules, those near the margin appearing as sharp spicules, interspaces thickly covered with smaller granules; middle of carapace anteriorly clothed with white hairs, a deeply infuscated patch surrounding the anterior median eyes; posterior lateral eyes with a small infuscated patch on their inner sides; abdomen flesh-coloured with long black hairs, except for a small anterior patch and a larger one above the spinners, which are clothed with stout white hairs.

Eyes.—Anterior row procurved, medians black, a little more than half their radius apart, a very little more from the laterals; posterior row recurved, the medians white, triquetrous, more than a diameter apart and $1\frac{1}{2}$ diameters from the laterals; median quadrangle a little longer than wide, a little wider in front than behind; clypeus more than the diameter of an anterior lateral eye.

Legs.—As in *P. aureus*.

Measurements.—Length of carapace, 1·4 mm. Total length, 3·6 mm.

Family ZODARIIDAE.

Gen. Caphaeris, Simon.

Caphaeris oncka, n. sp.

4 ♀♀, 2 ♂♂ (B 5903). Oncka.

1 ♂ (B 6296). Uwuthija.

♀ *Colour.*—Carapace deep red, coriaceous, thinly covered especially in the median line with fine white hairs, amongst which are some stouter fuscous ones ; femora dark mahogany brown with some white hairs, remaining segments reddish brown, clothed with black hairs, some white hairs intermixed with the black ones, especially superiorly on patellae and apices of tibiae ; sternum reddish, darkened at the margins and in the centre. Abdomen above thickly covered with black hairs with some scattered yellow and white ones, anterior apex with a horseshoe-shaped marking of yellowish hairs, behind it two rows of brown spots converging slightly posteriorly and enclosing in their posterior $\frac{1}{2}$ a leaf-shaped marking of 4 divisions, the last the smallest ; below two rows of brownish spots on each side converging slightly posteriorly.

Carapace.—Length equal to tibia+about $\frac{2}{3}$ metatarsus IV, and to tibia+metatarsus I ; breadth slightly exceeding metatarsus IV.

Eyes.—Anterior laterals not quite touching, anterior medians a little less than their own radius apart ; posterior medians more than their radius apart, about $1\frac{1}{2}$ times the diameter of a posterior lateral from the latter ; the centres of an anterior median, a posterior median, and a posterior lateral on the same side form slightly more than a right angle.

Legs.—Posterior legs stouter and more strongly spined than anterior ones ; all metatarsi with apical scopulae of stiff black hairs, strongest in III, weakest in I ; tarsus IV below with an apical pair and double row of 4 spines, in addition 5 anterior and 3 posterior spines.

Vulva.—As in fig. 16.

Measurements.—Length of carapace, 5·7 mm. Total length, 13 mm.

♂ *Colour.*—Carapace coarsely granular, fovea distinct, legs as in ♀, abdomen above sooty black, a median lanceolate stripe of stout yellow hairs tapering from anterior apex to just above spinners.

Eyes.—As in ♀, except that the posterior laterals are a little closer to the posterior medians.

Palp.—As in fig. 60.

Measurements.—Length of carapace, 5·4 mm. Total length, 10·6 mm.

Caphaeris kunenensis, n. sp.

2 ♀♀ (B 6167). Kunene River.

Colour.—Carapace black, coriaceous, with some scattered yellowish hairs; femora of legs black, remaining segments dark brown, pubescence as in *C. oncka* but thinner; abdomen black, finely striated, thinly covered with mixed black and yellow hairs, markings as in *C. oncka*, but the double row of brown spots above almost indiscernible.

Carapace equal in length to metatarsus+tarsus IV, subequal to patella+tibia+metatarsus II.

Eyes.—As in *C. oncka.*

Legs much more slender than in *C. oncka*, especially the anterior ones, anterior tarsi relatively longer than in the latter.

Vulva.—As in fig. 17.

Measurements.—Length of carapace, 5 mm. Total length, 12·4 mm.

This species differs from the preceding one in the pubescence of the abdomen and legs, in the slenderness of the legs, and in the shape and size of the vulva. Hitherto four species of this genus have been described: *C. crassimana*, *C. haematilis*, and *C. decorata*, all by E. Simon, and *C. transvaalicus* by Hewitt; the last-named species, however, from the Waterberg district, Transvaal, is probably synonymous with *C. decorata* from the adjacent district of the Zoutpansberg, judging from Simon's description of the latter species in Rev. Suisse de Zool., vol. xii, p. 66.

Gen. Diores, Simon.

Diores triangulifer, Simon.

4 ♀♀ (B 6244), (B 6273). Namakunde.

1 ♀ (B 5880). Namutoni.

Colour.—Carapace light reddish brown, yellow at the edges, ocular area, excluding the posterior median eyes, black; legs reddish, sternum and coxae yellow. Abdomen dark slate-grey above with a median dorsal marking on its posterior $\frac{3}{5}$, composed of 4–5 small wedge-shaped whitish spots ending in a large cream-coloured patch above the spinners; colulus black; under surface and lower sides of abdomen dirty white, distinctly demarcated from the upper surface.

Eyes.—Anterior medians comparatively large, a radius or a little less apart; posterior medians about 2 their own diameter apart and $1\frac{1}{2}$ times their diameter from posterior laterals; the two laterals on

the same side less than the diameter of a posterior lateral apart, the anterior eye distinctly the larger.

Labium slightly longer than broad, reaching $\frac{2}{3}$–$\frac{3}{4}$ the length of the maxillae, infuscated laterally at its base.

Legs.—Patellae with short stout spines above as follows :—I, 0 ; II, anterior row of 3–5, posterior row of 0–1 ; III similarly 4–7 and 3 ; IV, 4–5 and 4–5. Tibiae I and II each with a pair of basal, median and apical longer spines below.

Vulva.—As in fig. 10.

The female from Namutoni differs slightly from the rest in having the median dorsal stripe composed of small transverse bars instead of wedge-shaped markings.

Measurement.—Total length, 5–6 mm.

Family AMMOXENIDAE.

Gen. Ammoxenus, Simon.

Ammoxenus fallopius, n. sp.

6 ♀♀ (B 6280). Nomtele.

2 ♀♀ (B 6230). Ongandjera.

2 ♂♂ (B 5919). Sandup.

♀ *Colour.*—Carapace olivaceous, except ocular area which is black, a broad median stripe of snow-white hairs from behind the eyes not quite reaching the posterior margin ; a few similar hairs on ocular area, especially between the anterior lateral eyes ; abdomen deep velvety black above, a median lanceolate stripe of snow-white hairs bordered with some fiery-red ones tapering from anterior apex towards a white diamond-shaped patch above the spinners ; sides and ventral surface white ; coxae clothed with white hairs above ; legs brown, distal segments olivaceous, dorsal surfaces with mixed black and white hairs.

Eyes.—Anterior row strongly procurved, medians less than a diameter apart and about half as far from the laterals, than which they are smaller ; posterior row lightly procurved, medians oblong, slightly oblique, more than a long diameter apart, and less than a short diameter from the laterals, than which they are much smaller ; median quadrangle parallel or a little wider in front, longer than wide.

Chelicera from above, tapering towards the apices which are truncate and provided with 2 stout teeth, the inner one the larger.

Sternum with mixed white and fuscous hairs, the former plumose at their bases, the latter stout basally, finely tapering.

Legs spined, all tarsi below with a double row of spiniform hairs.

Vulva.—As in fig. 18.

Measurements.—Length of carapace, 2·6 mm. Total length, 5·5 mm.

♂ *Colour.*—Carapace dark brown clothed with mixed fiery-red and black hairs, the latter predominating towards the margin; median band white; abdomen above with fiery-red hairs, a short median white patch in the middle, a second white patch above the spinners.

Eyes.—As in ♀, except that the posterior medians are larger.

Sternum.—As in ♀, but the white hairs less numerous.

Palp undeveloped, the tarsus spined above.

Measurements.—Length of carapace, 2 mm. Total length, 4 mm.

In one ♀ specimen the black hairs on the dorsal surface of abdomen are largely replaced by fiery-red ones in the neighbourhood of the median lanceolate stripe.

Family ARGIOPIDAE.

Gen. Tetragnatha, Latr.

Tetragnatha praedator, Tullgr.

4 ♂♂, 2 ♀♀ (B 6162), from the Kunene River.

Tetragnatha nitens, Aud.

4 ♀♀ (B 5875). Namutoni.

5 ♂♂, 1 ♀ (B 5876). Namutoni.

♂ *Colour.*—Cephalothorax with fovea consisting of two deep oval pits lying in a depression with an anteriorly recurved margin, cephalic portion defined by lines of silvery-white hairs, ocular area with similar hairs, denser on the median ocular area; abdomen cinereous, thickly covered with dirty-white hairs; legs reddish brown, mandibles lighter.

Chelicera.—As in fig. 77, about as long as or but little longer than cephalothorax.

Eyes.—Anterior row distinctly recurved, medians considerably larger than laterals, less than their own diameter apart and much further from the laterals; posterior row a little narrower than anterior row, less recurved, the medians larger than the laterals and further from them than from each other; median quadrangle about as long as posteriorly wide, a little wider behind than in front; clypeus more than the diameter of an anterior median eye.

Legs I, II, IV, III; I much longer and stouter than the rest; II distinctly longer than IV. Femur I a little longer than length of body (abdomen+cephalothorax) with 6 large interior spines, and below them a sub-basal row of 3 small spines.

Pedipalp.—As in fig. 61. Left palp viewed laterally. Tarsus a little longer than tibia, the latter about $\frac{1}{4}$ longer than patella.

Measurements.—Length of carapace, 4·5 mm.; abdomen, 8·3 mm. Total length, 12·7 mm.

♀ *Colour.*—Cephalothorax with infuscated border, margins of cephalic area infuscated, the margins uniting at the fovea and continued to posterior border as a broad median infuscated band; abdomen above with four longitudinal infuscated stripes, the outer broader than the inner ones; below with a blackish median band, the sides lighter; femora with an apical infuscated band, patellae with apical ring, tibiae with an indistinct median and distinct apical broad infuscated band, metatarsi with basal, submedian, and apical bands, tarsi with distal halves infuscated.

Chelicera.—Inferior margin with a large apical tooth, its axis parallel with the longitudinal axis of mandible, a much smaller one below it, then a space followed by 10–11 teeth, their interspaces and size growing successively less; superior margin with 2 moderate apical teeth, the second larger than the first, then a considerable space followed by 9–10 teeth larger than those of the inferior margin, their interspaces and size successively decreasing, the last one granular.

Eyes.—As in ♂.

Legs I, II, IV, III; I longer and stouter than the rest; femur I with 5 large interior spines, below them a sub-basal row of 5–6 small spines.

Measurements.—Length of carapace, 3·4 mm.; abdomen, 8·6 mm. Total length, 11 mm.

As I have been unable to see any literature dealing with Audouin's species, I have had to base my diagnosis on a specimen in the Museum's collection identified by Dr. Purcell. I have redescribed the species in the event of it being new or the diagnosis being incorrect.

Tetragnatha andonea, n. sp.

3 ♂♂, 3 ♀♀ (B 5926). Andoni.

This species comes under Simon's group E, Hist. Nat. des Araign, vol. i, p. 724.

♂ *Colour.*—Cephalothorax yellow, eyes surrounded with black,

median quadrangle clothed with white hairs, fovea large, rounded, with strongly recurved anterior border and distinct radiations; cephalic area distinctly defined; abdomen above reticulate, fulvous, a narrow median luteous band in anterior half with some small transverse and posteriorly oblique radiations from it, below darker fulvous, not reticulate.

Chelicera.—As in fig. 76.

Eyes (from above).—Anterior row slightly recurved, much wider than posterior row, medians about their diameter apart and much further from the laterals, which are 3 times smaller than them; posterior row more recurved than anterior row, medians smaller than anterior medians, twice their own diameter apart and about the same distance from the laterals; median quadrangle about as long as posteriorly wide, wider behind than in front; clypeus about equal to diameter of an anterior median eye.

Legs I, II, IV, III.

Pedipalp.—As in fig. 62. Patella subequal to tibia, patella+tibia about equal to or slightly less than tarsus, tarsus+tibia+patella longer than femur.

Measurements.—Length of carapace, 3·1 mm.; abdomen, 5·6 mm. Total length, 7·7 mm.

♀ *Colour.*—Cephalothorax yellow, fovea consisting of two crescentic pits, cephalic portion defined by lines of silvery-white hairs, ocular area with similar hairs denser on the median ocular area, a median line of similar hairs from fovea to between posterior median eyes; thoracic portion with faint foveal radiations and thin lines of silvery-white hairs; abdomen above reticulate, fulvous, with narrow, ill-defined median luteous stripe, posteriorly oblique radiations more distinct.

Eyes.—As in ♂, clypeus more than diameter of anterior median eye.

Chelicera much shorter than in ♂, fangs normal, inferior margin with a moderate apical tooth near base of fang, then a space followed by a large tooth (about twice the size of apical one), then 4 teeth at short regular intervals growing successively smaller, the last considerably smaller than the penultimate one; superior margin with a small apical tooth (smaller and further from the base of the fang than that of the inferior margin), then a considerable space (larger than that of the inferior margin) followed by 5 teeth (the first much larger than the apical tooth) growing successively smaller, the last 2 considerably smaller than the preceding one.

Legs I, II, IV, III; II very little longer than IV, with femur, patella + tibia, and metatarsus + tarsus about equal in length. Femur with 3 interior spines in distal $\frac{1}{2}$.

Measurements.—Length of carapace, 2·8 mm.; abdomen, 7·6 mm. Total length, 9·8 mm.

Gen. Nephila, Leach.

Nephila senegalensis, subsp. *annulata*, Thorell.

1 ♀ (B 6134). Kunene River.

Gen. Araneus, Clerck.

Araneus morelii, Vinson.

2 ♂♂, 1 ♀ (B 5924). Andoni.
1 ♂, 1 ♀ (B 5878). Namutoni.
4 ♀♀ (B 5923). Andoni.
2 ♀♀, 1 ♂ (B 5931). Andoni.

Araneus eresifrons, Pocock.

5 ♀♀ (B 5934). Kunene River.

These specimens agree closely with Pocock's description and drawing of the vulva, P.Z.S., 1898, pl. xli, figs. 3*a*, 3*b*. The anterior row of eyes is, however, not procurved, but straight, or very slightly recurved. They also resemble *A. cereola*, Simon, of which a drawing is not given, and *A. cereolella*, Strand. The colour of the dorsal surface of the abdomen is in nature a vivid light green, which in spirit soon becomes an ivory white.

Family THERIDIIDAE.

Gen. Lactrodectus, Thorell.

Lactrodectus incertus, n. sp.

1 ♀ (B 6236). Ongandjera.
2 ♀♀ (B 5883). Namutoni.

Colour.—Cephalothorax brown with some narrow darker foveal radiations and stripes, abdomen marked as in fig. 78, the lighter stripes red, the rest light brown, below light brown with a lighter quadrilateral marking between the vulva and spinners.

Eyes.—Anterior row from above recurved, from in front slightly procurved, medians slightly smaller than the laterals, their diameter or a very little more apart and distinctly further from the laterals; posterior row recurved, medians less than their diameter apart and further from the laterals, than which they are a little larger; laterals on each side further than the diameter of an anterior lateral eye from each other; posterior medians larger than anterior medians; median quadrangle wider behind than in front, its length more than its posterior width; clypeus about the length of the median quadrangle. Length of carapace equal to metatarsus+tarsus III, a little less than $\frac{3}{4}$ metatarsus I.

Legs I, IV, II, III; metatarsus I equal to metatarsus+about $\frac{1}{3}$ tarsus IV.

Vulva.—As in fig. 19.

Measurements.—Length of carapace 3·8 mm.; length of abdomen about 6·3 mm.

This species resembles *L. hystrix*, Simon, in having the abdomen clothed with small spines (fig. 79), but differs in the disposition of the eyes; owing to the absence of literature in South Africa, I have been unable to see descriptions of several species; I have therefore provisionally described this species as new.

Family THOMISIDAE.

Gen. Stiphropus, Gerst.

Stiphropus scutatus, n. sp.

1 ♂ (B 6312). Namakunde.

1 ♂ (B 6157). Kunene River.

Colour.—Carapace (except the bases of the anterior lateral eyes which are fiery red) and mandibles black, coarsely granular, sternum reddish brown; abdomen covered dorsally with a cuirass of minute rounded tubercles, a pair of indistinctly demarcated rounded depressions just behind the middle line; ventral surface corrugated.

Eyes.—Anterior row recurved, medians about 2 their diameter apart; laterals much larger than the medians and a little less than 3 median diameters from the latter; posterior row more strongly recurved than the anterior row, medians smaller than the anterior medians, considerably smaller than the laterals and nearer to each other than to them; median quadrangle about $\frac{1}{3}$ wider than long, wider behind than in front; clypeus equal to a little more than the

diameter of an anterior median, less than the diameter of an anterior lateral eye.

Legs short and stout; tarsus and metatarsus of II together longer than those of I; metatarsus I not much shorter than tarsus I; tibia I equal to metatarsus+about $\frac{2}{5}$ tarsus I; tibia III subequal to metatarsus+tarsus III.

Palp.—As in fig. 63, seen from an infero-exterior direction.

Measurements.—Length of carapace, 2 mm. Total length, 4·2 mm.

Gen. PARAMYSTARIA, Lessert.

Paramystaria lata, n. sp.

4 ♀♀ (B 6199). Kunene River.

Colour.—Carapace red to blackish brown, a light triangular patch between the anterior median eyes, mandibles infuscated apically, sternum red to blackish brown, coxae and legs light orange, femora reddish, tibiae and distal segments with an infuscated dorsal stripe, except on third tarsus, patellae with or without a similar stripe or with a basal infuscated band; abdomen marked dorsally either as in *P. variabilis*, Lessert, Rev. Suisse de Zool., 1919, vol. xxvii, Nos. 5 and 6, pl. ii, fig. 42, or with a narrow dark median stripe with a broad irregular dark patch at each side, which is longitudinally produced infero-laterally; on the anterior half an oval red spot followed by a trapezium (broader behind then in front) of 4 smaller round spots, the posterior larger than the anterior pair; abdomen cream below.

Eyes.—Anterior row a little more strongly recurved than the posterior row (a line touching the superior borders of the medians passes just below the laterals); medians 3 times their diameter apart and $1\frac{1}{3}$ times as far from the laterals as from each other; posterior medians distinctly smaller than anterior medians, 7 times their own diameter apart and about $\frac{2}{3}$ that distance from the laterals; median quadrangle considerably wider than long; laterals on each side distant from each other $1\frac{1}{2}$ times the diameter of an anterior lateral eye; clypeus equal to 3 times the diameter of an anterior median eye.

Chelicera.—As in generic description (*loc. cit.*, p. 102).

Legs.—Femur I with 2 anterior apical spines; II and III with 1 superior median spine each. Tibia I with 1 median superior and 2 inferior apical spines.

Abdomen rounded, broader than long.

Vulva.—As in fig. 20.

Measurements.—Length of carapace, 1·6 mm.; length of abdomen, 2·8 mm.; breadth, 3·1 mm. Total length, 4·3 mm.

This species closely resembles *P. variabilis*, Lessert, in the flask-shaped form of the vulva and in the colouring; it differs from it in the disposition of the eyes.

Gen. Monoeses, Thorell.

Monoeses quadrituberculatus, n. sp.

1 ♂, 1 ♀ (B 6203). Oncka.

1 ♂ (B 6255). Ongandjera.

1 ♀ (B 5898). Mafa.

♀ *Colour.*—Carapace yellow, except tubercles of eyes and edge of clypeus which are white, and some irregular brown lateral markings not reaching the margin, except anteriorly at the lateral angles of the clypeus; mandibles yellow, tipped with white, their inner margins provided with spiniform hairs; legs yellow; abdomen above mottled white, a double row of spines on its anterior half, remainder with numerous spines; ventral surface with a narrow grey median band from epigastric area to spinners, a lateral band of distinct grey spots on each side.

Carapace.—Length subequal to metatarsus I, and also to tibia II.

Eyes.—Anterior row straight, equally spaced by about 4 median diameters; posterior row very slightly recurved, medians smaller than laterals and nearer to them than to each other; median quadrangle considerably wider behind than long, its length equal to its anterior width.

Legs.—Anterior metatarsi with 5·5 inferior and 1·1 median lateral spines; anterior tibiae with 5·5(6) inferior and 3·3 lateral spines; claw of tarsus I with 14 small teeth.

Abdomen.—Anterior dorsal margin with 3 curved, inwardly directed spines on each side; below anteriorly to the spinners, except the ventral median band, longitudinally striated, posteriorly to the spinners transversely creased and tapering; distance from spinners to posterior apex about equal to distance from anterior apex to spinners (excluding spinners themselves).

Vulva.—As in fig. 21.

Measurements.—Length of carapace, 2·7 mm. Total length, 10·4 mm.

♂ *Colour.*—Brown lateral markings in the ♀ replaced by blackish ones posteriorly; abdomen dorsally with a blackish patch on each

side of the anterior margin, followed more posteriorly by another smaller pair ; spines far less numerous than in the ♀, abdomen not tapering posteriorly to the spinners, but ending abruptly in a blunt projection above the spinners on which are situated 4 small tubercles each surmounted with a spine.

Pedipalp.—As in fig. 64.

Measurements.—Length of carapace, 2 mm. Total length, 5·2 mm.

Gen. Tmarus, Simon.

Tmarus crucifer, n. sp.

1 immature ♀ (B 6151). Kunene River.

Colour.—Carapace fuscous, mottled, two oblique ill-defined white lateral stripes extending from the level of the fovea to a transverse white stripe behind the posterior median eyes ; a white median stripe from the fovea passing through the transverse stripe ending behind the anterior median eyes ; on each side a dark fuscous stripe passing obliquely between the posterior median and lateral eyes intersecting between the anterior median eyes, forming an angle of about 100°, and continued as a less distinct stripe to just before the edge of the clypeus. Two spines on each side of the fovea directed inwardly ; two long paired spines in the middle of each lateral stripe, the larger of which is prone and directed forwards ; a similar spine at the junction of the transverse and median stripes ; two short spines behind the anterior median eyes ; clypeus with 4 inwardly directed spines along the margin, a 5th in the median line a little below the middle of the clypeus directed backwards between the anterior median eyes.

Abdomen above mottled white with a pair of sinuous grey stripes converging posteriorly, a double row of paired spines on each side down its entire length ; some blackish streaks at the sides, ventral surface dirty white with a broad median fuscous band in its entire length.

Eyes.—Anterior row slightly recurved, medians a little closer to each other than to the laterals ; posterior row recurved, medians a little closer to each other than to the laterals, and larger than the anterior medians, laterals smaller than the anterior laterals ; median quadrangle wider than long and considerably wider behind than in front ; clypeus equal to about twice the diameter of an anterior lateral eye.

Legs.—All femora spotted, the anterior much more than the posterior ones.

Measurements.—Length of carapace, 1·5 mm. Total length, 4·7 mm.

This species can be recognised by the distinct cross formed by the intersection of the two fuscous stripes on the carapace.

Gen. Pherecydes, Cambr.

Pherecydes zebra, n. sp.

1 ♀ (B 5899). Ongandjera.

Colour.—Carapace chocolate-brown, a narrow white marginal band posteriorly, a median horseshoe-shaped yellow marking posteriorly, the arms extending to the posterior eye tubercles and enclosing a yellowish area marked with symmetrical brown spots ; a white patch between the median eyes and on the front of the clypeus ; posterior and anterior median eyes on each side situated on an ill-defined outwardly curved (()) brown stripe ; lateral tubercles grey. The whole thickly covered with small spines, some fewer larger spines ; 4 large spines on the transverse portion of horseshoe marking.

Sternum black, coxae white, legs deep brown banded with white below or mottled grey above ; tarsus of palp white. Abdomen above mottled grey, a lighter median dumbbell-shaped area ending in a point above the spinners ; sides black, ventral surface with a broad black median band, a narrower white stripe on each side.

Carapace raised abruptly and almost vertically posteriorly, then almost horizontal as far as the anterior lateral eyes.

Eyes.—Anterior row a little more recurved than posterior row, median eyes a very little larger than posterior medians. Posterior tubercle facing postero-laterally much larger than anterior tubercle facing antero-laterally ; posterior laterals smaller than anterior lateral eyes ; median quadrangle considerably wider than long, a little wider behind than in front. Clypeus concave, sloping, a little less than the distance between the anterior median eyes.

Legs.—Tibia I with 3 inferior, metatarsus with 5 anterior, 1 inferior, spines ; tibia II with 1–2 inferior, metatarsus with 3 anterior, 1 inferior, spines. Abdomen bluntly polygonal, a little longer than wide, a small sharp tubercle above the spinners.

Vulva.—As in fig. 22.

Measurements.—Length of carapace, 2·5 mm. Total length, 6·1 mm.

Gen. Thomisus, Walck.

Thomisus caffer, Simon.

1 ♀ (B 6139). Kunene River.

The colouring and form of the vulva agree with Lessert's description and figure, Rev. Suisse de Zool., 1923, vol. 30, p. 171, fig. 16. The height of the clypeus is a little more than the distance between the anterior median eyes.

Gen. Runcinia, Simon.

Runcinia cataracta, n. sp.

2 ♀♀ (B 6149). Kunene River.

Colour.—Carapace yellow, except a narrow white margin, two lateral light brown bands not bordering the margins, and a narrow white stripe reaching from the posterior eyes to a posterior transverse strongly recurved white stripe; legs yellow, anterior ones with a narrow dorsal white stripe from coxa to end of tibia; abdomen above white, with an indistinct fuscous median band and lateral fuscous bands; a pair of short black longitudinal bars about the middle, 2 pairs of transverse slightly curved black bars a little in front of the spinners, the posterior a little longer than the anterior pair; ventral surface uniform white.

Eyes.—Anterior row recurved, medians about 3 times their diameter apart, equally or a little more distant from the laterals; posterior row less recurved than the anterior row, the medians a little further from each other than from the laterals and smaller than the anterior medians; posterior medians about $1\frac{1}{2}$ diameters from the carinate dorsal margin of carapace; the blunt tubercle between the lateral eyes provided with 3 spines. Anterior margin of clypeus with a curved row of 7 spines, a stouter spine at the lateral angles of the clypeus.

Legs.—Anterior tibiae with 3·3 or 4·4, metatarsi with 5·5 or 6·6 inferior spines. Femur I anteriorly with 3 weak widely separated spines in its proximal half.

Vulva.—As in fig. 23.

Measurements.—Length of carapace, 2·1 mm. Total length, 6·4 mm.

Gen. Xysticus, C. Koch.

Xysticus sagittifer, n. sp.

1 ♀ (B 6274). Namakunde.

Colour.—Carapace marbled brown and yellow, with a narrow brown margin except posteriorly; a dark brown spot behind the posterior lateral eyes; cephalic portion defined by two dark brown lines converging posteriorly and enclosing in its posterior apex a whitish arrow-head marking, the barbs directed obliquely antero-laterally; the shaft of the arrow formed by two median dark brown lines diverging between the posterior median eyes, parallel posteriorly, reaching to about $\frac{2}{3}$ of the arrow-head marking; clypeus yellow, mandibles yellowish brown with a lateral brown basal stripe. Anterior legs above brown, tarsi and metatarsi yellowish brown; below femora and patellae yellowish with some brown spots, remaining segments as on dorsal surface, except tibiae which are mottled with a yellowish proximal stripe diminishing distally; posterior legs white, apices of femora above, patellae above, tibiae laterally, with brown markings. Abdomen without markings, except some mixed white and blackish spots antero-laterally on the dorsum, and similar ones ventrally below the epigastric fold. The blackish spots on dorsal surface each provided with a spine in its centre which is a little longer and stouter than the surrounding spines which cover the whole dorsal area.

Eyes.—Median quadrangle considerably wider than long, a little narrower in front than behind. Clypeus about $2\frac{1}{2}$ times the diameter of an anterior lateral eye.

Legs.—Anterior metatarsi with 4·4 inferior, 1·1 superior and apical, 2·2 or 3·3 lateral spines; anterior tibiae with 4·4 inferior spines.

Vulva.—As in fig. 24. The shape is indistinct and below the area figured is very ill-defined, but seems to be transversely corrugated.

Measurements.—Length of carapace, 3·4 mm. Total length, 7·4 mm.

Gen. Philodromus, Walck.

Philodromus otjimbumbe, n. sp.

1 ♀ (B 6359). Otjimbumbe, Kunene River.

Colour.—Carapace light yellow, with foveal radiations and margin white, legs and sternum light yellow; abdomen white, with a light grey median stripe above and below not reaching the spinners.

Eyes.—Anterior medians more than twice as far apart as is a median from a lateral eye; median quadrangle about $\frac{1}{3}$ wider than long, and wider behind than in front; distance between posterior and anterior medians a little less than the distance between posterior and anterior laterals; clypeus less than the length of median quadrangle.

Chelicera.—Superior border with 1 apical tooth, and a curved fringe of spiniform hairs.

Legs II, I, III, IV; femur I with 2 superior and 1 anterior, femur II with 2 superior spines. Tibia I with 3 inferior pairs (the apical pair small) and 2 lateral pairs of spines; tibia II with 2 inferior pairs and 1 apical lateral pair; metatarsus 1 with 2 large and 2 small inferior pairs and 2 lateral pairs; metatarsus II with 4 inferior spines and 3 lateral pairs, the apical pair small. Tarsus I with 3, tarsus II with 2 small inferior pairs of spines.

Vulva.—As in fig. 25.

Measurements.—Length of carapace, 1·5 mm. Total length, 4·8 mm.

Gen. Hirrius, Simon.

Hirrius bidentatus, n. sp.

2 ♀♀, 4 ♂♂ (B 6182), 2 ♂♂ (B 6102). Kunene River.

♀ *Colour.*—Carapace dark brown, a broad median roughly parallel yellow stripe about equal in width to the distance between the posterior lateral eyes; two light brown or reddish stripes passing through the posterior median eyes, diminishing and converging posteriorly, merging anteriorly with the clypeus, which is a lighter brown than the rest of the carapace; sternum brown, coxae yellow, their apical thirds dark brown; legs below dark brown, except the bases of the femora which are yellow; legs above yellowish with brown infuscations on the distal and proximal portions of the femora, patellae with a brown basal stripe diminishing distally, tibiae with two brown spots more distinct on posterior than on anterior legs, tarsi and metatarsi brown; abdomen above dark brown, a black diamond-shaped marking anteriorly, with or without some chevron markings posteriorly, sides blackish brown, ventral surface mottled brown.

Eyes.—Anterior medians a very little smaller than anterior laterals and more than twice as far from each other as from them; a posterior median about the same distance from its lateral as from an anterior median on the same side; median quadrangle about as long as wide,

and wider behind than in front; clypeus about 1½ times the length of median quadrangle.

Chelicera.—Superior margin oblique provided a little below the apex with a stout, conical, almost vertical tooth, followed by a much weaker tooth just below it.

Legs II, IV, III, I.

Vulva.—As in fig. 26.

Measurements.—Legs: I, 10·6 mm.; II, 13·5 mm.; III, 10·8 mm.; IV, 11·5 mm. Length of carapace, 3·5 mm. Total length, 7·7 mm.

♂ *Colour.*—Median band on carapace, dorsal surface of abdomen except the anterior diamond-shaped marking, clothed with dirty-white and some reddish hairs; otherwise deep black giving the whole body a much darker appearance than in the ♀; some white hairs dorsally on the metatarsi, legs otherwise black.

Legs much longer than in the ♀; IV, II, III, I. Femora strongly spined.

Pedipalp.—As in fig. 65.

Measurements.—Legs: I, 11·9 mm.; II, 13·2 mm.; III, 12·1 mm.; IV, 13·7 mm. Length of carapace, 3·35 mm. Total length, 6·1 mm.

Hirrius arenaceus, n. sp.

2 ♀♀, 1 ♂ (B 5914). Sandup.

♀ *Colour.*—Carapace brown, a broad median band and narrow wavy marginal band yellow; two fairly broad brown stripes from behind, the posterior median eyes converging posteriorly and not reaching the fovea; a whitish transverse band separating the anterior and posterior rows of eyes, edge of clypeus with a roughly triangular whitish marking, sternum and coxae yellow, labium infuscated at its base, abdomen above covered with stout white squamous hairs plumose at their bases (see fig. 67A, Simon, Hist. Nat. des Araign, vol. i, p. 42), amongst these some smaller patches of brown ones; a number of large white-tipped spines, each spine situated in a patch of brown or yellowish hairs; abdomen when dry has a cinereous appearance, in spirit there appears two rows of fuscous oblique markings in the posterior ½ which enclose between them a dirty-white leaf-shaped marking; sides dotted with small brown patches, below white. Legs variegated.

Eyes.—Anterior medians about 1½ times their diameter apart and less than their diameter from the laterals which they equal in size; a line touching the superior borders of the medians would not touch

the laterals; posterior row very slightly recurved, the medians considerably smaller than the laterals and a little nearer to them than to each other; median quadrangle longer than broad, but not a third longer, and broader behind than in front.

Chelicera with 2 teeth on the superior margin a short distance from each other.

Legs IV, II, III, I. Anterior tibiae with 3 inferior pairs of spines, the apical pair smaller than the others, and 1 lateral pair; anterior metatarsi with 2 inferior pairs of spines.

Vulva.—As in figs. 27 and 28.

Measurements.—Legs: I, 10·7 mm.; II, 11·3 mm.; III, 11 mm.; IV, 11·6 mm. Carapace, 2·9 mm. Total length, 6·9 mm.

♂ *Colour.*—Carapace brown with irregular yellow margin, two yellow stripes from between the median and lateral eyes of the posterior row converging posteriorly and joining the marginal band. Abdomen above cinereous, a black diamond-shaped marking occupying its anterior half bordered by some white hairs; below dirty white. Legs variegated, femora below with a narrow white stripe diminishing distally.

Legs IV, II, III, I; very long and strongly spined.

Pedipalp.—As in fig. 66.

Measurements.—Legs: I, 14·2 mm.; II, 16 mm.; III, 15·4 mm.; IV, 16·8 mm. Total length, 4·6 mm.

This species shows a fair amount of variation, some specimens being more deeply coloured than others; the brown stripes behind the posterior median eyes may be fused to form a broad almost parallel band; in other specimens the abdomen is almost without markings; the vulva shows several degrees of variation from a form shown in fig. 27 to that seen in fig. 28. The male organ is on the other hand very constant.

Gen. Tibellus, Simon.

Tibellus vossioni, Simon, var. ?.

1 ♂ (B 6151). Kunene River.

This specimen agrees in the form of the palp with the figure given by Lessert, Rev. Suisse de Zool., 1919, vol. xxvii, p. 164, for *Tibellus vossioni* var. *minor*. The tibia is, however, a little longer than that figured for his variety. I have therefore placed this specimen as belonging to the above species, though Simon's description and figure have unfortunately not been seen.

Family CLUBIONIDAE.

Gen. Selenops, Latr.

Selenops radiatus, Latr.

1 ♀ (B 6221). Ongandjera.
1 ♀ (B 6184). Kunene River.
1 ♀ (B 6271). Namakunde.
1 ♀ (B 6187). Oncka.

Gen. Olios, Walck.

Olios furcatus, n. sp.

1 juvenile (B 5789). Namutoni.
1 ♀ (B 6625). Kunene River.
1 ♀ (B 6262). Namutoni.
2 ♀♀ (B 5909). Sandup.

♀ *Colour.*—Carapace and legs yellowish brown, mandibles reddish brown, abdomen above testaceous with short stripes and spots of brown hair at the sides, a narrow median brown stripe from colulus to anterior apex bifid just anteriorly to the middle; below uniform testaceous.

Chelicera.—Superior margin with 2 teeth, the apical larger than the basal; inferior margin with 3 teeth, the basal 1 bituberculate, much smaller than the other 2, which are subequal.

Eyes.—Anterior row recurved, medians considerably larger than the laterals, a little less than their own diameter apart and much nearer to the laterals; posterior row straight to very slightly procurved, the medians much smaller than anterior medians and about as far from the laterals as from each other; posterior laterals subequal to anterior laterals; median quadrangle as long as wide and as wide in front as behind (or a very little wider behind).

Length of carapace equal to metatarsus I, and to tibia $+\frac{2}{5}$ patella IV; width (greatest width between legs II and III) subequal to tibia I measured above.

Legs.—All tibiae with 2 inferior pairs of long spines, all metatarsi with 2 inferior pairs of spines in basal $\frac{1}{2}$, tibia IV with 2 lateral pairs of spines in addition, metatarsus IV with 3 lateral pairs of spines in addition.

Vulva.—As in fig. 29.

Measurements.—Length of carapace, 6·2 mm.; breadth, 5·1 mm. Total length, 18 mm.

♂ *Colour.*—Carapace reddish brown, abdomen tawny with some dark brown hairs; legs brown proximally, distally coloured as in carapace.

Chelicera.—As in ♀.

Eyes.—As in ♀; clypeus about equal to diameter of an anterior median eye.

Length of carapace equal to tibia II measured above, and to tibia+about $\frac{1}{6}$ metatarsus IV.

Legs II, IV, I, III; all tibiae and metatarsi with 2 pairs of inferior spines; tibia I with 2 posterior lateral spines; III with 2 or 1 anterior, 2, 1, or 0 posterior lateral spines; IV with 2 lateral pairs of spines; metatarsus III with 1 pair, IV with 3 pairs of lateral spines.

Pedipalp.—As in fig. 68.

Measurements.—Length of carapace, 9·3 mm. Total length, 21 mm.

This species approaches *S. croceiceps*, Pocock, in the shape of the vulva, in spination, and in coloration, but differs from it in the disposition of the eyes and proportions.

Olios tuckeri, n. sp.

1 ♂ (B 7124). Kunene River.

Colour.—Carapace, sternum, and legs below yellow, abdomen below uniformly yellow, abdomen above and legs above with brownish hairs.

Eyes.—Anterior row slightly recurved, the medians $1\frac{1}{2}$ times the size of the laterals, less than their own diameter apart and subcontiguous to the laterals; posterior row slightly procurved, the medians a little further from each other than from the laterals, which they equal in size; median quadrangle as long as wide and as wide in front as behind; clypeus less than the diameter of an anterior median eye.

Length of carapace about equal to tibia III.

Chelicera.—Inferior margin with 2 large well-separated teeth followed shortly by 2 much smaller ones; superior margin with 2 teeth, the basal one the smaller.

Legs very long, II, IV, I, III; spination as follows: all femora above with 3, 2, 3 spines, all patellae with a lateral pair; all tibiae with 2 inferior, 2 lateral pairs, and 1 superior subapical spine; tibia I with a basal superior spine in addition; all metatarsi with 2 inferior pairs, I and II with 2, III and IV with 3 lateral pairs.

Pedipalp.—As in fig. 67.

Measurements.—Length of carapace, 4·2 mm.; breadth, 3·8 mm. Total length, 10 mm.

Gen. Micrommata, Latr.

Micrommata ovambica, n. sp.

1 ♀ (B 6752). Mafa.

Colour.—Carapace yellow, a brown stripe along but not bordering the sides and not meeting posteriorly, a black spot opposite each coxa of the legs and palp; ocular area darkened; a broad median brown stripe from the posterior median eyes but not reaching the posterior border; abdomen above with a very clearly defined median lanceolate reddish-brown stripe from anterior apex tapering towards the colulus, indistinct brown markings at the sides; below yellow with a narrow brown median stripe just below the vulva, not reaching the spinners; legs brown, reddish brown distally, sternum with an indistinct spot at the sides opposite legs I, II, and III.

Chelicera.—Inferior margin with 2 large teeth followed by a much smaller basal tooth.

Eyes.—Anterior row recurved, laterals about twice the size of the medians, which are about $\frac{3}{4}$ their own diameter apart and less than their radius from the laterals; posterior row procurved, wider than the anterior row, medians equal to the laterals and a little nearer to them than to each other; median quadrangle longer than wide and much wider behind than in front.

Length of carapace equal to tibia+about $\frac{2}{5}$ patella IV, a little less than metatarsus+tarsus III.

Legs.—I missing; tibiae II, III, IV with 3 inferior and 2 lateral pairs of spines, metatarsi II, III, IV with 2 inferior pairs; III with 1, IV with 3 lateral pairs in addition.

Vulva.—As in fig. 30.

Measurements.—Length of carapace, 5·7 mm. Total length, 17·2 mm.

Gen. Chiracanthium, C. Koch.

Chiracanthium inornatum, n. sp.

1 ♀, 3 ♂♂ (B 6116). Ongandjera.

1 ♂, 1 ♀ (B 6156). Kunene River.

♀ *Colour.*—Carapace yellow, ocular area darkened, mandibles

blackish brown, abdomen uniform light yellow without markings, legs a little darker.

Eyes.—Anterior row straight to slightly recurved, the medians larger than the laterals, a little more than their own diameter apart and further from the laterals than from each other; posterior row procurved, medians larger than the laterals, about twice their own diameter apart and a little further from the laterals, which are smaller than the anterior laterals; median quadrangle wider than long, and wider behind than in front; clypeus about equal to radius, of an anterior median eye.

Length of carapace subequal to metatarsus I, about equal to tibia I, subequal to patella+tibia IV.

Legs.—Femora with 2 anterior apical spines, except IV which has 0, III sometimes with 3; tibia I with 2 medians inferior, III with 2 apical lateral, remainder with 0 spines; all metatarsi with an inferior basal pair of spines, IV with an inferior submedian spine in addition, III and IV with basal and median lateral pairs in addition and an apical verticillus of 5 spines.

Vulva.—As in figs. 31 and 32, the two horseshoe-shaped sections of the vulva are slightly separated, lightly concave, and rimmed at the edges.

Measurements.—Length of carapace, 3·7 mm. Total length, 11 mm.

The shape of the vulva is somewhat variable, two forms being distinguishable.

♂ *Eyes and Colouring.*—As in ♀. Length of carapace equal to a little more than $\frac{1}{2}$ ($\frac{5}{9}$) metatarsus I, and a little more than patella +tibia III.

Legs.—I considerably longer than the rest; femora I, II, IV with 2 anterior spines, those of II much stouter than the rest; III with two irregular rows of 6–10 spines, tibia I with 15–18 irregular spines inferiorly; metatarsus IV with a row of 15 spines inferiorly, 2 lateral pairs in addition and a verticillus of 5 spines.

Pedipalp.—As in fig. 69.

Measurements.—Length of carapace, 3·6 mm. Total length, 8·5 mm.

Chiracanthium castum, n. sp.

1 ♂ (B 6279). Namakunde.

Colour.—Carapace yellow, abdomen uniform fulvous, legs yellow, darker at their extremities.

Chelicera.—With 4 small teeth, the apical 2 smaller than the basal 2.

Eyes.—Seen from in front, anterior row straight, equally spaced by about the diameter of a median eye; posterior row procurved, the medians about $1\frac{1}{2}$ times their diameter apart, a little more from the laterals; median quadrangle slightly wider than long and slightly wider behind than in front; clypeus $\frac{1}{2}$ the diameter of an anterior median eye.

Length of carapace equal to metatarsus III and to about $\frac{3}{4}$ metatarsus II.

Legs.—Femora I, II, IV with 2 anterior apical spines, femur III with 15–16 in two irregular rows, metatarsus IV with a single inferior row of 20 unequal spines, 2 pairs of lateral spines and an apical verticillus of 5 long spines.

Pedipalp.—As in fig. 70.

Measurements.—Length of carapace, 4·1 mm. Total length, 8 mm.

Family PISAURIDAE.

Gen. Euphrosthenops, Pocock.

Euphrosthenops australis, Simon.

1 ♀ subadult (B 6120). Ongandjera.

Gen. Tetragonophthalma, Karsch.

Tetragonophthalma symmetrica, n. sp.

1 ♀ (B 6228). Ongandjera.

Colour.—Cephalothorax yellow, some blackish spots along the margin, a large, broad, blackish-brown marking not reaching the posterior margin and including the posterior row of eyes anteriorly; a dark line from the anterior lateral eyes to angle of clypeus, a narrow median yellow line extending to between the posterior median eyes anteriorly and bisecting the large median blackish-brown marking into two symmetrical portions. Legs yellowish brown, olive-brown below. Abdomen yellow above with markings as in fig. 74 and some indistinct brownish markings laterally towards the posterior apex; sternum with a blackish marginal spot opposite each coxa.

Eyes.—Anterior medians their own diameter or a little less apart and about $1\frac{1}{2}$ diameters from the anterior laterals, than which they are larger; posterior medians about $1\frac{1}{2}$ times their own diameter apart and further from the laterals; anterior medians twice or a little

less their diameter from posterior medians, than which they are a little smaller ; median quadrangle a little longer than its posterior width, wider behind than in front by the diameter or a very little less of a posterior median eye ; clypeus about 1½ times diameter of an anterior lateral eye.

Legs.—Tibia I subequal to tibia II and a little more than ½ patella III.

Vulva.—As in fig. 33, somewhat indistinct, some indistinct black markings (between the margin of the epigastrum and inferior rim of the vulva) which are not shown.

Measurements.—Length of carapace about 2·7 mm. Total length, 8·7 mm.

Gen. Thalassius, Simon.

Thalassius cataractus, n. sp.

1 ♀ (B 6135). Kunene River.

Colour.—Carapace chocolate-brown, clothed with mixed white and yellow hairs, some red ones in the median line ; a clearly demarcated marginal band of yellow hairs not meeting posteriorly and ending abruptly anteriorly on a line running from below the anterior lateral eye to the lateral angle of the clypeus ; abdomen above chocolate-brown, two indistinct wavy lines of red hairs converging but not meeting towards posterior apex of abdomen ; a lateral band of yellow hairs on each side of the abdomen similar to those of cephalothorax, not meeting anteriorly or posteriorly ; four yellow spots just within each lateral band situated at equal intervals, the posterior one the largest ; abdomen below tawny.

Chelicera.—Superior margin with 2 teeth, 1 large and 1 small, inferior margin with 3 large teeth.

Eyes.—Anterior medians larger than anterior laterals and nearer to them than to each other, posterior medians a little smaller than posterior laterals and nearer to each other than to them ; median quadrangle longer than wide, and equally wide behind as in front ; clypeus 1–1½ times length of median quadrangle.

Length of carapace greater than tibia I and equal to metatarsus + a little less ½ tarsus I ; width about equal to metatarsus III.

Legs IV, I, II, III ; all tibiae with 4, all metatarsi with 3 pairs of inferior spines.

Vulva.—As in fig. 34.

Measurements.—Length of carapace, 7·3 mm. ; breadth, 6·6 mm. Total length, 16 mm.

This species resembles *T. margaritatus*, Pocock in colouring, but differs from it in proportions.

Family LYCOSIDAE.

Gen. Hippasa, Simon.

Hippasa australis, n. sp.

3 ♀♀, 2 subadult ♂♂ (B 6626). Kunene River.

This species is very near to *H. decemnotata*, Simon, Ann. Mus. Civ. Genov., ser. 3, vol. iv, p. 390, recorded from Portuguese Guinea; it agrees with Simon's description in all except a few details. Without seeing the type I have preferred not to identify it as *H. decemnotata*, the distance between the habitats of the two species making it more likely that *H. australis* would be a southern and slightly different representative of Simon's tropical species. If identical, the species can be united.

Colour.—In this species the line of white hairs above the anterior row of eyes (as described in the case of *H. decemnotata*) is absent; abdomen below cinereous, not uniform but with a pair of narrow fuscous median stripes below the vulva which converge posteriorly, not reaching the spinners, basal joint of superior spinners with an apical annulation of white hairs.

Eyes.—Anterior row straight to slightly procurved, medians larger than the laterals, less than their radius apart and nearer to the laterals; medians about their own diameter from posterior medians, which are their own diameter or a little less apart; dorsal quadrangle wider behind than in front by about twice the diameter of a posterior lateral eye, its length about equal to its anterior width.

Length of carapace a very little more than $\frac{3}{4}$ metatarsus IV, equal to metatarsus+about $\frac{2}{3}$ tarsus I.

Legs.—Yellow-brown with fuscous bands successively darker posteriorly, tarsi uniform.

Vulva.—As in fig. 35, covered with long white hairs directed posteriorly.

Measurements.—Length of carapace, 4·7 mm. Total length, 12·2 mm.

Gen. Ocyale, Aud.

Ocyale maculata, Koch.

1 ♀ (B 6629). Ongandjera.

This specimen being an undeveloped female, it is impossible to

say with certainty to which species it belongs; as it agrees in other respects with the above species, I have placed it provisionally under this heading.

Gen. Lycosa, Latr.

Lycosa kalaharensis, Simon.

3 subadult ♀♀ (B 6163). Kunene River.
2 ♀♀ (B 5911). Sandup.
1 ♀ (B 6196). Kunene River.

This species agrees closely with Simon's description as regards colour, the spination of the legs, and in having the apical tooth of the inferior margin of the chelicerae smaller than the two others. The vulva is smaller than, though formed on the same plan as that of *L. mafensis* (fig. 37), with the hood terminating the septum anteriorly, less curved in the centre, almost straight.

Lycosa o'neilli, Purcell.

3 ♀♀ (B 6289). Namutoni.
2 ♀♀ (B 5887). Mafa.

I can see no difference between Purcell's species and the S.W. African specimens in the form of the vulva. The line formed by the lower margins of the anterior eyes is slightly recurved, and the posterior is a little wider than the anterior row, but in one of Purcell's specimens this is also the case.

Lycosa mafensis, n. sp.

1 ♀ (B 5882). Mafa.

Colour.—Carapace dirty white at the margins, two broad lateral bands of light brown hair, lighter towards the sides, enclosing between them a roughly lanceolate band of yellowish hairs anteriorly as broad as the distance between the posterior lateral eyes, narrowing but not tapering posteriorly, separated from the posterior margin of the carapace by a patch of blackish brown hair; abdomen above mottled light brown and white, some transverse sinuous dark brown bands in the posterior $\frac{1}{2}$, sides dirty white, below and infero-laterally deep black from sternum to spinners including the latter, black portion sharply demarcated from the white lateral bands, coxae a little lighter than sternum, mouth-parts a little lighter than coxae; mandibles with their basal $\frac{1}{2}$ clothed with mixed yellow and dirty-white hairs; legs reddish brown covered with short white

and some fewer long brown hairs; tibia IV with an inferior apical and basal blackish brown band; III with a less strongly marked apical band.

Chelicera with 3 large equal-sized teeth on inferior margin.

Eyes.—Anterior row decidedly narrower than second row (posterior medians), anterior medians about $\frac{1}{3}$ larger than anterior laterals, about their own radius apart and less from the laterals; posterior medians a little more than their radius apart and as far from the anterior medians as these are from each other; dorsal quadrangle considerably wider than long, its anterior width a little more than its length; clypeus equal to a little less than twice the diameter of an anterior lateral eye.

Length of carapace a little less than tibia+metatarsus I, equal to metatarsus+about $\frac{1}{3}$ tarsus IV.

Legs.—Patella I and II with an anterior spine; III and IV with a posterior spine in addition; legs otherwise spined as in *L. lindneri*, Simon, Ann. Mus. Civ. Genov., ser. 3, vol. iv, p. 391.

Vulva.—As in fig. 36; it is similar to *L. entebbensis*, Lessert, but differs from it in having the anterior row of eyes not wider than the second row but narrower. It is certainly very close to *L. lindneri*, Simon, but differs chiefly in its smaller size and the shape of the vulva. Simon describes the vulvular septum as being "antice abrupte acuminato." It is also near *L. raffrayi*, Simon.

Measurements.—Length of carapace, 7·4 mm. Total length, 14·5 mm.

Lycosa parvivulva, n. sp.

3 ♀♀ (B 6121). Ongandjera.

Colour.—Carapace blackish brown, a broad interrupted dirty-yellow marginal band disappearing just in front of the level of the first leg; a broad similarly coloured median band tapering abruptly posteriorly and including the dorsal ocular area anteriorly; sternum and coxae lightly fuscous, legs irregularly banded, except tarsi and metatarsi which are a uniform light brown; abdomen macerated below, a dark fuscous median lanceolate marking from anterior apex to just before the spinners, a narrow indistinct stripe on each side.

Chelicera with apical tooth of inferior margin the smallest, middle one the largest.

Eyes.—Anterior row a little narrower than second row, slightly procurved, medians about a third larger than laterals and a little nearer to them than to each other; medians about $\frac{1}{2}$ their own

diameter from posterior medians, which are a little more than their own radius apart; dorsal quadrangle wider behind than in front by a little more than diameter of a posterior lateral eye.

Length of carapace equal to metatarsus+about $\frac{3}{5}$ tarsus IV.

Legs IV, I, II, III; stout and comparatively short; spination as in *L. kalaharensis*, Simon, Schultze's Forschungsreise, Bd. iv, p. 212.

Vulva.—As in fig. 37, minute but clearly defined and situated in the middle line of the ventral fuscous stripe.

Measurements.—Length of carapace, 6·6 mm.; length of abdomen about 8·2 mm.

This species is obviously near *L. kalaharensis*, from which it differs in the shape and proportionately small size of the vulva.

Gen. Pardosa, C. Koch.

Pardosa potamophila, n. sp.

4 ♀♀, 2 ♂♂ (B 6136). Kunene River.

♀ *Colour.*—Carapace blackish brown, ocular area blackish, a whitish wavy submarginal band with indistinct radiations towards the fovea; a similarly coloured double median line tapering posteriorly and widening abruptly at the junction of the cephalic and thoracic portions, forming two horseshoe-shaped arms extending to just within and to the level of the posterior lateral eyes; abdomen above blackish brown with some light brown patches and some white ones at the anterior apex; a pair of indistinct white lines formed of irregular white spots roughly parallel anteriorly, but converging slightly posteriorly; below dirty white mixed with light brown hairs towards the spinners and sides; sternum infuscated as in fig. 75; femora with irregular sinuous, tibiae and metatarsi with regular olivaceous bands.

Chelicera.—Inferior margin with 3 strong teeth increasing in size towards the apical one, superior margin with 2, 1 large and 1 small tooth.

Eyes.—Anterior row slightly procurved and distinctly narrower than second row, medians less than their diameter apart and nearer to the laterals than to each other, anterior laterals about twice as far from edge of clypeus as from the posterior medians; posterior medians their own diameter apart and separated from the anterior medians by the diameter of the latter; eyes of second and third row equal in size, the quadrangle formed by them much wider than long, its

posterior width a little more than width of clypeus, its length about equal to its anterior width.

Length of carapace about equal to tibia II.

Legs IV, III, I, II; all patellae with a superior apical and basal spine and a lateral spine at each side, except I where the anterior lateral spine is missing; all tibiae with 3 pairs of inferior spines (the apical pair much the smallest), 2 pairs of lateral, 2 superior spines; all metatarsi with 3 pairs of inferior spines (the apical pair much the smallest), 2 lateral pairs and 1 inferior apical spine.

Vulva.—As in fig. 38.

Measurements.—Length of carapace, 4 mm. Total length, 8·7 mm.

♂ *Colour.*—As in ♀, except that the legs are lighter in colour and less distinctly annulated; sternum nearly wholly black, coxae infuscated, abdomen below blackish, some white hairs at the sides.

Eyes.—As in ♀.

Length of carapace about equal to tibia III.

Legs IV, I, II, III; spination as in ♀.

Pedipalp.—As in fig. 71, the extreme apex of tarsus furnished with 2 small equal-sized spines.

Measurements.—Length of carapace, 3·4 mm. Total length, 7 mm.

This species was found on the banks of the Kunene River lurking under shelving stones in shallow water, when disturbed running rapidly on the surface of the water.

Pardosa oncka, n. sp.

1 ♀ (B 6208). Oncka.

Colour.—Carapace black without marginal or submarginal bands, an ill-defined broad oval median band not reaching the posterior margin and extending to the level of the posterior lateral eyes in front, composed of ashy-grey hairs posteriorly, mixed with some brown and yellow ones anteriorly; abdomen somewhat rubbed, black above and at the sides with two lines of light spots appearing to enclose a lanceolate space, below dirty white sharply demarcated from the sides; sternum and coxae dark brown clothed with white hairs; legs above blackish brown with annulations of white or yellow hairs, except tarsus and metatarsus IV, metatarsus III faintly annulate.

Chelicera.—Inferior margin with 3 teeth, the basal one very small and contiguous with the middle one, which is smaller than the apical one and well separated from it.

Eyes.—Anterior row straight to slightly procurved, the medians about twice the size of the laterals, their own diameter apart and less than a radius from the laterals ; posterior medians about 1½ times their diameter apart, a little larger than the posterior laterals ; dorsal quadrangle not much wider than long, its length a little more than its anterior width, posterior width distinctly less than width of clypeus ; distance between edge of clypeus and an anterior lateral eye more than twice the distance between the latter and a posterior median eye.

Carapace very convex, sloping abruptly at the sides and rear, its length equal to tibia+about ½ patella IV, and to tibia+about ⅔ metatarsus I.

Legs IV, I, II, III.

Vulva.—As in fig. 39. The fossa of the epigynum is filled with a darkened membranous substance of no definite form, only the distinct chitinous outlines of the vulva appear in the figure.

Measurements.—Length of carapace, 3·8 mm. ; length of abdomen, 6 mm.

Pardosa lycosinella, n. sp.

5 ♀♀ (B 6627). Oncka.

2 ♀♀ (B 5895). Mafa.

Colour.—Cephalothorax brown, a moderate blackish-brown dentate marginal band, a broad dentate yellow-brown submarginal band (broader than in *P. lycosina*), a well-defined median lanceolate marking, a little darker than the submarginal band, broadest at the fovea, tapering posteriorly and anteriorly to the level of the posterior lateral eyes where it dilates slightly forming a small circular spot ; abdomen blackish above with paired brownish oblique markings which in the posterior ½ are confluent, forming ∧-shaped markings or transverse bars, below light yellow ; sternum light yellow, 3 small marginal intercoxal dots on each side ; legs olive-brown, indistinctly banded.

Chelicera.—Basal tooth of inferior margin the smallest (in one specimen apical tooth much the smallest), middle and basal teeth subcontiguous.

Eyes.—Anterior eyes straight, medians about twice the size of the laterals, less than their own diameter apart and nearer to the laterals than to each other ; posterior medians more than a diameter apart, about 1½ times the size of posterior laterals, dorsal quadrangle much wider than long, length about equal to anterior width ; distance

between edge of clypeus and an anterior lateral eye more than twice the distance between the latter and a posterior median eye.

Legs IV, I, II, III ; metatarsus distinctly longer than patella+tibia IV, superior claw of tarsus IV with 4–5 teeth.

Vulva.—As in fig. 40.

Measurement.—Total length, 5·6–5·8 mm.

This species is near *P. lycosina*, Purcell, but differs principally in its much smaller size. The labium is much broader than long ; there appear to be fairly wide differences regarding this character among the species of *Pardosa*. Of the specimens I have examined in the collection of the S.A. Museum, *P. clavipalpis*, *leipoldti*, *lycosina*, *crassipalpis* have the labium much broader than long, in *foveolata* and *potamophila* the labium is distinctly broader than long, in *schreineri* and *umtalica*, a little broader than long, while in *manubriata* and *oncka* it is a little longer than broad.

Gen. Evippa, Simon.

Evippa relicta, n. sp.

1 ♀ (B 6128). Ongandjera.
1 ♀ (B 6215). Oncka.
3 ♀♀ (B 5920). Sandup.

Colour.—Carapace blackish brown, a wide dentate yellowish-brown marginal band disappearing anteriorly to the first leg, a dark brown median thoracic band constricted behind the fovea and then widening ; abdomen above covered with mixed yellow-white and brown hairs, two yellow patches at anterior apex followed on each side by a row of about four smaller spots ; sides with some stripes and patches of cinereous hairs, below uniformly cinereous.

Chelicera.—Inferior margin with 2 stout equal-sized teeth.

Eyes.—Anterior row slightly procurved, medians larger than the laterals, a little more than their own diameter apart and separated from the laterals by a little less than the diameter of these ; anterior medians about $1\frac{1}{2}$ times their diameter from posterior medians, which are about $1\frac{1}{2}$ times their own diameter apart ; dorsal quadrangle wider behind than in front, its length a little more than its anterior width ; clypeus with a stout spine in the median line just below the inferior margin of the anterior median eyes, a row of four stout spines below this each corresponding to an eye of the anterior row.

Legs below clothed with flattened white lanceolate hairs ; tibia I with 5 pairs of long stout spines, the apical pair shorter than the rest ;

tarsus IV covered with longitudinal rows of stout brown spines; superior claw with 6 teeth; legs II and III missing.

Vulva.—As in fig. 41.

Measurements.—Length of carapace, 3·8 mm. Total length, 8·3 mm.

The specimens from Oncka and Sandup differ slightly from that from Ongandjera in the form of the vulva, but in other respects they are identical.

Gen. Proevippa, Purcell.

Proevippa ovambica, n. sp.

1 ♂ (B 6363). Ongandjera.

Colour.—Carapace covered with flattened lanceolate hairs, the cephalic portion with a long, broad, nearly parallel median band of dirty-white hairs as broad as and including the dorsal ocular area; some stout spines between the anterior median eyes; thoracic portion with a widened almost circular area of mixed white and yellow hairs, the yellow ones increasing posteriorly, marginal band broad, clothed with mixed white and yellow hairs with some patches of pure white hairs, some submarginal lines and dots, a patch of pure white hairs at the postero-lateral angles of the cephalothorax, a small patch of fiery hairs at the base of the posterior lateral eyes, some scattered ones between the posterior median eyes; sternum and legs below clothed with white hairs, except in femur, patella, and tibia I (patella with a few white hairs at the sides) which are clothed with black hairs; abdomen missing.

Chelicera.—Inferior margin with 2 short, stout, equal-sized teeth, superior margin with 3, the middle one the largest.

Eyes.—Anterior row procurved, the medians larger than the laterals, about $1\frac{1}{2}$ times their own diameter apart and less than their diameter from the laterals; posterior medians more than twice their own diameter apart; dorsal quadrangle wider behind than in front, its length more than its anterior width, posterior laterals smaller than posterior medians; distance between edge of clypeus and an anterior lateral eye a little more than distance between the latter and a posterior median eye.

Legs.—As in *P. lightfooti*, Purcell, the first pair stouter than the others, tibia clothed in its entire length with a comb-like even fringe of black hairs, above and below, the fringe below about twice the height of that above; patella below with a short fringe in the distal $\frac{1}{2}$, above normal.

Pedipalp.—As in fig. 82 from an extero-lateral direction.

Measurement.—Length of carapace about 2·7 mm.

Family OXYOPIDAE.

Gen. Peucetia, Thorell.

Peucetia kunenensis, n. sp.

3 ♀♀, 1 ♂ (B 6233). Kunene River.

♀ *Colour.*—Carapace dirty yellow-green, cephalic portion lightly infuscated, thoracic portion with short foveal radiations not reaching either fovea or margin of cephalothorax, ocular area blackish, clothed with yellow-white hairs; clypeus with a brown stripe at each lateral angle not continued on to the mandible, front of clypeus with a brown stripe from the exterior side of each anterior median eye to just before the edge of clypeus and continuing along the anterior surfaces of the mandibles to $\frac{2}{3}$ of their length; abdomen light green above with a pair of slightly converging white lines enclosing between them a series of 5–6 distinct arrow-head markings, abdomen below with a similar pair of white lines behind the epigastric area without enclosed markings; legs yellow, covered with long spines rising from a basal blackened area.

Eyes.—Quadrangle formed by anterior eyes $2\frac{1}{2}$ times as wide posteriorly as anteriorly, posterior row distinctly procurved, medians larger than the laterals, less than their own diameter apart and nearer to each other than to them; quadrangle formed by posterior medians and anterior laterals not quite as long as its anterior width; clypeus distinctly more than length of ocular area.

Length of carapace equal to tibia IV, equal to about $\frac{3}{4}$ tibia I.

Vulva.—As in fig. 42.

Measurements.—Length of carapace, 6 mm. Total length, 15 mm.

♂ *Colour.*—As in ♀; the markings on the cephalothorax clearer and olive-green in colour, abdomen a brighter green.

Length of carapace equal to tibia III, equal to $\frac{3}{5}$ tibia I.

Pedipalp.—As in fig. 80, *a* and *b*; tibia with a long, stout exterior and interior spine; interior spine a little above exterior spine. Apophysis of bulb, fig. 80, *b*, seen laterally from outer side.

Measurements.—Length of carapace, 4·7 mm. Total length, 11 mm.

This species resembles *P. fasciiventris* in the shape of the vulva, but differs in the eyes and the form of the male palp. It is also near *P. pulchra*, Cambridge, from St. Helena, but differs from it in coloration.

Peucetia crucifer, n. sp.

3 ♀♀ (B 6115). Ongandjera.

1 ♀ (B 6137). Kunene River.

2 ♂♂, 3 ♀♀ (B 5933). Kunene River.

Colour.—Carapace yellowish green with some indistinct fuscous markings, ocular area olive-brown, the eyes surrounded with black; an indistinct stripe on each side of the fovea, 4 spots forming a wide quadrilateral behind the ocular area; mandibles and clypeus without stripes, a group of dots clothed with small weak spines at the lateral angles of the clypeus above the clypeal spot; abdomen coloured as in the preceding species, the two white dorsal lines broader enclosing anteriorly a median dentate lanceolate stripe, darker green than the rest of the abdomen, a transverse bar joining two green spots, one on each side of it, forming a cross marking; below two white lines from the epigastrum at first converging, then roughly parallel to the spinners; legs, especially the two anterior pairs, with 2 inferior rows of short fuscous longitudinal bars whose basal extremities are furnished with a spine or spiniform hair; sternum coloured as in abdomen.

Eyes.—Quadrangle formed by anterior row more than twice (2–2½ times) as wide posteriorly as anteriorly; anterior median eyes more than their diameter apart and a diameter distant from an anterior lateral eye; anterior laterals a little more than 1½ times their diameter apart; quadrangle formed by posterior medians and anterior laterals, with its length about equal to its anterior width; clypeus equal to length of ocular area.

Vulva.—As in fig. 43.

Measurements.—Length of carapace, 5·5 mm. Total length, 14·3 mm.

♂ *Colour.*—As in ♀; anterior legs with bars absent or weak.

Length of carapace equal to tarsus+a little less than ½ metatarsus III.

Pedipalp.—As in fig. 81; tibia with exterior spine, interior spine absent.

Measurements.—Length of carapace, 3·7 mm. Total length, 9·3 mm.

Gen. Oxyopes, Latr.

Oxyopes castanea, n. sp.

1 ♂ (B 6756). Mafa.

2 ♂♂ (B 6213). Namakunde.

Colour.—Carapace chestnut-brown, a wide yellow-brown marginal

band with some dark spots anteriorly near the lateral angles of clypeus, two light brown median longitudinal bands from the posterior portion of marginal band curved slightly outwards () not reaching the eyes ; ocular area black, eyes surrounded with some fiery-red squamous hairs ; cephalothorax covered with squamous lanceolate hairs ; abdomen dark olive-brown above, some cream-coloured squamous hairs at anterior apex ; below light olive-brown, a line of white squamous hairs down each side, epigastric area chitinous ; legs yellowish brown, femora below with a tinge of red ; sternum yellowish brown, sparsely covered with yellow squamous hairs and a few yellow spiniform hairs.

Eyes.—Anterior medians about $1\frac{1}{2}$ times their own diameter apart, anterior laterals about their own diameter apart, and as near to each other as to the posterior laterals or a little nearer to them than to each other ; quadrangle formed by anterior lateral and posterior median eyes parallel and longer than wide ; length of latter $1\frac{1}{2}$ times length of the clypeus.

Pedipalp.—As in fig. 84 ; patella about $\frac{1}{3}$ longer than broad, considerably longer than tibia.

Measurement.—Total length, 4·7 mm.

Oxyopes auriculata, n. sp.

2 ♂♂ (B 5980). Mafa.

2 ♂♂ (B 6207). Oncka.

Colour.—Carapace yellow, a wide hairless marginal border ; internally to this an irregular band of black lanceolate hairs not meeting posteriorly and reaching the ocular area anteriorly, a double median line of red squamous hairs merging behind the fovea, area between the black and red bands covered with white lanceolate hairs ; dorsal ocular area with mixed white and red hairs, anterior ocular area with predominantly white hairs ; mandibles with an anterior basal spot ; abdomen above with some black longitudinal stripes laterally, enclosing a yellowish parallel area in which is situated (at the anterior apex of abdomen) a lanceolate marking covered with red squamous hairs, abdomen below with a parallel blackish median band about as wide as length of coxa III extending from epigastric area to spinners ; sternum with a black marginal dot in line with the upper border of each coxa.

Chelicera.—Superior and inferior margins each provided with a stout triangular equal-sized tooth, inferior margin with a row of 4 inwardly curved hairs at the base of the fang.

Eyes.—Anterior medians about $1\frac{1}{2}$ times their diameter apart, anterior laterals a little more than their own diameter apart; quadrangle formed by anterior lateral and posterior median eyes, a very little wider behind than in front and not much longer than its posterior width; its length 1–$1\frac{1}{2}$ times that of clypeus.

Pedipalp.—Tarsus, as in fig. 85*a*, seen from behind and above; femur with 2 short stout apical spines above, patella with 2, tibia with 3 long stout spines above, below with ear-shaped process (fig. 85*b*).

Measurement.—Total length, 6·4 mm.

One specimen lacks the red colouring of the abdomen and there are no spots on the sternum, the palp is more developed and darker in colour.

Family ATTIDAE.

UNIDENTATI.

Gen. Cyllobelus, Simon.

Cyllobelus chionogaster, Simon.

2 ♀♀, 1 ♂ (B 6632). Kunene River.
1 ♀ (B 6303). Mafa.

Gen. Heliophanus, C. Koch.

Heliophanus decoloratus, n. sp.

3 ♂♂ (B 6174). Kunene River.

Colour.—Carapace coriaceous, cephalic portion fairly densely covered with erect, blackish, spiniform hairs, thoracic portion with far fewer similar hairs, sides more densely and finely coriaceous with a few lanceolate flattened reddish-brown hairs, clypeus with some white squamous hairs; abdomen above black, some indistinct brown markings at anterior apex, covered with irridescent scales, below with some yellowish spiniform hairs; legs blackish brown, tibia and distal joints of I reddish, tarsus and metatarsus III yellow-brown, lighter than corresponding joints of remaining legs.

Chelicera.—Superior margin with 1 large and 1 small tooth, inferior margin with 1 large tooth.

Eyes.—Superior borders of anterior eyes forming a straight to recurved line, median eyes subcontiguous, laterals a little further from medians; posterior median eyes a little nearer to the anterior laterals than to the posterior laterals; quadrangle formed by anterior

laterals and posterior laterals a little wider behind than in front, posterior width not much less than width of carapace ; clypeus less than diameter of an anterior lateral eye.

Legs.—Tibia I with 1 basal and 2 subapical pairs of spines, metatarsus with a submedian and apical pair, all the outer spines much weaker and smaller than inner ones.

Pedipalp (seen from outer side).—As in fig. 83 ; femur with curved process resembling that of *H. orchesta*, Simon, Ann. Soc. Ent. Fr., vol. lxx, p. 54. It differs in the bifurcate process of the tibia, one prong of which is much broader than the other. It also differs in the uniformity of its colouring, having no markings as is the case in *H. orchesta*.

Measurements.—Length of carapace, 3·1 mm. Total length, 6·2 mm.

Gen. Festucula, Simon.

Festucula australis, n. sp.

1 ♀ (B 6112). Kunene River.

Colour.—Cephalothorax narrowly emarginate with black, blackish brown, a light brown median band posteriorly disappearing towards the middle, submarginal band of white hairs, ocular area and behind it clothed with white, remainder with yellowish-brown hairs ; abdomen much rubbed, evidently clothed with golden blackish brown and silvery-white hairs above, below with silvery-white hairs ; sternum black with long white hairs ; legs light brown, proximal portions of femur I lighter, remaining legs yellow.

Carapace.—Thoracic slightly wider than cephalic portion ; slightly indented posteriorly.

Eyes.—Superior margins of anterior row forming a slightly procurved, their centres a recurved, line ; medians much larger than laterals, occupying almost the whole anterior face of cephalothorax, posterior medians small and slightly nearer to the posterior laterals than to the anterior laterals, these subequal ; ocular quadrangle slightly wider behind than in front, the posterior width nearly equal to the width of cephalothorax.

Legs.—I stouter and longer than remaining ones, femur I compressed, clavate, tibia I interiorly with 3 stout subapical spines, the middle one nearer to the proximal than to the distal one, no exterior spines ; metatarsus I much shorter than tibia, a little longer than tarsus I, with two pairs of inferior spines in distal $\frac{1}{2}$.

Vulva.—As in fig. 44 ; an inverted T-shaped median septum

enclosing a rounded fossa on each side, the latter appearing indistinctly dark in spirit; anteriorly covered with white posteriorly directed hairs.

Measurements.—Length of carapace, 2·4 mm.; abdomen, 4·7 mm.

Gen. Menemerus, Simon.

Menemerus lesserti, n. sp.

1 ♀ (B 6758). Kunene River.

Colour.—Carapace with light brown and blackish-brown hairs, marginal band of pure white hairs at the sides but not posteriorly, tapering anteriorly, edge of clypeus with some long white inferiorly directed hairs, anterior eyes ringed with white or red hairs, a spot of white hairs just anterior to fovea and just behind the level of posterior lateral eyes, a short median stripe of white hairs behind the fovea, broadening posteriorly but not reaching posterior margin; abdomen above with a yellowish median dentate band clothed with white, golden, and a few blackish hairs, laterally dark sinuous bands clothed with blackish, golden, and a few white hairs, below yellow with silvery hairs.

Chelicera.—Superior margin with large apical and small basal tooth, inferior margin with 1 moderate sharp tooth; labium considerably longer than wide, parallel, maxillae long, their tips dilated.

Eyes.—Anterior row slightly recurved, medians not touching, a little further from the laterals; posterior medians nearer to the posterior than to the anterior laterals; ocular quadrangle much wider than long, and slightly wider behind than in front, posterior width less than width of cephalothorax.

Legs.—Femur I compressed, clavate; tibia I with 2 extero, 3 interoinferior spines; a fourth lateral spine between middle and apical interoinferior spines; metatarsus I with 2 longer inferior pairs of spines.

Vulva.—As in fig. 45; a rounded quadrilateral with its anterior width less than posterior width, the interior of the quadrilateral is without regular form and has not been drawn.

Measurement.—Total length, 6·5 mm.

Gen. Langona, Simon.

Langona bisecta, n. sp.

1 ♀ (B 6194). Kunene River.

Colour.—Carapace with a large median wedge-shaped area covered with mixed light brown and white hairs, about as wide as ocular

area anteriorly, tapering sharply posteriorly, its posterior apex white ; on each side a dark brown lateral band, broad posteriorly, narrowing abruptly behind posterior lateral eye, including it and posterior median eye, and continuing to behind anterior lateral eye ; a broad submarginal band of white hairs, some red ones between the anterior eyes, ocular area behind anterior eyes with red and black bristles disappearing posteriorly ; abdomen above dark brown, bisected throughout its entire length by a well-defined, parallel, longitudinal white stripe, tapering just before reaching the spinners, sides and ventral portion light yellow, a few brown dots at the sides.

Eyes.—Superior borders of anterior eyes recurved, medians subcontiguous, separated from laterals by less than the radius of these ; ocular area anteriorly as wide as, or a little wider than, posterior width ; posterior medians nearer to posterior laterals than to anterior laterals ; clypeus about equal to the radius of an anterior median eye.

Legs.—Anterior pairs short and stout, banded brown and white, posterior pairs longer and more slender, the femora only banded, tibia I with 3, metatarsus I with 2 pairs of inferior spines.

Vulva.—As in fig. 46.

Measurement.—Total length, 7·1 mm.

Langona ukualuthensis, n. sp.

2 ♀♀ (B 6305). Ukualuthi.

Colour.—Carapace deep brown, much rubbed, a transverse row of reddish bristles behind the anterior eyes ; abdomen deep brown, much rubbed, with some reddish-brown hairs, wrinkled posteriorly, below fulvous covered with dirty-white hairs ; sternum black, covered with long dirty-white hairs.

Eyes.—As in *L. bisecta* ; clypeus more than the radius of an anterior median eye.

Legs.—Tibia I with 3, metatarsus I with 2 pairs of inferior spines ; tibia I longer than metatarsus I, which is a little shorter than tarsus I ; tarsus+metatarsus IV longer than patella+tibia IV.

Vulva.—As in fig. 47.

Measurement.—Total length, 7 mm.

Gen. Neaethea, Simon.

Neaethea quadrimaculatas, n. sp.

1 ♀ (B 6150). Kunene River.

Colour.—Carapace coarsely and densely coriaceous, with a few

blackish spiniform hairs and some lanceolate golden ones; fovea a small rounded depression on a level with the posterior lateral eyes, clypeus with white spiniform hairs anteriorly, its edge bordered with long white spiniform hairs directed inferiorly and covering the proximal $\frac{1}{3}$ of the mandibles; anterior eyes ringed with fiery hairs; abdomen rubbed, above with mixed white and brown cylindrical hairs, anterior apex with a fringe of white hairs, 4 round white dots forming a quadrilateral which is longer than wide, anteriorly to this 3 pit-like depressions forming a triangle, the apex directed anteriorly, below with yellow-brown hairs.

Chelicera.—Inferior margin with a blunt triangular tooth, superior margin with a large apical and small basal one; maxillae bluntly polygonal.

Eyes.—Anterior row recurved, medians subcontiguous, a little further from the laterals; posterior medians considerably nearer to the anterior than to the posterior laterals, a small rounded prominence between and anteriorly to the anterior laterals and posterior medians; ocular quadrangle much wider than long, considerably wider behind than in front, posterior width very nearly equal to greatest width of carapace, which is just behind the posterior lateral eyes.

Legs.—Tibia I with 3 inferior pairs of spines, the middle pair slightly nearer to the apical than to the basal pair; metatarsus I with 1 sub-basal and 1 apical pair of stout spines, all patellae muticous; metatarsus IV with an inferior apical pair of moderate-sized spines, otherwise muticous.

Vulva.—As in fig. 48.

Measurement.—Total length, 6 mm.

Gen. Mogrus, Simon.

Mogrus macrocephalus, n. sp.

1 ♀ (B 6297). Ukualuthi.

Colour.—Carapace blackish brown, shiny, some white hairs on the thoracic portion; abdomen above blackish brown with some brown spots, the hairs rubbed; below white, an oval median blackish brown band not reaching the spinners; sternum black, coxae, trochanters, and proximal $\frac{2}{3}$ of femora reddish brown, remainder blackish brown.

Carapace very high, only a little longer than broad, sloping abruptly posteriorly, ocular area declivous anteriorly; fovea a small reniform pit, its anterior border recurved, a little in front of the posterior lateral eyes.

Chelicera.—Tooth of inferior margin large, triangular, with very broad base, tooth of superior margin smaller, bluntly bituberculate.

Eyes.—Superior borders of anterior eyes slightly recurved, medians not touching and about the diameter of a lateral eye from the latter; posterior median eyes as far from the posterior laterals as from the anterior laterals or a little nearer to the latter; posterior laterals a little smaller than anterior laterals, ocular quadrangle not much wider behind than in front, posterior width a little less than greatest width of cephalothorax; clypeus equal to or a little less than radius of an anterior lateral eye.

Legs.—Tibia I with 3, metatarsus I with 2 pairs of inferior spines; patella+tibia IV longer than tarsus+metatarsus IV.

Vulva.—As in fig. 49.

Measurement.—Total length, 8·5 mm.

Gen. Thyene, Simon.

Thyene damarensis, n. sp.

1 ♀ (B 6759). Oncka.

5 ♀♀ (B 6195). Kunene River.

1 ♀ (B 6100). Kunene River.

Colour.—Carapace brownish yellow, ocular area brown with strongly recurved posterior border, thoracic portion of cephalothorax covered with white hairs, some strong brown markings from posterior border and sides converging and diminishing towards the fovea; ocular area covered with mixed yellow and white hairs; a transverse bar of white hairs just behind the anterior eyes, a tuft of 3–4 black spiniform hairs bent in the middle, exterior to and just behind the posterior median eyes; 3 transverse bars of white hairs on the clypeus, the first at the middle level of the anterior median eyes by which it is interrupted, the second just below them, the third along the edge of the clypeus; long spiniform hairs on clypeus, dorsal ocular area, and behind ocular area; abdomen above with broad, brown, lateral bands cut by 3 posteriorly oblique white lines (the first 2 incomplete) enclosing a fuscous lanceolate patch with an interrupted dark median stripe, some indefinite brown spots at the sides; below dirty yellow, a dark interrupted median stripe, a similar stripe at each side from epigastric area to just before the base of the spinners; sternum with narrow black lateral borders disappearing posteriorly.

Eyes.—Superior borders of anterior eyes forming a straight line, medians separated from the laterals by about the radius of the latter and nearer to each other, posterior medians very small, about equidistant from the anterior and posterior laterals; quadrangle formed by anterior and posterior laterals, wider than long and very slightly wider behind than in front.

Legs.—Tibia I with 3 pairs of inferior spines equally spaced, 2 interior lateral spines, the distal one nearer to the median than to the apical inferior pair, the proximal one on a level with the basal inferior pair; metatarsus I with 2 pairs of stout inferior spines, tarsus I with 0, patellae I and II with a weak lateral interior spine, III and IV with exterior and interior lateral spines.

Vulva.—As in fig. 50.

Measurements.—Length of carapace, 3·6 mm. Total length, 10·4 mm.

Thyene bilineata, n. sp.

3 ♀♀ (B 6146). Kunene River.
2 ♀♀ (B 5938). Kunene River.
1 ♀ (B 6176). Kunene River.
3 ♀♀ (B 6114). Ongandjera.
1 ♀ (B 6760). Oncka.

Colour.—Carapace yellow, ocular area not darker than rest of carapace, a dark band of hair from behind each posterior lateral eye converging posteriorly and dilating suddenly near posterior border of carapace; ocular area with some white hairs, each anterior median eye surrounded by a compact ring of white hairs, long white spiniform hairs on clypeus and around anterior median eyes, a tuft of black bristles exterior to and just in front of posterior median eyes; sternum with a black sinuous border; abdomen above with a pair of dark longitudinal bands enclosing a white lanceolate area finely tapering towards but not reaching the spinners, laterally to each dark band a parallel white band; the two dark bands clothed with dark brown or reddish cylindrical hairs, the white bands with flattened silvery-white hairs; sides with dark spots or broken lines running postero-inferiorly; below a dark median stripe with a stronger lateral stripe at each side, all three not reaching epigastric margin or spinners.

Eyes.—Anterior medians subcontiguous and separated from the laterals by more than the radius of the latter, superior border of anterior eyes forming a recurved line; posterior medians very small

and nearer to the anterior than to the posterior laterals ; quadrangle formed by anterior and posterior lateral eyes, wider behind than in front.

Legs.—Tibia I with an outer row of 3 weak spines, an inner row of 4 strong spines, third spine of inner row (from the base) not in line with the rest, equidistant from 4 and 2, or nearer 4.

Vulva.—As in fig. 51 ; the epigyne is usually wider posteriorly than anteriorly, but may take the form of a rectangle.

Measurements.—Length of carapace, 3·6 mm. Total length, 10·5 mm.

Thyene bilineata var. *striatipes*, n. var.

1 ♀ (B 6146). Kunene River.

Colour.—Carapace yellowish brown, bands of dense blackish hairs behind the posterior lateral eyes converging but not meeting and not reaching the posterior edge of cephalothorax, a tuft of black bristles on a level with the posterior median eyes ; abdomen and sternum as in previous species, the brown bands of the abdomen with wavy light brown hairs.

Eyes.—Anterior medians subcontiguous and separated from the laterals by less than their radius ; posterior medians nearer to anterior laterals than to posterior laterals.

Legs.—Tibia I with an inner row of 4 spines, 3 a little nearer 2 than 4 and not in a straight line with them ; 1, 2, and 4 about equidistant ; outer row of 3 spines much weaker, not equidistant, 2 nearer to 3 than to 1 ; patellae and tibiae above with a longitudinal median and 2 lateral bands of long black hairs ; metatarsi and tarsi with 2 median and 2 lateral bands, the bands less distinct in metatarsi and tarsi.

Vulva is not fully developed, but appears to be very similar to that of *T. bilineata*, except that the quadrilateral opening is more anteriorly placed.

Measurement.—Total length, 8·8 mm.

This specimen differs markedly from *T. bilineata* in having distinct, regular bands of hairs on the legs, in the latter the hairs on the legs are irregularly arranged.

Gen. Hyllus, C. Koch.

Hyllus treleaveni, Peckham.

1 ♀, 1 ♂ (B 6142). Kunene River.

FISSIDENTATI.

Gen. Encymachus, Simon.

Encymachus hesperus, n. sp.

1 ♀ (B 6190). Oncka.

Colour.—Carapace dark blackish brown, median posterior portion lighter, some white and golden hairs on the ocular area; clypeus in front with long white inferiorly directed hairs, some golden ones at the sides, some long brown spines on a line passing between the anterior median eyes; abdomen above with a broad median band of mixed white and golden hairs, broad lateral bands of greenish brown with a few white and golden hairs, below with mixed white and golden brown hairs; legs with long spiniform and some short squamous white hairs.

Carapace with cephalic portion level, behind the eyes slightly then abruptly declivous; fovea short, distinct, situated in a shallow anteriorly recurved depression, some indistinct oblique radiations posteriorly to it.

Chelicera.—Inferior margin with a large bituberculate tooth, the apical tubercle the smaller; superior margin with 2 teeth, the apical one the larger; maxillae roughly polygonal; labium about as long as broad.

Eyes.—Anterior row forming a recurved line, medians subcontiguous, a little further from the laterals; posterior medians about equidistant from the anterior and posterior laterals; ocular quadrangle parallel, about as wide as long, posterior laterals subequal to anterior laterals.

Legs.—Tibia I with 3 equally spaced inferior pairs of spines.

Vulva.—As in fig. 52.

Measurement.—Total length, 7 mm.

Order SOLIFUGAE.

Family SOLPUGIDAE.

Gen. Solpuga.

Solpuga sericea, Pocock.

1 ♀ (B 4996). Tsumeb.

This specimen agrees with the above species in having a narrow yellow band on each side of the darkened median band of the abdomen. That this species occurs in South-West Africa is fairly certain; three

males from Haris taken by R. Tucker and one male sent by W. L. Miller from Windhuk undoubtedly belong to this species. A male specimen taken at Shiliowane, Leydsdorp, and recorded as belonging to this species by Purcell, belongs to *S. celeripes*, Hirst, which is quite distinct from *S. sericea* in the form of the flagellum; the toothless terminal portion of the dorsal jaw in Purcell's specimen is shorter and more curved, the first of the two intermediate teeth is more markedly small than the second, and the third (main) tooth is moderate. The narrow yellow lateral stripe is difficult to see as the abdomen is somewhat shrunken.

Solpuga bechuanica, Hewitt.

3 ♂♂ (B 4987). Etosha Pan.

3 ♂♂, 1 ♀ (B 4986). Etosha Pan.

1 ♂ (B 6388). Andoni.

The shape of the flagellum agrees exactly with Hewitt's drawing, Ann. Transv. Mus., vol. iv, p. 161, text-fig. 23.

♀ without infuscations on headplate or mandibles, dorsal surface of abdomen with two lines of black hairs converging and coalescing in the posterior segments, forming a narrow V-shaped marking; tarsus and distal $\frac{1}{3}$ of metatarsus of palp infuscated, less below than above; leg IV coloured as in ♂, densely clothed with long yellow silky hairs. Dentition as in fig. 88, only one fairly large intermediate tooth as in *S. marshalli*.

Measurements.—Width of headplate, 6·2 mm.; tibia of palp, 6·1 mm.; tarsus+metatarsus of palp, 7 mm.; tibia of leg IV, 6·7 mm.; metatarsus IV, 6·6 mm.; length of trunk about 26 mm.

Gen. Daesia, Karsch.

Daesia ovambica, n. sp.

3 ♂♂ (B 4990). Kunene River.

3 ♂♂, 1 ♀ (B 4991). Kunene River.

1 ♂, 1 ♀ (B 4992). Kunene River.

2 ♂♂ (B 6412). Kunene River.

♂ *Colour.*—Headplate marbled brownish purple except a median oval portion, a small rounded portion laterally to each eye, and the posterior margin which are all lighter, anterior margin with a narrow well-defined purple border; ocular tubercle dark, partly bisected posteriorly by a faint yellow line; mandibles with a medial and lateral longitudinal marbled stripe; abdomen above with a central marking

consisting of a purplish median and two lateral portions in each tergite, the centre of the median portion darker than the rest, the lateral portions coalescing with the median one along the anterior and posterior margins in each segment forming ⌒⌒-shaped anterior and ⌒⌒-shaped posterior margins, especially noticeable in the anterior tergites; the whole central marking clothed mainly at the sides with long silky yellow hairs; sides and ventral portion greyish yellow, sharply demarcated from the central dorsal marking; palp with femur yellow, its distal ½ infuscated, tibia yellow-brown, metatarsus and tarsus a little darker; legs with apex of femur and distal segments of I, apex of femur and proximal part of tibiae II and III, femur and tibia IV infuscated, the rest yellow; malleoli uniformly yellowish white.

Palp.—Femur with an inner row of 3–4 long setae, tibia with an outer and an inner row of 3 setae, metatarsus with a double row of 5 spines, the 3 distal pairs short and stout, the 2 proximal ones slenderer and setiform.

Dentition.—As in fig. 87; flagellum with the inferior margin of the upper portion of the disc passing directly through the rotatory centre, rotated anteriorly the tip of flagellum just reaches the fangtip of the dorsal jaw.

Legs.—Metatarsus II with 2 anterior and 5 posterior spines, including an apical pair; metatarsus III with 3 dorsal, 2 anterior, 3 posterior spines, including an apical pair.

Measurements.—Metatarsus+tarsus of palp, 8·3 mm.; tibia, 7·7 mm. Total length (coxa to tarsus), 24·7 mm.; width of headplate, 5·2 mm.; length, 4·6 mm.; length of trunk, 21·5 mm.

♀ *Colour.*—As in ♂, but much less distinct; in one of the specimens the stripes on the mandibles and central dorsal marking of abdomen barely visible.

Palp.—Femur with an inner row of 4 long setae, tibia with a double row of 3 setae, metatarsus with an inner row of 5 spines, the apical one short and stout, the rest setiform, an outer row of 5, the 2 proximal ones setiform, the rest short and stout.

Dentition.—As in fig. 86; the third dorsal tooth replaced in one specimen by two smaller teeth.

Measurements.—Metatarsus+tarsus of palp, 6·5 mm.; tibia, 5·7 mm. Total length, 18·3 mm.; width of headplate, 6·1 mm.; length, 5·4 mm.; length of trunk, 26·4 mm.

This species resembles *D. kolbei* in the dentition and spination of the palp, and differs chiefly in its coloration and considerably larger size.

Gen. Hemiblossia, Kraep.

Hemiblossia etosha, n. sp.

2 ♀♀ (B 4994). Nomtele.

Colour.—Headplate, mandibles deep uniform blackish purple, abdomen blackish purple except for a median dorsal and ventral greyish-white portion, the dorsal one less than ½ as broad as the darkened lateral marking, the ventral portion broader than the dorsal, both sharply demarcated from the darkened marking; palps uniformly coloured as headplate, the coxae a very little lighter; legs I yellow, the coxae light purple, II yellow throughout, III and IV with femora entirely purple, a little lighter below, especially apically, remaining segments yellow, except dorsal surfaces of tarsi which are faintly purplish in I, in II, III, and IV successively a little darker; malleoli narrowly dark edged.

Dentition.—As in fig. 90; mandibles with feather bristles interiorly, long brown setae above; metatarsus of palp with long brown setae and shorter spines springing from light-coloured spots, tibia with longer setae, especially below; darkened sides of abdomen with longish oval, distinctly raised callosities, darker than the surrounding skin, but with a lighter spot in the centre from which rise blackish-brown setae of moderate length, their tips bifurcate; callosities denser in posterior than in anterior segments.

Legs.—Tarsus IV as in fig. 89, about 2½ times as long as high; there is no visible division of the joint as in *H. o'neili*; 5 lateral spines, the 4 distal ones approximately equidistant, the proximal one a little further from the rest. Claws infuscated purple.

Measurements.—Length of headplate+mandibles, 3·3 mm.; width of headplate, 1·9 mm.; total length, 11·4 mm. Total length of larger specimen, 14·4 mm.

This species can be distinguished from the four described species by its peculiar colouring and the dentition.

Order SCORPIONES.

Family BUTHIDAE.

Gen. Buthus, Leach.

Buthus conspersus, Thorell, *aeratus*, var. n.

1 juv. ♀ (B 6041). Kunene River.

1 ♂, 2 ♀♀ (B 5424). Kunene River.

2 ♂♂ juvs. (B 5425). Kunene River.

2 ♀♀ (B 5421). Kunene River.

Colour.—Juvenile : trunk olivaceous, legs and tail yellow, tinged with reddish brown ; cephalothorax with greenish-black markings on the anterior margin, the anterior ¾ of the lateral margins, the median ocular tubercle and the area surrounding it, the anterior lateral keels, the posterior median and lateral keels (continuations of the abdominal median and lateral keels) ; abdomen above with 5 distinct rows of greenish-black markings, comprising the median and lateral keels and a submarginal lateral marking in each tergite, the latter further from the lateral keels than these are from the median ; in the smaller juvenile all 5 markings are very distinct, in the larger ones much less so, especially the submarginal ones ; in the 7th tergite the median keel broadly, the lateral ones narrowly infuscated. Tail with segments successively more strongly infuscated, especially below, segment V and vesicle reddish brown, all keels darkened (superior keels of I, II, and III only at their posterior apices), segment I with a narrow distinct black line bisecting the concave upper surface, II and III with similar but faint lines ; vesicle with smooth areas reddish brown, granulated areas darker ; pedipalps infuscated, with brown spots on the superior, posterior, and anterior surfaces of their joints (humerus with 4–5 spots superiorly at its base), hand and brachium with reticulate infuscation and stripes, legs except tarsi with reticulate infuscation.

Adult : uniform bronze green, the legs, pedipalps, and upper surfaces of caudal segments more brownish, vesicle with a reddish-brown stripe on each lateral surface.

Armature of cephalothorax and abdomen similar to *B. conspersus* and *B. arenaceus*, lateral abdominal keels of first two tergites weak, represented in I by 2, in II by 4 granules ; sternites not granulated or shagreened, except anterior and lateral surfaces of I, lateral surfaces and a ∩-shaped median area in IV, and the whole of V, which are granular ; II and III with a transverse row of 4 distinct widely separated punctures representing the anterior terminations of the 4 keels in IV and V ; I with punctures in the median line forming a rough ∧. Keels of sternite V very distinct, especially median keels ; these not reaching the anterior border of sternite, lateral keels short, reaching neither posterior nor anterior border of sternite. Sternite IV with distinct lateral granular keels and indistinct median keels consisting of 6–7 small, well-separated granules, III, II, and I with no trace of median keels, III and II with indistinct smooth lateral keels

(those of II barely discernible), I with no trace of lateral keels. In general much resembling the keels of *B. arenaceus*.

This variety differs from *B. conspersus* and *B. arenaceus* chiefly in the form and proportions of the caudal segments which are as follows :—

	B. c. var. *aeratus.*		*B. conspersus.*		*B. arenaceus.*	
	Length.	Width.	Length.	Width.	Length.	Width.
I	4	4·5	3	3	2·5	2·4
II	4·7	4·25	3·25	2·75	2·9	2·1
III	5	4	3·5	2·5	3·1	2
IV	6·1	3·9	4	2·5	3·5	2
V	8·3	3·8	5	2·5	4·8	2

From these measurements it can be seen that in this variety the first segment differs from that of the two other forms in being considerably broader than long, also the width of the caudal segments decreases successively from I to V, while in the other two forms the last three segments are equal in width ; segment V is more than twice the length of I, while in the other two forms it is not quite twice as long ; in the measurements of the cephalothorax it agrees closely with *B. conspersus*, in the proportional length of handback to movable finger it agrees with both *B. conspersus* and *B. arenaceus*, the proportions in the three forms being as follows :—

	B. c. aeratus.	*B. conspersus.*	*B. arenaceus.*
$\frac{\text{Length of handback}}{\text{Length of movable finger}}$	0·4620	0·4616	0·4616

Pectinal Teeth.—Adult ♀♀ 18–?, 18–18, 19–20, ♂ 24–26 ; juvenile ♀ 18–19, ♂♂ 25–26, 26–27.

Movable finger with 13 rows of teeth, consisting of 8–11 teeth, the basal row about twice as long as the others, consisting of 22 teeth.

Measurements.—Adult ♀ : length of carapace, 6·9 mm. ; anterior width, 3·8 mm. ; posterior width, 8·1 mm. ; median eyes from anterior margin, 3 mm. ; from posterior margin, 3·4 mm. ; handback, 3·7 mm. ; movable finger, 8 mm. ; length of vesicle, 8·3 mm. ; width, 3·8 mm. ; length of trunk, 24·8 mm. Total length, 43·6 mm.

Adult ♂ : length of trunk, 19·2 mm. ; total length, 43·6 mm.

This variety has characters in common with both *B. conspersus*

and *B. arenaceus*; it agrees with the former in colour, measurements (excepting caudal segments), and in having the sternites smooth, with the latter in having the same number of pectinal teeth; it differs from both in the greater proportional width of the anterior caudal segments. Since *B. conspersus* is recognised as a distinct species, I believe the above-described form and *B. arenaceus* to be varieties of that species.

Gen. Parabuthus, Pocock.

Parabuthus brevimanus, Thorell.

1 ♀, 1 ♂ (B 5426). Kunene River.

Pectinal Teeth.—29–30 in the ♂, 24–25 in the ♀; the latter with the posterior basal lamella of the scape lobate.

Measurements.—Trunk, 13·3 mm.; total length, 37·3 mm. Trunk, 11·1 mm.; total length, 32·3 mm.

Gen. Uroplectes, Peters.

Uroplectes planimanus, Karsch.

1 ♂ (B 6038).	Kunene River.	Pectinal teeth,	28–28.	
1 ♂ (B 6043).	Namakunde.	,,	,,	24–26.
2 ♂ (B 5423).	Kunene River.	,,	,,	26–27, 28–29.
1 ♂ (B 6045).	Namutoni.	,,	,,	26–29.
2 ♂ (B 6035).	Sandup.	,,	,,	26–26, 26–27.

Uroplectes vittatus, Thorell.

1 ♂ (B 6040). Oncka. Pectinal teeth, 17–17.

Measurements.—Trunk, 13·7 mm.; tail, 24·4 mm.

Uroplectes otjimbinguensis, Karsch.

1 ♀ (B 6042). Kunene River.

Tail, seen from the side, with about $\frac{1}{4}$ of segment III, $\frac{1}{3}$ of IV, and $\frac{1}{2}$ of V, basally infuscated; vesicle with a small dentiform tubercle below aculeus.

Pectinal teeth, 15–15.

Measurements.—Trunk, 18·2 mm.; tail, 21·5 mm.

Uroplectes carinatus, Pocock, var. ?.

1 juv. (B 6044). Otjimbumbe. Pectinal teeth, 23–24.
1 juv. (B 6036). Sandup. ,, ,, 27–28.
1 juv. (B 5431). Kunene River. ,, ,, 29–29.
3 juvs. (B 6039). Kunene River. ,, ,, 20–20, 26–26, 25–27.

Family SCORPIONIDAE.

Subfamily SCORPIONINAE.

Gen. Opisthophthalmus, C. Koch.

Opisthophthalmus carinatus, Peters.

1 ♂ (B 5422). Mafa. Pectinal teeth, 25–26.
1 ♀, 1 ♂ juvs. (B 6037). Sandup. ,, ,, ♀ 17–18, ♂ 26–26.
1 ♂ juv. (B 6051). Tsumeb. ,, ,, 24–25.
Measurements of adult ♂, trunk, 31·6 mm.; tail, 46·3 mm.

Subfamily ISCHNURINAE.

Gen. Hadogenes, Kraep.

Hadogenes sp. ?.

1 ♀ (B 5420). Kunene River. Pectinal teeth, 18–?
1 ♀, 1 ♂ juvs. (B 5428). Kunene River. ,, ,, 17–19, 20–22.

This will probably, on examination of more material, be found to be a new species, the tail being considerably shorter than in any other species. Two of the specimens being juveniles and the adult damaged, I have left them undescribed pending the acquisition of further material from the northern districts of South-West Africa.

EXPLANATION OF PLATES.

PLATE I.

FIG.
1. *Stegodyphus dumicola*, Poc.
2. *Scytodes tertia.*
3. *Prodidomus reticulatus.*
4. *Zelotes ovambensis.*
5. *Upognampa ctenipalpis.*
6. *Asemesthes lineatus*, Purcell.
7. ,, *kunenensis.*
8. ,, *sinister.*
9. *Zelotes demonaica.*
10. *Diores triangulifer*, Simon.
11. *Setaphis quadrativulva.*
12. ,, *omuramba.*
13. *Diaphractus muticus.*
14. *Xerophaeus aridus*, Purcell.

FIG.
15. *Trichothyse subtropica.*
16. *Caphaeris oncka.*
17. ,, *kunenensis.*
18. *Ammoxenus fallopius.*
19. *Latrodectus incertus.*
20. *Paramystaria lata.*
21. *Monoeses quadrituberculatus.*
22. *Pherecydes zebra.*
23. *Runcinia cataracta.*
24. *Xysticus sagittifer.*
25. *Philodromus otjimbumbe.*
26. *Hirrius bidentatus.*
27. ,, *arenaceus.*
28. ,, ,,

PLATE II.

29. *Eusparassus furcatus.*
30. *Micrommata ovambica.*
31. *Chiracanthium inornatum.*
32. ,, ,,
33. *Tetragonophthalma symmetrica.*
34. *Thalassius cataracta.*
35. *Hippasa australis.*
36. *Lycosa mafensis.*
37. ,, *parvivulva.*
38. *Pardosa potamophila.*
39. ,, *oncka.*
40. ,, *lycosinella.*
41. *Evippa relicta.*
42. *Peucetia kunenensis.*
43. *Peucetia crucifer.*
44. *Festucula australis.*
45. *Menemerus lesserti.*
46. *Langona bisecta.*
47. ,, *ukualuthensis.*
48. *Naethea quadrimaculata.*
49. *Mogrus macrocephalus.*
50. *Thyene damarensis.*
51. ,, *bilineata.*
52. *Encymachus hesperus.*
53. *Palpimanus aureus.*
54. *Diaphorocellus albooculatus.*
55. *Platyoides unidentatus.*

PLATE III.

56. *Stegodyphus filimaculatus.*
57. *Scytodes quarta.*
58. *Prodidomus hirsutus.*
59. *Theuma longipes.*
60. *Caphaeris oncka.*
61. *Tetragnatha nitens*, Aud.
62. ,, *andonea.*
63. *Stiphropus scutatus.*
64. *Monoeses quadrituberculatus.*
65. *Hirrius bidentatus.*
66. *Hirrius arenaceus.*
67. *Olios tuckeri.*
68. ,, *furcatus.*
69. *Chiracanthium inornatum.*
70. ,, *castum.*
71. *Pardosa potamophila.*
72. *Scytodes tertia.*
73. ,, *quinqua.*
74. *Tetragonophthalma symmetrica.*
75. *Pardosa potamophila.*

PLATE IV.

FIG.
76. *Tetragnatha andonea.*
77. „ *nitens*, Aud.
78. *Latrodectus incertus.*
79. „ „
80. *Peucetia kunenensis.*
81. „ *crucifer.*
82. *Proevippa ovambica.*
83. *Heliophanus decoloratus.*

FIG.
84. *Oxyopes castanea.*
85. „ *auriculata.*
86. *Daesia ovambica.*
87. „ „
88. *Solpuga bechuanica*, Hewitt.
89. *Hemiblossia etosha.*
90. „ „


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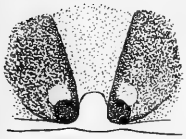
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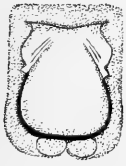
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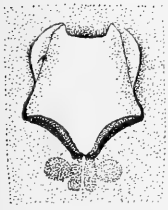
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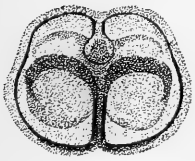
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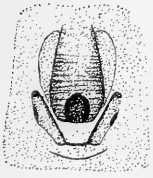
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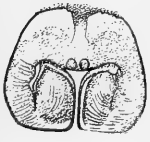
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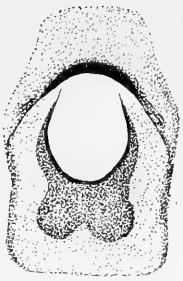
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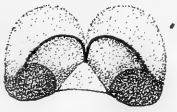
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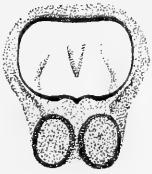
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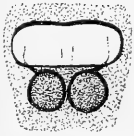
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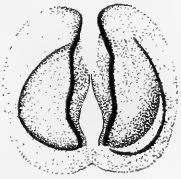
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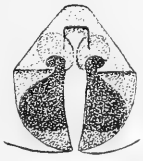
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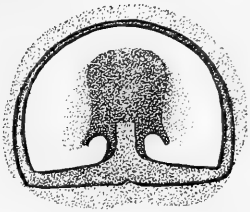
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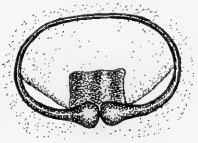
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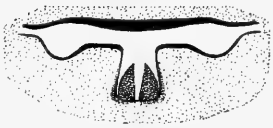
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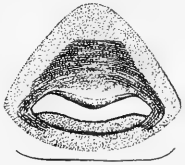
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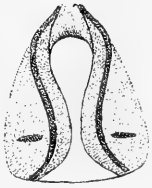
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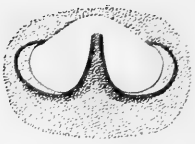
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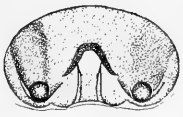

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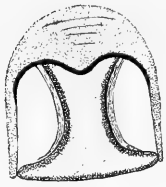

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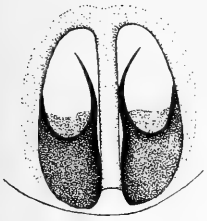

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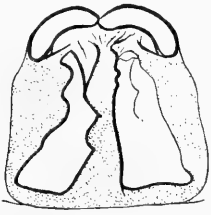

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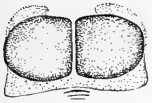

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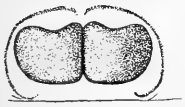

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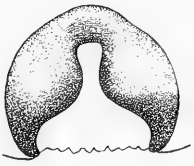

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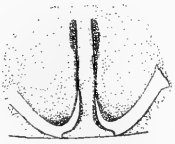

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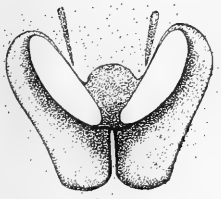

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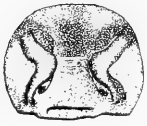

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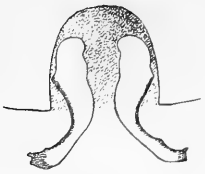

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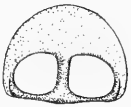

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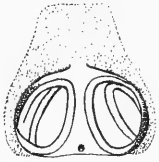

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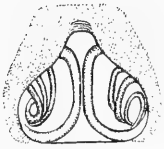

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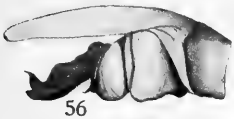
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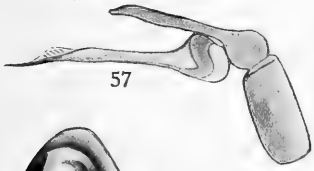
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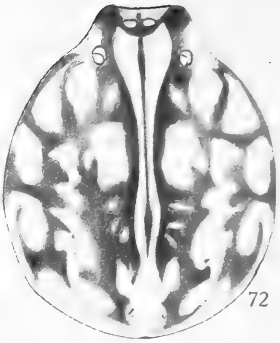
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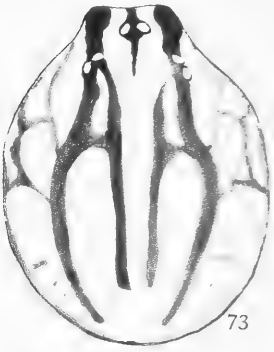
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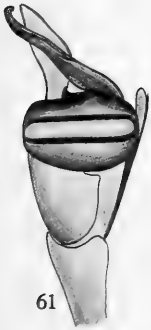
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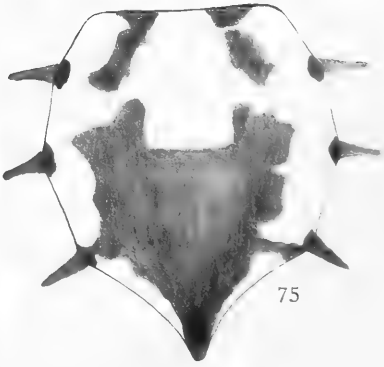
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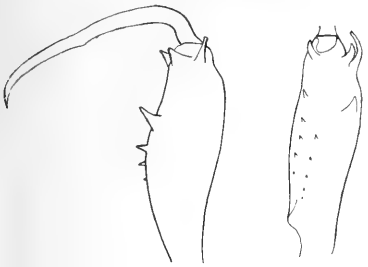

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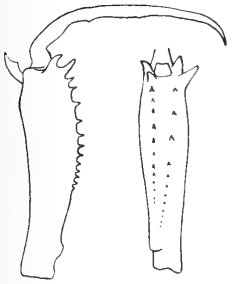

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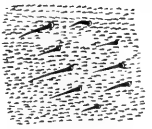

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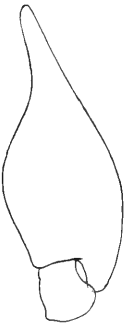

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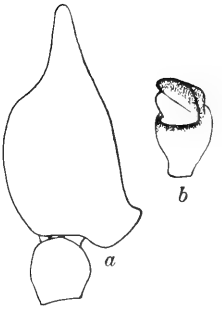

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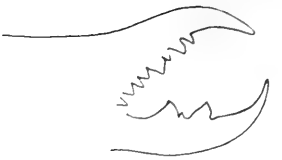

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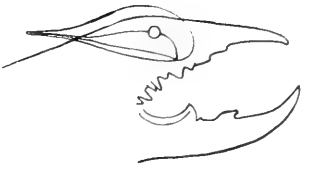

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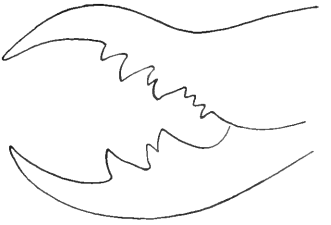

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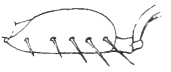

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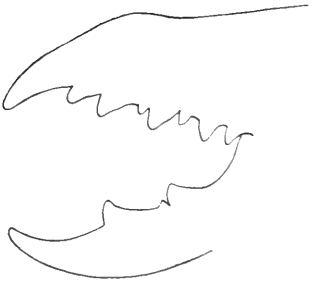

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2. *Reports on the Marine Mollusca in the Collections of the South African Museum.*—By J. R. le B. Tomlin, M.A.

II. Families ABYSSOCHRYSIDAE, OÖCORYTHIDAE, HALIOTIDAE, TONNIDAE.

(With four Text-figures.)

ABYSSOCHRYSIDAE, fam. nov.

This splendid and remarkable mollusc, from a depth of 900 to 1000 fathoms, seems to have a combination of characters which justify one in creating a new family for its reception.

The shell has the form and ornamentation of a Thiarid of the

Fig. 1.—*Abyssochrysos melanioides*, gen. and sp. nov.

Melanioides group, resembling especially some of the varieties of *T. variabilis* (Benson); the operculum much resembles that of *Littorina* and *Thiara*, but is thinner, and has a more central nucleus; there is a smooth, glossy periostracum of a rather pale brownish-golden colour; the radula is taenioglossate in character, but remarkably asymmetrical in the same specimen as regards the rhachidian cusps, which seem to follow no law whatever.

I propose to call it :

Abyssochrysos melanioides, gen. and sp. nov.

Shell elongately turreted, covered with a pale, brownish-golden periostracum ; all the specimens are decollate, number of whorls remaining in the type 13 ; the shell is furnished longitudinally with straight, prominent, distant ribs, and probably spirally grooved throughout, but through the periostracum one only sees about 4 lirae with broader, flat interstices immediately above the suture ; in the type these lirae are unusually indistinct ; the upper part of each whorl, some way below the suture, is encircled by a raised line, which forms rather acute prominences where it crosses the axial ribs ;

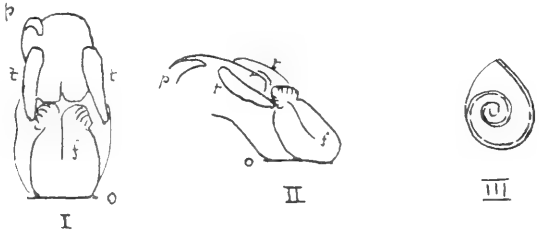


Fig. 2.—*Abyssochrysos melanioides*, I, II, two aspects of anterior portion of animal, enlarged ; *f*, foot ; *p*, penis ; *tt*, tentacles ; *o*, plane of operculum. III, operculum.

all the spiral sculpture varies much in degree ; suture impressed ; the base of the last whorl appears to be rather irregularly spirally grooved throughout ; umbilicus none ; aperture subcircular ; operculum thin, transparent, 4-whorled, less closely coiled than in a *Littorina*, pale reddish-brown in colour.

Long., 41 mm. ; diam. max., 12.

Aperture, long., 9 mm. ; lat., 6·5.

For the following report I am greatly indebted to Lt.-Colonel Peile, and I give it verbatim. The drawings of the animal and of details of radula are also his. I am equally indebted to Mr. A. E. Salisbury for the photograph of the shell with the operculum.

" The animal has well-developed tentacles but no eyes.

" There is a buccal armature consisting of two lateral lobes, each of gnat-wing shape ; they appear to be composed of crowded conical processes, which form also a serrated margin on the working edge of the lobe.

" The radula is taenioglossate, with formula 2.1.1.1.2. That of the

figured specimen has 119 rows (+nascent), and measures 3·5 mm. in length. Three specimens were stained with dahlia and mounted in Canada balsam; they agree as regards one striking peculiarity, namely, the variation in the number of cusps on the rhachidians.

FIG. 3.—*Abyssochrysos melanioides.* South African Museum, No. 139/A5116. Radula: approximate magnification × 250. Four successive rhachidians, lateral and marginals.

This appears to follow no law, the side cusps varying in number from 2 to 4. The arrangement 3.1.3 predominates in the figured specimen with many 2.1.3 and 3.1.2; in one of the other specimens a combination with 4 on one side or the other occurs more frequently.

" Taking two portions of the figured specimen we find :

	3.1.2	2.1.2
	3.1.2	3.1.3
	2.1.3	3.1.3
	2.1.3	2.1.4
	3.1.3	2.1.2
	3.1.3	4.1.3
	4.1.3	3.1.3
?	2.1.3	3.1.4
	3.1.4 ?	2.1.3
	2.1.3	3.1.3
	2.1.2	3.1.4

See fig. 2.

" Where 2 cusps only occur they are broader, and where 4 occur they are narrower than the average size."

Hab., Cape Point, N.E. × E.$\frac{1}{4}$E., 46 miles, 900 to 1000 fathoms, several live specimens (S.A. Mus., No. A5116).

Type in South African Museum.

OÖCORYTHIDAE.

The name of this family should, by its derivation from κόρυς, a helmet, be spelt as given by Fischer,* and not Oöcoritidae as Dall † has written.

It was first made known in 1883 ‡ from the dredgings of the "Talisman" off the Azores, in from 2285 to 5005 metres, and the same species has been dredged by the "Blake" off Guadeloupe, St. Vincent, and Grenada in the West Indies, at depths varying from 573 to 955 fathoms.

Dall (*loc. cit.*) says, "In this singular mollusk we have another instance of the comparatively limited value of the form of the operculum, or even its presence.

"*Tritonium* (*i.e. Cymatium*), *Cassis*, *Dolium* (*i.e. Tonna*), *Oöcorys* are all nearly related, yet the operculum is absent in one group, and in the others assumes most varied forms. By its dentition, its nucleus, and its thickened reflected lip and body callus it approaches *Cassis* more nearly than *Dolium*."

Locard § also gives a very full study of the group, and would be content to include *Oöcorys* as a genus of the Cassididae. It seems better, however, to maintain the Oöcorythidae as a separate family on an equal footing with the Cassididae, Tonnidae, and Cymatiidae.

Two specimens of an *Oöcorys* are amongst the Museum dredgings, both dead shells from 40 miles off Cape Point, 720 to 900 fathoms.

They obviously belong to the same species as the single "Challenger" example, with which I have been able to compare them, and which was dredged in mid-Atlantic a little north of the Equator.

In the "Challenger" Report Boog Watson identified this specimen with *O. sulcata* Fischer, though Fischer himself dissented, and though Watson acknowledges differences in sculpture; these, however, he attributes to greater age and worse condition.

Locard (*loc. cit.*) follows Fischer in discriminating the "Challenger" shell from that of the "Talisman," and proposes to call the former *O. watsoni*, recapitulating the differences which also struck Fischer. I have not seen a specimen of Fischer's *sulcata*, but as far as one can judge by figures and descriptions the discrimination is justified, and the Cape shell may stand as *O. watsoni* Locard.

* Man. Conch., p. 769.
† Bull. Mus. Comp. Zool., Harvard, xviii, p. 228.
‡ Journ. de Conch., xxxi, p. 392.
§ Exp. Sci. Travailleur et Talisman, Moll. I, p. 288.

Dautzenberg and Locard are inclined to surmise that another "Challenger" shell which Watson denominates *Buccinum? aquilarum* should be referred likewise to *Oöcorys*. It may, therefore, be not superfluous to mention that a short time ago I found the unique type of this species—after considerable search in the British Museum collections—included in the family of Cancellariidae.

An examination of the specimen convinces me that Smith was perfectly correct in so assigning it, and that it probably belongs to the genus *Admete*.

HALIOTIDAE.

Haliotis alfredensis Bartsch. U.S. Nat. Mus., Bull. 91, p. 175, pl. xxiv, figs. 7, 8, 28th July 1915.

Hab., The Kowie (the type locality).

Sowerby, in Proc. Malac. Soc., iv, p. 6, recorded what is evidently this species from The Kowie as *H. pertusa* Reeve; and Smith repeated Sowerby's record, *op. cit.*, v, p. 391.

Comparison with the type of *pertusa* Rve. shows that the Kowie shell is much more finely and regularly sculptured, as Bartsch points out, and must be known as *H. alfredensis* Bartsch.

TONNIDAE.

Tonna galea (L.).

Buccinum galea L. Syst. Nat., ed. 10, i, p. 734, 1758.

Hab., Algoa Bay, 29 fathoms, one much broken dead shell, which I refer to this species. It is a common Mediterranean shell, and occurs on the American side of the Atlantic from N. Carolina to Brazil.

Tonna luteostoma (Küster).

Dolium luteostomum Küster. Syst. Conch. Cab. (2), Lief. 158, p. 66, pl. lviii, fig. 2, 1857.

Hab., two dead shells from 34 fathoms off Cove Rock. The Kimberley Museum has three which were trawled off East London.

D. procellarum Euthyme (unfigured),* from "Sainte Elisabeth," is probably the same.

* Bull. Soc. Malac. France, ii, p. 247, December 1885.

EUDOLIUM CROSSEANUM (Monterosato).

Dolium crosseanum Monterosato. Journ. de Conch., xvii, p. 228, pl. xii, fig. 1, July 1869.

Hab., Buffalo River, N. 15 miles, 310 fathoms. One dead, somewhat immature shell only was dredged, measuring 33 mm. by 24 mm., but I do not think there can be any doubt as to its identity.

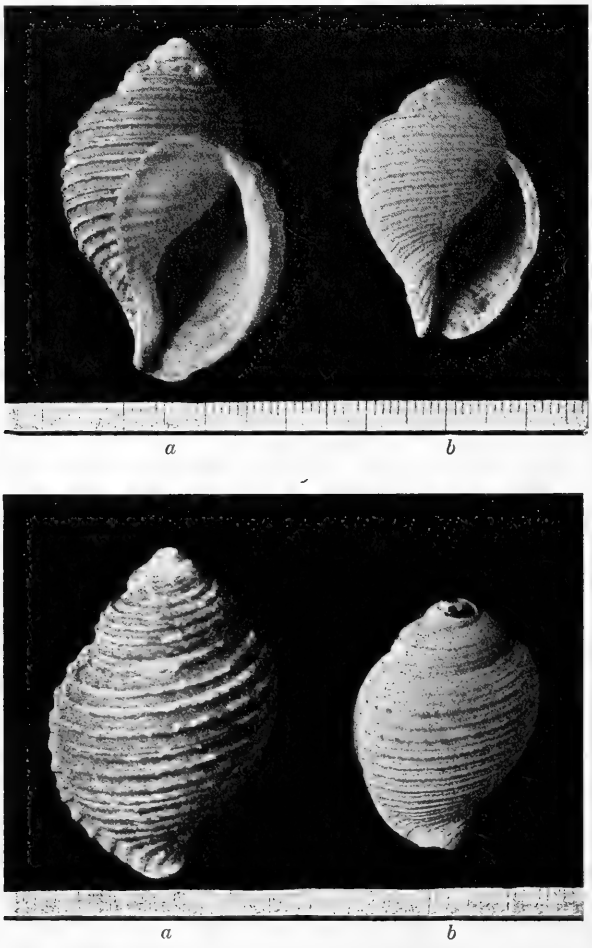


FIG. 4. (a) *Eudolium aulacodes*, n. sp. (b) *Eudolium crosseanum* (Monts.).

The species has an enormous range. It was first taken in deep water off Palermo, has been dredged on the Atlantic coast of the

U.S.A. as far north as Martha's Vineyard in 89 to 234 fathoms, and was taken by the " Blake " at various stations in the West Indies.

The Cape example, of which I give a figure, might almost have been the original of the figure in Bull. Mus. Comp. Zool., Harvard, xviii, pl. xv, fig. 5, but the shell depicted by Dall was 2 mm. longer. Monterosato's Palermo specimen measured 81×56 ; this seems to have been a particularly fine one, and Dall mentions that most of the Antillean shells are smaller though adult.

Eudolium aulacodes,* sp. n.

Shell remarkably solid and heavy, imperforate, pale ochreous in colour ; whorls 5½, sculptured with very strongly raised ridges, of which there are 17 on the body whorl, 6 on the penultimate, and 5 on the antepenultimate—the ridges being very regular and equal in size except that immediately above the suture, which is weak and threadlike ; the ridges are separated by wide interstices, and regularly spaced except two infra-peripheral ones, which are obviously much closer together (this may prove to be an individual peculiarity when further specimens turn up) ; analogously the ridge which I take to be the periphery is deeply furrowed, and this feature can be traced back to the antepenultimate whorl ; the first 2 whorls are more or less decorticate, on the third the interstices are crossed very obliquely by numerous axial threads ; otherwise the interstices are smooth ; canal rather long and broad ; outer lip much thickened and reflected, the ridges of the body whorl forming blunt raised denticles on the outer edge, and marked on the inner margin by faint, shallow channelling ; on body whorl and pillar is an extensive auriform callus which projects over part of the next whorl ; aperture elongate piriform.

Long., 43 mm. ; diam. max., 29 ; length of aperture, 21.

Hab., Cape Point, N.E. 40 miles, 560 to 700 fathoms, one dead but fresh shell (Mus. No. A3529).

Type in South African Museum.

Not unlike *E. verrillii* Dall, but more elongate both in spire and canal, and without canaliculation at the suture.

* αὐλακώδης, " in furrows."

3. *The Fresh-water Entomostraca of the Cape Province (Union of South Africa).*—By G. O. Sars. Part III : Copepoda.

(With Plates V–XVI.)

INTRODUCTION.

In two previous papers I have given an account of the South African species belonging to the orders *Cladocera* and *Ostracoda* as yet examined by me, most of these species having been observed in the living state by breeding from dried mud. I now propose to deal with another order of Entomostraca, viz. the *Copepoda*, which is also well represented in the South African Fauna. Of this order in all twenty-three species have been subjected to a closer examination ; but of these only three have been raised from dried mud, all the others are exclusively derived from gatherings, preserved in alcohol, taken at different times partly in the neighbourhood of Cape Town by the late Dr. Purcell, partly in other localities in the Cape Province. Three new species from South-West Africa are also included.

The species recorded in the present paper belong to the three leading divisions of free-living *Copepoda—Calanoida*, *Cyclopoida*, and *Harpacticoida* ; but of the last-named division only quite solitary specimens of two species have as yet come under my notice, whereas the two other divisions are rather abundantly represented, although the species only belong to one family of each, viz. *Diaptomidae* and *Cyclopidae*. Four of the Diaptomid species here recorded have been previously described by the present author in other Journals, but I have thought it advisable to redescribe these interesting forms, and to give new and more carefully drawn figures of each.

Division CALANOIDA.

Fam. DIAPTOMIDAE.

Gen. LOVENULA, Schmeil.

Syn. : Broteas, Lovén.

Remarks.—This genus was established as early as the year 1845 by Lovén, and was referred by him to the family *Cyclopidae*, this family

being at that time taken in a much wider sense than at present. As, however, the name *Broteas*, given to the genus by Lovén, had proved to be preoccupied by Koch for a genus of Arachnidae, Dr. Schmeil proposed in the year 1898 to change it as above. The genus is apparently allied to *Diaptomus*, from which it, however, differs essentially in the powerfully developed posterior maxillipeds, and in the tail of the female being only composed of 2 segments. From the succeeding genus, which approaches it rather closely, it differs in the general shape of the body, as also somewhat in the structure of the appendages, particularly in that of the maxillae and the posterior maxillipeds. Two nearly allied species of this genus will be described in the sequel, one of them being that originally observed by Lovén, the other having recently been detected by Mr. Barnard in South-West Africa.

1. Lovenula falcifera (Lovén).

(Plate V; Plate VI, figs. 1–5.)

Broteas falcifer, Lovén. Kql. Svenska Vetensk. Acad. Handlinger, 1845, p. 436, pl. vi.

Broteas falcifer, G. O. Sars. Arch. f. Mathem. u. Naturvidenskab, vol. xxi, No. 2, p. 22, pl. iv.

Distinctive Characters.—Length of female reaching to near about 5 mm. Body elongate, with well-marked constrictions between the segments. Front rather contracted. Lateral lobes of last pedigerous segment broadly triangular and conspicuously asymmetrical. Genital segment more protuberant on right side than on left, and much shorter than the anal segment. Anterior antennae about the length of the anterior division of the body. Posterior maxillipeds with the terminal spines very coarse, falciform. Right last leg of male with the distal joint of outer ramus gradually somewhat narrowed, outer-edge spine well developed, apical claw very strong, flexuous; terminal part of left leg imperfectly subdivided, apical lappet and outer-edge spine not far remote from each other, both deflexed.

Description of the Female.—The body (see figs. 1 and 2) is rather robust, though somewhat elongate, with the two chief divisions sharply marked off from each other. The anterior division is almost cylindrical in shape, being scarcely broader in front than behind, and has the segments defined laterally by well-marked constrictions. The foremost segment, constituting the head, attains nearly the length of the 3 succeeding segments combined, and contracts rapidly towards the end, which in the dorsal view of the animal (fig. 1) appears

narrowly rounded. In a lateral aspect (fig. 2) the frontal part of the head is seen to project a little beyond the insertion of the anterior antennae, terminating below in a short protuberance evidently replacing the rostrum in other Calanoida. The protuberance is, however, quite simple, without the slightest trace of any appendages on the obtuse tip. The last pedigerous segment is imperfectly defined from the preceding one, though a slight lateral impression indicates the limit between the 2 segments. It is deeply emarginated in the middle, and projects to each side of the emargination in a broadly triangular lobe pointing obliquely behind. On a closer inspection these lobes are found to be pronouncedly asymmetrical, the left lobe being constantly larger and deeper than the right.

The tail scarcely exceeds half the length of the anterior division, and is more generally turned a little to left side. It is only composed of 2 segments, the 1st of which (the genital segment) is slightly dilated in front of the middle, and, seen from above, somewhat asymmetrical in shape, the right side being conspicuously more protuberant than the left. The 2nd segment is considerably more prolonged than the 1st, and gradually widens somewhat distally, being transversely truncated at the end. It exhibits dorsally, in some distance from the extremity, a short transverse fold or opercle arching over the anal opening. The caudal rami (see fig. 12) are about twice as long as they are broad at the base, and somewhat narrowed distally, being scarcely at all divergent. The marginal setae are present in the usual number, 2 of them being attached to the outer edge, the other 3 to the tip. They are all comparatively short, but rather thick, and densely plumose, those on the outer edge considerably curved. In addition to these setae, a thin bristle is seen attached to the dorsal face of each ramus near the inner distal corner. The inner edge of the rami is perfectly straight, and throughout fringed with fine cilia.

The ovisac (see fig. 1) is of moderate size, and almost circular in outline, containing numerous densely crowded ova.

The anterior antennae (fig. 3) are rather slender, though scarcely exceeding the length of the anterior division of the body, and gradually taper distally. They are composed of the usual number of joints, viz. 25, and are clothed anteriorly with scattered setae of very unequal length, some of them being considerably prolonged and curved in different directions. Of the joints the first 2 are rather larger than the others, which successively increase in length. The 3 outermost joints are, however, again somewhat shorter, and the last joint is the smallest of all.

The posterior antennae (fig. 4) are comparatively of rather small size, with the outer ramus scarcely longer than the inner, and much thinner. It is composed of 7 joints, the 2nd of which is the largest, and somewhat swollen, whereas the 4 succeeding joints are extremely small and combined about the length of the terminal joint.

The mandibles (fig. 5) have the body well developed, with the masticatory part expanded in the usual manner and coarsely dentate at the extremity. The palp is, however, poorly developed, though otherwise of normal appearance.

The maxillae (fig. 6) exhibit all the constituent parts distinctly developed, and are in particular distinguished by the terminal joint of the palp being considerably produced and tipped with a number of very long setae curving outwards. The exopodal lobe is comparatively small and narrow oblong in shape.

The anterior maxillipeds (fig. 7) are rather strongly built, each forming a thickish anteriorly curving stem divided into two well-marked sections, a basal and a terminal. The basal section is almost of equal width throughout, and exhibits traces of a subdivision in its distal part. Anteriorly it is provided with 4 short digitiform lobules, each armed, in addition to the setae, with a coarse curved spine. The first joint of the terminal section is conspicuously constricted at the base, but widens gradually towards the end, its distal corner being somewhat produced and armed with a spine similar to those on the lobules of the basal part, accompanied by 2 slender setae. The 3 outer joints are very short and densely crowded, being armed with strong anteriorly curving spines.

The posterior maxillipeds (fig. 8) are highly distinguished by their extraordinarily strong development, being almost three times as long as the anterior ones, and constituting very powerful preying organs. The 2 basal segments are much prolonged, in particular the distal one, in which 2 strong muscles are seen joining the terminal part, one of them (the flexor) being in particular very powerful, and attached with its extremity to a strong chitinous tendon entering the terminal part at the flexure between it and the basal part, and continued almost to the end of the former. The terminal part is comparatively short, scarcely attaining half the length of the 2nd basal segment, but is rather thick and highly chitinised, being generally found closely bent upon the basal part in front. It is only composed of 4 joints, the last of which is very small, so as easily escaping attention. To the inner side of this part several curved setae of unequal length are attached, and from the end project 3 particularly strong and closely juxtaposed

falciform spines slightly curved in their outer part, and distinctly denticulated inside. At the first sight all 3 spines appear to issue from the very apex ; but it is easily proved on a closer examination that in reality only one of the spines is attached to the last joint, whereas the other two take their origin each from one of the 2 preceding joints.

The natatory legs (figs. 9 and 10) are on the whole built on the same type as in *Diaptomus*, though some minor differences may be found in their details.

The 1st pair of legs (fig. 9) are considerably smaller than the succeeding ones, and have the inner ramus only composed of 2 joints. The outer ramus exceeds the inner in length, and is distinctly triarticulate, with the 1st joint somewhat dilated and armed at the end outside with a long deflexed spine densely hairy on the inner side. The middle joint is abruptly much narrower, and without any trace of a spine outside. The last joint is still narrower and somewhat more elongate, being provided in its outer part with 2 very small but distinctly denticulate outer-edge spines. The apical spine of this joint is very slender, almost setiform, and apparently quite naked.

The 3 succeeding pairs of legs (fig. 10) are all of quite uniform structure, with both rami distinctly triarticulate. The outer ramus is considerably more elongate than the inner, and also more strongly built, with a well-developed denticulated outer-edge spine on each of the 2 proximal joints. The terminal joint of this ramus is unusually narrow, and has only a single comparatively small outer-edge spine attached close to the tip. The apical spine, however, is very fully developed, nearly attaining the length of the whole ramus. It is sabre-shaped, and densely fringed along the outer edge with slender spinules in a pectinate manner.

The last pair of legs (fig. 11) are very unlike the preceding ones, and on the whole agree in structure with those legs in *Diaptomus*, though being comparatively more robust. The proximal joint of the outer ramus is rather large and of uniform width throughout. The distal joint is, on the other hand, comparatively small, and apparently terminates in 3 somewhat diverging stout spines. The innermost and strongest of these spines forms, however, the immediate continuation of the joint, and evidently answers to the terminal claw in *Diaptomus*. The middle spine, too, which generally is abruptly incurved, so as crossing the base of the claw, is unquestionably identical with the small apical joint found in most species of the genus *Diaptomus*. The inner ramus is poorly developed, forming a simple narrow

cylindrical appendage extending alongside the outer ramus and scarcely reaching as far as the proximal joint of that ramus. It carries on the tip 2 comparatively short spines, but is otherwise quite unarmed.

Description of the Male.—In size the male is only slightly inferior to the female. It is, however, readily recognised by the usual sexual particularities, which in the present form are rather sharply marked. The body (see Pl. VI, fig. 1) appears on the whole more slender than in the female, with the anterior division conspicuously contracted behind, and the lateral lobes of the last segment very much reduced in size and scarcely at all asymmetrical.

The tail is very narrow and cylindrical in shape, being also considerably more prolonged than in the female. It is composed of 5 distinctly defined segments, the 1st of which is quite short and slightly protuberant on the left side, where the genital orifice is situated. To this orifice leads a rather long and roomy duct passing through the posterior part of the anterior division, and often containing a fully developed spermatophore, easily observed in specimens cleared up by immersion in glycerin (see fig. 1). The caudal rami (see fig. 5) are conspicuously asymmetrical, the right being somewhat longer than the left and bent more outwards. This ramus is, moreover, distinguished by a peculiar transformation of the 3 outermost setae, which are much stronger than the others, almost spiniform, and quite destitute of the usual dense ciliation.

The right anterior antenna (fig. 2) is, as usual, very unlike the left, being transformed to a powerful prehensile organ. It exhibits 3 well-marked successive sections of almost equal length, but rather dissimilar in appearance. The proximal section, comprising the first 12 joints, resembles on the whole the corresponding part of the left antenna, except that the 7th joint is somewhat larger, and that the penultimate one is produced in front to a coarse spiniform process. The middle section is, however, considerably swollen, oblong fusiform in shape, and traversed by a strong transversely striated muscle acting upon the terminal section. It is composed of 6 well-defined joints firmly connected with each other, the last 2 joints having each in front a somewhat spiniform lamella closely appressed to the anterior edge. The terminal section is a little shorter than the middle one, and very much narrower, being very mobile, so as allowing to be bent in front upon the adjacent part of the antenna. It is only composed of 3 joints successively diminishing in size, the first highly chitinised and armed in front with an appressed spine, the last produced at the

end to a short hook-like process, at the base of which several thin setae are attached (see fig. 3).

The posterior antennae, oral pieces, and natatory legs are exactly of same structure as in the female.

The last pair of legs (fig. 4), however, are much transformed and very powerfully developed, being adapted for prehension. They are conspicuously asymmetrical, the right leg being much larger than the left and of a very different appearance. On both legs a biarticulate basal part may be distinguished, and on the right leg also 2 rami, the inner of which, however, is very small, forming a narrow rod-like appendage terminated by a minute knob-shaped joint. The outer ramus of this leg, on the other hand, is very largely developed, and composed of 2 well-defined thickish joints, the last of which is the larger, and slightly tapered towards the end, with the inner edge almost straight, the outer gently curved. Outside this joint, near the apex, a well-defined though rather short spine is attached, and to the tip is movably articulated an exceedingly strong, somewhat flexuous claw finely denticulated in its outer part. The left leg is scarcely more than half as long as the right, and does not exhibit any trace of an inner ramus, the basal part being followed by a somewhat flattened and imperfectly subdivided piece terminated by a narrowly rounded lappet. Outside the base of this lappet a strong deflexed spine is attached, issuing from a knob-like prominence and accompanied inside by a slender seta.

Remarks.—This form, as mentioned above, was described in the year 1845 by Lovén as the type of his genus *Broteas*, but as our knowledge of the *Copepoda* at that time was still very imperfect, the description given by Lovén, though rather exhaustive, could not of course suffice for ascertaining the true systematic relation of this copepod to the other known forms, and it even appeared somewhat questionable if it could be classed at all among the fresh-water *Copepoda*. In any case, a renewed examination of this form seemed to be highly desirable. It was therefore of great interest to me to receive in the year 1898 from Dr. Purcell several well-preserved specimens of a large-sized Calanoid, in which I very soon recognised the form originally described by Lovén. The specimens were at once submitted to a careful anatomical examination, and a detailed description accompanied by figures given in the above-quoted Journal. I was thereby enabled to ascertain the near relationship of this form to the genus *Diaptomus*, and at the same time to point out some apparently essential differences sufficient to support the genus proposed by

Lovén. The present form is one of the largest known fresh-water *Copepoda*, and is in this respect scarcely rivalled by any other, except perhaps the huge *Diaptomus superbus*, Schmeil.

Occurrence.—The specimens originally examined by Lovén were collected by J. Wahlberg from a so-called salt-pan or small saline marsh in the neighbourhood of Port Natal. Those in my possession were taken by the late Dr. Purcell in two different places on Green Point Common, near Cape Town, and apparently in pure fresh water. The colour of the living animal is bluish, the antennae and tail red.

2. Lovenula barnardi, n. sp.

(Plate VI, figs. 6–9.)

Distinctive Characters.—Length of female scarcely exceeding 4·40 mm. Body less elongate than in the type species, with no obvious constrictions between the segments. Frontal part less contracted. Lateral lobes of last pedigerous segment less prominent and only slightly asymmetrical, each terminating in a sharp point. Genital segment more protuberant on left side than on right, and not at all shorter than the anal segment. Anterior antennae exceeding somewhat in length the anterior division of the body. Posterior maxillipeds with the terminal spines less strong and scarcely falciform. Right last leg in male with the distal joint of outer ramus conspicuously bulging inside, outer-edge spine rudimentary, apical claw evenly curved; terminal part of left leg distinctly subdivided, distal joint transverse, with the apical lappet turned inwards and the outer-edge spine exceedingly large and extant.

Description of the Female.—The body (see figs. 6 and 7) appears comparatively shorter and more compact than in the type species, with the anterior division rather more dilated, and not exhibiting any conspicuous constrictions between the segments. The cephalic segment is more evenly contracted anteriorly, with the frontal part, seen laterally, less narrow. The last pedigerous segment is almost completely confluent with the preceding one, and has the lateral lobes comparatively shorter than in the type species, and only slightly asymmetrical, each terminating in a somewhat extant sharp point.

The tail is comparatively short, only slightly exceeding in length $\frac{1}{3}$ of the anterior division, and differs conspicuously from that in the type species in the shape and mutual relation of its 2 segments. The genital segment, as in that species, is pronouncedly asymmetrical, but the asymmetry is the opposite of that found in *L. falcifera*, the

left side, and not the right, being the more protuberant. The distal, or anal segment is comparatively much shorter than in the said species, scarcely attaining the length of the genital segment, its greatest width being about equal to half the length. The caudal rami resemble in shape those in the type species, but the marginal setae are considerably more produced.

The ovisac (see fig. 6) is rather large, rounded oval in outline, and projecting beyond the tips of the caudal rami.

The anterior antennae (see figs. 6 and 7) are comparatively more prolonged than in the type species, exceeding somewhat in length the anterior division of the body. In structure, however, they perfectly agree with those in the said species.

The succeeding appendages also are so very like those in *L. falcifera*, that I think I may dispense myself from giving any detailed description of them. I only will note that the 3 terminal spines on the posterior maxillipeds are less coarsely developed, so as not properly to be called falciform.

The last pair of legs (fig. 8), though built upon the very same type as in the preceding species, appear somewhat less robust, with the proximal joint of the outer ramus conspicuously narrower, and the outer-edge spine of the distal joint more extant.

The *male* differs from the female in a very similar manner to that of the type species.

Yet the last pair of legs (fig. 9) exhibit some well-marked differences in their details, both as regards the right and the left leg. In the former the distal joint of the outer ramus is comparatively shorter and scarcely at all narrowed, its inner edge being considerably bulged. The outer-edge spine of this joint seems at first sight to be wholly wanting, and it is only on a very careful examination that an extremely small rudiment of this spine is detected close to the apex. The apical claw is less strong than in the type species, and evenly curved in its outer part. The left leg has the terminal part divided into 2 sharply defined joints, the distal one short and broad, transverse, or somewhat securiform in shape, with the inner corner produced to an inward-pointing digitiform lappet, the outer passing gradually over into an exceedingly coarse and extant spine curved downward and, as in the male of *L. falcifera*, exhibiting at the base a well-marked transverse suture. In the middle between this spine and the inner digitiform lappet a thin seta is seen, springing off from a small knob-like prominence.

Remarks.—The above-described form is closely allied to *L. falcifera*,

so closely, indeed, that at first I took it to be the very same species. A closer examination of the specimens has, however, proved it to be in reality a well-defined new species, to which the name of its collector may properly be applied.

Occurrence.—Numerous specimens of this form, all perfectly agreeing with each other, were collected by Mr. Barnard at six different places in Ovamboland, South-West Africa. According to the notes given by the collector, the colour of the living animal was bluish, the tail being, however, tinged with red.

Gen. PARADIAPTOMUS, G. O. Sars.

Syn. : Broteas, G. O. Sars (in part).

Remarks.—This genus was proposed in the year 1895 by the present author to include a peculiar South African Diaptomid raised by him from dried mud. The genus was, however, subsequently (in the year 1898) withdrawn, as I believed, at that time, that the said Diaptomid should more properly be referred to the genus *Broteas* of Lovén. Yet at present I have come to the conclusion that the genus *Paradiaptomus* in reality ought to be supported, as it exhibits some rather striking differences from both of the two species of Lovén's genus described above.

The chief characters distinguishing the present genus refer to the peculiar appearance of the tail in the female and to the structure of some of the appendages, in particular that of the maxillae and the posterior maxillipeds.

3. Paradiaptomus lamellatus, G. O. Sars.

(Plate VII.)

Paradiaptomus lamellatus, G. O. Sars. Chr. Vid. Selsk. Skrifter, 1895, No. 3, p. 46, pls. vii, viii.

Broteas lamellatus, G. O. Sars. Arch. f. Mathem. u. Naturv., vol. xxi, No. 2, p. 24.

Description of the Female.—The length of the body scarcely exceeds 3·90 mm., and this form accordingly does not by far grow to such a large size as the two above-described species of the genus *Lovénula*.

In the living animal the body is semipellucid, of a light bluish grey colour, with the hind edges of the segments somewhat darker, and the outer part of the tail almost colourless.

The general shape of the body (see figs. 1 and 2) looks rather unlike

that in the species of the preceding genus, being unusually short and stout, with the anterior division considerably inflated in its anterior part and gradually contracted behind. The cephalic segment is highly vaulted dorsally, with the frontal part evenly rounded off anteriorly and terminating below in a small simple rostral protuberance. The last pedigerous segment, as in *Lovenula*, is almost entirely confluent with the preceding segment, and has the lateral lobes rather prominent, narrow lanceolate in shape, and perfectly symmetrical.

The tail is about half the length of the anterior division and, as in *Lovenula*, only composed of 2 segments ; but the shape of these segments is rather unlike that in the said genus. The genital segment is somewhat produced, and does not exhibit any obvious asymmetry, being quite uniformly dilated in its anterior part and rather protuberant below. It tapers somewhat towards the extremity, which forms a very movable articulation with the anal segment. The latter is a little shorter than the genital segment and of a very dissimilar appearance, being pronouncedly flattened and greatly expanded towards the end, so as exhibiting, seen dorsally, the form of an equilateral triangle. It is transversely truncated behind, and provided dorsally, at some distance from the end, with a well-marked anal opercle. The caudal rami also exhibit a very strange appearance, unlike that met with in any of the other known *Diaptomidae*. They are of comparatively large size, fully equalling in length the anal segment, and have the form of 2 closely juxtaposed, broadly oval lamellae, with the inner edge perfectly straight, the outer gently curved. The marginal setae are present in the usual number, viz. 5 on each ramus, one of them attached to a well-marked ledge of the outer margin. All the setae are finely ciliated, but remarkably short, with the base bulbously dilated and the extremity drawn out to a very thin lash. The innermost but one is, as usual, the longest, though scarcely attaining the length of the corresponding ramus. The dorsal bristle, attached near the inner corner, is very small.

The ovisac is in most cases not very large, scarcely extending beyond the anal segment, and is almost circular in outline.

The eye is very small and, as in the species of *Diaptomus*, situated somewhat ventrally, at some distance behind the rostral protuberance.

The anterior antennae (fig. 3) are comparatively short, not nearly attaining the length of the anterior division of the body. They are, however, composed of the usual number of joints (25), and are rather densely setiferous ; but none of the setae are, as in *Lovenula*, particularly prolonged.

The posterior antennae (fig. 4) are far less reduced in size than in *Lovenula*, though exhibiting a rather similar structure. The terminal joint of the outer ramus is, however, much shorter than in either of the two species of that genus.

The mandibles (fig. 5) do not differ from those in *Lovenula*, except by the palp being more fully developed.

The maxillae (fig. 6), however, are prominently distinguished by the rudimentary condition of the terminal joint on the palp, this joint being, unlike what is the case in *Lovenula*, very small, nodiform, and only clothed with quite short setae. The exopodal lobe also is rather different in shape, being comparatively larger and somewhat expanded distally.

The anterior maxillipeds (fig. 7) are less robust than in *Lovenula*, but otherwise of a very similar appearance.

The posterior maxillipeds (fig. 8), however, look very different, being far less powerfully developed, and more resembling in structure those appendages in *Diaptomus*. Yet the terminal part is comparatively shorter and thicker than in that genus, with the setae partly converted to spines, one of these, projecting from the tip, being in particular rather strong and distinctly denticulate, though scarcely at all curved. The number of joints in this part is also reduced, only 4 joints being counted, the last extremely small.

The natatory legs (figs. 9 and 10), though having a similar jointing to those in *Lovenula*, exhibit a rather unlike appearance, being much shorter and stouter, with the rami comparatively broader and less unequal in length. The outer ramus in particular looks very dissimilar to that in *Lovenula*, its terminal joint being not at all narrowed, and the apical spine much shorter and of the very same structure as the other spines on this ramus.

The last pair of legs (fig. 11) resemble in general those in *Lovenula*, but are comparatively shorter and stouter, and differ, moreover, in the stronger development of the terminal claw, as also in the comparatively smaller size of the inner ramus.

The *male* (fig. 12) is not much inferior in size to the female, but is easily recognisable by the rather strongly marked sexual differences.

The anterior division of the body is, as in the female, considerably inflated, with the dorsal face evenly vaulted throughout. The lateral lobes of the last segment are, however, so much reduced as to be almost quite obsolete.

The tail looks very different from that in the female, being narrowly cylindrical in shape, and composed of 5 well-defined segments, none

of them exhibiting any obvious particularity in their structure. The caudal rami (fig. 14) also are very unlike those in the female, being much narrower and scarcely at all lamelliform. On a closer examination they are found to be somewhat asymmetrical, the right ramus being a little smaller than the left and more extant, with the outermost seta conspicuously thickened and spiniform. The other marginal setae are of quite normal appearance, and considerably more prolonged than in the female.

The right anterior antenna (see fig. 12) has the middle section considerably tumified, more so than in either of the two species of *Lovenula* described above. The terminal section is, however, comparatively short, and without any hook-like projection at the tip.

The last pair of legs (fig. 13), though at first sight rather like those in *Lovenula*, are found, on a closer examination, to exhibit some well-marked differences in their details. The right leg is rather strongly built, with the distal joint of the outer ramus comparatively large and broad at the base, being armed outside near the end with a rather strong spine. The apical claw is of moderate size and quite evenly curved throughout. The left leg is in particular distinguished from that in *Lovenula* by the presence of a distinctly defined inner ramus of simple conical shape, attached to the basal part in the usual place. The outer ramus of this leg, answering to the terminal part in *Lovenula*, is imperfectly subdivided, with the distal joint abruptly inflexed and somewhat boot-shaped, being armed outside with a thin deflexed spine. Another much coarser spine is seen originating from the outer side of the proximal joint, somewhat inside the edge, and abruptly bent at the base.

Remarks.—As above mentioned, this form was described as early as the year 1895 by the present author as the type of his genus *Paradiaptomus*, but was subsequently, in 1898, briefly characterised under another name, viz. *Broteas lamellatus*, owing to the author's opinion at that time that it was referable to Lovén's genus. It is an easily recognisable form, being in particular highly distinguished by the peculiar structure of the tail in the female, this character having indeed given rise to the specific name proposed. As it is the only as yet known species of the genus, any precise distinctive diagnosis cannot of course be given.

Occurrence.—The specimens originally examined by the present author were raised from dried mud taken by Mr. Thesen at Knysna on the south coast of the Cape Province. Several years afterwards I received from Dr. Purcell numerous well-preserved specimens of the

same interesting Diaptomid collected from ponds on Green Point Common, near Cape Town, and a few specimens were also raised from a parcel of mud derived from the same locality.

Gen. DIAPTOMUS, Westwood.

Remarks.—This genus comprises a vast number of species from nearly all parts of the world. As, however, some of these species apparently diverge more or less conspicuously from the usual type, it is most likely to believe that a subdivision of the genus will be found to be requisite in future. Of the four South African species described in the sequel, only the last (*D. congruens*) shows itself as a genuine member of the genus. The other three diverge in some particulars rather conspicuously, as seen from the descriptions here given.

4. Diaptomus capensis, G. O. Sars.

(Plate VIII, figs. 1–12.)

Diaptomus capensis, G. O. Sars. Arch. f. Mathem. u. Naturvidenskab, vol. xxviii, No. 8, p. 4, pl. i ; pl. ii, figs. 1 and 2.

Distinctive Characters.—Length of female, 1·90 mm. Body comparatively short, with the frontal part of head remarkably vaulted dorsally. Lateral lobes of last pedigerous segment obtusely triangular and scarcely extant. Genital segment remarkably asymmetrical and scarcely longer than the 2 succeeding segments combined. Ovisac oblong oval. Anterior antenna much shorter than the anterior division of body. Last pair of legs rather narrow, with the inner ramus attenuated and tipped with 2 slender setae. Right last leg in male much produced, with the 2nd basal segment remarkably expanded inside ; proximal joint of outer ramus provided at the end inside with a well-marked spiniform process, distal joint large, with the outer edge evenly curved and quite unarmed, inner ramus biarticulate. Left leg without any inner ramus, distal part comparatively small, terminating in a triangular-pointed lappet, outside which a digitiform appendage is attached.

Description of the Female.—In general appearance this form looks rather unlike most other known species of the present genus, the body (see figs. 1 and 2) being rather short and stout, with the anterior division of almost uniform width throughout and somewhat compressed. The cephalic segment is about the length of the 2 succeeding segments combined, and, seen dorsally (fig. 1), obtusely rounded at the extre-

mity. It is remarkably vaulted dorsally, in such a manner that the head, seen laterally (fig. 2), appears almost transversely truncated in front. Below it is produced to a well-marked rostral protuberance tipped with 2 very small recurved tentacular appendages. The last segment is completely coalesced with the preceding one, no trace of any defining suture or lateral impression between them being visible. It is deeply emarginated in the middle, and projects on each side of the emargination in the form of an obtusely-pointed triangular lobe extending straight behind. The 2 lobes are slightly asymmetrical, the left lobe being a little larger than the right.

The tail is comparatively short, scarcely exceeding in length $\frac{1}{3}$ of the anterior division, but is divided into 3 well-defined segments. The first of these segments, the genital one, is the largest, though scarcely exceeding in length the other two combined. It is highly distinguished by its very strongly marked asymmetry, exhibiting in the dorsal aspect a rather oblique suboval shape, with the right side strongly bulged in its whole extent, whereas the left side is somewhat flattened and only close to the base a little protuberant. The caudal rami are comparatively short, suboval in shape, and scarcely at all divergent. On a closer examination they are found to be slightly asymmetrical, the right ramus being constantly somewhat broader than the left. The marginal setae are of moderate length, one of them being attached to the outer edge, the other four to the obtusely rounded extremity.

The ovisac is oblong oval in outline, and extends considerably beyond the caudal rami.

The colour of the living animal, as ascertained in some specimens reared from dried mud, is clear yellow tending to light chestnut.

The eye is rather small and situated a little inside the rostral protuberance.

The anterior antennae (fig. 3) are comparatively short, not nearly attaining the length of the anterior division of the body. They are composed of the usual number of joints (25) densely clothed with rather strong subequal setae.

The posterior antennae (fig. 4) have the outer ramus well developed and considerably longer than the inner, being composed of 7 joints, the 3rd to 6th quite short, the last rather prolonged, exceeding in length those joints combined.

The mandibles (fig. 5) exhibit the usual structure, the masticatory part being defined by a well-marked collar and securiform expanded at the end, with the outermost dent of the cutting edge very large

and separated from the others by a deep sinus. The palp is about the length of the body of the mandible, and likewise of quite normal appearance.

The maxillae (fig. 6) have all the constituent parts distinctly defined, the outer part of the palp being faintly divided into 3 successive joints, gradually diminishing in size and densely fringed with finely ciliated setae of about equal length. The exopodal lobe is of moderate size, and provided with 7 more densely ciliated setae.

The anterior maxillipeds (fig. 7) are of comparatively small size, and have none of the setae pronouncedly spiniform, those of the terminal part being rather slender and densely crowded.

The posterior maxillipeds (fig. 8) are considerably more prolonged, but of rather feeble structure. The proximal segment of the basal part is about of same length as the distal one, but considerably broader and somewhat lamellar. It is provided anteriorly with several slender setae, and projects at the end to a narrow lobe finely ciliated on the tip. The terminal part is very narrow and composed of 5 well-defined joints clothed with weak setae, those issuing from the extremity more or less recurved and finely ciliated.

The natatory legs (figs. 9 and 10) resemble in their general structure those in the genus *Lovenula*, though being somewhat less elongate, with the apical spine of the outer ramus much shorter and less coarsely spinulose outside.

The last pair of legs (fig. 11) are of comparatively feeble structure, with the proximal joint of the outer ramus narrow cylindrical in shape, and the distal joint produced to a rather slender claw. Outside this claw the small apical joint is attached, pointing straight downwards, and immediately in front of it a still smaller thin spinule occurs. The inner ramus is very slender and attenuated, extending to the end of the proximal joint of the outer ramus, and is tipped with 2 rather long setae diverging by their outer parts.

The *male* is rather inferior in size to the female and of more slender shape, with the cephalic segment less vaulted dorsally, and the lateral lobes of the last pedigerous segment almost obsolete. The tail is, moreover, as usual, much narrower, and composed of 5 segments not much different in length. The caudal rami do not exhibit any obvious asymmetry, and have all the marginal setae of uniform structure.

The right anterior antennae is transformed in the usual manner, and has the terminal section comparatively short, though apparently composed of 4 joints.

The last pair of legs (fig. 12) are largely developed, and exhibit a rather characteristic appearance, in particular as regards the right leg. This leg is almost twice as long as the left, and is generally strongly curved inwards. The distal segment of the basal part has a very unusual shape, forming inside a large, somewhat lamellar expansion, narrowly truncated at the end, and causing this segment to be almost twice as broad as it is long. The proximal joint of the outer ramus forms with this segment an extremely movable articulation, and gradually widens towards the end, which is armed inside with a strong deflexed spine. The distal joint is rather large and somewhat fusiform in shape, with the inner edge perfectly straight, the outer well curved and quite unarmed. The apical claw is rather strong and evenly curved throughout. The inner ramus of this leg is quite simple, though composed of 2 well-defined joints.

The left leg has no inner ramus, its place being only occupied by a slight angular projection. The terminal part is of inconsiderable size and produced at the end to a triangular lappet, to the outer side of which a peculiar digitiform appendage is attached accompanied by a thin bristle. Otherwise this part is quite unarmed.

Remarks.—This form was described and figured in the year 1899 by the present author from specimens forwarded to me by Dr. Purcell. It is a rather anomalous species, differing conspicuously from the typical members of the genus *Diaptomus*, both as to the outward appearance and to the structure of some of the appendages, so as perhaps more properly to be regarded as the type of a particular genus.

Occurrence.—The specimens originally examined by me were collected by Dr. Purcell at five different places near Cape Town. In some of the samples it occurred very abundantly. A few specimens were also found in samples more recently collected on the Cape Flats by Mr. Barnard. As above mentioned, I also succeeded in rearing some specimens of this form from dried mud kindly sent to me by Dr. Purcell.

5. Diaptomus rigidus, n. sp.

(Plate VIII, figs. 13–18.)

Distinctive Characters.—Length of female, 2·10 mm. Anterior division of body somewhat similar to that of *D. capensis*, tail, however, differing conspicuously in the shape of the genital segment, which is much more prolonged and perfectly symmetrical. Last pair

of legs in male likewise rather dissimilar. Right leg with the distal segment of the basal part only slightly expanded inside, proximal joint of outer ramus with only a slight rudiment of a spine, distal joint with a well-developed outer-edge spine near the end. Left leg with the terminal part much larger than in *D. capensis*, and armed on the posterior face, close to the base, with a strong deflexed spine, apical lappet obtusely rounded off.

Description of the Female.—The general shape of the body (see figs. 13 and 14) somewhat resembles that of the preceding species, though the anterior division appears less compressed and, seen dorsally, more contracted in front. The dorsal face of this division is also more flattened, giving to the animal a peculiar rigid appearance; hence the specific name proposed. The frontal part of the head exhibits, seen laterally (fig. 15), a much similar shape to that in *D. capensis*. The lateral lobes of the last segment are comparatively a little shorter than in that species and more extant, as also more distinctly asymmetrical, the left lobe being conspicuously larger than the right.

The tail is rather more prolonged than in the preceding species, and pronouncedly distinguished by the very different appearance of the genital segment, this segment being considerably prolonged, so as occupying fully half the length of the tail. It is, moreover, not at all, as in *D. capensis*, asymmetrical, but quite uniformly protuberant on each side at the base, its posterior part being regularly cylindrical in shape. The caudal rami (see fig. 18) exhibit quite a normal appearance, no asymmetry being detected. They are slightly divergent, and have the marginal setae moderately prolonged.

The ovisac (see fig. 13) is rather large and almost circular in outline.

The several appendages of the body agree so closely in their structure with those in the preceding species, that I do not find it necessary to describe them in detail.

I only give for comparison on the accompanying plate a figure of a leg of the last pair (fig. 16), showing it to be a little more robust than in *D. capensis* (fig. 11).

The *male* is of very small size, as compared with the female, being scarcely larger than the male of the preceding species. The sexual differences are the usual ones.

Yet the last pair of legs (fig. 17) merit to be described more closely, as they differ in some points rather conspicuously from those in *D. capensis*. The right leg is comparatively less prolonged, and has the 2nd segment of the basal part far less expanded, its inner edge being only somewhat angularly produced in the middle. The 1st

joint of the outer ramus is scarcely constricted at the base, and has only a slight rudiment of the spine found in *D. capensis* at the inner distal corner. The 2nd joint, too, is of a rather different shape, being of uniform width throughout, and is armed with a well-defined, though rather short, outer-edge spine near the end. The apical claw is strongly incurved and somewhat flexuous. The left leg has the terminal part comparatively much larger than in the preceding species, being almost twice as long as the basal one. It is armed on the posterior face near the base with a very strong deflexed spine, and has, moreover, about in the middle of the outer edge a small spinule, and farther below a minute nodiform prominence. The apical lappet is rounded off at the extremity and finely denticulate on the edge.

Remarks.—The above-described form is nearly allied to *D. capensis*, but of considerably larger size, and is, moreover, easily distinguished by the very different shape of the genital segment in the female. The structure of the last pair of legs in the male is also rather different, as shown by the description given above.

Occurrence.—Several specimens of this form, most of them of the female sex, were collected by Mr. J. H. Power from a vley at Kimberley.

6. Diaptomus purcelli, G. O. Sars.

(Plate IX, figs. 1–8.)

Diaptomus purcelli, G. O. Sars. Arch. f. Mathem. u. Naturv., vol. xxviii, No. 8, p. 12, pl. ii, figs. 3–10.

Distinctive Characters.—Length of female, 1·20 mm. Body moderately slender, with the frontal part of head only slightly vaulted dorsally. Lateral lobes of last pedigerous segment terminating each in a very sharp point. Genital segment conspicuously protuberant at the base on left side ; last caudal segment with the anal opercle remarkably prominent. Ovisac cordiform. Anterior antennae considerably prolonged, with a remarkably strong seta at the end of the proximal joint. Last pair of legs with the terminal claw coarsely serrate inside, inner ramus extending to the end of the proximal joint of the outer. Right last leg of male with a peculiar twisted spiniform process inside the 1st joint of outer ramus, 2nd joint with a short outer-edge spine near the end. Left leg with the terminal part rather large and armed outside with a remarkably strong claw-like spine, inner edge angularly produced below, apical lappet straight and narrow linguiform.

Description of the Female.—The body (see figs. 1 and 2) is considerably more slender than in the two preceding species, with the anterior division narrow oblong in shape and rather contracted in front. The cephalic segment is about the length of the 3 succeeding segments combined, and has the frontal part only slightly vaulted dorsally, so as looking, seen laterally, much narrower than in the two preceding species. The rostral protuberance is very small, though tipped with the usual recurved tentacular appendages. The last segment is completely coalesced with the preceding one, and has the lateral lobes comparatively short, but each terminating in a very sharp point. The right lobe is somewhat broader than the left, and has inside the point a slight lamellar expansion.

The tail is about half the length of the anterior division, and is composed of 3 well-defined segments rather movably articulated together. The 1st or genital segment is of moderate size and somewhat asymmetrical, exhibiting near the base on the left side a rather prominent rounded protuberance, genital area terminating in a short recurved projection. The last segment is distinguished by the anal opercle being quite unusually prominent, so as giving to this segment, seen laterally, a peculiar clavate shape (see fig. 2). The caudal rami are comparatively small but of quite normal structure.

The ovisac (see fig. 1) is of a somewhat unusual appearance, being broadly cordiform in shape, with the posterior edge distinctly emarginated in the middle. The enclosed ova are comparatively large and few in number.

The anterior antennae (fig. 3) are much more prolonged than in the two preceding species, extending, when reflexed, somewhat beyond the middle caudal segment. They are, as usual, composed of 25 joints rather densely clothed with setae. One of these setae, issuing from the end of the proximal joint, is highly distinguished by its extraordinary development, equalling in length about $\frac{1}{3}$ of the antenna. It may, however, easily escape attention, as it in most cases lies in close approximation to the anterior edge, only projecting with its somewhat procurved extremity.

The posterior antennae and the oral pieces do not exhibit any noticeable particularities in their structure.

The natatory legs (fig. 4) also look rather similar to those in the two preceding species, though having the rami comparatively narrower and more produced.

The last pair of legs (fig. 5) are of moderate size, and in particular distinguished by the shape and armature of the terminal claw, which

is comparatively short, but rather broad, knife-shaped, and coarsely serrate at the inner sharpened edge. The inner ramus does not fully extend to the end of the proximal joint of the outer, and is tipped with 2 small spines.

The *male* (fig. 6) is not much inferior in size to the female, but is easily recognised by the usual sexual differences.

The caudal rami (see fig. 8), too, are distinctly asymmetrical, the right ramus being somewhat larger than the left, and having the outermost seta transformed to a coarse spine.

The last pair of legs (fig. 7), though built on the very same type as in the two preceding species, exhibit some well-marked differences in their details from either of them. The right leg has the 2nd basal segment only slightly expanded, with the inner edge evenly bowed and partly fringed with small denticles. The proximal joint of the outer ramus is armed at the end inside with a peculiar twisted spiniform process continued at the base in a short hyaline rim. The distal joint is narrow oblong in shape, and, as in *D. rigidus*, armed with a short outer-edge spine close to the end. The apical claw is well developed and gently curved. The inner ramus is quite simple uniarticulate. The left leg, as in the two preceding species, does not exhibit any trace of an inner ramus. The terminal part is rather large and of a somewhat irregular oblong shape, terminating in a well-defined narrow linguiform lappet, and having the inner edge produced below to a rather prominent angle. From the posterior face of this part, about in the middle, a very strong claw-like process originates, extending beyond the outer edge and curving downwards. This process seems to some extent to be movable, as several muscles are seen joining its base. Immediately below it a small outward-pointing prominence occurs tipped with fine cilia.

Remarks.—This form was originally described by the present author in the same paper in which *D. capensis* was dealt with, and the specific characters of these two species demonstrated. Although some points of agreement with the two preceding species may be found, the present form is prominently distinguished from either of them, both as to the outward appearance and to the structure of some of the appendages, in particular that of the last pair of legs in the two sexes. As quite unique characters of the species may be named the extraordinary development of one of the setae attached to the anterior antennae, and the peculiar shape of the ovisac. It is by far the smallest of the four species here recorded.

Occurrence.—Several specimens of this small Diaptomid were picked

up from samples taken by Dr. Purcell, some at Bergvliet, Cape Peninsula, some in the Cape Flats.

7. Diaptomus congruens, n. sp.

(Plate IX, figs. 9–13.)

Distinctive Characters.—Length of female, 1·90 mm. Body very slender, with the anterior division almost cylindrical in shape, frontal part of head slightly prominent anteriorly. Last pedigerous segment faintly defined from the preceding one; lateral lobes short and slightly extant, each terminating in a very sharp point. Genital segment much prolonged, subcylindrical in shape, with a small protuberance on each side of the base tipped with a short spike. The last 2 caudal segments very small and somewhat imperfectly defined. Anterior antennae much produced, exceeding in length the body. Last pair of legs rather clumsy, with the inner ramus very short. Right anterior antenna of *male* with the 2nd joint of the terminal section produced at the end to a strong spiniform projection. Right last leg with the distal joint of the outer ramus inflexed and armed outside, above the middle, with a very coarse spine. Left leg with the 2nd basal segment produced at the end inside to a conical process carrying the inner ramus, terminal part poorly developed, consisting of 2 digitiform lobules, the outer biarticulate, the inner uniarticulate.

Description of the Female.—The body (see figs. 9 and 10) is considerably more slender than in the three preceding species, with the anterior division narrow oblong or almost cylindrical in shape, though slightly contracted in front. The cephalic segment is about the length of the 3 succeeding segments combined, and is, seen dorsally, narrowly rounded at the extremity. Seen laterally (fig. 10), it appears gradually contracted, with the frontal part slightly projected. The rostral protuberance is short, and provided with the usual tentacular appendages. The last segment is dorsally confluent with the preceding segment, but the limit between them is well observed on each side. The lateral lobes of this segment are comparatively short, but somewhat extant, each terminating in a very sharp point. The left lobe is a little larger and more prominent than the right.

The tail scarcely exceeds in length $\frac{1}{3}$ of the anterior division, and is composed of 3 segments, the last 2 being, however, very small and less perfectly defined from each other. The genital segment is well developed, occupying rather more than half the length of the tail, and is of narrow cylindrical form, with a slight protuberance on each side

close to the base and tipped with a small spike. The ventral face of the segment exhibits in front a well-defined rounded genital protuberance, and appears also slightly expanded at the end. The 2nd caudal segment is extremely small and, as it were, sunk within the end of the genital segment, with which it has a very movable articulation. It is partly confluent with the last segment dorsally; but laterally the 2 segments appear pretty well defined from each other. The caudal rami are of quite normal structure, and about the length of the anal segment.

The ovisac is rather large and broadly rounded off at the extremity.

The anterior antennae (see figs. 9 and 10) are considerably prolonged, attaining the length of the whole body, and when reflexed even extending somewhat beyond the tips of the caudal rami. They are, as usual, composed of 25 joints somewhat sparingly clothed with setae, none of which are distinguished by any extraordinary length.

The posterior antennae, the oral pieces, and the natatory legs are of quite normal structure.

The last pair of legs (fig. 11), however, look somewhat unlike those in the preceding species, being of a rather clumsy appearance, with the proximal joint of the outer ramus much thickened, and the terminal claw comparatively short and stout. The inner ramus is, moreover, unusually poorly developed, not even extending to the middle of the proximal joint of the outer ramus.

The *male* is of rather smaller size than the female, and differs from it in the usual manner.

The right anterior antennae (fig. 12) have the middle section somewhat less tumified than in the three preceding species, and are, moreover, distinguished by the 2nd joint of the terminal section being produced at the end anteriorly to a strong spiniform process. The 2 outer joints of this section are rather small and of comparatively simple structure.

The last pair of legs (fig. 13) differ in some respects rather pronouncedly from those in the three preceding species, their structure agreeing on the whole with that found in the more typical species of the present genus. The right leg is rather powerfully developed, and has the 2nd basal segment gradually somewhat widening distally, carrying at the end inside the rather small and simple inner ramus. The proximal joint of the outer ramus is comparatively short, being slightly protuberant inside and produced at the end outside to an acute corner. The distal joint is rather large, obpyriform in shape, and conspicuously bent inwards, with the outer edge considerably

bowed and armed, somewhat above the middle, with a very coarse deflexed spine. The apical claw is well developed and somewhat unequally curved. The left leg is scarcely more than half as long as the right, and has the 2nd basal segment produced at the end inside to a conical deflexed process, to which a small digitiform appendage is attached, evidently representing the inner ramus. The terminal part of this leg is very much reduced, being replaced by 2 small digitiform lobules partly confluent at the base, the outer one the larger and biarticulate, the inner quite simple and uniarticulate.

Remarks.—This is a quite genuine member of the genus *Diaptomus*, agreeing rather closely with some of the well-known northern species, though apparently distinct from any of them. The specific name proposed alludes to this near relationship.

Occurrence.—Numerous specimens of this form were found in one of the samples taken by Mr. Barnard at Ongka, Ovamboland, South-West Africa. The preserved specimens were extremely pellucid and quite colourless.

Division CYCLOPOIDA.

Fam. CYCLOPIDAE.

Gen. CYCLOPS, O. F. Müller (sens. strict.).

8. Cyclops tenuisaccus, n. sp.

(Plate X, figs. 1–13.)

Distinctive Characters.—Length of female, 1·56 mm. Body moderately slender, with the anterior division somewhat tumefied in front. Last pedigerous segment slightly produced laterally. Genital segment rather dilated in front. Caudal rami considerably produced, occupying more than half the length of the tail, innermost apical seta about twice the length of the outermost, bristle of outer edge somewhat remote from the apex. Ovisacs unusually narrow and greatly divergent. Anterior antennae of moderate length, 17-articulate. Natatory legs with 2 outer-edge spines on the terminal joint of the outer ramus in all the pairs ; apical spines on inner ramus of 4th pair rather unequal. Last pair of legs with the distal joint slightly longer than the proximal, apical seta much shorter than the lateral.

Description of the Female.—The body (see fig. 1) is moderately slender, and of the usual, somewhat pyriform shape, the anterior division being rather tumefied, with the greatest width somewhat in

front of the middle and slightly exceeding half the length. The head, as in all known *Cyclopoida*, is completely confluent with the 1st pedigerous segment, both together constituting the large anterior body-segment, to which generally the name cephalic segment is applied. It occupies rather more than the half of the anterior division, and is evenly rounded off in front, being, however, continued ventrally in an obtuse recurved rostral protuberance. The 3 succeeding free segments diminish gradually in size, and have the lateral parts closely crowded and rounded off at the posterior corner. The last segment is still smaller, and, as usual, is sharply defined from the preceding segment, with which it has a very movable articulation, whereas behind it is firmly connected to the genital segment, so as looking to form more properly part of the tail. It is about twice as broad as it is long, and has the lateral parts slightly expanded.

The tail somewhat exceeds half the length of the anterior division, and is composed of 4 well-defined segments in addition to the caudal rami. The 1st of these segments, the genital one, is rather large and conspicuously dilated at the base. The seminal receptacle, as far as I could make it out in the preserved specimens, is quite simple, without the large posterior expansion characteristic of the succeeding genus. The remaining caudal segments successively diminish in size, and combined they scarcely exceed the genital segment in length.

The caudal rami (fig. 13) are considerably produced, occupying rather more than half the length of the tail, and fully five times as long as they are broad. They are narrow linear in shape, and scarcely at all divergent, with the inner edge finely ciliated, the outer provided, at some distance from the end, with a short bristle. To the obtusely truncated end of each ramus 4 setae of very unequal length are attached, the 2 middle ones being considerably produced and distinctly jointed at the base, the inner of them about the length of the whole tail. Of the 2 remaining setae, that attached to the inner corner is about twice as long as that on the outer. In addition to the above-mentioned setae, as in most other *Cyclopoida*, a very small bristle is seen issuing dorsally close to the tip of each ramus.

The ovisacs (see fig. 1) are greatly divergent, and distinguished by their extremely narrow shape, this particularity having indeed given rise to the specific name proposed.

The eye is only faintly traced within the frontal part of the head, its pigment being, as usual, almost wholly destroyed by the action of the preserving fluid.

The anterior antennae (fig. 2) are of moderate length, extending,

when reflexed, not fully to the end of the 1st free pedigerous segment, and gradually taper towards the end. They are, as in most other species of this genus, composed of 17 joints, clothed with rather strong and somewhat unequal setae pointing in different directions. The joints are of rather unequal size, the 1st being by far the largest of all, the 4th and 7th also conspicuously larger than the next preceding and succeeding ones. The 7th joint is followed by a row of 8 remarkably short and uniform joints arranged in 2 successive, though not very sharply defined, sets, with 4 joints in each set. The 2 outermost joints are again considerably prolonged, and in the present species of uniform size, both provided with a well-marked longitudinal keel.

The posterior antennae (fig. 3) are of comparatively feeble structure, each forming a rather narrow stem curving behind and composed of 4 joints. The first 2 of these joints may together represent the basal part, the other 2 the inner ramus, the outer ramus being replaced by a single very large and prolonged seta attached to the hind distal corner of the 1st basal joint and pointing straight behind. The 2nd basal joint is scarcely more than half as large as the 1st, and has only a single small bristle on the anterior edge, whereas 2 such bristles are present on the 1st joint. The penultimate joint is conspicuously contracted at the base, and gradually widens somewhat distally, being fringed along the anterior edge with a row of about 8 procurved bristles successively increasing in length distally. The terminal joint is of narrow linear shape and rather longer than the penultimate one, carrying at the tip 4–5 strong anteriorly curving setae.

The anterior lip (fig. 4) terminates behind in a sharpened edge, defined on each side by a somewhat projecting corner and fringed in the middle with densely crowded minute denticles.

The mandibles (fig. 5) have the masticatory part rather narrowly produced and only slightly expanded at the end, though well armed in the usual manner. The palp is reduced to an insignificant nodule, which, however, is tipped by 2 rather long and finely plumose setae accompanied by a rudimentary bristle.

The maxillae (fig. 6) are of comparatively simple structure, exhibiting a rather massive basal part filled with strong muscles, but without any trace of a vibratory (epipodal) lamina. It is continued in a somewhat compressed triangular masticatory lobe, curving inwards and armed with several short spines, 3 of which originate close together from the tip. The palp has the form of a thin lamella attached outside the basal part, and armed at the narrowly truncated extremity

with a short spine accompanied by 2 likewise short setae. Moreover, at some distance from the base, 3 somewhat diverging finely ciliated setae are attached to a slight expansion of the outer edge, and immediately above this expansion another somewhat similar seta issues.

The anterior maxillipeds (fig. 7) are rather more fully developed, with the basal part composed of 2 comparatively large and somewhat flattened segments, the 1st of which is provided near the end with a small bisetose lamella. The 2nd segment is somewhat larger, and provided with a single seta issuing from the middle of the somewhat projecting anterior edge. Between the basal and terminal parts a narrow lobe is seen projecting anteriorly tipped with 2 unequal setae. The terminal part is very movably articulated with the basal one, and, as the latter, composed of 2 joints; but these joints are of a very dissimilar appearance, the 1st being considerably produced at the end and terminating in a strong claw-like process, at the base of which is attached a coarse seta extending alongside the claw, both together forming thus a kind of scissors. The last joint is very small and tipped with 2 curved spines, accompanied by 2 or 3 thin bristles.

The posterior maxillipeds (fig. 8) are much smaller than the anterior, though composed of the same chief parts. The 2 segments of the basal part are far less expanded, and each provided with 2 unequal setae. The terminal part has its 2 joints quite simple, each armed with a slender anteriorly curving spine, the last joint, moreover, with 2 small setae.

The natatory legs (figs. 9–11) are built on the usual Cyclopoid type, being comparatively short and stout, with the basal part broad and somewhat lemellar, and both rami distinctly triarticulate, the inner one slightly longer than the outer, the terminal joint of which has only 2 outer-edge spines.

The 1st pair of legs (fig. 9) are somewhat smaller than the succeeding ones, and are distinguished by the presence of a slender spine attached to the inner distal corner of the basal part. Moreover, the terminal joint of the outer ramus is much shorter than in the other pairs, and wants the strong apical spine, this spine being replaced by an ordinary seta.

The 4th pair of legs (fig. 11) are comparatively more slender than the preceding ones, with the inner ramus narrower and more produced, and only provided with 2 setae of the inner edge. On the tip this ramus is armed with 2 spines of somewhat unequal length, the inner one being scarcely more than half as long as the outer.

The last pair of legs (fig. 12), as in other *Cyclopoida*, are extremely

small and of very simple structure, each leg being only composed of 2 joints, the proximal one carrying outside a slender bristle attached to a slight expansion of the joint, the distal one rather narrower and provided with 2 strong setae of unequal length, the shorter one attached to the tip, the longer one to a well-marked ledge of the inner edge close to the apex.

The *male* is of much smaller size than the female, and easily recognisable by the usual sexual differences in the structure of the tail and of the anterior antennae.

Remarks.—This is the largest of the South African *Cyclopidae* as yet examined by me. Although the structure of the several appendages agrees rather closely with that in the succeeding genus, I think that it cannot be adduced to that genus, but that it more properly may be referred to the genus *Cyclops*, in the restriction now generally accepted, in particular on account of the simple structure of the seminal receptacle and the greatly produced caudal rami.

Occurrence.—Some specimens, most of them of the female sex, were found in a sample taken by Dr. Purcell at Salt River, in the neighbourhood of Cape Town.

Gen. MESOCYCLOPS, G. O. Sars.

9. Mesocyclops obsoletus (Koch).

(Plate X, figs. 14–18.)

Cyclops obsoletus, Koch. Deutschlands Crustaceen, etc., Heft 21, pl. v.

Syn. : Cyclops leuckarti, Claus.

Distinctive Characters.—Length of female amounting to 1·10 mm. Cephalic segment conspicuously dilated anteriorly, with the front narrowly rounded. Last pedigerous segment very small. Genital segment only slightly dilated in front ; seminal receptacle produced behind to a linguiform lappet. Caudal rami about twice as long as broad, innermost apical seta fully three times as long as the outermost, bristle of outer edge rather remote from the apex. Ovisacs narrow oblong and rather divergent. Anterior antennae considerably produced and densely setiferous. Fourth pair of legs with the apical spines of inner ramus only slightly unequal. Last pair of legs with the proximal joint very short, setae of distal joint much produced, and of equal length.

Remarks.—This widely distributed species has generally been

recorded under the name of *Cyclops leuckarti*, Claus, but its identity with *C. obsoletus*, Koch, was stated by the present author in the year 1914, and as the specific name proposed by Koch is of much earlier date than that given to the species by Claus, it must of course be retained for this form. The species is easily recognisable by the shape of the anterior division of the body, the comparatively long and densely setiferous anterior antennae, as also by the narrow and divergent ovisacs. For comparison with the three other species here recorded, I give on the accompanying plate a figure of an ovigerous female together with some details. Any detailed description of this well-known form I do not think is requisite.

Occurrence.—Some few female specimens, exactly agreeing with the northern form, though of slightly larger size, were found in a sample taken by Dr. Purcell from a pond in the Cape Flats.

10. Mesocyclops neglectus, G. O. Sars.

(Plate X, figs. 19–22.)

Mesocyclops neglectus, G. O. Sars. Proceed. Zool. Soc. London, 1909, p. 51, pl. xiv, figs. 113–117.

Syn.: Cyclops hyalinus, Richard (not Rehberg).

Syn.: Cyclops oithonoides, Mrazek (not G. O. Sars).

Distinctive Characters.—Length of female, 0·80 mm. Body comparatively short, with the anterior division somewhat tumefied, but regularly oval in outline. Genital segment as in *M. obsoletus*. Caudal rami, however, much shorter, with the innermost apical seta scarcely more than twice as long as the outermost, and the bristle of outer edge not far remote from the apex. Ovisacs somewhat appressed to the tail. Anterior antennae comparatively less prolonged. Fourth pair of legs with the inner ramus narrowly produced, outer apical spine very small. Last pair of legs with the distal joint somewhat clavate in shape, its 2 setae very unequal in length.

Description of the Female.—The general shape of the body (see fig. 19), as compared with that in the preceding species, appears on the whole rather shorter and stouter, with the anterior division considerably tumefied and, seen dorsally, rather regularly oval in outline, the greatest width occurring about in the middle. The frontal part of the cephalic segment is also more obtusely blunted than in *M. obsoletus*. The last pedigerous segment is still smaller than in that species, with the lateral parts scarcely at all expanded.

The tail scarcely exceeds half the length of the anterior division,

and has the genital segment very narrow, though rather similar in structure to that in the preceding species, with the seminal receptacle of the same characteristic shape. The caudal rami (fig. 20) are, however, comparatively shorter and stouter, with the outer-edge bristle attached much nearer to the tip. The mutual relation of the apical setae is also somewhat different, the innermost one being scarcely more than twice as long as the outermost.

The ovisacs (see fig. 19) are comparatively small and somewhat appressed to the sides of the tail.

The anterior antennae are scarcely as long as in *M. obsoletus*, but of a very similar structure, being, as in all the other species of this genus, composed of 17 joints.

The natatory legs are on the whole less robust than in the preceding species, and in particular is the 4th pair distinguished by the slender form of the rami, the terminal joint of the inner one being quite unusually narrowed, with the outer apical spine much reduced in size.

The last pair of legs (fig. 21) are comparatively shorter and stouter than in *M. obsoletus*, and the setae of the distal, somewhat claviform joint are very unequal in length.

Remarks.—This species was described by the present author in the year 1909 from specimens obtained in the great Central African lakes. It is closely allied to *M. crassus*, Fischer (*hyalinus*, Rehberg), with which it indeed has formerly been confounded, but differs in the less robust shape of the body, and more particularly in the rather dissimilar mutual relation of the caudal setae.

Occurrence.—Some few female specimens of this form were picked up from a sample taken by Dr. Purcell from a brick-pond at Bergvliet, Cape Peninsula, May 1896.

11. Mesocyclops oblongatus, n. sp.

(Plate XI, figs. 1–15.)

Distinctive Characters.—Length of female, 0·90 mm. Body more slender than in the other species, with the anterior division oblong oval in shape. Last pedigerous segment slightly produced laterally. Genital segment somewhat dilated in front. Caudal rami more produced than in *M. obsoletus*, innermost apical seta about three times as long as the outermost, bristle of outer edge not far remote from the apex. Ovisacs oval and closely appressed to the tail. Natatory legs resembling in structure those in *M. neglectus*. Last pair of legs with

the setae of the distal joint very unequal. Anterior antennae of male rather slender, but transformed in the usual manner.

Description of the Female.—The body (see figs. 1, 2) is comparatively more slender than in any of the other known species of the present genus, the anterior division being, seen dorsally, regularly oblong oval in shape, with the greatest width in the middle and about equal to half the length. Seen laterally (fig. 2), this division appears also far less vaulted dorsally than in the two preceding species. The cephalic segment is rather large and quite evenly rounded off in front. The last segment is, as usual, rather small, but fully twice as broad as long.

The tail considerably exceeds in length half the anterior division, and gradually tapers behind. The genital segment is conspicuously dilated in front, and has the seminal receptacle produced behind as in the other species (see fig. 4). The caudal rami (see fig. 5) are considerably more produced than in the two preceding species, attaining the length of the last 2 segments combined, and fully three times as long as they are broad. The bristle of the outer edge is very small, and not far remote from the apex. The mutual relation of the apical setae is about as in *M. obsoletus*.

The ovisacs (see fig. 1) are very unlike those in the said species, both as to shape and to attitude. They are of rounded oval form, and are always found closely appressed to the sides of the tail.

The anterior antennae (fig. 6) are comparatively less produced than in the two preceding species, extending, when reflexed, scarcely beyond the limits of the 1st free pedigerous segment, being, however, otherwise of quite normal structure.

The same may also be said of the posterior antennae and the oral pieces (figs. 7–9), and a detailed description of these appendages I do not therefore regard as requisite.

The natatory legs (figs. 10–12) also are built on the very same type as in the other species, and in particular is the similarity of the 4th pair (fig. 12) with that in *M. neglectus* rather perplexing.

The last pair of legs (fig. 13) agree with those in the said species in the great inequality of the 2 setae on the distal joint, the apical one being scarcely half as long as the lateral.

The *male* (fig. 14) is of somewhat smaller size than the female, and has the body rather more slender, with the anterior division conspicuously narrower and more blunted in front.

The tail is considerably more produced and, as usual, composed of 5 well-defined segments, the 1st of which is much the largest, and generally contains on each side an oval, dark-coloured spermatophore.

The anterior antennae are considerably more prolonged than in the female, and are, as usual, both transformed to powerful grasping organs, being in preserved specimens generally abruptly bent forwards (see fig. 14). Their closer structure is shown by fig. 15.

The last pair of legs, on the other hand, do not exhibit any obvious difference in their appearance from those in the female.

Remarks.—The above-described form, though rather nearly related to the two preceding ones, is unquestionably specifically distinct from either of them, being easily recognised by the rather different shape of the body, as also by the attitude of the ovisacs. In the structure of the several appendages it seems to come nearer to *M. neglectus* than to *M. obsoletus*.

Occurrence.—Numerous specimens of this form occurred in a sample taken by Dr. Purcell, April 1896, from a small duck-pond at Salt River, in the neighbourhood of Cape Town. It also occurred occasionally in gatherings taken on the Cape Flats.

12. Mesocyclops major, n. sp.

(Plate XI, figs. 16–20.)

Distinctive Characters.—Length of female, 1·52 mm. Body robust, with the anterior division much tumefied. Last pedigerous segment slightly expanded laterally. Genital segment conspicuously dilated in front. Caudal rami more produced than in *M. obsoletus*, mutual relation of the setae about as in that species. Anterior antennae comparatively less produced. Natatory legs with the rami broader; apical spines on inner ramus of 4th pair nearly equal. Last pair of legs with the distal joint tapered and the setae somewhat unequal.

Description of the Female.—The general shape of the body (see fig. 16) appears rather robust, the anterior division being considerably tumefied, with the greatest width somewhat in front of the middle. The last segment is slightly expanded laterally, and more than twice as broad as long.

The tail about equals half the length of the anterior division and gradually tapers distally. The genital segment is conspicuously dilated in front, its greatest width fully equalling the length. The seminal receptacle appears to be somewhat shorter than in the three preceding species, but otherwise of a very similar structure. The caudal rami (fig. 20) are rather produced, being more than three times as long as broad, and fully attaining the length of the 2 preceding segments combined. The mutual relation of the apical setae is nearly

as in *M. obsoletus*; but the outer-edge bristle occupies a somewhat different place, being attached at about the posterior third part of the ramus, whereas in *M. obsoletus* it occurs almost in the middle.

The ovisacs were not present in any of the specimens examined by me.

The anterior antennae (see fig. 16) are rather produced, though scarcely so much as in *M. obsoletus*, nor is their setous clothing so dense as in that species.

The natatory legs (figs. 17 and 18) are comparatively more strongly built than in any of the preceding species, with the rami considerably broader. Those of the 4th pair (fig. 18) are, however, as usual, somewhat more slender than the others, with the inner ramus more produced. The 2 apical spines on this ramus are only slightly unequal.

The last pair of legs (fig. 19) are in particular distinguished by the shape of the distal joint, which is conspicuously contracted towards the tip. Its 2 setae are rather unequal in length.

Remarks.—The present form bears a rather close resemblance to *M. obsoletus*, so as perhaps, on a superficial examination, easily to be adduced to that species. It is, however, of much larger size, and, as it also exhibits some slight differences in the structural details, its specific distinctness appears to me to be indubitable.

Occurrence.—Only a few female specimens of this form have as yet come under my notice. They were found in a sample taken by Dr. Purcell from a brick-pond at Bergvliet, Cape Peninsula, May 1896.

Gen. LEPTOCYCLOPS, G. O. Sars.

13. Leptocyclops sublaevis, n. sp.

(Plate XII, figs. 1–10.)

Distinctive Characters.—Length of female, 1·20 mm. Body very slender, with the anterior division only slightly vaulted dorsally. Last pedigerous segment narrowly produced laterally. Genital segment rather broad at the base, seminal receptacle simple. Caudal rami considerably produced, without any distinct serration of the outer edge, innermost apical seta only slightly longer than the outermost. Ovisacs somewhat divergent. Anterior antennae moderately slender, 12-articulate, outer joints rather elongated. Posterior antennae with the terminal joint shorter than the preceding one. The 3 anterior pairs of legs with 3 outer-edge spines on the terminal joint of outer ramus. Fourth pair with only 2 such spines, inner

ramus longer than outer, and the apical spines normally developed. Last pair of legs with the spine of inner edge exceedingly strong.

Description of the Female.—The body (see fig. 1) is very slender, with the anterior division only slightly dilated, and, seen dorsally, oblong oval in shape, with the greatest width somewhat in front of the middle, and scarcely attaining half the length. The lateral corners of the segments are somewhat projecting behind, in particular those of the penultimate segment. The last pedigerous segment is short and broad, with the lateral parts produced to narrow, somewhat recurved lappets tipped with fine hairs.

The tail is very slender and attenuated, equalling about in length $\frac{2}{3}$ of the anterior division. The genital segment does not exceed in length the 2 succeeding segments combined, but is rather dilated at the base, its width here somewhat exceeding the length. The seminal receptacle is of quite simple structure. The caudal rami (see fig. 10) are very narrow and prolonged, attaining nearly the length of the 3 preceding segments combined. They are only very slightly divergent, and have the outer edge in most cases perfectly smooth, without the small denticles flanking this edge in most other species of the present genus. Only in a single case a slight indication of such denticles was observed immediately in front of the outer-edge bristle. This bristle is very small, and attached at a short distance from the tip of the ramus. The 2 middle apical setae are rather produced, though somewhat unequal in length, the inner one being, as usual, much the longer. The innermost seta is rather small, only slightly exceeding in length the outermost, which, however, is much coarser, almost spiniform.

The ovisacs (see fig. 1) are of oblong or somewhat fusiform shape, and rather divergent. As in all other known species of the present genus, their outer coating is very sharply marked and everywhere quite even.

The anterior antennae (fig. 2) are rather slender and attenuated, extending, when reflexed, about to the end of the 2nd free pedigerous segment. They are, as in the other species of this genus, only composed of 12 joints, this reduction being apparently due to a concrescence of some of the short joints following the 7th one in the 17-articulate antennae of the 2 preceding genera. In the present species the 3 last joints are remarkably narrow and prolonged.

The posterior antennae (fig. 3) are scarcely half as long as the anterior, and have the terminal joint unusually short, scarcely attaining the length of the preceding joint.

The oral pieces do not exhibit any more noticeable particularity in their structure.

The 3 anterior pairs of legs (figs. 4 and 5) differ, however, essentially from those in the preceding genus in the armature of the terminal joint of the outer ramus, this joint having 3, instead of 2, spines on the outer edge. In the 1st pair (fig. 4) these spines are rather thin, but in the 2 succeeding pairs (fig. 5) they are well developed and, like the strong apical spine, distinctly denticulate. The 4th pair of legs (fig. 6) are more in accordance with those in *Mesocyclops*, having only 2 outer-edge spines on the terminal joint of the outer ramus. In the present species these legs are rather strongly built, with the inner ramus distinctly projecting beyond the outer, and having the 2 apical spines well developed, though of somewhat unequal length.

The last pair of legs (fig. 7) are very unlike those in the 2 preceding genera, each leg being only composed of a single short and somewhat flattened joint, which terminates in a conical lappet tipped by a thin bristle. A similar, but rather shorter, bristle issues from a knob-like prominence outside the joint, and opposite this bristle a very strong spine is attached to the inner edge, curving downwards and coarsely denticulated throughout.

The *male* (fig. 8) is much smaller than the female, and of a quite particularly slender form of the body, the anterior division being only very slightly dilated and the tail extremely narrow and prolonged.

The anterior antennae (fig. 9) are transformed in the usual manner, but appear comparatively shorter and stouter than in the species of the preceding genus.

Remarks.—This is a quite genuine member of the present genus, though apparently lacking on the caudal rami the usual serration of the outer edge. In so far it somewhat resembles the European species *L. speratus* (Lilljeb.), from which it, however, in some other respects differs decidedly.

Occurrence.—Several specimens of this form were found in samples taken by Dr. Purcell from ponds in the Cape Flats. Most of the preserved specimens showed a well-marked light corneous colour of the body.

14. Leptocyclops prasinus (Fischer).

(Plate XII, figs. 11–20.)

Cyclops prasinus, Fischer. Beitr. zur Kennt. der Entomostraceen, p. 652, pl. xx, figs. 19–26.

Syn.: Cyclops pentagonus, Vosseler.

Distinctive Characters.—Length of female, 0·70 mm. Body comparatively short, with the anterior division rather tumefied. Last pedigerous segment very small. Genital segment only slightly dilated in front, but rather protuberant below, seminal receptacle of complicate structure. Caudal rami very short, with the innermost apical seta rudimentary. Ovisacs appressed to the tail. Anterior antennae not much produced, 12-articulate. Posterior antennae with the terminal joint rather prolonged. The 2 anterior pairs of legs with 3 outer-edge spines on the terminal joint of outer ramus, the 2 succeeding pairs with only 2 such spines; 4th pair rather feeble, with both rami narrow attenuated and of about equal length, apical spines of the inner one thin and very unequal. Last pair of legs with the spine of inner edge narrow, almost setiform.

Description of the Female.—The body (see figs. 11, 12) is on the whole of a much shorter and stouter appearance than in the preceding species, with the anterior division somewhat tumefied and, seen dorsally, rather regularly oval in shape. Seen laterally (fig. 12), the dorsal face of this division appears considerably vaulted throughout. The lateral corners of the segments are obtusely rounded off and not at all projecting. The last segment is very small, with the lateral parts not expanded.

The tail does not attain half the length of the anterior division, and has the genital segment only slightly dilated in front, but rather protuberant below (see fig. 12). The seminal receptacle I have not been enabled to trace distinctly in the preserved specimens, but, according to the statement of Dr. Schmeil, it is of a rather complicate structure. The caudal rami (fig. 20) are very short, being not nearly twice as long as broad, and scarcely exceeding the anal segment in length. Their outer edge does not exhibit any traces of denticles, but has the usual short bristle at some distance from the tip. The innermost apical seta is very small, scarcely attaining half the length of the outermost.

The ovisacs (see fig. 11) are of a similar shape to that in the preceding species, but are far less divergent, being generally rather closely appressed to the sides of the tail. The enclosed ova are few in number and appear somewhat angular by mutual pressure, only 2 rows being visible in the dorsal aspect of the animal.

The anterior antennae (fig. 13) are comparatively somewhat shorter and thinner than in the preceding species, but, as in that species, composed of 12 joints, the mutual relation of which, however, is a little different, the outermost joints being far less prolonged.

The posterior antennae (fig. 14), on the other hand, are considerably

more slender than in the said species, with the terminal joint much produced, far exceeding the preceding joint in length.

The 2 anterior pairs of legs (figs. 15 and 16) agree on the whole in structure with those in the preceding species, having 3 outer-edge spines on the terminal joint of the outer ramus. In the 2 succeeding pairs (figs. 17 and 18), however, only 2 such spines are present. The 4th pair of legs (fig. 18) are, moreover, rather feebly developed, both rami being remarkably narrow and attenuated and of uniform size. The apical spines on the inner ramus are very thin and exceedingly unequal in length, and also the spines of the outer ramus appear more feebly developed than usual.

The last pair of legs (fig. 19) are extremely small, but agree on the whole in structure with those in the preceding species, except that the spine of the inner edge is far less strong, being almost setiform in appearance.

Remarks.—This is a rather anomalous species, and indeed at first I felt some doubt about its real systematic position. After a careful anatomical examination I have, however, arrived at the conclusion that it ought to be included in the genus *Leptocyclops*, in spite of some rather puzzling divergences from the usual type.

Occurrence.—Some few female specimens of this small Cyclopid were picked up from samples taken by Dr. Purcell, partly from a dam at Bergvliet, Cape Peninsula, partly from ponds on the Cape Flats. The species seems to be widely distributed, being recorded from many distant parts of the continents.

AFROCYCLOPS, n. g.

Remarks.—This new genus is proposed to include the species originally described by Brady under the name of *Cyclops gibsoni*. Although this form in several respects bears a close resemblance to the typical species of the genus *Leptocyclops*, I have, on a closer examination, found that it in reality exhibits in the structural details some points of divergence sufficiently important to remove it from that genus. The chief differences refer to the structure of the legs and to the mutual relation of the 2 sexes.

15. Afrocyclops gibsoni (Brady).

(Plate XIII.)

Cyclops gibsoni, Brady. Proc. Zool. Soc. London, 1904, vol. ii, p. 123, pl. 6, figs. 1–10.

Syn. : Cyclops longistylis, Brady.

Description of the Female.—The length of fully adult specimens amounts to 1·20 mm., and this form is accordingly of middle size.

In shape the body appears rather robust, with the anterior division, seen dorsally (fig. 1), oblong oval in outline, its greatest width occurring about in the middle and equal to half the length. Seen laterally (fig. 2), the cephalic segment appears remarkably deep and gently vaulted dorsally, whereas the remaining part of the anterior division is somewhat depressed, with the lateral lobes of the segments slightly expanded. The last segment is rather broad and somewhat flattened, with the lateral parts distinctly lamellar, and clothed at the tip with a number of fine hair-like bristles.

The tail is comparatively less attenuated than in the *Cyclopidae* described in the preceding pages, and in particular, seen laterally, exhibits a rather clumsy appearance (see fig. 2). The genital segment is rather large, being fully as long as the 3 succeeding segments combined, and tapers only slightly behind. The seminal receptacle is comparatively of simple structure and inconsiderable size. The caudal rami are considerably produced, attaining nearly the length of the 3 preceding segments combined, and are narrow linear in shape. They are slightly divergent, and have the edges perfectly smooth. The 2 middle apical setae are well developed and of the usual appearance, whereas the other 2 setae are very small and subequal in length, that attached to the inner corner being, however, much thinner than that on the outer. The outer-edge bristle is extremely minute and attached near the tip of the ramus.

The ovisacs (see fig. 1) are comparatively small and oval in shape, being only slightly divergent.

The anterior antennae (fig. 3) are built on the very same type as in the genus *Leptocyclops*, being only composed of 12 joints. They are, however, comparatively less produced, extending, when reflexed, scarcely beyond the limits of the cephalic segment. Of the joints, the last is distinctly longer than the next preceding ones.

The posterior antennae (fig. 4) are comparatively short and stout, with the terminal joint of about same length as the penultimate one.

The mandibles (fig. 5) and maxillae (fig. 6) are of quite normal structure.

The 2 pairs of maxillipeds (figs. 7 and 8) are, however, comparatively shorter and stouter than in the preceding Cyclopids, the anterior ones (fig. 7) being in particular distinguished by the shortness of the

unguiform process issuing from the proximal joint of the terminal part.

The natatory legs (figs. 9–12) are very powerfully developed, and differ very essentially from those in *Leptocyclops* by the terminal joint of the outer ramus being in all the pairs only armed with 2 spines of the outer edge.

The 1st pair of legs (fig. 9) are, as usual, somewhat smaller than the succeeding ones, and have the inner ramus conspicuously broader than the outer, but scarcely longer. These legs, moreover, differ from the others in the presence of a well-marked spine at the inner distal corner of the basal part, and in the apical spine of the outer ramus being replaced by an ordinary seta.

The 2 succeeding pairs of legs (figs. 10 and 11) are of quite uniform structure, with both rami very strong and of about equal size. The spines of the outer ramus are very coarse, and successively increase somewhat in length distally, all being distinctly denticulated on the edges.

The 4th pair of legs (fig. 12) have, as usual, the rami somewhat narrower and more unequal, the inner one projecting distinctly beyond the outer. The terminal joint of this ramus has, moreover, only 2 setae inside, but is armed on the tip with 2 coarse spines of unequal length, flanked on each side by a dentiform projection of the joint.

The last pair of legs (fig. 13), as in the preceding genus, are uniarticulate, but the joint differs somewhat in shape, being comparatively longer and narrower, with the base conspicuously contracted. The spine of the inner edge is rather strong and coarsely denticulated on the outer edge, being slightly curved inwards, not, as in *Leptocyclops*, outwards.

The *male* (fig. 15), unlike what is generally the case, is of about same size as the female, and exhibits a similar robust shape of the body, the anterior division being scarcely narrower, though differing somewhat in the more extant lateral corners of the segments. The last pedigerous segment has the lateral lobes more evenly rounded off than in the female, and fringed throughout with a regular row of densely crowded short bristles (see fig. 18).

The tail (*ibid.*) appears somewhat more attenuated than in the female, and is, as usual, composed of 5 well-defined segments, the 1st of which is rather large and considerably dilated in front, exhibiting very distinctly the 2 chambers for lodging the spermatophores. The spine attached to the end of this segment on each side is much

prolonged, extending almost as far as the 3rd segment, and is coarsely denticulate. The caudal rami are exactly of same appearance as in the female.

The anterior antennae (fig. 16) are very powerfully developed, and in the preserved specimens are generally bent forwards, being curved in a hamiform manner (see fig. 15). They exhibit the 3 usual successive sections well defined from each other. The proximal section is nearly of equal width throughout, and has the number of joints rather reduced, some of them being only faintly indicated. Three of the setae attached to this section are exceedingly strong and produced, pointing in different directions. The middle section is considerably tumefied in its proximal part, and is traversed by a very strong muscle acting upon the terminal section. It is divided into 4 joints, the 2 middle ones shorter than the other 2, and is armed with a few spines of different size. The terminal section is much narrower and somewhat shorter than the middle one, with which it is very movably articulated. It is only composed of 2 joints, the proximal one somewhat curved and highly chitinised, the distal one of about same length but rather narrower, and terminating in a somewhat claw-shaped point.

The natatory legs are still more powerfully built than in the female, and in particular are the 2 middle pairs (fig. 17) in this respect highly distinguished. The proximal spine on the outer ramus is about as in the female, but the 4 other spines on this ramus, as also the apical spine on the inner ramus, exhibit a rather different appearance, being quite extraordinarily strong, dagger-like, with the edges perfectly smooth. The last pair of legs (see fig. 18) are exactly of same structure as in the female.

Remarks.—This form was originally described by Brady in the year 1904 from specimens collected at Greytown, Natal, and the same species was subsequently (1912) also recorded from Steinkopf, Bushmanland, and Berseba, South-West Africa, by C. van Douwe, who gives some additional notes on it, accompanied by a few figures. One of these figures, representing an ovigerous female, is, however, quite misleading, having apparently been drawn from a specimen deformed by action of the preserving fluid, all the segments being drawn out from each other in quite an unnatural manner, so as to give to the body a very narrow and elongated shape. Yet the other 3 detail-figures do not leave any doubt on the identity observed by him with Brady's species. In a more recent paper Brady has reproduced a number of drawings, made by Dr. Graham, of diverse

Cyclopids from living specimens, and has tried to identify these forms. One of them, to which the specific name *longistylis*, n. sp. has been given, looks so very like the form here treated of, that I cannot but believe it to be the very same species.

Occurrence.—A rather considerable number of specimens of this Cyclopid have been secured. They were found in several samples taken by Dr. Purcell from ponds in the neighbourhood of Cape Town. Unlike what is generally the case, male specimens were much more frequent than females.

Gen. PLATYCYCLOPS, G. O. Sars.

16. Platycyclops phaleratus (Koch).

(Plate XIV, figs. 1–4.)

Cyclops phaleratus, Koch. Deutschlands Crustaceen, etc., Heft 21, pl. ix.

Syn. : Cyclops canthocarpoides, Fischer.

Distinctive Characters.—Length of female, 0·80 mm. Body robust, with the anterior division rather broad and expanded. Last pedigerous segment almost three times as broad as long. Tail strongly built, with the segments partly spinulose. Genital segment short and broad. Caudal rami scarcely twice as long as broad, each with 3 oblique rows of small spinules across the dorsal face, outermost apical seta spiniform and about the length of the innermost, the 2 middle setae rather produced and distinctly spinulose. Ovisacs closely appressed to the tail. Anterior antennae comparatively feeble, 10-articulate, posterior ones, however, very strongly built. Last pair of legs imperfectly developed, each replaced by a slight rim armed with 3 sub-equal spiniform setae.

Remarks.—The present form is so well known and of such a characteristic appearance, that I think I may dispense with giving any detailed description of it. Yet, for comparison with the succeeding species, the above short diagnosis is given, and, on the accompanying plate, a figure of an ovigerous female together with a few detail-figures.

Occurrence.—Only some few female specimens of this easily recognisable form have been found in the material forwarded to me from the South African Museum. They were picked up from some samples taken by Dr. Purcell on the Cape Flats. The species has a very wide geographical distribution, being recorded from all of the five chief continents.

17. Platycyclops poppei (Rehberg).

(Plate XIV, figs. 5–17.)

Cyclops poppei, Rehberg. Beitr. z. Kenntn. d. freilebenden Susswasser Copepoden, Abh. d. nat. Verein zu Brehmen, p. 550, pl. vi, figs. 9–11.

Distinctive Characters.—Length of female, 0·76 mm. Body less robust than in the preceding species, with the anterior division comparatively narrower. Tail slightly attenuated, with the genital segment more prolonged. Caudal rami fully three times as long as broad, each with a single oblique row of small spinules across the dorsal face, outermost apical seta shorter than the innermost. Ovisacs slightly divergent. Anterior antennae short, and remarkably broad at the base, 8-articulate, the posterior ones less strongly built than in *P. phaleratus*. Last pair of legs well defined, resembling in structure those in *Leptocyclops*. Anterior antennae in male remarkably short and stout.

Description of the Female.—The general shape of the body (see fig. 5) appears comparatively less robust than in the preceding species, the anterior division being far less expanded and, seen dorsally, rather regularly oval in outline, with the greatest width about in the middle. The cephalic segment is comparatively large, occupying rather more than half the length of the anterior division, and is gradually contracted anteriorly, with the front narrowly rounded. The lateral corners of the 3 succeeding segments are somewhat projecting behind. The last segment is comparatively short but rather broad, with the lateral parts somewhat produced and clothed at the tips with fine spinules.

The tail about equals in length $\frac{2}{3}$ of the anterior division, and appears somewhat less strongly built than in *P. phaleratus*, tapering gradually behind. The genital segment is somewhat dilated at the base, and considerably exceeds the length of the 2 succeeding segments combined. The seminal receptacle (see fig. 14) is comparatively of simple structure and transversely oval in shape. The caudal rami (see fig. 15) are much more produced than in the preceding species, being nearly as long as the 2 last caudal segments combined, and fully three times as long as broad. They are of linear shape and scarcely at all divergent, each ramus having across the dorsal face a single oblique row of small spinules. The apical setae are rather unequal in length, the 2 middle ones being, as usual, much longer than the other 2, the inner of them attaining the length of the tail. The

innermost apical seta is a little longer than the outermost, but much thinner. The bristle of the outer edge is very small and attached at a short distance from the tip.

The ovisacs (see fig. 5) are of oval shape, and less closely appressed to the sides of the tail than in the preceding species. They contain only a limited number of ova.

The anterior antennae (fig. 6) are very short and stout, scarcely exceeding half the length of the cephalic segment, and are remarkably expanded at the base. They are only composed of 8 joints rather densely clothed with setae, some of which are distinctly ciliated. Of the joints the first 2 are somewhat lamellar, and less sharply defined from each other than the succeeding joints, which are of rather unequal size, the 4th joint being much the largest.

The posterior antennae (fig. 7) are comparatively less strongly built than in *P. phaleratus*, but of a very similar structure, the terminal joint being much shorter than the preceding one.

The 2 pairs of maxillipeds (figs. 8 and 9) appear somewhat poorly developed, in particular the posterior ones (fig. 9), on which the setae are very much reduced.

The natatory legs (figs. 10–12) have the basal part rather broad, and fringed outside with small denticles. The rami are, however, comparatively narrow, though well chitinised, and somewhat unequal in length, the inner one projecting distinctly beyond the outer. The 2 proximal joints of the latter ramus are, like the basal part, fringed with small spinules on the outer edge, and the terminal joint is in the 3 anterior pairs armed with 3 outer-edge spines. The inner ramus of these pairs is distinguished by the last 2 joints being produced at the outer corner to a sharp spiniform process.

The 1st pair of legs (fig. 10) are, as usual, somewhat smaller than the others, and have a rather strong deflexed spine at the inner distal corner of the basal part, wanting, moreover, an apical spine on the outer ramus. The inner ramus is remarkably slender, with the terminal joint comparatively narrower than on the other pairs and the apical spine more produced.

The 4th pair of legs (fig. 12) differ from the others by the want of one of the outer-edge spines on the terminal joint of the outer ramus, as also by the last 2 joints of the inner ramus not being remarkably produced at the outer corners. The terminal joint of this ramus has, moreover, as usual, only 2 setae inside, whereas at the tip 2 spines of unequal length are attached, flanked by 2 dentiform processes.

The last pair of legs (fig. 13) are very small, but pretty well defined

from the segment, and on the whole rather similar in structure to those in the genus *Leptocyclops*, each leg having the form of a somewhat trigonal lamella tipped with a thin bristle, and, moreover, provided outside with a similar bristle, inside with a strong deflexed spine coarsely denticulated along the outer edge.

The *male* (fig. 16) is of somewhat smaller size than the female, but of a rather similar shape of the body, the tail being, however, somewhat more produced in relation to the anterior division, and, as usual, composed of 5 well-defined segments.

The anterior antennae (fig. 17) are very strongly built, though, as compared with those in the preceding genera, of a rather short and clumsy appearance. The proximal section is composed of 6 well-defined joints, the 1st of which is much the largest, and provided about in the middle of the anterior edge with a peculiarly transformed, somewhat lamellar spine, obtuse at the tip, and fringed with coarse cilia. The remaining joints of this section are all of them very short and somewhat projecting behind in the form of small rounded lobules. The middle section is considerably tumefied and oval in shape, containing a very strong muscle, which joins the terminal section by a highly chitinised tendon. It is, as usual, composed of 4 joints, the 2nd somewhat cup-shaped, the 4th obtusely blunted at the end and larger than the others. Anteriorly this section exhibits several irregular rounded lobes, and is armed with 3 coarse more or less curved spines. The terminal section has the appearance of a short curved claw, but is in reality, as in the other *Cyclopidæ*, composed of 2 joints, the distal of which, however, is very small and spiniform.

The other appendages are exactly of same structure as in the female.

Remarks.—In the outward appearance the present form looks rather like the European species, *P. affinis*, G. O. Sars. It is, however, essentially distinguished both from this and the preceding species by the very different structure of the anterior antennae, which on the other hand is almost precisely as in *P. fimbriatus* (Fischer). On this cause it has indeed been considered by Dr. Schmeil as only a variety of that species. Yet its specific distinctness appears to me to be evident, as the shape of the caudal rami is very conspicuously different in these two forms.

Occurrence.—Several specimens of this form, almost all of the male sex, occurred in a sample taken by Dr. Purcell from a pond at Fishhoek, Cape Peninsula. In addition to the occurrence of this species in

Europe and South Africa, I have recorded it from another widely distant locality, viz. from one of the Pacific isles (Hawaii).

CRYPTOCYCLOPS, n. g.

Remarks.—This new genus is proposed to include those species of the old genus *Cyclops* in which the rami of all the natatory legs are only composed of 2 joints by the complete fusion of the 2 outer ones. True, in some few species still retained in the genus *Cyclops* (sens. strict.), a somewhat similar reduction of the rami is observed in one or other of the foremost pairs of legs; but in none of these species the reduction extends to the 2 posterior pairs, which in all of them are normally developed, with distinctly 3-articulate rami. Another character distinguishing the present genus is the extremely rudimentary condition of the last pair of legs, which have the form of insignificant rod-like appendages, easily escaping attention by their small size. In all the species, moreover, a very conspicuous slender, somewhat recurved seta is found attached to the lateral corners of the last pedigerous segment. The genus seems to be rich in species. In addition to the 2 first-described species, *C. varicans* and *bicolor*, the *Cyclops gracilis* of Lilljeborg ought to be adduced to this genus, and not, as formerly opined by me, to the genus *Mesocyclops*. Of the several Cyclopids recorded by the present author from the great Central African lakes, no less than five species are quite certainly referable to this genus, viz. *C. attenuatus*, *varicans*, *exiguus*, *Cunningtoni*, and *pachycomus*, and in the present account are added four apparently new species from South Africa.

18. Cryptocyclops assimilis, n. sp.

(Plate XV, figs. 1–8.)

Distinctive Characters.—Length of female, 1·10 mm. Body elongate, pyriform in shape, with the cephalic segment considerably dilated in front; lateral corners of the 3 succeeding segments rounded off. Last segment rather broad, with the seta of the outer corners well developed. Genital segment comparatively large, with the anterior half conspicuously dilated. Caudal rami rather produced, exceeding in length the last 2 segments combined, seta of inner corner shorter than that of the outer, bristle of outer edge somewhat remote from the apex. Anterior antennae 12-articulate, 1st, 3rd, and 7th joints the largest. Natatory legs with the distal joint of inner ramus much

broader than in *C. varicans*; apical spine of this ramus in 1st pair moderately strong and slightly procurved; 4th pair almost as strongly built as the preceding pairs, apical spines of inner ramus unequal in length. Last pair of legs rod-like, with a minute spinule inside the apical bristle.

Description of the Female.—The body (see fig. 1) is somewhat elongate and pronouncedly pyriform in shape, being rather broad in front and gradually tapered behind. The cephalic segment is considerably tumefied and broadly rounded off anteriorly, occupying a little more than half the length of the anterior division. The lateral lobes of the 3 succeeding segments are scarcely at all projecting and obtusely rounded off at the tips. The last segment is rather broad, with the lateral corners somewhat produced and each tipped with a slender gently recurved seta.

The tail somewhat exceeds half the length of the anterior division, and has the genital segment comparatively large, being conspicuously expanded in its anterior half. The caudal rami (see fig. 8) are narrow linear in shape and rather produced, being fully four times as broad as long and considerably exceeding in length the last 2 segments combined. The apical setae are very unequal in length, the 2 middle ones being, as usual, well developed and distinctly jointed at the base, whereas the other 2 are much shorter, that attached to the inner corner being in particular very small, and nearly attaining the length of that on the outer corner. The bristle of the outer edge is rather remote from the apex, being attached at about the posterior 3rd part of the ramus.

The ovisacs were wanting in all the specimens examined.

The anterior antennae (fig. 2) are comparatively short, scarcely attaining the length of the cephalic segment, and gradually taper distally. They are only composed of 12 joints clothed in front with scattered setae. The mutual relation of the joints is somewhat different from that observed in *C. varicans*, the type of the genus. In the present species the 1st, 3rd, and 7th joints are much the largest.

The posterior antennae (fig. 3) do not exhibit any noticeable particularity in their structure, and the same is also the case with the oral pieces.

The natatory legs (figs. 4 and 5), on the other hand, are highly distinguished by their unusually short and clumsy appearance, both rami in all of them being only composed of 2 joints, the proximal one quite short, the distal one more than twice as large and in reality answering to the 2 outer joints in other Cyclopidae combined. In so far

the structure of the legs in the present genus agrees with that found in still immature specimens of other *Cyclopidae*. The rami are in all the pairs of about equal size, the outer one differing, as usual, from the inner by its armature of spines outside. In the 3 anterior pairs 4 such spines are counted, one of them being attached to the proximal joint, the other 3 to the distal joint. The inner ramus of these pairs has only a single spine attached to the tip and accompanied inside by a seta.

The 1st pair of legs (fig. 4) are, as usual, somewhat smaller than the others, and differ, moreover, from them in a quite similar manner to that mentioned in the preceding Cyclopids, viz. by the presence of a deflexed spine on the inner corner of the basal part, and by the want of a true apical spine on the outer ramus. The inner ramus is distinguished by the comparatively strong development of the apical spine, which is considerably produced and somewhat procurved at the end.

The 4th pair of legs (fig. 6) are almost as strongly built as the next preceding ones, but differ in the want of one of the outer-edge spines on the distal joint of the outer ramus, as also of the seta inside the proximal joint. The inner ramus, too, has only 3 setae inside the distal joint, but 2 well-defined spines of unequal length on the tip. The shape of this joint is in all the pairs conspicuously different from that in the type species, being considerably broader, with the outer-edge seta more remote from the apex.

The last pair of legs (see fig. 7) are extremely small and rudimentary, each consisting of a thin rod-like joint attached to the hind edge of the corresponding segment and tipped with a small bristle accompanied inside by a minute spinule.

Remarks.—The present form is apparently nearly allied to the typical species, *C. varicans*, G. O. Sars, but is of considerably larger size, differing, moreover, somewhat in the general shape of the body, in the more produced caudal rami, and in the shape of the natatory legs.

Occurrence.—Some specimens of this form, all of the female sex, were found in a sample taken by Dr. Purcell from a pond on the Cape Flats.

19. Cryptocyclops crassipes, n. sp.

(Plate XV, figs. 9–14.)

Distinctive Characters.—Length of female, 0·80 mm. Body shorter and stouter than in the preceding species, with the cephalic segment less tumefied. Lateral corners of the 3 succeeding segments some-

what projecting behind. Genital segment gradually tapered distally. Caudal rami less produced than in the preceding species, with the innermost apical seta longer than the outermost, bristle of outer edge not far remote from the apex. Anterior antennae 11-articulate, 1st and 4th joints the largest. First pair of legs with the apical spine of inner ramus remarkably strong and distinctly procurved. Fourth pair of legs less strong than the others, with the distal joint of inner ramus attenuated, apical spines well developed.

Description of the Female.—The body (see fig. 9) appears on the whole rather shorter and stouter than in the preceding species, with the anterior division, seen dorsally, more regularly oval in outline. The cephalic segment is rather large, being almost twice as long as the remaining part of this division, but appears less tumefied than in the said species. The 3 succeeding segments are very short and densely crowded, with the lateral corners somewhat projecting behind. The last segment is about twice as broad as long, and carries on each side the slender curved seta characteristic of the genus.

The tail scarcely exceeds half the length of the anterior division and gradually tapers distally. The genital segment is less expanded in its anterior part than in the preceding species, and more evenly tapered behind. The caudal rami (fig. 14) are less produced, not nearly attaining the length of the 2 preceding segments combined, and scarcely more than twice as long as broad. The mutual relation of the apical setae is also somewhat different, that attached to the inner corner being more than twice as long as that on the outer. The bristle of the outer edge is rather small and not far remote from the apex.

The ovisacs (see fig. 9) are comparatively small and oval in shape, being only slightly divergent.

The anterior antennae (fig. 10) are comparatively shorter than in the preceding species, and apparently only composed of 11 joints. The mutual relation of the joints differs conspicuously from that in the said species, and more agrees with that in *C. varicans*.

The natatory legs (figs. 11–13) are on the whole built on the same type as in the preceding species, yet exhibiting, on a closer comparison, some well-marked differences in their details.

The 1st pair of legs (fig. 11) are in particular distinguished by the extraordinary coarse development of the apical spine on the inner ramus, this spine being, moreover, of a dark corneous colour, so as to be easily perceived even in the intact animal projecting below.

The 2 succeeding pairs of legs (fig. 12) are remarkably strongly built, with the spines of the outer ramus unusually coarse.

The 4th pair of legs (fig. 13), however, are conspicuously more feeble in structure, with the rami comparatively rather narrower than in the other pairs, the distal joint of the inner ramus being in particular much contracted towards the end. The apical spines of this joint are well developed, though, as usual, somewhat unequal in length.

The last pair of legs are still more rudimentary than in the preceding species, but apparently of a similar structure.

Remarks.—This form is perhaps still more closely related to *C. varicans* than the preceding one, but its specific distinctness from either of them cannot in my opinion be questioned. The most characteristic feature of the species refers to the extraordinary development of the apical spine on the inner ramus of the 1st pair of legs, and indeed the specific name is proposed in allusion to this particularity.

Occurrence.—Some specimens of this form were picked up from samples taken by Dr. Purcell in ponds on the Cape Flats.

20. Cryptocyclops caudatus, n. sp.

(Plate XV, figs. 15–20.)

Distinctive Characters.—Length of female, 0·67 mm. Body slender and attenuated, with the anterior division only slightly dilated and the lateral corners of the segments rounded off. Last pedigerous segment comparatively small. Tail considerably produced, with the genital segment conspicuously contracted at the base, but immediately behind the contraction considerably bulging on each side. Caudal rami not much produced, innermost apical seta very small. Anterior antennae 10-articulate. Fourth pair of legs rather feeble, with only a single apical spine on the inner ramus.

Description of the Female.—In general appearance the body (see fig. 15) differs conspicuously from that in the two preceding species, being much more slender and attenuated, with the anterior division only slightly dilated. The cephalic segment somewhat exceeds in length the remaining part of this division, and is narrowly rounded in front. The 3 succeeding segments gradually diminish both in length and width, and have the lateral corners rounded off. The last segment is comparatively small, with the lateral parts only slightly produced, but tipped with the usual curved seta.

The tail is unusually slender and produced, attaining about $\frac{2}{3}$ of the length of the anterior division. The genital segment is of a very characteristic shape, being remarkably contracted at its origin, but immediately behind this contraction bulging considerably on each side; its ventral face appears also in this region rather protuberant. The caudal rami (fig. 20) are a little more than twice as long as broad, and are distinguished by the rudimentary condition of the innermost apical seta, which scarcely exceeds in length $\frac{1}{3}$ of the outermost.

Ovisacs were not present in any of the specimens examined.

The anterior antennae (fig. 16) are rather short and apparently only composed of 10 joints, though a slight indication to a subdivision of the 5th joint may be traced.

The natatory legs (figs. 17–19) agree in structure rather closely with those in the European species, *C. bicolor*, G. O. Sars. As in that species, the 4th pair (fig. 19) is much feebler than the others, with both rami remarkably narrow, and the spines of the outer one much reduced in size. The inner ramus has, moreover, only a single spine on the tip, and the basal part is blunted at the inner corner, with the edge minutely spinulose.

The last pair of legs are extremely small, each only provided with a single short bristle on the tip.

Remarks.—The present form seems to be rather closely related to *C. bicolor*, the structure of the several limbs being almost exactly as in that species. It is, however, at once distinguished by the much more slender form of the body, as also by the different shape of the genital segment and of the caudal rami. Another species may also here be mentioned, viz. that recorded by the present author from the Lake Tanganyika under the name of *Cyclops exiguus*, this form exhibiting a rather similar slender shape of the body to that here described. It is, however, of much smaller size, and, moreover, differs conspicuously in the structure of the genital segment.

Occurrence.—Only some few female specimens of this form have as yet come under my notice. They were picked up from a sample taken by Dr. Purcell from a pond on the Cape Flats.

21. Cryptocyclops inopinatus, n. sp.

(Plate XV, figs. 21–25.)

Distinctive Characters.—Length of female, 0·70 mm. Body moderately slender, with the anterior division oblong oval in shape. Last pedigerous segment more than twice as broad as long. Genital

segment gradually contracted behind. Caudal rami about the length of the last 2 segments combined, innermost apical seta very small, outer-edge bristle remote from the apex. Ovisacs large, appressed to the tail. Anterior antennae 11-articulate. Natatory legs comparatively less strong than in the other species, 4th pair with only a single apical spine on the inner ramus.

Description of the Female.—The body (see fig. 21) is not nearly so slender and elongated as in *C. caudatus*, but comparatively narrower than in the other 2 species here recorded, the anterior division, seen dorsally, being of a rather regular oblong oval shape, with the greatest width nearly in the middle. The cephalic segment is about twice as long as the 3 succeeding segments combined, and has the frontal part somewhat protruding. The succeeding segments are densely crowded, with the lateral corners scarcely projecting, except those of the penultimate segment. The last segment is of moderate size, with the lateral corners slightly produced and tipped with the usual curved seta.

The tail about equals in length $\frac{2}{3}$ of the anterior division, and gradually tapers distally. The genital segment is rather broad at the base, but contracts evenly behind, being about the length of the 3 succeeding segments combined. The caudal rami (see fig. 21) are of the usual narrow linear shape, and do not fully attain the length of the last 2 segments combined. The mutual relation of the apical setae is about as in *C. caudatus*, that attached to the inner corner being extremely small and rudimentary. The bristle of the outer edge is rather remote from the apex.

The ovisacs (see fig. 21) are comparatively large, of oblong oval shape, and closely appressed to the sides of the tail, each containing a somewhat limited number of ova.

The colour of the living animal is whitish pellucid, with a very faint yellowish tinge. The ovarial tubes with their several ramifications are easily traced through the transparent integuments, and the eye is very conspicuous by its bright red pigment and glistening lateral facets.

The anterior antennae (fig. 22) are composed of 11 distinctly defined joints clothed with rather coarse and somewhat unequal setae. Of the joints, the 1st, 3rd, and 7th are distinctly larger than the others.

The natatory legs (figs. 23–25) are comparatively of somewhat smaller size than in the other species, but built on the very same type. The 4th pair (fig. 25) appear, however, less reduced than in

C. caudatus, though, as in that species, having only a single slender apical spine on the inner ramus.

The last pair of legs exhibit a quite similar rudimentary condition as in the said species.

The *male* is of rather smaller size than the female, and has the body considerably more slender. It is, moreover, easily recognised by the transformed anterior antennae and by the tail being composed of 5 segments.

Remarks.—The present form is apparently nearly allied to *C. caudatus*, yet differing conspicuously in the general shape of the body, as also in that of the genital segment. It is also of somewhat larger size.

Occurrence.—The present form developed rather plentifully in a small aquarium prepared with mud kindly forwarded to me from the South African Museum, and taken by Mr. Barnard from a swamp in South-West Africa. The mud was not very productive, but yet yielded a few things of particular interest, among them the present Cyclopid. At first only a solitary nearly fully-grown specimen appeared in my aquarium. The specimen was left for further observation and was carefully watched every day. After some time it became laden with large ovisacs filled with the usual kind of thin-skinned ova, from which the Nauplii soon escaped, rapidly growing to mature specimens of both sexes. These, propagating in the usual manner, gave rise in their turn to succeeding generations, the result being that my aquarium at last abounded with specimens of this Cyclopid in different stages of development.

This is the first instance that I have succeeded in breeding *Cyclopidae* from dried mud. Indeed, I had formerly regarded such a breeding to be quite impossible, because no true resting ova, like those not unfrequently met with in the *Diaptomidae*, are produced at all by any form of the present group of *Copepoda*. Of course I was not a little puzzled by the development of the present Cyclopid in my aquarium. However, after having read the interesting observations made by Mr. Youday on North American *Cyclopidae*, I find a quite satisfactory explanation of the present case. According to the said distinguished author, in shallow swamps which have become completely dried up, specimens of Cyclops are occasionally found enclosed within a tight envelope or cyst, evidently formed to protect the animal against exsiccation, and thus to ensure its life in a latent or resting condition, until the swamps are again filled with water.

Now, it is very likely that the specimen at first observed in my

aquarium was in reality such an encysted individual, which happened to be included in the mud, and which revived in the aquarium, afterwards accomplishing its further development and multiplying in the usual manner. It may be assumed that in every case the encysted specimens are nearly fully-grown females, which have previously been fecundated, and thus are adapted to produce new generations of specimens, to ensure the continued existence of the species.

Division HARPACTICOIDA.

Fam. CANTHOCAMPTIDAE.

Gen. NITOCRA, Boeck.

22. Nitocra dubia, n. sp.

(Plate XVI, figs. 1–10.)

Distinctive Characters.—Length of female, 0·50 mm. Body not very slender, subcylindrical in shape. Rostre very small. Anal opercle and posterior edge of last caudal segment coarsely dentate. Caudal rami short, quadrangular. Anterior antennae 8-articulate, clothed with long curved setae, terminal part almost as long as the basal one. First pair of legs scarcely prehensile, the inner ramus being almost straight, with the outer 2 joints simple and, combined, longer than the 1st. Last pair of legs with the distal joint conically produced, inner expansion of proximal joint short, truncated at the end.

Description of the Female.—The body (see figs. 1 and 2) is comparatively less elongate than in most other species of the present genus, and of short cylindrical shape, with the anterior division only slightly broader than the posterior, and not very sharply marked off from it. The cephalic segment about equals in length the 3 succeeding segments combined, and appears, in the dorsal view of the animal, obtusely rounded anteriorly, exhibiting, however, in the middle a very small narrow conical rostrum, which projects between the insertions of the anterior antennae. The lower edges of this segment are remarkably inflexed in the middle and broadly rounded off behind (see fig. 2). The 3 succeeding segments are almost of equal size, and have the lateral lobes closely appressed to the sides of the body, each terminating behind in an obtuse corner. The last segment is rather short, but nearly as broad as the preceding one.

The tail only slightly exceeds half the length of the anterior division,

and is of almost uniform width throughout. It is composed of the usual number of segments, all armed at the end laterally with rows of small denticles. The genital segment is about the length of the 2 succeeding ones combined, and shows slight trace of a subdivision in the middle. The last segment (see fig. 10) is slightly incised in the middle and somewhat obliquely truncated laterally, being armed on each side with a curved transverse row of coarse spinules. The anal opercle is likewise fringed with spinules of a similar kind. The caudal rami are short and rather widely apart, subquadrangular in shape, and armed with several small spinules, both dorsally and laterally. The 2 middle apical setae are well developed, though rather unequal in length, the inner one being fully twice as long as the outer. The other setae are very thin, hair-like.

The anterior antennae (fig. 3) do not attain the length of the cephalic segment, and taper gradually towards the end. They are each composed of 8 joints richly clothed with rather long and curved setae, and grouping themselves into 2 well-marked sections, a basal and a terminal, each comprising 4 joints. The 2nd basal joint is much the largest and considerably dilated, whereas the 3rd joint is comparatively small. The 4th joint is more than twice as long, and projects at the end anteriorly to a short prominence carrying a slender sensory filament accompanied by 2 unequal setae. The joints of the terminal section are not very different in size and rather narrow, the last carrying, in addition to the setae, a short sensory filament.

The posterior antennae (fig. 4) are comparatively small, though built on the usual type, the inner ramus being abruptly curved and armed on the distal joint with a number of strong spines and with 3 or 4 geniculated setae. The outer ramus, as in the other species of the present genus, is very small, and only consisting of a single somewhat lamelliform joint edged with 3 subequal setae.

The mandibles and maxillae were not sufficiently made out, but their structure seems to be that usually met with.

The anterior maxillipeds (fig. 5) are rather poorly developed, being only provided with a single small bisetose lobe inside the claw-like terminal joint.

The posterior maxillipeds (fig. 6) are also comparatively small, but of quite normal structure, terminating, as in most other Harpacticoida, in a subcheliform hand.

The 1st pair of legs (fig. 7) differ conspicuously in their structure from those in the other known species, in particular as regards the

inner ramus, which is far less strongly built and scarcely at all prehensile. The proximal joint of this ramus is only slightly produced and of oblong oval shape, being, like the 2 succeeding joints, provided inside near the end with a plumose seta. The outer part of the ramus, comprising the last 2 joints, is not, as in the other species, abruptly bent upon the proximal joint, but extends in about same line with it, and the strong apical claw found in those species is replaced by a quite ordinary spine, accompanied inside with a slender geniculated seta. The outer ramus is a little shorter than the inner, and on the whole built on the same type as in the other species.

The 3 succeeding pairs of legs (fig. 8) are very slender, with the rami narrow and rather unequal in length, the outer one being much the longer. All the 3 joints of this ramus are fringed outside with small spinules in addition to the usual spines, 4 of which belong to the terminal joint. The setae of the inner edge are rather reduced, one of them, however, attached near the tip being in the 4th pair rather strong and excessively prolonged, with the edges densely spinulose (see fig. 8). The inner ramus is of much feebler structure than the outer, and has the setae of the inner edge more uniformly developed, being, moreover, armed on the tip outside with a short spine.

The last pair of legs (fig. 9) are, as usual, pronouncedly lamellar in shape, and are each composed of 2 very dissimilar joints. The proximal joint sends off outside from a quite short base a narrow digitiform process tipped with a slender bristle, whereas inside it expands to a broad lamella extending to about the middle of the distal joint. The lamella is fringed outside with fine cilia, and carries on the obtusely truncated extremity 5 setae of somewhat unequal length. The distal joint is rather produced, extending to the end of the genital segment (see fig. 2), and is narrow oblong or somewhat lanceolate in outline, tapering to an obtuse point. Its inner edge is somewhat bulging near the base, and is here densely ciliated, whereas the outer edge is nearly straight. The joint is provided with 6 thin, more or less prolonged setae, 4 of which are attached to the outer edge, one particularly slender seta to the tip, and another, at a short distance from the latter, to the inner edge.

Remarks.—The above-described form is unquestionably referable to the genus *Nitocra* of Boeck, though it differs conspicuously from the usual type in the structure of the 1st and last pairs of legs. It may easily be recognised from the other species by its less slender shape of the body.

Occurrence.—A solitary female specimen of this form was found in a sample taken by Dr. Purcell from a pond on the Cape Flats.

Fam. HARPACTICIDAE.

Gen. HARPACTICUS, M. Edwards.

23. Harpacticus meridionalis, n. sp.

(Plate XVI, figs. 11–22.)

Distinctive Characters.—Length of female, 0·8 mm. General form of body resembling that in *H. litoralis*, though somewhat less robust. Anterior antennae less slender, with the basal part gradually tapered and the terminal part very short. Posterior maxillipeds scarcely as powerful as in the said species. First pair of legs almost precisely as in *H. littoralis* ; last pair, however, distinctly differing in shape, distal joint much narrower and tapering to an obtuse point, inner expansion of proximal joint obliquely rounded at the end, and provided with 5 somewhat unequal setae. Male differing from female in the usual manner.

Description of the Female.—The body (see figs. 11 and 12) is moderately slender, with the anterior division slightly depressed and, seen dorsally, regularly oblong oval in outline. The cephalic segment about equals in length the 3 succeeding segments combined, and has the posterior edge somewhat projecting dorsally (see fig. 12). It is quite evenly contracted in front and provided with a somewhat lamellar rostrum obtusely rounded off at the tip. This rostrum is sharply defined from the segment by a well-marked transverse suture, and appears to be to some extent mobile, being generally somewhat bent downwards, so as to be nearly hidden in the dorsal view of the animal (see fig. 11). The 3 succeeding segments are evenly vaulted dorsally, and have the lateral lobes rounded off at the tip. The last segment is rather broad, with the sides blunted.

The tail scarcely attains half the length of the anterior division, and is somewhat flattened, with the hind edges of the segments finely spinulose laterally. The genital segment occupies about half the length of the tail, and is, seen dorsally, almost quadrate in shape, with trace of an imperfect subdivision in the middle. The 3 succeeding segments rapidly diminish in size, the last one being very small, with the anal opercle unarmed. The caudal rami are extremely short, so as not easily to be perceived. The 2 middle apical setae are, how-

ever, considerably prolonged, in particular the inner one, which attains more than half the length of the body.

The anterior antennae (fig. 13) are comparatively less slender than in most of the other known species, scarcely exceeding half the length of the cephalic segment. They are, however, composed of the same number of joints, viz. 9, 4 of them belonging to the basal part, the other 5 to the terminal part. The former joints gradually taper distally, and are clothed at the end with bunches of densely crowded setae, the last of them being somewhat shorter than the preceding one, and carrying at the end the usual slender sensory filament together with some ordinary setae. The terminal part is comparatively short, not nearly attaining half the length of the basal one, and has the outer joints extremely small. The setae attached to this part form together a dense penicillate apical fascicle.

The posterior antennae (fig. 14) are rather largely developed, and apparently only consist of 2 segments very movably connected, and generally forming together an abrupt geniculate bend. The proximal segment, which in reality is formed by the complete fusion of the 1st joint of the inner ramus with the basal part, is rather expanded, and provided anteriorly with a curved seta. Opposite this seta is attached to the outer face of the segment a narrow biarticulate appendage, constituting the outer ramus and provided with 5 or 6 partly ciliated setae. The distal segment is rather constricted at the base, but gradually widens distally, and is armed outside with 3 coarse spines, followed at the inner corner by 3 geniculate, procurved setae.

The mandibles, maxillae, and anterior maxillipeds are of exactly same structure as in the other species, and need not therefore be described in detail.

The posterior maxillipeds (fig. 15) are moderately strong and, as usual, each composed of a rather slender basal part, to the end of which is very movably articulated a well-developed subcheliform hand. The propodus of the latter is somewhat swollen and of oval shape, with the palm defined in front by a well-marked projecting angle armed with densely crowded denticles. The apical claw, or dactylus, is very strong, falciform, and generally closely bent upon the propodus.

The 1st pair of legs (fig. 16) exhibit the peculiar structure characteristic of the present genus, being very unlike the succeeding pairs, and transformed to well-marked prehensile or preying organs. They are rather slender, projecting more or less to each side of the body. The basal part is somewhat lamellar, and composed of 2 well-defined

segments, the proximal of which has the outer edge densely fringed with slender spinules. The distal segment exhibits outside a well-marked ledge, to which a strong, closely denticulated spine is attached, and has at the inner corner another much thinner spine. The rami are very unequal in length, the outer one being almost twice as long as the inner and more or less bent outwards. It is composed of 3 joints, the first 2 narrow linear in shape and about of equal length, with the outer edge densely spinulose and, moreover, provided near the end with a short spine. The last joint of this ramus is very small, but armed with 4 highly chitinised hooked claws accompanied inside by a curved bristle. The inner ramus is only composed of 2 joints, the proximal one narrow linear and ciliated on both edges, the distal one quite short and armed with a strong curved claw accompanied by a thin bristle.

The 3 succeeding pairs of legs are natatory, and of quite normal structure.

The last pair of legs (fig. 17) are comparatively small, scarcely extending beyond the middle of the genital segment, but of the usual lamellar appearance. The distal joint is oblong or somewhat conical in shape, tapering gradually to an obtuse point, and is provided with 5 not very slender setae, that issuing from the tip being, however, rather thin and prolonged. The inner expansion of the proximal joint is comparatively broad and obliquely rounded at the end, being likewise provided with 5 setae.

The *male* (fig. 18) is about of same size as the female, but differs somewhat in the shape of the body, the anterior division being comparatively narrower and almost of equal width throughout, with the epimeral lobes more expanded laterally. The tail is, moreover, as usual, composed of 5 well-defined segments, and is comparatively narrower than in the female, with the 2 middle apical setae still more prolonged.

The anterior antennae (fig. 19) are powerfully developed and somewhat clavate in shape, being terminated by a much inflated, nearly globular part, sharply marked off from the preceding joints. In the interior of this part an exceedingly strong, transversely striated muscle is seen, acting upon a short hooked piece generally found closely bent upon the globular part, thus manifesting the pronouncedly prehensile nature of these appendages.

The posterior maxillipeds do not, as in some of the other species, exhibit any obvious difference in their structure from those in the female, and the 1st pair of legs also are of the very same appearance.

The 2 middle pairs of legs (figs. 20 and 21), on the other hand, are conspicuously transformed, and on the whole considerably more strongly built than in the female.

The 2nd pair of legs (fig. 20) have the outer ramus perfectly straight, with all the joints, but in particular the last, comparatively more robust than in the female. The inner ramus is somewhat narrower, and has the 1st joint remarkably prolonged, fully attaining the length of the other 2 combined. The 2nd joint, too, is distinguished by the outer corner being produced in the form of a mucroniform process running alongside the terminal joint. In the present species this process scarcely extends beyond the tip of the ramus, whereas in most of the other species it is very much longer.

The 3rd pair of legs (fig. 21) are exceedingly powerfully developed, with the outer ramus remarkably thickened and somewhat curved inwards. All the joints on this ramus are conspicuously expanded and highly chitinised, with the spines much coarser than in the female, whereas the setae of the inner edge are much reduced. It is very probable that these legs may assist the anterior antennae in getting hold on the female during copulation.

The last pair of legs (see fig. 22) are rather unlike those in the female and of much smaller size, with the proximal joint not at all expanded inside. The distal joint is somewhat spatulate in shape, and is armed at the end with 3 coarse spines, followed at the inner corner by 2 thin bristles.

Remarks.—The present form is apparently closely allied to the European species, *H. littoralis*, G. O. Sars, but is rather inferior in size, and, moreover, differs conspicuously in the structure of the anterior antennae and of the last pair of legs in the female.

Occurrence.—Some few specimens of this form were found in a small tube sent to me, together with other samples from the South African Museum. I am, however, unable to indicate the locality where the specimens were taken, as the writing on the label in the tube had been quite effaced by the action of the preserving fluid (formol). Most probably the specimens were taken from some brackish pool. It should, however, be here noted that a true fresh-water species of this otherwise marine genus has been recorded by the present author from the great Siberian lake Baikal.

EXPLANATION OF THE PLATES.

Plate V.

Lovenula falcifera (Lovén). ♀

FIG.

1. Adult ovigerous female, viewed dorsally.
2. Same, without the ovisac, but with a spermatophore adhering to the genital segment; seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible, with palp.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 3rd pair.
11. Leg of last pair.
12. Extremity of tail, with the caudal rami, dorsal view.

Plate VI.

Lovenula falcifera (continued). ♂

1. Adult male, dorsal view.
2. Same, right anterior antenna.
3. Extremity of same antenna, more highly magnified.
4. Same, last pair of legs.
5. Same, extremity of tail, with the caudal rami, dorsal view.

Lovenula barnardi, n. sp.

6. Adult ovigerous female, dorsal view.
7. Same, without the ovisac, seen from left side.
8. Same, leg of last pair.
9. Last pair of legs of male.

Plate VII.

Paradiaptomus lamellatus, G. O. Sars.

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisac, seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible, with palp.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.

FIG.
10. Leg of 3rd pair.
11. Leg of last pair.
12. Adult male, seen from right side.
13. Same, last pair of legs.
14. Same, extremity of tail, with the caudal rami, dorsal view.

Plate VIII.

Diaptomus capensis, G. O. Sars.

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisac, seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible, with palp.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 3rd pair.
11. Leg of last pair.
12. Last pair of legs of male.

Diaptomus rigidus, n. sp.

13. Adult ovigerous female, dorsal view.
14. Same, without the ovisac, seen from left side.
15. Frontal part of head, more highly magnified, lateral view.
16. Leg of last pair.
17. Last pair of legs of male.
18. Extremity of tail, with the caudal rami, dorsal view.

Plate IX.

Diaptomus purcelli, G. O. Sars.

1. Adult ovigerous female, dorsal view.
2. Same, without ovisac, seen from left side.
3. Anterior antenna.
4. Leg of 3rd pair.
5. Leg of last pair.
6. Adult male, seen from right side.
7. Same, last pair of legs.
8. Same, extremity of tail, with the caudal rami, dorsal view.

Diaptomus congruens, n. sp.

9. Adult ovigerous female, dorsal view.
10. Same, without the ovisac, seen from left side.
11. Leg of last pair.
12. Distal part of right anterior antenna of male.
13. Last pair of legs of same.

PLATE X.

Cyclops tenuisaccus, n. sp.

FIG.

1. Adult ovigerous female, dorsal view.
2. Anterior antenna.
3. Posterior antenna.
4. Lip.
5. Mandible.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 3rd pair.
11. Leg of 4th pair.
12. Leg of last pair, more highly magnified.
13. Extremity of tail, with the caudal rami.

Mesocyclops obsoletus (Koch).

14. Adult ovigerous female, dorsal view.
15. Leg of 1st pair.
16. Leg of 4th pair.
17. Leg of last pair.
18. Extremity of tail, with the caudal rami.

Mesocyclops neglectus, G. O. Sars.

19. Adult ovigerous female, dorsal view.
20. Leg of 4th pair.
21. Leg of last pair.
22. Extremity of tail, with the caudal rami.

PLATE XI.

Mesocyclops oblongatus, n. sp.

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisacs, seen from left side.
3. Frontal part of head, seen from the ventral face.
4. Genital segment, together with the adjoining part of the anterior division of body, ventral view.
5. Distal part of tail, with the caudal rami, dorsal view.
6. Anterior antenna.
7. Posterior antenna.
8. Anterior maxilliped.
9. Posterior maxilliped.
10. Leg of 1st pair.
11. Leg of 3rd pair.
12. Leg of 4th pair.
13. Leg of last pair.
14. Adult male, dorsal view.
15. Same, anterior antenna.

Mesocyclops major, n. sp.

FIG.
16. Adult female, dorsal view.
17. Leg of 1st pair.
18. Leg of 4th pair.
19. Leg of last pair.
20. Extremity of tail, with the caudal rami.

Plate XII.

Leptocyclops sublaevis, n. sp.

1. Adult ovigerous female, dorsal view.
2. Anterior antenna.
3. Posterior antenna.
4. Leg of 1st pair.
5. Leg of 3rd pair.
6. Leg of 4th pair.
7. Leg of last pair.
8. Adult male, dorsal view.
9. Same, anterior antenna.
10. Extremity of tail (female), with the caudal rami.

Leptocyclops prasinus (Fischer).

11. Adult ovigerous female, dorsal view.
12. Same, without the ovisacs, seen from left side.
13. Anterior antenna.
14. Posterior antenna.
15. Leg of 1st pair.
16. Leg of 2nd pair.
17. Leg of 3rd pair.
18. Leg of 4th pair.
19. Leg of last pair.
20. Extremity of tail, with the caudal rami.

Plate XIII.

Afrocyclops gibsoni (Brady).

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisacs, seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 2nd pair.
11. Leg of 3rd pair.
12. Leg of 4th pair.

FIG.

13. Leg of last pair.
14. Genital segment, together with the last pedigerous segment, viewed from the ventral face.
15. Adult male, dorsal view.
16. Same, anterior antenna.
17. Same, leg of 2nd pair.
18. Same, tail together with last pedigerous segment, viewed from the ventral face.

Plate XIV.

Platycyclops phaleratus (Koch).

1. Adult ovigerous female, dorsal view.
2. Anterior antenna.
3. Lateral part of last pedigerous segment, with the corresponding rudimentary leg.
4. Extremity of tail, with the caudal rami, dorsal view.

Platycyclops poppei (Rehberg).

5. Adult ovigerous female, dorsal view.
6. Anterior antenna.
7. Posterior antenna.
8. Anterior maxilliped.
9. Posterior maxilliped.
10. Leg of 1st pair.
11. Leg of 3rd pair.
12. Leg of 4th pair.
13. Leg of last pair.
14. Genital and last pedigerous segments, ventral view.
15. Extremity of tail, with the caudal rami, dorsal view.
16. Adult male, dorsal view.
17. Anterior antenna of same.

Plate XV.

Cryptocyclops assimilis, n. sp.

1. Adult female, dorsal view.
2. Anterior antenna.
3. Posterior antenna.
4. Leg of 1st pair.
5. Leg of 3rd pair.
6. Leg of 4th pair.
7. Lateral part of last pedigerous segment, with the corresponding rudimentary leg and the lateral seta.
8. Extremity of tail, with the caudal rami.

Cryptocyclops crassipes, n. sp.

9. Adult ovigerous female, dorsal view.
10. Anterior antenna.
11. Leg of 1st pair.

FIG.

12. Leg of 3rd pair.
13. Leg of 4th pair.
14. Caudal ramus.

Cryptocyclops caudatus, n. sp.

15. Adult female, dorsal view.
16. Anterior antenna.
17. Leg of 1st pair.
18. Leg of 3rd pair.
19. Leg of 4th pair.
20. Extremity of tail, with the caudal rami.

Cryptocyclops inopinatus, n. sp.

21. Adult ovigerous female, dorsal view (drawn from life).
22. Anterior antenna.
23. Leg of 1st pair.
24. Leg of 3rd pair.
25. Leg of 4th pair.

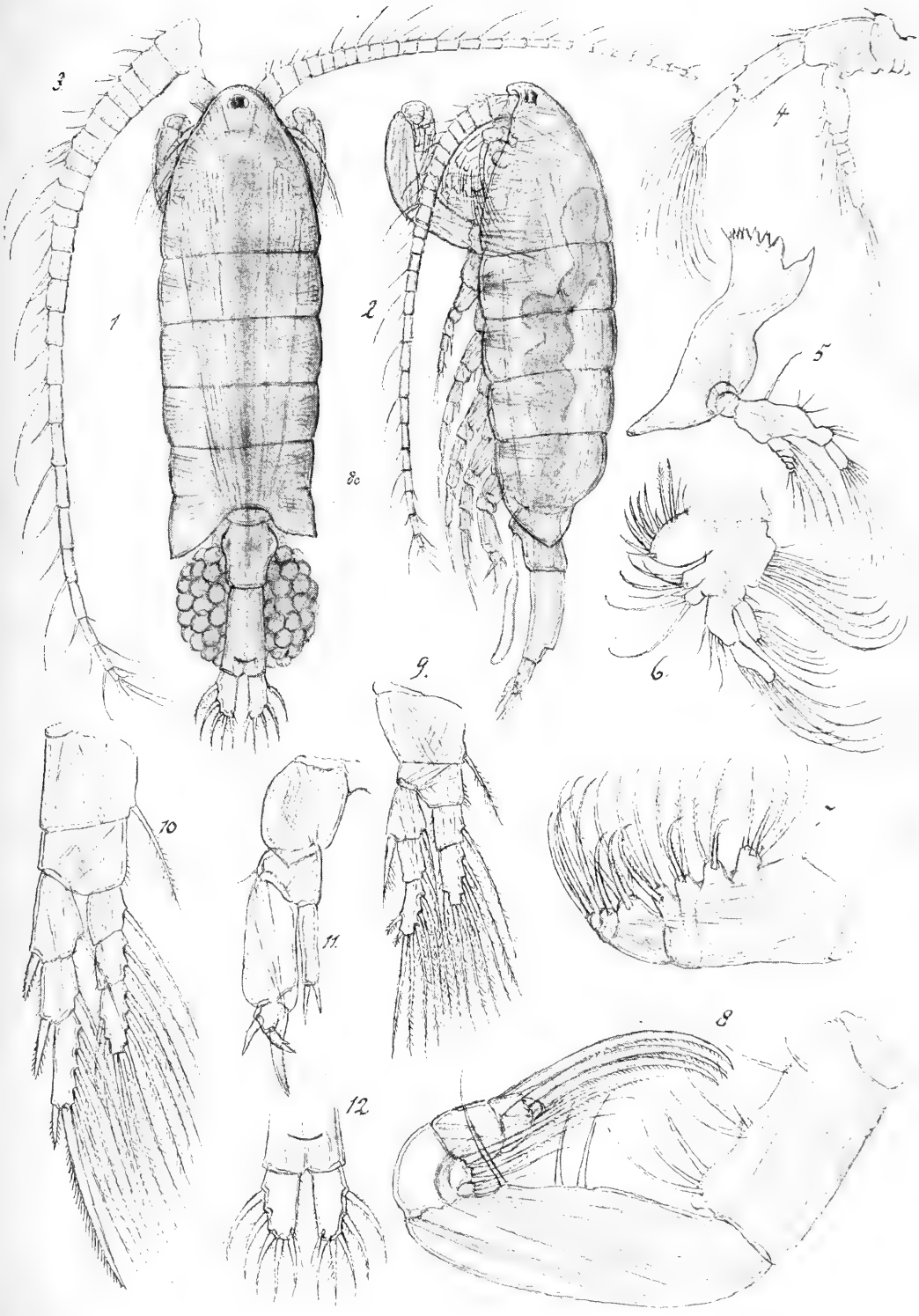
PLATE XVI.

Nitocra dubia, n. sp.

1. Adult female, dorsal view.
2. Same, seen from left side.
3. Anterior antenna and rostrum, lateral view.
4. Posterior antenna.
5. Anterior maxilliped.
6. Posterior maxilliped.
7. Leg of 1st pair.
8. Leg of 4th pair.
9. Leg of last pair.
10. Extremity of tail, with the caudal rami, dorsal view.

Harpacticus meridionalis, n. sp.

11. Adult female, dorsal view.
12. Same, seen from left side.
13. Anterior antenna.
14. Posterior antenna.
15. Posterior maxilliped.
16. Leg of 1st pair.
17. Leg of last pair.
18. Adult male, dorsal view.
19. Same, anterior antenna.
20. Same, leg of 2nd pair.
21. Same, leg of 3rd pair.
22. Same, lateral part of last pedigerous segment, with the corresponding leg, and adjoining part of genital segment, with enclosed spermatophore.



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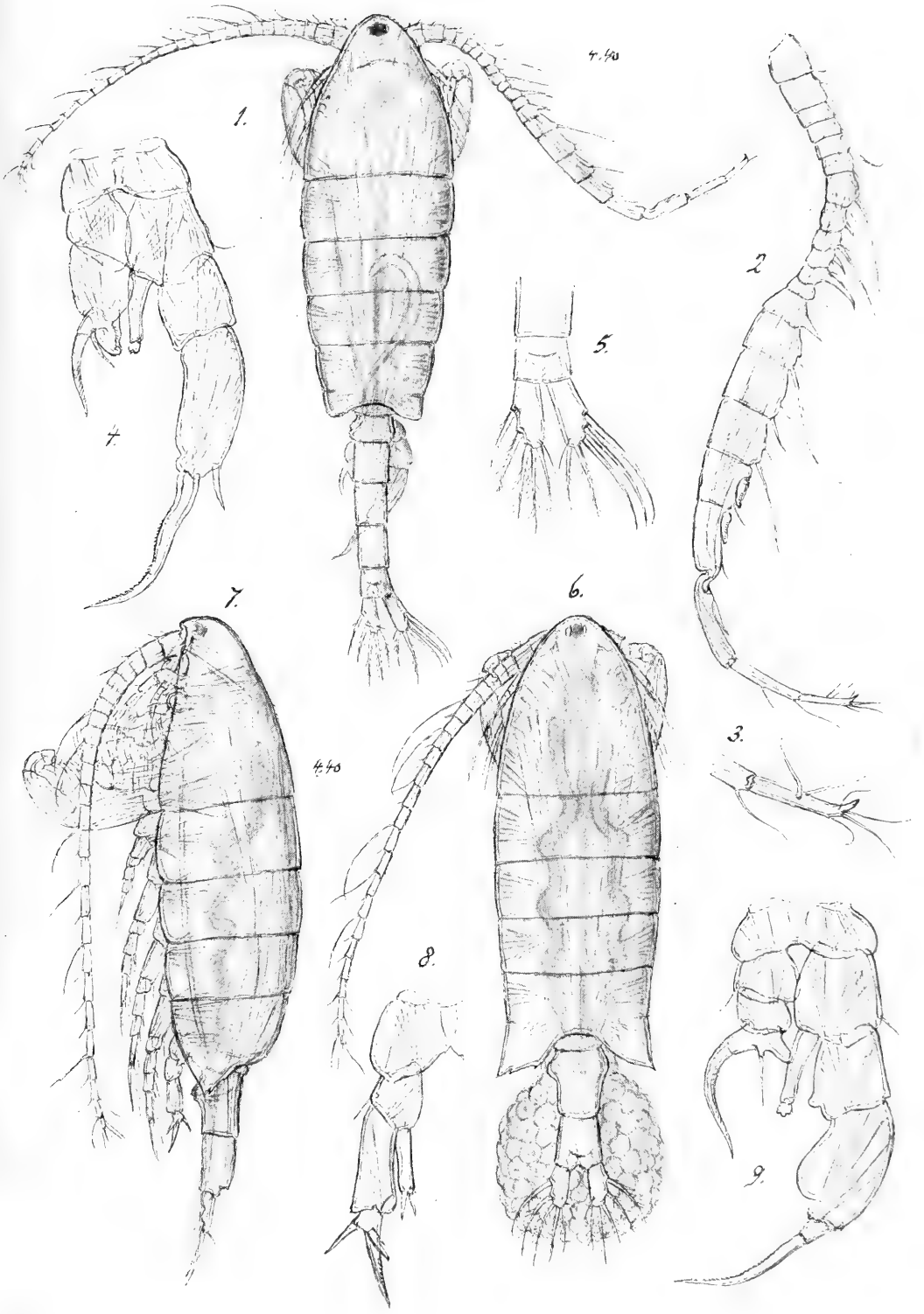

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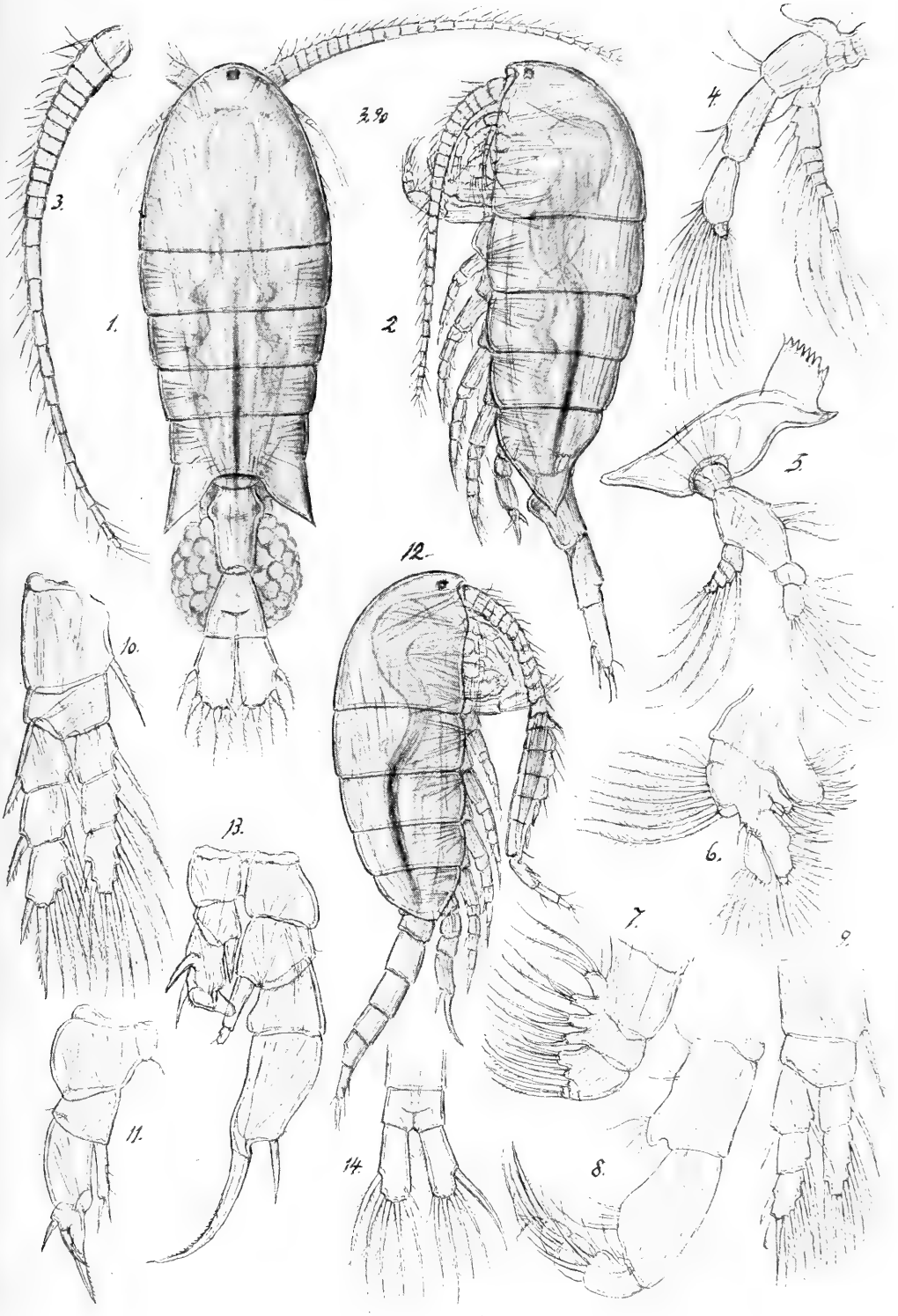

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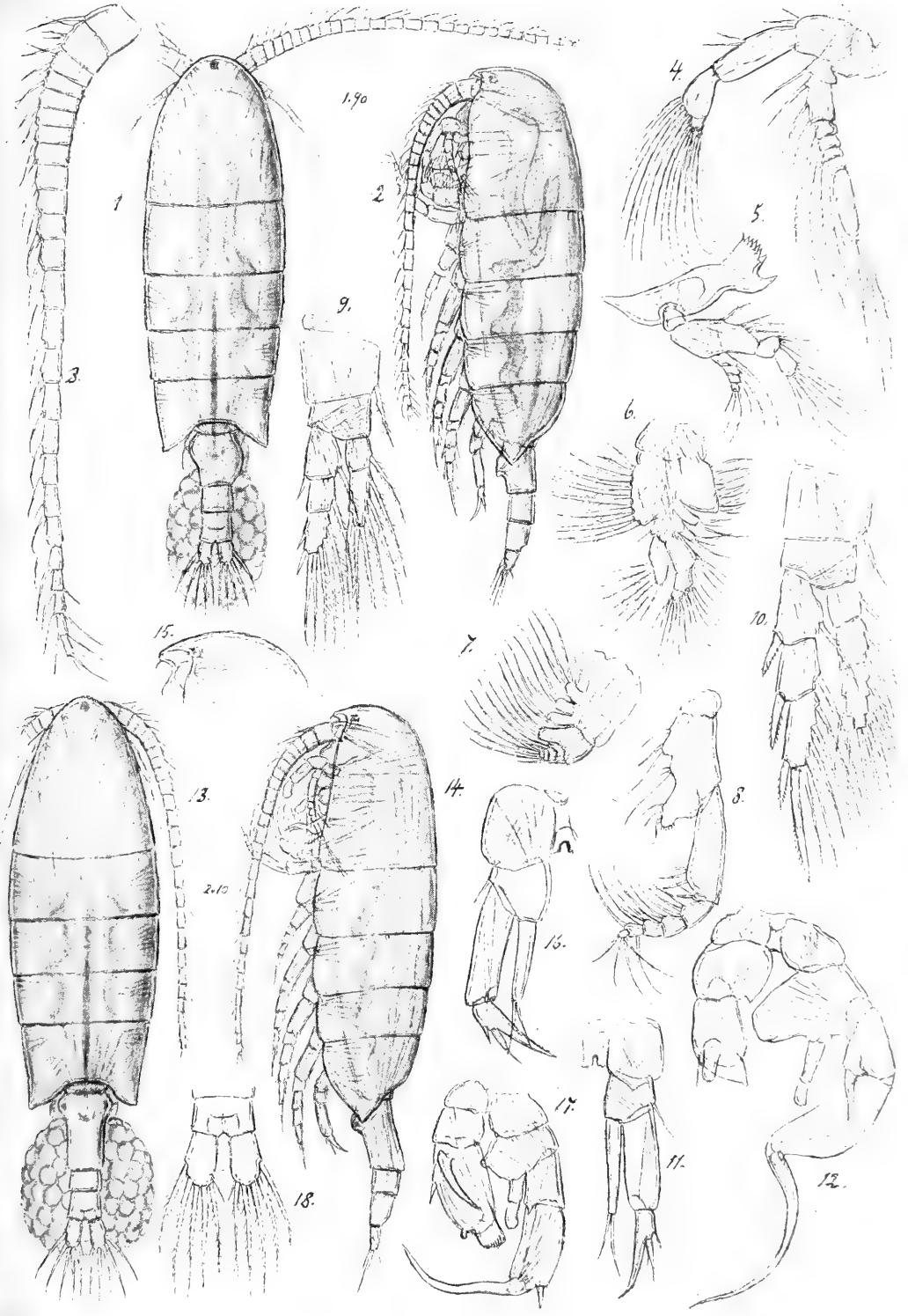

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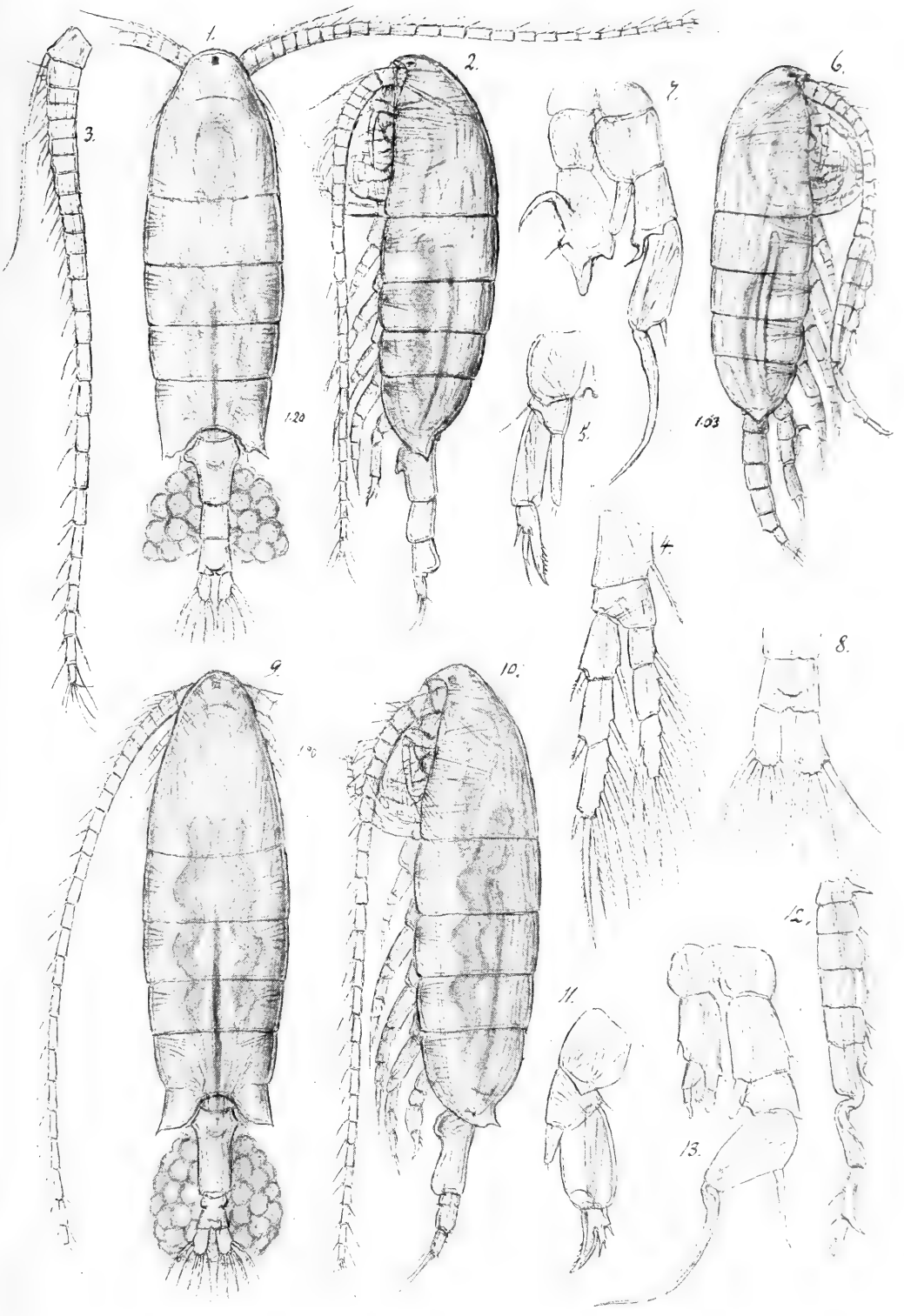

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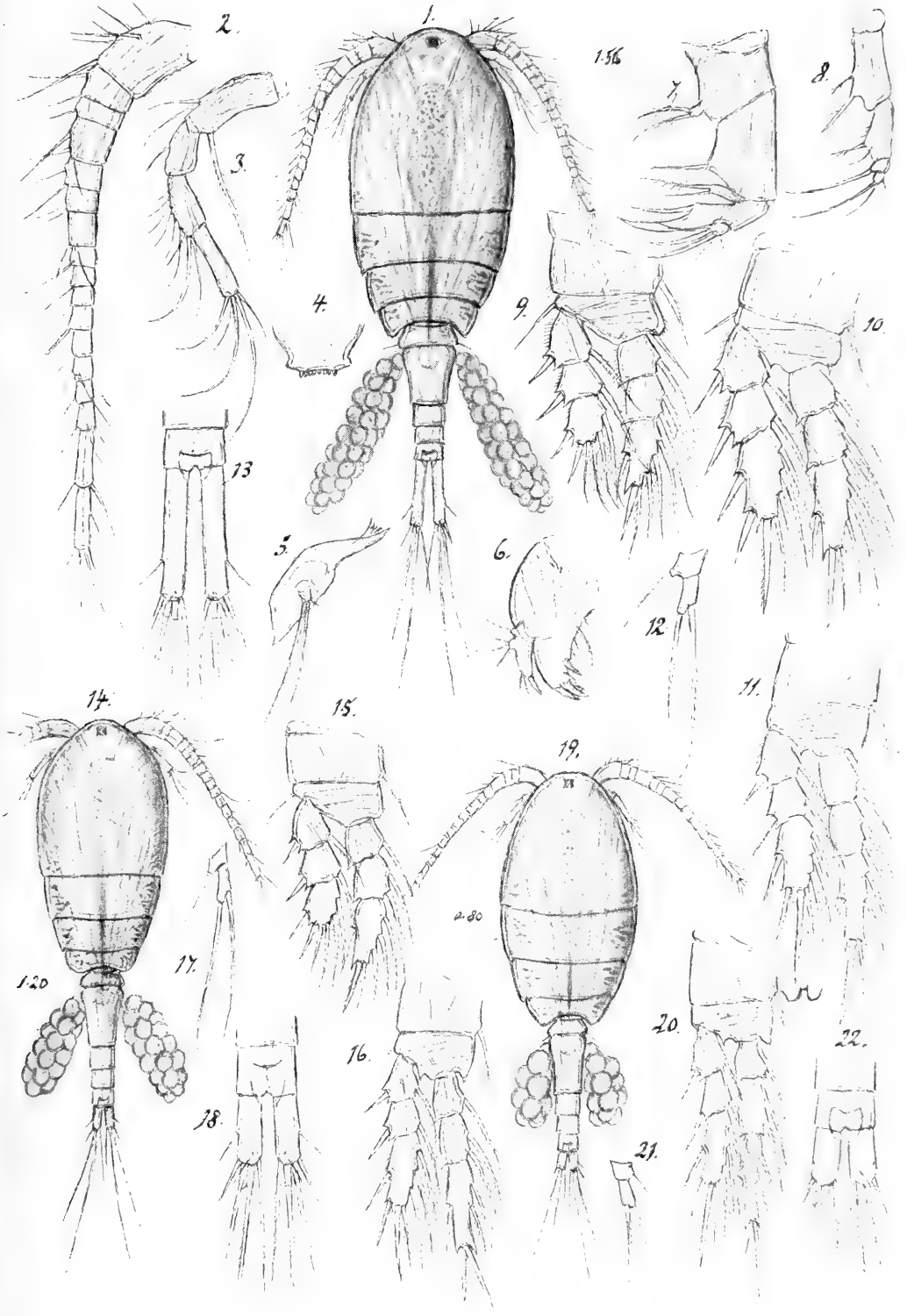

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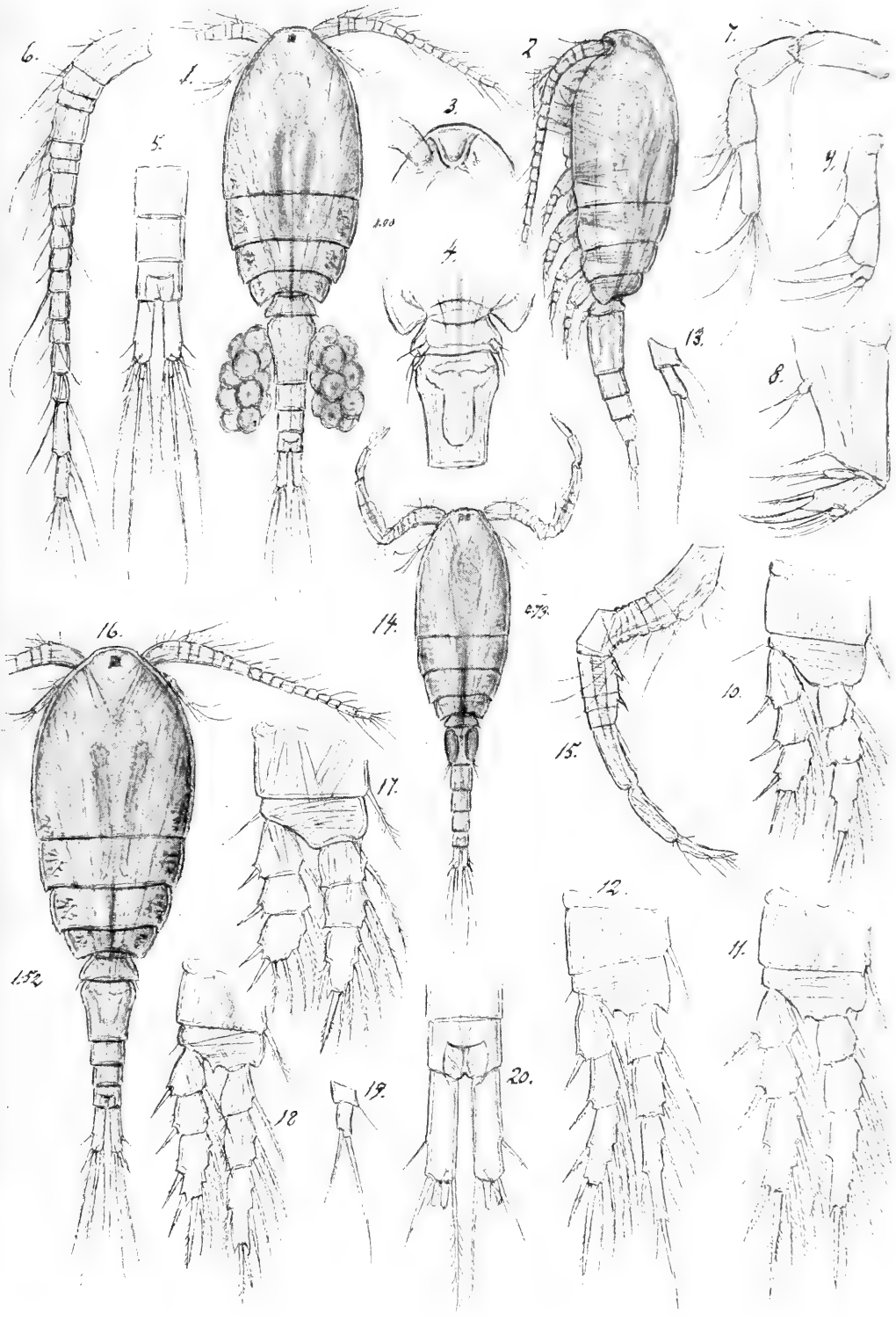

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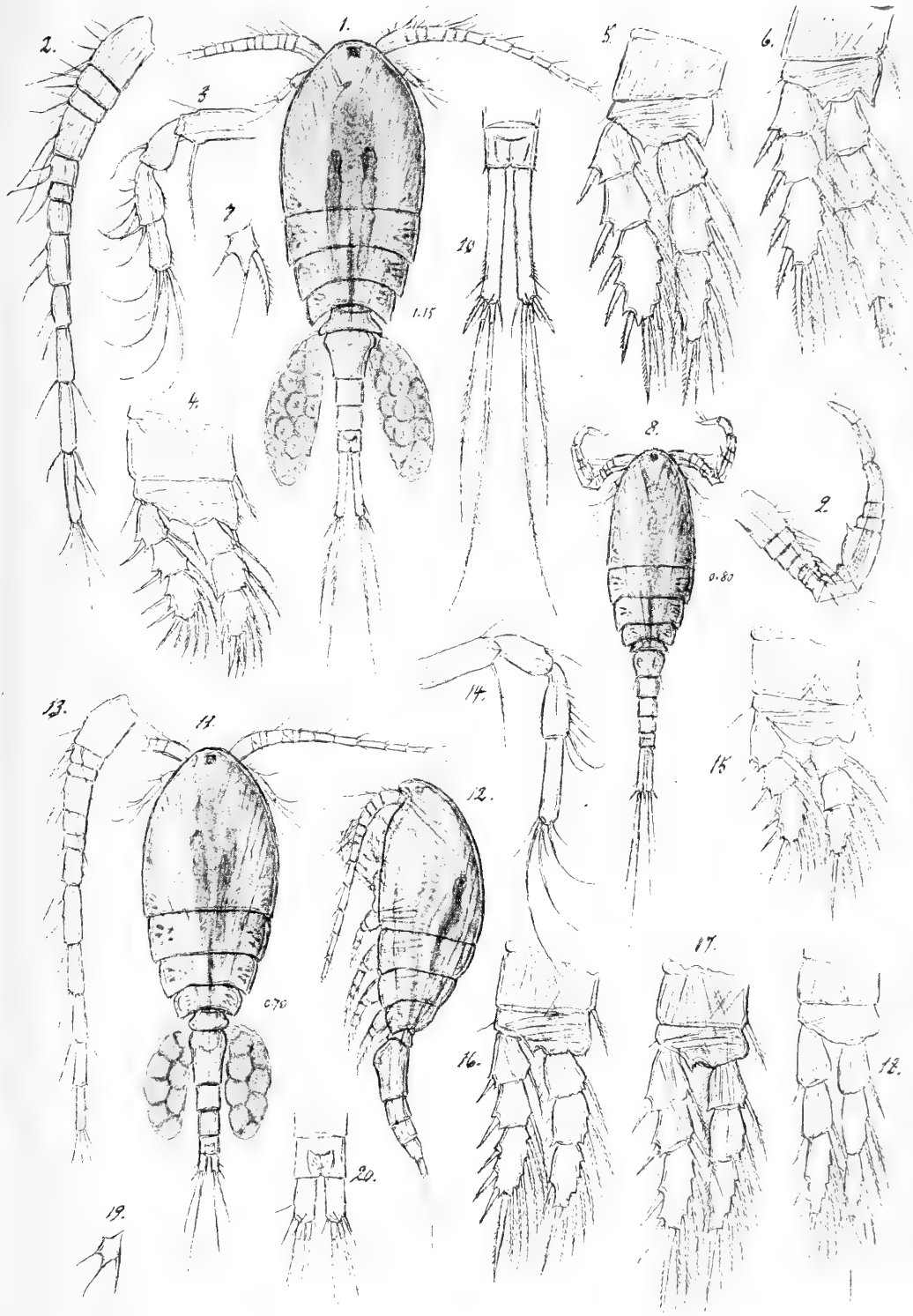

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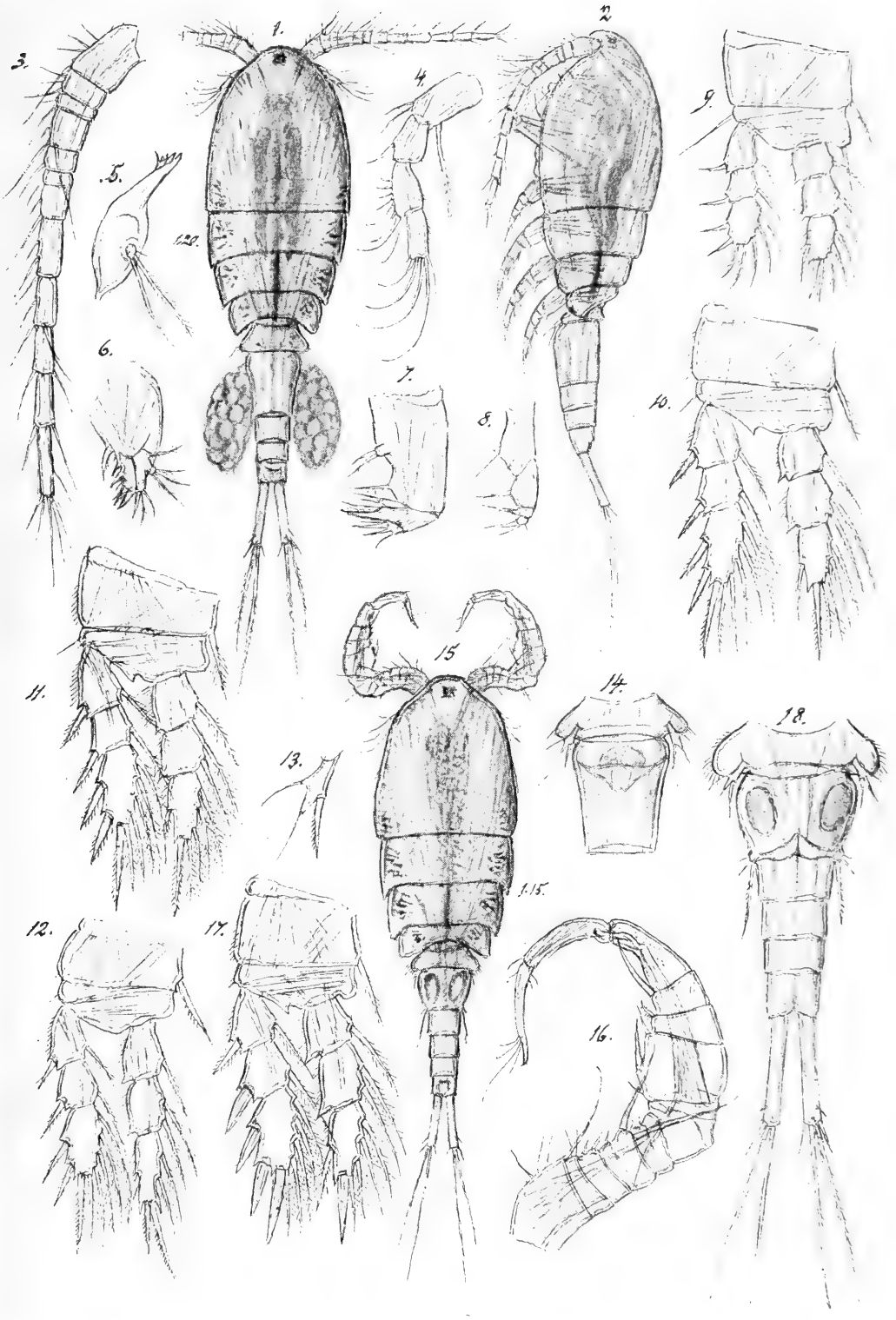

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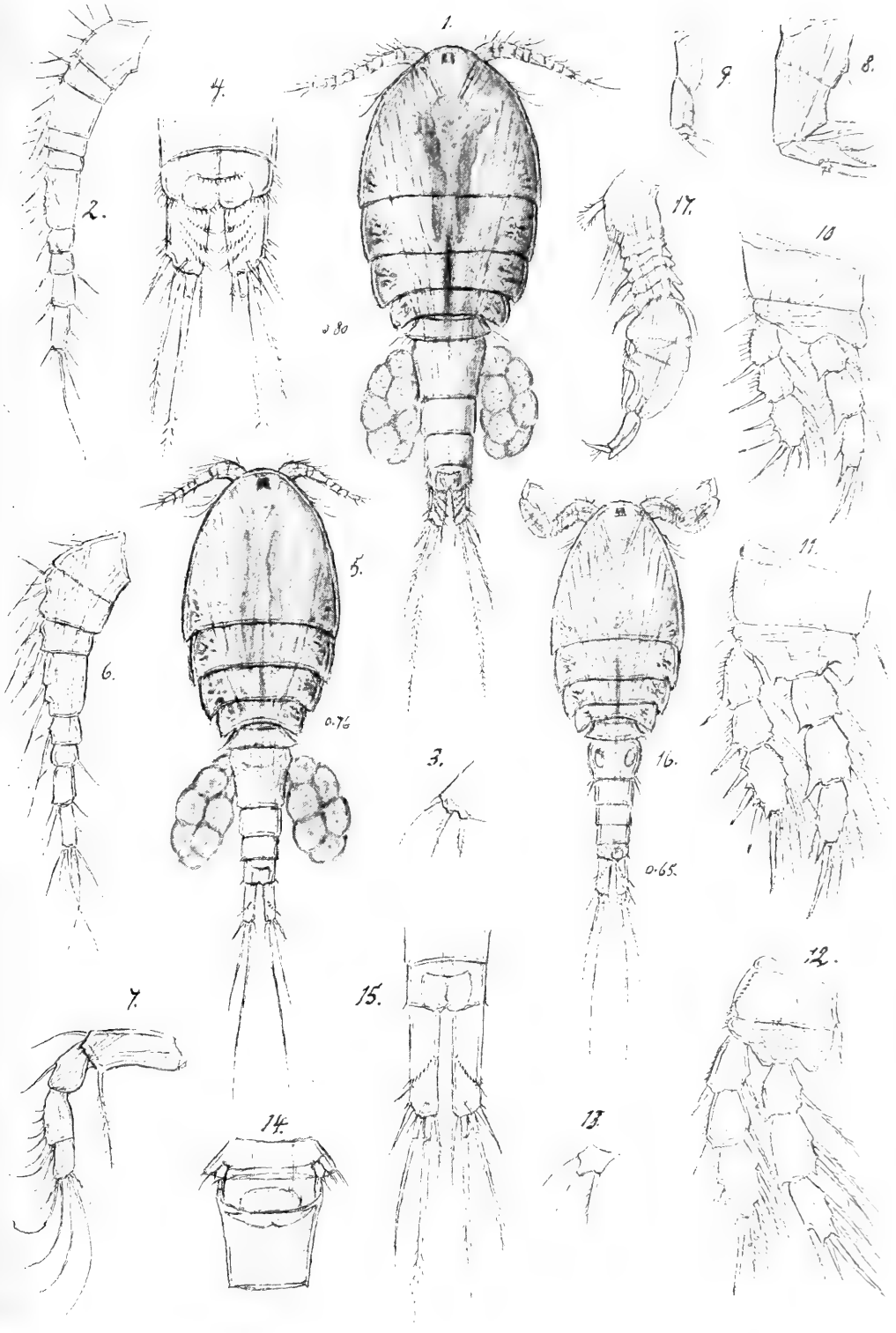

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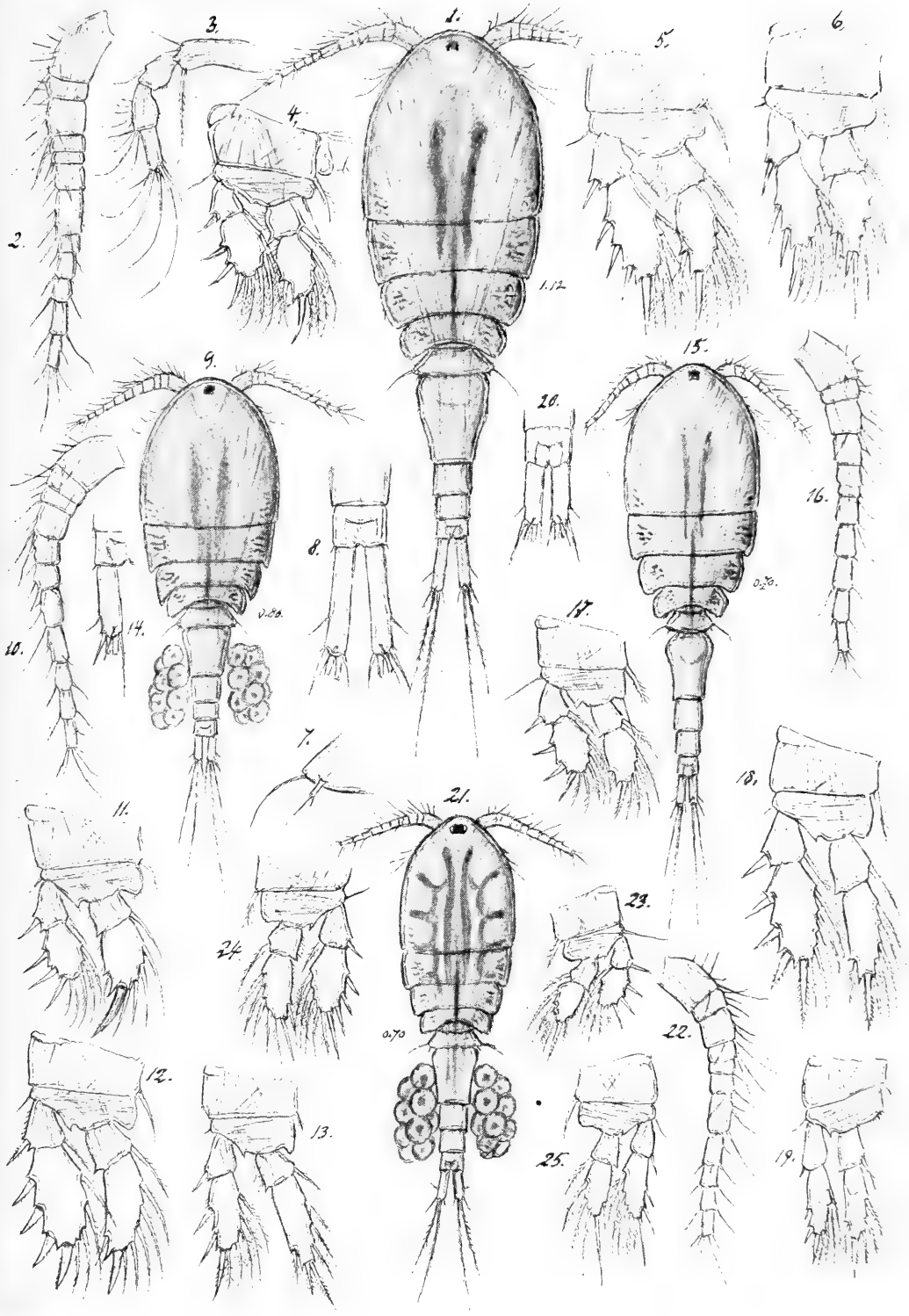

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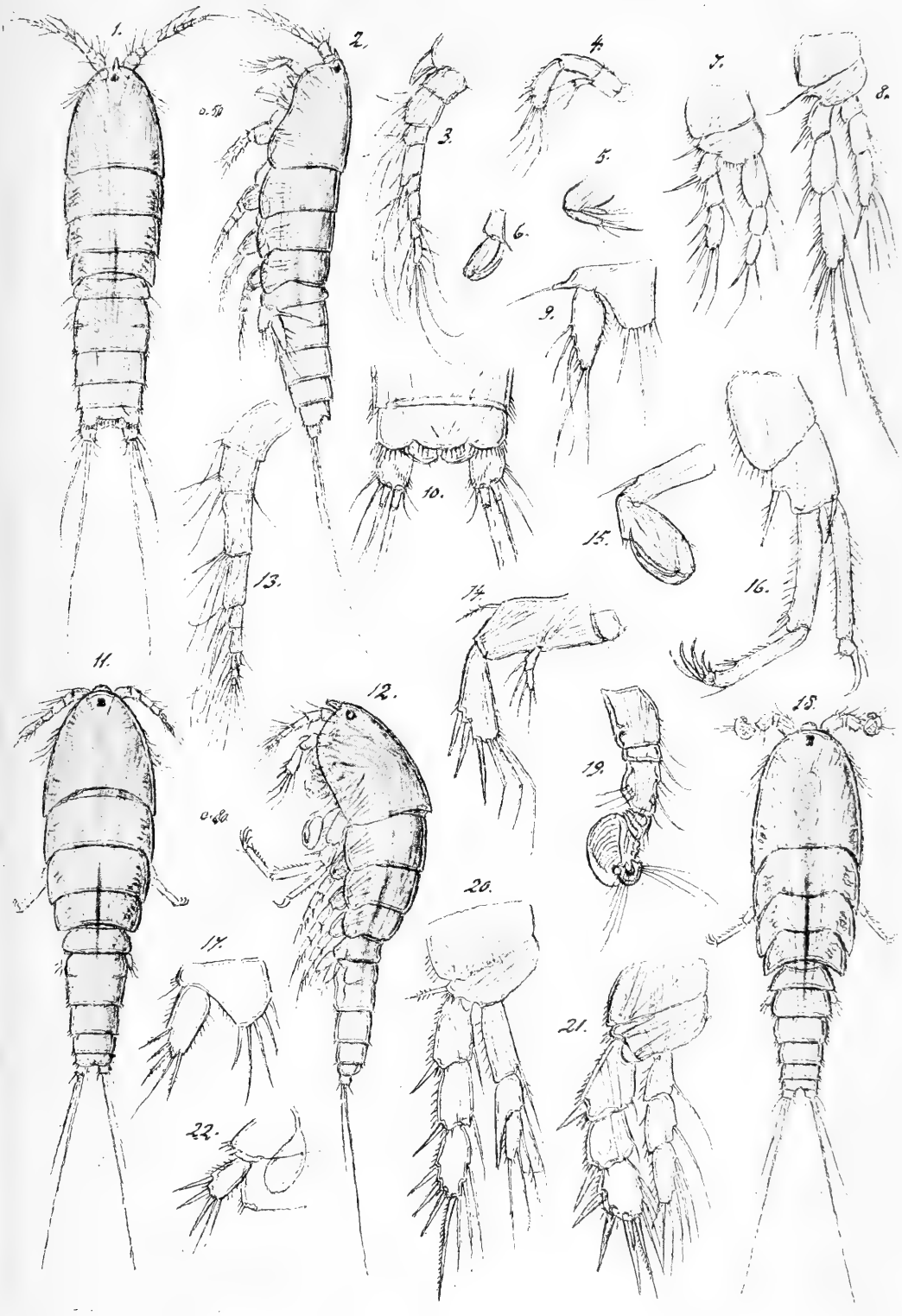

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4. *The Cephalopoda of the South African Museum.*—By Anne L. Massy, Department of Fisheries, Dublin.

(With Plates XVII and XVIII.)

Editor's Note.

[The collection which forms the basis of this report was made by the Cape Government trawler, s.s. "Pieter Faure." When the "Pieter Faure" collections came into the possession of the South African Museum, the Cephalopods were despatched to Dr. Hoyle in 1910 for report. Owing to pressure of other work, Dr. Hoyle was continually prevented from undertaking the examination of the material, and in 1923 handed it over to Dr. Simpson.

Dr. Robson of the British Museum then suggested that Miss Massy, who was then at work on other collections from South African waters, should undertake to write the report on our material, and with Dr. Simpson's concurrence this has been done.

A condition attached to this suggestion was that a first set should be presented to the British Museum. In view of the long time that had elapsed since the collection was made and the desirability of avoiding further delay, and also possibly further transport of the material to another specialist, this condition was accepted. The types of the new species and a set of the specimens are therefore in the British Museum.

A few specimens derived from other sources have been added to the "Pieter Faure" collection and are reported upon in the following pages.—Editor.]

This collection consists of 95 specimens belonging to 11 genera and 16 species.

There are also a few examples which are in too bad condition or too juvenile to be specifically assigned. Two new species of *Sepia* and another of somewhat peculiar form which is provisionally distinguished by a letter occur.

The area explored extends from Hout Bay, near Cape Town, on the south-west coast to Delagoa Bay on the south-east. Twenty-three

hauls were made in shallow water to about 50 fathoms and resulted in catches of *Loligo*, *Inioteuthis*, and *Sepia*. Eight deep-water hauls from 84–600 fathoms caught *Bathypolypus*, *Rossia*, and *Sepia*. The examples of *Inioteuthis* are referred to *I. japonica*, Verrill, a species which has not previously been recorded, except from India and Japan. Another eastern species is *Loligo indica*, Pfeffer. *Polypus granulatus* (Lam.), which ranges from the Indian Ocean round the Cape to the Azores, is represented by two specimens. A very young example of *Todaropsis eblanae* (Ball) occurred in the Cape Town area. The remaining 11 species appear to be peculiar to South Africa.

I am indebted to the Director of the South African Museum for permission to work out the collection.

The drawings have been done by Miss E. Barnes of the Dublin Museum.

List of Species obtained.

Moroteuthis sp. A, Robson.
Todaropsis eblanae (Ball).
Rossia enigmatica, Robson.
Inioteuthis japonica, Verrill.
Inioteuthis sp.
Loligo indica, Pfeffer.
Loligo reynaudi, d'Orb.
Loligo B, Robson.
Acanthosepion vermiculata (Q. et G.).
Rhombosepion australis (Q. et G.).
,, *hieronis*, Robson.
,, *robsoni*, sp. nov.
Rhombosepion sp. A.
Doratosepion joubini, sp. nov.
Sepia sp.
Hemisepius typicus, Stn.
Bathypolypus valdiviae (Chun).
Polypus granulatus (Lam.).
Polypus sp.

Family ONYCHOTEUTHIDAE.

Moroteuthis sp. A.

W. of Dassen Island, 250 f. One.

Photographs of a cast of the actual specimen have been sent to me. As in the specimen recorded from Cape Town (Robson, 1924, p. 595), the mantle is 5 times as long as its breadth, and the posterior end of fin is much attenuated. The length of the fin in proportion to the

mantle-length is about 58 per cent. The breadth of the fin expressed as a percentage of the mantle-length is about 45 per cent.

The peculiar elevations covering the mantle are clearly shown in the photograph.

Distribution.—Cape Town, 135 f., one adult (♀) (Robson, 1924).

Division OEGOPSIDA.

Family OMMATOSTREPHIDAE.

Subfamily Illicinae.

Todaropsis eblanae (Ball), 1841.

P.F. 466. Lat. 34° 43′ 15″ S. Long. 18° 30′ 00″ E., shrimp trawl, 123 f., green mud. One.

This is a very young example with a mantle-length of 40 mm., and the skin of the head is not yet developed so as to cover a considerable portion of the eyes as in larger examples. In an Irish specimen with mantle-length of 82 mm., the eye has a diameter of 19 mm., and is so sheathed by the skin that only an opening of 7×9 mm. is left, instead of the eye being quite free and uncovered as in the present individual.

Distribution.—North Sea, Ireland, Plymouth, Spain, Portugal, Mediterranean, South Africa (Robson, 1924).

MYOPSIDA.

Family SEPIOLIDAE.

Rossia enigmatica, Robson, 1924.

P.F. 16,644. Cape Point Lighthouse, N.E. $\frac{3}{4}$ E., 29 m., shrimp trawl, 470 f., greensand. One ♀.

This specimen has a dorsal mantle-length of 30 mm., and the nidamental glands measure 7 mm. in length. Some suckers of the 2nd pair of arms are the largest and measure about 2 mm. in diameter, and their ring is about $\frac{1}{3}$ the diameter of a whole sucker. The tentacular suckers have 5 rows of plates. The fins commence at 7 mm. from the anterior margin of the mantle and are 20 mm. in length by about 15 mm. in width.

Distribution.—Cape Town, 220 f., and Cape, 151 f. (Robson, 1924).

Inioteuthis japonica, Verrill, 1881.

P.F. 2255. Lion's Head, N. 78 E., 12 m., shrimp trawl, 60 f., sand and small black specks. One ♂.

P.F. 7063. Sebastian Bluff, N.W. ¾ W., 8½ m., shrimp trawl, 34 f., mud. One ♂.

P.F. 7054. Sebastian Bluff, N.W. by W. ¼ W., 8½ m., shrimp trawl, 34 f., mud. One ♀.

P.F. 15,343. Struys Point, N. by W. ½ W., 7½ m., shrimp trawl, 42 f., green mud. One ♀.

In both the males the chromatophores are much larger and more abundant and resemble those of *I. maculosa*, Goodrich. The width of the nuchal commissure is, however, less than the length of the fin at insertion. In specimens of *I. maculosa* from the Orissa coast and from Burma which I have examined, these measurements are about equal. The specimen No. 32 (dorsal mantle, 10 mm.) has the spermatophore filled with amber-coloured sperms, each of which measures about 3 mm. in length.

Distribution.—Japan (type), Andaman Islands (Massy, 1916).

Inioteuthis sp.

P.F. 6068. Outside Sebastian Bay, Cape Infanta, N.E. ¾ N., 4½ m., shrimp trawl, 37 f., mud. (?.) Two juv., mantle 2·50 mm.

P.F. 10,506. Cape St. Blaize, N.E. ½ N., 8¼ m., tow net. Two juv., mantle, 1·2 mm.

Family LOLIGINIDAE.

Loligo indica, Pfeffer, 1884.

P.F. 10,403. Gericke Point, N. by E. ¼ E., 5 m., shrimp trawl, 35 f., fine sand. Four ♂, one ♀.

P.F. 7062. Sebastian Bluff, N.W. ¾ W., 8½ m., shrimp trawl, 34 f., mud. Two ♂, two ♀.

P.F. 2283. Mouth of Hout Bay, shrimp trawl, 40–50 f., fine sand. One ♀.

P.F. 10,269. Sebastian Bluff, N.W. by W. ¼ W., 8½ m., shrimp trawl, 34 f., mud. One ♀.

P.F. 2273. Hout Bay, shrimp trawl, 9–20 f., fine sand and brackish shingle. One ♀.

Agulhas Bank, July 1922. Two ♂, one ♀ (K. H. Barnard).

The specimens from Agulhas Bank are the largest of the above, the males having a mantle-length of 83–90 mm. and the female 114 mm. Goodrich (1896, pl. ii, figs. 20 and 26) found that in the specimens which he referred to this species, the teeth surrounded the rings of the arm

suckers in the male, but were more clearly defined on the distal border, and in the female they were limited to the distal $\frac{1}{2}$, the rest of the ring being smooth.

The Agulhas Bank specimens agree in this as far as examined. In both sexes the teeth are present on half the ring in the small tentacular suckers as found by Goodrich (*op. cit.*, pl. ii, fig. 24). The examples from the 5 other stations are all smooth, the largest having a mantle-length of 38 mm. They have clusters of dark chromatophores on the back of the head which bear a superficial resemblance to eyes.

This species has not previously been recorded from the Cape Town area.

Distribution.—Java (type), South of Papua (" Challenger "), India, South Africa (Robson, 1924 ; Massy, 1925).

Loligo reynaudi, d'Orb, 1845.

P.F. 529. Algoa Bay. Lat. 33° 52′ S. Long. 25° 48′ E., shrimp trawl, 22 f. One ♀.

P.F. 104. Off Sebastian Bay, Cape Infanta, E. by N. $\frac{3}{4}$ N., $4\frac{3}{4}$ m., shrimp trawl, 35 f., mud. (?.) Two young.

The specimens to which a query is affixed measure 17–27 mm. in mantle-length and are not in good condition. Both have the median suckers of the club much larger than the rest, but all the suckers have teeth on the rings, whereas in the largest specimen (P.F. 529) the largest rings are smooth. The largest of the young specimens have 2 large red dots on the back of the head just where clusters of chromatophores are present in young *Loligo indica*, Pfeffer.

Distribution.—South Africa.

Loligo B, Robson, 1924.

P.F. 11,741. Tugela River mouth, N.W. by N. $\frac{3}{4}$ N., $15\frac{1}{2}$ m., shrimp trawl, 36–42 f., mud. (?.) One ♀.

This has a mantle-length of 32 mm. and is evidently a different species from *Loligo indica*, Pfeffer, having relatively smaller suckers and paler colouring, and the arm rings instead of having broad square teeth have narrow-pointed teeth, sometimes with small teeth in between as in Robson's species (1924, text-fig. 29, 2, p. 653). The tentacle rings have long pointed teeth. There are no clusters of dark chromatophores on the back of the head. The mantle is not narrower in proportion than that of *L. indica*.

Distribution.—Natal Coast.

Family SEPIIDAE.

Acanthosepion vermiculata (Q. et G., 1832.)

East London shore. Wood, April 14, 1900. One ♀. [63.]

Zwart Kops. April 4, 1897. One ♂. [64.]

Delagoa Bay. October 1912. Collector, K. H. Barnard. One ♀, one ♂.

The specimens measure 30–130 mm. in dorsal mantle-length. The Zwart Kops example has lost the horny rings of the arms and tentacles. It is narrower than the other specimens and has some tubercles on the ventral surface. No. 63 has a mantle-length of 30 mm., the arm suckers are in 4 regular rows of about equal size ; most of the rings are smooth, but some have 5–8 teeth on the distal border as found by Robson (1924, p. 640). The large rings of the club have about 18 teeth, and there are about 6 on the small rings. The male from Delagoa Bay (mantle, 68 mm.) also has teeth on the large tentacle rings, whilst in the female with mantle of 130 mm. they are smooth. It will probably be found that as in *S. singalensis*, Goodrich (Massy, 1916, p. 227), youthful specimens usually have the large tentacle rings denticulate, and that they lose this character when more grown. All the specimens have 2 suckers twice the size of their neighbours at the tip of club. As regards the size and position of the large suckers, they follow closely Robson's *op. cit.*, text-figure 23. The largest example alone shows the distinctive colour of light transverse bars on a darker background, but the other Delagoa Bay specimen has pink spots in transverse lines. No. 64 is faded and No. 63 has a much-abraded skin. The shells are all in bad condition. The last loculus, when examined microscopically, shows a delicate, coral-like, intersected pattern.

Distribution.—South Africa.

Rhombosepion australis (Quoy et Gaimard, 1832).

Sepia capense, d'Orb, 1834.

Sepia australis, E. A. Smith, 1917.

Rhombosepion capense, Robson, 1924.

P.F. 51. Cape St. Blaize, N. 42° E., mag. 11 m., shrimp trawl, 1–3½ f., sand shells. One ♀.

P.F. 2284. Mouth of Hout Bay, shrimp trawl, 40–50 f., fine sand. (?.) Two ♀.

P.F. 8046. Cape Infanta, N.E. by N., 19 m., shrimp trawl, 46 f., sand and shingle. Two ♂, one ♀.

P.F. 99. Off Mossel Bay. Lat. 34° 14′ S. Long. 22° 23′ E., shrimp trawl, 36 f., mud. One ♂.

P.F. 6051. Off Sebastian Bay, Cape Infanta, E. by N. ¾ N., 4¾ m., shrimp trawl, 35 f., mud. One ♂, one ♀.

P.F. 2255. Lion's Head, N. 78 E., 12 m., shrimp trawl, 60 f., sand and small black specks. Two ♂.

P.F. 10,404. Gericke Point, N. by E. ¼ E., 5 m., shrimp trawl, 35 f., fine sand. One ♂, one ♀.

P.F. 7053. Sebastian Bluff, N.W. by W. ¼ W., 8½ m., shrimp trawl, 34 f., mud. One ♂.

P.F. 15,577. Cape Point Lighthouse, W. ¼ S., 9½ m., shrimp trawl, 32 f., fine sand. Three ♂, two ♀, 3 juv.

P.F. 2273. Hout Bay, shrimp trawl, 9–20 f., fine sand and brackish shingle. Two ♂, three ♀.

P.F. 1866. Cape St. Blaize, N., 36 m., shrimp trawl, 54 f., sand and shingle. Four ♀, two ♂.

P.F. 529. Algoa Bay. Lat. 33° 52′ S. Long. 25° 48′ E., shrimp trawl. One ♂.

P.F. 18,054. False Bay, near Roman Rock, shrimp trawl, 17–19 f., fine sand. One ♀.

This little species was given the name of *australis* or "Southern" by the old French naturalists who first found it in the far south latitude of the Agulhas Bank, off Cape Agulhas. Later writers were led by the name into regarding it as an Australian species, and specimens of a *Sepia* from Victoria and New South Wales have been named *S. australis*, Q. et G. Robson (1924, p. 643), with regard to this, says: "... from an examination of an undoubted example from New South Wales (British Museum), I cannot have any doubt that the Australian form is very distinct from the South African, although there are certain features in common." Robson, *op. cit.*, taking the view that *S. australis*, Q. et G. is an Australian species, gives the South African form the name of *R. capense*, and stresses the differences between the figures of Quoy and Gaimard and d'Orbigny and Férussac. That these figures, wonderful as they are, cannot be too closely relied upon is, I think, clear, particularly from the figure of the club of *S. australis* given by d'Orbigny (pl. xii).

In the present collection of 16 males and 16 females and 3 young, with dorsal mantle-length of 12–47 mm., considerable variation exists. A striking character by which the male can be picked out at once is the presence of an orange or purple streak which adorns either side of the dorsal mantle at the base of the fins. It seldom extends

farther than about half-way to the anterior margin. It is noteworthy that this is one of the characters given by Pfeffer for *S. venusta*.

The same streak is generally, but not invariably, absent in the female, and when present it is always less distinct than in the male. In small females it is faintly indicated by oval orange spots, but never forms a distinct line or band. The hectocotylus is well defined and affects the proximal three-fourths of the 4th left arm.

The proximal 4 or 5 suckers are normal and are succeeded by about 10 rows of very minute suckers. A sperm pad is moderately developed in the female. The dorsal mantle measures 36–39 mm. in the 6 largest males and 40–47 in the 6 largest females. The females are frequently a little broader in the centre than the male and sometimes have the fins approximated apically. In one haul of 4 females and 2 males all have the fins widely separated apically. In another haul consisting of 1 large female, 2 males, and 2 young (apparently female), all have the fins widely separated apically and are widest at centre of body. As regards the suckers, those of the arms agree with the description of d'Orbigny in being " très inégale en grosseur ; celles du milieu plus grosses." Several specimens show a quite smooth ring, as found by Robson. Usually about 12 pointed teeth are present on the distal border. All the specimens which are in sufficiently good condition show about 12 long close-set, square-topped teeth on the distal margin of the large rings of the tentacular club, and about 8 similar shaped teeth placed wide apart are present on the small rings. All the examples have the purple ventral bands pointed out by Robson more or less clearly defined. The fins are usually broad and thin and without spots. The specimens Nos. 59 * and 62 † have narrower and thicker fins. The sculpture on the last loculus of the shell consists of fine undulating lines which are placed closer together than in *Doratosepion joubini* sp. nov. No. 62 has straighter lines in the last loculus than the other shells examined and fewer teeth on the arms and tentacle rings, but in its general appearance and the shape of club and the clear fins, it seems to be in close agreement with the other examples referred here to *R. australis*.

Distribution.—South Africa.

Rhombosepion hieronis, Robson, 1924.

P.F. 14,981. Lion's Head, S.E. ½ E., 47 m., shrimp trawl, 175 f., green sand. One ♂. [19.]

* Cape St. Blaize. † False Bay.

1261, No. 24. Lion's Head, S.E. $\frac{1}{4}$ E., 50 m., shrimp trawl, 230 f., green sand. Two ♀ and two young ♂.

P.F. 15,057. Lion's Head, S.E. $\frac{1}{4}$ S., 50 m., shrimp trawl, 230 f., green sand. One ♂ and two young. [58.]

These have a mantle-length of 6–29 mm. All have the ventral surface and fins almost entirely clear, the colour being condensed into a band of freckles on either side of fin base. The upper surface is uniformly reddish with a number of warts on the head and mantle. A large central tubercle surrounded by smaller ones is frequently present. The web extends about $\frac{1}{3}$ of the arms on the upper pairs. The buccal membrane is unusually high and much folded. It is without suckers. All the specimens have only 2 rows of suckers on the dorsal arms. Robson (1924, p. 646) notes this character only in the female. In the other arms the arrangement of the suckers is almost always in the following order, reading proximally to distally, second and third pairs, 2—3—2; fourth, 2—4—2. In a young specimen with mantle of 6 mm., the fourth arms read 2—4—2, and all the other arms 2. As observed by Robson, *op. cit.*, patches of much enlarged suckers occur on the second and third arms, as well as on the hectocotylised arm in the male. In the two largest males (Nos. 19 and 58) teeth are present on the distal border of the enlarged suckers wherever these occur. In the small males, mantle 11–12 mm., the hectocotylus is but little indicated, but the enlarged suckers of the lateral arms are very marked and their rings agree with the other suckers of the sessile arms in being smooth.

Distribution.—Cape Town, 112–150 f. (Type.)

Rhombosepion robsoni, sp. nov.

(Plate XVII.)

P.F. 2273. Hout Bay, shrimp trawl, 9–20 f., fine sand and shingle. One ♂.

This little creature bears a general resemblance to *R. hieronis*, Robson, but is distinguished from it by having grooved suckers (smooth rings) which are placed in 2 rows on all the arms, and none is enlarged in the male. They are very regular and relatively large, except distally where they are much reduced in size. The hectocotylus begins proximally and extends $\frac{3}{4}$ of the length of arm. A small sucker is on either margin with grooves between. As regards the club, about 53 stalked suckers are present and about 3 median rows have larger suckers than the rest. They are placed 4–6 in a row in the median

part. A papillary area is much developed, but teeth appear to be also present on part at least of the ring. The suckers are all much smaller than those of the arms, the largest equals in diameter a ring of a large arm sucker. The swimming membrane is large, and there are no chromatophores on it or on any other part of the club. In the specimens of all sizes referred in this paper to *R. hieronis* there are small chromatophores on the back of the club, and still smaller and darker ones usually form lines in the grooves on the back of the swimming membrane. Another colour difference between the two species is that the ventral surface has only a few freckles along the fin base instead of the mass of dark colour forming bands in this part in *R. hieronis*. Elsewhere the specimen is flesh-colour to pale brown and the surface is almost smooth. There are a few tubercles along the outline of the shell and on the head. The chromatophores are minute dark specks which extend partly on to the fins. The inner lip is papillose, the outer lip thin and smooth.

The buccal membrane is without suckers. The fins commence 3 mm. from the mantle-margin, and are wide and thin and separated by a space of 2 mm. The dorsal mantle-border is very slightly produced in the centre. Ventrally the mantle is deeply indented to receive the siphon. A very remarkable feature exists in the dorsal arms. The distal portions are thickened and end in rounded knobs without suckers. When observed laterally the surface is seen to be folded as if suckers might be in course of formation. The appearance may therefore be due to accident. In species of *Polypus* I have frequently seen arms in course of regeneration, but they were always much thinner and ended in curved points. The calcareous portion of the shell has unfortunately been totally dissolved, only the membranous part remaining.

Principal Measurements.

Dorsal mantle-length, 17 mm.
Dorsal mantle breadth at centre of body, including fins, 15 mm.
Breadth of head, 10 mm.
Club, 3 mm. × 2 mm.

	mm.		mm.
1st right arm,	10	1st left arm,	11
2nd ,, ,,	11	2nd ,, ,,	12
3rd ,, ,,	11	3rd ,, ,,	12
4th ,, ,,	13	4th ,, ,,	13

Rhombosepion sp. A.

P.F. 10,715. Cape Natal, W. by N., 6½ m., shrimp trawl, 54 f., fine sand and algae. One ♂.

This resembles *R. hieronis*, Robson, very closely in general appearance, but the suckers of the arms have teeth on the distal border, and though a few suckers on the second and third right arms appear to be enlarged, this feature is not at all so marked as in almost similar sized males of that species, in which the suckers of all sizes as far as examined have smooth rings. The suckers are not grooved as in *R. robsoni*.

The order of suckers on the various arms reading proximally-distally is as follows:—First right, 2; second and third right, 2 (some enlarged); fourth right, 4—2 (obviously injured). First and second left arms, 2; third left, 2—3—2; fourth left, 2—0. The hectocotylus commences proximally and continues for ¾ of the arm, a minute sucker being placed on either margin with grooves between. Distally there are no suckers. The ventral bands of colour which are so distinct in *R. hieronis* are not present in this specimen. The colour of the dorsal mantle is reddish and there are many tubercles. The anterior mantle-margin is but little produced. The shell is, unfortunately, almost dissolved.

The principal measurements are as follows:—

	mm.		mm.
Dorsal mantle . .	13	1st right arm . .	5
Breadth . . .	10	2nd and 3rd right .	7
Breadth of head .	7	4th right . . .	8

Sepia (*Doratosepion*) *joubini*, sp. nov.

(Plate XVIII.)

P.F. 11,741. Tugela River mouth, N.W. by N. ¾ N., 15½ m., shrimp trawl, 36–42 f., mud. One ♀.

P.F. 10,715. Cape Natal, W. by N., 6½ m., shrimp trawl, 54 f., fine sand and algae. Two ♂, one ♀.

The most remarkable feature of this species is that the lateral arms of the female, and to a lesser extent those of the male, are extremely narrow and terminate in stiff lash-like ends. The arms are semi-equal, the dorsal the shortest, and the lateral perhaps the longest, but the measurements given must be regarded as only approximate. All have protective membranes with transverse strengthening bands.

The dorsal arms of the large female have the suckers on long stalks and in 4 irregular rows, except proximally where there are fewer in a row. The distal $\frac{1}{3}$ of arm has a median canal with the suckers arranged in pairs on either side. The lateral arms have the suckers placed 2 in a row for about 6 proximal rows, they are then placed 4 in a row with a space in the centre, and distally for almost $\frac{1}{2}$ of the arm they are suddenly reduced in size and are placed 2 in a row, one on either side of arm with a deep canal between. These minute suckers are pale in colour and resemble seed pearls. The suckers of all the arms are smooth as far as examined. The web is carried to the point where the arms are suddenly reduced in size and number. The fourth pair of arms are mutilated. The proximal suckers are scattered thinly and are succeeded by suckers placed 4 in a row. In the other female these arms possess suckers placed 4 in a row to the tip, but on the distal $\frac{1}{3}$ they are very small and placed in pairs on either side of a deep groove.

The tentacular club has 4 suckers much enlarged and with teeth or irregular notches all round the ring. The smaller rings sometimes have teeth all round the ring and often only about 8 are present.

In the largest male the dorsal arms have the suckers placed 4 in a row to the tip where they are very minute. The lateral pairs have the suckers 4 in a row, except distally where they are placed 2 in a row and are very minute, but without the canal which is so marked in the female, and the arms are not so narrow and lash-like. The fourth right arm has large irregular proximal suckers succeeded by 4 in a row of much smaller size, and distally the suckers become very minute, but appear to be in 4 rows to the tip of arm. The hectocotylus on the fourth left arm is rather obscure.* It is situated on the distal $\frac{1}{2}$ of arm where the suckers on the dorsal border become more minute and are separated considerably from the ventral suckers which are reduced to a single row. This arrangement persists for about 6 rows. The distal portion has minute suckers placed 4 in a row. The males have a mantle-length of 33–40 mm., and the same measurement in the females is 36–47 mm. The width of the largest female at the centre of the body, including fins, is 23 mm. The fins commence in this specimen at 3 mm. from the mantle-margin and are widest posteriorly. They are clear above and below. All the specimens are flesh-colour to cinnamon and have an almost smooth surface. A few tubercles are present on the dorsal mantle and head and along the fin margin. Some oblong red markings are present on the dorsal mantle and

* In the other male many suckers are missing on this arm.

reddish patches occur between the eyes. There is also a slight sprinkling of minute dark chromatophores on the mantle. The inner lip is thick and papillose, and the outer lip is thinner and smooth. There are no suckers on the buccal membrane and in the female a sperm pad is not developed, the space between the ventral arms being merely a little deeper. In the largest female the nidamental glands measure 8×5 mm., and in the smaller example they measure 6×3 mm. and are placed much farther from the arms. The shells of all the specimens are unfortunately in very soft condition. Those of a male and female were examined and proved to be of the usual *Doratosepion* type with a spine. The ventral surface of both shows a rounded outline of the striated area, and on the last loculus a beautiful pattern of wavy lines becomes apparent when examined microscopically. The chitinous margin is pale horn colour.

Principal Measurements.

	P.F. 11, 741 ♀ mm.	P.F. 10, 715 ♀ mm.	♂ mm.	♂ mm.
Dorsal mantle-length . .	47	36	40	33
Dorsal mantle breadth, including fins . . .	23	18	16	15
Breadth of head . . .	13	11	12	12
1st right arm . . .	15	14	16	mutil.
2nd ,, ,, . . .	21	17	15	,,
3rd ,, ,, . . .	18	17	16	13
4th ,, ,, . . .	mutil.	14	18	15
Tentacle	35	46	mutil.	40
Club	6	5	..	4

Sepia sp.

P.F. 10,440. Cape St. Blaize, N. 7½ m., large dredge, 37 f., fine sand. One juv.

This is a hard dried-up specimen with mantle-length of 10 mm. The arm suckers are in 2 rows and the suckers of the club are all small.

Sepia sp.

P.F. 754. Buffalo River, 2 miles above jetty, small shrimp nets, mud. One juv.

This is in very bad condition. The dorsal mantle-length measures 12 mm. The arm suckers are in 4 rows and appear to have smooth rings, but they are very minute. The tentacle club measured 3 mm. in length, and had some suckers larger than the rest, apparently with

smooth rings. The shell has dissolved, but its impression shows that it had a spine and a rounded striated area.

Sepia sp.

P.F. 7072. Cape Infanta, N.N.W., 4 m., tow net. Three.

These appear to be different stages of the same species and have a mantle-length measuring from 2·50–7 mm. All have large dark-red chromatophores which are larger and rounder on the ventral surface. The fins, which commence at about 1·50 mm. from mantle-margin in the largest specimen, are clear, as is also the siphon in the youngest. The next largest has chromatophores on the sides of siphon, and in the most developed specimen they cover its visible surface.

The arm suckers appear to be in 2 rows, and the tentacular clubs have 2 or 3 suckers much larger than the others.

Hemisepius typicus, Stn., 1875.

P.F. 3046. False Bay, Roman Rock, N.W. ¾ N., ¾ m., large dredge, 18 f., sand and rough shingle. One ♂.

P.F. 2273. Hout Bay, shrimp trawl, 9·20 f., fine sand and brackish shingle. Two ♂.

Steenstrup got the type from Table Bay, Cape Town (Capt. Andréa). It was next taken by the Scottish National Antarctic Expedition (Hoyle, 1904) at Saldanha Bay, Cape Colony, two females being trawled at 8–10 fathoms. The Valdivia Expedition procured the first male, of which the hectocotylus on the fourth left arm was figured by Chun (1915, p. 412, fig. 34). A small female was caught at the same place, namely, the shallow water of Francis Bay, a north part of the Agulhas Bank. Chun remarked that from this it would appear that the genus is tolerably restricted in its distribution. The present examples do not extend the distribution materially, but show that the species is evidently present in shallow water all along the coast from Saldanha Bay to Cape Agulhas. The principal measurements of the specimen from False Bay, are given below.

	mm.		mm.
Dorsal mantle-length	21	Breadth of mantle and fins	22
Breadth of head	12		
1st right arm	12	1st left arm	11
2nd ,, ,,	13	2nd ,, ,,	13
3rd ,, ,,	15	3rd ,, ,,	15
4th ,, ,,	15	4th ,, ,,	14

OCTOPODA.

Family POLYPODIDAE.

Subfamily Octopodinae.

Bathypolypus valdiviae (Chun, 1915).

P.F. 18,162. Cape Point, N.E. by E. $\frac{3}{4}$ E., 28 m., shrimp trawl, 300 f., fine sand. One ♂.

This fine specimen, which is preserved in alcohol, is reddish brown above and paler below. The web is very delicate and almost transparent. It extends about $\frac{1}{3}$ up the arms and is slightly higher laterally than dorsally and lowest ventrally. The body is of very soft consistency. The dorsal surface of the head, body, and web is densely covered with large and small tubercles. The end of the body appears to be smooth, but small tubercles become visible on examination with a lens. A peripheral keel is present. The suckers of the arms are very minute and average 1 mm. in diameter. The modified portion of the hectocotylised arm measures 8 × 5 mm. and has a pointed tip and 5 transverse ridges.

Principal Measurements.

	mm.		mm.
Head across eyes .	30	1st right arm . .	62
Breadth of body .	32	2nd ,, ,, . .	60
Ventral mantle-length	27	3rd ,, ,, (hect.) .	45
		4th ,, ,, . .	59

Distribution.—500 m., Agulhas Bank, 35° 10·5′ S., 23° 2′ E., type. (Chun, 1915.)

Polypus granulatus (Lam., 1799).

P.F. 16,022. Seal Island, S.S.W., $\frac{1}{2}$ m. False Bay, dredge, 11 f., brackish shingle. (?.) One young.

P.F. 871. About 23 m. E. of East London. Lat. 32° 48′ 30″ S. Long. 28° 14′ 30″ E., large trawl, 24–27 f., mud and sand. One ♀.

Board of Agriculture, Cape Colony. One ♀. [1311 D.]

The young specimen has a mantle-length of only 11 mm. and is paler than older specimens of *P. granulatus*. It is very rough skinned and has a large cirrus inside each eye and at the end of body. The lateral arms are the largest and measure about $2\frac{1}{2}$ times the length of the body. The web is lowest dorsally.

The principal measurements of the example 1311 D are given below.

	mm.		mm.
Ventral mantle .	19	Breadth of body . .	24
End of body to eye	28	Diameter largest sucker	3
1st right arm .	56	1st left arm . .	65
2nd ,, ,, .	mutil.	2nd ,, ,, . .	mutil.
3rd ,, ,, .	79	3rd ,, ,, . .	81
4th ,, ,, .	mutil.	4th ,, ,, . .	mutil.

Distribution.—Azores to Cape, Indian Ocean, Pacific.

Polypus sp.

P.F. 16,022. Seal Island, S.S.W., ½ m. False Bay, dredge, 11 f., brackish shingle. One.

The above is a small rough-skinned specimen with a ventral mantle-length of 11 mm. The lateral arms are the largest and the web is lowest dorsally. There is a very prominent tubercle at the end of the body and cirri about the eyes. It is perhaps a young example of *P. granulatus* (Lam.), but is paler than older specimens.

Polypus sp.

P.F. 858. Off E. of Cape Morgan. Lat. 32° 45′ 45″ S. Long. 2°. One young.

This has a ventral mantle measuring 2·50 mm. in length, the general colour is pale greenish with minute dark specks, and large dark chromatophores occur on the back of the arms. These measure about 3 times the length of the body and are longest laterally. Surface smooth, except in the neighbourhood of the eyes where there are numerous granules.

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EXPLANATION OF PLATES.

Plate XVII.

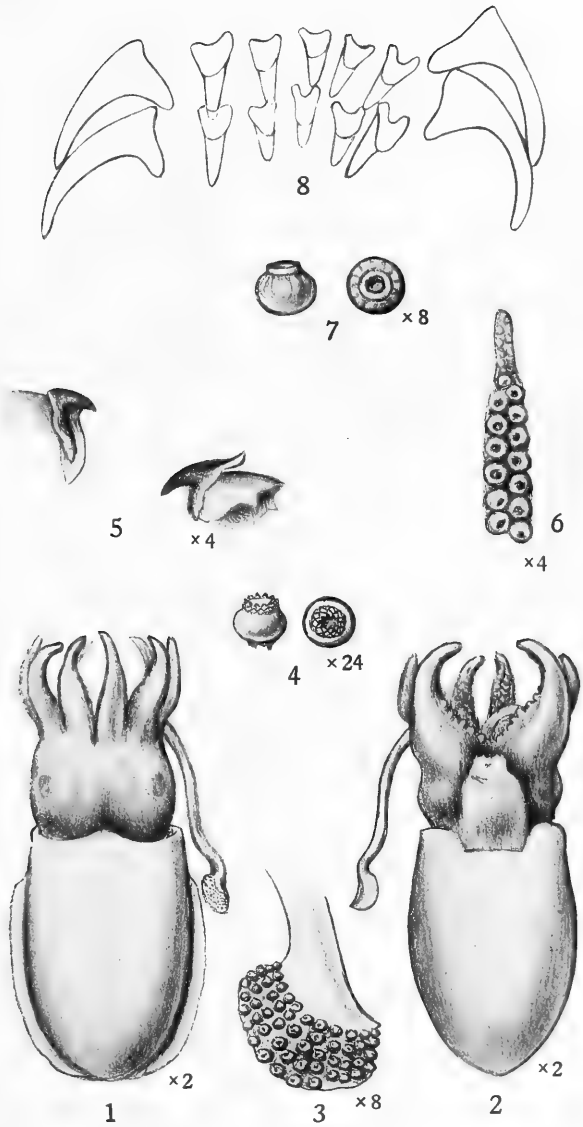
Rhombosepion robsoni, sp. nov. ♂.

FIG.
1. Dorsal aspect. ×2.
2. Ventral aspect. ×2.
3. Club of tentacle. ×8.
4. A club sucker. ×24.
5. Mandibles. ×4.
6. A lateral arm. ×4.
7. An arm sucker. ×8.
8. Radula (much enlarged).

Plate XVIII.

Doratosepion joubini, sp. nov. ♀.

1. Dorsal aspect. ×2.
2. Ventral aspect. ×2.
3. A club sucker. ×16.
4. Club of tentacle. ×4.
5. A lateral arm. ×4.
6. An arm sucker. ×16.
7. Mandibles. ×4.
8. Radula (much enlarged).
9. Shell, ventral aspect. ×2.
10. Sculpture of shell on unstriated area, much enlarged.



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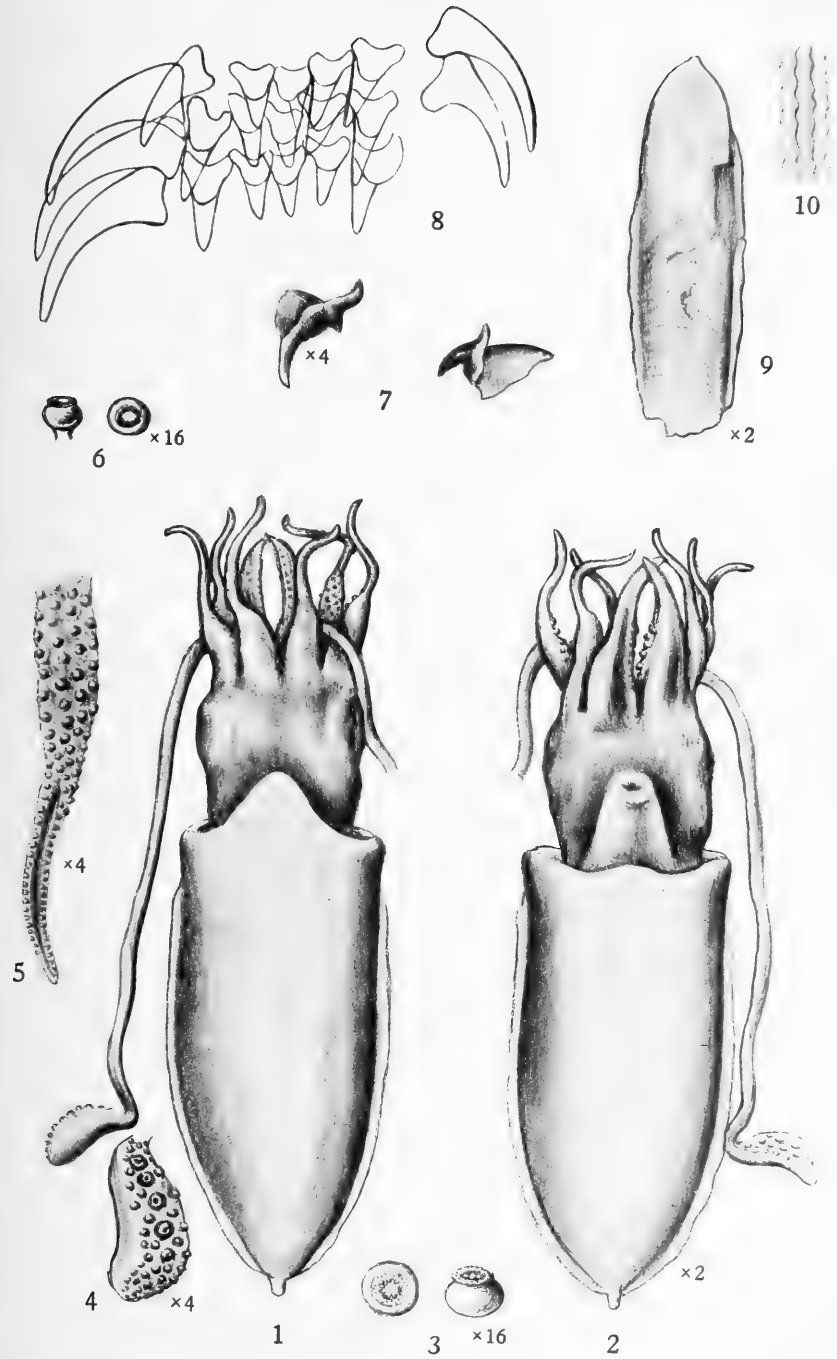
RHOMBOSEPION ROBSONI.



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DORATOSEPION JOUBINI.

5. *Contributions to a Knowledge of the Fauna of South-West Africa.*

No. 6. On the Occurrence of the Freshwater Bryozoan *Lophopodella thomasi* Rouss. in Ovamboland.—By K. H. Barnard, D.Sc., F.L.S., Assistant Director.

Although Kraepelin has already reported on the Freshwater Bryozoa collected by Michaelsen (Beitr. Kennt. Land. u. Süssw. Fauna Südwestafr., i, p. 57, 1914), it may be thought useful to report the occurrence of a further species from the northern part of the territory which was not traversed by Michaelsen.

Kraepelin's paper forms a handy compendium of the species of Bryozoa inhabiting Africa as a whole, with illustrations of their statoblasts, and a bibliography up to 1914. Since that date the only paper dealing with the African species is Cunnington's discussion on the fauna of the African lakes (Proc. Zool. Soc. Lond., xi, p. 538, 1920).

Freshwater Bryozoa are readily distributed by means of the resting eggs or statoblasts, which may be contained in the mud adhering to the feet of water birds, or dispersed by wind agency. It is not surprising, therefore, that of the eleven species found in Africa, four may be termed cosmopolitan, being distributed over Europe, Asia, and America, and two Afro-Indian.

Three of the four species hitherto recorded from South-West Africa are cosmopolitan species, namely, *Plumatella repens* (Linn.), *P. emarginata* Allm., and *P. punctata* Hanc. The fourth form is a variety of a species originally described from the Cape Flats, near Cape Town, *Lophopodella capensis* (Sollas). Up to the present it has only been recorded from the Cape and South-West Africa, but it will probably be discovered in other parts of South Africa.

Particular interest attaches to the few endemic African species. Possible causes for their localised distribution, as opposed to the wide distribution of the cosmopolitans, have not yet been investigated. Such may be the inability of the zoaria to withstand a considerable range of temperature, or of the statoblasts to withstand prolonged desiccation. Compare the difference in behaviour of the resting eggs

of *Apus* and *Lepidurus* (Brauer. SB. K. Ak. Wiss. Wien., lxxv, pt. 1, p. 583, 1877).

Lake Tanganyika alone possesses three endemic species (Cunnington, *loc. cit.*, p. 539). The only other two are *L. capensis*, already mentioned, and *Lophopodella thomasi* Rouss. The latter species was described from Hunyani River, Salisbury, in Rhodesia, and is now recorded from Ovamboland. It does not seem to be common. Numerous vleis were searched, but it was only found in a large temporary vlei situate in the old watercourse or " omuramba " at Tamansu, about 50 miles west of Ondongua. This omuramba is known to have been at one time a regular channel for the overflow waters of the Kunene River in the wet season, though of late years this overflow seldom happens. Water from the Kunene River came down in 1925.

It would perhaps be premature to attempt an interpretation of the distribution of *L. thomasi*, seeing that it is only known from two localities, albeit these localities are relatively widely separated. Nevertheless, it may be noted that they are situated in the drainage systems of two rivers which are considered to have been more or less intimately connected in times past.

If it were proved by experiment that the statoblasts of this species were unable to withstand desiccation, we might rule out of account dispersal by means of the mud sticking to the feet of aquatic birds, and regard this species as evidence that the river systems of the Kunene and Zambesi were once connected.

These remarks are made to show that the investigation of the freshwater fauna of South-West Africa may prove important from a geographical, as well as from a zoological, point of view.

6. *South African Nudibranch Mollusca, with Descriptions of New Species, and a Note on some Specimens from Tristan d'Acunha.* —By K. H. Barnard, M.A., D.Sc., F.L.S., Assistant Director.

(With Plates XIX, XX and six Text-figures.)

The following paper is intended as a starting-point for the study of the Nudibranch Mollusca of South Africa, by bringing together all the records to date, giving brief diagnoses of the families and genera, and coloured figures of some of the commoner species.

Nudibranchs, on account of their brilliant colours and variety of form, are one of the most fascinating groups of Mollusca to collect, but possess the great drawback that after death and preservation both colour and form to a very large extent disappear. Perhaps it is for this reason that so little has been done to investigate the South African fauna. Practically the only collectors have been Mr. Burnup in Natal, Dr. Gilchrist during the course of the Marine Investigations under the Cape Government, and the present writer.

Mr. Burnup's collections were reported on by Sir Charles Eliot, and comprised ten species. Dr. Gilchrist and the s.s. "Pieter Faure" accumulated a moderately large collection, which was sent to Bergh for examination. The result was the addition of some twenty-nine species to the fauna list, of which twenty-six were considered to be novelties.

The present author has had the advantage of being able to observe the living animals, making coloured drawings, and examining the specimens in a fresh state immediately after death. Four species not hitherto recorded from South Africa are here added to the fauna list, and nine are described as new, all of the latter but one having been collected by the author along the littoral of False Bay.

Thus there is evidently a wide scope for collectors to add further species. It should be borne in mind, however, that preserved specimens without coloured sketches of the living animals, or at least detailed notes of the coloration, are of comparatively little use. On account of the lack of such data, and the unsatisfactory condition of

the material, many of Bergh's species are almost or quite unrecognisable even by specialists.

Moreover, owing to their great contractility, specimens which have been put direct into preserving fluids are frequently impossible to dissect and identify satisfactorily. These animals should always be anaesthetised. The writer has used menthol crystals, scattered over the surface of the sea-water in the bowl containing the animals, with very satisfactory results. Other anaesthetics are 70 per cent. alcohol, cocaine, and, according to information given me by Dr. Gill, Epsom salts, added drop by drop to the sea-water. Care must be taken to leave the animals long enough to allow the anaesthetic to destroy all power of contractility, but not long enough for decomposition to set in.

As permanent preservatives, formalin, formol-alcohol, or 70 per cent. alcohol to which a drop or two of glycerine has been added, can be recommended.

It is certain that many of the smaller forms still await discovery in these waters. The best means of collecting these is to gather carefully handfuls of seaweeds, hydroids, encrusting sponges, etc., which grow on the rocks and boulders at low tide, and leave them in a bowl of fresh sea-water overnight. The next morning the Nudibranchs will be found crawling on the sides of the bowl or floating on the surface of the water.

In the Northern Hemisphere there is a marked seasonal migration, the animals coming inshore in the spring and summer months to spawn. In South Africa such a seasonal migration does not seem so marked; at least that is the writer's experience as regards shore-collecting in False Bay and the western coast of the Cape Peninsula. During a short collecting trip in December and January in Natal, at the localities where previously Mr. Burnup had collected in, the writer obtained no Nudibranchs. These observations are mentioned to show how little we know of the biology of the marine life around our shores.

The classification and nomenclature of the *Nudibranchiata* is still *sub judice*. The classification here adopted is mainly that of Bergh, with the removal of the *Duvauceliidae* (*Tritoniidae*) from the *Kladohepatica* in accordance with Eliot's pertinent remarks (1903, Fauna Geogr. Mald. Lacc., vol. ii), and the adoption of Iredale and O'Donoghue's group *Zonobranchiata*. The nomenclature is a greater problem, but it is clear that the laws of priority must be applied, even though this means the disappearance of many names long in use.

A. HOLOHEPATICA.

1881. Bergh, Verh. k. k. Zool. bot. Ges. Wien, xxx, p. 236.
1890. Bergh, Zool. Jahrb. Abt. Syst., v.
1892. *Id.*, Das System der Nudibranchiaten Gasteropoden, p. 79.
1924. O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 542.

Gills usually few in number, situate medio-dorsally behind the middle of the body. Mandibles absent. Liver forming a compact mass, never branched. Two vesiculae seminales.

In this group are comprised the numerous and varied forms known collectively as " Dorids." They are found in all parts of the world, being especially numerous, large, and brilliantly coloured in the tropics.

Three divisions are represented in South Africa, the *Cryptobranchiata*, the *Porostomata*, and the *Phanerobranchiata*, though these terms are not very satisfactory, and are being discarded by modern writers.

1. Cryptobranchiata.

1879. Bergh, Arch. Naturg., xxxv, 1, p. 341.
1891. *Id.*, Zool. Jabrb. Abt. Syst., vi, p. 103.
1892. *Id.*, Das System, p. 83.

Gills contiguous at their bases, retractile (almost always) into a common cavity (except in *Hexabranchus*). Rhinophores always with perfoliate club. Pharynx never suctorial. Radula with the lateral teeth not differentiated.

For purposes of grouping South African representatives it may be noted that :

(i) The gills are retractile into separate cavities in the *Hexabranchidae*.

(ii) A labial armature is present only in the *Discodoridae* and the genus *Glossodoris*.

(iii) The form is elongate slug-like in the *Glossodoridae*, very depressed in the *Platydoridae*.

(iv) The gills are simply pinnate only in the genera *Doridigitata*, *Glossodoris*, and *Diaulula* (?) *morosa* Bgh.

Family HEXABRANCHIDAE.

1892. Bergh, Das System, p. 99.
1924. O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 545.

Body elongate-oval, soft, depressed, smooth, margin wide, undulate. Tentacles large, foliaceous, margin crenulate. Gills 6 to 8, arborescent, retractile into separate cavities, or more strictly speaking contractile. Foot broad. Labial armature strong, composed of minute hooks. Radula without central tooth, laterals numerous, hamate without accessory denticles. Penis very long, unarmed.

Gen. Hexabranchus Ehrenbg.

1828. Ehrenberg, Symb. Phys.
1892. Bergh, *loc. cit.*, p. 99.
1905. *Id.*, Siboga Exp., Monogr. 50, p. 89.
1908. Eliot, J. Linn. Soc. Lond., xxxi, p. 97.

With the characters of the family.

**Hexabranchus adamsi* Ad.

	Hexabranchus adamsi.		Gray MSS.
1858.	,,	,,	H. and A. Adams, Gen. Moll., ii, p. 59, pl. 63, fig. 9.
1905.	,,	,,	Eliot, Proc. Mal. Soc., vi, p. 235.
1905.	,,	*punctatus.*	Bergh, Siboga Exp., Monogr. 50, p. 92, pl. xiii, fig. 27 (radula tooth).
1908.	,,	*adamsi.*	Eliot, J. Linn. Soc. Lond., xxxi, p. 97.
1910.	,,	,,	Smith, Ann. Nat. Mus., ii, p. 180 (listed).

Locality.—Scottburgh, Natal.

Distribution.—East Indies and Pacific Ocean.

Eliot in 1908 thinks that the Natal specimen should be referred to Bergh's species, which is described as being dirty-yellow with scattered black specks on the back. Whether it is the same as that figured by Adams remains uncertain.

Family ARCHIDORIDAE.

1892. Bergh, Das System, p. 100.
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 226 (*Dorodigitatidae*).
1924. O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 547 (*Archidorididae*).

* Not represented in S.A. Mus. Collections.

Body not hard, somewhat depressed, margin not narrow. Back tuberculate or granulate. Tentacles small. Gills nearly always 3- or 4 pinnate. Foot rather broad. No labial armature. Radula without central tooth, laterals numerous, hamate. Penis usually unarmed.

Gen. Archidoris Bgh.

1878. *Archidoris.* Bergh, Malac. Unters, xiv, p. 616.
1892. ,, *Id.*, Das System, p. 100.
1923. ,, Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 228.

Tentacles stout, longitudinally grooved. Gills not numerous, 3 to 4 pinnate. Vagina unarmed.

**Archidoris capensis* Bgh.

1907. *Archidoris capensis.* Bergh, Mar. Invest. S.A., v, p. 42.
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 176 (listed).

Back shagreened.
Locality.—Off Cape Point.

**Archidoris granosa* Bgh.

1907. *Archidoris granosa.* Bergh, Mar. Invest. S.A., v, p. 43, pl. v, figs. 16–18 (nodules of back, radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 176 (listed).

Back nodulose.
Locality.—Off Tongaati River, Natal, 36 fathoms; Woodstock Beach, Table Bay.

**Archidoris* ? *scripta* Bgh.

1907. *Archidoris* ? *scripta.* Bergh, Mar. Invest. S.A., v, p. 44, pl. xi, figs. 19–25 (animals, radula, ♂ reprod. organ).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 176 (listed).

Back smooth. White, back with irregularly scattered black points and lines, margin yellow.
Locality.—Itongazi River, Natal.
Systematic position very doubtful.

Gen. Doridigitata D'Orb.

1839. *Doridigitata.* D'Orbigny in Webb and Berthelot, Ile Canar., ii, 2, Moll., p. 39.
1878. *Staurodoris.* Bergh, Malac. Unters., xiii, p. 578.
1892. ,, *Id.*, Das System, p. 101.
1923. *Doridigitata.* Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 229.

Back tuberculate. Margins of the rhinophoral and branchial cavities protected with elevated valve-like tubercles. Tentacles short, stout, externally grooved. Gills rather numerous, *simply pinnate.* Penis and vagina unarmed.

Doridigitata verrucosa (Cuv. emend. Bgh.).

1878. *Staurodoris verrucosa.* Cuv. Bergh, *loc. cit.*, p. 578 (non *verrucosa* Linn.).
1907. ,, ,, Bergh, Mar. Invest. S.A., v, p. 46, pl. xi, figs. 26, 27 (radula).

Greyish or yellowish-brown, simulating a sponge and barnacle shells which grow on the rocks between tide marks.

Locality.—St. James, False Bay ; Saldanha Bay ; low tide.

Distribution.—Mediterranean and east and west sides of Atlantic.

Family DISCODORIDAE.

1892. Bergh, Das System, p. 102.
1905. *Id.*, Siboga Exp., Monogr. 50, p. 98.

Body not hard, depressed, margin rather wide. Back minutely granulate. Tentacles digitiform. Gills nearly always 3 or 4 pinnate. Foot rather broad. Labial armature formed of minute rods. Radula without central tooth, laterals numerous, hamate. Penis nearly always unarmed.

Gen. Discodoris Bgh.

1888. *Discodoris.* Bergh, Malac. Unters., xvi, p. 805.
1892. ,, *Id.*, Das System, p. 102.
1906. ,, Eliot, Proc. Zool. Soc. Lond., ii, p. 651.
1910. ,, *Id.*, Tr. Linn. Soc. Lond., xiii, p. 421.

Body soft, round or oval. Branchial aperture slightly crenulate, stellate, or bilabiate. Upper lip of the anterior margin of foot more or less incised. Large prostate gland.

**Discodoris coerulescens* Bgh.

1888. *Discodoris coerulescens.* Bergh, *loc. cit.*, p. 805, pl. lxxxiii, figs. 6–12.
1910. ,, ,, (?) juv. Eliot, Ann. Nat. Mus., ii, p. 222.

Back rough, whitish mottled with irregular darker patches composed of black lines of varying length, thickness, and direction; foot whitish.

Locality.—Natal coast.

Distribution.—Mauritius.

Gen. Geitodoris Bgh.

1892. *Geitodoris.* Bergh, Das System, p. 103.
1894. ,, *Id.*, Bull. Mus. Comp. Zool., xxv, 10, p. 162.
1907. ,, *Id.*, Mar. Invest. S.A., v, p. 47.

Body oval, depressed, back minutely granulate or smooth. Upper lip of the anterior margin of foot incised with prominent lobes. Inner laterals strong, outer feeble, thin, not hamate. No prostate gland.

**Geitodoris capensis* Bgh.

1907. *Geitodoris capensis.* Bergh, *loc. cit.*, p. 47, pl. xii, figs. 2–5 (labial armature and radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 176 (listed).

Colour when alive yellow.

Locality.—Off Glendower Beacon (Port Alfred).

Family DIAULULIDAE.

1892. Bergh, Das System, p. 105.

Body not hard, or rather soft, more or less depressed. Back usually minutely villous, often velvety. Tentacles digitiform. Branchial aperture round, crenulate, gills tripinnate. Foot anteriorly

bilabiate, the upper lip medianly incised. No labial armature. Radula without central tooth, laterals numerous, hamate. Penis as a rule unarmed.

Gen. Diaulula Bgh.

1880. *Diaulula.* Bergh, Sc. Res. Explor. Alaska, pt. 1, p. 189.
1892. ,, *Id.*, *loc. cit.*, p. 105.
1905. ,, *Id.*, Siboga Exp., Monogr. 50, p. 118.
1907. ,, *Id.*, Mar. Invest. S.A., v, p. 48.

Back velvety. All the lateral teeth hamate. Prostate large.

**Diaulula capensis* Bgh.

1907. *Diaulula capensis.* Bergh, *loc. cit.*, p. 48, pl. v, figs. 19–22 (skin and radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 177 (listed).

Gills tripinnate. Colour when alive light brown.

Locality.—Mossel Bay, 11 fathoms. In the original description Seal Island is mentioned in brackets after Mossel Bay, which seems to indicate that the label was erroneous, and that False Bay was intended.

**Diaulula* ? *morosa* Bgh.

1907. *Diaulula* ? *morosa.* Bergh, *loc. cit.*, p. 50, pl. v, figs. 23–26 (skin and radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 177.

The systematic position of this species is uncertain. The gills are simply pinnate, which is quite unique in the family. Back dark greenish-gray, foot white.

Locality.—Mossel Bay, shore.

Gen. Thordisa Bgh.

1884. *Thordisa.* Bergh, "Challenger" Rep., x, p. 106.
1892. ,, *Id.*, Das System, p. 106.
1905. ,, *Id.*, Siboga Exp., Monogr. 50, p. 121.
1906. ,, Eliot, Proc Zool. Soc. Lond., ii, p. 654.
1907. ,, Bergh, Mar. Invest. S.A., v, p. 50.

Tentacles tuberculiform. Outermost lateral teeth pectinate.

**Thordisa burnupi* Eliot.

1910. *Thordisa burnupi.* Eliot, Ann. Nat. Mus., ii, p. 223.

Orange, closely sprinkled with lighter orange or yellow spots, with numerous black and yellow bristles. Rhinophores white with a reddish line on inner side. Foot yellow with black spots around its upper side. Only 17 hamate lateral teeth.

Locality.—Natal coast.

**Thordisa punctulifera* Bgh.

1907. *Thordisa punctulifera.* Bergh, *loc. cit.*, p. 50, pl. vi, figs. 1–4 (skin and radula).

1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 177 (listed).

Uniform white with small black roundish and irregular spots on back, sometimes also on foot-brim. About 100 hamate lateral teeth.

Locality.—False Bay, 23 fathoms.

Family PLATYDORIDAE.

1892. Bergh, Das System, p. 109.

1924. O'Donoghue, J. Linn. Soc. Lond. Zool., xxxv, p. 550 (*Platydoridide*).

Body firm, coriaceous, deplanate, oval or round. Back smooth or minutely granulate, margin wide. Tentacles digitiform. Foot anteriorly with the upper lip deeply fissured. Labial armature absent. Radula without central tooth, laterals numerous, hamate. Prostate large.

Gen. Platydoris Bgh.

1888. *Platydoris.* Bergh, Malac. Unters., xvi, p. 801.
1892. ,, Bergh, Das System, p. 109.
1903. ,, Eliot, Proc. Zool. Soc. Lond., ii, p. 374.
1905. ,, *Id.*, J. Conchol., ii, p. 252.
1905. ,, Bergh, Siboga Exp., Monogr. 50, p. 135.
1906. ,, Eliot, Proc. Zool. Soc. Lond., p. 645.
1910. ,, *Id.*, Tr. Linn. Soc. Lond., xiii, p. 425.

Back granulate. Penis armed internally with large spines, vagina similar, or at least with strong cuticle.

Platydoris scabra (Cuv.).

1806. *Doris scabra.* Cuvier, Ann. Mus. Paris, iv, p. 466.
1877. ,, *coriacea.* Abraham, Proc. Zool. Soc. Lond., p. 247, pl. xxvii, figs. 1–4 (whole animal).
1888. *Platydoris eurychlamys.* Bergh, Malac. Unters., xvi, p. 802, pl. lxxxiii, figs. 30–32.
1903. ,, *coriacea.* Smith, Proc. Malac. Soc., v, p. 357.
1910. ,, *scabra.* Eliot, *loc. cit.*, p. 426 (synonymy).

Locality.—South Africa.

A young specimen, 28 mm. long by 19 mm. wide, which appears to belong to this species, was taken at Durban (H. W. Bell-Marley, July 1918). In colour it is light grey and mottled with subcircular darker patches.

Distribution.—Seychelles, East Indies, Sir C. Hardy's Islands (Queensland).

Family GLOSSODORIDAE.

1892. Bergh, Das System, p. 111 (*Chromodorididae*).
1924. O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 552 (*Glossodorididae*).

Body elongate, compressed, rather soft, brightly coloured, usually with stripes or spots. Margin rather broad anteriorly and more especially posteriorly, but narrow laterally. Back almost always smooth. Tentacles small, conical, usually reversible. Gills usually simply pinnate. Labial armature, when present, strong, formed of minute hooks. Radula sometimes with spurious minute central tooth, laterals numerous, hamate, and usually with secondary denticles, the 1st lateral with denticles on both sides. No proper ventricle. Penis unarmed.

Gen. Glossodoris Ehrenb.

1831. *Glossodoris.* Ehrenberg, Symb. Phys.
1855. *Chromodoris.* Alder and Hancock, Br. Nudibr. Moll., pt. 7, p. xvii.
1879. ,, Ihering, Malak. Bl., ii, p. 5.
1892. ,, Bergh, Das System, p. 112.
1904. ,, Eliot, Proc. Zool. Soc. Lond., I, ii, p. 382.
1905. ,, Bergh, Siboga Exp., Monogr. 50, p. 142.
1905. ,, Farran in Herdman's Ceyl. Pearl Fish. Suppl. Rep., xxi, p. 341.

1906. *Chromodoris.* Eliot, Proc. Zool. Soc. Lond., ii, p. 640.
1906. ,, MacFarland, Bull. Bur. Fish., xxv, p. 128 (references).
1907. ,, Bergh, Mar. Invest. S.A., v, p. 55.
1924. *Glossodoris.* O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 553 (synonymy).

Body elongate or elongate-oval, smooth (with few exceptions), margin simple. Gills, 5 to nearly 30 in number, typically simply pinnate, but sometimes some are bifid or even multifid. Labial armature strong.

A very large genus, the species of which are mostly brightly coloured. The colours and pattern are often variable, and many of the species are merely synonyms, though in many cases it is almost impossible to determine accurately some of the earlier described species.

Synopsis of the South African Species.

1. Radula teeth simply bifid.
   a. Gills simply pinnate . . . . . *euelpis.*
   b. Gills bipinnate . . . . . *capensis.*
2. Radula teeth with denticulations under the two prongs.
   a. Glandular knobs under mantle-edge . . . . *runcinata.*
   b. No glandular knobs . . . . . *annulata, carnea, lineata.*
3. Radula teeth denticulate . . . . . *albolimbata, porcata*

Glossodoris capensis n. sp.

(Plate XIX, figs. 3, 4.)

Translucent white with a fuscous tinge dorsally; mantle edge, except in front of rhinophores, whitish-purple, with a series of irregular blotches of similar colour each with a chocolate-purple centre; these blotches extend round in front of the rhinophores and behind the gills; the back with some irregularly scattered chocolate spots, and 3 or 5 longitudinal white lines, the outermost of which is continued round in front of the rhinophores and behind the gills; sides of foot unspotted; tail with purplish and chocolate blotches; clubs of rhinophores and axes of gills orange.

Labial armature composed of slender, straight, conical rods. All the teeth of the radula simply bifid, the 1st lateral as usual trifid.

Gills about 10, all bipinnate.

Length up to 60 mm.; breadth and height about 8 mm.

Locality.—St. James, False Bay, low tide (April 1912, K.H.B. Not common).

The general scheme of coloration is comparable with that of the specimens from Zanzibar identified by Eliot as a variety of *magnifica* Q. and G. (1904, Proc. Zool. Soc., p. 397), but lack the yellow border to the mantle and the violet and chocolate markings along side of foot. The bipinnate gills and simply bifid teeth constitute a clear specific difference.

**Glossodoris euelpis* (Bgh.).

1907. *Chromodoris euelpis.* Bergh, Mar. Invest. S.A., v, p. 56, pl. vi, figs. 14–17 (labial armature and radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 178 (listed).

Yellowish, back and sides very finely punctuated with black dots.
Locality.—Off Umvoti River, Natal, 45 fathoms.

**Glossodoris albolimbata* (Bgh.).

1907. *Chromodoris albolimbata.* Bergh, Mar. Invest. S.A., v, p. 55, pl. vi, figs. 18–24 (gill, labial armature, and radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 178 (listed).
1923. ,, ,, Odhner, Göteb. Vet. Handl., xxvi.
1926. ,, ,, Tomlin, Ann. Nat. Mus., v, p. 286.

Reddish-white, margin of back chalk-white.
Locality.—Agulhas Bank, 20 fathoms.

**Glossodoris carnea* (Bgh.).

1888. *Chromodoris carnea.* Bergh, Malac. Unters., xvi, 2, p. 836, pl. lxxxiii, figs. 20–29.
1910. ,, ,, Eliot, Ann. Nat. Mus., ii, p. 225.

Back whitish with a few longitudinal white lines, sparsely and irregularly spotted with crimson and orange, margin with an interrupted band of plum colour, extreme edge white, head, tip of tail, and gills white with orange lines, rhinophores white with an orange spiral line, under surface white.
Locality.—Natal coast.
Distribution.—Mauritius.

**Glossodoris annulata* (Eliot).

1904. *Chromodoris annulata.* Eliot, Proc. Zool. Soc. Lond., i, p. 389, pl. xxiv, figs. 1–3 (coloured fig., gills, radula).
1905. ,, ,, *Id.*, Proc. Malac. Soc., vi, p. 233.
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 179 (listed).

Dirty grey with white spots, a large purple blotch occupying nearly the whole back behind rhinophores. Gills 9 to 16, with a dark stripe down inner and another down outer edge. Teeth with 8 to 10 denticles.

The original description and the coloured figure show the coloration as follows : translucent white with yellow spots, a deep purple border round the margin, two rings of the same colour around the rhinophoral and branchial areas, underside and sides of foot white, yellow spots on tail, rhinophores and a stripe down inner and outer margins of gills deep purple. Eliot notes that the preserved specimens became reddish-purple with white spots, with no trace of the border and rings of purple.

Locality.—Scottburgh, Natal.

Distribution.—Zanzibar.

**Glossodoris lineata* (Soul.).

1852. *Doris lineata.* Souleyet, Voy. Bonite, ii, p. 453, pl. xxv, figs. 5–9 (coloured fig. of animal, gills).
1904. ,, ,, Eliot, Proc. Zool. Soc. Lond., i, p. 396, pl. xxiv, fig. 7.
1905. ,, ,, *Id.*, Proc. Malac. Soc., vi, p. 233.
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 179 (listed).

Bluish-white with 5 raised lines along back. Gills, 11. Rhinophores and gills probably red in life. Teeth bifid with 4 to 5 denticles. Souleyet describes the colour as being pale yellow with longitudinal violaceous lines, rhinophores and gills orange.

Locality.—Scottburgh, Natal.

Distribution.—Sandwich Islands.

**Glossodoris porcata* (Bgh.).

1888. *Chromodoris porcata.* Bergh, Malac. Unters., xvi, 2, p. 831, pl. lxxxii, figs. 1–8.
1910. ,, ,, Eliot, Ann. Nat. Mus., ii, p. 224.

Back whitish, irregularly mottled with yellowish-brown, with a few irregular plum-coloured blotches all round near the margin. Rhinophores brown with white spiral lines. Gills and under surface white. Bergh describes the colour as milky or greenish-white, with violet points everywhere except on sole, back lemon-yellow, rhinophores citron with the branches colourless or yellowish. In one case the two posterior gills were bifid.

Locality.—Natal Coast.

Distribution.—Mauritius.

**Glossodoris runcinata* (Bgh.).

1877.	*Chromodoris runcinata.*		Bergh, Semper's Reise, xii, p. 479, pl. li, figs. 32, 33, pl. liii, figs. 5–12 (Philippines).
1904.	,,	,,	Eliot, Proc. Zool. Soc. Lond., i, p. 393.
1905.	,,	,,	*Id.*, Proc. Malac. Soc., vi, p. 232.
1910.	,,	,,	Smith, Ann. Nat. Mus., x, p. 178 (listed).

Bluish-white marked with yellow or orange and dark blue, both colours forming a reticulate mottling as well as isolated spots. Gills 12 to 13, grey, red, or yellowish. Rhinophores red. Teeth with very fine, often obscure, denticles under the two prongs. About 8 glandular knobs under the mantle-margin posteriorly.

Locality.—Scottburgh, Natal.

Distribution.—Philippines, east coast of Africa.

**Glossodoris* sp.

1907.	*Chromodoris* sp.		Bergh, Mar. Invest. S.A., v, p. 57, pl. vi, figs. 25, 26 (labial armature and radula).
1910.	,,		Smith, Ann. Nat. Mus., ii, p. 178 (listed).

Whitish, gills grey. Back covered with small round tubercles.

Locality.—False Bay, 23 fathoms.

Gen. Aphelodoris Bgh.

1879.	*Aphelodoris.*	Bergh, Malakozool. Blätt., n.f. I, p. 107.
1892.	,,	*Id., loc. cit.*, p. 120.
1907.	,,	*Id.*, Mar. Invest. S.A., v, p. 58.
1924.	,,	O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 556.

Body similar in form to *Glossodoris*, but (pallial) margin and foot narrower. Tentacles truncate. Gills tripinnate. No labial armature.

Aphelodoris brunnea Bgh.

(Plate XIX, figs. 5, 6.)

1907. ? *Aphelodoris brunnea.* Bergh, *loc. cit.*, p. 58, pl. xi, figs. 28, 29, pl. xii, fig. 1 (radula and gen. organs).

In life the tail does extend a short way beyond the back. The species is rather variable in the extent of the brown markings on the back. The animal swims energetically in water by rapid contortions like a detached lizard's tail.

Length.—Up to 60 mm.

Colour.—White or creamy with irregular chestnut-brown markings, variable in extent on the back, a few similarly coloured spots on the sides, gills veined with same colour, rhinophore club brown or white.

Locality.—St. James and Kalk Bay (False Bay), low-tide (May and August, K.H.B.).

Gen. Chromodoridella Eliot.

1905. *Chromodoridella.* Eliot, Proc. Malac. Soc., vi, p. 233.

A *Chromodorid* [*Glossodoris*] with the branchial pocket not on the dorsal surface, but on underside of body, pointing downward. Perhaps a monstrosity, but there is no sign of injury (Eliot).

**Chromodoridella mirabilis* Eliot.

1905. *Chromodoridella mirabilis.* Eliot, *loc. cit.*, p. 233.
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 179 (listed).

Very like *C. semperi* in shape, colour, radula, and labial armature (*cf.* Bergh, Malac. Unters., xi, p. 482), 21 mm. Dirty white with numerous deep yellow spots and fewer scattered green-blue spots, both arranged quite irregularly, but fewer at sides. Sole colourless. Outer margin of foot thickened but not grooved.

Mantel margin thin, distinct. Rhinophores yellow, stout, mace-like, and ca. 15 perfoliate. Twelve simply pinnate branchiae. Radula teeth bifid, innermost teeth with an accessory denticle, and the outermost, which are fairly tall and straight, have 2 to 3. Fifty-eight rows. Maximum number of teeth on each side is ca. 80 (Eliot).

Locality.—Scottburgh, Natal.

2. Porostomata.

1876. Bergh, Malac. Unters, x.
1892. *Id.*, Das System, p. 121.
1905. *Id.*, Siboga Exp., Monogr. 50, p. 168.

Mouth-opening pore-like. Pharynx suctorial. No mandibles or radula.

Family DENDRODORIDAE.

1892. Bergh, Das System, p. 122 (*Doriopsidae*).
1924. O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 560 (*Dendrodoridae*).

Body nearly always soft and similar in shape to the true Dorids. Tentacles very short. Rhinophores and gills as in true Dorids. Back smooth or tuberculate, margin usually wide and undulate. Foot broad. Oral tube not glandular. Posterior extremity of liver deeply incised. Penis armed with hooks.

Although at first sight extremely like an ordinary "Doris," these forms are at once distinguished by the pore-like mouth and the very small tentacles, and a glance at the internal anatomy will show the characteristic incision at the end of the liver (which distinguishes this family from the *Phyllidiidae*), and the absence of the projecting radula sac.

Gen. Dendrodoris Ehrenb.

1831. *Dendrodoris*. Ehrenberg, Symb. Phys.
1860. *Doriopsis*. Pease, Proc. Zool. Soc. Lond., p. 32.
1864. *Doridopsis*. Alder and Hancock, Tr. Zool. Soc., v, p. 124.
1865. ,, *Id.*, Tr. Linn. Soc., xxv, 2, p. 189.
1871. *Doriopsis*. Pease, Amer. J. Conch., vi, p. 299.
1875. ,, Bergh, J. Mus. Godeffray, viii, p. 82.
1876. ,, *Id.*, Malac. Unters, x, p. 384.
1890. ,, *Id.*, *ibid.*, xvii, p. 963.
1892. ,, *Id.*, Das System, p. 126.
1906. *Doridopsis*. Eliot, Proc. Zool. Soc. Lond., ii, p. 661.
1924. *Dendrodoris*. O'Donoghue, *loc. cit.*, p. 560 (synonymy).

Back soft, smooth. Buccal ganglia situated in the posterior part of the bulbus pharyngeus.

Synopsis of the South African Species.

1. Whitish, margin of back with roundish black patches. Gills 5. *capensis.*
2. Whitish, margin and front part of back blackish, also a few black patches over rest of back. Skin full of spicula. Gills 6. . . . . *callosa.*
3. Bluish. Gills 8 . . . . . *caesia.*
4. Greyish. Gills 6 . . . . . *D. sp.*
5. Black. Gills 8–10 . . . . . *nigra.*

**Dendrodoris capensis* (Bgh.).

1907. *Doriopsis capensis.* Bergh, Mar. Invest. S.A., v, p. 60, pl. xiv, fig. 4 (hooks on penis).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 179 (listed).

Yellowish-white, margin with black patches. Gills 5, their tips grey.
Locality.—Off Umhlanga River, Natal.

**Dendrodoris callosa* (Bgh.).

1907. *Doriopsis callosa.* Bergh, Mar. Invest. S.A., v, p. 61, pl. viii, figs. 1–4 (armature of penis, spicula, bulbus pharyngeus).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 179 (listed).

Whitish, margin and fore part of back and a few patches on the back blackish. Skin with numerous long spicules. Gills 6.
Locality.—False Bay, 17 to 27 fathoms.

**Dendrodoris caesia* (Bgh.).

1907. *Doriopsis caesia.* Bergh, Mar. Invest. S.A., v, p. 62.
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 180 (listed).

Bluish when alive. Gills 8.
Locality.—False Bay, 10 fathoms.

**Dendrodoris* sp.

1907. *Doriopsis* sp. Bergh, Mar. Invest. S.A., v, p. 63, pl. viii, figs. 5, 6 (penis and armature).
1910. ,, Smith, Ann. Nat. Mus., ii, p. 180 (listed).

Whitish, sides and back with grey patches. Gills 6.
Locality.—False Bay, 10 fathoms.

Dendrodoris nigra (Stimps.).

1855. *Doris nigra*. Stimpson, Proc. Ac. Nat. Sci. Philad., vii, p. 380.
1864. ,, ,, Alder and Hancock, Tr. Zool. Soc. Lond., v, p. 128, pl. xxxi, figs. 13–16.
1881. *Doriopsis nigra* var. *coerulea*. Bergh, Jap. Nudibr. Verh. Zool. Bot. Ges. Wien, xxx, p. 181.
1888. ,, ,, var. *nigerrima*. *Id.*, Mal. Unters., xvi, p. 842.
1903. ,, ,, Eliot, Fauna Mald. Lacc. Archipel., ii, p. 560.
1905. ,, ,, and var. *luteopunctata*. Bergh, Siboga Exp., Monogr. 50, p. 169, pl. ii, fig. 13, and p. 170, pl. ii, fig. 14.
1924. *Dendrodoris nigra*. O'Donoghue, J. Linn. Soc. Lond., xxxv, p. 561.

Gills 8 to 10. Black, with or without yellowish specks, and a more or less distinct yellowish margin, tips of the rhinophores yellow or whitish.

Locality.—Mozambique, low tide (November 1912, K.H.B.).

Distribution.—Indo-Pacific to Japan and W. Australia.

Gen. Doriopsilla Bgh.

1880. *Doriopsilla*. Bergh, Jahrb. d. Malakozool. Ges., vii, p. 316.
1892. ,, *Id.*, Das System, p. 131.
1906. ,, Eliot, Proc. Zool. Soc. Lond., ii, p. 663.

Back somewhat hard, granulate. Buccal ganglia situated in the front part of the bulbus pharyngeus.

Doriopsilla capensis Bgh.

1907. *Doriopsilla capensis*. Bergh, Mar. Invest. S.A., v, p. 64, pl. viii, fig. 7 (penis).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 180 (listed).

Whitish, nodules of the back white.

Locality.—Agulhas Bank, and off Saldanha Bay, 190 fathoms.

INCERTAE SEDIS.

**Doris natalensis* Krss.

1848. *Doris natalensis.* Krauss, Südafrik. Moll., p. 35.
1903. ,, ,, Smith, Proc. Mal. Soc., v, p. 357 (listed).

" D. corpore ovato, crasso, molli, supra maculis nigris picto, verrucis magnis, inaequalibus, saepius granulatis, medio punctatis obtecto ; pallio dilatato, postice emarginato ; lobis branchialibus 5 ramosis." —(Krauss).

Locality.—Natal.

**Doris* (?) *pseudida* Bgh.

1907. *Doris* ? *pseudida.* Bergh, Mar. Invest. S.A., v, p. 52, pl. vi, figs. 7 to 8 (radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 177 (listed).

Gills 6, tripinnate. Whitish, a white line along margin. No labial armature.

Locality.—Table Bay, 154 fathoms.

Doris ? *perplexa* Bgh.

1907. *Doris* ? *perplexa.* Bergh, Mar. Invest. S.A., v, p. 53, pl. vi, figs. 5, 6 (radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 177 (listed).

Whitish, grey in front. Gills 6, simply pinnate. No labial armature.

Locality.—Agulhas Bank, 39 fathoms.

**Doris* (?) *glabella* Bgh.

1907. Doris ? *glabella.* Bergh, Mar. Invest. S.A., v, p. 54, pl. vi, figs. 9–13 (gill, labial armature, radula).
1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 177 (listed).

Yellowish-white, gills yellowish, rhinophores brownish. Gills 10, simply pinnate. Labial armature present.

Locality.—False Bay, 30 fathoms.

**Doris* (?) *kalkensis* n. sp.

(Plate XIX, fig. 9.)

A single specimen of a large Dorid was found at low tide at St. James, False Bay (February 1912, K.H.B.). A coloured drawing

was made from the living animal, which is here reproduced, but the specimen was accidentally destroyed while being preserved before any morphological notes were taken. No further specimens have since come to hand. Nevertheless it seems worth while publishing the coloured figure, as from it living specimens can be easily identified.

The general colour of the back is red, fading to white towards the mantle edges, where there is a blue border composed of numerous small dots and specks; the tail is pale with orange and blue dots; the rhinophores red with brown clubs; the gills orange with numerous blue specks.

There is a strong likeness in the scheme of coloration to Kelaarts' "*Doris*" *elizabethina*, figured by Eliot (Proc. Zool. Soc. Lond., 1906, pl. xliii, fig. 3), and which has not yet been recognised and placed in its true genus.

The specific name is from Kalk Bay, a locality near St. James in False Bay.

3. Phanerobranchiata.

1879. Bergh, Arch. Naturg. Abr. Syst., xxxv, i, p. 341.
1879. *Id.*, Verh. k. k. Zool. bot. Ges. Wien, xxix, p. 599.
1880. *Id.*, *ibid.*, xxx, p. 629.
1883. *Id.*, *ibid.*, xxxiii, p. 135.
1892. *Id.*, Das System, p. 137.

Gills not retractile into a common hollow. Rhinophores usually with perfoliate club. Pharynx sometimes with suctorial apparatus. Radula with lateral teeth differentiated into strong inner ones and feebler outer ones.

Family EUPHURIDAE.

1892. Bergh, Das System, p. 142 (*Polyceridae*).
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 229 (*Euphuridae*).
1924. O'Donoghue, J. Linn. Soc. Lond., Zool., xxxv, p. 564 (*Euphuridae*).

Body more or less elongate, dorso-lateral margin more or less prominent. Gills usually few. Foot usually narrow. No suctorial apparatus.

Key to South African Genera.

I. Dorso-lateral margin of body with processes.
  A. Tail not crested.
    1. Frontal margin only with processes.
      a. Processes simple, digitate. Mandibles with wings . *Polycera.*
      b. Frontal margin crenulate. Mandibles without wings. *Palio.*
    2. Frontal and dorso-lateral margins with processes.
      a. Processes clavate . . . . . *Triopa.*
      b. Processes arborescent:
        i. Body depressed . . . . . *Kalinga.*
        ii. Body not depressed . . . . *Euplocamus.*
  B. Tail crested . . . . . *Plocamopherus*
II. Dorso-lateral margin of body not conspicuous, without processes *Nembrotha.*

Gen. Polycera Cuv.

1817. *Polycera.* Cuvier, Regne Anim, ii, p. 390.
1879. ,, Bergh, Verh. k. k. Zool. bot. Ges., xxix, p. 599.
1892. ,, *Id.*, Das System, p. 150.
1906. ,, MacFarland, Bull. Bur. Fish., xxv, p. 141.

Body not depressed, more or less tuberculate. Frontal margin with digitiform processes. Rhinophores scarcely retractile, club perfoliate. Branchiae few (7 to 9), simply pinnate, flanked on either side by a large digitiform process. Tentacles short, lobe-like.

Mandibles with a wing-like process above. Radula not very narrow, no central, laterals consisting of 2 large unequal hamate teeth within, and 4 simple plate-like teeth on outer side. Penis armed.

Polycera nigrocrocea n. sp.

(Plate XIX, figs. 7, 8.)

Form similar to *P. quadrilineata* (O. F. Müller). Body smooth, not tuberculate. Frontal margin with 6 processes, of which the hindermost is bifid. Gills 9 (or 10). Mandibles normal. Radula very similar to that of the northern species, but the two hamate laterals are stouter, the distal limb of the hook shorter, than in *quadrilineata* as figured by Alder and Hancock (1864) and Bergh (1879).

Length.—Reaching 60 mm. or even occasionally 70 mm.

Colour.—White, rather dirty, with 3 longitudinal black stripes, one medio-dorsal from between the rhinophores to the gills, continued for a short distance posterior to the gills, and one on each side from below the posterior frontal process to behind the gills, where it breaks up into a number of irregular black or grey spots. Rhinophores and

bases of gills black. Frontal processes, apices of gills and flanking processes clear yellow. Sometimes also a posterior medio-dorsal yellow stripe on the tail.

Locality.—False Bay and Table Bay, low tide (St. James and Kalk Bay, February, March, May, October 1912, K.H.B.; March 1901, W. F. Purcell; Cape Town Docks, March 1922).

This species is clearly distinct from the northern Atlantic and Mediterranean species, *P. quadrilineata*, and the Californian *P. atra*, in the bifid posterior frontal process, the smooth body, and the coloration.

With regard to the latter feature, *quadrilineata* varies considerably, and it is to be expected that specimens of the Cape species will be found differing more or less markedly from the normal as here described and figured.

Gen. Palio Gray.

1857. *Palio.* Gray, Guide Brit. Moll. Br. Mus., i, p. 213.
1879. ,, Bergh, Verh. k.k. Zool. bot. Ges., xxix, p. 601.
1892. ,, Bergh, Das System, p. 150.

Body not depressed, more or less tuberculate. Frontal margin crenulate or with short digitiform processes. Rhinophores scarcely retractile, club perfoliate. Branchiae few, bi- or tri-pinnate, flanked by one or more processes. Dorso-lateral margins crenulate.

Mandibles without wing-like expansion. Radula resembling that of *Polycera*.

**Palio capensis* (Q. and G.).

1824. *Polycera capensis.* Quoy and Gaimard, Voy. de l'Ur. Zool., p. 417, pl. lxvi, fig. 4 (Cape seas).
1892. *Palio* ,, Bergh, *loc. cit.*, p. 150 (species dubia).
1903. *Palio* (?) ,, Smith, Tr. Malac. Soc., v, p. 357.

This species has not yet been rediscovered.

Gen. Triopa Johnston.

1838. *Triopa.* Johnston, Zool. Miscell., i, p. 123.
1880. ,, Bergh, Verh. k.k. bot. Zool. Ges., xxx, p. 638.
1892. ,, *Id.*, Das System, 147.
1907. ,, *Id.*, Mar. Invest. S.A., v, p. 65.

Body not very depressed. Frontal and dorso-lateral margins set with clavate processes. Rhinophores retractile, claws perfoliate. Branchiae 3 or 5, tripinnate. Tentacles short, canaliculate.

Mandibles absent. Radula narrow, no central tooth, first two laterals large (the outer larger than inner) and hamate, the rest small and quadrangular. Penis armed with a series of hooks.

Triopa lucida Stimpson.

(Plate XIX, fig. 2.)

1856. *Triopa lucida.* Stimpson, Pr. Ac. Nat. Sci. Philad., vii, p. 388 (Simon's Bay).
1907. ,, ,, Bergh, *loc. cit.*, p. 66, pl. xii, figs. 6–7 (dorsal process and radula), off Tugela River.

A single dried specimen (Kalk Bay, 3/2/04) appears to be this species. It has, however, 5 distinct branchiae, whereas the specimen examined by Bergh had only 3. Unfortunately the specimen seems to have been mutilated about the mouth, for the bulbus pharyngeus, and consequently the radula, could not be found.

Two specimens from Gordon's Bay (24/9/22, K.H.B.) both have 5 gills, which seems to show that this is the normal number in this species, and that either Bergh miscounted the gills in his Natal specimen or that it should have been referred to another species.

Length.—Up to 16–17 mm.

Colour.—White, an irregular series of orange spots along each side and down the middle of the back from the rhinophores to the gills, tips of clavate processes, the clavus of the rhinophores and the gills also orange.

Bergh states that his specimen was procured off the mouth of the Tugela River, but that it was found (so his words would seem to imply) together with *Idialiella amoenula*, which was found at Gordon's Bay. In view of the fact that Stimpson's specimen was from Simon's Bay, the above-mentioned dry specimen from Kalk Bay, and my specimens from Gordon's Bay—all three localities in False Bay—the Natal locality must be looked upon as doubtful, unless Bergh's specimen should be referred to another species.

Gen. Kalinga Ald. and Hanc.

1864. *Kalinga.* Alder and Hancock, Tr. Zool. Soc., v, p. 134.
1892. ,, Bergh, Das System, p. 134.
1907. ,, *Id.*, Mar. Invest. S.A., v, p. 74.

Body large, oval, depressed. Frontal margin with numerous papilligerous processes, dorso-lateral margins with similar but fewer

processes. Rhinophores retractile, club perfoliate. Branchiae few (5), large, separate, quadripinnate. Foot broader than back. Sides and back tuberculate.

Mandibles absent. Radula with a large number of uniform, small, tricuspid teeth. Penis armed.

**Kalinga ornata* A. and H.

1864. *Kalinga ornata.* Alder and Hancock, *loc. cit.*, p. 135, pl. xxxii, figs. 7–10 (coloured figures).
1905. ,, ,, Farran in Herdman's Ceylon Pearl Fish. Suppl. Rep., xxi, p. 347, pl. iii, figs. 23, 24 (radula).
1906. ,, ,, Eliot, Proc. Zool. Soc. Lond., ii, p. 670, pl. xlvii, fig. 2 (animal).
1907. ,, ,, Bergh, *loc. cit.*, p. 75, pl. xiii, figs. 1–5 (anatomy and radula).

A large ornate species. Light flesh or light brown when alive, tubercles, rhinophores, tips of gills crimson.

Locality.—Zululand coast.

Distribution.—Indian seas.

Gen. Euplocamus Phil.

1836. *Euplocamus.* Philippi., Enum. Moll. Sci., i, p. 103.
1879. ,, Bergh, Verh. k. k. bot. Zool. Ges., xxix, p. 623.
1892 ,, Bergh, Das System, p. 153.
1907. ,, *Id.*, Mar. Invest. S.A., v, p. 70.

Body somewhat elongate. Frontal and dorso-lateral margins with arborescent processes. Rhinophores retractile, club elongate, perfoliate. Branchiae few (5), tripinnate. Tentacles auriform. Foot broad.

Mandibles strong. Radula rather broad, no central tooth, 2 or 3 inner laterals large and strongly hamate, outer laterals (5 to 35) simple, quadrangular. Penis armed.

**Euplocamus croceus* Phil.

1836. *Euplocamus croceus.* Philippi, *loc. cit.*, p. 103.
1879. ,, ,, Bergh, *loc. cit.*, p. 625, pl. xi, figs. 9–12, pl. xii, figs. 7–17, pl. xiii, figs. 1–16, pl. xiv, figs. 1, 2 (anatomy, radula).

1907. *Euplocamus croceus*, var. *capensis*. Bergh, *loc. cit.*, p. 71, pl. xii, figs. 18–24 (head, anatomy, radula).
1923. ,, ,, Odhner, Göteb. Vet. Handl., xxvi.
1926. ,, ,, Tomlin, Ann. Nat. Mus., v, p. 286.

Yellowish or greenish, with small red spots.
Locality.—Agulhas Bank.
Distribution.—Mediterranean.

Gen. Plocamopherus Leuck.

1828. *Plocamopherus*. Leuckart, Rüppel's Ak. Reise N. Afrika, p. 17.
1866. ,, Alder and Hancock, Tr. Zool. Soc., v, p. 132.
1879. ,, Bergh, Verh. k. k. Zool. bot. Ges., xxix, p. 639.
1883. ,, *Id.*, *ibid.*, xxxiii, p. 144.
1892. ,, *Id.*, Das System, p. 154.

Body elongate. Frontal margin well-developed with ramose appendages. Lateral margin marked by ramose, usually apically tuberculate, processes. Rhinophores retractile, club perfoliate. Tentacles large, lamellate. Branchiae few (5) tripinnate. Foot not very narrow, grooved anteriorly. Tail crested.

Mandibles fairly strong. Radula rather broad, no central but a wide striated " false plate," laterals numerous, the inner ones hamate, the outer simple, plate-like. Prostate large, penis armed.

Plocamopherus apheles n. sp.

(Text-fig. 1.)

Form as usual. The frontal margin with very small and feebly branched (or unbranched) processes. The 3 lateral processes in the

Fig. 1.—*Plocamopherus apheles* n. sp. Nat. size.

positions described by Bergh for *P. imperialis*, *i.e.* shortly behind the rhinophores, in front of and behind the gills, the 1st and 2nd subequal, finely granulate, the 3rd with a conical tuberculate " head."

Appendages on the sides almost obsolete. Tail crenulate but apparently without processes. Rhinophore sheaths low, stalk scarcely higher than sheath (in the preserved specimen), club set obliquely on stalk projecting in front as well as behind (somewhat like a mushroom).

Radula as usual, about 7 hamate and 10 simple plate-like laterals.

Length.—60 mm., height about 15 mm.

Colour.—The specimen as preserved is dirty greyish, but still shows faint green speckles on the upper and lower surfaces of the frontal veil.

Locality.—Nahoon Estuary, East London (31/5/01, Dr. Gilchrist).

This form may prove, when more specimens have been collected and their colours in life noted, to be only a smooth variety of one of the already described species.

Gen. Nembrotha Bgh.

1877. Bergh, Malac. Unters., xi, p. 450.
1881. *Id.*, Beitr., ii, p. 658.
1892. *Id.*, Das System, p. 152.
1904. Eliot, P.Z.S., II, i, p. 89.
1905. Bergh, Siboga Exp., Monogr. 50, p. 193.
1907. *Id.*, Mar. Invest. S.A., v, p. 67.
1908. Eliot, J. Linn. Soc. Lond., xxxi, p. 98.
1924. O'Donoghue, *ibid.*, xxxv, p. 567.

Body limaciform, almost smooth. Rhinophores retractile, clavus perfoliate. Branchiae nearly in the middle of the back, paucifoliate (3 to 5), bi- or tri-pinnate. Tentacles short, lobate. Foot narrow.

Mandibles, none, or very feeble. Radula narrow, median tooth quadrangular, laterals falciform, the outermost simple and quadrangular. Penis armed with hooks.

Nembrotha capensis Bgh.

(Plate XIX, fig. 10.)

1907. *Nembrotha capensis.* Bergh, *loc. cit.*, p. 68, pl. xii, figs. 8–17 (anatomy and radula).

Brownish-black, with two thin light green lines along the back, joining (anteriorly) in front of the rhinophores, and (posteriorly) in a sharp angle halfway between gills and end of tail, a small triangular space outlined by similar lines near the end of tail. Foot sole bluish. Gills with the axes black, the finer branches blue.

Locality.—St. James and Kalk Bay, low tide (False Bay).

This species may be the same as *morosa* Bgh. (1877, Malac. Unters., p. 457, pl. xxv, fig. 9, coloured fig. of animal as *Trevelyana morosa*, and pl. xxxiii, fig. 7, gills) from the Philippine Islands.

Family OKENIIDAE.

1892. Bergh, Das System, p. 155 (*Goniodorididae*).
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 217.

Body more or less depressed, with strong margin separating back and sides. Gills usually many. Foot usually broad. A suctorial apparatus in addition to labial armature and radula.

Gen. Idaliella Bgh.

1881. Bergh, Wiegm. Arch. f. Naturg., xlvii, p. 145.
1883. *Id.*, Verh. k. k. bot. Zool. Ges. Wien, xxxiii, p. 174.
1892. *Id.*, Das System, p. 164.
1907. *Id.*, Mar. Invest. S.A., p. 80.

Body not depressed. Dorso-lateral margin continuous all round, cirrigerous. Back without cirri. Rhinophores not retractile, club perfoliate. Gills simply pinnate, distinct from one another. Foot large, with short tail. Mandibles present. Radula narrow, no central, 1st lateral strong, hooked, outer lateral a simple plate. Penis armed.

Idaliella differs from *Okenia* Menke (syn.: *Idalia* Leuck., non-Hübner) in not having cirri on the back, and in having mandibles instead of series of small hooks.

**Idaliella amoenula* Bgh.

1907. *Idaliella amoenula.* Bergh, *loc. cit.*, p. 80, pl. xiii, figs. 6–11 (coloured fig., radula, and anatomy).

Locality.—Gordon's Bay, low tide (False Bay).

B. ZONABRANCHIATA.

1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 229 (*Zonabranchiatae*).

Body quadrangular in cross section. Frontal velum more or less bilobed, bearing papilliform or digitiform processes, the external

angle developed into a spoon-like tentacle. Rhinophores, sheath tubular with reverted margin, club simple surrounded by pinnae, retractile into the sheath. Dorso-lateral margin with (or without *Tritonidoxa*) more or less ramose branchial tufts. Vent lateral. Foot broad. Mandibles strong, radula multiseriate, median tooth tridentate, first lateral blunt, others hamate. Liver compact, not ramose.

In certain characters somewhat intermediate between the *Holohepatica* and *Kladohepatica*.

Sluggish animals, feeding on Alcyonarians, etc., and distributed over nearly the whole world, except perhaps the tropics. Spawn a long, much convoluted, gelatinous cord.

Family DUVAUCELIIDAE.

1892. Bergh, Das System, p. 74 (*Tritoniadae*).
1906. Vayssière, Bull. Mus. Paris, xii, p. 148.
1907. Bergh, Mar. Invest. S.A., v, p. 82 (*Tritoniidae*).
1907. Eliot, Nat. Antarct. Exp., ii, p. 3.
1912. Thiele, Deutsche Südpol. Exp., xiii.
1923. Iredale and O'Donoghue, *loc. cit.*, p. 229 (*Duvauceliidae*).

With the characters given above.

Gen. Marionia Vayss.

1877. Vayssière, C.R., lxxxv, p. 299.
1892. Bergh, Das System, p. 77.
1904. Eliot, P.Z.S., II, i, p. 93.

Frontal veil, with usually numerous digitiform processes. Ventricle armed with spines. With branchial tufts.

**Marionia arborescens* Bergh.

1890. *Marionia arborescens*. Bergh, Malac. Unters., xvii, p. 891, pl. lxxxviii, figs. 31–39 (anatomy).
1910. ,, ,, Eliot, Ann. Nat. Mus., ii, p. 222.

Locality.—Port Shepstone, Natal.

Distribution.—Philippines, East Indies, Red Sea, and east coast of Africa.

Eliot (1908, J. Linn. Soc. Lond., xxxi, p. 122) mentions the possibility of this species being synonymous with the Red Sea species, *Cyanobranchiata* Rüpp. and Leuck., 1828.

Gen. Sphaerostoma MacG.

1798. *Tritonia.* Cuvier, Table, Elem. Hist. Nat., p. 387 (no species mentioned).
1803. „ *Id.*, Ann. Mus. d'Hist. Nat. Paris, i, p. 483.
1843. *Sphaerostoma.* MacGillivray, Hist. Moll. Anim. Aberd., p. 335.
1892. *Tritonia.* Bergh, Das System, p. 76.
1894. „ *Id.*, Bull. Mus. Comp. Zool., xxv, p. 146.
1905. „ *Id.*, Siboga Exp., Monogr. 50, p. 203.
1907. „ *Id.*, Mar. Invest. S.A., v, p. 82.
1923. *Sphaerostoma.* Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 229.

The name *Tritonia* has been discarded because Cuvier, in his diagnosis of the genus in 1798, mentioned no particular species, and although in 1803 he specified *T. hombergi*, Meigen had in the meantime (1800) used the name *Tritonia* for a genus of *Diptera*.

Ventricle unarmed. Frontal veil papilligerous. Radula with numerous laterals. With branchial tufts.

Sphaerostoma aurantiacum n. sp.

(Plate XIX, fig. 1.)

Frontal veil with 3 digitiform processes on either side. Six gills along each side of back. Deep orange, the gills rather paler. 25 mm.

Locality.—Strandfontein, False Bay, on *Melitodes* coral, with spawn (22/2/12, K.H.B.).

Sphaerostoma pallidum (Stimpson).

1854. *Tritonia pallida.* Stimpson, Pr. Ac. Nat. Sci. Philad., vii, p. 388.
1905. „ „ Eliot, Tr. Roy. Soc. Edin., xli, 3, p. 528, figs. 11–14 (veil and radula), (the text-figs. are labelled *Tritonia antarctica*).
1907. „ „ Bergh, Mar. Invest. S.A., v, p. 83, pl. xiii, figs. 12–15, pl. xiv, fig. 1 (mandible and radula).
1909. „ „ Eliot, Scott. Nat. Ant. Exp., v, p. 20, figs. 11–14 (a reprint of the 1905 paper).

" One inch long, of transparent white colour, with a few flake-white spots on the back, the filaments around the truncated extremity

of the sheaths of the tentacles of a dark brownish colour; a white line extends below and parallel to the branchiae on the sides of the body" (Stimpson).

Frontal veil with 4 digitiform processes on either side. 12 to 17 gills along each side of back.

Locality.—Cape Morgan to Saldanha Bay, 30 to 40 fathoms.

**Sphaerostoma indecorum* (Bgh.).

1907. *Tritonia indecora.* Bergh, Mar. Invest. S.A., v, p. 85, pl. xiii, fig. 16, pl. xiv, figs. 2, 3 (radula).

Pinkish. Frontal veil with 11 to 12 processes on either side. 5 to 8 gills along each side of back.

Locality.—Off Cape Point.

Gen. Tritonidoxa Bgh.

1907. *Tritonidoxa.* Bergh, Mar. Invest. S.A., v, p. 86.
1906. ,, *Id.*, Zool. Jahrb., xxiii, 6, p. 740.

In all respects like *Sphaerostoma*, but without branchial tufts.

**Tritonidoxa capensis* Bgh.

1907. *Tritonidoxa capensis.* Bergh, *loc. cit.*, p. 87, pl. viii, figs. 8 to 13 (frontal veil, mandible, radula, and penis).

Uniform white.

Locality.—Off Glendower Beacon, 66 fathoms.

C. KLADOHEPATICA.

1881. Bergh, Verh. k. k. Zool. bot. Ges. Wien, xxx, p. 236.
1890. *Id.*, Zool. Jahrb. Abt. Syst., v.
1892. *Id.*, Das System, p. 7.

Gills more or less numerous, in the form of elongate-conical, arborescent or foliaceous processes (papillae cerata) of the skin, situate dorsally or dorso-laterally, rarely laterally. Mandibles present. Liver sending off branches into the gills. A single vesicula seminalis.

The forms in this group are known collectively as "Aeolids." They are found in all parts of the world, but, contrary to the Dorids, they are more numerous in the extra-tropical regions.

Representatives of six families are found in South Africa : *Aeolidiidae* (comprising several subfamilies), *Tethymelibidae*, *Iduliidae*, *Scyllaeidae*, and *Arminidae*, which may be distinguished by means of the following synopsis :—

Limaciform. Papillae usually in several dorsal series . . . *Aeolidiidae.*
Head developed into a large cowl . . . . . *Tethymelibidae.*
Limaciform. Papillae in a single series, nodose . . . . *Dotonidae.*
Compressed. Two pairs of dorsal processes with gill tufts on inner surfaces *Scyllaeidae.*
Gill lamellae lateral . . . . . *Arminidae.*

Family AEOLIDIIDAE.

Sub-family AEOLIDIINAE.

1892. Bergh, Das System, p. 26.

Body depressed or subdepressed. Papillae more or less compressed. Margin of mandibles smooth, radula uniseriate, broad, pectinate. Penis unarmed.

Gen. Aeolidiella Bgh.

1874. *Aeolidiella.* Bergh, Beitr., ii, p. 396.
1881. ,, Trinchese, Aelididae, ii, p. 23.
1888. ,, Bergh, Malac. Unters., p. 781.
1892. ,, *Id.*, Das System, p. 27.
1905. ,, *Id.*, Siboga Exp., Monogr. 50, p. 222.
1913. ,, Eliot, J. Coll. Sci. Tokyo, xxxv.

Rhinophores simple with a spiral groove. Teeth emarginate in the middle.

Aeolidiella saldanhensis n. sp.

(Text-figs. 2 and 3.)

Saldanha Bay, low tide (s.s. " Pieter Faure " coll.). Largest specimen 20 mm. in length.

Fig. 2.—*Aeolidiella saldanhensis* n. sp. $\times 1\frac{1}{2}$.

Colour in life ?.

Radula : ca. 24 teeth, widely emarginate, with prominent central cusp (text-fig. 3). Antero-lateral angles of foot rounded.

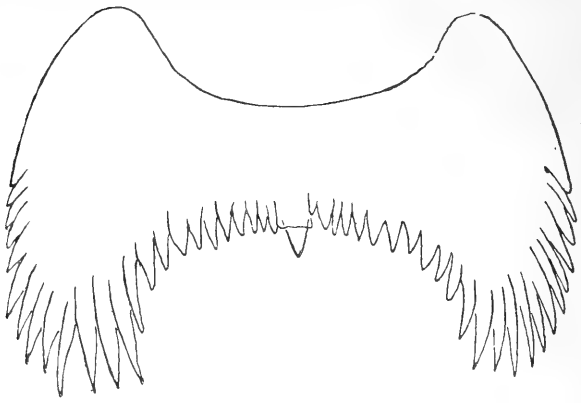

Fig. 3.—*Aeolidiella saldanhensis* n. sp. Radula tooth. ×150.

Sub-family CRATENINAE.

1892. Bergh, Das System, p. 29.

Body slender. Rhinophores simple. Papillae subcylindrical. Mandible with one or more series of denticles. Radula uniseriate, teeth angular, with a strong central cusp flanked with denticles. Penis unarmed.

Gen. Hervia Bgh.

1875.	*Hervia.*	Bergh, Beitr. Aeoliden, ii, p. 409.
1879.	*Rizzolia.*	Trinchese, Rend. Acc. Bologn, p. 1.
1881.	,,	Bergh, Verh. k. k. Zool. bot. Ges. Wien, xxxi, p. 156.
1884.	,,	*Id.*, "Challenger" Rep., x, p. 27.
1888.	*Hervia.*	*Id.*, Beitr. Aeoliden, ix, p. 676.
1892.	,,	*Id.*, *loc. cit.*, p. 31.
1904.	,,	Eliot, Proc. Zool. Soc. Lond., ii, 2, p. 286 (*Rizzolia*, a synonym).
1905.	,,	Farran in Herdman's Ceylon Pearl Fish. Suppl. Rep., xxi, p. 331.
1905.	,,	Bergh, Siboga Exp., Monogr. 50, p. 231 (*Rizzolia* queried as a synonym).
1906.	,,	Eliot, Proc. Zool. Soc. Lond., p. 1007.

Antero-lateral angles of foot produced, tentaculiform. Margin of mandible with a single series of denticles.

If *Rizzolia* be a synonym of *Hervia*, the genus will contain two species with the name "*modesta* Bgh."

Hervia quadricolor n. sp.

(Plate XX, figs. 9, 10.)

Body slender with long tapering tail, which is dorsally keeled. Tentacles long and slender. Rhinophores also slender, simple in life, but wrinkled and seemingly annulate in the preserved specimen. Papillae fusiform in 5 groups, about 30 to 40 in the first, 30 in the second, 25 in the third, 20 in the fourth, and 12 to 15 in the fifth, the outer ones short, the innermost longest (5 to 6 mm. in the preserved state). Genital orifice immediately below the first, and the anal papilla in the middle of the second group on the right side. Antero-lateral angles of foot produced, tentaculiform.

Mandibles with about 45 denticulations on the masticatory edge, some of them bifid, and with secondary denticles. Radula with 26 teeth, angularly horseshoe-shaped, with strong central cusp flanked with 3 (occasionally 4) denticles.

Length.—3·5 cm., of which the tail measures 1·5 cm.

Colour.—Head pale orange above, with 2 white streaks from the tentacles to the bases of the rhinophores ; tentacles and rhinophores same colour as head, with the tips sulphur yellow. Rest of body translucent white, the tail with a narrow median stripe of orange bordered by opaque (faintly blue) white, stomach and intestines showing through the skin a dull blue. Papillae dark brown with a purplish tinge, towards the end a band of bright orange and one of ultramarine blue separated by a narrow band of dark brown, apex sulphur yellow, the ground colour is also sprinkled lightly with sulphur-yellow dots just below the orange band.

Locality.—St. James, False Bay (20/6/12, K.H.B.).

When the animal is disturbed the tentacles and rhinophores are contracted, and simultaneously the papillae are extended and pointed in all directions like a bristling porcupine. Alder and Hancock (Brit. Nudibr. Moll.) describe a similar action in the case of a *Facelina coronata* (Forbes) about to attack and devour one of its fellows.

The agreement in the mandibles and radula between this species and *Rizzolia australis* Bgh. ("Challenger" Rep., x, p. 27, pl. ix, figs. 1–5) from Australia is very close. Bergh thinks that perhaps the bifid nature of the denticles on the mandible may be of specific value in recognising this species, but similar bifid denticles have been noted in *H. militaris* by Eliot (1906, Proc. Zool. Soc. Lond., p. 1008), and in *H. rosea* Bgh.

Since, however, the colours of the living animal of *R. australis* were

not noted, and the species has not been again found, it seems preferable to give the Cape species a distinctive name.

Gen. Cratena Bgh.

1885. *Cratena.* Bergh, Beitr. Aeolid, viii (Verh. Zool. bot. Ges., xxxv), p. 27.
1892. ,, *Id.*, Das System, p. 30.
1905. ,, *Id.*, Siboga Exp., Monogr. 50, p. 230.
1916. *Cuthona.* Eliot, Mem. Ind. Mus., v, 4, p. 378. *Cratena* regarded as syn. with *Cuthona*, which is older. See also 1906, Eliot, p. 129.

Antero-lateral angles of foot slightly produced, anterior margin gently arcuate.

Margin of mandible with a single series of denticles.

Cratena capensis n. sp.

(Plate XX, fig. 8.)

Body slender, tail moderately long, tapering. Tentacles and rhinophores moderately long, the latter simple. Papillae fusiform, in 8 to 9 groups, about 12 in 1st, 7 in 2nd and 3rd, 5 in 4th and 5th, 4 in 6th, and 2 in 7th and 8th. Genital immediately below 1st group on right side, anal papilla behind 2nd right-hand group. Antero-lateral angles of foot very slightly produced, rounded.

Mandibles with numerous (50 or more) fine denticulations on the masticatory edge. Radula with about 15 teeth, the teeth horseshoe-shaped, with a very strong and prominent central cusp flanked by 6 (5 to 7) slender denticles.

Length.—12 to 15 mm.

Colour.—Body translucent white, a faint orange tint between the bases of the rhinophores and tentacles, due to the mandibles showing through; rhinophores and tentacles white, the black eyes showing through at the base of the former; papillae indian red with white apices.

Locality.—St. James, and other places on east shore of Cape Peninsula; Sea Point, Table Bay; low tide (March, April, May, July, November, 1912-13, K.H.B.).

Sub-family FACELININAE.

1892. Bergh, Das System, p. 39.

Body slender. Rhinophores perfoliate or annulate. Tentacles elongate. Antero-lateral angles of foot produced in a tentaculiform

process. Mandible with margin denticulate. Radula uniseriate, a strong central tooth flanked by smaller denticles. Penis armed with numerous spines arranged around the margin of a foliaceous expansion.

Gen. Facelina A. and H.

1855. Alder and Hancock, Brit. Nudibr. Moll., vii, App., p. xxii.
1881. Trinchese, Aeolididae, ii, p. 31.
1892. Bergh, *loc. cit.*, p. 40.
1904. Eliot, Proc. Zool. Soc. Lond., ii, 2, p. 288.
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 205.

Facelina faurei n. sp.

(Text-figs. 4 and 5.)

Locality.—Off Saldanha Bay, 33 fathoms; Dassen Island, 6/4/98, low tide (s.s. " Pieter Faure " coll.).

Fig. 4.—*Facelina faurei* n. sp. Nat. size.

Length.—Up to 25 mm.

Papillae thickly bunched on anterior third of body, behind which is very large penial lamina.

Papillae on hinder part not distinctly grouped.

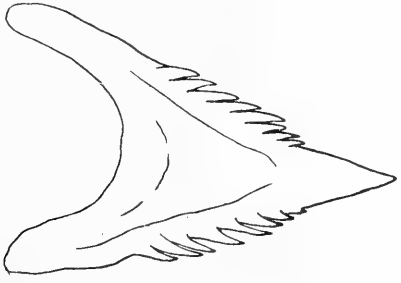

Fig. 5.—*Facelina faurei* n. sp. Radula tooth. ×150.

Radula with 8 to 9 denticles on either side of the prominent central cusp. 20 to 24 denticles on mandible.

Rhinophores annulate. Colour not noted.

Sub-family GLAUCINAE.

1892. Bergh, Das System, p. 43.

Body stout. Elongate papillae arising in 3 bunches along sides of body. Rhinophores simple, short. Foot truncated in front. Mandibles strong, radula uniseriate. Pelagic.

Gen. Glaucus Forster.

1892. Bergh, *loc. cit.*, p. 43.

With the characters of the family.

Glaucus atlanticus Forster.

(Plate XX, fig. 2.)

1890. Bergh, Malac. Unters., Hft. xvii, p. 876.
1899. *Id.*, Res. Sci. Camp. Monaco., fasc. 14, p. 4, pl. ii, figs. 11, 12 (coloured fig. and spawn).
1907. *Id.*, Mar. Invest. S.A., v, p. 94.

Frequently thrown up on the beach in False Bay and Table Bay, chiefly after south-east winds in summer.

Widely distributed. Floats back downwards on the surface of the sea, and feeds on the pelagic Gastropod *Janthina*.

Spawn: a number of hyalin tubes, 4 to 6 mm. long and 0·1 mm. wide, containing 20 to 25 eggs (Bergh, 1899, *loc. cit.*).

Sub-family ZEPHYRININAE.

1892. Bergh, Das System, p. 44 (*Janidae*).
1907. *Id.*, Mar Invest. S.A., v, p. 88 (*Janidae*).
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 213 (*Zephyrinidae*).

Body not depressed, dorsal margin with thickly set papillae. Vent medio-dorsal (except *Madrella*) far back. Rhinophores usually perfoliate. Antero-lateral angles of foot not prominent. Mandibles very strong, radula multiseriate (except *Madrella*), median and lateral teeth elongate, not denticulate.

Gen. Janolus Bgh.

1884. Bergh, " Challenger " Rep., x, p. 18.
1904. *Id.*, Malac. Unters., vi, 1, p. 6.
1923. Iredale and O'Donoghue, *loc. cit.*, p. 213 (synonymy).

Rhinophores perfoliate, with inter-rhinophoral crest. Anal papilla medio-dorsal. Margin of mandibles not dentate.

Janolus capensis Bgh.

(Plate XX, figs. 6, 7.)

1907. *Janolus capensis.* Bergh, *loc. cit.*, p. 90, pl. vii, figs. 6–21 (anatomy), False Bay, 17–30 fins.

Common at St. James and other localities on the east coast of Cape Peninsula at low tide, reaching 40 mm. in length.

The colour varies. As a rule the cerata are indian (brick) red, but occasionally they are slate-grey; the rest of the animal white. Another specimen (Buffels Bay, 1/3/15) was pale blue, the cerata tipped with white, tail edged with pale blue, and a darker blue median stripe.

Family TETHYMELIBIDAE.

1892. Bergh, Das System, p. 47.

Dorsal papillae exceedingly large. Head produced forwards, cowl-like, its margin cirriferous. Rhinophores with contractile sheath and perfoliate club. Radula and often also mandibles wanting. With or without gills at base of papillae.

Locality.—Warm and tropical seas.

Gen. Melibe Rang.

1829. *Melibe.* Rang, Man. des Moll., p. 129, pl. iii, fig. 3.
1907. ,, Bergh, Mar. Invest. S.A., v, p. 95 (references).

Foot narrow, body somewhat compressed. Mandibles present. No gills.

Melibe rosea Rang.

(Plate XX, fig. 1.)

1829. *Melibe rosea.* Rang, *loc. cit.*, p. 129, pl. iii, fig. 3.
1907. ,, ,, Bergh, *loc. cit.*, p. 96, pl. ix, figs. 1–12 (anatomical details).

Locality.—Very common along the shores of the Peninsula in Table Bay and False Bay, reaching a length of 40 mm.

Spawns in August; a spirally-coiled, flat, upstanding ribbon, salmon in colour, attached to rocks, weed, etc.

Family IDULIIDAE.

1892. Bergh, Das System, p. 52 (*Dotonidae*).
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 210.

Body similar to that of the *Aeolididae*. Rhinophores consisting of a simple club inserted on a retractile, apically repandate sheath. Papillae in a single row on each side, very caducous, inflated, tuberculate, or nodose. Mandibles with smooth margin. Radula uniseriate (as a rule). Penis unarmed.

Gen. Idulia Leach.

1815. *Doto.* Oken, Lehrbuch d. Zool., i, p. 278 (not *Doto* Oken, 1807).
1852. *Idulia.* Leach, Syn. Moll. Brit., p. 25.
1879. *Doto.* Bergh, Beitr. Aeolid, vi, p. 574.
1881. ,, Trinchese, Aeolididae, ii, p. 89.
1888. ,, Bergh, *ibid.*, ix, p. 693.
1892. ,, *Id.*, *loc. cit.*, p. 54.
1905. ,, *Id.*, Siboga Exp., Monogr. 50, p. 221.
1918. *Dotona.* Iredale, Proc. Mal. Soc., xiii, p. 30.
1923. *Idulia.* Iredale and O'Donoghue, *ibid.*, xv, p. 210.

Radula uniseriate. Papillae typical (tuberculate or nodose).

Idulia cinerea Trinchese.

(Plate XX, fig. 5.)

1881. *Doto cinerea.* Trinchese, *loc. cit.*, p. 92, pl. lv, fig. 1 (coloured fig.).

Six papillae (occasionally a small seventh one) along each side, set with rounded tubercles.

Length.—Up to 14 mm.

Colour.—Lower part of body dirty white, upper parts speckled and marbled with grey-brown, posterior margin of rhinophores (sheath and club) similarly speckled, papillae grey-brown with the tubercles white-tipped.

Locality.—St. James, False Bay; April 1912, spawning on Hydroids (K.H.B.); common.

These specimens seem to be assignable to *cinerea* Trin., with the coloured figure of which they agree. Trinchese's figure shows only 5 papillae on the right and 6 on the left, but the number of papillae

cannot be regarded as constant enough for specific distinctions, since the Cape specimens frequently possess a seventh pair of small papillae at the tail end in addition to the normal six pairs.

Distribution.—Mediterranean, Great Britain.

Idulia splendida Trinch.

(Plate XX, fig. 4.)

1881. *Doto splendida.* Trinchese, *loc. cit.*, p. 93, pl. lvi (coloured fig.).

A specimen of another species was found at Sea Point, Table Bay (29/11/13, K.H.B., low tide). It resembles the preceding specimens except that the papillae are plumper, and the tips of the tubercles are black with a faint white ring. There are 7 papillae on the left side, 6 on the right.

It agrees well with Trinchese's figure of *splendida* from the Mediterranean.

Bergh (1892, *loc. cit.*, p. 55) makes *pinnatifida* Mtg. synonymous with *splendida*, but with a query. If this should prove to be the case, then *pinnatifida* has precedence.

Family SCYLLAEIDAE.

1892. Bergh, Das System, p. 62.
1902. Eliot, Proc. Zool. Soc. Lond., ii, p. 64.
1906. *Id.*, *ibid.*, ii, p. 674.
1908. *Id.*, J. Linn. Soc. Lond., xxxi, p. 90.

Body compressed. The back with one or two lobe-like projections bearing small ramose branchial tufts on their inner surfaces. Vent lateral, about the middle of the body. Frontal velum small or absent. Rhinophores large, lobe-like, with small perfoliate clubs in the cup-like apices of the stalks. Tail short, more or less crest-like. Foot narrow. Mandibles strong, radula multiseriate, with denticulate median and lateral teeth.

Cosmopolitan in tropical and sub-tropical waters, crawling on sea-weeds and floating Sargassum, and feeding chiefly on Hydroids.

Eliot (*loc. cit.*, 1902 and 1908) discusses the question whether *Crosslandia* should be kept distinct from *Scyllaea*, and is of opinion that the differences are of doubtful generic value.

In support of the view that they should be kept distinct, I may draw attention to the difference in the shape of the spawn, which in *Crosslandia* is said to resemble a string of beads. The spawn of the

South African specimens of *Scyllaea* shows no trace of a moniliform arrangement (see *infra*).

Gen. Scyllaea Linn.

1758. *Scyllaea.* Linné, Syst. Nat., ed. 10, p. 656.
1864. ,, Alder and Hancock, Tr. Zool. Soc., v, p. 136.
1875. ,, Bergh, Malac. Unters., viii, p. 315.
1892. ,, *Id.*, Das System, p. 64.
1893. ,, *Id.*, Res. Camp. Sci. Monaco, fasc. 4, p. 8.
1905. ,, *Id.*, Siboga Exp., Monogr. 50, p. 216.
1905. ,, Farran in Herdman's Ceylon Pearl Fish. Suppl. Rep., xxi, p. 333.
1909. ,, Eliot, Spol. Zeylan., vi, pt. 23, p. 81.

Body compressed, foot very narrow. Two pairs of large lobes dorso-laterally, bearing on their inner surfaces small ramose branchiae. Rhinophores large, lobe-like, bearing a small perfoliate club tentacle in the hollowed cup-like apex. Vent lateral, between the two dorsal lobes. Tail more or less raised into a crest. Mandibles strong, radula multiseriate, the teeth minutely denticulate.

Scyllaea pelagica Linn.

(Plate XX, fig. 3.)

1758. Linné, *loc. cit.*, p. 656.
1875. Bergh, *loc. cit.*, p. 319, pl. xl, figs., pl. xlii, pl. xliii, pl. xliv, figs. 1–20, pl. xlv, figs. 6–18.
1923. Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 214.

A species of this genus is common at St. James, Sea Point, and elsewhere along both shores of the Peninsula, and the " Pieter Faure " took some in St. Francis Bay. It clings to brown seaweeds, and can be found throughout the year, spawning in August and October. It reaches a length of 55 mm., or even 60 mm., but is highly contractile.

Colour.—Brown with fairly numerous, irregularly disposed emerald green spots along the sides.

The specimens are similar in general shape and structure to some specimens of *S. pelagica* taken in the Atlantic which I have examined. The upper parts of the body, however, are rather strongly verrucose (see Farran, 1905). The branchial tufts measure 5 mm. in length on a specimen 50 mm. long. The tail is not truncate, and the crest is moderately high.

The rhinophores are considerably stouter than in the specimens

of *S. pelagica*, more cylindrical, and less lobate and compressed. The posterior margin is more or less crested, the apex is groved throughout, and forms a flat saucer when expanded, the margin of which is crenulate.

Anal papilla nearer the hind lobe.

As Bergh, 1905, is inclined to think, there seems to be only one widely distributed species with several colour variations. Farran, 1905, suggests that *marmorata* A. and H. is not distinct from *pelagica*.

Spawn, a long string arranged in a coil with upstanding loops, the top of each loop bending over towards the centre, pale yellowish in colour.

Other localities.—Off von Staden's River (St. Francis Bay), 32 fathoms.

Family ARMINIDAE.

1892. Bergh, Das System, p. 68 (*Pleurophyllidiidae*).

1906. Eliot, Proc. Zool. Soc. Lond., p. 676 (*Pleurophyllidiidae*).

Body elongate or elongate-oval, somewhat depressed. Head large, with a lamella which is free behind and forms ear-like lobes laterally. Neck usually with a caruncle, behind which are the short retractile rhinophores. Back projecting laterally over the sides of the body, with raised longitudinal lines or pustules, and furnished with numbers of cnidocysts. Gills on the sides in front, followed by a series of lamellae, which reaches usually to the tail, but sometimes not so far. Genital pore under the right-hand gill, anal papilla further back on the same side.

Mandibles strong. Radula short and broad, with numerous laterals flanking the median tooth.

Mostly fairly large animals, brightly coloured.

Gen. Armina Raf.

(Text-fig. 6.)

1814. *Armina.* Rafinesque Schmaltz, Préc. découv. trav. Somiol., p. 30.

1816. *Pleurophyllidia.* Meckel in Hammer, Dis. Obs. Anat. Comp.

1866. „ Bergh, Naturh. Tidsskr., 3 R., 4 Bd., p. 207.

1880. „ *Id.*, Verh. k. k. Zool. bot. Ges., xxx, p. 172.

1890. „ *Id.*, Weitere Beitr. Pheuroph., Verh. k. k. Zool. bot. Ges., xl.

1892. „ *Id.*, *loc. cit.*, p. 71.

1905. „ *Id.*, Siboga Exp., Monogr. 50, p. 213.

1907. „ *Id.*, Mar. Invest. S.A., v, p. 99.

1923. *Armina.* Iredale and O'Donoghue, Proc. Mal. Soc., xv, p. 217.

Body elongate. Caruncle distinct. Rhinophores contiguous.

Fig. 6.—*Armina* sp. to show general shape, gills, and lamellae.

Key to the South African Species.

I. Masticatory margin of mandibles perfectly smooth. (Median plate with 10 denticles flanking central cusp) . . . . . *capensis.*

II. Masticatory margin of mandibles with minute conical denticles.

1. Lateral teeth (except 1st) without denticles.
   a. Median tooth greatly broader than long. . . *natalensis.*
   b. Median tooth not greatly broader than long . . . *euchroa.*
2. Lateral teeth with denticles, except some of the outermost ones.
   a. Central tooth flanked with 4 denticles . . *gilchristi.*
   b. Central tooth flanked with 8–10 denticles . . *microdonta.*

Armina capensis (Bgh.).

1907. *Pleurophyllidia capensis.* Bergh, *loc. cit.*, p. 99, pl. viii, figs. 23, 24 (radula).

1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 182 (listed).

Locality.—Off East London, 37 to 39 fathoms.

Armina gilchristi (Bgh.).

1907. *Pleurophyllidia gilchristi.* Bergh, *loc. cit.*, p. 101, pl. viii, figs. 14–18 (mandible and radula).

1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 182 (listed).

Locality.—Agulhas Bank and Cape Point, 35 to 40 fathoms.

**Armina euchroa* (Bgh.).

1907. *Pleurophyllidia euchroa.* Bergh, *loc. cit.*, p. 102, pl. vii, figs. 1–5, pl. viii, fig. 25 (penis and radula).

1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 182 (listed).

Locality.—False Bay, 16 to 50 fathoms.

Armina microdonta (Bgh.).

1907. *Pleurophyllidia microdonta.* Bergh, *loc. cit.*, p. 103, pl. viii, figs. 19–22 (radula).

1910. ,, ,, Smith, Ann. Nat. Mus., ii, p. 182 (listed).

Locality.—Off Saldanha Bay, 33 fathoms.

**Armina natalensis* (Bgh.).

1848. *Diphyllidia lineata.* Krauss, Südafrik. Moll., p. 35 (non Otto).

1866. *Pleurophyllidia natalensis.* Bergh, Naturh. Tidsskr., (3), iv, p. 34, pl. vi*b*.

1903. ,, ,, Smith, Proc. Mal. Soc., v, p. 357 (listed).

Locality.—Natal coast.

NUDIBRANCHS FROM TRISTAN D'ACUNHA.

There are five specimens (collected by P. C. Keytel, 1909) moderately well preserved though considerably shrunken, owing, no doubt, to their having been placed direct in the preserving fluid without previous anaesthetising. No data as to coloration were made, and the specimens were presumably collected on the littoral at low tide.

Two specimens, about 16 mm. long, represent, perhaps, a species of *Discodorid*. The labial armature consists of very minute straight rods, and the radula teeth are hamate with a series of minute denticulations. The back appears to be quite smooth, the tentacles stout, conical, and grooved externally. The gills are about 6 to 7, tripinnate. In shape resembling a *Glossodoris*.

Another specimen, about 20 mm. long, is a "Doris," but to what genus or species it should be assigned is doubtful. A rather distinct, though thin, transparent, and structureless, labial cuticle is present. The radula teeth are strongly hamate, without thickened bases. The mantle a good deal overlapping the foot, and densely covered with fine papillae. The rhinophore and branchial openings with even, though papillate, margins. Gills tripinnate. Tentacles apparently absent.

The other two specimens are large, about 65 mm. long by 45 mm. wide by 25 mm. high. The mantle is thick and fleshy, soft, and without

spicules. It is covered with a number of papillae of various sizes, mostly rounded, but around the branchial and rhinophoral openings they become columnar and completely close in these openings. Rhinophores perfoliate. Gills 6, tripinnate. Tentacles large, thick, flat, externally grooved. No labial armature. Radula teeth hamate, strong, with thickened bases.

These specimens correspond well with Abraham's figures and description of *Asteronotus mabilla* (Proc. Zool. Soc. Lond., 1877, p. 249, pl. xxviii, figs. 1–4). I can find, however, no trace of the dart in the reproductive organs, which is characteristic of this genus. Also there are no spicules in the skin of the present specimens.

The Nudibranch fauna of Tristan d'Acunha seems never to have been investigated, and it is therefore all the more regrettable that the present specimens are in such poor condition, and lack all data as to colour.

The nearest locality from which Nudibranchs have been recorded is Gough Island, where the "Scotia" obtained *Tritoniopsis brucei* Eliot, 1905.

EXPLANATION OF PLATES.

Plate XIX.

FIG.

1. *Sphaerostoma aurantiacum*, n. sp. ×2.
2. *Triopa lucida* Stmpon. ×3.
3 and 4. *Glossodoris capensis* n. sp. Nat. size. Side view and dorsal views.
5 and 6. *Aphelodoris brunnea* Bgh. Nat. size. Two pattern variations.
7 and 8. *Polycera nigrocrocea* n. sp. Nat. size. Side and dorsal views.
9. *Doris* (?) *kalkensis* n. sp. Nat. size.
10. *Nembrotha capensis* Bgh. Nat. size.

Plate XX.

1. *Melibe rosea* Rang. Nat. size.
2. *Glaucus atlanticus* Forst. Nat. size.
3. *Scyllaea pelagica* Linn. Nat. size.
4. *Idulia splendida* Trinch. ×3.
5. *Idulia cinerea* Trinch. ×3.
6 and 7. *Janolus capensis* Bgh. Nat. size. Two colour varieties.
8. *Cratena capensis* n. sp. ×3.
9 and 10. *Hervia quadricolor* n. sp. ×1¾. With one papilla enlarged.

1.

2.

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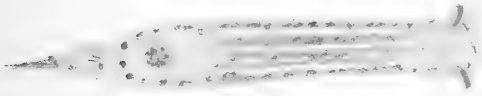

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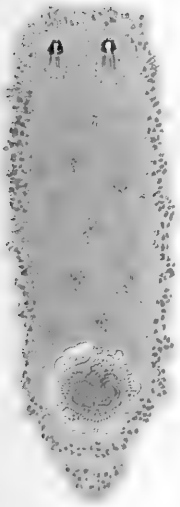

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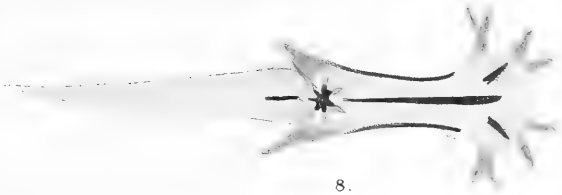

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K. H. B. ad nat. pinx.

SOUTH AFRICAN NUDIBRANCH MOLLUSCA.

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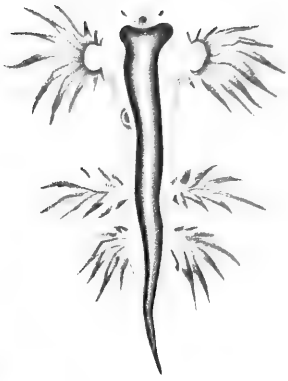

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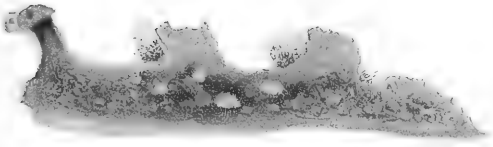

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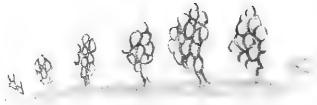

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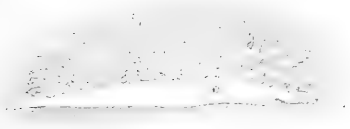

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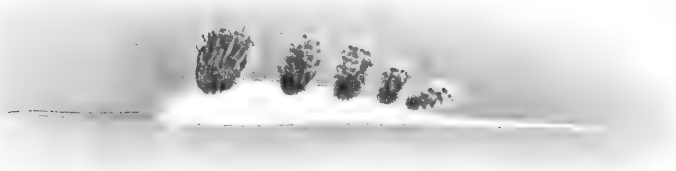

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SOUTH AFRICAN NUDIBRANCH MOLLUSCA.

ANNALS

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7. *Contributions to a Knowledge of the Fauna of South-West Africa.*

VII. Arachnida. (Part 2.) By R. F. Lawrence, B.A., Assistant.

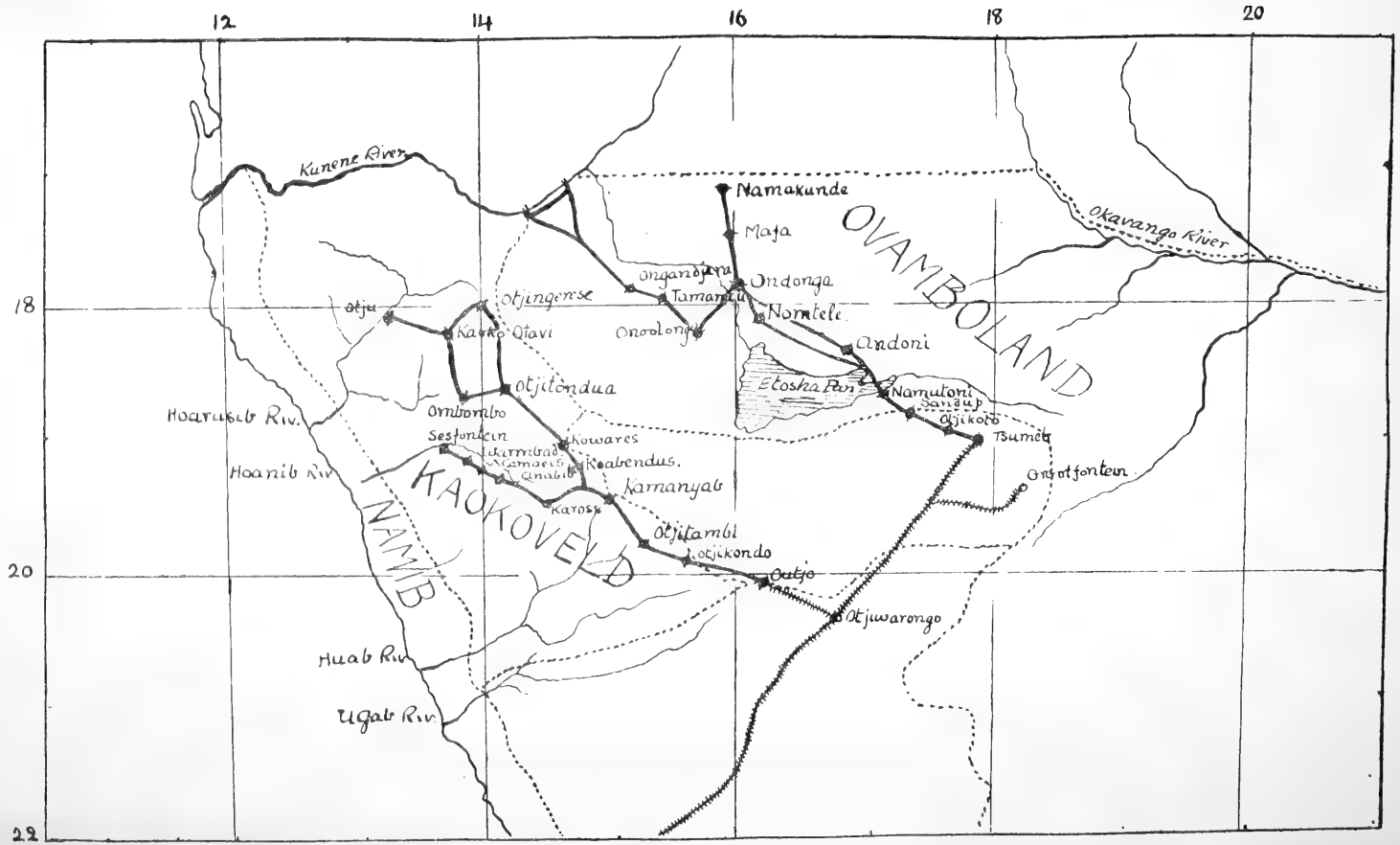
(With Plates XXI–XXIV and 1 Text-figure.)

This second contribution to the study of South-West African Arachnids comprises the work done on material collected on the third and fourth expeditions of the staff of the South African Museum during the years 1925 and 1926 respectively. Both expeditions traversed the region called the Kaokoveld situated in the northern part of South-West Africa between Ovamboland and the coastal belt or Namib ; the first section of the route taken was the same in both years, the earlier expedition, however, branching off to the north-westward and ending at Sesfontein, the second pursuing a more or less direct course northwards and reaching the Hoarusib River seventy miles south of the Kunene River. All the sites where the expedition halted and made collections are marked in the accompanying map (p. 218).

Following on the systematic portion of this paper is a brief account of the ecology and distribution of the Arachnids of this portion of South-West Africa, based on the results of the present paper and on the previous one dealing with the fauna of Ovamboland (Ann. S.A.M., Vol. XXV, pt. i, p. 1, 1927).

The False Scorpions have been entrusted to Mr. Hewitt, Director of the Albany Museum, Grahamstown, who is working on the whole group in the South African region ; to him also I am indebted for assistance and advice in the difficulties of systematising the new subfamily of Scorpionidae. The following table shows the proportion of new to known species :—

	Known spp.	New spp.	Spp. taken.
Araneae	46	34	80
Solifugae	7	5	12
Scorpiones	10	4	14
Acari	7	0	7
Total . .	70	43	113



Map showing the Routes taken by Museum Expeditions.

Order **ARANEAE.**

Family AVICULARIIDAE.

Gen. Ceratogyrus, Pocock.

Ceratogyrus bechuanicus, Purcell.

Examples of both sexes from Okerosave, Koabendus, Outjo, Otjitondua.

Gen. Moggridgea, Cambr.

Moggridgea purpurea, n. sp.

1 ♀ (6686). Caimaeis.

Colour.—Carapace olivaceous, region of the fovea and radiations therefrom mahogany brown, appendages mahogany brown, legs III and IV below olivaceous; abdomen above deep purple anteriorly.

Carapace considerably longer than broad, greatest breadth (between coxae I and II) equal to distance between the posterior margin of carapace and hind margin of posterior median eyes; length equal to patella+tibia+about $\frac{1}{2}$ metatarsus I. A long seta on a slight protuberance between and just anterior to the anterior median eyes, a row of setae behind the ocular area at right angles to and bisecting a line joining the posterior median eyes, the most anterior of these situated just anterior to the centres of the posterior medians with a seta on each side of it mesially to, and at the level of, the anterior margins of the posterior median eyes, the three setae forming a procurved line.

Eyes.—Width of ocular area slightly more than $\frac{3}{4}$ length of metatarsus I, distance between anterior margin of carapace and anterior median eyes $\frac{1}{4}$–$\frac{1}{3}$ width of ocular area; anterior margins of anterior row of eyes forming a fairly strongly procurved line, posterior margins of posterior row of eyes forming a little less strongly recurved line; anterior row wider than posterior row by the long diameter (or a little less) of an anterior lateral eye; anterior medians their own diameter apart and $1\frac{1}{2}$ diameters from their laterals which are $2\frac{1}{2}$–3 times as large; posterior medians 5 times as far from each other as from their laterals, and less than their greatest diameter from the latter; greatest diameter of the medians less than the long diameter of the laterals.

Pedipalps.—Coxae of pedipalps with 9–10 teeth, labium with

5 teeth ; sternum long, narrowing anteriorly, with one pair of sigilla opposite coxa II forming with each other an angle of less than 90°.

Legs.—All coxae without spinules or stout setae below. Patella I (right leg) with a curved spine at its postero-inferior apex, left leg with 2 long curved setae instead ; patella III with 1 spine near its antero-superior margin ; tibia III with 1 spine near its postero-inferior margin ; metatarsus III with an inferior subapical row of 6 spiniform setae ; metatarsus IV with an anterior (longitudinal) row of 4–5 long spiniform setae, the apical one the stoutest, a posterior, apical (transverse) tuft of 3 similar setae.

Measurements.—Length of carapace, 10 mm. ; breadth, 8·1 mm. Total length, 22 mm.

This spider had made its burrow in a cleft 3 feet from the base of an almost vertical wall of limestone rock. A juvenile female was obtained at Anabib (6692) and another at Sesfontein (6642) ; in the latter the labium had 16 teeth, the coxae of the pedipalps about 22.

Family ULOBORIDAE.

Gen. Uloborus, Latr.

Uloborus plumipes, Lucas.

10 ♀♀ (6660). Sesfontein. In the crevices of the wild fig-tree, *Ficus damarensis*.

Family ERESIDAE.

Gen. Stegodyphus, Simon.

Stegodyphus canus, Purcell.

2 ♀♀ (6693). Anabib.
2 ♀♀ (6961). Kaoko Otavi.
2 ♀♀ (7060). Outjo.
1 ♀ (6727). Outjo.

Stegodyphus dumicola, Pocock.

8 ♀♀, 1 ♂ (6700). Kamanyab.
1 ♀ (7089). Ombombo.

Stegodyphus filimaculatus, Lawrence.

1 ♂ (6954). Kaoko Otavi.

Gen. Dresserus, Simon.

Dresserus fontensis, n. sp.

2 ♀♀ (6938). Kaoko Otavi.

1 ♀ (6707). Otjikondo.

Colour.—Carapace anterior to fovea, palps, and anterior legs dull red, posterior legs reddish brown, abdomen mouse brown.

Carapace.—Length equal to patella, tibia, metatarsus+$\frac{1}{5}$ tarsus I, and to patella, tibia+$\frac{1}{2}$ metatarsus IV; breadth equal to tibia, metatarsus+$\frac{1}{3}$ tarsus I, a little less than patella+tibia IV.

Eyes.—Area formed by the laterals a little wider behind than in front, a little less than $2\frac{1}{2}$ times as wide behind as long; posterior medians $1\frac{1}{2}$–2 their diameter apart, at least 4 diameters from the anterior laterals, $3\frac{1}{2}$–4 times the area of the anterior medians; anterior medians their own diameter apart and that distance from the posterior medians, a line joining their superior borders passing a little below the inferior borders of the posterior medians; median quadrangle twice as wide behind as long and about $2\frac{1}{2}$ times as wide behind as in front.

Legs spineless.

Vulva as in fig. 1.

Measurements of largest ♀.—Length of carapace, 6·3 mm.; breadth, 4·6 mm. Total length, 12·8 mm.

Family SICARIIDAE.

Gen. Sicarius, Walck.

Sicarius damarensis, n. sp.

1 ♀ (7057). Outjo.

Colour.—Cephalic area reddish brown, thoracic area a little lighter, legs and abdomen yellowish brown.

Carapace considerably wider than long, width equal to tibia I and to metatarsus+$\frac{1}{2}$ tarsus I, provided with swollen, blunt, infuscated hairs arranged on the cephalic area in a row behind each lateral group of eyes, between them about 5 much less distinct rows converging towards a posterior convexity where there are two longitudinal strips of hairs; on the thoracic area three sinuous rows radiating from the centre toward the margin which is bordered with similar hairs more numerous at the posterior angles and lateral angles of the clypeus.

Eyes.—Anterior medians separated by $\frac{1}{2}$–$\frac{2}{3}$ their diameter, laterals separated by $\frac{6}{7}$ the diameter of an anterior lateral which is a little larger than a posterior lateral.

Abdomen with a double series of 4 crescentic strips of blunt, swollen hairs divided by a narrow median strip devoid of these hairs, the first strip almost circular, the fourth meeting in the middle line forming a ⌒-shaped transverse line; at the posterior apex of abdomen a similar shorter line can be seen from above.

Legs.—Femora above with a posterior row of about 4 cream-coloured oblanceolate spines (more oblanceolate than in *S. albospinosus*, Purc., but less so than in *S. testaceus*, Purc.) interspaced by some slenderer and shorter infuscated spines below a double row of shorter infuscated spines, the area between them naked, anterior surfaces irregularly, posterior surfaces not spined or with some small ones at their distal apices.

Measurements.—Length of carapace, measured in the median line, 5 mm.; breadth, 5·4 mm. Total length, 12·1 mm.

Sicarius dolichocephalus, n. sp.

1 ♀ (6943). Kaoko Otavi.

5 ♀♀ (6937). Kaoko Otavi.

Colour darker than in *S. damarensis*, cephalic area dull red, thoracic area a little lighter; abdomen light mouse brown; legs reddish brown.

Carapace about as wide as long, length measured in the middle line equal to tibia IV, a little less than metatarsus+$\frac{1}{2}$ tarsus III.

Eyes.—Median eyes separated by a little more than their radius, laterals separated by diameter of an anterior lateral which is a little larger than a posterior lateral.

Arrangement of hairs on the carapace similar to that of *S. damarensis*. On the abdomen they do not form crescentic strips but appear as a double median row of four patches of hairs and four indistinct lateral patches which merge with the hairs at the sides and below.

Legs with a dorsal posterior row of 4–8 oblanceolate spines, similar in shape to those of *S. damarensis*; legs otherwise similar to that species.

Measurements.—Length of carapace, 5·5 mm.; breadth, 5·6 mm. Total length, 12 mm.

Gen. Loxosceles, Lowe.

Loxosceles simillima, Lawrence.

2 ♀♀ (6684). Caimaeis.
4 ♀♀ (6746). Kaross.
3 ♀♀ (7028). Kaoko Otavi.
5 ♀♀ (6647). Sesfontein.

Gen. Scytodes, Latr.

Scytodes tertia, Lawrence.

1 ♀ (7134). Kaoko Otavi.
2 ♀♀ (7063). Outjo.
2 ♀♀ (6749). Sesfontein.
2 ♀♀ (6950). Kaoko Otavi.

Scytodes kaokoensis, n. sp.

2 ♀♀ (6680). Kaross.
4 ♀♀ (6737). Caimaeis.

Colour.—Carapace with markings as in fig. 2; anterior surface of mandibles with lateral markings on their proximal $\frac{2}{3}$; labium with a narrow transverse band at its base, a spot at each of the superior angles, maxillae narrowly bordered externally; sternum with a marginal marking opposite each coxa, the two anterior ones crescentic and inwardly curved (⌠ ⌡), the two posterior ones consisting of an irregular dot; coxae marked anteriorly and apically, more so in the anterior than in the posterior ones.

Legs.—All femora with a distinct basal annulated band, connected in I and II with a median band by a pair of infero-lateral irregular stripes, basal and median bands in III and IV not connected; all femora with a subapical band; all patellae with a complete band in the apical half; all tibiae with basal, median, and apical bands; median band longest in I, then IV, II, and III; median band in IV more clearly defined than in I; all metatarsi with a faint apical band most distinct in IV.

Abdomen irregularly infuscate above or with ill-defined markings.

Vulva as in fig. 3; the anterior transverse bar sometimes regularly curved in the form of an arc.

Measurements.—Total length, 4·6 mm.

This species is related to *S. tertia* from Ovamboland, but differs markedly in at least the abbreviated median cephalic stripe.

Family DYSDERIDAE.

Gen. Ariadna, Aud.

Ariadna masculina, n. sp.

4 ♂♂ (7083). Ombombo.

Colour.—Carapace yellowish brown, finely granular, sparsely covered with short, fine, fuscous hairs; legs coloured as in carapace, distal segments lighter covered with similar hairs; these hairs are so fine that when these specimens are compared with other species of Ariadna, *e.g.* the ♂ of *A. karrooica*, they appear to the naked eye comparatively hairless; abdomen above dark slate grey.

Carapace equal in length to metatarsus+$\frac{1}{2}$ tarsus IV, a little shorter than tibia II.

Eyes.—Medians touching, one diameter distant from the posterior laterals and less from the anterior laterals; clypeus equal to a little more than the diameter of an anterior lateral eye.

Chelicerae muticous.

Legs.—Metatarsus I distinctly shorter than tibia I; tarsus I short and curved downwards. Femora: I with 1 anterior, 3 (4) superior, 1 (0) posterior spines; II similarly with 2, 4 (5), 1 spines; III with 1, 3 (4), 2 (3) spines; IV with 0, 8 (10), 2 spines; all patellae muticous. Tibiae: I below with a subapical spine at each side, above with 6 spines along the exterior, 3 along the interior surface; II below with 5 exterior, 2 interior spines near the apex, above with 5 exterior, 3 interior spines; III below with 5 exterior, 1 interior apical spines, above with 5 exterior, 2 interior spines; IV below with 2 exterior, 1 interior; above with 0 exterior, 3 interior spines. Metatarsi: I with its distal apex swollen, unspined except for 1 stout spine at exterior apex, and two rounded club-shaped teeth, one situated at the interior apex, the other a little below it, fig. 4; II below with 2 exterior, 0 interior, above with 3 exterior, 3 interior spines; III below with 3 exterior, 1 interior, above with 3 exterior, 5 interior spines; IV below on exterior side with a row of 5 spines, also 2 apical spines, inner side with 0 except for an apical group of 4 stout setiform spines.

Pedipalp as in fig. 5.

Measurements.—Length of carapace, 3·4 mm. Total length, 6·5 mm.

This species cannot be compared with other forms as in the great majority of these only the females have been described. The palp resembles that of *A. karrooica*, Purcell (Trans. S.A. Phil. Soc., vol. xv, p. 159), though there are minor differences; in spination and the peculiar shape of the first metatarsus it differs markedly. *A. karrooica* is also much more thickly clothed with hair and has the first metatarsus distinctly longer than the tibia.

Family CAPONIIDAE.

Gen. Diploglena, Purcell.

Diploglena capensis var. *major*, n. var.

1 adult ♀ (6736). Kaross.

Colour.—Carapace, sternum, and mouth-parts reddish; legs a little lighter; abdomen yellowish brown; legs and coxae below with golden-brown hairs; sternum with fine hairs in the centre bordered at the sides with stouter, blunter ones.

Carapace a trifle longer than tibia, metatarsus, and tarsus I, equal to tibia, metatarsus+about $\frac{1}{3}$ tarsus IV.

Otherwise as in *Diploglena capensis*, Purcell (Trans. S.A. Phil. Soc., vol. xv, p. 170).

Measurements.—Length of carapace, 3·7 mm. Total length, 9·3 mm.

This variety differs from *D. capensis* only in its proportions and larger size.

Family PRODIDOMIDAE.

Gen. Prodidomus, Hentz.

Prodidomus reticulatus, Lawrence.

Syn. *Prodidomus hirsutus*, Lawrence.

1 ♂ (7155). Sesfontein.

1 ♂, 1 ♀ (7051). Okorosave.

The ♀ from Okorosave agrees with *P. reticulatus* (Ann. S.A.M., Vol. XXV, p. 9), which is based on two ♀♀ from Namakunde, while the ♂♂ from Okorosave and Sesfontein agree with *P. hirsutus* (*id.*, p. 10), described from a single ♂ found at Ongandjera. These two species are therefore united under *P. reticulatus*.

Family DRASSIDAE.

Gen. Platyoides, Cambr.

Platyoides alpha, n. sp.

1 ♂ (6952). Kaoko Otavi.

1 ♂ (6645). Sesfontein.

Colour.—Carapace brownish red narrowly edged with black, finely granular; the demarcations of the cephalic area distinct; foveal cleft continued on to the cephalic area almost to the eyes as a narrow median suture; legs pale salmon pink; abdomen slate blue with markings as in Cambridges' figure of *P. simoni* (P.Z.S., 1907, pl. 50, fig. 17).

Carapace equal in length to tibia+$\frac{1}{4}$ patella I.

Eyes.—Anterior medians a little more than their radius apart, equal to and about as far from their laterals as from each other; posterior medians slightly more than their long diameter apart, $1\frac{1}{2}$–2 their long diameter from the laterals; laterals on each side a little less than the diameter of an anterior lateral apart; median quadrangle broader behind than long, as broad in front as long.

Chelicerae.—Inferior border with 1 long pointed tooth, a little nearer the base of the fang than to the base of chelicera.

Legs without spines; metatarsi I and II with a few spatulate hairs apically below; metatarsi III and IV without spatulate hairs but with a double row of strong setiform bristles below.

Palp as in fig. 6.

Measurements.—Length of carapace, 2·8 mm.; breadth, 2·6 mm. Total length, 6 mm.

This species differs from other known forms in at least the shape and length of the tibial apophysis of the palp.

Platyoides beta, n. sp.

1 ♀ (6720). Outjo.

Colour as in *P. alpha*, the abdomen without definite markings, lighter in the centre than at the sides.

Carapace equal in length to femur III measured above, and to tibia+a little less than $\frac{1}{2}$ patella I; breadth equal to tibia II.

Eyes.—Anterior medians a diameter apart, the same distance from the laterals which are a little larger; posterior medians $1\frac{1}{2}$–2 their long diameter apart and 2–$2\frac{1}{2}$ their long diameter from the laterals;

laterals on each side about the diameter of an anterior lateral apart; median quadrangle $1\frac{1}{3}$ times as broad behind as long, broader behind than in front, and broader in front than long.

Chelicerae as in *P. alpha*.

Legs.—I with distal $\frac{3}{5}$ of tibia, metatarsus, and tarsus bearing spatulate hairs inferiorly; II with spatulate hairs lacking in tibia, metatarsus with some apical ones, tarsus with spatulate hairs in its distal half inferiorly; III and IV without spatulate hairs.

Vulva as in fig. 7; the length of the anterior quadrate portion a little less in proportion to its width than is shown in the figure.

Measurements.—Length of carapace, 3 mm.; breadth, 2·8 mm. Total length, 8 mm.

This species resembles *P. alpha*, with which it may prove to be synonymous, but until the two sexes have been taken together I have described it as a separate species.

Gen. Callilepis, Westr.

Callilepis varius, Tucker.

3 ♀♀ (6732), 3 ♀♀ (7137). Outjo.

2 ♀♀ (7068). Otjitondua.

1 ♀ (7092). Ombombo.

1 ♀ (7036), 1 ♀ (7031), 1 ♀ (6936), 1 ♀ (7041). Kaoko Otavi.

These specimens agree in the shape of the vulva with Tucker's figure (Ann. S.A.M., Vol. XIX, pl. 8, fig. 7), the central darkened portion is, however, very indistinct. The anterior median eyes sometimes appear slightly larger, at other times slightly smaller, than the laterals when seen in spirit; when measured dry with a micrometer eyepiece, they are slightly smaller than the laterals and these are a little more than their own diameter from the edge of the clypeus.

Colour.—Carapace as in the description of type; as regards the colouring of the abdomen there appear to be two forms, the one as in the cotype 3726 (from the N.-W. Transvaal) is "dark and olivaceous in colour and flecked with testaceous spots which become very numerous posteriorly," the other form is as in the cotype 5504 (from Windhoek). The colouring of the specimens from the Kaokoveld is very constant and agrees in every detail with the latter form. In these specimens there are three pairs of black dots dorsally in the anterior half, each composed of a brown sigillum surrounded by a fuscous ring, the first two pairs of sigilla are subrotund, the third large

and oval, the second pair nearer to the first than to the third, and the area enclosed by the two rows fuscous; behind the third pair of sigilla are four distinct fuscous chevron markings followed by a well-defined black dot above each median spinner; ventrally there is a short chitinous transverse bar just anterior to the spinners; sides with irregular reticulate fuscous markings.

This species is near to *C. frenata*, Purcell, in the eyes and markings though differing somewhat in the shape of the vulva.

Gen. Asemesthes, Simon.

Asemesthes lineatus, Purcell.

1 ♀ (6960). Kaoko Otavi.
1 ♀ (6719). Outjo.

Asemesthes purcelli, Tucker.

1 ♀ (6939). Kaoko Otavi.
2 ♀♀ (7090). Ombombo.

Asemesthes windhukensis, Tucker.

2 ♀♀ (7125). Otjikondo.

Asemesthes alternata, n. sp.

1 ♀ (7126). Kaoko Otavi.

Colour.—Carapace with a median longitudinal band of white hairs a little broader than the area occupied by the median eyes, on each side a dark brown band a little broader than the median band, well defined, including the lateral eyes and reaching the posterior margin; between this band and the narrow black margined border of the carapace a submarginal white band about the same width as the median band. Abdomen above with two fuscous lateral bands connected across the anterior apex of abdomen (where a shorter median band is given off) but not connected posteriorly; some fuscous spots posteriorly at the sides and some indistinct chevron markings above the spinners.

Carapace equal in length to metatarsus IV.

Eyes.—Both rows from above equally and strongly recurved, posterior row a little wider than anterior row; anterior row with

their lower margins forming a straight line, medians their radius apart and nearly touching the laterals which are not quite twice as large; posterior row with medians much smaller than laterals, white, diverging behind, about a short radius apart and a little less from the laterals, posterior medians distinctly smaller than anterior medians; median quadrangle much longer than wide, as wide in front as behind, posterior lateral subequal to an anterior lateral and about its own diameter from it; clypeus 2–2½ times the diameter of an anterior lateral eye.

Spinners.—Inferior spinners with 3 fusules.

Vulva as in fig. 8.

Measurements.—Length of carapace, 2·2 mm. Total length, 6·3 mm.

Gen. Setaphis, Simon.

Setaphis kaokoensis, n. sp.

4 ♀♀, 1 ♂ (6945). Kaoko Otavi.

3 ♀♀ (7046). Okorosave.

♀ *Colour.*—Carapace brown, apex of femur, patella, and tibia of first leg infuscated, remaining segments yellowish brown; legs II, III, and IV more or less infuscated at the sides; abdomen above with the anterior pair of white markings small and subrotund, the posterior pair long, cuneiform, forming a large white patch on each side ventrally, these divided (ventrally) by a median infuscated band much broader anteriorly than posteriorly.

Carapace.—Length equal to tibia, metatarsus+tarsus III, and to metatarsus, tibia+a little more than ½ patella I.

Eyes.—Anterior row procurved, medians slightly less than their diameter apart, touching the laterals; posterior row procurved, medians about 1½ diameters apart, less than a diameter from the laterals; median quadrangle a very little longer than wide behind, wider behind than in front; laterals on each side less than the diameter of a posterior lateral apart; an anterior lateral eye about its radius from the edge of the clypeus.

Chelicerae.—Superior margin with 4 teeth, inferior margin with 1 granule.

Legs.—Metatarsus I below with 1 subbasal anterior spine (none on the left leg); metatarsus II below with a pair of subbasal spines; legs III and IV with numerous spines.

Vulva as in fig. 9.

Measurements.—Length of carapace, 2·2 mm. Total length, 7·3 mm.

♂ *Colour.*—Carapace and legs lighter, abdomen above with the posterior pair of white markings smaller, subrotund, joining the ventral white patches which are not completely divided by a median band.

Carapace.—Length equal to tibia, metatarsus+about ½ tarsus I.

Eyes as in ♀.

Chelicerae.—Superior margin with 3 teeth, inferior margin muticous.

Palp as in fig. 10.

Measurements.—Length of carapace, 2·3 mm. Total length, 5·4 mm.

Setaphis lapidaria, n. sp.

3 ♂♂, 6 ♀♀ (6723). Outjo.

♀ *Colour.*—Carapace and sternum brown; coxae yellow brown; abdomen above deeply infuscated, with two pairs of white oblique markings in its anterior half, below with a white band posterior to the epigastric region, divided longitudinally in the centre by one broad or two narrow infuscated stripes joining the dark area anterior to the spinners; inferior spinners black; legs with apex of femur, patella, and tibia of I dark infuscated, remaining segments light brown; II, III, and IV with infuscated lateral stripes on patellae and remaining distal segments, otherwise light brown.

Carapace.—Length equal to metatarsus+tibia+½ patella I, and to metatarsus+tarsus IV.

Eyes.—Anterior row procurved, medians black, smaller than the laterals, about a diameter apart and touching the laterals; posterior row slightly procurved, medians about a diameter apart and nearer to the laterals; posterior laterals smaller than the anterior laterals and nearer to them (less than the diameter of a posterior lateral) than are the posterior medians to the anterior medians; an anterior lateral eye a little less than its diameter from the edge of the clypeus.

Chelicerae.—Superior margin with 4 teeth, inferior margin with 2 granules.

Legs.—I without spines, metatarsus II below with 1 anterior subbasal spine, III and IV with numerous spines.

Vulva as in fig. 11.

Measurements.—Length of carapace, 2·3 mm. Total length, 6·5 mm.

♂ *Colour.*—Carapace light brown, sparsely clothed with slender white hairs, finely coriaceous, fovea with olivaceous infuscation, remainder of carapace with minute olivaceous flecks and stripes; abdomen above blackish with the usual 4 white spots, below the white patches coalescing to form a continuous transverse band in the middle; legs light brown, tibiae of I and II clothed with whitish hairs.

Eyes as in ♀.

Chelicerae.—Superior margin with 3 teeth, inferior margin muticous or with a small apical granule.

Legs as in ♀.

Pedipalp as in fig. 12, viewed from the outer side. The style at the tip of the bulb passes downwards and under the tarsus which is transparent.

Measurements.—Total length, 4·8 mm.

Setaphis hessei, n. sp.

1 ♀ (6674). Warmbad.

Colour.—Carapace and sternum reddish brown; femur except inner surface, patella, and tibia of leg I dark infuscated, remaining segments yellowish brown; legs II, III, and IV more or less infuscated, femora less so; abdomen above as in *S. lapidaria*, the white spots on each side further apart, ventral surface dark with two white oval patches on each side divided by a dark median band which is a little lighter than the area anterior to the spinners.

Eyes.—Anterior medians about their diameter apart, subcontiguous to the laterals than which they are smaller; posterior row slightly procurved, medians more than a diameter apart, less than a diameter from the laterals; median quadrangle as wide behind as long and wider behind than in front, laterals on each side a little less than the diameter of a posterior lateral apart; an anterior lateral less than its diameter from the edge of the clypeus.

Chelicerae.—Superior border with 4 teeth, the apical one (nearest the fang) minute; inferior border with 1 indistinct granule.

Legs spined as in *S. lapidaria.*

Vulva as in fig. 13.

Measurements.—Length of carapace, 2·4 mm. Total length, 5·9 mm.

Gen. Trichothyse, Tucker.

Trichothyse fontensis, n. sp.

1 ♂ (7136). Sesfontein.

Colour.—Carapace olivaceous, covered with white plumose hairs except a median longitudinal band reaching to the eyes which is hairless (these may have been rubbed off), all femora olivaceous, remaining segments light brown with an olive tinge, except tibia and distal segments of IV which are a little darker; abdomen dark olivaceous above with a blackish transverse band at anterior apex, lighter below.

Carapace equal in length to metatarsus+tarsus II, and to patella, tibia+about $\frac{1}{3}$ metatarsus II.

Eyes.—Anterior medians $\frac{2}{3}$ their own diameter apart and considerably larger than the laterals with which they are subcontiguous, posterior medians a little more than their diameter apart and as far from the laterals as from each other; laterals $1\frac{1}{2}$ times as large as the medians, a little larger than the anterior laterals and less than their own diameter from them; median quadrangle longer than wide, a little wider in front than behind; clypeus equal to the diameter of an anterior lateral eye.

Chelicerae.—Superior margin with 1 tooth at its apex, inferior margin muticous.

Legs.—Femur I above with 1 (0) anterior, 3 superior, 0 posterior spines; remaining femora similarly: II with 2, 3 0, III with 2, 3, 2, IV with 1, 3, 1 spines; tibiae I and II below with 1 median anterior spine, 1 pair of apical spines; metatarsi I and II below with 1 pair of subbasal spines; tibia III below with 1 anterior subbasal spine, 1 median pair, 1 apical pair, 2 lateral pairs; metatarsus III below with a median and apical pair, and 2 lateral pairs.

Pedipalp as in fig. 14.

Measurements.—Length of carapace, 3·1 mm. Total length, 7·7 mm.

Gen. Camillina, Berland.

Camillina corrugata, Purcell.

1 ♀ (6750), 1 ♀ (6662). Sesfontein.
1 ♀ (7093). Ombombo.
2 ♀♀ (6687). Caimaeis.

Gen. Zelotes, Gistl.

Zelotes radiata, n. sp.

2 ♀♀ (6675). Sesfontein.
3 ♀♀ (7099). Kowares.

Colour.—Carapace reddish brown with some dark radiations from the fovea, legs a little lighter, abdomen testaceous.

Carapace equal in length to tibia+metatarsus I, and to patella+tibia IV.

Eyes.—Anterior row from in front procurved, medians much smaller than the laterals, about a diameter apart and subcontiguous to the laterals; posterior row from above straight to slightly procurved, medians subangular, a little smaller than the laterals, about their short diameter apart and twice as far from the laterals; posterior laterals much smaller than the anterior laterals and less than their own diameter from them; median quadrangle longer than wide and a little wider behind than in front; an anterior lateral less than its diameter from the edge of the clypeus.

Chelicerae.—Superior margin with 4 teeth, inferior margin with 2–3 granules.

Legs.—Metatarsus I with a subbasal pair of spines below; metatarsus II below with a subbasal pair, a median pair, and an apical pair, the last weaker than the others. Legs III and IV with numerous spines.

Vulva as in fig. 15.

Measurements.—Length of carapace, 2·8 mm. Total length, 8·7 mm.

Gen. Xerophaeus, Purcell.

Xerophaeus aridus, Purcell.

5 ♀♀ (6743). Kaross.
7 ♀♀ (6963). Kaoko Otavi.
6 ♀♀ (7043), 2 ♀♀ (7049). Okorosave.
1 ♂ (7062). Outjo.
1 ♀ (7078). Otjingerese.
2 ♀♀ (7085). Ombombo.
1 ♀ (7094). Kamanyab.
2 ♀♀ (7097). Ombombo.

Gen. THEUMA, Simon.

Theuma longipes, Lawrence.

Ann. S.A.M., Vol. XXV, p. 19.

1 ♂ (6670). Warmbad.

2 ♀♀ (7045), 1 ♂, 2 ♀♀ (7047). Okorosave.

2 ♀♀ (6953). Kaoko Otavi.

The type was described from a ♂, the following is a description of the ♀.

♀ *Colour.*—Carapace seen in spirit, brown with a pair of parallel infuscated stripes on each side converging from behind the lateral eyes towards the fovea, the space between them with reticulate infuscation; some similar infuscations between fovea and lateral margins of carapace which is clothed with silver-grey pubescence; abdomen dark testaceous; femora olivaceous, remaining segments brown.

Carapace equal in length to metatarsus IV, and to metatarsus + about $\frac{2}{3}$ tarsus I.

Eyes.—Anterior row slightly recurved, medians smaller than laterals, a little more than their own radius apart, and nearly touching the laterals; posterior row from above slightly recurved, medians large subangular, quadrate, at least equal to the laterals, less than their short diameter apart and a little more than their long diameter from the laterals; median quadrangle longer than posteriorly wide and a little wider behind than in front; an anterior lateral more than its diameter from the edge of the clypeus.

Chelicerae.—Superior margin with 4–5 teeth (the fifth, if present, minute), inferior margin with 3 smaller teeth.

Legs.—Tibia I with 2 anterior and 2 posterior spines below; tibia II with 2 anterior, 3 posterior spines below; metatarsi and tarsi I and II sparsely, III and IV not scopulate below.

Vulva as in fig. 16.

Measurements.—Length of carapace, 3·5 mm. Total length, 8·5 mm.

Theuma recta, Lawrence.

1 ♀ (6724). Outjo.

Theuma microphthalma, n. sp.

1 ♀ (7138). Warmbad.

Colour.—Carapace yellow, clothed with yellowish hairs; legs yellow; abdomen silver-grey.

Carapace equal in length to tibia+about $\frac{2}{5}$ metatarsus I, and to metatarsus+a little less than $\frac{1}{2}$ tarsus IV.

Eyes.—Small, anterior row from in front straight to slightly procurved, laterals nearly twice the size of the medians which are their own radius apart and as far from the laterals; posterior row from above straight to very slightly recurved, medians a little less than twice their diameter apart and twice their diameter from the laterals which are $1\frac{1}{2}$ times as large; posterior laterals subequal to anterior laterals, a little more than the diameter of a posterior lateral from them and further from the posterior medians; median quadrangle considerably wider behind than long; clypeus equal to a little more than the diameter of an anterior lateral eye.

Chelicerae.—Superior margin with 4, inferior margin with 3 teeth.

Legs.—Tibia I with 3 pairs of spines below and a median spine between the two basal spines; metatarsus I with 2 pairs of spines below; second leg similar except that the tibia has 3 anterior lateral spines in addition; metatarsi and tarsi of I and II with very few and short scopular hairs.

Vulva as in fig. 17.

Measurements.—Length of carapace, 2·8 mm. Total length, 6 mm.

Theuma funerea, n. sp.

1 ♀ (6681). Caimaeis.

1 ♀ (6738), 3 ♀♀ (6742). Kaross.

Colour.—Carapace and legs uniform yellowish, abdomen testaceous.

Carapace.—Length equal to tibia+a little less than $\frac{1}{2}$ metatarsus I, and to metatarsus+a little less than $\frac{1}{2}$ tarsus IV.

Eyes.—Anterior row from in front slightly procurved, medians smaller than the laterals about $\frac{2}{3}$ their own diameter apart and nearly touching the laterals; posterior row from above slightly recurved, medians subrotund, subequal to the laterals, half their greatest diameter apart and a little more than their diameter from the laterals, medians a little nearer the anterior than the posterior laterals; posterior laterals smaller than anterior laterals and less than the diameter of a posterior lateral from them; median quadrangle with its posterior width a little more than its length. Clypeus less than the diameter of an anterior lateral eye.

Chelicerae.—Superior margin with 4, inferior margin with 4 teeth.

Legs.—Tibia I with 4 anterior (the fourth, apical spine smaller than the others), 3 posterior spines; metatarsus I with a pair of basal spines; second leg similar except for the addition of 2 lateral anterior

spines in the distal half of tibia; tarsi and metatarsi of I and II scopulate.

Vulva as in fig. 18.

Measurements.—Length of carapace, 3·1 mm. Total length, 8 mm.

Family PALPIMANIDAE.

Gen. Diaphorocellus, Simon.

Diaphorocellus biplagiatus, Simon.

1 ♂, 3 ♀♀ (6696). Kamanyab.
2 ♀♀ (6643). Sesfontein.
1 ♀ (6672). Warmbad.
3 ♂♂, 5 ♀♀ (6934). Kaoko Otavi.
1 ♂, 5 ♀♀ (6725). Outjo.
1 ♀ (6685). Caimaeis.

Diaphorocellus albooculatus, Lawrence.

2 ♀♀ (7139). Kaoko Otavi.
1 ♂, 2 ♀♀ (6654). Warmbad.

Family ZODARIIDAE.

Gen. Cydrela, Thorell.

Cydrela otavensis, n. sp.

1 ♀ (6935). Kaoko Otavi.

Colour.—Carapace black with a few white hairs, ocular area with some long brown setae, a row of forwardly directed slender fuscous setae down the middle line behind the eyes reaching the fovea; legs lighter than carapace; abdomen greyish black, clothed with mixed white and black hairs, a pair of small, oval, posteriorly diverging yellow spots just behind the middle, a median row of about 4 yellowish spots above the spinners, the last one much more distinct than the remainder.

Carapace equal in length to tibia, metatarsus+$\frac{3}{5}$ tarsus I, and to metatarsus+tarsus IV.

Eyes.—Anterior laterals $2\frac{1}{2}$ times their diameter apart, less than a diameter from the medians which are about $\frac{1}{2}$ their diameter apart and larger than the laterals; posterior row recurved, medians about

their diameter apart and 3 times their diameter from the laterals which they exceed in size, a little more than their diameter from the anterior medians; median quadrangle longer than wide, a little wider behind than in front; clypeus about twice the distance between the anterior lateral eyes.

Legs.—Metatarsus I without, metatarsus II with, apical scopular brush.

Vulva as in fig. 19. The epigynal fossa is a shallowly concave depression with the sides sloping up towards the rim and not very sharply defined from it.

Measurements.—Length of carapace, 4·5 mm. Total length, 10·2 mm.

Gen. Caphaeris, Simon.

Caphaeris cordivulva, n. sp.

3 ♀♀ (6715). Sesfontein.

1 ♀ (7069). Otjitondua.

Colour.—Carapace, femora, and palps deep reddish brown; patellae and distal segments of legs light reddish brown; carapace coriaceous, sparsely clothed with long white hairs, some long fuscous curved spines just behind and between the eyes; legs clothed with mixed white and blackish brown hairs; abdomen above fuscous clothed with mixed white and fuscous hairs, two pairs of indistinct whitish spots in posterior half followed by a median row of 3 whitish spots above the spinners; below with the post-epigynal area blackish ornamented with two rows of light brown spots converging slightly towards the spinners.

Carapace equal in length to tibia+metatarsus I, and to patella +tibia+about $\frac{2}{5}$ metatarsus IV.

Eyes.—Anterior row with medians $\frac{1}{3}$ their diameter apart, laterals subcontiguous to each other, medians twice as large as the laterals, a little more than their own diameter from them; quadrangle formed by the anterior eyes longer than posteriorly wide and twice as long as anteriorly wide; posterior row straight to very slightly recurved, medians $\frac{3}{4}$ their diameter apart and $1\frac{1}{2}$ diameters from the laterals which are a little larger; median quadrangle longer than wide and a little wider in front than behind; clypeus $1\frac{1}{2}$ times the length of quadrangle formed by the four anterior eyes.

Legs.—Metatarsi I and II scopulate in their apical third; metatarsus II shorter and stouter than metatarsus I; tarsi I and II scopulate.

Vulva as in fig. 20.

Measurements.—Length of carapace, 5·1 mm. Total length, 12·3 mm. (excluding spinners).

Caphaeris apophysalis, n. sp.

1 ♂ (6661). Sesfontein.

Colour.—Carapace black, coriaceous, fairly sparsely clothed with white, cylindrical, pointed hairs; palps, femora of legs black, patellae and distal segments of legs successively lighter, anterior legs clothed above with white, posterior legs with dirty yellow hairs; mandibles reddish brown; abdomen above clothed with yellow hairs from anterior apex to just above the spinners, below sooty black.

Carapace equal in length to tibia+$\frac{3}{4}$ metatarsus I, and subequal to metatarsus+tarsus IV.

Eyes.—Anterior medians a little less than $\frac{1}{4}$ their diameter apart, about their diameter from and twice as large as the laterals which are subcontiguous with each other; posterior row straight, medians their own diameter apart and about $1\frac{1}{2}$ diameters from the laterals which are a little larger; median quadrangle wider than long, a little wider in front than behind, clypeus a little less than $1\frac{1}{2}$ times the length of quadrangle formed by the anterior eyes.

Legs.—Tibia I with 6 anterior, 4 posterior spines below; metatarsus I with 7–8 anterior, 5–6 posterior unequal spines below, 1 anterior apical lateral spine; tarsus I below with about 4 short spines on each side.

Pedipalp as in figs. 21, 22. Fig. 21 from exterior side showing the large, blunt, very prominent tibial apophysis directed at an angle of about 50° from the horizontal plane of the tibia. In *C. oncka* this process is a low and blunt tubercle; the junction of tibia and tarsus is not shown in this figure, being very indistinct. Fig. 22, tarsus as seen from below.

Measurements.—Length of carapace, 5·4 mm. Total length, 10·6 mm.

Gen. Diores, Simon.

Diores sp.

1 ♀ (6697). Kamanyab.

This single specimen agrees remarkably with *D. radulifer*, Simon (from Little Namaqualand and the Kalahari) in the colouring and structure of the eyes, but differs somewhat in the spination; the vulva is unfortunately damaged and is difficult to define.

Family HERSILIIDAE.

Gen. Hersilia, Aud.

Hersilia arborea, n. sp.

2 ♂♂, 4 ♀♀ (6941). Kaoko Otavi.
1 ♂ (7141). Warmbad.
3 ♂♂, 1 ♀ (6944). Kaoko Otavi.
1 ♂, 1 ♀ (6726). Outjo.

♀ *Colour.*—Carapace yellow, thoracic portion speckled with fuscous dots, some fuscous radiations from the fovea, ocular area black; clypeus yellow with an oblique stripe composed of reddish hairs from below each anterior median eye to edge of clypeus; abdomen yellow with a fuscous or blackish median band in the anterior half; tibiae I, II, and IV with apical fuscous bands, second joint of metatarsi of same legs with apical fuscous bands; all tarsi in their distal $\frac{2}{3}$, tarsus of palp in distal half, infuscated.

Carapace with length about equal to breadth which is equal to the second segment of metatarsus IV.

Eyes.—Anterior medians less than a diameter apart (about $\frac{5}{6}$) and nearly twice as large as the posterior medians which are about $1\frac{1}{2}$ times their diameter apart, equidistant from the posterior laterals, posterior medians their own diameter from anterior medians, median quadrangle a little wider in front than long and wider in front than behind; clypeus about twice the length of median quadrangle.

Legs.—Femora above with white spines; tibiae I and II with 2 anterior, 3 superior, 2 posterior black spines.

Vulva as in fig. 23, with semicircular corrugations at the sides meeting in the middle line.

Measurements.—Length of carapace, 3 mm. Total length, 7·9 mm.

♂ *Colour.*—Carapace dark olivaceous except for a light spot behind the ocular area; clypeus light except for an oblique fuscous stripe laterally to each anterior median eye and a wedge-shaped marking below them; abdomen dark olivaceous with a few light spots at the sides; femora light with irregular olivaceous annulations; remaining segments of legs I, II, and IV olivaceous except for a subbasal and subapical annulation in tibiae, and a basal annulation in first segment of metatarsi which are light; basal segments of inferior spinners light with an apical olivaceous marking; apical segment olivaceous except for a lighter annulation before the middle.

Eyes.—Anterior medians almost 3 times the size of posterior

medians, $\frac{2}{3}$ their diameter apart; posterior medians about their diameter apart and equidistant from the posterior laterals; posterior medians less than their diameter from the anterior medians; median quadrangle a little longer than posteriorly wide, much wider in front than behind; clypeus a little less than twice the length of median quadrangle.

Palp as in fig. 24. When viewed from below the tarsus is twisted outwards, showing in profile the large outwardly projecting conductor which is characteristic of this group; tibia above with 2, patella with 4, black setae; tibia with a group of white setae on its exterior distal edge.

Measurements.—Length of carapace (equal to breadth), 2·4 mm. Total length, 5·6 mm.

This species falls under the group represented by *Hersilia alluaudi*, Berland, in which the median ocular quadrangle is much wider anteriorly than posteriorly and the anterior median eyes are more than twice as large (at least in the males) as the posterior medians. *H. arborea* resembles *H. alluaudi* in the eyes, but differs in the male sexual organ from that figured by Berland (Voy. de Ch. Alluaud et R. Jeannel en Afrique Orientale, iv, 2^{e} partie, p. 124, fig. 145).

Note.—Males from the same or different localities differ largely in colouring; some are coloured as is described in the female which is an almost uniform yellow save for a dark median band on the dorsum of abdomen; other females conversely are coloured as in the male described above, *i.e.* almost entirely deep olivaceous; while specimens of *Hersiliola* were taken under stones, *Hersilia* was captured only on the bark of trees, and in these spiders remarkable differences of colour were observed, ranging from reddish yellow to deep olivaceous according to the colour of the bark of the tree on which they happened to be resting; it thus appears that in individuals of *Hersilia* there occur responses in the pigment cells of the skin to external changes of colour; those found on the bark of the native tree *Commiphora oliveri*, which has a bright-coloured reddish yellow bark, were yellow to red in colour; others were noticed on the wild fig-trees *Ficus guerichiana* and *F. damarensis*, which have a fawn-coloured bark, while those found on the greyish surface of the baobab tree, *Adansonia digitata*, were olivaceous.

The proportions of light-coloured to melanic individuals are as follows: light, 3 ♀♀, 2 ♂♂; melanic, 4 ♀♀, 6 ♂♂. 1 ♂, 1 ♀ from the Waterberg Mountains, R. W. E. Tucker, come under this species.

Hersilia setifrons, n. sp.

5 ♀♀, 1 ♂ (6665). Sesfontein.
1 ♂ (7140). Kaoko Otavi.
2 ♀♀ (6653). Warmbad.

♀ *Colour.*—Carapace with well-defined blackish marginal band along the sides reaching the lateral angles behind and continued to the lateral angles of the clypeus anteriorly; carapace otherwise clothed with yellowish hairs except for two indistinct markings below and at the exterior side of each anterior median eye which are composed of reddish brown hairs; femora I and II with a short basal infuscated stripe antero-inferiorly; patellae in basal half, tibiae apically, metatarsi at junction of first and second segment, second segment apically, tarsi wholly (except for a faint yellow annulation) infuscated in legs I, II, and IV; legs otherwise yellow mottled with brown, anterior and posterior spines of femora white, superior spines black; abdomen mottled yellowish brown with a red or black stripe at the sides disappearing posteriorly, and a median blackish marking above; spinners not infuscated except very faintly at the tips and near the middle above in the apical segment.

Carapace a little longer than wide, length subequal to second segments of metatarsi I and II which are equal; longer than the same segment in leg IV.

Eyes.—Posterior medians a little smaller than anterior medians, which are about their diameter apart, posterior medians a little less than their diameter apart and the same distance from the anterior medians as from each other; posterior medians equal to the posterior laterals and $1\frac{1}{3}$ as far from them as from each other; median quadrangle almost a square, as long as posteriorly wide, slightly wider in front than behind; clypeus $1\frac{1}{3}$ the length of median quadrangle. A pair of black curved setae behind the posterior median eyes in the middle line, a pair of very long, white, sinuously curved white setae between the median eyes projecting forwards in a horizontal plane beyond the edge of the clypeus.

Vulva as in fig. 25, resembling both *H. sericea*, Pocock, and *H. bicornis*, Tucker, in general form, but differing from them in the greater width of the median portion.

Measurements.—Length of carapace, 3·5 mm. Total length, 8 mm.

♂ *Colour* as in ♀.

Eyes.—Anterior medians distinctly larger than posterior medians, $\frac{2}{3}$ their own diameter apart and less from the anterior medians;

length of median quadrangle equal to posterior width, a little wider in front than behind; clypeus 1–1½ times the length of median quadrangle.

Palpal organ resembling that of *H. bicornis*, Tucker (Ann. S.A.M., Vol. XVII, pl. 29, fig. 10B). The curved process is stouter and much shorter and not drawn out in a narrow point; patella with a small basal and large apical spine above, tibia with 1 subbasal exterior spine and a smaller subapical interior spine.

Measurements.—Length of carapace (greater than breadth), 2·8 mm. Total length, 7 mm.

Further records are 1 ♀ (6202) (Oncka), Ovamboland; 1 ♀ (5208), Tsumeb; 1 ♀ (5170), Windhoek. The latter two collected by R. W. E. Tucker.

Gen. Hersiliola, Thorell.

Hersiliola fragilis, n. sp.

2 ♀♀ (7059), 1 ♀ (6729). Outjo.

1 ♀ (6745). Kaross.

1 ♀ (6663). Sesfontein.

Colour in liquid: carapace yellow, ocular area and sides of clypeus infuscated; infuscation continued behind the ocular area mesially to the fovea as a star-shaped patch bearing a round white dot in the centre, lateral margins broadly ornamented with fuscous markings, clypeus in the middle yellow; abdomen with the usual black crenulated line separating the dorsal yellowish mottled portion from the darker fuscous sides, this dorsal yellowish portion bearing anteriorly the usual black doubly constricted median marking followed by some transverse fuscous bars; sides with fuscous stripes becoming attenuated and disappearing towards the ventral surface; femora yellow with irregular annular infuscations, patella and distal segments of legs I and II olivaceous, tibia II with a narrow longitudinal light stripe superiorly, tibia IV dark olivaceous with 2 distinct yellow bands, metatarsus IV with a distinct subbasal yellow band which can be barely seen in the remaining legs; basal segment of superior spinners with a brown dot laterally at its base, apical segment with a similar basal dot at the sides and above. Seen dry, the abdomen is covered with mixed white and golden plumose hairs and numerous setiform spines, predominantly black, in a few cases white; ocular area with plumose golden hairs among the median eyes, some scattered ones on the clypeus, a group of three long black setae between the

median eyes, two white ones on each side at the edge of the clypeus, carapace with mixed white and golden hairs.

Carapace wider than long, length subequal to metatarsus+tarsus III, breadth equal to tibia I.

Eyes.—Anterior median eyes almost twice the size of posterior medians, $\frac{2}{3}$ their own diameter apart and less than $\frac{1}{4}$ their diameter from the posterior medians, these $\frac{1}{2}$ their own diameter apart and twice as far from the posterior laterals which are a little smaller than the anterior medians; anterior laterals the smallest of the eyes and nearer to the posterior laterals than to the anterior medians; median quadrangle wider in front than long and much wider in front than behind; clypeus not quite twice the length of median quadrangle.

Legs.—Tarsus I more than $\frac{1}{2}$ the length of metatarsus I.

Vulva as in fig. 26. It is clearly defined by a chitinous rim with a short lateral projection on each side; the fossa enclosed by the chitinous rim forms a shallowly concave depression.

Measurements.—Length of carapace, 2·7 mm.; breadth, 2·9 mm. Total length, 8 mm.

Family ARGIOPIDAE.

Gen. Tetragnatha, Latr.

Tetragnatha nitens, Aud.

3 ♂♂, 1 ♀ (6655). Warmbad.

Gen. Nephila, Leach.

Nephila senegalensis windhukensis, Strand.

2 ♀♀ (7054). Okorosave.
3 ♂♂, 4 ♀♀ (7040). Kaoko Otavi.
2 ♀♀ (7074). Otjingerese.
1 ♀ (7086). Ombombo.

1 adult ♀ taken at the Kunene River, Ovamboland, in 1922, and recorded as subspecies *annulata* (*ante*, p. 30) is now recorded as subspecies *windhukensis*.

Gen. Argiope, Aud.

Argiope nigrovittata, Thorell.

1 ♀ (7109). Otjingerese.
1 ♀ (6713). Otjikondo.

Gen. Araneus, Clerck.

Araneus morelii, Vinson.

1 ♂ (7107). Hoarusib River.

Araneus eresifrons, Pocock.

2 ♀♀ (6676). Warmbad.
1 ♀ (7079). Otjingerese.
2 ♀♀ (6678). Warmbad.

Gen. Cyrtophora, Simon.

Cyrtophora citricola, Forskal.

1 ♀ (6658). Sesfontein.
1 ♀ (7076). Otjingerese.
2 ♀ (6949). Kaoko Otavi.
1 ♀ (6708). Otjikondo.

Family THOMISIDAE.

Gen. Stiphropus, Gerst.

Stiphropus scutatus, Lawrence.

Ann. S.A.M., Vol. XXV, pt. i, p. 31.
1 ♀, 1 ♂ (6717). Outjo.
3 ♀♀, 4 ♂♂ (6942). Kaoko Otavi.
1 ♀ (7095). Kaoko Otavi.

The above species was described from a male, the following is a description of the female.

Colour as in ♂, *loc. cit.*

Carapace equal in length to tibia+metatarsus+about ½ tarsus II, and to tibia+metatarsus+tarsus IV.

Eyes.—Anterior medians a little more than twice their own diameter apart, about 4 diameters from the laterals which are much larger; posterior medians larger than anterior medians, ¼ further from their laterals than from each other; median quadrangle with length equal to anterior width, posterior width 1½ times anterior width; anterior lateral eye its own diameter from edge of clypeus.

Legs.—Metatarsi I and II shorter than their respective tarsi.

Vulva as in fig. 27. There is some variation in form among the ♀♀ from Kaoko Otavi; in one specimen the chitinous arms forming the anterior border of the epigynal fossa meet, forming a continuous transverse arc; in another they join in the middle line, coming downwards to form a median septum.

Measurements.—Length of carapace, 2·7 mm. Total length, 5·4 mm.

Gen. Monoeses, Thorell.

Monoeses debilispina, n. sp.

1 ♀ (7030). Kaoko Otavi.

Colour.—Carapace mottled white at the sides, greyish above in the middle, with fairly broad fuscous submarginal bands; clypeus with a distinct white stripe from the tubercle of the posterior lateral eye to the edge of clypeus and continued along the side of the mandibles; edge of clypeus with 4 spines; a few black spots on the carapace each bearing a black spine; sternum lightly infuscated posteriorly, coxae and mouth parts yellowish white; abdomen greyish above with yellow patches in each of which is a spine, the area immediately surrounding its base being black; sides with a narrow white stripe broadening somewhat posteriorly; in anterior half of abdomen two black markings situated just within this white stripe on each side, the anterior one considerably larger than the posterior one; spines on abdomen becoming progressively more numerous posteriorly, most numerous on caudal process which is much creased, abbreviated and pointed (length of caudal process about $\frac{1}{4}$ remainder of abdomen); ventral surface with a median light fuscous longitudinal band reaching from epigastric area to, and including, the spinners. Legs irregularly marked with fuscous dots, metatarsi I and II only with a distinct blackish apical annulation.

Carapace equal in length to about $\frac{3}{4}$ tibia I.

Eyes.—Anterior medians a very little nearer to each other than to the laterals, than which they are about 3 times smaller; posterior medians larger than anterior medians and further from each other than from the laterals; posterior laterals smaller than anterior laterals; median quadrangle wider behind than long, and nearly twice as broad behind as in front; clypeus about equal to length of median quadrangle.

Legs covered with hairs and some weak spines not arranged in a regular series.

Vulva as in fig. 28.

Measurements.—Length of carapace, 1·7 mm. Total length, 5·9 mm.

This species may prove to be the same as *M. griseus*, Pavesi.

Gen. Parabomis, Kulczynski.

Parabomis anabensis, n. sp.

1 ♀ (7035). Kaoko Otavi.

1 ♀ (6690). Anabib.

Colour.—Mandibles, mouth parts, sternum, carapace above, and clypeus yellow; carapace yellowish brown at the sides, a blackish marking at the posterior lateral angles of the carapace, granular border of the oblique posterior face of the carapace lined with short and stout white hairs; legs yellow, sparsely clothed with similar hairs; femora II and III blackish in the middle; abdomen above with lateral and transverse folds bordered with rows of white spines; inferior spinners with a small blackish dot interiorly at their base.

Eyes.—Anterior medians 14 times their own diameter apart, a little less than twice their diameter from the laterals and 3 times their diameter from the posterior medians; median quadrangle a little wider behind than in front and 3 times as wide behind as long; clypeus twice the length of median quadrangle.

Abdomen in both specimens rounded and subglobular, without the three small keels mentioned in the description of *P. martini*, Lessert (Rev. Suisse de Zool., vol. xxvii, Nos. 5 and 6, p. 116); abdomen as wide as long.

Vulva as in fig. 29.

Measurements.—Length of carapace, 1·3 mm.; length of abdomen, 3 mm.; breadth, 3 mm.

Found on the native tree *Grewia monticola*, Kaoko Otavi, whose flowers they closely resemble.

1 ♀ (5065), Grootfontein, R. W. E. Tucker, also falls under this species.

Gen. Thomisus, Walck.

Thomisus schultzei, Simon.

1 ♀ (6644). Sesfontein.

1 ♀ (6689). Anabib.

1 ♀ (6730). Outjo.

1 ♀ (7037). Kaoko Otavi.

Gen. Xysticus, C. Koch.

Xysticus sagittifer, Lawrence.

Ann. S.A.M., Vol. XXV, pt. i, p. 37.

3 ♂♂, 1 ♀ (7071). Otjitondua.

1 ♂ (7088). Ombombo.

1 ♀ (6955). Kaoko Otavi.

The above species was described from a female example; the following is a description of the male.

Colour.—Carapace uniform dark mahogany brown without a white marginal band or white markings except for a white recurved stripe anteriorly including the anterior row of eyes and the posterior lateral eyes; abdomen and legs coloured as in female; sternum brown, variegated with a few white spots.

Eyes.—Distance between anterior medians $1\frac{1}{2}$ times that between an anterior median and lateral, anterior laterals $2\frac{1}{2}$ times the size of the medians; posterior medians a little nearer to each other than to the laterals, median quadrangle as wide in front as behind and wider than long; an anterior median about the same distance (or a very little less) from an anterior lateral as from the edge of the clypeus.

Legs.—Tibiæ I and II below with 4 pairs of long spines, above with 3 pairs of short spines; metatarsi with 3 inferior pairs and 3 lateral pairs of spines.

Pedipalp as in fig. 30.

Measurements.—Total length, 4·2 mm.

This species is near to *X. jugalis*, Koch (Aegypt. u. Abyss. Arach., p. 63, pl. 6, figs. 4, 4*a*), from Abyssinia; it resembles it in the colouring, eyes, and the general form of the palpal organ (cf. *loc. cit.*, fig. 4*a*). The similarity of forms from the northern parts of S.-W. Africa to those of the north-eastern corner of Africa is remarkable, especially among Thomisidæ. These specimens were taken under the bark of the wild fig-tree, *Ficus guerichii*, and under stones.

Gen. Philodromus, Walck.

Philodromus bigibba, Cambr.

1 ♀ (6739). Kaross.

Colour.—This agrees very closely with the description given by Cambridge (P.Z.S., 1876, p. 590). There is in this specimen a narrow

V-shaped brownish marking between the posterior median eyes. The edge of the clypeus in front is defined by a narrow white stripe ; patellae and tibiae of legs with a white apical ring or dot ; abdomen above anterior to the tubercles with a black lateral oblique stripe, posteriorly to the tubercles two pairs of /\-shaped black stripes, the first pair starting from the bases of the tubercles and not, though nearly, meeting in the middle line, the posterior pair not so near each other in the middle but extending farther inferiorly behind the tubercles ; abdomen below dirty white with a broad median luteous band.

Eyes in general as in specific description ; the medians of both rows $1\frac{3}{4}$ as far from each other as from the laterals, anterior medians about $1\frac{3}{4}$ the size of the laterals, posterior laterals subequal to the posterior medians which are smaller than anterior medians ; median quadrangle broader than long, nearly twice as broad behind as in front ; clypeus a little less than anterior width of median quadrangle.

Legs.—Femora and patellae with white plumose hairs ; femur I with 2 anterior white spines and 3 black superior spines ; femur II with 2 anterior black spines and 3 superior spines ; tibia I and II with 2 long pairs of spines below in proximal half, 3 lateral shorter pairs of spines ; metatarsi I and II with 2 long pairs of spines in proximal half, 2 pairs of shorter lateral spines ; tibiae I and II thickly clothed at their sides and sparsely below with plumose hairs ; metatarsi and tarsi provided along their whole length with a scopula of club-shaped hairs.

Abdomen with a few thickened, dark, club-shaped hairs posteriorly, 2–3 on the summits of the tubercles, a few smaller ones above the spinners, a large one at the posterior termination of each of the two hind oblique stripes.

Vulva as in fig. 31.

Measurements.—Total length, 5·5 mm.

This will probably prove to be a variety of the species described by Cambridge in view of the distance between the habitats of the two records. As it is impossible to state definitely without having seen the type that the above specimen does not actually belong to this widespread species of *Philodromus*, I have left it provisionally under this heading. Should it prove to be a variety of *P. bigibba*, I propose for it the name *P. bigibba* var. *australis*. The type of *P. bigibba* is described from Egypt.

Gen. Hirrius, Simon.

Hirrius arenaceus, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 39.
4 ♀♀ (6722), 2 ♂♂, 2 ♀♀ (6718). Outjo.
1 ♂, 1 ♀ (6714). Otjikondo.
3 ♀♀ (7048). Okorosave.
1 ♂ (6701). Kamanyab.
2 ♀♀ (7100). Kowares.
7 ♀♀ (6933). Kaoko Otavi.
3 ♀♀ (7070). Otjitondua.

Family CLUBIONIDAE.

Gen. Olios, Walck.

Olios furcatus, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 41.
3 ♀♀ (6748). Kaross.
2 ♂♂, 1 ♀ (7052). Kaoko Otavi.
1 ♀ (7058). Outjo.

Olios correvoni var. *nigrifrons*, var. n.

1 ♀ (6703). Kamanyab.

Colour as in *O. correvoni*, Lessert (Rev. Suisse de Zool., vol xxviii, p. 388), with the following differences: carapace bordered anteriorly by a transverse fuscous stripe including the clypeus and anterior row of eyes, chelicerae black, maxillae yellow, infuscated exteriorly at their apices, an olivaceous dot interiorly opposite the upper edge of the labium, the latter yellow with an olivaceous apical dot at the sides.

Carapace considerably longer than wide (about $\frac{2}{5}$), subparallel, length a little greater than metatarsus II, breadth equal to tibia IV.

Eyes.—Anterior row straight, medians less than their diameter apart and distinctly larger than the laterals, posterior row slightly procurved, medians more than twice their diameter apart; posterior medians distinctly smaller than anterior medians; median quadrangle wider behind than long, and wider behind than in front; anterior medians about their radius from the edge of the clypeus.

Chelicerae.—Inferior margin with a row of 5 bristles at the base of the fang, armed with 4 teeth, the 2 apical ones large and subequal, the third considerably smaller, the fourth smallest of the 4 and considerably smaller than the third.

Legs spined as in *O. correvoni*. Femur I with 3 anterior, 4 posterior spines; II and III similarly with 3, 2, 3 spines; IV with 3, 2, 1. A dense slate-grey scopula occupying tarsi and metatarsi of I, II, and III, IV with proximal half of metatarsus not scopulate.

Vulva as in fig. 32. A tongue-like shiny convex lobe filling up the anterior triangular septum between the lobes, these not meeting posteriorly.

Measurements.—Length of carapace, 6·4 mm. Total length, 13·4 mm.

Gen. Palystella, gen. n.

♀ Considerably smaller than *Palystes*.

Carapace longer than wide, convex anteriorly, lightly and regularly arched above, cephalic portion higher than in *Palystes*, eyes occupying more than half of the anterior width of carapace, and more prominent than in the latter. Anterior eyes recurved, laterals much larger than the medians; posterior eyes straight, equidistant; laterals decidedly larger than the medians and equal to the anterior laterals; median quadrangle much longer than wide, clypeus wider than an anterior lateral eye.

Mandibles stout, the anterior surfaces convex, inferior margin with 3 robust teeth, the apical the largest, the basal the smallest; labium very short, shorter than in *Palystes*, truncated apically, reaching to about a fourth the length of maxillae; maxillae not vertical as in *Palystes* but diverging outwards (especially the inner margins), the apices not rounded and swollen but much more pointed distally than in *Palystes*; pubescence of the mouth parts as in *Palystes*; sternum as wide as long, almost circular. Legs II, IV, III, I more or less equal, and spined as in *Palystes*.

Palystella sexmaculatus, n. sp.

3 ♀♀ (7056). Outjo.

5 ♀♀ (6734). Outjo.

Colour.—Carapace with cephalic portion reddish brown, ocular area darker, 4 parallel longitudinal brown bars on posterior part of

cephalic area ; thoracic portion yellow-brown with a blackish wavy ⌣⌣-shaped marking posteriorly, sides irregularly spotted with black, an indistinct black marginal dot between the legs ; clypeus blackish except for a yellowish spot between the anterior median and lateral eyes and laterally to the anterior lateral eyes ; mandibles black, sternum and coxae uniform yellow ; abdomen above blackish brown, darker anteriorly in the middle, bearing anteriorly 3 pairs of white dots, the last pair smaller than the others ; below dark brown with a darker median band below the vulva. Legs a little lighter than the sternum (tarsi and metatarsi darker), without spots or annulations except the femora which are provided with some irregular fuscous markings above and bear fuscous spots at the bases of the spines.

Carapace equal in length to tibia+about $\frac{2}{5}$ metatarsus I, and to metatarsus+$\frac{1}{3}$ tarsus IV.

Eyes.—Anterior row decidedly recurved, medians less than their diameter apart and less than a radius from the laterals which are twice as large ; posterior row straight, equally spaced, the distance between them exceeding the diameter of a median eye ; posterior laterals as large as or very slightly larger than anterior laterals, $1\frac{1}{2}$ times the size of the posterior medians which are larger than the anterior medians ; median quadrangle longer than posteriorly wide, and much wider behind than in front.

Chelicerae as in generic description.

Legs.—All femora with 3 anterior, 2 superior, 3 posterior spines, except IV which has 3, 2, 2 (1) spines ; all tibiae with 3 inferior pairs of spines, 2 anterior, 2 posterior, and 2 superior spines ; all patellae muticous, all metatarsi with 2 inferior pairs of spines, 3 anterior and 3 posterior spines.

Vulva as in fig. 33. The anterior portion is covered with posteriorly directed hairs and appears to be a low depression from the floor of which arises the median tongue-like septum which is shiny and convexly rounded in its posterior portion ; the sclerites on each side of the septum bear a sinuous longitudinal shallow impression.

Carapace.—Length, 8 mm. ; breadth, 6·9 mm. Total length, 17·3 mm.

The Museum has also an immature ♂ of this species from Sesfontein ; other examples, collected by R. W. E. Tucker, are recorded from Nauchas, Areb, Choaberib, and Gurumanas in Great Namaqualand.

Gen. Rhaeboctesis, Simon.

Rhaeboctesis denotatus, n. sp.

1 ♀ (6716). Outjo.

1 ♀ (6699). Kamanyab.

3 ♀♀ (6947), 1 ♀ (6956). Kaoko Otavi.

Colour.—Carapace reddish brown, legs brown, abdomen ashy brown, a little lighter below, without markings of any kind.

Carapace with length equal to metatarsus IV, and to tibia+$\frac{2}{5}$ patella I.

Eyes.—Anterior row seen from in front with their inferior borders slightly procurved, medians their own diameter apart, less than a radius from their laterals which are about $1\frac{1}{2}$ times as large ; posterior row straight to slightly recurved, medians about $\frac{2}{3}$ their own diameter apart and $1\frac{3}{4}$ diameters from the laterals ; median quadrangle longer than wide behind, a little wider behind than in front ; anterior laterals less than their own diameter from the edge of the clypeus.

Chelicerae.—Inferior border with 2 low, blunt, well-separated teeth, superior margin with 3 low, blunt teeth, the middle one the largest, the apical one nearer to it than the basal one.

Legs.—Femur I with 2 anterior, 1 superior (subbasal), 0 posterior spines ; remaining femora similarly, II with 4, 1, 0, III with 4 (3), 3, 3, IV with 0 (1), 2, 3 spines ; tibia I below with 1 subbasal anterior spine, 1 median anterior spine ; metatarsus I below with a pair of subbasal spines ; tibia II with 1 subbasal anterior spine, a pair of median spines, 1 apical anterior spine ; metatarsus II with a pair of subbasal spines, 1 anterior median spine ; legs III and IV with numerous spines.

Vulva as in fig. 34.

Measurements.—Length of carapace, 4·3 mm. Total length, 10·5 mm.

Gen. Graptartia, Simon.

Graptartia granulosa, Simon.

1 ♀ (7064). Outjo.

The Museum has a ♂ specimen from Salisbury and a juvenile ♀ from Portuguese East Africa.

Gen. Copa, Simon.

Copa benina, Strand.

1 ♀ (7110). Hoarusib River.

This ♀ agrees closely with the description and figure of the vulva given by Lessert (Rev. Suisse de Zool., vol. xxviii, No. 17, p. 429). The colour of the abdomen in the Kaokoveld specimen is, however, predominantly blackish brown above, relieved by a few yellowish transverse bars or chevrons in the middle and at the sides. There is no trace of a triangular scutum anteriorly. The Museum has 3 ♀♀ of this species from Inhambane, Portuguese East Africa.

Family PISAURIDAE.

Gen. Euprosthenops, Pocock.

Euprosthenops australis, Simon.

2 ♀♀ (7055). Outjo.

These ♀♀ differ from *E. bayoanianus*, Br. Cap., of which the Museum has specimens from Inhambane, Portuguese East Africa, in the colouring of the abdomen which is white, while in *bayoanianus* it is ocraceous. The median carina of the vulva is considerably broader, and the first leg is more than five times as long as the carapace (in *bayoanianus* it is just five times as long). The ♂♂ from Inhambane agree with the figure of the palpal organ given by Simon (Hist. Nat. d. Araign., vol. ii, fig. 299, p. 286).

Family AGELENIDAE.

Gen. Agelena, Walck.

Agelena australis, Simon.

3 ♀♀ (6652). Warmbad.
1 ♀ (6744). Kaross.
1 ♀ (7067). Otjitondua.

Family LYCOSIDAE.

Gen. Chaleposa, Simon.

Chaleposa coccineo-plumosum, Simon.

1 ♀ (6733). Outjo.
1 ♂ (7039). Kaoko Otavi.

Gen. Lycosa, Latr.

Lycosa furvescens, Simon.

1 ♀, 1 ♂ (6673). Warmbad.

Lycosa kalaharensis, Simon.

1 ♀ (6728), 2 ♀♀ (7061). Outjo.
2 ♀♀ (6957), 1 ♀ (6958), 2 ♀♀ (6959). Kaoko Otavi.
2 ♀♀ (7072). Otjitondua.
1 ♀ (7044). Okorosave.
2 ♀♀ (7102). Kowares.

Lycosa subpersonata, Simon.

2 ♀♀ (7101). Kowares.

Lycosa obturata, n. sp.

2 ♀♀ (7096). Ombombo.

Colour seen dry: median band in the cephalic area of carapace not much lighter than the broad brown lateral bands except at its edges, its greatest width a little more than the distance between the posterior lateral eyes, slightly constricted behind these eyes, then widening a little; posterior portion of median band behind the fovea much lighter than anterior portion, resembling the dirty white submarginal band with which it is continuous posteriorly; submarginal band fairly narrow, dentate, ill-defined anteriorly; dorsal ocular area covered with brown hairs, posterior median eyes with rings of yellowish hairs, spaces between the anterior eyes with cream-coloured hairs, a spot of similarly coloured hairs at each side of the anterior row of eyes; mandibles in their upper half and at the sides with yellow hairs, their lower half shiny, sparsely clothed with black bristles; sternum thickly covered with yellow hairs, anterior coxae sparsely, posterior coxae thickly covered with black hairs, giving the latter, especially III, a blackish tinge; femora above mottled brown, patellae with blackish anterior and superior longitudinal stripes more distinct in posterior legs, remaining segments without distinct markings; legs above clothed with mixed black and white hairs and some long, irregularly disposed black setae, below uniformly covered with whitish hairs; abdomen olive brown above, two black spots at anterior apex, then a trapezoidal figure bordered with black,

a black projection at each of the posterior angles; posteriorly about 5 faint transverse arcuate stripes, lighter than the rest of the dorsal area; spinners surrounded by yellow hairs at their base, ventral surface entirely yellow, a few faint spots at each side and a faint indication of a narrow fuscous stripe in the middle.

Carapace equal in length to metatarsus+$\frac{1}{4}$ tarsus IV.

Eyes of anterior row procurved, not strongly so, narrower than the second row by about $\frac{1}{4}$ the diameter of a posterior median on each side; medians about $\frac{2}{3}$ their diameter apart, less than a radius from the laterals, their diameter from the edge of the clypeus; posterior medians very large, their radius or a little more apart; posterior laterals not much smaller than posterior medians (their diameter about $\frac{5}{6}$ of these); dorsal quadrangle a little longer than anteriorly wide, distance between a median and a lateral about equal to the diameter of a lateral eye.

Chelicerae.—Inferior margin with 3 large equal-sized teeth.

Legs stout and fairly long, especially IV; anterior metatarsi and tarsi short and stout, posterior ones long and slender; metatarsus IV equal to patella+tibia IV; tibiae I and II with 3 inferior pairs, 2 inner lateral spines; metatarsi I and II with 2 inferior pairs, 3 inferior apical, 2 inner lateral spines; anterior tarsi and metatarsi scopulate, posterior tarsi with mostly black setae.

Vulva as in fig. 35.

Measurements.—Length of carapace, 8·7 mm. Total length, 19·7 mm.

These specimens were found on the flat plains lying between the hills at Ombombo where the soil is hard and firm. They resemble *L. cunicularia*, Simon, from the plateaux of Algeria (Étude sur les Arach., rec. en Tunisie, 1883–1884, p. 7), both in general appearance and in making a tubular retreat with a cork-like door. The structure of the nest differs from that described by Simon in the cork-like stopper being almost as deep as wide (about 1 cm. each way) and in not being attached by a hinge to the mouth of the burrow. The trap-door tapers slightly towards its lower extremity much as in the cork of a small bottle, and when the spider is absent from the nest is placed about 1 cm. away from the mouth of the tube in an inverted position. In most of the nests seen this was the case, the width of the nests ranging from about 4 mm. to a little more than 10 mm.

Gen. Pardosa, C. Koch.

Pardosa manubriata, Simon.

3 ♀♀ (7087). Ombombo.

2 ♀♀ (7133), 2 ♀♀, 1 ♂ (6948). Kaoko Otavi.

The South African Museum contains in its collection numerous examples of this widespread species; in the Cape Province it is recorded from Ceres, Tulbagh, Ashton, Swellendam, Montagu, Calvinia, Hanover, Laingsberg, Beaufort West, and Uitenhage; in Natal from the Umhlatuzi River, in the Transvaal from Acornhoek and Kaapmuiden, in Rhodesia from Umtali, and in South-West Africa from the Kunene River. The vulva, fig. 36, in a specimen taken at Kaoko Otavi agrees in almost every detail with those of specimens captured at Dunbrody, Uitenhage.

Gen. Evippa, E. Simm.

Evippa relicta, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 53.

Syn. *Proevippa ovambica*, Lawrence (*loc. cit.*, p. 54).

1 ♂ (7098), 1 ♀ (7084). Ombombo.

The ♂ from Ongandjera named as *Proevippa ovambica* was wrongly identified and certainly does not belong to Purcell's genus. It agrees with the ♂ from Ombombo and must come under this heading. The tibial fringe of hairs in *Evippa* and *Proevippa* are very much alike and at first sight the genera seem identical, but are in reality very dissimilar, especially in the structure of the hairs which in *Evippa* are flattened and scale-like, while in *Proevippa* they are plumose.

Family OXYOPIDAE.

Gen. *Peucetia*, Thorell.

Peucetia crucifer, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 55.

3 ♀♀ (7108). Hoarusib River.

3 ♂♂ (7065). Outjo.

1 ♂ (6735). Kaross.

1 ♀ (6679). Caimaeis.

2 ♂♂ (6656). Sesfontein.

3 ♀♀ (6667). Warmbad.

Gen. Oxyopedon, Cambridge.

Oxyopedon rufocaligata, Simon.

1 ♀ (6706). Otjikondo.

Oxyopedon rostrifrons, n. sp.

1 ♀ (7081). Otjingerese.

Colour.—Carapace dark reddish brown, clypeus lighter; abdomen above dark reddish brown, some brown markings in the centre, below with a longitudinal whitish band at the sides speckled with black; sternum white in the centre, with black margin; labium and maxillae dirty white at their apices; legs black except for a subapical band in tibiae I and II, a subapical band in metatarsi I and II (in metatarsus III this band occupying median $\frac{3}{5}$), and the whole of the tarsi which are yellow.

Carapace.—Eyes of posterior row each provided with a tuft of hairs behind it, projecting forwards and upwards and overhanging the eyes; anterior lateral eyes with a less noticeable tuft behind each eye; edge of clypeus in the middle with a blunt, cone-shaped rostrum formed by a tuft of mixed, predominantly brown hairs.

Eyes.—Quadrangle formed by anterior row $2\frac{3}{4}$ times as broad behind as in front, laterals 3–4 times as large as medians; medians more than their own diameter apart, their diameter from the laterals, these a little less than twice their own diameter apart; posterior row fairly strongly procurved, the distance between the medians $1\frac{1}{4}$ times as great as that between a median and lateral eye; quadrangle formed by the posterior medians and anterior laterals slightly longer than posteriorly wide, a little wider behind than in front. Clypeus concave, equal to the posterior width of the quadrangle formed by the anterior eyes.

Vulva as in fig. 37.

Measurements.—Carapace, 4·1 mm. Total length, 8·7 mm.

This species differs from *O. kulczynskii*, Lessert (Rev. Suisse de Zool., vol xxiii, No. 11, p. 485), in the form of the vulva, the eyes (distance between the posterior median eyes is only $1\frac{1}{4}$ times as great as that between a median and lateral), the tufts behind the eyes and on the clypeus. It differs markedly from *O. rufocaligata* in the shorter clypeus, the shape of the abdomen, which resembles that of *O. kulczynskii* in colouring, and the legs which are much more slender,

especially the tarsi and metatarsi. It differs markedly from *O. strandi,* Lessert (Rev. Suisse de Zool., vol. xxx, No. 6, p. 209), in at least the eyes and vulva.

Family ATTIDAE.

UNIDENTATI.

Gen. Heliophanus, C. Koch.

Heliophanus semirasus, n. sp.

2 ♂ (7130). Kaoko Otavi.

Colour.—Carapace blackish brown, ocular area covered with black forward and upwardly projecting bristles; clypeus below the eyes and at the sides of the head moderately clothed with white scale-like hairs, lower half of anterior median eyes encircled by white scale-like hairs, upper half by pointed cylindrical hairs; coxa I blackish brown, II, III, and IV successively lighter, whole of first leg and femora of remaining legs dark brown, remaining segments reddish brown; mouth parts a little darker than coxa I; sternum blackish, sparsely clothed with long white filamentous hairs and a few flattened white lanceolate hairs; abdomen blackish, entirely covered above with yellow hairs, some white ones anteriorly at the sides, a few similar ones below.

Eyes.—Upper margins of anterior eyes forming a straight line, medians subcontiguous, laterals a little farther from the medians; dorsal quadrangle a little wider behind than in front; posterior median eyes a little nearer to the anterior than to the posterior lateral eyes; anterior medians very close to the edge of the clypeus.

Legs.—Tibia I with 3 pairs of inferior spines, those on the exterior side much shorter and weaker than the interior ones, 1 stout lateral spine interiorly at the apex; metatarsus I with an apical and sub-median pair of spines, the exterior much weaker than the interior ones; tibia and metatarsus II similarly spined but the exterior spines not weaker than the interior ones.

Pedipalp as seen from the outer side, fig. 38; the apophysis of the femur arises from the outer side of that segment, interiorly to the apophysis the lower surface of femur is corrugated; palpal organ seen from below, fig. 39.

Measurements.—Length of carapace, 2·7 mm. Total length, 6 mm.

Gen. Menemerus, Simon.

Menemerus hypenetes, n. sp.

1 ♂ (7075). Otjingerese.

1 ♂ (7033). Kaoko Otavi.

Colour.—Carapace with a marginal band of white hairs, edge of clypeus with long white setiform hairs, sides of carapace with deep black, middle with mixed white and brown hairs; ocular area, especially anteriorly and between the anterior eyes with reddish brown hairs; sternum with yellowish, silky, filamentous hairs in the middle, some stout white ones at the sides; abdomen dorsally clothed in central portion with mixed brown and white hairs, the brown ones more numerous towards the sides; two lateral bands composed of deep bluish-black hairs with a few deep brown ones intermixed, the exterior side of each lateral band wavy and sharply demarcated from the adjacent white portion; ventral surface white at the sides, a broad median cinereous band tapering towards the spinners clothed with yellowish hairs; legs with mixed white and brown hairs and a large number of irregularly disposed black setiform hairs (femur I entirely clothed with black hairs except for an apical patch of brown and white hairs above); tibiae and metatarsi with apical and basal infuscated bands most distinct in tarsus IV.

Eyes.—Superior margin of anterior row forming a lightly recurved line, medians subcontiguous, laterals a little further from the medians, ocular quadrangle parallel, posterior medians a little nearer to the posterior than to the anterior laterals.

Legs.—Tibia I with 3 inferior pairs of spines, the outer much shorter than the inner ones; tibia II with 1 subbasal and 1 apical pair of spines; metatarsi I and II with a submedian and subapical pair of spines; stouter than the tibial spines; tibia IV below with 2 subapical spines; metatarsus IV with an apical verticillus of 5 (6) spines.

Pedipalp.—Bulb as in fig. 40; distal half of femur above with white hairs, patella with white and reddish-brown hairs, tibia with a few reddish-brown hairs and a tuft of long white bristles in proximal half on its inner side, tarsus above with cinereous hairs and long blackish setae.

Measurements.—Carapace, 3 mm. Total length, 6·7 mm.

Menemerus rubicundus, n. sp.

1 ♀ (6683). Caimaeis.

Colour.—Carapace black, covered with well-mixed white and red

cylindrical-pointed hairs, the red ones slightly predominating; dorsal quadrangle with scattered erect black bristles more numerous towards the anterior row of eyes; margin of clypeus with long white hairs; abdomen above thickly covered with hairs similar to those on the carapace, forming confused patches and stripes but with distinct patches towards the sides composed of chiefly reddish hairs, giving the abdomen a mottled appearance; these hairs interspersed with scattered black setae, especially in the middle line; abdomen below covered with white hairs, those posteriorly at the sides longer; sternum in the centre with very slender long silky hairs, at the sides with long white stout hairs; legs yellow without annulations, sparsely clothed with mixed white and red hairs similar to those on the abdomen and carapace, and some long black setae.

Eyes.—Anterior row with their superior margins forming a lightly recurved line, medians subcontiguous, laterals distant about their own radius from the medians; dorsal quadrangle wider behind than in front, the posterior median eyes a little nearer to the posterior than to the anterior laterals.

Legs.—All femora with 3 superior spines, all except IV with an anterior apical spine; tibia I below with 3 inner, 2 outer spines, 1 lateral spine between the apical and median inner spines; tibia II below with 1 subbasal outer, 1 subapical inner, and 1 inner lateral spine below the subapical inner spine; metatarsi I and II with 2 inferior pairs of spines stouter than the tibial spines; tibia IV below with 1 subbasal, 1 (2) subapical spines; metatarsus IV below with 2 subbasal, 3 subapical spines.

Vulva as in fig. 41.

Measurements.—Length of carapace, 3 mm. Total length, 6·2 mm.

Gen. Langona, Simon.

Langona bisecta, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 60.

1 ♀ (6668). Warmbad.

Gen. Thyene, Simon.

Thyene damarense, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 63.

1 ♀ (7106). Hoarusib River.

3 ♀♀ (6688). Caimaeis.

4 ♀♀ (6649). Warmbad.

Gen. Mexcala, Peckham.

Mexcala agilis, n. sp.

1 ♂ (6962). Kaoko Otavi.

Colour.—Carapace black with flattened yellowish scale-like hairs in the middle line, similar blackish-brown hairs at the sides ; abdomen above covered with flattened yellow hairs, a black transverse band anteriorly and another just anterior to the middle line, but no band just anterior to the spinners ; abdomen below with iridescent scale-like hairs mixed with normal-pointed hairs ; sternum with white flattened hairs at its margins, yellowish-pointed hairs in the middle ; legs with femora black, distal segments lighter, femur I with a snow-white patch of hairs anteriorly at its apex, tarsus I clothed with similar hairs except basally, remaining femora with some white hairs above.

Eyes.—Anterior row recurved, equally spaced, subcontiguous ; second row very small, a little nearer to the third than to the first row ; quadrangle formed by the laterals a little wider in front than behind.

Pedipalp as in fig. 42.

Measurements.—Carapace, 3·2 mm. Total length, 7·8 mm.

FISSIDENTATI.

Gen. Tusitala, Peckham.

Tusitala barbata, Peckham.

1 ♂ (6951). Kaoko Otavi.
1 ♂ (7029). Kaoko Otavi.

Order **SOLIFUGAE.**

Family SOLPUGIDAE.

Gen. Solpuga, Licht.

Solpuga sericea, Pocock.

19 ♂♂ and 2 ♀♀ were taken at Kaoko Otavi and 5 ♂♂ at Outjo. This species is common in the northern parts of South-West Africa, appearing most abundantly between the hours of 11 a.m. and 1 p.m., the hottest time of the day. The males are much more frequently

seen than the females, and the erect mane of the hind legs together with their erratic gait gives them a striking resemblance to a fluffy wind-blown seed. They were always found in the neighbourhood of blue dolomitic rock.

Solpuga monteiroi, Pocock.

1 ♂ (6407). Sesfontein.

Solpuga lethalis var. *rectus*, Hewitt.

1 ♂ (6817). Outjo.
1 ♂ (6822), 1 ♀ (6824). Kowares.

Solpuga browni, n. sp.

1 ♂ (6413). Otjiwarongo.

Colour.—Uniform yellow, mandibles without dark longitudinal stripes, headplate a little darker at the sides; femur IV except at base, tibia, and distal apex of femur of palp, a little darker than the remaining segments.

Dentition as in fig. 43. Third tooth of dorsal jaw small but quite distinct, outer series of cheek teeth four in number, well separated from the large terminal tooth of the fang series, the first and third larger than the second and fourth; inner series also consisting of four teeth, the first large, the second minute. Seen from above, the dorsal jaw is provided with a blunt tooth on its mesial side, nearer to the first tooth than to the fang-tip.

Flagellum as in fig. 43, seen from the outer side; resembling *S. alcicornis*, Kraepelin, in general appearance, especially when viewed from in front; the distal portion is, however, not so much flattened but rounded, and not bent backwards on itself; the curve of the flagellum is a regular one, and its main axis is approximately perpendicular to the axis of dorsal mandible; the outer prong is not curved backwards in a vertical plane as in *alcicornis* but is more or less straight, the inner prong is armed with small serrations on its distal downward curving portion, fig. 44. Seen from above, fig. 45, the inner and outer prongs are widely divergent.

Spination.—Mandibles with some fairly long but not very stout setae above; metatarsus of palp below with a narrow scopulated strip in the proximal half, except at the base.

Measurements.—Length of mandible, 7 mm.; width of headplate, 5 mm.; tibia+metatarsus+tarsus, 21·5 mm. Total length, 24 mm.

This species is allied to *S. alcicornis*, Kraepelin (Land u. Süsswasserfauna Deutsch-Südwestafrikas, Lief. 1, p. 125), from Keetmanshoop, but differs therefrom in the flagellum, the two intermediate teeth between the main teeth of the dorsal jaw, and the inner series consisting of four, not three, teeth ; *S. browni* comes under the *collinita, cervina, alcicornis* group, characterised by the anteriorly trifurcate flagellum. It is named after its discoverer, Mr. J. S. Brown, Government Boring Engineer, who over a period of several years has made important contributions of new and little-known Arachnids to the collections of the South African Museum.

Solpuga furcifera var. *kaokoensis*, var. n.

1 ♂ (6406). Kaross.

Colour.—Mandibles with a faint median and lateral stripe ; headplate with a pale violet patch on each side of the ocular tubercle ; abdomen above ashy grey, median portion with numerous brown bristles, lateral portions muticous, ventral surface similar to dorsal surface in colour, covered with yellowish silky hairs ; leg IV with whole of femur and tibia, metatarsus basally, pale violet, remaining legs with whole of femur, tibia except at the apex, similarly coloured ; palp with distal half of femur, whole of tibia, metatarsus except at apex, pale violet ; tarsus yellowish brown.

Flagellum when seen from the outer side, fig. 46, differs from *S. furcifera* in its posterior portion, being straight and not sinuate except for the slight bend at the apex formed by the lateral fork which is first bent downwards and then upwards, not subparallel as in *furcifera* ; the median fork is not quite so long as the lateral one and is provided with a few microscopic teeth. The flagellum is not so long as in *furcifera*, reaching back to only a little beyond the middle point between the basal enlargement and the eye tubercle.

Dentition in general appearance resembling *furcifera*, fig. 46 ; the saddle-shaped depression in front of the flagellar enlargement of the dorsal jaw is very much more pronounced.

Palp.—Metatarsus with scopula consisting of a narrow strip occupying the middle half of segment.

Headplate broader than long, breadth more than half the length of tibia or metatarsus+tarsus of pedipalp.

Measurements.—Breadth of headplate, 4·9 mm. ; length, 4·1 mm. Total length, 25·5 mm.

Solpuga glabricornis, n. sp.

2 ♂♂ (6813). Okorosave.

In general appearance resembling *S. serraticornis*, Purcell, and also *S. schlechteri*, Purcell.

Flagellum, fig. 47, seen from the outer side, reaching to about half the length of the mandible, subparallel or directed upwards at an angle of about 30°; it arises at the level of the first tooth, the procurrent portion short, then fairly sharply bent backwards; the middle portion straight or very slightly sinuate, the tip slightly curved downwards; flagellum slender, its anterior two-thirds of uniform thickness, then narrowing gradually to a slender point; except for the anterior portion, which is slightly flattened, it is cylindrical and smooth throughout, without teeth or serrations. Seen from above, the flagellum lies parallel to the inner surfaces of the mandible, its anterior portion is only a little wider than the rest and not to any extent as stout as in *S. serraticornis* or *S. schlechteri*.

Dentition.—Teeth large and distinct; terminal fang-tip of dorsal jaw fairly long, not bluntly rounded at the tip, bent downwards and very slightly outwards; the outer series consists of 2 large anterior teeth followed by a space, then a small tooth which adjoins a third main tooth which is about as long but wider than the 2 anterior teeth; posteriorly to the third main tooth is another space provided with a granule, then 4 teeth, the last of which is small and inconspicuous, the rest moderate; seen from above, the terminal fang is pointed, rounded above, not flattened, a very slight dilation on the inner side ends in a hardly noticeable granule; the inner series is represented by 4 teeth, the first, third, and fourth in a straight line, the second nearer to the outer series, the first large, the third moderate, the two others small.

Palp.—Scopula of metatarsus represented by an elliptical patch occupying the whole of under surface except the basal sixth, and a little more than the apical sixth, darker than the prevailing colour of the segment and distinctly demarcated from it; metatarsus+tarsus equal to tibia.

Colour as in *S. serraticornis*, spination as in the latter but weaker.

Measurements.—Length of headplate, 7·5 mm.; width, 8·5 mm.; length of mandible, 12·3 mm.; width, 4·1 mm.; flagellum, 5·7 mm.; tibia and metatarsus+tarsus, each 15·4 mm. Total length, 42·5 mm.

This species resembles *S. serraticornis* in the dentition except that there is only one small tooth between the second and third main

teeth ; it differs in the shape of the flagellum, which is not so curved or so high above the mandible, lacks serrations and is much more slender and tapering. It also resembles *S. schlechteri* in the general curvature of the flagellum, but differs markedly from it in the more highly developed dentition and anterior portion of flagellum being narrow.

Gen. Zeriassa, Pocock.

Zeriassa, sp.

1 ♀ (6823). Kowares.

This specimen agrees with *Z. purcelli*, Hewitt, in the dentition ; in the palp, however, it differs markedly, for while this in *purcelli* is stout, short, and the metatarsus provided with some stout spines and setae, that of the female from Kowares is long, slender, and entirely without spines or setae ; in colouring it also agrees more or less with *purcelli*, while in the slenderness of the palp it approaches *cuneicornis* ; on the acquisition of more material from the same sources it will probably be found to differ from both species.

Gen. Daesia, Karsch.

Daesia ovambica, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 67.

2 ♀♀ (6833), 1 ♀ (6830). Warmbad.

2 ♀♀ (6814). Okorosave.

1 ♀ (6821). Kowares.

1 ♂ (6808), 1 ♂ (6809). Kaoko Otavi.

Both sexes were distinctly smaller than those of the types from Ovamboland.

Daesia striata, n. sp.

2 ♂♂, 1 ♀ (7225). Otjikondo.

1 ♀ (7224). Otjikondo.

1 ♀ (7227). Kamanyab.

♂ *Colour.*—Mandibles above with a median and lateral violet stripe, the median stripe about half the length of the lateral one ; headplate with a quadratiform violet marking on each side of the eye tubercle, elongate and bifurcate posteriorly enclosing a median pear-shaped yellow patch ; between quadratiform markings and eye tubercle a small triangular light spot and laterally to the quadratiform

marking a short light stripe running obliquely from the anterior margin and cutting off the rather pointed anterior corner of the headplate; thorax yellow; abdomen above ashy grey in the centre with three rows of violet spots, sides lighter than the median portion bearing a number of small longish-oval pigmented callosities (more numerous in the posterior segments) from which spring stout setae cleft at their tips; fourth leg with femur violet, paler towards the base; tibia and proximal half of metatarsus violet except inferior surface; III with femur and tibia violet except inferior surfaces; segments of I and II faintly infuscated violet; palps with distal half of femur and remaining distal segments violet, less so below than above.

Flagellum as in fig. 48, seen from the inner side; when rotated forwards the tip falls distinctly short of the fang-tip of the dorsal jaw; rotatable axis appears as an ill-defined longish triangular marking which in spirit is a bright orange colour; there is a narrow slit-like opening reaching from the rotatable axis to near the apex, and above it some oblique curved striations are visible.

Dentition.—Outer row of teeth as in fig. 48. Inner row separated from outer row by a considerable space consisting of 4 teeth, the first and third of which are large, the others minute. Inner side of both jaws with a compact row of feather bristles which partly obscure the dentition when viewed from the inner side, those towards the base of the jaw strongly bent (almost at right angles), those nearer to the apex only sinuate; point of origin of the feather bristles of upper jaw extending a little beyond the third small tooth, those of the lower jaw reaching to about half-way between the first large and second small tooth.

Palps.—Tibia with a double row of setae below, the inner much longer than the outer ones; metatarsus with 5 pairs of curved spines below, the proximal pair or two proximal pairs long and setiform.

Measurements.—Metatarsus+tarsus of palp, 5·7 mm.; tibia, 5 mm.; width of headplate, 3·2 mm.; length, 3·2 mm. Total length, 17 mm.

♀ *Colour* as in the ♂ except that the dorsal markings of the abdomen are obsolete.

Dentition.—Upper jaw with 2 large basally broad anterior teeth, the second a little larger than the first, then a small tooth followed by a third main tooth equal to the second tooth in size, then 2 small teeth followed by 2 moderate ones, the second a little smaller than the first; lower jaw with first tooth comparatively larger than

in the male, not so far from the anterior apex of the fang and nearer to the two other teeth; both jaws provided with a fringe of feather bristles.

Palp.—Metatarsus below with an internal row of 5 spines, the apical one short and stout, the rest long, pointed, setiform; an external row of 5 spines, the 2 proximal ones setiform, the rest short and stout; tibia with two rows of 3 long setae below

Measurements—Metatarsus+tarsus of palp, 4·4 mm.; tibia, 3·7 mm.; width of headplate, 3·8 mm.; length, 2·7 mm. Total length, 16 mm.

Gen Blossia, Simon.

Blossia spinicornis, n. sp.

2 ♂♂ (6404). Outjo.

Colour.—Headplate and mandibles chocolate-brown, thoracic segments pale yellow, blackish at the sides; abdominal tergites lightly infuscated mesially (the last five segments successively darker posteriorly, the last two uniformly blackish), blackish at the sides; femur IV with a little more than the distal half chocolate-brown, remainder yellow, distal segments infuscated at the sides; femur III except for the proximal third infuscated, remaining segments lightly infuscated at the sides; whole of pedipalp except proximal half of femur infuscated; tarsus, base and apex of metatarsus a little darker than the rest.

Mandibles above well provided with spines and bristles, those situated posteriorly larger than the anterior ones; upper surface with an oblique, transverse, slightly curved row of 6 stout spines near the base of mandible, 2 or 3 similar ones situated more anteriorly on the outer side, these all provided with blunt tips, remaining ones shorter and pointed; the main distal dorsal bristle springing from a little behind the rotatory axis and parallel to the upper surface of the dorsal jaw, not reaching the fang-tip.

Headplate with a number of upwardly directed blunt spines on the eye tubercle, remainder of headplate uniformly covered with short triangular, tooth-like spicules.

Flagellum as in figs. 49, 50; seen from the inner side (fig 50), the edges fold over, meeting in the proximal third, enclosing a longish oval space; a median slightly sinuate rib can be seen from both inner and outer sides; the apex of the flagellum is produced into a curved spine-like point, which when the structure is rotated

forwards reaches, or passes a very little beyond, the apex of the fang-tip.

Dentition as in fig 49, seen from the outer side.

Pedipalp.—Tibia with two rows of 5 spines and some irregular shorter spines below; metatarsus with numerous truncated bristles, the inner side with 3 short, stout spines.

Measurements.—Width of headplate, 1·9 mm.; tibia of palp, 4·2 mm.; metatarsus+tarsus of palp, 3·5 mm. Total length, 9·6 mm.

Gen. Hemiblossia, Kraepelin.

Hemiblossia etosha, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 69.
1 ♀ (6832). Outjo.
1 ♀ (7223). Caimaeis.
2 ♀♀ (6396). Warmbad.
5 ♀♀ (6806). Kaoko Otavi.
3 ♀♀ (6402). Otjikondo.

Hemiblossia pteroceras, n. sp.

1 ♂ (6398). Anabib.

Colour.—Headplate light brown, a darker patch on each side of the eye tubercle which is black; mandibles chocolate-brown; tergites of abdomen and thorax white, bordered with a deep blackish-purple band, sharply demarcated from the rest; legs yellow, femur IV with a light violet infuscated patch exteriorly in the middle, tarsus infuscated above at the tip, malleoli with their edges broadly infuscated purple, maxillary process below with dark purple spines and bristles.

Mandibles with 8 or 9 long setae, one very long one behind and mesially to the flagellum, almost as long as the mandible, no true spines; inner sides of both jaws with feather bristles, 6–7 stridulatory ridges.

Abdomen with numerous yellow bristles above, a few weak blackish ones; third postgenital sternite with some long thickened yellowish hairs.

Legs.—Tarsus IV with 5 pairs of spines below, increasing successively in length distally, clothed with numerous other spines and bristles, the shorter ones cleft at their apices. First leg and palp missing.

Flagellum and dentition viewed from the outer side as in fig. 51, flagellum resembling *H. idioceras*, Hewitt, in general appearance, the

spicules at the dorsal apex smaller than in figure; seen from the inner side, there is a folding in of the lamina to form a pouch-like sac near the ventral border of the flagellum; this has a fairly wide slit-like opening.

Measurement.—Total length, 6·6 mm.

This species, though probably the male of *H. etosha*, differs so much from the female types of that species in the dentition that until both sexes have been taken together it has been described as a new species.

Gen. Gluviopsis, Kraepelin.

Gluviopsis australis, Purcell.

1 ♀ (6812). Okorosave.
1 ♀ (7221). Kowares.
1 ♀ (7220). Kaoko Otavi.
1 ♀ (6834). Otjikondo.

These specimens resemble a female identified by Purcell as the above species in the dentition, colour, and spination. Purcell's female is recorded from Livingstone, Rhodesia.

Order **SCORPIONES.**

Family BUTHIDAE.

Gen. Buthus, Leach.

Buthus conspersus var. *aeratus*, Lawrence.

Ann. S.A.M., Vol. XXV, pt. 1, p. 69.

Examples of both sexes taken at Caimaeis, Sesfontein, Kaoko Otavi, Hoarusib River, Otjitondua, Okorosave. A female taken at Kaoko Otavi with young possessed the markings and type of coloration as described in the juveniles (*loc. cit.*, p. 70). None of the Kaokoveld specimens were as large as those from the Kunene River.

Gen. Parabuthus, Pocock.

Parabuthus brevimanus, Thorell.

Examples of both sexes taken at Sesfontein, Kamanyab, Outjo, Okorosave, Ombombo, Kaoko Otavi.

Parabuthus granulatus, Hempr. and Ehrenb.

Examples of both sexes taken at Warmbad, Sesfontein, Kamanyab.

Parabuthus kraepelini, Werner.

A subadult female from Koabendus. The pectines carry a rounded basal lobe and 32 teeth.

Parabuthus brachystylus, n. sp.

1 ♀, 3 ♂♂, 9 juvs. (6794). Kaoko Otavi.
2 juvs. (6989). Kaoko Otavi.
1 ♀ (6087). Kamanyab.
2 juvs. (6072). Kamanyab.

In general characters related to *P. transvaalicus* and *P. villosus*.

♀ *Colour*.—Blackish bronze-green, the fingers yellow, the distal segments of the legs brown; ventral surface of abdomen deep olive brown, the last sternite darker; third sternite sometimes with a wide triangular pallid marking, more distinct in the males.

Carapace broader than long, coarsely but not densely granular in the posterior half, anterior half with weak granulation, the granules low and rounded; ocular tubercle low and flattened, the area immediately surrounding it and the interocular groove with a few small indistinct granules; superciliary ridges smooth and shiny, the eyes small (actually smaller than in *transvaalicus*), the distance between them $3\frac{1}{2}$ times their diameter.

Tergites I–VI with anterior half of segment smooth except at the sides and a patch on each side of the median keel which bear small scattered granules, posterior half with coarse granules (much larger than those in *transvaalicus*) as large, at least in segment VI, as the granules of the carapace; segment VII shagreened between the median keels which are well defined, and whereas in *transvaalicus* these keels disappear posteriorly, they here curve outwards, almost meeting the lateral keels anteriorly near the lateral borders of the segment.

Sternites as in *transvaalicus*, the lateral keels of V a little stronger.

Tail stout, moderately pilose, segments I–V decreasing successively in width, I very little wider than II but decidedly wider than IV, which is again decidedly wider than V, I narrowing posteriorly but II–V almost parallel-sided; segments I–IV about equal in height. V

distinctly lower ; vesicle very large, its width equal to or slightly less than that of V.

Segments keeled as in *transvaalicus*, but infero-median keels in IV only occupying anterior half of segment (in *transvaalicus* anterior two-thirds), superior keels in II–IV with the posterior terminal tooth not spiniform and only slightly enlarged in IV, superior crests in V distinct throughout, more strongly curved than in *transvaalicus*, the accessory crests conspicuous, consisting of 3 teeth not as large or pointed as in the latter, infero-median keel present but not very distinct being more or less doubled. Median grooves in upper surfaces of segments I–IV growing successively deeper ; shagreened areas in segments I and II composed entirely of granules, that of I broader than in II, III with a narrow band of minute granules, IV with none at all, the shagreened areas more clearly defined than in *transvaalicus*, the areas between them and the superior crests free of granules, shiny, reticularly punctate ; shagreened area in I with its greatest width equal to half the distance between the superior crests and to more than half its own length, anterior edge of segment descending perpendicularly in the middle and not sloping ; shagreened area in II flask-shaped, reaching the posterior margin, narrowing posteriorly but not broadening again just before the posterior margin, its width less than a third the width of the segment, its length $2\frac{1}{2}$–3 times its greatest width, anterior edge of segment descending almost, if not quite, perpendicularly. Lateral and ventral surfaces of all segments, especially posterior ones, coarsely granular, less so between the superior and supero-lateral keels and between the supero-lateral and medio-lateral keels of segments II–IV.

Vesicle, with rows of coarse granules below, only shallowly excavated superiorly at its base.

Pedipalps.—Femur and tibia finely granular above, anterior tibial crest terminated proximally by an enlarged tooth, length of tibia along its upper side 2–$2\frac{1}{2}$ times its width, width of hand slightly less than that of tibia ; movable finger about $2\frac{2}{5}$ times length of handback, with 15 rows of teeth.

Pectines, with a large rounded lobe at their base, 35–37 teeth.

Measurements of tail segments as follows :—

[Table.

	Length.	Width.	Height.
I . . .	7·7	8·7	7
II . . .	8·7	8·5	7·1
III . . .	9·1	8·25	7·1
IV . . .	9·8	7·9	7
V . . .	11	7·3	6·7
Vesicle . .	12·3	7·2	5·8

Measurements of larger ♀: length of carapace, 12 mm.; breadth, 13·6 mm.; immovable finger, 11·5 mm.; handback, 4·8 mm. Total length, 116 mm. *Measurements* of smaller ♀: length of trunk, 48 mm.; tail, 65 mm. Total length, 113 mm.

♂.—The males are smaller and differ from the females in the following:—The wide triangular pallid marking of the third sternite is quite distinct, the carapace is fairly densely granular, the anterior half of the tergites are finely granular, not smooth, not sharply differentiated from the larger granules of the posterior half; superior accessory crest of fifth tail segment with 4 teeth. Pectinal teeth, 40–45; basal lobe absent.

Measurements.—Length of carapace, 9 mm.; breadth, 10·3 mm.; immovable finger, 9 mm.; handback, 4·6 mm.; trunk, 30 mm.; tail, 50 mm. Total length, 80 mm.

This species differs from *transvaalicus* in the granulation of the carapace and tergites, the smaller eyes, the first caudal segment being wider than the fourth and its anterior edge perpendicular, the larger and broader vesicle, darker colouring and larger size.

It differs from *villosus*, and can be at once distinguished from it by the much sparser pubescence; the dense pubescence on the hind margins of the abdominal tergites of *villosus* is here either weak or entirely absent; the granulation of the posterior half of the tergites is more differentiated from that of the anterior half; the tail is shorter in proportion to the trunk and the segments are shorter and broader, giving it a more robust appearance; the first caudal segment is more narrowed posteriorly, is shorter in proportion to the second segment, and the shagreened area is not so flat; the most apparent difference, however, is the shagreened area of the second segment which in *villosus* is oval, deeply and very distinctly excavated, and never reaches the posterior margin, while in *brachystylus* it is shallowly excavated, parallel-sided, and always reaches the posterior margin;

the vesicle is larger and deeper. In short this species is a connecting link between *transvaalicus* and *villosus*, for it resembles the former in the shagreened areas of the first two caudal segments and is related to the latter in the successively narrowing caudal segments and the breadth of the vesicle. The inferior median keel of caudal segment V is distinct in *transvaalicus*, indistinct in *villosus*, while that of *brachystylus* represents an intermediate stage ; the same can be said of the flattening of the eye-tubercle in these three forms.

The two large female specimens of *villosus* from Gt. Namaqualand mentioned by Purcell (Ann. S.A.M., Vol. II, p. 162) represent a variety connecting *villosus* with *brachystylus* ; in these the shagreened area of the second segment is deeper and more rounded than in *brachystylus* though not nearly so deep or defined as in *villosus* ; it reaches to about half-way between that reached by *villosus* and the posterior margin of the segment ; the infero-median keel of segment V is fairly definite and the pubescence of the tail is sparse and absent on the abdominal tergites.

The evidence of Pocock that *villosus* occurs in Benguella and the Congo must be looked upon as very improbable ; it is unlikely that it would pass over the northern parts of South-West Africa to reappear in the Congo.

Gen. Uroplectes, Peters.

Uroplectes planimanus, Karsch.

Examples of both sexes from Warmbad, Kaoko Otavi, Ombombo, Kaross, Outjo.

Uroplectes carinatus, Pocock.

Examples of both sexes from Outjo and Warmbad.

Uroplectes otjimbinguensis, Karsch.

Examples of both sexes from Warmbad, Okorosave, Kaoko Otavi.

Family SCORPIONIDAE.

Subfamily SCORPIONINAE.

Gen. Opisthophthalmus, C. Koch.

Opisthophthalmus carinatus, Peters.

Numerous examples of both sexes from Outjo, Kaoko Otavi, Okorosave. In the males the V tergite is always, II–IV sometimes more, sometimes less wrinkled. Pectinal teeth, ♀♀ 14–18, ♂♂ 18–24.

Opisthophthalmus wahlbergi, Thorell.

1 ♂ (6086). Otjikondo.

Colour.—Palps, legs, and vesicle yellow, remainder olive-brown; fifth caudal segment a little darker than the other caudal segments below. There are large terminal teeth on the superior crests of caudal segments II–IV; carapace with very small fine granules not much larger than those of the tergites, a roughly quadrate area in front of the median and between the lateral eyes quite smooth; tergites finely granular; hand with posterior and upper surfaces practically at right angles to each other, flat and almost smooth; handback narrow and fairly long, hand and fingers comparatively longer than those of specimens in the Museum's collection. Pectinal teeth, 25. This specimen, which differs in coloration from all the forms of *wahlbergi*, is evidently a northern race of the typical form which probably came from Damaraland. There are a large number of both sexes in the Museum's collection from Otjiwarongo (J. S. Brown) agreeing with Thorell's description of the typical form; in these the palps, legs, and vesicle are a light reddish brown, trunk and tail olive brown without blackish infuscations.

Opisthophthalmus cavimanus, n. sp.

3 ♂♂ (6094, 6095). Sesfontein.

Colour.—Carapace, caudal segments, and legs yellow or yellowish brown, vesicle above and below with a light brown stripe; posterior border of carapace, anterior border except in the middle, a spot behind each lateral eye, ocular tubercle between and behind the eyes, with light olivaceous infuscations; tergites dark olivaceous except at the sides and posterior half of segment VII; sternites light olivaceous.

Carapace uniformly but not densely granular throughout, except near the posterior border where the granules are finer and more numerous (at the sides), or almost absent (in the middle); granules (except posteriorly) moderate, round and shiny; the anterior **Y**-shaped fork can be seen, but it is indistinct, wide and short; anterior margin weakly incised in the middle line.

Abdomen.—Tergites with fine dust-like granulation, VII coarsely granular at the sides; sternites II–V wrinkled, less so in their anterior half at the sides, I smooth and shiny.

Tail.—Segments I–III wrinkled below, becoming successively less so in posterior segments, IV only faintly so; I–III with only superior

and supero-lateral keels, IV with indications of infero-lateral keels as well; segments I–III with a few granules between the superior and supero-lateral keels, becoming successively fewer in the posterior segments, IV with none; terminal teeth of superior keels in II–IV enlarged and often bifid, superior keels of V almost obsolete, represented by a row of small granules, inferior median keel represented by an irregular row of pointed teeth, infero-lateral keels of V with sharp, jagged, backwardly projecting teeth, alternating with smaller teeth to which they may be subjoined; vesicle flattened above and below, compressed, with some rows of punctures below and at the sides, and a few very small scattered granules below at its base.

Pedipalp.—Inner edge of hand slightly convex, finger-keel well defined, smooth; upper surface of hand smooth, shiny, flat to slightly concave (especially near the finger-keel and inner edge of hand), secondary keels obsolete; hind and upper surfaces, fingers of hand with numerous yellow-brown setiform hairs, those of the hind surface of hand and inferior surface of movable finger shorter than those on the upper surface and immovable finger; supero-anterior crest of tibia composed of serrate, bluntly pointed teeth.

Legs.—Tarsal lobes of III and IV with 5 inner, 4 outer spines; tarsi III and IV below with 6–7 inner and 3–4 outer spines.

Pectinal lamellae with 23–23, 23–24, 25–26 teeth.

Length of handback to breadth of handback in proportion of 1·5–1·6 to 1; length of movable finger to length of handback as 1·5 to 1.

Measurements of largest specimen: length of trunk, 31 mm.; tail, 37·5 mm.; handback, 9 mm.; immovable finger, 13·4 mm. Of other specimens: trunk, 31 and 31 mm.; tail, 37 and 35 mm. respectively.

This species belongs to Kraepelin's *schultzei*, *undulatus* group; it differs specifically from the latter species in the greater number of tarsal spines and pectinal teeth, proportions of the hand, and less so in the granulation of the carapace, while agreeing with it in the wrinkling of the sternites and caudal segments.

Opisthophthalmus brevicauda, n. sp.

1 ♂ (6090). Sesfontein.

Colour.—Carapace, humerus, and brachium reddish brown; hands and legs orange, fingers reddish; tergites, as in carapace, variegated with olivaceous markings; sternites yellow-brown, the fifth with an olivaceous tinge posteriorly; caudal segments and vesicle brown, variegated with deep olive markings, more so below and at the sides.

Carapace.—Eyes $1\frac{2}{3}$ as far from the anterior border of carapace as from the posterior border ; the median furrow forming a lanceolate depression in front of the eyes, not forked anteriorly but forming a deep **V**-shaped excavation at the anterior margin, the sides of which are inclined towards each other ; carapace except the interocular area granular, the sides with coarse rounded granules, those behind the posterior transverse depressions much smaller ; interocular area for the most part not granular, faintly rugose but shiny, frontal lobes with a few wart-like granules anteriorly, especially along the anterior margin and behind the lateral eyes ; some small scattered granules anteriorly on each side of the median incision.

Abdomen.—Tergites with very fine and dense granulation in the anterior half, that of the posterior half less dense ; anterior tergites almost smooth, shiny, the last one with some larger granules at the sides ; sternites quite smooth and shiny, V without trace of keels.

Tail very short, only $2\frac{2}{3}$ times the length of carapace ; segments I–III smooth below, the infero-median keels of I and II obsolete, of III smooth, of IV crenulate ; infero-median keel of V strong, composed of pointed tooth-like granules, an irregular row of granules on each side between it and the infero-lateral keels which are well defined but not so strong as the median keel ; infero-lateral keels obsolete or indistinct in I–III, distinct in IV ; superior keels present in all segments except V, those of I only present in the posterior half of segment, consisting of 4 blunt granules, terminal teeth in segments II–IV larger than the remaining teeth but not large ; supero-lateral keels present in I–IV, crenulate ; segments, with the exception of a few minute scattered granules at the sides, smooth ; vesicle entirely smooth, it and the posterior part of segment V below with some bristles ; caudal segments decreasing successively in width, vesicle broader than segment V, segment I broader than its length measured at the side.

Pedipalp.—Superior surface of humerus with some large but not numerous granules, the anterior and posterior crests strong and distinct, the anterior surface with 7–10 strong, pointed granules, the inferior crest distinct ; anterior surface much narrower than the superior surface ; brachium with its greatest width greater than width of humerus ; hand with posterior surface forming more than a right angle with upper surface, slightly convex above, covered but not densely with low tubercles, those in the centre elongated, anastomosing, finger-keel distinct but not strong, accessory keels absent ; length

of handback greater than its width (about $1\frac{1}{4}$), movable finger $1\frac{1}{2}$ times the length of handback.

Legs.—Tarsi below with 6 internal spines decreasing successively in size proximally, the sixth minute, 3 external spines ; tarsal lobes with 5 internal, 4 external spines ; inner side of protarsi in legs I–III with 3 short spines, IV with an apical one only.

Pectines.—Basal lobe of lamellae rectangular behind ; pectinal teeth, 26–27.

Measurements.—Length of carapace, 15 mm. ; posterior width, 12·8 mm. ; length of handback, 10 mm. ; width, 8·2 mm. ; movable finger, 15 mm. ; tail, 39 mm. Total length, 89 mm.

Subfamily ISCHNURINAE.

Gen. Hadogenes, Kraepelin.

Hadogenes taeniurus, Thorell.

One adult female from Kowares (6967), juveniles from Kowares, Otjitondua, Kamanyab, Kaoko Otavi, Warmbad.

The adult specimen agrees with the description of Thorell (Actes Soc. Ital. Sci. Nat., vol. xix, p. 254, 1877), except in the proportions of the third caudal segment as given by him. In his description this segment is stated to be $2\frac{1}{2}$ times as long as posteriorly wide ; without doubt this should have read $2\frac{1}{2}$ times as long as posteriorly *high*, for in the description of his variety *phyllodes* the measurements given for this segment are " lg. $11\frac{1}{2}$, lat. 2, alt. 3," which would mean that the length was almost 6 times the width, not " almost $3\frac{1}{2}$ times " as stated in the first part of the description, while the length would be actually $3\frac{1}{2}$ times the height.

In the case of *taeniurus* Thorell does not give the measurements of segment III, but it is pretty certain that the same error was made here as in the case of *phyllodes*. This is borne out by the fact that in the Kaokoveld specimens the length of segment III is $2\frac{1}{2}$ times the posterior height but about 4 times the posterior width. In all their measurements the Kaokoveld specimens agree substantially with those of *taeniurus* with the exception of the width of the vesicle which is given by Thorell as equal to its total length, aculeus included, and is therefore obviously incorrect.

For comparison the measurements of Thorell are given, and next to them those of the adult female from Kowares.

	H.t.	No. 6967.		*H.t.*	No. 6967.
Total length . .	123½	120	Length of vesicle .	8¾	8·7
Length of tail . .	61	60	Width ,, ,, .	8¾ ?	2·6
Length, carapace . .	16¾	16·6	Height ,, ,, .	3¼	3·3
Breadth, ,, . .	17	17	Length of humerus .	16	16·4
Eyes from ant. marg. carapace . . .	8	8·1	Width ,, ,, .	6¼	6
			Length of brachium .	14¼	14·2
Eyes from post. marg. carapace . . .	7½	7·6	Width (max.) ,, .	9	9
			Width (min.) ,, .	6	6
Length, 1st caud. seg. .	7½	7·4	Length of handback .	20	18·7
Width, ,, ,, ,, .	3¾	3·7	Width ,, ,, .	11	10·4
Height, ,, ,, ,, .	3	3	Height ,, ,, .	5	5·3
Length, 5th caud. seg. .	12¼	11·5	Movable finger . .	15½	15
Width, ,, ,, ,, .	2	2	Immovable finger .	10½	10·8
Height, ,, ,, ,, .	3	3			

Measurements of caudal segment III: length, 10·2 mm.; height, 4·1 mm.; posterior width, 2·7 mm.

Pectinal teeth in adult, 17–17; in the juvenile specimens, 14–18, with the exception of one which has 21–22.

These specimens differ markedly from the specimens of *phyllodes* in the Museum's collection; the anterior margin of the carapace is more lightly excavated and the vesicle above is flat to slightly convex and not concave as in *phyllodes*. In the adults at least the two posterior depressions of the last sternite are pitlike and deeply sunk in *taeniurus*, while in *phyllodes* the sternite is quite flat or with only a slight depression posteriorly at the sides.

The specimens recorded from Ovamboland (see Ann. S.A.M., Vol. XXV, pt. 1, p. 73) come under this heading.

Subfamily LISPOSOMINAE, n. subfamily.

A new subfamily, for which I propose the above name, seems necessary to receive a species of small scorpion from the Kaokoveld. The new subfamily falls under the Scorpionidae in view of the two main characters given by Kraepelin in his key (Das Tierreich, Lief. 8, p. 5), namely the decidedly pentagonal sternum and the single anterior pedal spur at the junction of the tarsus and protarsus. On cursory examination the evidence for the last-named character is not so good as that of the first, for in all genera of Scorpionidae, both in adult and juvenile forms, this spur, as is well known, is a very distinctive character, being a stout, bluntly-pointed structure embedded in the

membranous tissue connecting the tarsus and protarsus. In adults it is often blackened at the tip and is generally thickened near the base, being in some cases conical; it is easily distinguished from the stoutest spines which may be found in its proximity. In the case of *Lisposoma* this character (figs. 54 (*a*), 55 (*a*)) is not so readily distinguished on account of the small size of the animal; it is here roughly parallel-sided, more slender and colourless except at the tip; it is not so strongly differentiated from a thickened spine as in typical Scorpionids, while at the same time being quite distinct from the other spine-like structures of the tarsus and protarsus which here take the form of either setiform spines or small spicules, while in most of the Scorpionid genera there is a double inferior row of stout spines. Thus the spur in *Lisposoma*, occupying as it does the same position on the anterior side of the leg at the junction of the tarsal segments, is undoubtedly homologous with the pedal spur of the Scorpionidae. The sternum is very clearly pentagonal and does not differ in any way from that characteristic structure in Scorpionidae (fig. 52 (*a*)); it will be discussed in greater detail later.

The structure of the chelicerae when seen from below (fig. 53) reveals typical Scorpionid characters in their simplest form, such as is found in *Opisthopthalmus*; the tooth next to the distal tooth of the movable finger is not large or fang-like, nor are there accessory teeth on the inferior margin of the immovable finger; further evidence of Scorpionid affinity is to be found in the complete absence of keels on the tergites and carapace, while the stigmata are narrow and elongated, though not so much so as in typical Scorpionids.

Kraepelin in his key attaches family importance to the character of a modified median pectinal lamella, and it is necessary to mention that here the median lamella is divided into 8 or 9 " pearl-like " lobes (fig. 52 (*c*)), a character which would seem to connect it with the Bothriuridae and Vejovidae. It would, however, hardly be a character of far-reaching importance, but rather one which would be subject to exceptions in any family; in the Scorpionidae, Hemiscorpius has the same modification. A character which it does not possess in common with most Scorpionidae is the median groove and Y-shaped fork of the carapace; in the Scorpionidae if the Y-shaped fork is not present there are at least indications of a median groove terminating in a triangular incision in the anterior border of the carapace. All this is entirely absent in *Lisposoma*.*

* In this respect *Lisposoma* approaches more nearly the condition of newly-born young of Scorpionids.

The distinguishing characters which can be said to be peculiar to this scorpion are few ; it is remarkable rather in the characters which it embodies from all the other groups of the Scorpionidae. In the sternum being wider than long and parallel-sided, it resembles the Ischnurinae rather than the other subfamilies ; the median eyes are placed anterior to the middle of the carapace, resembling the Diplocentrinae and Hemiscorpinae ; the teeth of the chelicerae being simple with the penultimate tooth of the movable finger not fang-like, resemble Scorpioninae (*Opisthophthalmus*), Ischnurinae (*Cheloctonus*), and the Urodacinae ; the tarsi have truncated not rounded end lobes, no stout inferior spines, and in this resemble Ischnurinae (*Iomachus*) and Hemiscorpioninae, there being a further resemblance to the latter in the short superior lobes ; the tail is stout and not compressed, and in this resembles the Scorpioninae ; the vesicle being unspined below is a character shared by all the other subfamilies except the Diplocentrinae ; the fingers of the hand are without basal lobes, agreeing with the Scorpioninae, *Cheloctonus*, and perhaps *Diplocentrus* ; in the absence of a median groove on the carapace it approaches the Scorpioninae with the exception of *Opisthophthalmus*, and in the modification of the median pectinal lamella, *Hemiscorpius*.

The most favoured in relationship of these subfamilies would be the Ischnurinae on account of the important characters of the sternum, chelicerae (*Cheloctonus*), and the presence of sharply-truncated end lobes in the tarsus ; the spination of the tarsus is also Ischnurine and the absence of basal lobes in the fingers of the hand is found in one genus, *Cheloctonus* ; next to the Ischnurinae in order of relationship would come the Hemiscorpinae on account of the forward position of the eyes, tarsal lobes, spination of tarsus, and pectines ; then would come the Scorpioninae on account of the chelicerae, dentition of the fingers of the hand, and non-compressed, fairly powerful tail ; last would stand the Diplocentrinae and Urodacinae.

The characters of the subfamily Lisposominae would be as follows :—

No median furrow or fork on the carapace, median eyes placed anterior to middle of carapace, 3 lateral eyes ; tarsus with truncated end lobes (figs. 54, 56), without true spines below, but with setae and a median row of spicules ; sternum wider than long, parallel-sided ; chelicerae without enlarged penultimate tooth on movable finger ; tail stout, not laterally compressed, vesicle without a spine below aculeus ; fingers of hand without basal lobes, cutting edges

not angularly notched; pectines with median lamella broken up into 8 or 9 rounded lobes.

Kraepelin's key to the subfamilies would be adapted to include the Lisposominae as follows :—

1. A spine or tubercle below aculeus . . . . . A. Diplocentrinae
   No spine below aculeus 2
2. Tarsus with rounded end lobes 3
   Tarsus with truncated end lobes, forming a right angle with the superior lobes 4
3. Tail in all segments with only 1 inferior median keel, cutting edge of fingers of the hand with many compressed, irregular granules, 2 lateral eyes. B. Urodacinae
   Tail with 2 inferior median keels except in segment 5 which has 1 regular or irregular keel; cutting edge of fingers of hand with a single or indistinctly doubled row of granules; 3 lateral eyes . . . C. Scorpioninae
4. Carapace with a median groove ending in a Y-shaped fork at the anterior border of carapace 5
   Carapace without median groove or Y-shaped fork D. Lisposominae, n. subfamily
5. A single inferior median keel in all caudal segments; tarsus below with a double row of 6 setae; vesicle of ♂ elongate, provided with a short round dilation on each side of the aculeus . . . E. Hemiscorpioninae
   Two inferior median keels in segments 1–4, segment 5 with 1 regular or irregular keel; vesicle in ♂ and ♀ of the usual form . F. Ischnurinae

Gen. Lisposoma, n. gen.

Body small, not flattened; tarsi with sharply truncated end lobes, superior lobes small, inferior claw (" gehstachel ") large and prominent (figs. 55, 56), with irregularly disposed setae, a median row of 11–13 short spicules inferiorly; keels or rows of granules absent from carapace and tergites, tail not laterally compressed, inferior surface entirely without keels; brachium with rounded anterior surface, without angular or prominent lobe, hand rounded and polished above, without finger-keel, length of handback greater than its width, movable finger with a single row of granules divided into 5 or 6 shorter rows and flanked anteriorly by 6 larger teeth (fig. 57).

Lisposoma elegans, n. sp.

Twenty-two specimens from Outjo, Kaoko Otavi, Sesfontein.

♀ *Colour.*—Markings as in fig. 58, the dark pattern chocolate-brown, the rest yellow.

Carapace as long as broad, anterior margin ⌒-shaped without triangular incision, median depression in front of median eyes ill-

defined, shallow, the sides rounded, forming superciliary ridges between the eyes, widening behind to enclose a longish oval shallow depression; on each side of this, commencing near the posterior margin of carapace, an oblique, slightly-curved groove disappearing before reaching the sides; laterally to each median eye a roundish depression; whole of carapace with exceedingly fine granules, a few larger scattered granules in the posterior half, frontal lobes smooth and shiny; distance of median eyes from the anterior border $\frac{6}{7}$ that from the posterior border of carapace, less than their own diameter apart.

Tergites with a median impression wider in front than behind, in the middle of which is a rounded prominence, the median impression except the prominence finely granular, remainder of tergites smooth except tergite V, in which the obsolete median keels are represented by 3 granules near the posterior border of the segment, the lateral keels by a large tuberculiform granule; there are also some scattered granules.

Sternites entirely devoid of granules, polished; sternite V with two median rows of 2 punctures each, a lateral row of 2 punctures further apart than those of the median rows, remaining segments with similar rows of punctures but less distinct; the punctures may or may not carry a bristle.

Tail.—Segments I and II concave above, III less so, IV slightly concave, V flat, I–III with a median groove, more marked in II than in I; the whole upper surface of segments I–III finely granular with some larger scattered granules, the median grooves seen under low power present a series of fine transverse ridges resembling those of some species of *Parabuthus*, segments IV and V smooth above, V polished and shiny; all segments smooth and polished inferiorly, sides without granules except in a strip occupying a depression below and anterior to the supero-lateral keels in segments I–III; all keels obsolete represented at most by a few granules at their commencement or termination, superior keel in segment I represented by a sinuous irregular row of about 12 granules, the last 2 enlarged and conical, supero-lateral keel represented anteriorly by 2 small granules, posteriorly by 1 enlarged black tubercle; segment II with superior keels represented by a sinuous irregular row of about 11 granules, the last 1–3 enlarged and conical, the granules well separated but the row occupying whole length of segment, supero-lateral keels consisting of 2 or 3 granules in anterior third, the last one enlarged; segment III with superior keels consisting of a hardly distinguishable row of small separated granules and punctures, the last or two last

granules large and rounded, supero-lateral keel represented by a single enlarged terminal granule; segment IV with superior keels represented by 1 or 2 minute granules at its commencement and a small rounded terminal granule, between these some punctures, supero-lateral keel represented by a terminal puncture; segment V perfectly smooth above without punctures.

Inferior surfaces of all segments with keels entirely absent, these represented by punctures usually provided with bristles; segment I with 2 median rows of 3 punctures commencing a little anterior to the middle, the last one bordering the posterior edge of the segment, lateral punctures similar; segment II similar to I, but median rows consisting of 4 punctures occupying anterior $\frac{2}{3}$ of segment, lateral rows with 3 punctures; segment III as in II, but median rows consisting of 5 punctures occupying whole length of segment, lateral rows of 3 punctures, 1 at each end of segment and 1 in the middle; segment V with some irregular rows of punctures, the anterior third with scattered granules; vesicle below with 2 median and a lateral row of punctures armed with bristles, posterior third or half with scattered granules and bristles.

Pedipalps.—Brachium smooth with a rounded anterior prominence, without keels or tooth-like granules, but with a postero-superior and postero-inferior row of 4 punctures bearing long bristles, upper surface smooth with a few punctures; hand smooth and polished with a few punctures above, handback longer than wide, a little longer than movable finger (in some specimens, presumably males, movable finger a little longer than handback); movable finger with 5 rows each except the last consisting of 7–9 teeth, the proximal tooth enlarged, the last (proximal) row consisting of 13 teeth, an anterior flanking row of 6 larger teeth (fig. 57).

Legs.—Tarsi (fig. 56) with 3 inferior pairs of spiniform setae, the 2 distal pairs close together near the apex, these setae very weak in the anterior legs being bristle-like and colourless, a median inferior row of 10–13 spicules; tibia below with a long spine-like seta at its apex.

Pectines.—Pectinal lamella well provided with bristles, 13 unmodified pectinal teeth.

The sexes are difficult to discriminate from external characters, one specimen from Outjo seems to be a male; the pectinal teeth are distinctly longer than in the others, the halves of the genital operculum are slightly more divergent, a pair of minute stylets are visible; pectinal teeth, 14.

In the Sesfontein specimens the colouring is in general lighter;

there is an unbroken median light stripe on the tergites, the fifth segment is light in its anterior half or third ; pectinal teeth, 15–17.

Measurements.—Length of carapace, 2·3 mm. ; width, 2·3 mm. ; width of hand, 1·1 mm. ; handback, 1·6 mm. ; length of segment V, 2·9 mm. ; width, 1·4 mm. ; length of segment I, 1 mm. ; width, 1·3 mm. ; trunk, 9·9 mm. ; tail, 10·1 mm. Total length, 20 mm.

In order to find whether these scorpions were adult or not, one of the largest specimens was dissected ; the oviducts were found embedded in the digestive gland and bore numerous ova and ovules, the ova being large in proportion to the size of the scorpion and containing a considerable amount of yolk ; they were attached to the walls of the oviduct, but in the process of dissection most of them broke loose ; between the large ova were many intermediate stages of ova varying in size from quite small nucleated cells to the largest or apparently ripe ova which were all of a standard size ; no ova were observed in the ducts. The oviducts terminated in a large muscular sac or swelling, just before uniting to form the genital aperture ; this specimen which was not larger than most of the others was the only one dissected, and from this data it was concluded that the animal was subadult if not fully adult ; those that were regarded as juveniles were smaller, with the genital operculum smaller and much wider than long ; the number of pectinal teeth was not so constant, being as high as 16 and 17.

The Lisposominae, judging from the many and diverse characters of several of the subfamilies which it combines in itself while at the same time retaining the more primitive characters of the family, would seem to have been an offshoot from the immigrating Scorpionid stock when or even before this stock had given rise to the other natural groups of the family. In his noteworthy paper, " Facts and Theories on the Distribution of Scorpions in South Africa " (Trans. Roy. Soc. S. Africa, Vol. XII, pt. 4, p. 249), Hewitt has dealt with the various primitive and specialised characters in the light of distribution ; according to this authority the primitive characters in *Lisposoma* would be, (1) the sternum, (2) the simple chelicerae, (3) the anterior position of the eyes, (4) the simplicity of the digits of the hand and their dentition ; minor characters would be the smoothness of the tergites, carapace, and sternites, and the absence of an anterior prominence in the brachium ; the lung-books are also of a primitive type ; they are here in general appearance similar to the primitive Scorpionid type as defined by Laurie in his classification of scorpions

on the structure of the lamellae (Ann. Mag. Nat. Hist. 6, vol. xvii, pp. 190–193); in *Lisposoma* the free edges of the lung lamellae are of the spinous type found in Scorpionids, though the spines themselves are much reduced, and they may possibly be of a more primitive character than the latter; there is no sign of the reticulate structure characteristic of Buthids. The absence of a median groove and anterior notch is a completely negative character and may here be looked upon as primitive; in *Lisposoma* there is no trace of a groove, and the anterior margin of the carapace, so far from being notched, forms a slight protuberance in the middle; in *Opisthophthalmus* the median groove and notch is always present even if in some species there is a very small degree of development, and the partial disappearance of a character which is more or less general throughout the group can be called a specialisation away from the more primitive form; even in newly-born young of *O. granulatus* the anterior median notch is quite distinguishable although the grooves are absent.

Modificational characters which, though not necessarily secondary, may prove to be such, are: (1) the absence of a finger-keel, (2) the fairly numerous pectinal teeth, (3) the stout and long tail, and perhaps the shortening of the superior tarsal lobes. The disappearance of the keels of the tail must be taken as a specialisation; here there are various stages of development, the superior keels in general being stronger than those of the inferior surface, where they are indeed quite obsolete; the fact that some keels are represented by granules, in others some of the granules are replaced by punctures, while the inferior keels are represented by bristle-bearing punctures only, suggest that the keels have ceased to play any functional role; this seems to be the case in various small types of scorpions, and is found in several species of the genus *Uroplectes*.

On the whole, *Lisposoma* is evidently simpler than *Opisthophthalmus* which Hewitt regards as the most primitive of South African Scorpionid genera; it combines the three primitive characters of sternum, chelicerae, and lung-books, with its anteriorly-placed eyes, simplicity of the digits of the hand, and absence of grooves on the carapace; at the same time it seems specialised in the disappearance of the keels of the tail and possibly also in the smooth hands without a finger-keel, but this is by no means certain in view of the characters of some Carboniferous scorpions; it perhaps represents a group of a very primitive nature overlaid with a few peculiar specialisations, a position which points to an early sundering of the group from the parent stock and to an isolating habitat; the small size of this

scorpion, the shortness and simplicity of the fingers, and the lack of full development of many characters such as the pedal spur may perhaps be ascribed to inbreeding within a circumscribed habitat, while specialisations such as those of the hands and tail are due to the localised environment itself; on the other hand the apparent simplicity and small size of this scorpion may be due to the fact that it is in a state of arrested development, the mechanical consequence of its small size, this again being due to a cramping environment; South-West Africa has several such faunistic outliers, and the Buthid genus *Karasbergia* with a limited distribution in the southern parts of South-West Africa is an almost parallel case; for here the animal is again small with exceptionally primitive characters, though here we have also a highly-specialised character in the granulation of the first three caudal segments. *Lisposoma* represents the most primitive form of Scorpionidae yet discovered in South Africa, as *Karasbergia* is the most primitive member of South African Buthids.

Distribution.—All specimens were found living under porous limestone rocks in a strip of territory about 200 miles long and 50 broad along a route which forms a more or less straight line between Kaoko Otavi and Outjo, the farthest locality to the west of this line being Sesfontein. A previous expedition through Ovamboland in 1923 failed to bring any specimens to light although the same formations exist at Tsumeb and Namutoni as at Outjo. It is thus improbable that the family occurs in the sandy, grassy flats of Ovamboland; it would hardly be found in the sand dunes of the Namib to the west of the Kaokoveld which has distinct topographical features of its own with such unique examples of a specialised fauna as the sand-living lizard *Pelmatogecko*. It is therefore very probable that the distribution of *Lisposoma*, limited by the sandy regions to the east and west of it, will be found to be confined to the narrow strip formed by the hilly and mountainous regions of the Kaokoveld; it will probably be found to extend northwards as far as the Kunene River and perhaps also to the south of the Outjo district, though in the latter case the territory has been investigated by several workers. Mr. R. W. E. Tucker, who conducted a search for Arachnid material in the Waterberg mountains and the Otjiwarongo district generally, did not include a specimen in his collections.

Habits.—It is regrettable to have to state that owing to specimens having been mistaken for the juveniles of *Opisthophthalmus carinatus*, no notice was taken of their habits during the process of collecting. It is presumably not a burrower but a dweller in small rock crevices.

Order **ACARI.**

Family IXODIDAE.

Section *Argatini.*

Gen. Argas, Latr.

Argas persicus, Fisch.–Waldh.

9 ♀♀ from Caimaeis, free living under flakes of limestone rock of escarpment containing the nests of *Agapornis roseicollis* and starlings.

Argas aequalis, Neum.

1 ♀ under a stone at Outjo.

Subfamily IXODINAE.

Gen. Rhipicephalus, C. Koch.

Rhipicephalus evertsi, Neum.

3 ♂♂ from *Lepus capensis* at Kaoko Otavi.

Rhipicephalus bursa, Can. et Fanz.

2 from *Bucorax cafer* at Onoolongo, Ovamboland.

Gen. Hyalomma, C. Koch.

Hyalomma aegyptium, Linn.

1 ♂ from Kowares.

Gen. Aponomma, Neum.

Aponomma exornatum, C. Koch.

2 ♂♂, 1 ♀ from *Varanus albogularis*, Kamanyab.

Aponomma laeve laeve, Neum.

1 ♂ from *Naia nigricollis* at Kowares.

Observations on Distribution and Ecology based on a Study of the Arachnid Fauna of South-West Africa.

The region in which an attempt is now made to throw light on the problems of distribution and ecology is to a student of the Arthropoda one of the most interesting as well as the least known of the regions of Southern Africa.

The province dealt with comprises the two northern districts of South-West Africa, the Kaokoveld and Ovamboland. The Kaokoveld embraces a tract of rugged broken country with an average width of 95 miles bordering the Namib on its western flank, between the Kunene and Ugab Rivers. The outstanding feature of this tract is a great chain of table-topped mountains and plateaux capped with volcanic rocks, ranging in elevation from 2600 to 4200 feet, and forming a mighty terrace between the Namib and the South African plateau; from the western rim of this plateau several rivers take their rise, and flow through the Namib to the sea. Eastwards of the Kaokoveld the rugged nature of the country merges by gradations through smaller ranges of hills into the undulating grass-grown steppes of Ovamboland.

In a study of distribution so many factors such as physiography, humidity, and temperature, and following from these, plant geography, impinge upon the problem that it will be well to give a short account of the region dealt with from this point of view.

It may seem a paradox to state that one of the most important factors in dealing with the fauna of this region is the presence of the cold Benguella Current, but there is no doubting the importance of the rôle which it plays in the climate and physiography of the Namib. This cold current, originating in the Antarctic, sweeps along the west coast of Southern Africa and robs the winds blowing towards the land of most of their moisture; it does this in the first place by lowering the temperature of the air to such an extent that the bulk of the water vapour which it contains is condensed into particles which give rise to the fogs which so frequently enshroud this part of the African coast; secondly, the water is so cold that very little evaporation actually takes place near the coast. The littoral, moreover, possesses a hot climate and low relief, so that the air blowing over it, instead of being forced to precipitate such moisture as it does contain, in actual fact becomes warmer and loses this moisture. The current also plays a very important part in transporting sand along the coast and depositing the sand dunes which are such a feature of the Namib.

The Namib is therefore a region barren and desolate beyond description, swept for the greater part of the year by powerful south-western winds; it is without doubt subjected to the most severe desert conditions in Southern Africa and is characterised by the destitution of its vegetation, which is represented by a few Xerophytes such as Bushman's food (Ganna), *Salsola*, some peculiar species of *Mesembryanthemum* and the remarkable *Welwitschia mirabilis*.

There is naturally no definite natural boundary between the Namib and the two regions with which this paper deals—the Kaokoveld and Ovamboland—which lie to the west of it; the Kaokoveld and to a lesser extent Ovamboland are much influenced by the physical and climatic conditions of the Namib, though this influence tends gradually to disappear progressively eastwards. The Kaokoveld, though provided with a very limited rainfall, is more benefited in this respect than the Namib; here, owing to the broken and dissected nature of the country, most of the rain which falls finds its way directly into the rivers, some of which come down two or three times during the rainy season, so that while the mountains and plateaux present a most barren and unfertile appearance, the valleys and level pans lying between the hills support a fairly rich flora containing a large number of flowering plants. The portions of the Kaokoveld bordering the Namib favour a desert succulent flora such as *Euphorbia*, *Hoodia*, *Mesembryanthemum*, and drought-resisting trees as *Acacia giraffae*, while to the west it is characterised by bush-steppe. In Ovamboland there is an infiltration of tropical vegetation, for here the climatic influence of the western coastline is partly counteracted by the normal tropical conditions prevailing in Central and East Africa so that the rainfall is fairly plentiful though subject to violent fluctuations; the aspect of Ovamboland is almost entirely tropical, consisting of vast grass and tree covered steppes unbroken by definite mountain ranges, and the rainfall tends to collect in low-lying pans and slow-flowing rivers (omuramba). The vegetation of Ovamboland is predominantly tropical, characterised by an abundance of palms, baobab trees, and the widespread mopane tree (*Copaifera mopane*).

Thus the rainfall and vegetation of these regions tends to change from the Namib to Ovamboland as follows :—

[Table.

	Rainfall.	Character of Vegetation.
Namib. .	·56″	Xerophytic.
Kaokoveld .	3″ and upwards	Xerophytic in the west, bush-steppe mixed with tropical vegetation in the east.
Ovamboland.	10″ and upwards	Tropical — grass and forest-steppe.

Distribution.

Araneids.—Of the 41 families of spiders differentiated by Simon in his Histoire Naturelle des Araignées, 22 occur in the region dealt with, and for purposes of distribution can be divided into groups according to the mode of living or method which determines dispersal. The one family which differs from all the rest in the mechanism of dispersal is that of the Argiopidae or orb-web weavers, a family which is by far the largest and the most differentiated among its own members. This family differs so largely in its various subdivisions in colour, size, structure, and general appearance that two individuals might easily suggest to the passing observer differences of at least family importance. All members of the family are, however, characterised by the universal habit of building snares in the form of a logarithmic spiral with radiating spokes from the centre, and in the method of dispersal of the young ; these, on leaving the egg cocoon of the parent, spin parachutes and may be carried long distances to fresh fields by favourable winds, the process being repeated in the next generation, which may be carried still farther afield. That this means of dispersal should ensure the offspring being carried to regions far distant from the original centre is apparent, and young Argiopidae have been observed at sea 300 miles from the nearest land. Such a group tends to have a cosmopolitan distribution, and the family of orb-weavers is in fact common throughout the world with the exception of the polar regions. Several species recorded in South-West Africa occur throughout Africa (*Araneus eresifrons* and *Nephila senegalensis*), another (*Araneus morelii*) is found in Madagascar as well, while *Tetragnatha nitens* reaches the northern shores of the Mediterranean. Thus, in a family with such a specialised method for widespread dispersal, no definite lines of migration are indicated, individuals being found wherever suitable conditions for building snares occur.

The only factors which in any way militate against the establishment of such a group are desert barriers, these being incapable of supporting bush or small scrub vegetation, between the branches of which the snares can be spun; in such conditions there is also a marked deficiency of flowering plants on which Argiopids, being stationary and not active predatory spiders, are dependent for their food supply of winged insects; such factors come into play in regions like the more easterly desert portions of the Kaokoveld, where a marked decrease in the number of Argiopid species is noticeable, as also in the number of individuals of a given species as compared with Ovamboland and still more markedly the east coast of Africa. The Argiopidae are incapable of either using other means of dispersal than that of the parachute or of accommodating themselves to other methods of obtaining food than that of the circular snare. Such a method of dispersal has its inconveniences, the animal making use of it being subject to the control of physical forces which may react on it with unfavourable consequences; these, in the case of violent storms, may mean its destruction, or, in the absence of any wind at all, confine it to regions already over-populated; on the other hand this family undoubtedly owes its world-wide distribution to its command of this very effective means of dispersal.

Though very many individuals are dispersed every year, it is in all probability only those that alight in or near the more fertile valleys and along river banks that survive, and these valleys and river banks form new centres or reservoirs for fresh migrations under favourable environmental conditions; this must especially occur in Southern Africa, where the diversified character of the surface of the country and the difference in the distribution and in the amount of the rainfall are so considerable as to have caused corresponding important differences both in the aspect and systematic constituents of the vegetable landscape; in a certain sense, then, the rivers and valleys clothed with a rich vegetation may be looked upon as the incoming routes of migration and the chief lines along which propagation of fresh fauna has been conducted.

The family of Thomisid spiders, characterised by their sluggish latigrade movements, are second only to the Argiopidae in their geographical range, and resemble them in that they also are indirectly dependent on flowering vegetation for food and dispersal; in this family there is no mechanism for the aerial distribution of the young, and the egg-bag is fastened to the underside of a dried leaf, the juvenile spiders usually emerging from it after the death of the parent;

members of this family are, however, often dispersed by wind in seeds, withered leaves, or flowers. The adults are highly specialised in form and colouring, and usually resemble the calyces, bracts, or leaves of plants, on which they lie motionless until the prey (predominantly anthophilous hymenoptera) is within easy reach ; one or two abnormal forms found in the south-western extremity of Africa do not live on vegetation at all, but have adopted a cryptic habitat and are almost decolorous.

In this family most of the individuals found in South-West Africa are specifically distinct, but are not in any other way differentiated from related species which occur in the East African region ; all the genera, 11 in number, occur also in the latter region ; one South-West African species, *Tibellus voissoni*, is found in Egypt, while another, *Xysticus sagittifer*, is closely allied to *X. jugalis*, occurring in Abyssinia. The relationship of the arachnid fauna of the north-east corner of Africa to that of South-West Africa is indeed strikingly displayed in this family, revealing an even greater similarity between these regions than is found between the south-eastern coast belt and South-West Africa ; this similarity has also been commented on by de Dalmas with regard to certain Drassidae (Ann. Ent. de France, vol. lxxxix, p. 233), but it may be due to the greater knowledge of the first-named region, while that of East Africa is a vast and comparatively unexplored one.

In a study of distribution it is impossible to include in the same group animals which differ widely in their method of living, diet, habitat, etc. ; it has therefore been necessary to arrange the numerous families of Araneids with these ecological considerations in view, and they have been here divided into four subdivisions. The families Argiopidae and Thomisidae are here treated as the first natural group, being both directly or indirectly dependent on vegetation for their existence ; they are here called the PHYTOPHILOUS group.

In order to show the relationship of the fauna of South-West Africa with other regions, the genera recorded in the paper dealt with are tabulated and are also recorded under columns denoting other regions in Africa when occurring in these. The regions dealt with are (1) Africa, under which are recorded genera widespread in Africa or beyond it ; (2) South Africa, *i.e.* the extreme south of Africa ; (3) Northern Transvaal and Rhodesia ; (4) East Africa, *i.e.* Portuguese East Africa to Lake Victoria Nyanza ; (5) West Africa, *i.e.* Congo and the Cameroons ; (6) North Africa, *i.e.* Egypt, Abyssinia, and Somaliland. In these tables, genera are recorded rather than species, for the reason

that in such a heterogeneous group as the Araneids many of the larger and unexplored territories are better known with regard to generic than specific distribution.

The genera of the Phytophilous group are tabulated as follows :—

TABLE I.—*Phytophilous Group.*

	Genus.	Africa.	S. Africa.	Transv.-Rhod.	E. Africa.	W. Africa.	N. Africa.
Argiopidae.	*Tetragnatha*	×	×	×	×	×	
	Nephila	×	×	×	×	×	
	Araneus	×	×	×	×	×	
	Argiope	×	×	×	×	×	
	Cyrtophora	×	×	×	×	×	
Thomisidae.	*Stiphropus*				×	×	
	Paramystaria				×		
	Monoeses	×	×	×	×	×	
	Tmarus				×	×	×
	Pherecydes				×		×
	Thomisus	×	×	×	×	×	
	Runcinia	×	×	×	×	×	
	Xysticus	×	×	×	×	×	
	Philodromus	×	×	×	×	×	
	Hirrius			×			
	Tibellus	×	×	×	×	×	

Of the above 16 phytophilous genera recorded in South-West Africa it is seen that 11, or 69 per cent., are widely distributed in Africa or beyond it, and of the remaining more circumscribed genera, 80 per cent. are found in East Africa, 60 per cent. in the extreme south of Africa, and 40 per cent. in both North and West Africa.

A second natural group is formed by four families of so-called wandering spiders which do not attempt to make a web for snaring their prey—the Lycosidae, Pisauridae, Clubionidae, and Attidae ; here in most cases the egg-bag is carried by the female spider attached to the spinnerets at the posterior ventral surface of the abdomen. These four families are here treated as a group—the NOMADIC group. In this division, dispersal is carried out by the natural wanderings of the spiders, which are powerful and extremely active ; some of them, like the Attidae, have formed the habit of leaping on their prey instead of running it down. Among the Pisauridae some of the larger members such as *Thalassius* are hydrophilous in habit, haunting the banks of rivers and feeding upon tadpoles and small fish ; they are often carried long distances upon floating detritus. The genus *Pardosa* of the Lycosidae has somewhat similar habits, lurking near pools and river

banks, its lightness and the tufted hairs of the tarsi allowing it to run with great speed over the surface of water without breaking the surface film; in these two genera, at least, rivers play a large part in distribution, while most of the remaining genera are dispersed in the natural wanderings of the spiders in search of prey. Taking the first three families and omitting the Attidae, which are at present very insufficiently known as compared with the Clubionidae, Pisauridae and Lycosidae, we find that these are represented by 16 genera in the region under consideration; the geographical distribution of these genera is set down in Table II below.

TABLE II.—*Nomadic Group.*

	Genus.	Africa.	S. Africa.	Transv.-Rhod.	E. Africa.	W. Africa.	N. Africa.
Clubionidae.	*Selenops*	×	×	×	×	×	×
	Olios	×	×	×	×	×	×
	Micrommata			×	×		×
	Chiracanthium	×	×	×	×	×	×
	Palystella						
	Copa				×	×	
	Graptartia			×	×		
	Rhaeboctesis		×	×			
Pisauridae.	*Thalassius*	×	×	×	×	×	×
	Euphrosthenops	×	×	×	×	×	×
	Tetragnatha				×		×
Lycosidae.	*Ocyale*	×	×	×	×	×	×
	Lycosa	×	×	×	×	×	×
	Pardosa	×	×	×	×	×	×
	Evippa			×			×
	Hippasa				×	×	×

On glancing at this table we find that half these genera are widely spread throughout Africa, and most of them, such as *Lycosa, Pardosa, Selenops, Olios, Chiracanthium,* extend through Arabia and the Mediterranean region to Europe and the Orient. Disregarding these widespread genera we find that of the remaining eight genera, South-West Africa shares 63 per cent. with the East African region and hence also with the Transvaal and Rhodesia, 50 per cent. with the north-east corner of Africa, 25 per cent. with West Africa, and only $12\frac{1}{2}$ per cent. with the southern extremity of Africa; in other words, the arachnid fauna of this group has most in common with East Africa, closely followed by North-East Africa, considerably less with West Africa, and very little with the southern extremity of Africa. In the case of genera which are found both in South-West Africa and

in West Africa (Congo, Cameroons), it must be pointed out that these genera are represented in the East African region as well. The single genus *Rhaeboctesis*, which South-West Africa possesses in common with the southern extremity of Africa, is a peculiarly modified one, bearing characters similar in many respects to certain cryptozoic Drassid spiders ; it is, moreover, represented in the region we are dealing with by a distinct species, *R. denotata* ; the eight genera widespread in Africa are, of course, common both in South-West Africa and the southern extremity of Africa, but the South-West African species show a more noticeable resemblance to those of the east and south-eastern region than to the south-western or Cape region. One genus, *Palystella*, is peculiar to South-West Africa alone.

For purposes of distribution it is again convenient to group together a number of families which on account of their mode of life must undoubtedly possess affinities in the method and acceleration of their dispersal. Under this heading I place the Drassidae, Prodidomidae, Zodariidae, Palpimanidae, Hersiliidae, and Eresidae, and these I propose to call Pseudocryptozoic fauna ; this group cannot be called entirely cryptozoic on account of the fact that genera among the same family may differ from each other, some being genuinely cryptozoic while others as in the Drassidae may live an active life among damp humus, decaying leaves, etc., and spending a certain portion of their lives in the open. As an example in the cribellate family of Eresidae, *Stegodyphus*, a common social spider, makes a large labyrinthine nest in acacia trees, the communal nest supporting a population of three or four hundred individuals ; on the other hand *Dresserus*, of the same family, is cryptozoic and solitary, living under stones against which it builds a flat, sheet-like nest. Among the Hersiliidae, *Hersilia* lives entirely on and in the crevices of bark of trees, while *Hersiliola*, a closely-related genus, is definitely cryptozoic. Further, seasonal and climatic fluctuations bring about alterations in the conditions of life, so that individuals which in other regions are free living or phytophilous temporarily adopt a rupicolous life.

This group shows no reduction in the usual number of eight eyes.

The most important family of this group is that of the Drassidae, itself far larger numerically than any of the other families, some of which closely resemble it in structure ; it is represented in South-West Africa by 12 genera and 31 species. The rupicolous habits of most of this group render it less likely that any members of these families should have such a wide distribution as is found, for instance, in

Argiope of the phytophilous group or *Lycosa* of the nomadic group. The distribution of the genera of this group is as follows :—

TABLE III.—*Pseudocryptozoic Group.*

	Genus.	Africa.	S. Africa.	Transv.-Rhod.	E. Africa.	W. Africa.	N. Africa.
Drassidae.	*Platoides*		×	×	×		
	Upognampa						
	Callilepis		×	×		×	×
	Asemesthes		×	×			×
	Xerophaeus		×	×	×		
	Setaphis		×				×
	Trichothyse						
	Echemus		×			×	×
	Camillina		×	×	×		×
	Diaphractus		×				
	Zelotes		×	×	×		×
	Theuma		×	×			
Palpimanidae.	*Diaphorocellus*		×		×		
	Palpimanus	×	×	×	×	×	×
Zodariidae.	*Caphaeris*		×	×			
	Diores		×	×	×		
	Cydrela		×	×	×		
Eresidae.	*Dresserus*		×	×	×		×
	Stegodyphus	×	×	×	×	×	×
Hersiliidae.	*Hersiliola*		×				×
	Hersilia		×	×	×	×	
Prodidomidae.	*Prodidomus*		×		×	×	×

As seen from this table, only two genera, *Palpimanus* and *Stegodyphus*, can be called widespread ; of the remainder, 90 per cent. are held in common with the southern extremity of Africa, 60 per cent. with Transvaal and Rhodesia, 50 per cent. with East Africa, 45 per cent. with North Africa, and 15 per cent. with West Africa, while two genera are peculiar to South-West Africa alone. Two or three of these genera (*Prodidomus*, *Diaphorocellus*, *Zelotes*) occur or are nearly related to genera found on the east coast of South America.

In this group the greatest similarity is with the extreme south, then with Transvaal and Rhodesia, then East Africa, North Africa, and lastly West Africa ; or it can be said that along a strip of the west coast from the south of Angola to the Cape the members of this group show a close similarity among themselves ; it is also noticeable that the relationship with the Transvaal-Rhodesian region and the East African region is not an equal one, as is the case in both the phytophilous and nomadic groups, but is distinctly in favour of the

Transvaal-Rhodesian region, members of this group appearing to become more restricted in distribution from west to east.

It seems reasonable to suppose that with only 10 per cent. of the pseudocryptozoic group having at all a wide distribution as compared with 50 per cent. of the nomadic group and 69 per cent. of the phytophilous group, the method of life of the two latter is more successful than that of the former; the methods employed by the first two groups for snaring their prey and the dispersal of the young are more specialised and far more complex than is the case in the pseudocryptic families; the Argiopidae in the instance of the phytophilous group build a complex snare and employ a special mechanism for the dispersal of the young; the nomadic group, though in the main they make no webs, build trap-doors sometimes closing with a lid (Lycosa), and also carry the egg-bag attached to their bodies in their wanderings; their comparatively wide distribution, however, must be chiefly attributed to their activity and their association with an aquatic environment; the pseudocryptozoic group have no special provision either for dispersal or for acquiring food and are far more localised in habitat; their methods of feeding are more simple, their chelicerae are weaker and they are limited in their choice of diet to other cryptic arthropods of small size and the eggs and larvae of these.

All the families of this group except the Drassidae retain the third inferior tarsal claw, a fundamental possession of Araneids which is thrown off by members of the nomadic group, where it is only present on the tarsi of the newly-hatched spiders in the cocoon. The pseudocryptozoic group seems, in some respects then, simpler and less specialised than the two first-named ones.

The fourth and last group to be considered is represented by three ancient families—the Dysderidae, Caponiidae, and Sicariidae—and though these families occur in other parts of the world they are represented here by genera having a limited distribution in Africa, most of them being confined to the west coastal region; five genera are found in South-West Africa, and these are all truly cryptic in habit, being found under stones and nowhere else; they are here termed the Cryptozoic group. With these families are associated certain structural peculiarities common to them all; these are in connection with the respiratory system whereby the posterior stigmata are placed at the sides of the ventral surface of the abdomen instead of in the middle; in *Diploglena* (Caponiidae), the pulmonary sacs are wholly replaced by tracheae. In all these groups a reduction has

taken place in the number of eyes, which are six instead of eight, and these are all of the nocturnal type; the third or inferior tarsal claw persists; lastly, the reproductive organs of both sexes are characterised by extreme simplicity. The members of this well-defined group of families are the most primitive of all spiders found in Africa, and are most comparable with the tracheate araneid *Liphistius* which, with its segmented abdomen, lies in the most direct line to the hypothetical arche-araneid. The distribution of the genera of this group is set out in the table below:

TABLE IV.—*Cryptozoic Group.*

	Genus.	Africa.	S. Africa.	Transv.-Rhod.	E. Africa.	W. Africa.	N. Africa.
Dysderidae.	*Ariadna* .		×	×	×	×	
Caponiidae.	*Diploglena* .		×				
Sicariidae.	*Loxosceles* .		×	×	×		×
	Sicarius .		×				
	Scytodes .		×	×	×	×	×

As will be seen from the above table, none of these genera have a wide distribution in Africa, but all belong, strictly speaking, to the south-western coast region; though a few species of the genus Scytodes reach East and North Africa, these are few in comparison with those found in the south-western region. Another peculiarity not found in the other groups, respecting genera with a limited distribution in Africa, is that all these cryptozoic forms occur along the east coast of South America, though they do not spread farther inland on the American continent.

The cryptozoic group appears to be the most primitive one in Southern Africa, the pseudocryptozoic group being also primitive but less so, while the two other groups are more or less specialised. From a glance at the table below, which combines the results of the four previous tables, it will be seen that the phytophilous fauna possesses the largest number of widely-spread genera, while the crypto-fauna has none at all.

TABLE V.—*Combined Groups.*

Group.	Africa.	S. Africa.	Transv.-Rhod.	E. Africa.	W. Africa.	N. Africa.
Phytophilous.	69	0	20	80	40	40
Nomadic .	50	12½	63	63	25	50
Pseudocryptic	10	90	60	50	20	45
Cryptic .	0	100	60	60	40	40

As has been pointed out, the simple cryptic group stands nearest in relationship to the most primitive groups represented among living spiders by the segmented *Liphistius*; the fossil spiders of the Upper Carboniferous, where they are first met with, are all characterised by having a segmented abdomen; no true spiders have been met with after the Carboniferous throughout the whole of the Secondary deposits, but in the Tertiary nearly all the forms are related to living families, and the abdomen is unsegmented as in modern spiders; fossil forms from the Upper Miocene (*Thomisus, Oeningensis*) and Lower Oligocene (*Mizalia rostrata*) belong to families comprising the phytophilous and nomadic groups of this paper and do not differ except in detail from present-day genera; it is very probable that all the phytophilous group and most of the nomadic group became differentiated only in Tertiary times, their arrival presumably synchronising with that of most of the flying orders of insects, and following on the rise of angiosperm vegetation in the Cretaceous. From this we conclude that the primitive cryptic fauna were the first to arrive and populated the whole continent of Africa, when they were probably far more numerous than they are to-day; the later and more specialised families followed later, and to a large extent replaced them, especially along the east coast and in Central Africa. Where the original centre of the cryptofauna was is difficult to say, but from the presence of all the genera on the east coast of South America it seems likely that when this group was being dispersed in space the west coastline of Africa did not constitute the limit to progressive migrations westwards that it does now; it is otherwise difficult to explain how these primitive families, which are to-day more geographically restricted than any other Araneid groups, reached the now remote continent of South America.

With regard to the more recent and specialised groups which arrived later, it will be seen from looking at Tables I, II, and V that the fauna of South-West Africa has more affinities with that of the eastern region than with that of the North African one, while it has little relationship to West Africa and hardly any to the extreme south of Africa. The relationship of South-West Africa with North Africa (Egypt, Abyssinia, Somaliland) is a striking one considering the distances separating them, and, as has been pointed out, is specific as well as generic, while there is but little relationship with the north-west corner (Morocco, Algiers). Many of these genera occur again in Arabia, Asia Minor, and also in Europe and Asia, while some of them are replaced by closely-allied forms. It seems fairly certain that the fauna of these groups entered Africa from the north and

north-eastern coasts; though the arid region of the Sahara would form a strong natural barrier separating the Mediterranean from the Ethiopian region, a gap formed by the Nile would admit the incoming stream of migration which, proceeding up the watershed of the Nile, would follow the course of the Great Rift Valley until the region of the East African lakes was reached; this fertile and well-watered region would constitute a natural reservoir from which a fresh impetus would be given to further migrations; a small branch would here be given off which, travelling along the tributaries of the Congo, would arrive at the west coast of Africa, but the main stream would continue southwards to meet with the Zambesi; from thence travelling eastwards these stocks would travel along the upward course of this river and easily reach the Kunene via Lake Ngami and the Okavango River, spreading through southern Angola and the northern regions of South-West Africa (Ovamboland, the Kaokoveld, and Damaraland). In the South-West African region they do not seem to have been able to penetrate farther southwards across the wide desert barriers formed by Namaqualand and the Kalahari, but at the same time the fauna of East Africa would have progressed farther southward through Portuguese East Africa and Natal, and travelling westwards a few stragglers would eventually reach the south-west extremity; this is without doubt the reason for the only slight similarity between the fauna of South-West Africa and the Cape region in this group. This is also illustrated by the distribution of certain tree- or grass-living Colubrid snakes for which a certain amount of humidity is essential to existence; the common mamba, *Dendraspis*, is not found in South-West Africa at all except in the extreme north, whereas in the Transvaal, Rhodesia, and East Africa it is well known and is found as far south as Natal.

That the phytophilous fauna in Africa must have followed roughly the courses of the great rivers is borne out by the fact that the whole of the east coast has an almost similar fauna as far south as Natal, that of the latter being a tropical one with many relationships to the Great Lakes region, which again agrees with both the northern parts of South-West Africa and the north-east corner of Africa. The east coast region is well watered in comparison with the south-western coastline, and, possessing a far higher summer rainfall, supports a tropical forest and savannah vegetation which is favourable to the mode of life adopted by the phytophilous forms of spiders. On comparing the fauna of Portuguese East Africa, based on a collection made there in 1923, with that of South-West Africa, it has been

found that among the Argiopidae the numerical proportion of eastern to western genera is almost 2 to 1 and the proportion of species almost 3 to 1. Although some of the Arachnida can withstand more or less severe conditions of drought as is the case in the Scorpions, yet all of them require a certain minimum of moisture ; in certain parts of the very arid rocky regions of the Kaokoveld, no Arachnids can be found over large areas. In the case of such phytophilous Arachnids as the Argiopidae, while they are not directly dependent on water, a good supply of it is favourable to their rapid dispersal as a means of providing abundance of food of flying orders of insects.

Distribution of Scorpions.

The scorpions, with which may be grouped the Pseudoscorpions and Pedipalpi, can be placed with the fourth natural group as being definitely cryptic in habit. The distribution of the scorpions, which is a far better known and more homogeneous group than that of the Araneids, has been discussed by Hewitt in his paper " Facts and Theories on the Distribution of Scorpions in South Africa " (Trans. Roy. Soc. S. Africa, Vol. XII, p. 249). The conclusions he comes to are mainly that the most primitive forms of scorpions are found in the west or south-west of Africa, while the more recent or specialised ones are found in the east. Certain primitive genera, such as *Opisthophthalmus* and *Scorpio*, belonging to the family Scorpionidae, were at first spread over the continent of Africa and were later replaced by other more specialised genera of the family entering from the east or north-east, and in certain areas by the more advanced family Buthidae. He thinks the evidence of distribution definitely against an African origin for the families found in it and attributes the immediate source of our scorpion fauna to Eurasia as being also the centre from which Australia and perhaps the new world received their respective faunas.

The most common genus in South Africa, *Opisthophthalmus*, closely allied to the North African *Scorpio*, followed, according to Hewitt, a line of migration which came south down the east coast and curved westwards towards the Cape region, a few species again turning north in the direction of Namaqualand ; other species such as *O. carinatus* took a more direct route across the continent, reaching South-West Africa via Rhodesia and the Kalahari. The great majority of the species collected in South-West Africa are well known and have a fairly wide distribution ; these were taken into

account in Hewitt's paper and do not throw any fresh light on the question of distribution, being in accord with the general lines of his hypothesis.

A discovery of considerable importance made in the Kaokoveld, which has a bearing on distribution, is that of a new scorpion revealing features differing from those of any other member of the South African or even African fauna. This scorpion, *Lisposoma*, possesses characters which approach most nearly those of the family Scorpionidae, and has been placed with it, but in a separate subfamily. The characters which distinguish the Scorpionidae from the other African family, Buthidae, are a pentagonal sternum and a single tarsal spur; the pentagonal sternum, as shown by Petrunkevitch in the American Naturalist, vol. l, is a character possessed by most of the families of Palæozoic scorpions, and is regarded by him as primitive. This feature, together with the possession of eyes placed far forward on the carapace, which is agreed upon by authorities such as Pocock and Hewitt as being primitive, and its small size (the adults are 22 mm. in length), point to a general simplicity of structure which is greater than in any other species of the family, and probably greater than in any other scorpion living in Africa.

The most striking features, then, of *Lisposoma* are its complete dissimilarity from other South African scorpions and a general tendency towards reduction and simplification of the characters; it lends further evidence for the almost invariable occurrence of primitive forms in the west. Its distribution is evidently very localised, *Lisposoma* having been hitherto found only in a restricted area of the Kaokoveld; in the structure of the pectinal lamellae it shows affinity with the South American families Bothriuridae and Vejovidae.

Another small primitive scorpion with a very restricted distribution has been found in South-West Africa in the Karas Mountains, near the Orange River; this scorpion, *Karasbergia*, also shows reduction of characters and represents the most primitive form of the Buthidae. *Lisposoma* represents the most primitive form of the Scorpionidae.

Distribution of Solifugae.

The Solifugae are in habit most nearly allied to the nomadic group of Araneids, most of them being quick-moving, active creatures with bodies well provided with sensory hairs, bristles, and spines; some are nocturnal, others diurnal, in habit. Two species, at least, have a distributional relationship with Rhodesia and the Kalahari (*S.*

sericea, *S. monteiroi*), while others such as *S. furcifera* have a local distribution in South-West Africa; they show a fair amount of affinity with the extreme southern region.

Ecology.

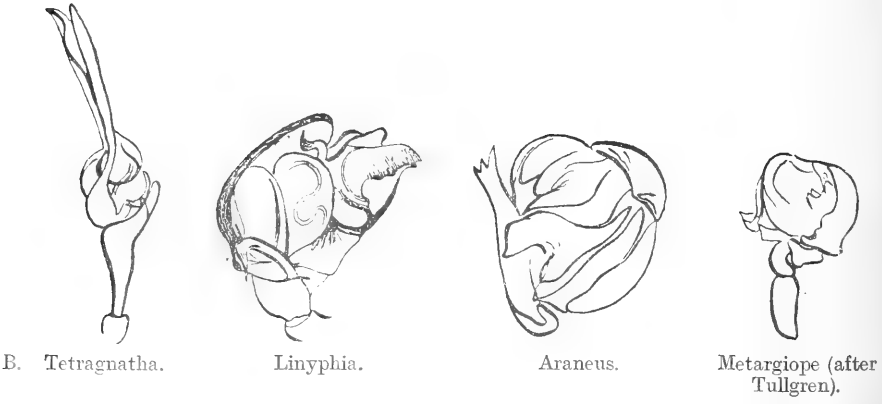
Structure.—Most peculiarities of structure occur among the desert-icolous Araneids of the cryptozoic group; they are characterised by a partial replacement of the lung-books by tracheae in most of the genera, while in *Diploglena* the pulmonary organs are entirely tracheate. The eyes are reduced to six, or two in the case of *Diploglena*, all others being of the nocturnal type without a retinal pigmentary layer, as compared with the pseudocryptic group in which there are both nocturnal and diurnal types, while the phytophilous group have mainly diurnal eyes; other peculiarities, as in *Sicarius*, are a general flattening of the body which recalls some of the Pedipalpi, and a comparative absence of sensory hair structures which may be represented by modified claviform hairs (*Sicarius*); another important structure presenting analogies with certain scorpions is the presence of a stridulatory apparatus; this in *Sicarius* consists of a finely striated lamella on the external side of the chelicera, which when rubbed against the internal surface of the femur, provided with a row of small denticles, gives rise to a faint humming sound; a slight variation of this mode of stridulation is found in the scorpion *Opisthophthalmus*. The sexual organs of the cryptic spiders are all extremely simple and show great uniformity among themselves; the reproductive organ in the male is in all cases a simple bulb drawn out in a long slender style by means of which the seminal fluid is communicated to the vulva of the female which in this group is a simple pit.

The nomadic group show a greater development in regard to sight than is found in any other group, the Attidae being the most far-sighted of the Araneids; they are also provided with a thick covering of hairs which are often flattened, resembling the wing-scales of Lepidoptera.

The phytophilous group have poorly-developed eyes of the diurnal type, which however are little used, the direction, size, etc., of the prey being located by means of sensitive perceptory hairs; the reproductive organs, at any rate in the males, are in striking contrast to those of the cryptic group, showing great complexity and differentiation among themselves. (Text-fig. 1, p. 304.)

Among the scorpions of the Kaokoveld the members of the genus

Parabuthus are provided with the well-known stridulating organ consisting of a granulated area on the upper surface of the first and second caudal segments, the point of the sting being brought over and down and rasped along these areas, giving rise to a hissing sound ; this stridulating organ has a certain range of variation among the



Text-fig. 1.—A. The male reproductive organs of four genera of the cryptic group. B. The same of the phytophilous group (Argiopidae).

different species of the genus, being most weakly developed in *P. granulatus* and strongly so in *P. flavidus*. It is also well developed in *P. brachystylus*, found in the northern Kaokoveld, the sound being evoked by the irritating stimuli of light and touch. Pocock described the stridulating organ in *Parabuthus* as having been evolved for a warning or intimidating purpose and thought that its *raison d'être* was solely to strike fear into its enemies ; this seems a hypothesis based on psychological premises which we have no means of verifying ;

in the Kaokoveld it was observed on many occasions with regard to *P. brachystylus* that while stridulation was proceeding large drops of poison were exuded from the tip of the sting so that very soon the segments on which the sting was being operated were covered with it; thus it may be a purely mechanical method of stimulating rapid and continuous contraction of the muscles surrounding the poison-sac and so ensuring a liberal secretion of poison.

In *Opisthopthalmus* the stridulating mechanism is very different; it is here situated on the upper surface of the chelicerae, consisting of a granular patch which rubs against the overhanging chitinous wall of the carapace.

The structure of *Lisposoma elegans*, a peculiar and primitive scorpion belonging to the family Scorpionidae with a very localised distribution in the Kaokoveld, is a puzzling one; it possesses several characters which are not in agreement with some of those commonly met with in all members of the family Scorpionidae. In the first place it is the smallest member of the family, and though only 22 mm. in length revealed on dissection well-developed ova attached to the oviduct and a large seminal receptacle; these ova were simply attached to the wall of the oviduct as is the case in the family Buthidae, the ova in most Scorpionidae being contained in long diverticula which open into the oviduct; small animals are generally simpler in structure than large ones of the same family, and several characters of *Lisposoma* are undeveloped and extremely simple; there is a general absence of the armature of keels and granules which are a feature of most scorpions, the chelicerae are simple in their dentition, while the hands are reduced and feeble; this dwarfing of the development suggests a case of cretinism or infantilism due to a pathogenic condition of the endocrine organs; no other scorpion in South Africa shows anything like the same extent of simplicity. The weakened condition of the hands would not admit of burrowing habits, and this scorpion is always found hiding in the cavities formed in porous limestone rock.

Habitat and Climate.—A rainfall such as that of South-West Africa, which in the Kaokoveld is subject to great fluctuations, brings about seasons of severe drought, and in one or two cases a mode of life different to the one usually adopted has resulted. The family Thomisidae, which in the great majority of its members is a phytophilous one, provides two instances of forms having adopted a cryptic habitat which may have been permanent or only a temporary measure in times of unusual drought. *Xysticus*, though not in other

regions cryptic, is in the Kaokoveld only found beneath the bark of trees (*Ficus damarensis*), while *Hirrius* is invariably found beneath stones.

The Clubionidae, a family of the nomadic group of spiders, is most frequently represented in the Cape Peninsula by the familiar large brown spider, *Palystes castaneus*; the genus *Palystes* is not found in the south-west region at all, but is replaced by an allied form, *Palystella*, which is entirely rupicolous in habitat; *Palystes* lives in small trees and shrubs, while *Palystella* carries the egg-bag attached posteriorly to the abdomen.

The nest of *Lycosa obturata*, found in the Kaokoveld, differs from the usual tubular retreat with an open turret of interwoven grass at the entrance adopted by most species of *Lycosa*; the mouth of the tube built by *L. obturata* is provided with a tightly fitting cork-like trap-door made of silk and mud, and this is completely removed when the spider leaves the burrow; very similar burrows are built by *L. cunicularia* in Algeria, and *L. domicola* living in the Karroo of South Africa. This trap-door habit may have been adopted for obviating the danger of flooding, which must occur very regularly in arid regions subject to sudden downpours of rain on a flat, sun-hardened surface and where there is no even distribution of vegetation to absorb the water. Such deviations from the usual habits of these genera apparently occur only in the Kaokoveld, and not in the adjacent territory of Ovamboland where the rainfall is a more regular one.

Habitat and Rock Formation.—The habitat of a large part of the fauna of South-West Africa, as has been pointed out, is rupicolous; as in many arid regions where surface evaporation is excessive a crust of superficial limestone covers a great part of this region, forming an ideal hiding-place for numbers of different orders of Arachnids and insects. This stone is not hard, and contains small cavities in which the nests are often made; the porosity of the limestone boulders also enables a minimum of moisture to be retained when the surrounding soil has been desiccated by a season of extreme drought. Most limestones contain more water than igneous rocks, and this may account for the prevalence of cryptic fauna wherever limestone outcrops are encountered in South-West Africa. Adult specimens of the common fowl tick, *Argas persicus*, were found in the Kaokoveld under thin flakes of marble at the foot of an escarpment in which parrots (*Agapornis roseicollis*) had built their nests; it was also noticed that the Solifugid, *Solpuga sericea*, was only found in conjunction with outcrops of blue dolomitic rocks. On the

other hand, *Hadogenes taeniurus*, a scorpion which is marked by flattening of the whole body and tail, was found to live only in narrow crevices of gneissic rock.

In Ovamboland, where no rocks occur except in the extreme north, and sandy plains take the place of the Kaokoveld rock formations, *Ammoxenus*, a small spider peculiar to Southern Africa, burrows with great rapidity in the soft sand, recalling the habits of the larvae of Myrmeleonidae; the chelicerae in this spider are modified, being provided with a rastellum composed of strong conical spines.

Habitat and Colour.—In South-West Africa the ground-living Araneids, *i.e.* the cryptic and pseudocryptic groups, are characterised by their uniformity and sobriety of colouring; among the large family of Drassidae there is only one genus, *Setaphis*, which possesses contrasting colours, all the remainder tending toward earthy brown shades. The nomadic group also are for the most part decolorous; the colouring of *Graptartia granulosa* is a good imitation of that of a female Mutillid wasp * which is common in these regions.

Among the phytophilous Thomisidae, *Parabomis* is found living in the flowers of native trees whose colouring it closely resembles. In one case adaptive pigmentary variations in the skin among individuals of the same species were observed. *Hersilia arborea*, which lives between the crevices and on the bark of trees, was often found on the native tree *Commiphora oliveri*, which has a bright yellow wrinkled bark; individuals resting on this tree were of a yellowish colour, in contrast with others of the same species found on the smooth bark of the baobab, which is a dark slate-grey in colour; these latter were all melanic.

A Comparison of the Fauna of South-West Africa with that of Portuguese East Africa.

The ecology of the fauna of the northern part of South-West Africa dealt with in this paper is best illustrated by a comparison with the east coast region, where a collection of Arachnids was made in 1923 by the writer.

Portuguese East Africa is a low-lying country of mixed grass, woodland, and savannah with a high summer rainfall; it is covered in many parts with tropical vegetation composed of large perennial trees such as the maroola, *Sclerocarya caffra*, interlaced with numbers of creepers and lianes such as the wild grape, *Rhoicissus capensis*, and

* *Dolichomutilla guineensis.*

monkey ropes which in some parts form a dense tangle of forest. The cryptic forms are found for the most part in the rich humid mould to which these forests give rise.

In general there is from east to west an increasing total rainfall and an increasing predominance of summer rainfall over that of the winter months. South-West Africa has, in addition to other rock formations, a large superficial limestone deposit which, owing to excessive evaporation, tends to encrust the surface soil ; Portuguese East Africa, on the other hand, is almost without any outcrops of rock, at any rate in the southern part, but is covered with a superficial sandy soil.

As has been shown, the fauna of the western region is predominantly cryptic, while that of the east is predominantly phytophilous. Among the Drassidae, which are a typical ground-living or rupicolous family, 31 species were found living in South-West Africa, while but three species were recorded in Portuguese East Africa. On the other hand, while 22 species of Argiopidae were taken in Portuguese East Africa, only 8 were found in South-West Africa ; both the Drassids in the west and the Argiopids in the east show a great differentiation into species.

A survey of the respective faunas of these two regions shows that the phytophilous Arachnids increase in genera and species from the west coast of South-West Africa across the Kalahari and Transvaal to East Africa ; not only are there a greater number of distinctly differing genera, but the number of species for each genus increases and the numerical proportions of individuals for most species are still greater. Taking the combined genera of Thomisidae and Argiopidae, there occur in the Kaokoveld (western extreme) 12 genera and 14 species, in Ovamboland 16 genera and 20 species, in Portuguese East Africa 23 genera and 43 species. In the nomadic group, Pisauridae, Clubionidae, Lycosidae, the respective numbers of genera for these same regions are :

	K'veld.	Ov'ld.	P.E.A.
Pisauridae . . .	1	3	5
Clubionidae . . .	5	7	11
Lycosidae . . .	3	5	4

or 9 : 15 : 20 for the group as a whole. The nomadic group is therefore also better represented on the east than the west coasts. Among the pseudocryptic fauna the numerical relationship of genera is the reverse of that found in the phytophilous group, the larger number of genera being found in the west, viz. 22 in the Kaokoveld

and Ovamboland, and 13 in Portuguese East Africa ; in the true cryptic group the proportion is still greater, 5 being found in South-West Africa and only 1 in Portuguese East Africa.

Thus the rupicolous and cryptic fauna in the west tends to be replaced by a phytophilous fauna in increasing measure eastwards ; also the distribution of the cryptic fauna is considerably more restricted than that of the phytophilous fauna of East Africa, many genera and species of which have a wide range. While many of the phytophilous members of the East African fauna are found in the west, comparatively few, if any, cryptozoic individuals become established in the eastern region ; genera that are found in both regions have different habitats in their respective regions, *e.g. Platyoides*, a rupicolous Drassid spider, is found beneath the bark of trees in Portuguese East Africa. Among the Zodariidae, which is a predominantly cryptic family, the genera *Hermippus* and probably also *Patiscus* and *Casaetius* live among shrubs in the Eastern region, these being replaced in South-West Africa by the cryptic genera *Cydrela*, *Diores*, and *Caphaeris*.

Among the Myriopods the Geophilomorphous forms live under stones in South-West Africa but beneath the bark of trees in Portuguese East Africa ; the same can be said of *Cormocephalus*, one of the smaller Scolopendrids. Portuguese East Africa is poor in scorpions, a very typical cryptozoic group ; it is here represented by 2 genera and 2 species in contrast with the 6 genera and 15 species taken in South-West Africa ; none of the genera occurring in either region are common to the other.

The difference in general appearance between the fauna of the west and eastern regions is a striking one. In the former the ground-living forms are characterised by their sombre colouring and general uniformity of appearance in contrast to the vividly contrasting colours of such eastern plant-living forms as *Thomisops*, *Camaricoproctus*, and *Platythomisus*, in which a lavish display of greens, whites, reds, and blacks form striking colour effects ; this is also the case among Argiopid spiders in the genera *Argyroepeira* and *Gasteracantha*.

In the cryptozoic forms of South-West Africa there is in general a uniformity of colour and size with very slight sexual dimorphism in contrast with the phytophilous forms of the east, where both these differences are marked ; in the latter region great differentiations of form and colour occur in closely related species, while the males are in most cases smaller and less brilliantly coloured than is the case in the females (*Gasteracantha*).

Conclusions.

The arachnid fauna of South-West Africa, from an ecological viewpoint, can be roughly divided into two groups: (*a*) a cryptic group not dependent on vegetation but associated entirely with a rupicolous environment; (*b*) a phytophilous group directly or indirectly dependent on plant life. The distribution of these two groups is as different as their environment.

The cryptic group, which is the more predominant and typical in South-West Africa, appears to have the more primitive and older fauna. In distribution it is restricted to a region along the west coast of Africa from Angola to the Cape, and does not in general show a disposition to spread to the east coast. In structure the most typical members are characterised by reduction in the number of eyes, replacement of the pulmonary sacs by tracheae, and simplicity of the reproductive organs.

The phytophilous group is poorly represented in South-West Africa, the forms found there being in general those which have a wide distribution in Africa. This group, in contrast to the cryptic group, is dominant in the east, from whence the south-west region receives its fauna; it includes all the species which have a wide distribution in Africa, showing a disposition to establish itself wherever environmental conditions permit. It reveals a far greater differentiation of form, size, and colouring among its members in the east than is found among the cryptic fauna in the west; furthermore its individuals are more complex in structure and more specialised in habits than is the case among individuals of the cryptic fauna.

With regard to the geological history of the arachnid fauna of South-West Africa the cryptic group appear to be the oldest members; in earlier geological time they probably occupied a larger geographical area in Africa than they do to-day, but the centre of their original dispersal remains obscure. The phytophilous group is more recent in origin than the cryptic group, and judging from their relationships in the various regions of Africa entered the continent from the north or north-east, and being dependent on vegetation followed the courses of the great rivers and valleys of Africa; to-day they are widespread throughout Africa, being abundant in the well-watered parts but restricted in arid regions such as South-West Africa.

The adverse climatic conditions of an arid region such as South-West Africa are best countered by a cryptic rupicolous environment; several Arachnids, which in other regions are phytophilous in habit,

are here found adopting—temporarily or permanently—a rupicolous habitat; in other cases, however, phytophilous Arachnids are represented in this region by distinct but closely allied forms which are themselves genuinely rupicolous in habit.

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EXPLANATION OF PLATES.

PLATE XXI.

FIG.
1. *Dresserus fontensis*, ♀.
2. *Scytodes kaokoensis*, ♀.
3. ,, ,, ♀.
4. *Ariadna masculina*, ♂.
5. ,, ,, ♂.
6. *Platyoides alpha*, ♂.
7. ,, *beta*, ♀.
8. *Asemesthes alternata*, ♀.
9. *Setaphis kaokoensis*, ♀.
10. ,, ,, ♂.
11. ,, *lapidaria*, ♀.
12. ,, ,, ♂.
13. ,, *hessei*, ♀.
14. *Trichothyse fontensis*, ♂.
15. *Zelotes radiata*, ♀.
16. *Theuma longipes*, Lawrence, ♀.
17. ,, *microphthalma*, ♀.
18. ,, *funerea*, ♀.
19. *Cydrela otavensis*, ♀.
20. *Caphaeris cordivulva*, ♀.
21. ,, *apophysalis*, ♂.
22. ,, ,, ♂.
23. *Hersilia arborea*, ♀.
24. ,, ,, ♂.
25. ,, *setifrons*, ♀.
26. *Hersiliola fragilis*, ♀.
27. *Stiphropus scutatus*, Lawrence, ♀.

PLATE XXII.

28. *Monoeses debilispina*, ♀.
29. *Parabomis anabensis*, ♀.
30. *Xysticus sagittifer*, Lawrence, ♂.
31. *Philodromus bigibba*, Cambr., ♀.
32. *Olios correvoni nigrifrons*, ♀.
33. *Palystella sex-maculatus*, ♀.
34. *Rhaeboctesis denotata*, ♀.
35. *Lycosa obturata*, ♀.
36. *Pardosa manubriata*, Simon, ♀.
37. *Oxyopedon rostrifrons*, ♀.
38. *Heliophanus semirasus*, ♂.
39. ,, ,, ♂.
40. *Menemerus hypenetes*, ♀.
41. ,, *rubicundus*, ♀.
42. *Mexcala agilis*, ♂.
43. *Solpuga browni*, ♂.
44. ,, ,, ♂.
45. ,, ,, ♂.
46. ,, *furcifera kaokoensis*, ♂.
47. ,, *glabricornis*, ♂.

PLATE XXIII.

48. *Daesia striata*, ♂.
49. *Blossia spinicornis*, ♂.
50. ,, ,, ♂.
51. *Hemiblossia pteroceras*, ♂.
52. *Lisposoma elegans*, ♀. *a*, sternum; *b*, genital operculum; *c*, pectinal lamella.
53. *Lisposoma elegans*, ♀. Chelicera.
54. ,, ,, ♀. Tarsus and tibia of leg I (seen from below); *a*, pedal spur; *b*, median row of spicules.
55. *Lisposoma elegans*, ♀. Tarsus and tibia of leg III (seen laterally); *a*, pedal spur; *b*, "gehstachel."
56. *Lisposoma elegans*, ♀. Tarsus of leg II.
57. *Lisposoma elegans*, ♀. Dentition of movable finger of pedipalp.

PLATE XXIV.

58. *Lisposoma elegans*, ♀.


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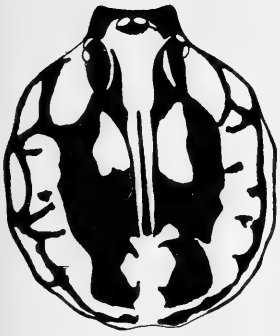
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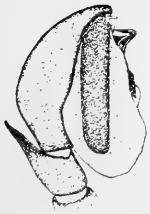
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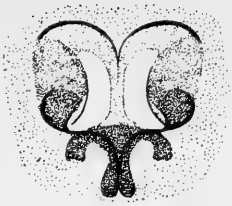
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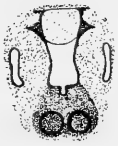
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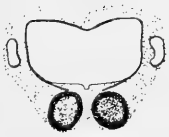
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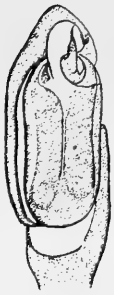
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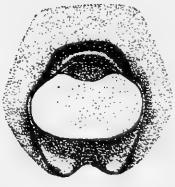
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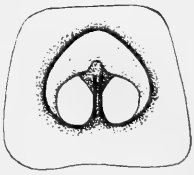
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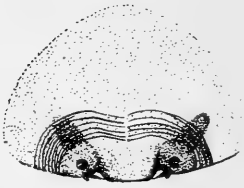
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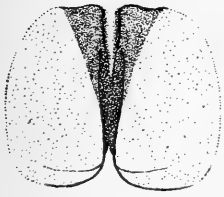

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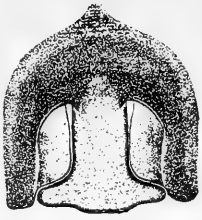

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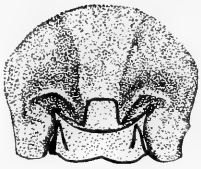

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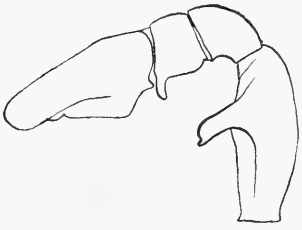

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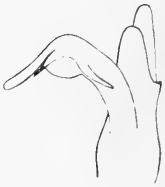

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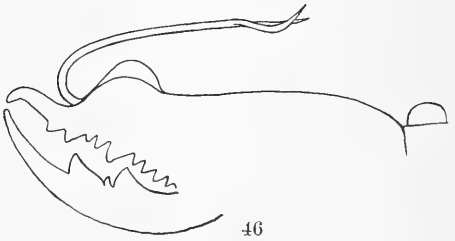

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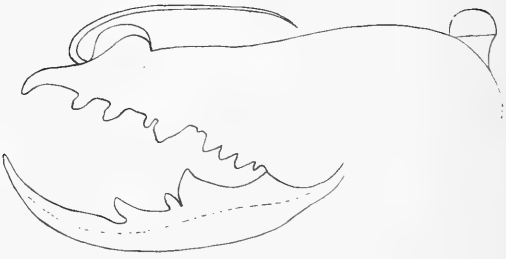

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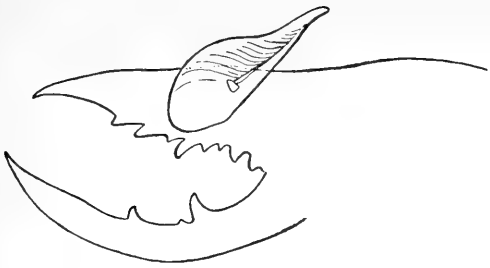

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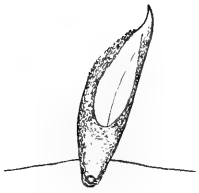

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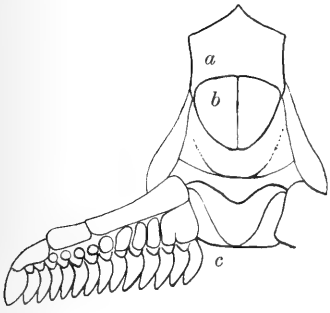

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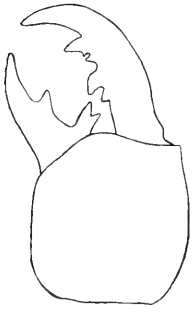

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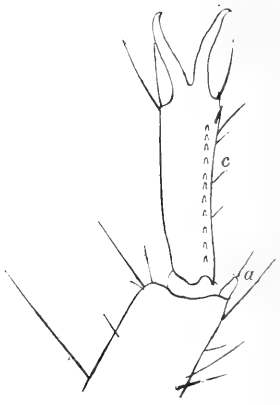

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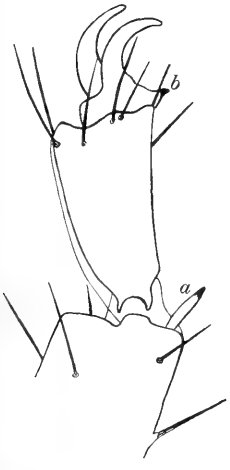

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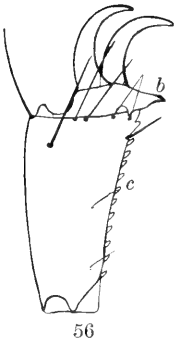

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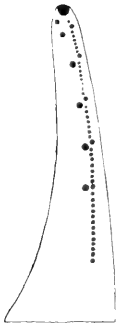

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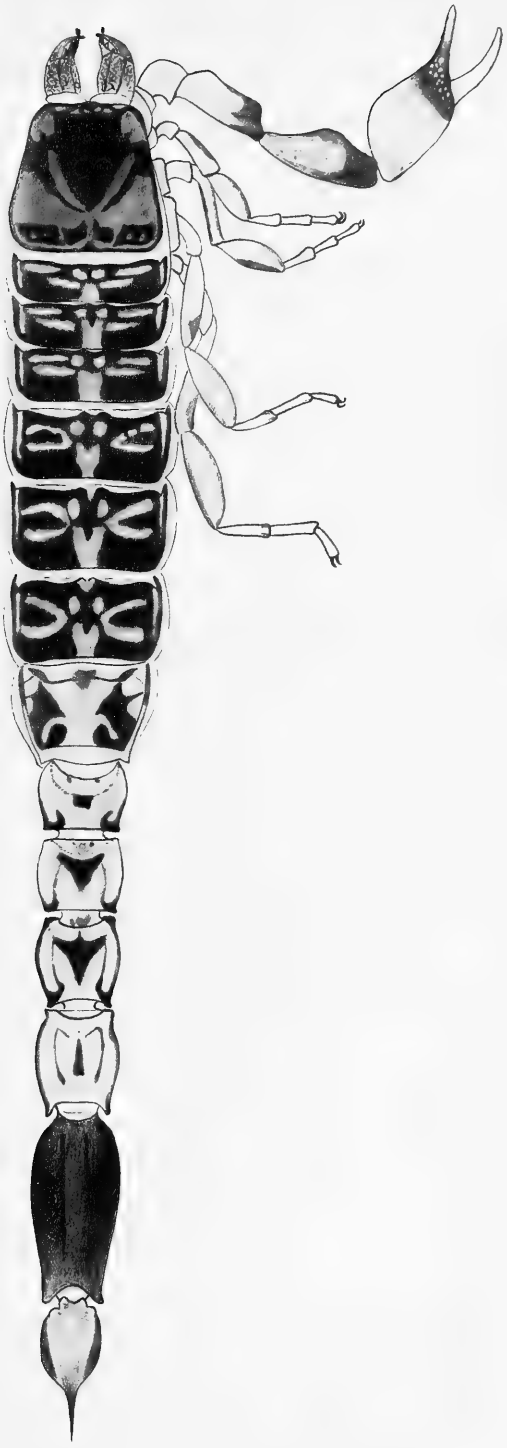

R. F. Lawrence, del. *Neill & Co., Ltd.*

8. *Reports on the Marine Mollusca in the Collections of the South African Museum.*—By J. R. le B. Tomlin, M.A.

(With Plates XXV, XXVI.)

III. Revision of the South African NASSARIIDAE (*olim* NASSIDAE).

Now that it has been found that *Nassa* Bolten (1798)—applied to the group of *Thaididae* more generally known as *Iopas* H. and A. Adams—anticipates Lamarck's usage by a year, we have no option but to discard *Nassa* Lam. The next available name appears to be *Nassarius* Duméril (1806), and this, together with *Nassariidae* for the family, has been in use in literature for some eight or nine years. The matter is very fully set forth in Proc. Malac. Soc. London, vol. xii, p. 82.

I have not attempted to distribute the species into subgenera. The limits of those in use seem to be rather artificial. For convenience of reference the species are placed in alphabetical order, and there is also a complete index at the end, as well as a short bibliography.

As regards geographical range much, I might almost say everything, remains to be done. The fauna of a few favourite and accessible strands is adequately known, mainly of course from dead and more or less beach-worn material. When "live" examples, dredged or otherwise, do turn up, it is frequently a matter of the greatest difficulty to appraise their relationship with the worn types or battered series which constitute all that is hitherto available.

In the ensuing list I have tried to gather together all the published localities, and have added a few which I can vouch for from various sources.

Gen. Nassarius Duméril.

Nassarius algidus (Reeve).

Nassa algida Reeve. Conch. Icon., viii, pl. xxii, figs. 145*a*, *b*, Dec. 1853. Moreton Bay (Strange).
,, ,, ,, F, p. 5. Natal.
,, ,, ,, G, p. 368. Natal.
,, ,, ,, J, p. 111, pl. i, fig. 17. Durban (Burnup).

Types (3) in British Museum.

Smith (J.) discusses the variation in size, colouring and sculpture, of Durban specimens. The South African Museum has a very fresh beach example from Durban (S.A.M., No. 14039) measuring 22 mm. in length, and fine live specimens, from 24–27 mm., dredged in 12–14 fathoms off the Tugela R. (S.A.M., No. A6398). The opercula are not very perfect but closely resemble that of *N. arcularia* figured by Quoy and Gaimard in the "Voyage of the Astrolabe," Atlas Moll., pl. xxxii, fig. 4. Their periostracum is either black or very dark chestnut-brown.

Nassarius arcularius (L.).

Buccinum arcularia L.	Syst. Nat. ed. x, p. 737, 1758.	Loc. unknown.
,, ,, ,,	A, p. 122.	Very common in Natal Bay.
Nassa arcularia L.	E, p. 148.	Rarely found at the Cape.
,, ,, ,,	F, p. 12.	Port Elizabeth, seldom.

There are three from Durban in the British Museum, and M'Clelland has shown me specimens collected in Durban harbour. A very widespread species in the Indian and Pacific Oceans. In the South African Museum there are specimens from Natal, Delagoa Bay and Mozambique Island.

Nassarius babylonicus (Watson).

Nassa babylonica Watson.	J. Linn. Soc., Zool., xvi, p. 366.	
,, ,, ,,	"Challenger" Rep., xv, p. 185, pl. xi, fig. 8, 1886, Philippines, 375*f.*	
,, ,, von Martens.	K, pp. 100, 167, fig., East Africa, 1134–1644 metres.	

A dead shell, in good condition, was dredged by the s.s. "Pieter Faure" 24 miles N. by E. of Cape Natal in 440 fathoms (S.A.M., No. A3445).

Nassarius bicallosus (Smith).

Nassa bicallosa Smith.	J. Linn. Soc., Zool., xii, p. 543, pl. xxx, fig. 1, Sept. 19, 1876.	W. Australia (Brazier); Swan River; Cape Natal.

Nassa laevigata Marrat. On Some Proposed New Forms in the Genus *Nassa*, p. 3, pl. i, fig. 7, 1877. Hab.?

„ *glabella* Marrat (*non* Sow.). *Loc. cit.*

The tablet of three Cape Natal shells in the British Museum is marked underneath by Smith himself as his types, and it may therefore be well formally to declare Natal as the type locality.

The South African Museum has one fresh but dead shell dredged off the Tugela River in 24 fathoms (S.A.M., No. A6399). This species is very close to *algidus* (Rve.) and seems to be mainly differentiated by a regular series of blunt tubercles along the top of the last two whorls. In *algidus* this feature is absent or very nearly so. *N. bicallosus*, in the specimens I have seen, is unicolorous and narrower in proportion to length. *N. algidus* has red streaks and blotches.

Nassarius capensis (Dunker).

Buccinum capense Dunker. Zeitschr. f. Malakozool., iii, p. 110, July 1846. Cape of Good Hope.

„ „ „ A, p. 122. Cape coast, common.

Nassa (*Alectrion*) *pulchella* A. Adams. Proc. Zool. Soc., 1851, p. 108, Dec. 7, 1852. Cape of Good Hope (Mus. Cuming).

„ „ *serotina* A. Adams. *Loc. cit.* Australia (Mus. Cuming).

Buccinum (*Nassa*) *capense* Dunker. C, p. 138. Algoa Bay.

Nassa cerotina Reeve. Conch. Icon., viii, pl. xvi, fig. 107, Dec. 1853 (error for *serotina*).

„ *pulchella* A. Adams. D, p. 4. Port Elizabeth.

„ *cerotina* (" A. Adams ") Reeve. D, p. 4. Port Elizabeth.

„ *capensis* Dunker. F, p. 12. Cape of Good Hope.

„ *serotina* A. Adams. F, p. 12. Simon's Bay, Port Elizabeth.

„ „ „ N, p. 23. Port Alfred.

Alectrion capensis Dunker. P, p. 51. Algoa Bay, Port Alfred, Albany.

„ *cerotina* (" A. Adams ") Reeve. P, p. 52. Port Alfred.

Types of *capensis* (2), *pulchella* (3) and *serotina* (4) are in the British Museum.

The British Museum has a series of 15 received without any name from Krauss, in 1840.

Also seen from East London (Kimberley Museum and British Museum), Jeffreys Bay (Grahamstown Museum), Kalk Bay (Kimberley Museum), Coffee Bay (Grahamstown Museum). The South African Museum has specimens from False Bay, Sandown Bay, Mossel Bay, Algoa Bay, and a very small form which was collected at the mouth of the Tongaat River.

The name *serotina* was applied to the brown and red forms which are unicolorous, but for a light zone at the base of the body whorl. These are certainly colour phases of *capensis*.

Nassarius circumtextus (Martens).

Nassa (*Amycla*) *circumtexta* Martens.	K, p. 27, pl. iii, fig. 18, 1903. Francis Bay, Algoa Bay, Agulhas Bank and Simon's Bay at various depths from 70 to 117 metres.
,, (*Tritia*) *trifasciata* A. Adams.	Proc. Zool. Soc., 1851, p. 113, Apr. 29, 1853. Vigo Bay (M'Andrew).
,, *trifasciata* A. Adams.	F, p. 13. Port Elizabeth.
,, ,, ,,	L, p. 228, pl. iv, fig. 2. Off Nanquas Peak, 11½ m., in 58 f.
,, *analogica* Sowerby.	L, p. 219, pl. iv, fig. 3. Off Cape Infanta, 6½ m., 40 f. mud.
,, *trifasciata* A. Adams.	Q, p. 6. Off Cape Infanta, 3 m., 34 f.; off Cape Barracouta, 10 m., 40 f.

Types of *trifasciata* (3) and of *analogica* (1) in British Museum. Sowerby (*loc. cit.*) queries the Crag fossil, *Nassa labiosa* J. Sow., as conspecific.

The name *N. trifasciata* is preoccupied by a species of Gmelin.

Smith * was undoubtedly right in considering Sowerby's *analogica* a synonym.

Martens queried the identity of his *circumtexta* with *trifasciata*. Probably the Vigo Bay locality is an error.

I have a dead shell given me by Connolly from Camps Bay. The South African Museum has a long series from the Saldanha Bay, False Bay, Agulhas Bank and Algoa Bay areas, 22 to 80 fathoms.

* Ann. Natal Govt. Mus., i, pt. 1, p. 36.

Nassarius coronatus Bruguière.

Buccinum coronatum Brug. Encycl. Méth., Vers, i, p. 277, 1789. Madagascar and Indian Ocean.
„ „ „ A, p. 123. Natal coast, rare.
Nassa coronata Brug. F, p. 12. Natal coast (Krauss).

The British Museum received Natal specimens from Krauss in 1840, and also has specimens from Durban. M'Clelland also has shown me Durban examples.

This species has a very wide range throughout the Indian Ocean and as far as the Philippines.

The South African Museum has specimens from the Natal coast, 14 to 24 fathoms.

Nassarius desmoulioides (Sowerby).

Nassa desmoulioides Sow. L, p. 219, pl. iv, fig. 1, July 8, 1903. Umhloti River-mouth bearing N.W. ½ W., 15½ m., 100 f.
„ „ „ O, p. 36. *Loc. cit.*

The South African Museum has examples from the Agulhas Bank, Algoa Bay and Natal coast, 40 to 124 fathoms, including cotypes from the original locality. Type in British Museum.

Nassarius eusulcatus (Sowerby).

Nassa eusulcata Sow. Marine Invest. S. Africa, ii, p. 94, pl. ii, fig. 8, Sept. 25, 1902. Mouth of Tugela River, N. by W., 18 m., 46 f. mud.
„ „ „ M, p. 373. *Loc. cit.*

Natal coast, 40 to 55 fathoms, including cotypes from the original locality (South African Museum). Type in British Museum.

Nassarius fenestratus (Marrat).

Nassa fenistrata Marrat. On some Proposed New Forms in the Genus *Nassa*, p. 10, 1877. Philippines, Moreton Bay, Mozambique. (M. refers to Reeve's monograph of *Nassa*, pl. vii, fig. 47.)
„ *fenestrata* Marrat. H, p. 5. Natal (Gibbons).

In the South African Museum, labelled Natal.

Durban specimens are in the British Museum. See under *N. marginulatus* Lam.

Nassarius filmerae (Sowerby).

Nassa filmerae Sow. I, p. 2, pl. i, fig. 5, Apr. 2, 1900. Pondoland.
,, ,, ,, M, p. 373. Pondoland.

The single example in the British Museum, received from Sowerby, may be the type, but is not so marked.

Specimens marked cotypes, ex coll. Becker, are in the South African Museum.

Nassarius gaudiosus (Hinds).

Nassa gaudiosa Hinds. Voy. "Sulphur," Zool., ii, p. 36, pl. ix, figs. 16, 17, 1844. Straits of Malacca.
,, ,, ,, M, p. 373. Umkomaas (Burnup).

Specimens are in the British Museum labelled Natal (Burnup).

A series of five in the British Museum marked Str. of Macassar (Belcher) and bearing a label in Hinds' writing beneath the tablet may probably be accounted types.

Very widely distributed in the east and in the Pacific.

Nassarius gemmulatus (Lamarck).

Buccinum gemmulatum Lam. Anim. sans Vert., vii, p. 271, Aug. 1822. Hab. ?.

Nassa clathrata Lam. Tableau Encycl. Méth., Vers., iii, pl. 394, fig. 5*a*, *b*, 1827.

,, *gemmulata* Lam. M, p. 373. Durban.

A common Indian Ocean species.

Nassarius horridus (Dunker).

Buccinum horridum Dunker. Zeitschr. f. Malakozool. iv, p. 59, Apr. 1847.

,, *scabrum* Dunker (*non* Anton, 1839). *Op. cit.*, iii, p. 171, Nov. 1846. *Patria ignota.*

Nassa horrida Dunker. H, p. 5. Natal.

Durban (British Museum and H. M'Clelland). The shells are exactly like New Caledonian examples.

Nassarius kochianus (Dunker).

Buccinum kochianum Dkr. Zeitschr. f. Malakozool., iii, p. 111, July 1846. Cape of Good Hope.

,, *signatum* Dkr. *Op. cit.*, iv, p. 61, Apr. 1847. East Indies.

,, *kochianum* Dkr. A, p. 122. Cape coast.

,, *regulare* Küster. Syst. Conch. Cab. (2), Lief. 164, p. 68, pl. xii, figs. 23, 24, 1858. Cape of Good Hope (Krauss).

Nassa quantula Gould. Proc. Boston Soc. N. Hist., vii, p. 331, Sept. 21, 1860. S. Simon's Bay (Stimpson).

,, *spurca* Gould. *Op. cit.*, p. 332, Sept. 21, 1860. S. Simon's Bay.

Buccinum (*Nassa*) *kochianum* Dkr. C, p. 138. False Bay and Algoa Bay.

Nassa quantula Gould. C, p. 139. False Bay.

,, *spurca* Gould. C, p. 139. False Bay.

,, *coccinea* (A. Ad. MS.) Sow. D, p. 4. Port Elizabeth.

,, ,, ,, ,, F, p. 12 and H, p. 5. Cape coast generally.

,, *crawfordi* Sow. F, p. 13, pl. iv, fig. 86, 1892. Port Elizabeth.

,, *kochiana* Dkr. H, p. 5. Table Bay (Tryon).

,, *coccinella* Sow. (*non* Lam.). H, p. 5. Algoa Bay (Gibbons).

,, *incrassata* Sow (*non* Müller). I, p. 3. Pondoland.

,, (*Hima*) *crawfordi* Sow. K, p. 28. Francis Bay.

,, *crawfordi* Sow. N, p. 23. Port Alfred (Turton).

,, *poecilosticta* Smith. N, pp. 23, 33, pl. ii, fig. 16, July 11, 1904. Port Alfred (Turton).

,, *coccinea* (A. Ad.) Sow. N, pp. 23, 33, as a synonym of *poecilosticta*.

Alectrion quantula Gould. P, p. 51. Port Alfred (Turton).

,, *poecilosticta* Smith. P, p. 51, as a synonym of *quantula*.

,, *crawfordi* Sow. P, p. 51. Port Alfred (Turton).

,, *kochiana* Dkr. P, p. 51. Algoa Bay; Port Alfred (Turton).

I do not think there can be any doubt about this extensive synonymy; a species so variable in size, coloration and build is sure to be described many times over. The earliest name for it is Dunker's *Buccinum kochianum*, and Krauss correctly called it so two years later.

Gould's *spurca* is the colour phase with a single dark peripheral band; *coccinea* Sow. is the unicolorous orange or pinkish phase; *crawfordi* Sow. has a varying number of brown spiral bands—the types have lost almost all trace of spiral sculpture through beach abrasion; *incrassata* was one of Sowerby's numerous misidentifications with European molluscs—he recants it in H, p. 5; *coccinella* Lam. (=*incrassata* Müll.) was also a misidentification; *B. signatum* was described as new under the idea that it came from the E. Indies. The error of locality is corrected by Tryon in Man. Conch., iv, p. 57.

The types of *poecilosticta* Smith (4) and of *crawfordi* Sow. (3) are in the British Museum, which also has a specimen of this species received from Krauss, unnamed, in 1840.

It is common apparently on the whole coast.

The South African Museum has examples from False Bay to Algoa Bay and Pondoland.

Nassarius kraussianus (Dunker).

Buccinum kraussianum Dkr. Zeitschr. f. Malakozool., iii, p. 111, July 1846. Cape of Good Hope.
,, ,, ,, A, p. 123. Cape and Natal coasts.
Nassa küsteri Krauss *in lit.* A, p. 123, quoted in synonymy.
Nassa (*Eione*) *orbiculata* A. Adams. Proc. Zool. Soc., 1851, p. 102, Dec. 7, 1852. Hab. ? (Mus. Cuming).
Buccinum (*Nassa*) *kraussianum* Dkr. C, p. 139.
Nassa kraussiana Dkr. D, p. 4. Port Elizabeth.
,, ,, ,, F, p. 12. Common at Port Elizabeth.
,, ,, ,, N, p. 23. Port Alfred (Turton).
Alectrion kraussiana Dkr. P, p. 52. Albany, Port Elizabeth, Port Alfred.

The type of *orbiculata* is in the British Museum, which also has one (Port Natal) received without name from Krauss in 1840, and series from Delagoa Bay, Algoa Bay, Buffalo River. I have seen it also from Jeffreys Bay and Coffee Bay (Grahamstown Museum).

The South African Museum has it from Algoa Bay, off East London,

43 fathoms, Natal coast and Delagoa Bay; and a specimen said to have been picked up in Table Bay.

Nassarius lentiginosus (A. Adams).

Nassa (*Alectrion*) *lentiginosa* A. Ad. Proc. Zool. Soc., 1851, p. 105, Dec. 7, 1852. Masbate, 7 f. (Mus. Cuming).
,, ,, ,, ,, M, p. 373. Durban (Burnup).

Types (3) in British Museum (Mus. Cuming), which also has examples from Natal.

Indian Ocean to Philippines.

Nassarius margaritifer (Dunker).

Buccinum margaritiferum Dkr. Zeitschr. f. Malakozool., iv, p. 60, Apr. 1847. *Patria ignota.*
Nassa (*Tritia*) *costellifera* A. Ad. Proc. Zool. Soc., 1851, p. 113, Apr. 29, 1853. Curimas (Mus. Cuming).
,, *margaritifera* Dkr. M, p. 373. Durban.

Types (3) of *costellifera* in British Museum.

Indian Ocean to Philippines.

Nassarius marginulatus (Lamarck).

Buccinum marginulatum Lam. Anim. sans Vert., vii, p. 278, Aug. 1822. Mediterranean, on coasts of Barbary and Naples.

This species is claimed as South African by Krauss. There is, however, no reason to doubt the localities of Lamarck, and Kobelt is probably correct in placing it in the synonymy of *N. reticulatus* (L.).

Sowerby (F, p. 12) quotes Krauss' record and speaks of *N. marginulata* as a common Indian Ocean shell. One can only surmise what species Sowerby was thinking of: Krauss quotes Kiener's figure of *Buccinum marginulatum* (Coq. Viv., *Buccinum*, pl. xxix, fig. 117) and adds the Sunda Islands to Lamarck's Mediterranean localities. This figure is certainly a non-European shell and Kobelt (Iconogr. Europ. Meeresconch., i, p. 136) remarks that he has never seen a Mediterranean shell like it.

From Krauss' short description of his Natal shell I have little doubt that it was *fenestratus* (Marrat).

Nassarius mucronatus (A. Adams).

Nassa mucronata A. Ad. Proc. Zool. Soc., 1851, p. 105, Dec. 7, 1852. Dumaguete, Island of Negros, 11 f. (Mus. Cuming).

Types (2) in British Museum.
Collected by M'Clelland at Durban.
Indian Ocean to Philippines, and New Caledonia.

Nassarius myristicatus (Hinds).

Nassa myristicata Hinds. Voy. "Sulphur," ii, p. 36, pl. ix, figs. 10, 11, 1844. Cape of Good Hope.
,, ,, ,, A, p. 123 (quoting Hinds).
,, *fuscata* A. Ad. Proc. Zool. Soc., 1851, p. 112, Dec. 7, 1852. Hab. ? (Mus. Cuming).
,, *myristica* Sowerby. F, p. 12 (by error).

Types of *myristicata* and *fuscata* in British Museum, the former marked as received from Belcher.

Nothing further has ever transpired as to this species and its habitat. Tryon makes one of his grotesquely bad shots in suggesting its identity with the W. African *tritoniformis* Kiener.

It is much more evidently akin to a small Panama group which includes *stimpsoniana* C. B. Adams and *dentifera* Powis, and it was very satisfactory, after some search at the British Museum, to find a tablet of three from the Mus. Cuming labelled "Panama, H.C." (*i.e.* Hugh Cuming). There is, therefore, evidence that the Cape locality originated with the notoriously unreliable Belcher, and that the South African list need no longer be cumbered with this name.

Nassarius natalensis (Smith).

Nassa natalensis Smith. Proc. Malac. Soc. London, v, p. 373, pl. xv, fig. 6, Oct. 31, 1903. Natal (Ponsonby).
sturmii Rve. (*non* Phil.). Conch. Icon., viii, pl. xxii, figs. 148*a*, *b*, Dec. 1853.

Types (2) in British Museum, which also has three specimens of Reeve's *sturmii* (Mus. Cuming).

Nassarius pictus (Dunker).

Buccinum pictum Dkr. Zeitschr. f. Malakozool., iii, p. 172, Nov. 1846. *Indiae orientales?*

Nassa filosa (Gray MS.) Reeve, Conch. Icon., viii, pl. vi, figs. 35*a*, *b*, Dec. 1853. Cagayan, 25 f. (Mus. Cuming).

,, *picta* Dkr. H, p. 5. Natal (Gibbons).

,, *filosa* Rve. M, p. 373. Durban (Burnup).

Types of *pictus* (1) and of *filosa* (2) in British Museum.

Durban examples are in the British Museum and I have seen others in M'Clelland's collection from the same locality.

Indian Ocean to Philippines, and in Polynesia.

Nassarius plebeculus (Gould).

Nassa plebecula Gould. Proc. Boston Soc. Nat. Hist., vii, p. 332, Sept. 1860. Ousima (Stimpson).

,, *producta* Sow. H, p. 6, pl. viii, fig. 4, 5, 1897. Durban.

Type of *producta* in British Museum. It is a poor, discoloured specimen which never ought to have been used for the foundation of a new species, and looks as if it might have been derived from ballast.

N. plebeculus was described from Japan and seems to have a very wide Polynesian range. I have also seen live specimens from Mauritius. Probably *balteatus* Pease is the same.

Nassarius plicatellus (A. Adams).

Nassa (*Alectrion*) *plicatella* A. Ad. Proc. Zool. Soc., 1851, p. 111, Dec. 7, 1852. Wallwich [*sic*] Bay (Mus. Cuming).

,, *plicatella* A. Ad. C, p. 138. Walfisch Bay: rather widespread northwards on the west coast.

,, ,, ,, ,, F, p. 12. Natal.

Types (2) in British Museum labelled "Walwich Bay" (Mus. Cuming).

Table Bay, dead (South African Museum).

Nassarius plicosus (Dunker).

Buccinum plicosum Dkr. Zeitschr. f. Malakozool., iii, p. 111, July 1846. Cape of Good Hope.
,, ,, ,, A, p. 122. Cape.
Nassa speciosa A. Ad. Proc. Zool. Soc., 1851, p. 100, Dec. 7, 1852. Hab. ? (Mus. Cuming).
,, *plicosa* Dkr. D, p. 4. Port Elizabeth.
,, ,, ,, F, p. 12. Port Elizabeth.
,, (*Arcularia*) *plicosa* Dkr. K, p. 26. Francis Bay, Algoa Bay, Simon's Bay, 70 to 100 metres.
,, *speciosa* A. Ad. N, p. 23. Port Alfred (Turton).
Alectrion plicosa Dkr. P, p. 52. Simon's Bay (Stimpson); Port Alfred (Turton).
Nassa (*Alectrion*) *plicosa* Dkr. Q, p. 6. Off Cape Barracouta, Cape Infanta and Sebastian Bay, in deep water.

Types (3) of *speciosa* in British Museum (Mus. Cuming).

There are specimens from Port Elizabeth in the British Museum and from Simon's Bay—dredged in 1847 by the "Rattlesnake." Off Cape St. Blaize, 40 fathoms (S.A. Mus.)

The South African Museum has a long series from the Saldanha Bay, Table Bay, False Bay, Agulhas Bank, Algoa Bay, Pondoland and Natal areas, low-tide to 100 fathoms.

Nassarius pullus (L.).

Buccinum pullus L. Syst. Nat., ed. x, p. 737, 1758.
Nassa sulcifera A. Ad. Proc. Zool. Soc., 1851, p. 98, Dec. 7, 1852. Algoa Bay (Mus. Cuming).

Type of *sulcifera* in British Museum.

N. sulcifera has remained unique ever since it was first described, and the records in C, p. 138, and in F, p. 13, are copied from A. Adams.

I have carefully studied the type; it is obviously a monstrosity due to early damage; the first five whorls are those of a young *pullus* with a slight tendency to scalariformity; the last two are abnormally expanded and have a shallow channelling round the upper part. The sculpture of the last two whorls is mainly spiral, the longitudinals which are familiar on a normal *pullus* being obsolete at intervals.

I have shown the shell to several other conchologists and all are unanimous in referring it to *pullus*. It is curious that this should be the only record of *pullus* from the Cape. It and *arcularius* have an equally wide eastern and Polynesian range.

Nassarius pyramidalis (A. Adams).

Nassa (*Desmoulea*) *pyramidalis* A. Ad. Proc. Zool. Soc., 1851, p. 113, Apr. 29, 1853. Hab. ? (Mus. Cuming).
Desmoulea pyramidalis A. Ad. D, p. 4. Port Elizabeth.
Demoulia pyramidalis A. Ad. F, p. 13. Port Elizabeth.
Nassa pyramidalis A. Ad. N, p. 23. Port Alfred (Turton).
Alectrion pyramidalis A. Ad. P, p. 52. Port Alfred (Turton).

The single type specimen in the British Museum was subsequently labelled " Japan "—a locality which we know now to be erroneous. It is not obvious why it has been so persistently assigned to *Demoulia* Gray. Its nearest relation is *filmerae* Sow., which no one has ever thought of putting in *Demoulia*.

There are examples in the South African Museum from Agulhas Bank and Algoa Bay, 10 to 27 fathoms.

Nassarius rufulus (Kiener).

Buccinum rufulum Kiener. Coq. Viv., *Buccinum*, p. 89, pl. xxiv, fig. 95, 1834. Mediterranean ?
Nassa rufula Kiener. H, p. 5. Natal.

There is now no means of ascertaining what Sowerby's shells really were, but it is in the highest degree improbable that they were this W. Australian species unless derived from ballast. Without further evidence it cannot be admitted to the South African list.

Nassarius suturalis (Lamarck).

Buccinum suturale Lam. Anim. sans Vert., vii, p. 269, Aug. 1822. Hab. ?

The South African Museum has a very fresh specimen of this from Durban (No. 4741).

A widely distributed shell and recorded from Mauritius.

Gen. Demoulia Gray.

Demoulia Gray. Ann. Nat. Hist., i, p. 29, March 1838, as a new genus of *Buccinidae*, the type species being *D. pulchra* Gray from Sierra Leone.

In 1847 Gray altered the spelling of his name to *Desmoulea* (Proc. Zool. Soc., 1847, p. 140), but this was *ultra vires* under the International Rules and the first name must stand.

This is a small genus represented by half a dozen species all told, of which two are South African.

Demoulia abbreviata (Gmelin).

Buccinum abbreviatum Gmelin. Syst. Nat., ed. xiii, p. 3478, 1791. Indian Ocean.

Nassa globosa Sow. Gen. Rec. and Foss. Shells, pt. 25, pl. ccxlv, fig. 6, 1825. (No locality.)

Desmoulea abbreviata Chem. C, p. 139. Cape.

,, ,, Wood. D, p. 4. Port Elizabeth.

Demoulia ,, ,, F, p. 13. Port Elizabeth.

Nassa (*Desmoulea*) *abbreviata* Chem. K, p. 28. Francis Bay, 80 to 100 m.

,, (*Demoulia*) *abbreviata* Gmel. N, p. 23. Port Alfred (Turton)

Desmoulea abbreviata Gmel. P, p. 52. Port Alfred (Turton).

I have also seen it from Gordon's Bay (Kimberley Museum).

There is a series from False Bay to Algoa Bay and Natal, 18 to 52 fathoms, in the South African Museum.

Demoulia retusa (Lamarck).

Buccinum retusum Lam. Anim. sans Vert., vii, p. 270, Aug. 1822. Hab. ?

Nassa ventricosa Lam. Tableau Encycl. Méth., Vers, iii, pl. cccxciv, figs. 3*a*, *b*, 1827. (No locality.)

Desmoulea retusa Lam. C, p. 139. Cape.

,, ,, ,, D, p. 4. Port Elizabeth.

Demoulia ,, ,, F, p. 13. Port Elizabeth.

Nassa ,, ,, N, p. 23. Port Alfred (Turton).

Desmoulea ,, ,, P, p. 52. Algoa Bay, Port Alfred, Port Natal.

Tryon (Man. Conch., iv, p. 245) erroneously assigns *N. ventricosa* Lam. to *N. mutabilis* L. He evidently looked at fig. 4 on pl. 394, instead of fig. 3.

The South African Museum has it from False Bay, Mossel Bay, Agulhas Bank and the Zululand coast, 5 to 55 fathoms.

The following species from Tertiary and recent deposits have been recorded or are in the South African Museum collections :

Nassarius arcularius. 375 feet above sea-level at Umgeni, Durban.
,, *coronatus.* Durban.
,, *kochianus.* Raised beach between mouths of Sunday's and Koega Rivers.
,, *kraussianus.* Same locality as *kochianus* ; near Redhouse Station, 7 miles from mouth of Zwartkops River ; Pleistocene deposits at Port Elizabeth (Tr. Geol. Soc. S. Afr., 1909, xii, p. 112) ; raised beaches at mouths of Keurbooms and Little Brak River, and deposits at mouth of Knysna River (Rep. Geol. Comm., C.G.H., 1899, p. 61 and 1905, p. 293) ; excavations for grain elevator and bridges at Durban and Congella.
,, *plicatellus.* Raised beach at Geelbek, Saldanha Bay.
,, *plicosus.* Tertiary limestone at Hoetjes Bay (Saldanha Bay).

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INDEX OF SPECIFIC NAMES.

Those regarded as synonyms or as erroneously included in the S. African fauna are in italics, and as regards termination are left as quoted.

IV. Families TEREBRIDAE, COLUMBARIIDAE, THAIDIDAE, ARCHITECTONICIDAE.

TEREBRIDAE.

There is nothing of very special interest to record in this family. All the species mentioned have been reported from South Africa before, but our records of *Terebra* are so scanty that any additional information is worth chronicling.

Terebra affinis Gray.

T. affinis Gray. Proc. Zool. Soc., 1834, p. 60 (25th Nov. 1834).

Natal: previously known from Durban (Burnup).

T. evoluta Deshayes.

T. evoluta Desh. Proc. Zool. Soc., 1859, p. 292 (Oct. 1859).

Umhloti River, N. by E., 2 miles, 27 fathoms: Durban, where it was previously found by Burnup.

T. fictilis Hinds.

T. fictilis Hinds. Thes., i, p. 183, pl. xlv, figs. 109, 110 (Jan. 15, 1845).

Durban, whence it is also recorded by Sowerby: the South African Museum also has a series of "live" shells labelled Natal.

T. longiscata Deshayes.

T. longiscata Desh. Proc. Zool. Soc., 1859, p. 294 (Oct. 1859).

O'Neil Peak, N.W.$\frac{1}{4}$W., 9 miles, 95 fathoms. Durban (Sowerby).

T. laevigata Gray.

T. laevigata Gray. Proc. Zool. Soc., 1834, p. 61 (25th Nov. 1834).

Natal, whence Sowerby also records it.

T. nebulosa Sowerby.

T. nebulosa Sow. Tankerville Cat., App., p. xxv, 1825.

Natal. Durban (Sowerby).

COLUMBARIIDAE nov. fam.

The group-name *Columbarium*, when described by Martens in Conchol. Mittheilungen ii, Hefte i and ii, p. 105, 1881, was assigned as a subgenus to *Pleurotoma*, and we find it in the same family in his paper on the Gastropods * of the Tiefsee-Expedition, published in 1903.

Much more recently Dall adopts the same classification in his synopsis † of the recent and fossil groups of the *Turridae*.

In 1921, however, Peile was able to examine complete radulae of *C. pagoda* (Lesson), and reported that its true position was near the *Muricidae*.‡ Previously in 1881, Schacko § had figured two teeth supposed to come from Martens' new species *spinicincta*, but Peile is surely right in supposing these figures to represent something crustacean.

The protoconch of *Columbarium* is smooth, bulbous and two-whorled, remarkably similar to that of *Neptunea despecta* (L.)

The operculum has an apical nucleus, not subapical as in the typical group of the *Muricidae*, and herein suggests comparison with the *Fusinidae* or with the genus *Colus* and others in the *Buccinidae*.

The *Columbarium* operculum, however, is not unguiform in shape, but pear-shaped, narrowing very regularly and rapidly on either side to an acute point.

I venture to suggest that under the circumstances it will be better to establish a family *Columbariidae* with near relationship on one side to the *Muricidae*; a more remote one possibly on the other side to the *Buccinidae*.

* Wiss. Ergebn. Deutsch. Tiefsee-Exp., vii, Lief. i, p. 92.

† Proc. U.S. Nat. Mus., liv, p. 324, 1918.

‡ Proc. Malac. Soc. Lond., xv, p. 13, fig. 1.

§ Conchol. Mitth., tom. cit., pl. xxiv, figs. 1–2.

Columbarium formosissimum n. sp.

(Plate XXV, fig. 1.)

Shell with the usual bulbous, smooth protoconch of 2 whorls, and 8 others all white : whorls with an extremely acute infra-median keel with obtuse triangular projections at right angles to the axis, there being 10 to 11 of these on each of the last 2 whorls : a second keel appears on the lower part of the body-whorl at the insertion of the peristome, and about two-thirds of the way down between upper and lower keel is a third, which has more the character of a raised spiral thread, with traces of less conspicuous threads both above and below ; shell imperforate ; canal perfectly straight, 21 mm. long, encircled by a series of regular, oblique spiral threads ; the area on the whorls between suture and infra-median keel is smooth except for a close succession of wavy growth-lines. Aperture small, rather irregularly piriform. Operculum broadly piriform, tapering sharply to an acute nuclear apex.

Long., 47 mm. ; diam. max., 11 mm.

Hab., Cape St. Blaize, N. by E.$\frac{1}{4}$E., 65 miles, 90 fathoms, living (Type : S.A.M., No. A3501) ; Cape Seal, N. by W.$\frac{1}{2}$W., 55 miles, 87 fathoms, dead (S.A.M., No. A3499) ; Cape St. Francis, N.E., 29 miles, 75 fathoms, living (S.A.M., No. A3500); Glendower Beacon (near Port Alfred), N.$\frac{1}{2}$W., 16 miles, 66 fathoms, dead (S.A.M., No. A3498).

Columbarium natalense n. sp.

(Plate XXV, fig. 2.)

This shell bears considerable resemblance to *C. canaliculatum* Martens,* but is not canaliculate at the suture. There are 12 upturned spines on the shoulder keel on each of the last 2 whorls ; between the suture and this keel are 3 broad, equally spaced spiral cords and 4 spiral threads, the latter being closer together and crossing the bases of the spines ; a second less prominent keel encircles the lower part of the body-whorl, starting from the insertion of the peristome ; between this and the row of spines are 4 spiral cords, and below this the shell is regularly ornamented with spirals to the base of the canal ; a scaly effect is given to most of the shell by a series of fine axial raised threads ; these, however, are very easily abraded and therefore appear irregular. The bulbous protoconch is smooth and white, the rest of the shell brownish. Aperture almost circular.

* Wiss. Ergebn. Deutsch. Tiefsee-Exp. vii, Lief. 1, p. 92, pl. ii, fig. 7.

Long., 37 mm. ; diam. max., 11 mm.

Hab., Cape Natal, W.$\frac{3}{4}$N., 12 miles, 85 fathoms, one dead shell (S.A.M., No. A3497).

The specimen is not quite perfect, hence the gap below the aperture.

THAIDIDAE.

Latiaxis capensis n. sp.

(Plate XXVI, fig. 3.)

A beautiful white shell of the *deburghiae* type, but smaller, more compact, with the laminated processes of the coronet pointing upwards and gradually recurved over the subsutural area. The shell is turreted, with a protoconch of about 2 whorls, and 6 other whorls. There is a series of triangular laminae—as mentioned above—round the shoulder of each whorl, some 10 in number on the last and last but one, leaving a sort of parapet between these and the suture. The laminae continue downwards across the whorl as obtuse, irregular, rather inconspicuous ridges. The whole shell is spirally ridged from the periphery upwards ; below the periphery the spirals become very much broader and flatter.

Shell with a funnel-shaped umbilicus, the columella being prolonged round it on the side away from the aperture in an arcuate series of imbricated scales. Canal narrow, recurved, 3 mm. long. Aperture rather small, measuring 8 mm. by 5 mm.

Long., 21 mm. ; diam. max., 13 mm.

Hab., Sandy Point, N.$\frac{1}{4}$E., 10 miles, 95 fathoms, one specimen (S.A.M., No. A3522).

ARCHITECTONICIDAE.

Architectonica perspectiva (L.).

Trochus perspectivus L. Syst. Nat., ed. x, p. 757, 1758.

A common Indian and Pacific Ocean species which just reaches the Cape. Has been recorded for Natal. Dredged by the " Pieter Faure " as follows :

Umvoti River, N. by W.$\frac{1}{2}$W., 4 miles, 27 fathoms.

Cape Natal, W. by N., 4 miles, 47 fathoms.

Cape Vidal, 9 miles, 90 fathoms.

The South African Museum also has this species from Delagoa Bay.

A. reevei (Hanley).

Solarium reevei Hanley. Proc. Zool. Soc., 1862, p. 204, 1862.

Gt. Fish Point, 100 fathoms.
New to the South African list.

Heliacus Orbigny, 1842.

Gray in Proc. Zool. Soc., 1847, p. 151, gives his own genus *Torinia* precedence, quoting it as of 1840 and 1842. These two references are to different editions of the "Synopsis of the Contents of the British Museum," and are fully explained by Iredale in Proc. Malac. Soc. (London), x, pp. 294–309. The 1840 usage of *Torinia* is a *nomen nudum*; the 1842 edition gives a short comparative account of operculum only, quoted on p. 308. It hardly seems a sufficient diagnosis on which to found a genus, and the reasons for rejection given by Iredale on p. 301 may well be applied to this case at any rate.

Heliacus hybridus (L.)

Trochus hybridus L. Syst. Nat., ed. x, p. 757, 1758.

Tongaat.

H. variegatus (Gmelin).

Turbo variegatus Gm. Syst. Nat., ed. xiii, p. 3608, 1791.

Tongaat.

H. asper (Hinds).

Solarium asperum Hds. Proc. Zool. Soc., 1844, p. 23, 1844.

This species was dredged dead in the Straits of Makassar. Two have been taken by the "Pieter Faure," both dead, in fairly deep water, viz.:

Cape Natal, W. by N., 6 miles, 54 fathoms, a perfect specimen.

Umhloti River, N.N.W., 3 miles, 27 fathoms, a broken shell.

These have both been compared with Hinds' type specimen in the British Museum.

H. africanus Bartsch.

Heliacus africanus Bch. U.S. Nat. Mus. Bull. 91, p. 123, pl. xxiv. figs. 1, 3, 5, 28th July 1915.

This is the *Heliacus* that has been frequently recorded as *dorsuosus*

Hinds and seems widely distributed in South Africa. It is unquestionably very closely related but can, I think, be discriminated. The two peripheral keels in *dorsuosus* are more nearly of a size and between them runs a distinct spiral line, varying in degree from a raised thread to quite a strong beaded cord. In *africanus* the lower keel is generally the smaller and stands out less, and there is no intercarinal line.

The beading in *dorsuosus* is throughout very regular in size and shape, the beads or tubercles being mainly elongate-oblong; in *africanus* they are elongate, but rounded elongate, and by no means so regular in size.

The form mentioned by Bartsch on p. 124 with "an umbilicus fully twice as wide" as the type of *africanus* is puzzling, but seems to grade into the type. Much more material is needed. It is very flat and has the beading, at any rate, on the body-whorl, even more narrowly elongate than *dorsuosus*, but the beads are rounded at the narrow ends and not rectangular, as already noted in typical *africanus*.

The South African Museum has specimens of the type form from Tongaat.

Heliacus sp.

A very minute specimen was dredged in 22 fathoms off Gt. Fish Point.

Heliacus petasus * n. sp.

(Plate XXVI, fig. 4.)

Shell thin, discoidal, very flat, pale cream-coloured, semi-transparent; protoconch white, smooth, two-whorled; there are six other whorls, the last acutely carinate, all ornamented with irregularly spaced, raised tubercled spirals, both tubercles and spirals varying much in degree; there is a partial arrangement of one fine thread between each pair of tubercled spirals, but it is frequently varied; there are seven of the larger spirals on the last whorl. Umbilicus large and crenulate throughout, with a maximum diameter of 7 mm.

The base of the shell is slightly concave towards the periphery and more regularly sculptured; outside the umbilical crenulation is a strongly tubercled spiral ridge, and next to this two more threadlike tubercled spirals; the rest of the base is marked with plain or almost plain spirals, which become finer and closer together as they approach

* A broad-brimmed hat.

the periphery ; in the type there are twelve of these altogether, the first two being particularly broad and flat.

Aperture shaped very much like the section of a valve of *Hemicardium cardissa* in miniature.

Alt., 5 mm. ; diam. max., 16 mm.

Hab., Scottburgh, dredged in 92 fathoms, one dead (S.A.M., No. A3579).

The only recent species that bears any resemblance to this is *dilectus* Deshayes, described in " Cat. Moll. Ile de Réunion," p. 68, pl. ix, figs. 3–6, but the two species differ in size, proportions and details of sculpture.

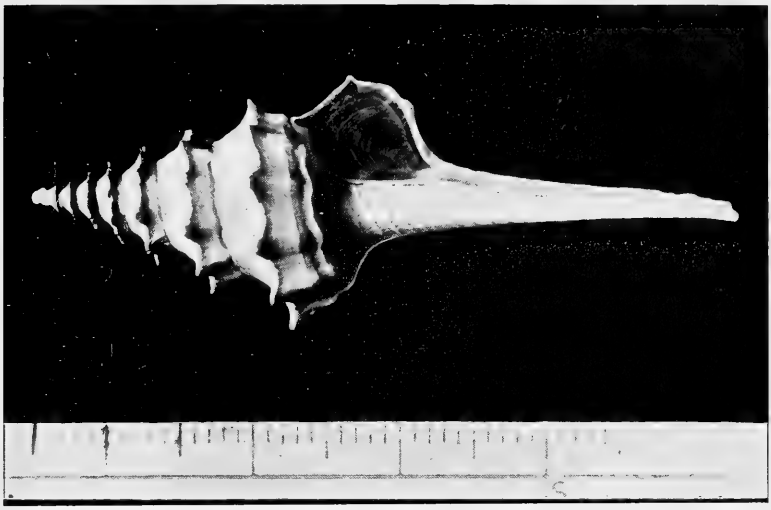

FIG. 1.—*Columbarium formosissimum* n. sp.

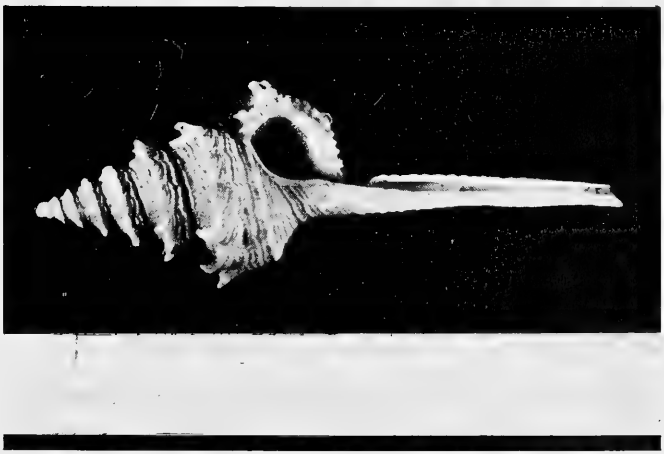

FIG. 2.—*Columbarium natalense* n. sp.

A. E. Salisbury, photo. *Neill & Co., Ltd.*

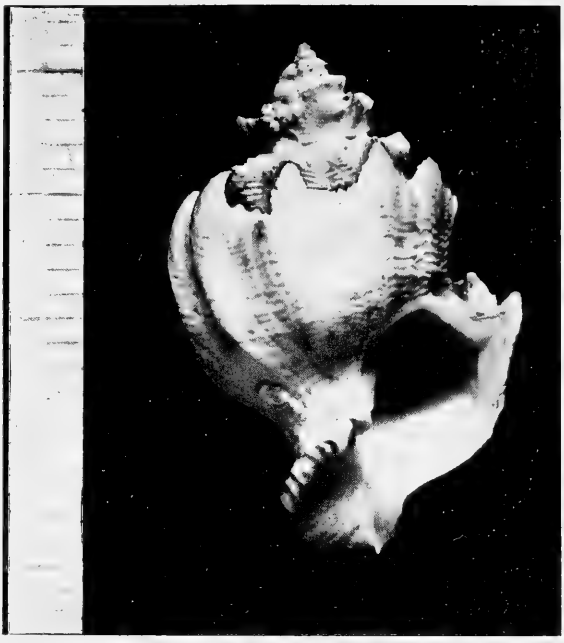

FIG. 3.—*Latiaxis capensis* n. sp.

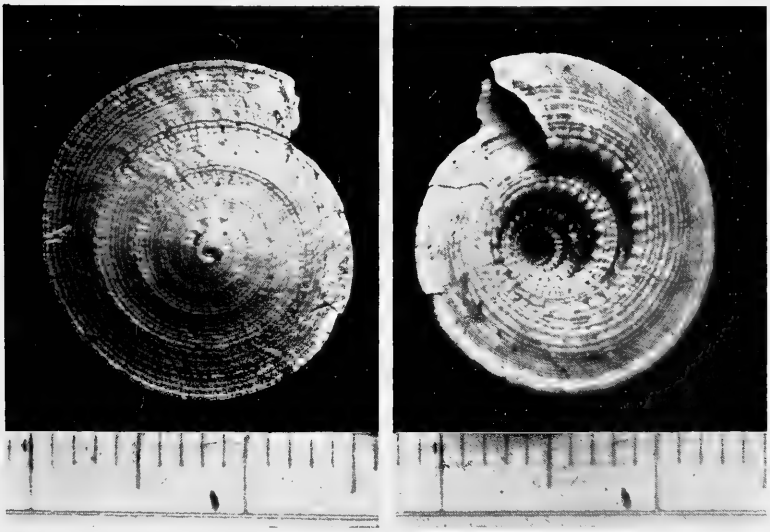

FIG. 4.—*Heliacus petasus* n. sp.

A. E. Salisbury, photo. *Neill & Co., Ltd.*

9. *Observations on South African Onychophora.*—By G. E. Hutchinson, late of the Department of Zoology, University of the Witwatersrand, Johannesburg.

(With 1 Text-figure.)

The following notes are based on material from two sources :

1. A collection made in various parts of the Cape Province in December 1926 and January 1927 (G. E. H.).

2. The hitherto unexamined material in the South African Museum (S.A.M.).

For the loan of the latter specimens and for help with literature I am much indebted to Dr. E. L. Gill, Dr. K. H. Barnard, and Mr. Lawrence. In addition to a description of a new species, notes of new localities and on variation and distribution are given.

(1) *Peripatopsis sedgwicki* Purc.

Coldstream (Humansdorp dist.), i. 1921 (S.A.M., R. W. Tucker coll. B 752).

Witte Els Bosch (Humansdorp dist.), 11, i. 1927 (G. E. H.).

(2) *Peripatopsis intermedia* n. sp.

Green, basal part of antenna unpigmented, some of the larger papillae on the dorsal surface paler ; below largely pale, especially at the bases of the legs ; posterior part of ventral surface fairly well pigmented.

About twelve irregular annuli per segment.

Large papilli obtusely subconical.

Eighteen pairs of pregenital legs and a much reduced genital pair ; the right-hand genital leg clawed but apparently without a foot, as claws cannot be made out on the left-hand genital leg (in the type). First sixteen pairs of legs with well-developed coxal vesicles ; these structures are rudimentary and slit-like in the last two pairs of pregenital legs (fig. 1). Median pad of foot just under twice as wide as the proximal (7 : 4).

No crural gland papillae enlarged (presumably ♀).

External lamina of mandible with one accessory denticle, internal lamina with five accessory denticles.

Length (in alcohol, contracted and curved) *ca.* 33 mm.

Seven miles E. of Montagu, xi. 1919 (S.A.M., R. W. Tucker coll. B 748. *Type*).

The single specimen described above represents a species superficially resembling *P. balfouri* Sedgw. both in the number of legs and in the armature of the genital pair (in part), but differing notably in the large coxal vesicles on the first sixteen pairs of legs. In this character it forms a link between those species in which coxal vesicles

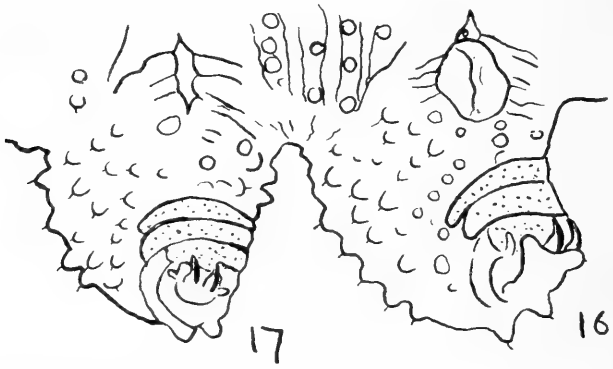

Fig. 1.—*Peripatopsis intermedia* n. sp. Sixteenth and seventeenth left legs, showing fully developed and rudimentary coxal vesicles.

are rudimentary or absent (*capensis* Grube, *clavigera* Purc., *leonina* Purc., and *balfouri* Sedgw.) and the more eastern and primitive group in which they are well developed (*sedgwicki* Purc., and *moseleyi* W.-M.). *P. intermedia* also differs from *balfouri* in its rather more deeply pigmented ventral surface.

Unfortunately the single, presumably female, specimen is in such a poor state of preservation that nothing can be made out of its internal anatomy. Its position in the genus is of sufficient interest to warrant this preliminary account, pending the discovery of better material.

(3) *Peripatopsis clavigera* Purc.

George. In a wooded bank about 2 miles along the Knysna road. 19, xii. 1926 (G. E. H.).

(4) *Peripatopsis balfouri* Sedgw.

Stellenbosch, Jonkers Hoek Valley, 22, i. 1914 (S.A.M., K. H. Barnard coll. B 743).

R. Zonde Ende, 1919 (S.A.M., K. H. Barnard coll.).

Wilderness (George dist.), 19, xii. 1926 (G. E. H.).

(5) *Peripatopsis capensis* Grube.

R. Zonde Ende, 1919 (S.A.M., K. H. Barnard coll.).

In 1901 Purcell (Ann. S. Afr. Mus., II, p. 99) described a series of specimens from Swellendam in which there were individuals with 18 as well as the normal 17 pairs of pregenital legs. We obtained near Swellendam five specimens of which two were of the 18-legged form, and I have examined yet another taken at the same place by Lawrence and Hesse. In the complete series from Swellendam (S.A.M., including Purcell and G. E. H.) there are eighteen specimens, and of these nine belong to the 18-legged variety. So far as I am aware, *P. capensis* has not been recorded east of Swellendam nor has the 18-legged form been noted elsewhere. It would be most interesting should the latter replace the type in the extreme eastern part of the range of *capensis*; the species should be searched for, *e.g.* at Riversdale. Purcell's specimens are unfortunately now somewhat faded, but when the series as a whole is considered, it is evident that the brown forms at Swellendam tend to be of the 18-legged variety, the black of the 17-legged type form.

	17-legged.	18-legged.
Brown with dark bands—		
Purcell types 2 to 3 . .	..	6
Intermediate—		
Purcell types 3 to 4 . .	1	3
Greenish-black—		
Purcell type 4 . . .	8	..

Zoogeographical Remarks.

The primitive element in the Cape fauna has been the subject of innumerable comments since the discovery of *Peripatopsis capensis*, but its exact nature is not entirely clear, nor can it be so till greater unanimity is reached as to the geological history of the Southern

Hemisphere. Meanwhile certain tentative inferences may be drawn. There is a primitive element in the fauna presumably comparable to the Bushman and Hottentot peoples, *i.e.* early invaders from the North, and in the northern and eastern parts of South Africa replaced by newer forms. This element is ably discussed by Hewitt in a recent publication (S. Afr. Journ. Sci., xx, 1923, p. 96), in which it is shown that, as we proceed southward and westward from northern centres of distribution, we meet more primitive forms. Most zoogeographers, however, have believed that certain groups, and the *Peripatopsidae* are a conspicuous example, represent the remains of an ancient fauna formerly inhabiting an antarctic or subantarctic land-mass. Such groups would have been distributed from the South, and we find that they show their greatest abundance of species in the Cape Peninsula and adjacent mainland. By analogy with the groups distributed from the North, we might expect these relict groups to have their most primitive representatives in the north-eastern part of their range, and this seems actually to be the case with *Peripatopsis*. *P. moseleyi* and *P. sedgwicki* are regarded by Bouvier as the most primitive species of the genus and are the most eastern, while the most specialised *P. capensis* is one of the western group. The other species are distributed in various parts of the West Province and obey no rule, but it should be noted that the Cape Peninsula has three species (*capensis, balfouri, leonina*), more than any other locality so far examined (*balfouri, sedgwicki,* and *clavigera* may all occur in Knysna forest). *P. capensis* again seems to obey a similar law in its variation, for the more primitive 18-legged form is found only at the eastern extremity of its range. A somewhat similar case in the acanthodriline earthworms has recently been noted by Pickford (Rec. Albany Mus., iii, p. 452, 1927). Other animal groups with a like distribution are hardly big enough to show the phenomenon, and I am not aware that it has so far been found among plants.

10. *Notes on the Types of Orthoptera described by Dr. L. Péringuey.*— By B. P. Uvarov, Imperial Bureau of Entomology.

(With 11 Text-figures.)

Since the late Dr. L. Péringuey was not a specialist in Orthoptera, it is not surprising that the species of this group published by him * as new were not all described in such a way that they may be easily recognised. It is, therefore, quite necessary to study his types, and this was made possible to me through the kind co-operation of Dr. E. L. Gill, Director of the South African Museum, and Dr. A. J. Hesse, who sent me all Péringuey's types for examination. The present paper embodies the results of my studies on all species by Péringuey, except those belonging to the subfamily *Stenopelmatinae* which will be communicated for examination to Dr. H. Karny who is monographing the group.

Paratypes of several species are now deposited in the British Museum, while the types are returned to the South African Museum.

Family ACRIDIDAE.

Bulla boschimana (Péring.).

1916. *Cystocoelia boschimana*, Péringuey, *loc. cit.*, p. 411.

The structure of the head and pronotum in the type, a female, leave no doubt that the species must be referred to *Bulla*, not to *Cystocoelia*.

Prostalia granulata (St.).

1873. *Pneumora granulata*, Stål, Öfv. Vet. Akad. Förh., 30 (4), p. 53.

1873. *Pompholyx granulata*, Stål, Rec. Orth., i, p. 144.

1916. *Bulla subalata*, Péringuey, Ann. S. Afr. Mus., 15, p. 409, fig. 1. (*Syn. nov.*)

* "Descriptions of New or Little-known Orthoptera in the Collection of the South African Museum," Ann. S. Afr. Mus., xv, 1916, pp. 401–452, 1 pl., 8 figs.

There is in the British Museum a male of *P. granulata*, from Natal, which agrees in all details with the original description of the species, and Péringuey's type of *Bulla subalata*, also from Natal, is undoubtedly another sex of the same species, the structure of head and pronotum being practically identical with that in the male. Péringuey labelled his type "*Bulla semialata*," but in the published description he called the species "*subalata*."

Shortridgea miranda Péring.

Péringuey described this genus and species from several specimens which belong to different species and even genera, but it is clear from his description and the figure that the male from Port St. Johns must be considered as the holotype. Female from the same locality is also the same species, while two more males from Eshowé, Zululand, though undoubtedly congeneric with *miranda*, seem to differ from it specifically; the material at hand, however, does not permit a definite conclusion. One more male, also from Eshowé and another from Umkomaas (not mentioned by Péringuey, but sent to me as a co-type) belong to *Bulla longicornis* St.

In the British Museum there is a damaged female specimen of *Shortridgea miranda*, also from Port St. Johns, Nov. 1923 (R. E. Turner).

The genus *Shortridgea* is readily distinguishable from *Cystocoelia* by the sharp humeral keels of the pronotum. Apart from *miranda* (and the, apparently, distinct species from Zululand mentioned above) to this genus must be referred also *Cystocoelia absidata* Karsch, from East Africa, which also has well-developed humeral keels.

Family TETTIGONIIDAE.

Subfamily DECTICINAE.

Gen. Arytropteris Herm.

1916. *Umtata*, Péringuey, Ann. S. Afr. Mus., xv, p. 444 (*syn. nov.*).

Péringuey could not distinguish *Arytropteris* from *Thoracistus* Pictet, but I have pointed out their differences in another paper (Trans. Ent. Soc. London, 1924, p. 507). He described seven new species, but four of them were based on the female sex only, while in none were the genitalia of either sex mentioned in the descriptions. Only two of these seven species can be referred to *Arytropteris*, while one belongs to my genus *Anarytropteris*, one represents a new genus,

and the remaining three must be included in *Thoracistus*. On the other hand, the genus *Umtata* is a pure synonym of *Arytropteris*, the genotype (*U. musicus*) being even conspecific with one of Péringuey's own species of *Arytropteris* (*A. granulithorax*, see below).

Arytropteris granulithorax Péring.

1916. *Arytropteris granulithorax*, Péringuey, Ann. S. Afr. Museum, xv, p. 441.

1916. *Umtata musicus*, Péringuey, *loc. cit.*, p. 444, pl. xlii, fig. 6 (*syn. nov.*).

I received one male and one female labelled as types of *A. granulithorax*, but the male is clearly immature and without a locality label, and I select here the female as the single type of the species. It is from Port St. John's in the Cape Province, taken by G. C. Shortridge, and so is the single male type on which *Umtata musicus* is based. Apart from the sexual differences in the pronotum, as usual in the genus *Arytropteris*, the male of *U. musicus* differs from the female of *A. granulithorax* only in the absence of the blackish markings, but the general condition of the male type shows that it has been preserved in alcohol (or other liquid) which may have destroyed the markings; moreover, the degree of development of dark spots alone cannot be considered of specific value in this genus. I do not hesitate, therefore, in establishing the above synonymy.

A. granulithorax is very closely allied to *A. semiaenea* Serv., differing from it mainly in the larger size, pronotum more strongly granulose and more extended and flattened behind. Male genitalia in both species are identical, but the female subgenital plate in *granulithorax* is broader and more broadly triangularly excised behind than in *semiaenea*.

Arytropteris excisa Péring.

Represented by the single female type. Differs from *A. granulithorax* mainly by the pronotum excised behind; ovipositor is also slightly longer and the subgenital plate more narrow apically, as in *A. semiaenea*.

Anarytropteris irrorata (Péring.).

1916. *Arytropteris irrorata*, Péringuey, *loc. cit.*, p. 441.

The structure of the fastigium in the single female type does not permit retaining this species in *Arytropteris*, while it agrees exactly

with the condition observed in *Anarytropteris*. This latter genus was founded by me for a single species, *fallax* Uv., from Nyasaland, and only the male sex of the genotype is known. A direct comparison of *irrorata* and *fallax* is, therefore, impossible, but Péringuey's species differs from *fallax* already in the striking black pattern, not even slightly indicated in *fallax*. Ovipositor of *irrorata* is relatively not long, stout, almost straight in the basal half and distinctly recurved in the apical half. Subgenital plate is elongate, convex, with a narrow triangular projection behind (fig. 1).

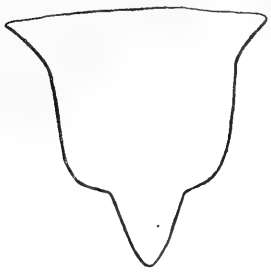

Fig. 1.—*Anarytropteris irrorata* (Pér.). Subgenital plate of the female.

Gen. Thoracistus Pictet.

The genus was founded on *Th. peringueyi* Pict., which has an enormously long and inflated pronotum in the male sex. Another species, *viridifer* Wlk., has been also included by me (Trans. Ent. Soc. London, 1924, p. 508) in this genus, but its pronotum is less strikingly modified. Amongst the three species of Péringuey, which I refer to *Thoracistus*, in two only are the males described, and the pronotum in them, though rounded as it should be in *Thoracistus*, is relatively not long. In the width and shape of the fastigium, however, all Péringuey's species agree with *Thoracistus*. It is not impossible that further studies of the group will make it necessary to restrict the genus *Thoracistus* to the species with inflated pronotum, but it would be premature to do so at the present stage, when our knowledge of the South African Decticinae is of the most fragmentary character.

Two of Péringuey's species are synonymous, so that only three remain, as follows :

Thoracistus modestus (Péring.).

1916. *Arytropteris modesta*, Péringuey, *loc. cit.*, p. 442.

Represented by one male (selected here as the single type) and one female. The genitalia are as follows :

♂ (fig. 2). Last tergite transverse, with a fairly deep and not very broad emargination ; the lobes triangular. Cerci rather long, conical, unarmed, but with the apex incurved.

♀. Ovipositor moderately long, stout, practically straight basally,

Fig. 2.—*Thoracistus modestus* (Pér.). Male genitalia.

recurved and narrowed apically. Subgenital plate broadly triangular, with a minute apical emargination.

Thoracistus intricatus (Péring.).

1916. *Arytropteris intricata*, Péringuey, *loc. cit.*, p. 443.

1916. *Arytropteris plebeia*, Péringuey, *loc. cit.*, p. 443 (*syn. nov.*).

Both these species were described from females and the author himself could not find any difference between them, except in the number of spinules on the hind femora. This character, however, is subject to strong individual variation in all Decticinae and has no specific value.

Ovipositor in this species is practically straight throughout, but somewhat suddenly recurved near the apex.

Ceresia, gen. nov.

A member of the group *Arytropteres*, differing from other known genera by the front tibiae armed above with only one spine. Fastigium of vertex narrower than the first antennal joint, contiguous with the fastigium of frons. Pronotum of the male long and narrow, but not covering the abdomen; lateral lobes forming scarcely perceptible angles with the convex disc; their margin with a very feeble humeral sinus. Elytra partly visible from underneath the pronotum in the male.

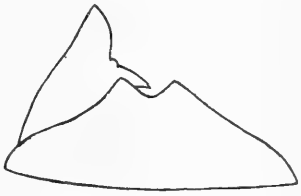

Fig. 3.—*Ceresia pulchripes* (Pér.). Male genitalia.

Genotype: *Arytropteris pulchripes* Péring.

While *A. pulchripes* approaches in its general appearance the two species of *Thoracistus* discussed above, it differs from them in some characters, the armature of the front

tibiae being, in my opinion, especially important and necessitating the description of a new genus.

Male genitalia of *Ceresia pulchripes* are very characteristic, as will be seen from the figure (fig. 3).

Aroegas nigroornatus Péring.

This is a very curious insect and I am not even absolutely certain that it really belongs to Decticinae, the tarsal plantulae being very short and thick, while the tympanal organ of the front tibiae is very widely open. This latter character is present only in one other genus of Decticinae, viz. *Aprosphylus* Pictet (also from South Africa), which in my opinion may also belong not to this subfamily, but, perhaps, to Mecopodinae.

Anterior tibiae of *Aroegas nigroornatus* are entirely unarmed above.

Subfamily CONOCEPHALINAE.

Péringuey described five species belonging to this subfamily and he referred all of them to the genus *Xiphidion* Serv., or *Conocephalus* Thnbg. as it should be correctly called. A study of the types shows, however, that only two of his species belong to *Conocephalus*, while three are members of the genus *Megalotheca* Karny. This latter genus has been established by Karny (Abhandl. zool.-bot. Ges. Wien, iv, 3, 1907, p. 79) for one species from South Africa, and one from Madagascar. Karny included the genus in the subfamily Agroeciinae, but it lacks the essential characters of the latter, while there is nothing against its being referred to Conocephalinae, in the immediate vicinity of *Conocephalus*.

Megalotheca vaginalis Karny.

1907. *Megalotheca vaginalis*, Karny, Abhandl. zool.-bot. Ges. Wien, iv, 3, p. 79.

1916. *Xiphidion restiorum*, Péringuey, *loc. cit.*, p. 447 (*syn. nov.*).

I received three specimens under the name *X. restiorum*. One is a male from Cape Town (J. C. Bridwell), bearing a type label, and I designate it as the single type. Another is a female from Hottentot's Holland (K. H. Barnard) and it agrees exactly with the description and the figure of *Megalotheca vaginalis* Karny; although it was not taken actually together with the male, there is no reason to doubt their being conspecific, and this leads to the above synonymy. Third

specimen is a male labelled French Hoek, Cape Colony, Jan. 1917 (K. Barnard), and it belongs to a new species of *Conocephalus* described below as *C. peringueyi*; as the specimen was collected after the publication of Péringuey's paper, it cannot possibly be one of the typical series.

Megalotheca parvula (Péring.).

1916. *Xiphidion parvulum*, Péringuey, *loc. cit.*, p. 449.

Péringuey's description and the figures of the male genitalia are not accurate, and I think it useful to figure a cercus dissected out (fig. 4). The male subgenital plate is represented by Péringuey as deeply excised, while in fact it is truncate.

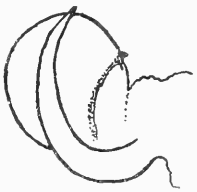

Fig. 4.—*Megalotheca parvula* (Pér.). Left male cercus from inside.

Apart from the two males from Cape Town (type and co-type), I received one male from the Ceres Division, which was identified as *parvula*, but proved to be an entirely different and undescribed species. Its description is as follows:

Megalotheca montana, sp. n.

♂. Slightly larger than *M. parvula* and less slender. Fastigium of vertex strongly compressed, lamellate, acute. Pronotum a little

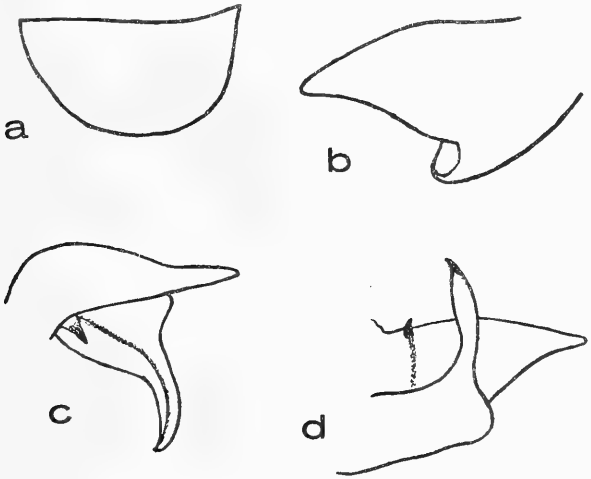

Fig. 5.—*Megalotheca montana*, sp. n., ♂. *a*, lateral pronotal lobe; *b*, *c*, *d*, isolated right cercus viewed from different sides.

longer than the head, very slightly selliform ; front and hind margin truncate ; lateral lobes (fig. 5, *a*) much longer than deep, regularly rounded below. Elytra reaching the middle of the abdomen. Last tergite large, rounded, prominent in the middle behind. Cercus (fig. 5, *b, c, d*) consisting of a triangular foliaceous part and a curved spine-like inner appendage, the basal part of which is also foliaceous ; there is a small tooth at the base of the triangular part. Subgenital plate truncate.

Coloration dirty-stramineous ; a brownish fascia runs along the head and pronotum ; lower margin of pronotal lobes whitish.

Total length 10 ; pronotum 2·5 ; elytra 3 ; hind femur 7 mm.

Described from a single male, taken at Matroosberg, Ceres Division, 4000 ft., Jan. 1917 (Lightfoot).

Megalotheca longiceps (Péring.).

1916. *Xiphidion longiceps*, Péringuey, *loc. cit.*, p. 450.

This species distinctly differs from the three mentioned above by its larger size and extremely elongated habitus reminding one of the subfamily Saginae. It is not impossible that further studies in this little-known genus will necessitate splitting it up into two genera, but it would be premature to do so now.

I append two figures (fig. 6) taken from the type which may help

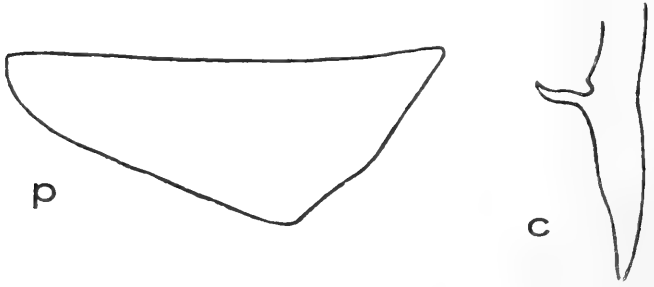

Fig. 6.—*Megalotheca longiceps* (Pér.). *p*, lateral pronotal lobe ; *c*, right cercus.

to identify this species. It seems to be very near to *M. xiphidioides* Karny, from Madagascar, but somewhat larger ; the tooth of the cerci in *M. xiphidioides* is stated to be beyond the middle of the cercus.

Conocephalus (*Xiphidion*) *bechuanensis* Péring.

The type is not a female, as it stands in the original description owing to a misprint, but a male. The cercus is described by

Péringuey very inaccurately ; it is fairly long, with a beak-like inner tooth near the obtuse apex, and another similar, but smaller, tooth at

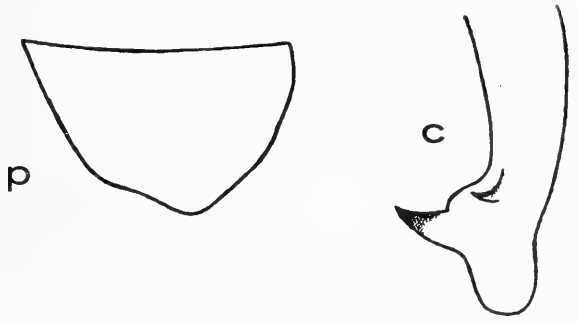

Fig. 7.—*Conocephalus bechuanensis* Pér. *p*, lateral pronotal lobe ; *c*, right cercus from above.

the base of the first one (fig. 7, *c*). Subgenital plate is not "deeply arcuate emarginate," the emargination being round and shallow.

Conocephalus (*Xiphidion*) *rhodesianus* Péring.

This is a very slender species, resembling somewhat *Megalotheca longiceps* in its outward appearance, even the cerci being of the same type. The structure of the fastigium, however, shows plainly that it is not a *Megalotheca*, but a *Conocephalus*. The figure of the cercus and of the pronotum may help in recognising the species (fig. 8, *p*, *c*).

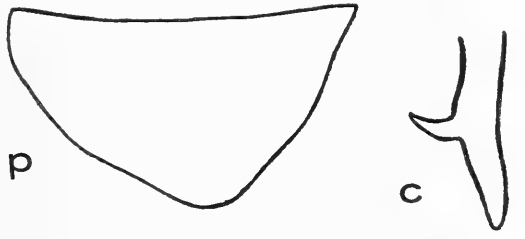

Fig. 8.—*Conocephalus rhodesianus* Pér. *p*, lateral pronotal lobe ; *c*, right cercus.

Together with the unique type of this species there was sent to me another male *Conocephalus*, which belongs to a new species as follows :

Conocephalus (*Xiphidion*) *peringueyi*, sp. n.

♂. About the size of *C. bechuanense*, but more slender. Fastigium of vertex strongly compressed (though less so than in *Megalotheca* spp.); seen from the front, its margins are slightly divergent upwards and the apex rounded; seen in profile the fastigium is somewhat ascending anteriorly, with the apex acutely angulate, but the immediate angle is rounded. Pronotum cylindrical, truncate in front, broadly and shallowly emarginate behind; disc with one fine transverse furrow placed well in front of the middle; lateral lobes (fig. 9, *p*) much longer than deep, their lower margin behind the middle roundly excised and strongly ascendent, hind margin straight. Elytra a little shorter than the pronotum. Knee-lobes spined.

Last tergite transverse, hind margin obtusely angulate produced, with the sides somewhat sinuate. Cercus (fig. 9, *c*) consists of a broad conchate basal part, bearing on the concave inner side a chitinous

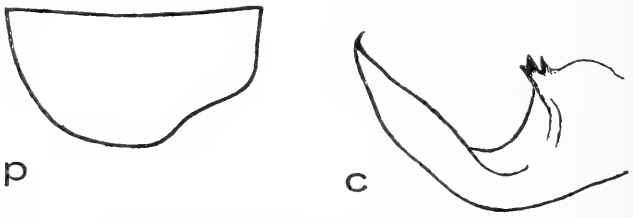

Fig. 9.—*Conocephalus peringueyi*, sp. n. *p*, lateral pronotal lobe; *c*, right cercus.

ridge ending in a double spine, and a spine just below the latter; from the lower hind corner of the basal part arises a long recurved appendage with the apex pointed and curved; the appendage is directed obliquely upwards and inwards.

Stramineous, with a broad castaneous dorsal stripe, and a more narrow and less sharply defined lateral stripe of the same colour along the middle of each pronotal lateral lobe extending also on to the sides of the head.

Total length 12·5; pronotum 3; elytra 3; hind femur 9·5 mm.

Described from a single male from French Hoek, Cape Colony, Jan. 1917 (K. Barnard).

I append here a brief description of one more new species of *Conocephalus* found by me in the British Museum collection in the course of the above studies on Péringuey's types.

Conocephalus (*Thecoxiphidion*) *inaequalis*, sp. n.

♂. Similar to *C. caudalis* Wlk.,* differing from it in the structure of the male genitalia, and in the development of the elytra. The latter are longer than the pronotum, reaching to the middle of the abdomen, with the apex parabolic; they are greenish in front of the radial veins which are green, and brownish behind them, with brown spots along the middle.

Last tergite (fig. 10) produced behind into a paired appendage.

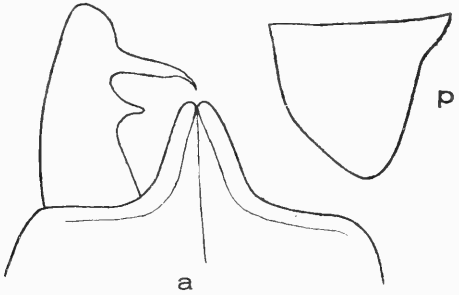

Fig. 10.—*Conocephalus inaequalis*, sp. n. *a*, last tergite and a cercus; *p*, lateral pronotal lobe.

Cercus similar to that in *C. caudalis*, but its inner teeth are very unequal in size, the one nearer the base being much shorter and obtuse.

Total length 12; pronotum 3; elytra 4·5; hind femur 13 mm.

Described from a single male from South Africa (apparently Transvaal, but the exact locality not known). Distant coll.

Subfamily HETRODINAE.

Hetrodes marginatus Wlk.

1869. *Hetrodes marginatus*, Walker, Cat. Derm. Salt. Brit. Mus., ii, p. 226.

1899. *Hetrodes marginatus*, Kirby, Ann. Mag. Nat. Hist., ser. 7, iii, pp. 97, 142.

1916. *Hetrodes knysna*, Péringuey, *loc. cit.*, p. 429 (*syn. nov.*).

* I take the opportunity to publish the following synonymy of this species based on the type:

1869. *Xiphidium caudale*, Walker, Cat. Derm. Salt. Brit. Mus., ii, p. 273.

1891. *Xiphidium natalensis*, Redtenbacher, Verh. z.-bot. Ges. Wien, xli, p. 519 (*syn. nov.*).

Péringuey states that, according to the notes which he took long ago at the British Museum, *H. marginatus=pupus*, but my direct comparison of the types of *marginatus* and *knysna* shows that they are undoubtedly conspecific and well distinct from *pupus*.

Péringuey put the type labels on two specimens of *knysna*, a male and a female from George, Cape Colony, and I select here the male as the single type ; there is another male co-type from the same locality, and still another from Knysna ; it would seem more reasonable to select the latter as the single type, but I feel bound by the author's selection.

Hetrodes namaqua Péring.

Four specimens were sent to me as types, two males and two females, all from O'okiep, Namaqualand, and I select the largest male as the single type. Péringuey mentions also specimen (or specimens) from Uitenhage, Cape Province, but I have not received it.

In the British Museum there is a female of this species from Windhoek, S.W. Africa.

Gen. Acanthoplus St.

Systematists dealing with species of this genus based their taxonomic conclusions entirely on the armature of pronotum, legs, and abdominal segments, but it is sufficient to study even a few specimens of any species to see the unreliability of these characters. Armature of pronotum, consisting of strongly developed spines, is fairly constant, but it does not offer much variety even when different species are compared. At the same time, the number of small spinules on the upperside of tibiae, the underside of femora, as well as the degree of development of spinules on tergites, are subject to considerable individual variation, the armature of femora being often different on the left and the right side of the same specimen.

Péringuey's key to species is based almost entirely on the armature of legs and abdomen and is valueless, while two of his species, based on such characters, must go. Equally unfounded are several species described by Kirby, the types of which are before me.

My own conclusions on the synonymy of species are based primarily on the study of the male cerci, which, though not absolutely constant in shape, present characters much more reliable than the highly unstable armature of legs and abdomen. Since none of the previous authors even mentioned genitalia of their species, while some described them from females and immature specimens, there remain several

species of doubtful standing, as will be seen from the complete list of species, which I think useful to publish here.

Acanthoplus longipes (Charp.).

1845. *Hetrodes longipes*, Charpentier, Orthoptera descr. et depicta, pl. 45.

1916. *Acanthoplus loandae*, Péringuey, *loc. cit.*, p. 433 (*syn. nov.*).

The only difference of *loandae* from *longipes* is in the presence of spinules on tergites, but I find the spinules varying in their development individually. Thus, amongst three males in the British Museum

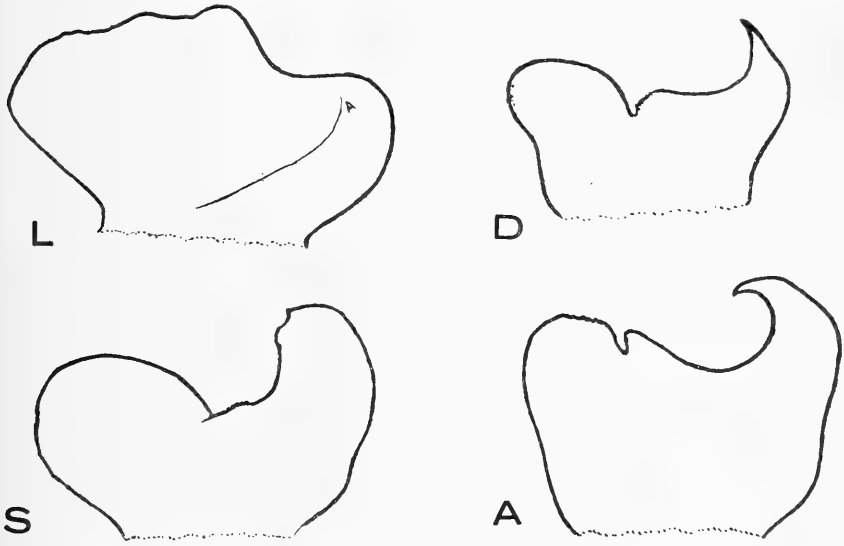

Fig. 11.—Cerci of four species of *Acanthoplus*. L, *A. longipes* (Charp.); D, *A. discoidalis* (Wlk.); S, *A. speiseri* Brancs.; A, *A. armativentris* Pér.

from the Angola Coast (R. Hinamangando, south of Cape St. Martha, F. M. Penney), one has tergites entirely unarmed, another has a median row of spinules, and the third bears one median spine and two lateral ones on the third tergite. Equally variable and often different on the two sides is the number of spinules on the underside of femora; as a rule, however, at least the hind femora bear 1–3 spines on each side underneath.

The male cerci of *A. longipes* (fig. 11, L) are very thick and inflated; their thick apex bears one (sometimes two) very short spinule; the shape of the basal lobe is not very constant.

In its distribution *A. longipes* must be restricted to S.W. Africa, extending from the coast into the Kalahari; it seems to be replaced farther to the east by the next species, but their respective areas of distribution are not yet sufficiently known.

Acanthoplus discoidalis (Wlk.).

1869. *Hetrodes discoidalis*, Walker, Cat. Derm. Salt. Brit. Mus., ii, p. 230.

1869. *Hetrodes pallidus*, Walker, *loc. cit.*, p. 231.

1899. *Acanthoplus desertorum*, Kirby, Ann. Mag. Nat. Hist., ser. 7, iii, p. 142.

1899. *Acanthoplus serratus*, Kirby, *loc. cit.*, p. 143.

1899. *Acanthoplus germanus*, Kirby, *loc. cit.*, p. 143.

1916. *Acanthoplus bechuanus*, Péringuey, *loc. cit.*, p. 433 (*syn. nov.*).

The synonymy of the species described by Walker and Kirby has been correctly established by Péringuey, who, however, distinguished *bechuanus* solely on the armature of tergites, a purely individual character.

This species differs from *A. longipes* by its smaller size, distinctly shorter legs, unarmed underside of femora, and the shape of the male cerci, which are less inflated and bear an acute curved spine at the apex (fig. 11, D); between the spine and the basal lobe there is an obtuse projection which varies somewhat in shape, being either round or conical.

A. discoidalis ranges from Transvaal to Bechuanaland, while Péringuey records it from the S.W. coast as well, which records I am inclined not to accept without verification.

Acanthoplus speiseri Brancs.

1896. *Acanthoplus speiseri*, Brancsik, Jahr. Naturw. Vereines Trencs. Com., xvii–xviii, p. 258, pl. 8, figs. 9*a–d*.

1916. *Acanthoplus varicornis*, Péringuey, *loc. cit.*, p. 435 (*syn. nov.*).

Péringuey's type of *A. varicornis* is a male larva which differs from *speiseri* only in the antennae and tarsi being blackish, which may be either an individual or a juvenile character. Cerci, see fig. 11, S.

Acanthoplus jallae Griff.

Not known to me except from the description.

Acanthoplus armativentris Péring.

Seems to be very close to the preceding species, and may be its synonym. Péringuey separated them (without seeing *A. jallae*) because his species has lateral rows of spinules on the tergites, but this character is variable in the genus. Cerci, see fig. 11, A.

Acanthoplus stratiotes Brancs.

Not known to me and suspiciously near to *A. longipes* and *A. discoidalis*.

Gen. Enyaliopsis Karsch.

Systematics of species of this genus are in an almost hopeless condition. Sjöstedt attempted to clear up some of the confusion by comparing the types of several species, but the key he has drawn up (Arkiv v. Zool., 8, No. 6, 1913, p. 15) does not include all known species, refers only to males, and is based on single type-specimens of each species, the probable individual variation of characters not having been taken into consideration. Péringuey (*loc. cit.*, p. 437) has published a key to six South African species (three of them described by himself), but this did not improve matters, if it did not make them worse. First of all he divided the genus into two groups on the shape of the female ovipositor, in which, in the majority of species, the upper and the lower valvae are divergent, while in two species they are not. After a study of a large material of various species of *Enyaliopsis* in the British Museum, I am able to state definitely that the second type of ovipositor may be observed in any species *in the immature stages*. Péringuey's type of female of *E. patruelis* is undoubtedly a larva in the last stage, and it seems highly probable that the female of *E. durandi* Lucas, in which ovipositor is similarly built, was also immature.

Further separation of species by Péringuey's key depends entirely and solely on the number of tibial spines. This character is, in fact, fairly constant, but, of course, not absolutely reliable, specific difference depending often on a single spine. Moreover, the figures in the key are often in disagreement with those given in the specific descriptions, owing to misprints, or to carelessness of the author.

It is clear that nothing can be done with species of *Enyaliopsis* until a general revision, based on large series of specimens, is undertaken. In the meantime I can only give some notes on the three species described by Péringuey.

Enyaliopsis binduranus Péring.

According to Péringuey's key, this species differs from *petersii* Schaum only by having 4 spines on the outer side of the hind tibiae, the other species having 5 such spines. In the specific description of *binduranus* the number of spines on the hind tibiae is given, however, as 15–16, not 4–17 as in the key (the second figure referring to the inner row of spines); the type, which I examined, has 4 outer and 15–16 inner spines, the latter being irregular in size and differing in number on the two sides of the insect.

I have compared the type of *binduranus* with some specimens in the British Museum which I refer to *E. petersii*, as they agree in every detail with the original description and the figure of the latter. Pronotum of *binduranus* is much more narrow than that of *petersii*, Péringuey's species resembling in that respect *E. ephippiatus* Gerst.; the pronotal spines are all distinctly shorter in *binduranus* than in *petersii*. These characters may be illustrated by the following measurements of pronotum (of the female sex):—

	petersii.	*binduranus.*
Length	18 mm.	16 mm.
Width between hind angles of anterior projection	16 ,,	13 ,,
Width between apices of median spines	15 ,,	10·5 ,,
Width between apices of longest lateral spines	21 ,,	18 ,,
Width between the two spines of hind margin	10 ,,	8 ,,

The ovipositor of *binduranus* has the upper valves more angulately excised than they are in *petersii*, and in this respect it resembles very closely *E. matabelensis* Sjöst. The resemblance between *matabelensis* and *binduranus* in the structure of pronotum is also very close, and the two species seem to differ mainly in their size (*matabelensis* being a smaller insect) and in the number of spines on the middle and hind tibiae.

There are in the British Museum several specimens from Mashonaland, Rhodesia, referable to *binduranus*.

Enyaliopsis transvaalensis Péring.

1916. *Enyaliopsis transvaalensis*, Péringuey, *loc. cit.*, p. 438.

1916. *Enyaliopsis patruelis*, Péringuey, *loc. cit.*, p. 439 (*syn. nov.*).

Péringuey separated *patruelis* mainly on the structure of the ovipositor, which has the valves less recurved than in other species. This is, however, only a larval character, the two female co-types before me being both immature (in the last larval stage). In the structure of pronotum there is no difference between the types of *transvaalensis* and *patruelis*, while the apparently different number of spines on the middle and hind tibiae is due to incorrect count. Indeed, in the co-types of both species, the middle tibiae bear 3–4 spines on one side and 2-4 on the other, while the number of spines on the outside of hind tibiae varies in both from 4–5.

Péringuey's statement that *transvaalensis* is of a darker bronze colour than any of the South African species is due to bad preservation of some of the co-types.

One of the female co-types from Barberton has been marked by Péringuey with the type label, and I confirm here his selection. As regards *patruelis* the selection of the single type is made difficult by the fact that I received four co-types, all bearing specific label in Péringuey's writing. Two of them, a male and female (immature), bear also red type-labels, but the locality label is " Barberton, Rev. Kolbe " for the male, and " Transvaal, Barberton, Randall " for the female. Two other specimens are an immature male with the label " Victoria Falls, Capt. Conolly," and an immature female labelled " Amatongaland, Jan. 89, J. de Coster." Since neither Barberton nor Victoria Falls are mentioned in the original description of *patruelis*, I feel right in ignoring Péringuey's selection of types and select here as the single type of *patruelis* the female from Amatongaland, this being the first locality mentioned in the specific description. Selection of one or another of the co-types as the single type does not affect the above synonymy, since Barberton specimens are obviously conspecific with the others and with the type of *transvaalensis*, also taken at Barberton.

ANNALS

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11. *A Revision of the Notonectidae and Corixidae of South Africa.*—By G. Evelyn Hutchinson, M.A., F.L.S., F.E.S. (sometime Senior Lecturer in Zoology, the University of the Witwatersrand, Johannesburg).

(With Plates XXVII–XLI.)

INDEX.

I.—INTRODUCTION.

THE present study is based on the following material:—The collections of the South African Museum (S.A.M.), Transvaal Museum (T.M.), and the Albany Museum (A.M.), and unworked African Notonectidae in the British Museum (B.M.); on a large collection made by Grace E. Pickford (G.E.P.), chiefly in the East Cape Province in 1926, and in the East Cape Province and Orange Free State, in company with Miss D. F. Bleek, in 1928; on much material forwarded from time to time by Letitia M. Starke (L.M.S.), chiefly from the Cape Peninsula and Flats; and on collections made in various parts of South Africa by myself (G.E.H.). In addition to these main sources various South African biologists have forwarded specimens which are acknowledged in the text. My best thanks are due to the following, who have entrusted to me collections and specimens in their charge:—Dr. E. L. Gill, Dr. A. J. Hesse, Dr. C. J. Swierstra, Mr. G. van Son, Mr. J. Hewitt, Dr. E. Warren, Dr. H. Scott, and Mr. W. E. China. To the latter I am especially indebted for valuable information on nomenclature, and for very numerous transcriptions of descriptions not available in South Africa, without which the work would have been impossible. The systematic work was intended as a preliminary to a more extended ecological study, which now, unfortunately, cannot be completed. Such information as has been collected on the zoogeography and ecology of these insects is presented in separate sections after the systematic part. The other groups of aquatic Heteroptera were collected with the families discussed in this

paper ; the surface bugs will be forwarded to Professor T. Esaki, and other families worked out as opportunity permits. The large number of new species hardly calls for an apology seeing that no adequate investigation of these insects has ever before been made in South Africa.

The somewhat unsatisfactory definition of South Africa usual in works on zoogeography is accepted, *i.e.* that part of Africa south of the Zambesi and Kunene Rivers. The present paper therefore attempts the consideration of the Notonectids and Corixids of the Union of South Africa, Portuguese East Africa, South Rhodesia, the Bechuanaland Protectorate and Caprivi Strip, and South-West Africa.

Unfortunately for the naturalist interested in problems other than pure systematics, the majority of the species are hard to distinguish except on sexual characters. It is therefore of great importance to take enough specimens to ensure ♂♂ being present from every locality. The synonymy makes no claim to be exhaustive, only references of importance being admitted to the lists. The figures are semi-diagrammatic *camera-lucida* drawings, in which irrelevant hairs are omitted.

The types of all new species in my possession, and a first set of all described ones, will be deposited in the South African Museum ; further sets will be sent where possible to the British Museum, to Dr. T. Jaczewski, Professor H. B. Hungerford, and Professor T. Esaki.*

II.—SYSTEMATIC PART.

1. Fam. NOTONECTIDAE.

Aquatic Hemiptera modified for swimming with the dorsal surface below. Deep bodied, convex dorsally, and more or less triangular in section. Posterior legs natatory and more or less fringed with hairs.

The water boatmen (also known as " back swimmers " in North America) may be easily recognised by the deep body, quite unlike the flattened form of the other families of water bugs, and presumably developed in relation to their habit of swimming upside down.

Two subfamilies are usually recognised :

1. (2) Hind legs flattened and with a conspicuous fringe of hair. Larger species over 4 mm. long. . . . . *Notonectinae.*

2. (1) Hind legs not more flattened than the other pairs, and but little more ciliated. Smaller species under 3 mm. long . *Pleinae.*

* Since this was written Mr. Hutchinson has presented a large part of his private collection, including the types of the n.spp., to this Museum.—Editor.

Subfam. Notonectinae.

The genera have recently been discussed by Hale (Proc. Linn. Soc., N.S.W., xlix, pt. 4, 1924, p. 462), who groups them according to the number of well-developed antennal joints. Omitting the insufficiently known genera *Martarega* B.-Wh. and *Signoretiella* Berg., stated to have four antennal joints but in facies more allied to *Anisops* and *Nychia*, we may divide the subfamily into two tribes thus :

1. (2) Intermediate femur with a subapical tooth on its posterior margin. Antenna with four well-defined joints. Male genitalia symmetrical . . . . . *Notonectini* n.

2. (1) Intermediate femur without a subapical tooth. Antenna with three well-defined joints. Male genitalia asymmetrical *Anisopini* n.

A third tribe may have to be instituted for the two neotropical genera above mentioned.

Tribe Notonectini.

These insects are distinguished from those belonging to the *Anisopini* by their more robust form, and usually by their larger size, as well as by the characters given above. But two genera are known, both occurring within our area.

Pronotum somewhat transverse, anterior angles not foveate *Notonecta* L.

Pronotum very transverse, anterior angles each with a fovea in which lie the antennae . . . . . *Enithares* Spin.

Notonecta L.

Notonecta Linnaeus, 1758, Syst. Nat., p. 343.
,, Kirkaldy, 1897, Tr. Ent. Soc. Lond., p. 397.

Moderately robust. Pronotum not very transverse, anterior angles not foveate. (Plate XXVII, fig. 1.)

Wings with Sc well developed and chitinised, marginal for the greater part of its course, then bending down and fusing with Rs. R well chitinised, R_1 very short, not quite meeting Sc. M chitinised to just beyond r-m, which is short and well chitinised. Cu_1, Cu_2, and A_1 chitinised strongly only at the base, A_2 barely indicated, m-cu absent. (Plate XXVII, fig. 3.)

♂ genital capsule (9th abdominal sternite) with or without a ventral digitiform appendage. Parameres symmetrical. Aedeagus with a short chitinous portion supported on the basal plates, apically membranous and subspherical with a small aperture in a depression just anterior to the apex. This wide membranous portion is supported

by an internal chitinous stay, which projects up from the inner side of the wall of the basal part (*s*). The structure, as shown in Plate XXVIII, fig. 2, apparently represents the phallosoma of Pruthi (Tr. Ent. Soc. Lond., 1925, p. 181). It is drawn from a preparation of an aedeagus taken from a specimen captured *in copula*, after treatment with potash, and appears to be more expanded than the aedeagi of this genus examined by previous authors. The aedeagus of *Notonecta* differs from those of the other genera of the family in having neither paired lateral (hereafter termed "alae") nor median anterior or posterior ("appendix interna" and "externa") dilatations.

The genus *Notonecta* is chiefly Palaearctic and Nearctic, having its headquarters in the latter region. It extends into South America, and is represented by a single species in Australia (Professor Hungerford tells me he is making this the type of a new subgenus). It is apparently absent from the Oriental part of Asia, and but a single species is found in the Ethiopian region.

The genus (excluding the Australian *N. handlirschi* Kirk.) may be divided into two groups, which I here give as subgenera.

1. (2) Male genital capsule produced ventrally into a cylindrical digitiform appendage.
   Female usually with the first pair of gonapophyses elongate, well chitinized, and used for making slits in aquatic plants. Usually larger, more robust species . . . *Notonecta* Linn. s. str. (type *N. glauca* Linn.).
2. (1) Male genital capsule angulate or tuberculate below, but not produced into a digitiform appendage.
   Female with first pair of gonapophyses short and weak. Eggs laid on aquatic plants, etc., but not in slits. Usually small or slender species *Paranecta* subg. n. (type *N. lactitans* Kirk.).

Notonecta s. str. includes *glauca* Linn., *furcata* Fab.,* *viridis* Delc., *lutea* Mull., *maculata* Fab., *pallidula* Poiss., and probably some of the other Old World species, and *irrorata* Uhler and *borealis* Bueno and Hussey among the North American. *Paranecta* includes *lactitans* Kirk. from Ethiopian Africa, the remaining New World species, *kiangsis* Kirk. (=*bergrothi* Esaki=*suensoni* Hungfd.) from China, and *triguttata* Motsch from Japan (*vide* Hutchinson, Ent. Month. Mag., Feb. 1928, p. 35).

It will be seen that the single Ethiopian species is more closely allied to those of North America and the Far East than to its nearest geographical allies (*N. maculata* F., *N. furcata meridionalis* Poiss.,

* Since the above was written Esaki (Ann. Mag. Nat. Hist. (10), ii. p. 65) has corrected the nomenclature of this and the succeeding species to *N. obliqua* Gallén, with subspecies *N. o. obliqua* Gallén and *N. o. meridionalis* Poiss., and *N. marmorea* Fabr., with subspecies *N. m. marmorea* Fabr. (=*mediterranea* Hutch.) and *N. m. viridis* Delc.

N. viridis mediterranea Hutch., and *N. pallidula* Poiss.) in Palaearctic Africa. Not only has the subgenus *Paranecta* a discontinuous distribution itself, but the same phenomenon is shown to a striking degree in the African species *N.* (*P.*) *lactitans*, recorded from the Cape and from parts of West Equatorial Africa, but absent from a large intervening belt. We may conclude that *Paranecta* is the older subgenus, and in particular that *lactitans* is a very ancient species. It is to be noted that the characters of this subgenus are undoubtedly more primitive than those of *Notonecta* s. str.

In an interesting study of the chromosomes of *Notonecta*, Browne (J. Morph., 27, No. I, 1916, p. 119) finds that in *undulata*, *indica*, and *shooteri* the diploid number is 26, the first spermatocyte division showing 14 (the sex chromosomes conjugate late), and the second 13. In *glauca* and *irrorata* the diploid number is 24, the first spermatocyte division showing 13 and the second 12. In *insulata* the meaning of this decrease in number is shown, for here though the second spermatocyte division shows 12, in the first there are either 13 or 14. In those cases where but 13 were clearly indicated the small 14th was " often found attached to the longest chromosome."

We may note that the 26 chromosome forms belong to the primitive subgenus *Paranecta*, while the 24 chromosome species are of the more specialised *Notonecta* s. str.

In *insulata* where the notonectoid type of spermatogenesis seems to be developing, the somatic characters, undoubtedly agreeing with *Paranecta*, show a distinct foreshadowing of the notonectoid type. Thus the gonapophyses of the female are the best developed of those figured by Hungerford (Kansas Sc. Bull., 1919, xi, pl. xxxi) for species of this subgenus, and the male genital capsule is curiously angulate ventrally. Unfortunately no diploid groups which could be counted were found by Browne.

Poisson in *N.* (*N.*) *maculata* (Arch. Zool. Exp. Gen. 66, No. 2, 1927, p. 23) has likewise found 24 chromosomes in diploid groups, conjugating to give 13 in the first spermatocyte division, with 12 in the second. This species differs from its allies in the short weak first gonapophyses, which are not used for making slits in plants.

The occurrence of the short type is also noted below in *Enithares* and *Nychia*, and was found by Hale in *Paranisops*, while the long drilling type occurs in *Anisops* (Hale, *l.c.*), *Plea*, and *Buenoa* (Hungerford, *l.c.*, pl. xxv and p. 173).

The species described below is the sole member of the genus occurring in Ethiopian Africa.

1. *Notonecta lactitans* Kirk.

Notonecta lactitans * Kirkaldy, 1897, Ann. Mag. Nat. Hist. (6), xx. p. 58.
var. *stygica* ,, 1897, Tr. Ent. Soc. Lond., p. 406.

Testaceous, pronotum yellowish-grey ; scutellum, showing through latter posteriorly, black ; legs testaceous.

Slender and subparallel, just over 3 times as long as broad. Width of head and eyes about $2\frac{1}{2}$ times that of the vertex, which is $1\frac{1}{2}$–$1\frac{2}{3}$ times as wide as the pronotum. Notocephalon slightly longitudinally carinate in its posterior half.

Pronotum with anterior angles obtuse, about $1\frac{3}{4}$ or a little more times as broad as long, sides and posterior margin very slightly sinuate ; with an indefinite transverse impression before the middle, slightly longitudinally carinate and somewhat transversely anteriorly.

Scutellum with a sparse golden pubescence, especially laterally, apically impressed in preserved specimens, about $1\frac{1}{4}$ times as long as the pronotum.

Anterior leg with tibia $2\frac{1}{5}$–$2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as the third ; longer claw rather longer than the latter.

Intermediate leg with tibia just under $2\frac{1}{2}$ times the first (1+2) tarsal joint, which is about twice as long as the third or a little more ; longer claw a little longer than the latter, trochanter simple, femur with a single, straight, slightly forwardly directed, subapical spur in both sexes.

Outer lobe of membrane slightly longer than inner.

♂ (=var. *stygica* Kirk.). Elytra black with a very short, sparse, golden pubescence, best developed on the anterior part of the embolio-corial suture ; the outer edge of the clavus and an elongate spot on the inner part of the posterior margin of the corium and the outer margin of the embolium dull yellow ; membrane smoky brown.

Genitalia as figured. (Plate XXVIII, figs. 1, 2, and 3.)

♀ (=type Kirkaldy). Elytral pubescence as in ♂, black with the clavus, except for its internal margin, the posterior part of the embolium and a large area posteriorly on the corium dull yellow, membrane smoky grey brown. First pair of gonapophyses short.

Length : ♂, 10·5–11 mm.
♀, 11–12 mm.

* One of Kirkaldy's paratypes (Africa, B.M.) was labelled "*lactitans* Burchell," which MS. name Kirkaldy retained. Burchell presumably collected the species in the Western Cape Province.

Cape.

Table Mountain, Hely-Hutchinson Reservoir, 27, xii, 1925 (G.E.P.).

,, bog above Window Gorge, 31, i, 1926 (G.E.P.).

Silver Mine Valley, Cape Penin., 7, v, 1927, (L.M.S.).

Schoesters River Valley, Cape Penin., 23, vii, 1926 (G.E.P.).

Chapmans Peak Road, near Point, Cape Penin., pond, 24, vi, 1926 (G.E.P.).

Klipfontein Road, Cape Flats, pond, *in copula*, 21, vii, 1926 (G.E.H.).

Zeekoe Vlei, Cape Flats, weedy pool near vlei, 24, x, 1926, nymphs and teneral ♂ (L.M.S.).

Frazerdale Vlei, near Mowbray, 7, xi, 1926 (L.M.S.).

Banhoek, near Stellenbosch, c. 3000 ft., 24, i, 1926 (G.E.P.).

Wellington, pond, 324 ft., 15, v, 1927 (L.M.S.).

Great Winterhoek, Tulbagh dist., c. 3800 ft. and c. 4200 ft., iv, 1916 (R. M. Lightfoot, S.A.M.).

Ceres, kloof on west side of Mitchell's Pass, pool near top of Pass and mountains above on west side, 5–7, xii, 1926 (G.E.H.).

Swellendam, pools in streams, Duivelsbosch and above Koloniesbosch, 13–14, xii, 1926 (G.E.H.).

Also recorded from the Cape of Good Hope (Paris Mus.) by Kirkaldy (*l.c.*). Though known from such widely separated localities as Guinea (*type* Kirkaldy), Gaboon (Vienna Mus., Kirkaldy), and the Cape, this species must have a curiously discontinuous distribution, for it appears to be entirely absent from collections made in the northern and eastern parts of South Africa.

Life-history.—The dates given above indicate that in the Cape Peninsula, if not elsewhere, there is a migration from mountain pools in the autumn to low-lying waters on the Cape Flats and elsewhere, in which situations the insects breed, the newly emerged adults then ascending and populating the localities left by their parents. No specimens were found on Table Mountain a few days before the pairs were taken *in copula* on 21, vii, 1926, as recorded above.

The eggs are as yet unknown, but are presumably laid on submerged objects without being embedded, as in the other species of the subgenus (Hungerford, 1917, Kans. Univ. Sc. Bull., xi; Bare, 1926, Ann. Ent. Soc. Am., xix).

The nymphs described below were taken by Miss L. M. Starke in Frazerdale Vlei near Mowbray, on the Cape Flats, on 7, xi, 1927.

Nymphs. L. 4·5 mm. (? 3rd instar).

Head dilated anteriorly between the eyes, internal borders of eyes very slightly divergent, the least distance between them being very

little less than the greatest. Pronotum very transverse, about $\frac{3}{4}$ times as long as head, and rather more than $3\frac{1}{2}$ times as wide as long, lateral margins curved, the greatest width being behind the middle, where it is slightly wider than the head (Plate XXIX, fig. 10). Mesonotum $1\frac{1}{8}$ times as long as head. Anterior leg with tibia $1\frac{1}{2}$ times as long as tarsus, the latter being just under twice as long as longer claw. Intermediate leg with tibia $1\frac{1}{2}$ times as long as tarsus, which is just over twice the longer claw. Intermediate femur without a subapical spine.

Length : 6·4 mm. (? 4th instar).

Head dilated anteriorly between eyes, internal borders of eyes slightly more divergent than in the previous specimen, the greatest vertical interocular distance being about $1\frac{1}{5}$ times the least ; the latter has about the same absolute measurements as it has in the adult, *i.e.* the synthlipsis is relatively much wider and the eyes less broad. Pronotum $\frac{7}{8}$ times as long as the head, very transverse and trapeziform, the sides being straight, widest posteriorly where it is about $1\frac{1}{6}$ times as wide as the head, and about $3\frac{1}{4}$ times as wide as long. Mesonotum $1\frac{1}{3}$ times as long as the head.

Anterior leg with tibia about $1\frac{1}{2}$ times as long as tarsus, which is just over twice as long as the longer claw. Intermediate leg with tibia about $1\frac{1}{2}$ times as long as tarsus, which is just over twice as long as the longer claw. Intermediate femur with a short subapical spine.

Length : 8·5 (last instar, ? 5th).

Head more dilated anteriorly than in adult, internal margins of eyes still more divergent than in the preceding, but the least interocular distance, which is contained in the greatest about $1\frac{1}{3}$ times, actually exceeds the width of the adult synthlipsis (Plate XXIX, fig. 11). Pronotum shaped much as in the preceding, $\frac{6}{7}$ times the length of the head, and just over 3 times as wide as long. Mesonotum $1\frac{2}{3}$ times as long as head.

Anterior leg with tibia just under $1\frac{2}{3}$ times as long as tarsus, which is $2\frac{1}{2}$ times as long as the longer claw.

Intermediate femur with a short subapical spine.

The nymphs are dull yellow with maroon-brown eyes. Similar nymphs to those described above, from 5–9 mm. long, were taken on 24, x, 1926, in a weedy pool near Zeekoe Vlei, Cape Flats. A cast last nymphal moult from this locality is 9·3 mm. long, giving the size of the fully grown nymph.

It will be seen that a considerable change in form occurs between the first and second of the stages described above, particularly in the

lateral margins of the pronotum and in the appearance of the femoral spine on the intermediate leg. Butler (Biology of the British Hemiptera-Heteroptera, 1923, p. 560) states of these changes in the European members of the typical subgenus : " *Notonecta* has at least five larval instars . . . . in the first three, however, the shape of the head and eyes does not resemble the adult at all, but is more akin to that of *Corixa*. . . ." A very teneral specimen (♂ Zeekoe Vlei, 24, x, 1926) is greyish-yellow, with greenish-grey legs ; a ♀ taken with it is fully coloured, but probably was somewhat soft when taken. The adult coloration would therefore seem to appear quite soon after ecdysis (cf. *Anisops varia*, infra).

Enithares Spin.

Enithares Spinola, 1837, Ess. Hemip., p. 60.
,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 10.
,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v. p. 78.
Bothronotus, Fieber, 1851, Rhynchotogr., p. 46.

Robust and more depressed than *Notonecta*. Pronotum very transverse with a fovea in each anterior angle in which the antenna lies.

Wing with Sc well developed and fused apically with Rs ; R running very close to Sc, R_1 obsolete, Rs fused with M in the region where r-m is found in *Notonecta* ; Cu_1 and Cu_2 moderately well marked in the pigmented outer part of the wing, fused marginally, and m-cu represented by a line of slightly darker colour. A_1 fairly well developed, A_2 indicated basally. The wing of *Notonecta* is more primitive in the persistent r-m, but less so in the poor development of the cubitals, which are probably more apparent in *Enithares* owing to its pigmentation (Plate XXVII, fig. 5).

♂. Genital capsule without a digitiform appendix. Parameres symmetrical ; aedeagus chitinous basally, centrally, and apically, somewhat thin walled, with two appendices externae, a sac-like one basally and a more pointed apical one, which forms with the main shaft of the organ a wide apical portion when fully erected, supported with thickened hoops. Jaczewski's figure (*l.c.*) is presumably from a very partially expanded specimen.

♀. First pair of gonapophyses short and weak.

This is a widespread genus in the Old World occurring throughout the Ethiopian and Oriental regions, in the Eastern Palaearctic, and also Australia. In the New World it is known from South America, but is apparently absent from the Nearctic region as it is from the

Western Palaearctic. The following species have been described from Africa :—

sobria Stål, 1855, " Caffraria."
cincta Gerst., 1860, Mombasa.
glauca Bolivar, 1879, Abyssinia.
v-flavum Reuter, 1884, Ashanti.
compacta Gerst., 1892, Zanzibar.
chinai Jacz., 1927, South Africa, Uganda, Sudan.
rhodopis Hutch., 1928, White Nile.

Kirkaldy (*l.c.*) dismisses *compacta* as a synonym of *blandula* Sign, 1860, from Madagascar, and regards *cincta* and *glauca* as not determinable.

Key to South African Species of Enithares Spin.

1. Smaller, 6·5–9 mm.
   a. 6·5–8·5 mm.
      Anterior tibia of ♂ darkened on the lower surface. Pronotal fovea darkened and often with a conspicuous black spot. First anterior tarsal joint about $1\frac{1}{2}$ to twice as long as second. First intermediate tarsal joint $1\frac{1}{3}$ times (or less) as long as second . . *sobria* Stål.
   b. 8·5–9 mm.
      Anterior tibia of ♂ not darkened below. Pronotal fovea concolorous with pronotum, pale. First anterior tarsal joint $1\frac{1}{2}$ to twice as long as second. First intermediate tarsal joint $1\frac{1}{3}$–$1\frac{1}{2}$ times as long as second . . . . . *chinai* Jacz.
2. Larger, 11–11·5 mm.
   Pronotal fovea largely blackish or with conspicuous smoky spot. First anterior tarsal joint from a little under 2–$2\frac{1}{2}$ times as long as second. First intermediate tarsal joint $1\frac{1}{2}$ to twice as long as second *v-flavum* Reut.

1. *Enithares v-flavum* Reut.

Enithares v-flavum Reuter, 1882, Oefv. Finsk. Vet. Förk., xxv, p. 41.
„ „ Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 103.

Head and eyes from $2\frac{2}{5}$–$2\frac{3}{4}$ times as wide as vertex, which is 2–$2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum very sparsely punctured ; foveae in the anterior angles pale greyish to black ; $2\frac{1}{2}$–3 times as wide as long.

Scutellum very finely and sparsely punctured, from nearly $1\frac{1}{2}$ to more than twice as long as the pronotum.

Anterior tibia about twice as long as the tarsus ; first (1+2) tarsal joint 2–$2\frac{1}{2}$ times as long as third, which is shorter than the claw.

Intermediate tibia $2\frac{2}{5}$–$2\frac{3}{5}$ as long as the first (1+2) tarsal joint, which is about twice as long as the third or a little less ; claw subequal to the latter.

♂ anterior tibia not darkened below.

Genital capsule 1·5–1·7 mm. long, of characteristic form. (Plate XXVIII, figs. 8, 9.)

Length : 11–11·5 mm.

I have some hesitation in referring the specimens on which the description is based to this species, though they agree tolerably well in structural characters with Kirkaldy's description. This author states that the typical form of *v-flavum* has blackish elytra " die gelbliche Hinterhälfte der Clavus und Coriums ausgenommen." In South African material as well as in a very similar series from Blantyre, Nyasaland (Dr. J. E. S. Old, 1910 ; B.M., 1911–13), two colour forms are recognisable.

a. Predominantly yellowish grey or cinerous, elytra concolorous.

b. Scutellum and metanotum black, the former with two convergent yellow flecks which form a V, incomplete at the apex and rather indefinite in outline, each fleck being dilated centrally or anteriorly ; elytra with a black area at the distal end of the corium and base of the membrane.

The pale coloration in the dark form is situated, therefore, at the base and not in the posterior half of the elytra, and I cannot help suspecting some error unless I misunderstand Kirkaldy's phrase. A single ♂ specimen from Angola (B.M. 76–55) appears from its genitalia to belong to the same species as those from Nyasaland and South Africa. It differs, however, in its slightly smaller size, more regularly defined V on the scutellum, and almost uniformly black elytra, only the base and a marginal area being pale. It is possible that this may represent a distinct local race, but it would be unwise to describe it as such till a better knowledge of the variation of the species is achieved.

Cape.

Debe Nek (stream in forest near Mnqesha), 27, ii, 1926 (G.E.P.). (*a*) ♂ and ♀. (*b*) ♂.

Kentani, Transkei (*a*) 1899 (S.A.M.).

Natal.

Kranz Kloof (*b*) ii, 1915 (Marley, S.A.M.).

Transvaal.

Witpoortje, Krugersdorp div., 29, ix, 1926 (*a*), and 2, iv, 1927 (*a* and *b*) (G.E.H.).

Haenertsburg, Pietersburg div. (*a*) ix, 1927 (Miss M. E. Blenkiron).

Southern Rhodesia.

Great Zimbabwe, pool in stream, 6, vii, 1927 (G.E.H.) (*a*, *b*, and intermediates, probably teneral *b*).

This species is recorded also by Kirkaldy from Guinea (Addah, Reuter's *type*), Ashanti, Togoland, Gaboon, Abyssinia, Erythraea, and the Transvaal.

In all the localities for which definite information exists, this species has occurred in the pools and slower running parts of streams. Some large *Enithares* nymphs noted in a backwater of the river at Wittelsbosch in the Humansdorp division of the Eastern Cape Province probably belong here.

2. *Enithares chinai* Jacz.

Enithares chinai, Jaczewski, 1927, Ann. Mag. Nat. Hist. (9), xx, p. 436.

Dirty yellowish-grey, pronotal foveae not darkened, anterior part of scutellum darkened, elytra almost unmarked or with a small dark fleck in the inner angle of the corium along the corio-claval suture, legs testaceous, wings smoky black, scutellum black with an irregular yellow posterior border of varying width, and distal part of corium and cuneus more or less black.

Width of head and eyes $2\frac{1}{4}$–$2\frac{1}{2}$ times that of the vertex, which is about twice as wide as the synthlipsis.

Pronotum very finely and sparsely punctured, with an indefinite and small transverse depression before the central part of the anterior margin. $2\frac{2}{3}$–$2\frac{3}{4}$ times as wide as long.

Scutellum transversely wrinkled posteriorly, $1\frac{1}{2}$ to nearly twice as long as the pronotum.

Anterior tibia $\frac{1}{2}$ or $\frac{2}{3}$ as long again as the tarsus, concolorous in both sexes; first (1+2) tarsal joint $1\frac{1}{2}$ to twice as long as the third, which is shorter than the longer claw.

Intermediate leg with tibia $2\frac{2}{5}$–$2\frac{4}{5}$ as long as the first (1+2) tarsal joint, which is $1\frac{1}{5}$–$1\frac{1}{2}$ times as long as the third; claw slightly shorter than the latter.

♂ anterior tibia not darkened below.

Genital capsule about 1·5 mm. long, of characteristic form (Plate

XXVIII, fig. 4), with the upper margin of the posterior lobe strongly concave.

Length : 8·5–9 mm.

CAPE.

♂ and 2 ♀♀, East London, " 2nd Creek," 16, ii, 1926 (G.E.P.).

Type and 5 *paratypes*, East London, 1, v, 1925 (Holden *fide* Jaczewski).

TRANSVAAL.

Kaapmuiden, xi, 1918 (S.A.M., R. Tucker).

♂, ♀♀, Limpopo River, Main Drift, near Messina, 1927 (G.E.H.).

SOUTHERN RHODESIA.

♀ Khami River, below ruins near Bulawayo, 27, vi, 1927 (G.E.H.).

♀ Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

The only species with which this might be synonymous is *compacta* Gerst., but if Kirkaldy is correct in synonymising that species with *blandula* Sign, it cannot have concolorous pronotal foveae.

Enithares chinai occurs in the backwaters of rivers and streams, and in pools in dry river-beds. Jaczewski records it from Nawandala, Uganda (G. L. R. Hancock), and Tovit, Sudan (T. R. Yardley). It is just possible that the latter record refers to *E. rhodopis* Hutch., an allied species distinguished by the form of the male genital capsule. The undescribed South African species referred to in the description of *rhodopis* (Ann. Mag. Nat. Hist., i, p. 157, 1928) is *chinai*.

3. *Enithares sobria* Stål.

Notonecta sobria Stål, 1855, O.V.A.F., xii, p. 89.
Enithares sobria Stål, 1865, Hemip. Afr., iii, p 191.
,, ,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 106.
,, ,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, pp. 78–81.
,, ,, Jaczewski, 1927, Ann. Mag. Nat. Hist. (9), xx, p. 435.

Width of head and eyes $2\frac{3}{10}$–$2\frac{1}{2}$ times that of vertex, which is 2–$2\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum with foveae varying from yellowish-grey with a small smoky spot dorsally to almost uniform smoky black ; about 3 times as wide as long and sparsely punctate.

Scutellum slightly wrinkled posteriorly, from $1\frac{1}{2}$–$2\frac{2}{5}$ times as long as the pronotum.

Anterior leg with tibia just under twice as long as the tarsus, first (1+2) tarsal joint about $1\frac{1}{2}$ to twice as long as the third; the latter about $\frac{5}{8}$ as long as the longer claw.

Intermediate tibia 2–3 times as long as the first (1+2) tarsal joint, which is slightly longer than the third; the latter slightly longer than the longer claw.

♂ anterior leg with apical $\frac{2}{3}$ of tibia, dark below. (Plate XXVII, fig. 6.)

Genital capsule about 1·1 mm. long, of characteristic form. (Plate XXVIII, fig. 6.)

Length: ♂, 7·5–8 mm.
♀, 8–8·5 mm.

Kirkaldy gives the dimensions as 7·2–10 mm., probably the specimens before him contained an admixture of *Enithares chinai* Jacz. and allied species.

The coloration of *Enithares sobria* is very variable, typically it is greyish-yellow or greenish, with transparent greyish elytra; the scutellum whitish-yellow or pale greenish-grey, and with a large black spot on the distal half of the corium and the cuneus. The size of this spot is very variable, and it may be altogether absent. Many of the brighter coloured individuals are beautifully opalescent. A striking rusty variety of the female is described below.

Cape.

Buffels Bay, Cape Penin., iv, 1926 (G.E.P.).

Alderman's Farm, Firgrove, Cape Flats, dam, 24, v, 1926 (G.E.P.).

Banhoek, near Stellenbosch, 29, xii, 1925 (G.E.P.).

Swellendam Dam, 17, xii, 1927 (G.E.H.).

Knysna, ponds, 21–23, xii, 1927 (G.E.H.).

Assegaibosch, pool in stream, 13, i, 1927 (G.E.H.).

Grahamstown, dam, 6, iii, 1927 (G.E.H.).

Alice, vlei at Native College Farm and Tyumie River, 23, ii, 1926 (G.E.P.).

Debe Nek, Mnqesha River, 2, iii, 1926 (G.E.P.).

Pirie Mission, pool in stream bed, 2, iii, 1926 (G.E.P.).

East London, pool in stream bed, 13, ii, 1926 (G.E.P.).

" Caffraria " (*type* Stål.).

Natal.

Estcourt, 1897 (B.M., 1926, 40, F. Brown).

Transvaal.

Witpoortje, Krugersdorp dist., 22, iv, 1928 (G.E.H.).

Plat River, Waterberg dist., 6–18, iv, 1906 (C. Swierstra, T.M.).

Nakapan (*sic*=? Makapan), c. 11, Nouahlier (*fide* Kirkaldy, *l.c.*).

Southern Rhodesia.

Fort Victoria, 5, vii, 1927 (L.M.S.).

Cleveland Dam, near Salisbury, 2, vii, 1927 (G.E.H.).

Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

Bechuanaland Protectorate.

Swamp of Linyanti River, Sailodelo, south of Kabulabula, 17, vii, 1927 (G.E.H.).

Portuguese East Africa.

Pool near Lake Marramwe, vi, 1928 (Miss E. L. Stephens).

form *danae* n.

♀. Basal part of corium and inner margin of cuneus ferruginous red, scutellum yellow or greenish with an indefinite antero-median tawny orange patch.

Cape.

♀, Alice, Tyumie River, 23, ii, 1926 (G.E.P.).

♀, Debe Nek, Mnqesha River, 2, iii, 1926 (G.E.P.).

2 ♀ ♀ (*type* and *paratype*), Blaauwkrantz Valley, pools in stream bed near Kowie Road, 9, iii, 1926 (G.E.P.).

Southern Rhodesia.

♀ Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

This species appears to occur in a greater variety of habitats than the preceding. It is widely distributed throughout Africa. Kirkaldy records it from Abyssinia and Somaliland, and Jaczewski from Sierra Leone, French Senegal, and Uganda. Dr. F. O. Stohr has sent me this species from Munshiwemba, Ndola, Northern Rhodesia, and I have taken it in the Sindi River, near Livingstone. Form *danae* is apparently limited to the female sex, and occurs sporadically with the type.

Life-history.—Egg unknown, presumably laid on submerged objects, but not inserted in a slit.

Nymphs.—L. 4·5 mm. (probably *E. sobria*, Cleveland Dam, near Salisbury, 3, vii, 1927).

Head greyish-yellow, eyes grey, pro- and meso-thorax yellow, elytral rudiments, metathorax and base of abdomen blackish, remainder of abdomen greyish.

Head with vertex very slightly swollen anteriorly, internal margins of eyes fairly divergent, the vertex being just over $1\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum just over $\frac{1}{2}$ as long as head; lateral margins very slightly concave, sides of prothorax deeply excavated; widest posteriorly where it is rather wider than the head and rather over $4\frac{1}{2}$ times its length. Mesonotum about $1\frac{1}{3}$ times as long as the pronotum.

Anterior leg with tibia just under $1\frac{1}{2}$ times as long as the tarsus, which is just over $1\frac{1}{2}$ times the longer claw.

Intermediate leg with tibia about $1\frac{1}{4}$ times the tarsus, which is about $1\frac{3}{4}$ times the longer claw. Intermediate femur with a short subapical spine.

Length : 6·0 mm. (Grahamstown, 6, iii, 1926 ; last nymphal instar).

Dirty yellowish-grey, margins of elytral rudiments dark brown. Head with a slight anterior dilatation; vertex $2\frac{1}{3}$ times the synthlipsis. (Plate XXIX, fig. 12.)

Pronotum just over $\frac{1}{2}$ as long as the head and $4\frac{1}{2}$ times as wide as long; prothorax deeply excavated laterally, the lateral margins of the pronotum being somewhat concave, particularly on their anterior part, the general structure being reminiscent of an adult *Nychia*.

Mesonotum just over $1\frac{1}{2}$ times as long as pronotum.

Anterior tibia about $1\frac{5}{6}$ times as long as tarsus, which is nearly twice as long as the longer claw.

Intermediate tibia rather more than $1\frac{1}{3}$ times the tarsus, which is about $2\frac{1}{3}$ times the longer claw. Intermediate femur with a small subapical spine.

The first nymph described may be of the penultimate or antepenultimate nymphal instars, in the latter case the femoral spine of the intermediate leg is acquired earlier than in *Notonecta*.

The nymphs of *Enithares* can be distinguished from those of *Notonecta* by the more transverse pronotum, which is at least 4 times as wide as long, and the relatively longer head which, however, is less swollen anteriorly. The synthlipsis is also relatively narrower than in *Notonecta* nymphs of the same size.

Tribe Anisopini.

These insects, distinguished from *Notonectini* by the characters given above, are slender, and for the most part small insects with pale coloration. The genera are separated by Hale (Proc. Linn. Soc. N.S.W., xlix, pt. 4, 1924, p. 462) as follows :—

1. (2) Anterior and intermediate legs short; posterior femora, tibiae, and tarsi subequal in length. Eyes basally contiguous. *Nychia* Stål.

2. (1) Anterior and intermediate legs long ; posterior femora, tibiae, and tarsi not subequal in length. Eyes rarely basally contiguous.

3. (6) Ventral keel extending to tip of abdomen. Anterior tibiae of male with a stridulatory comb on a basal spur. Ovipositor of female with a pair of elongate subspatulate and strongly chitinised gonapophyses.

4. (5) Anterior tarsi of male single-jointed . *Anisops* Spin.

5. (4) Anterior tarsi of male two-jointed . . *Buenoa* Kirk.

6. (3) Ventral keel not extending on to last abdominal segment. Anterior tibiae of male without stridulatory comb or basal spur. Ovipositor of female not so modified . . . *Paranisops* Hale.

Only *Nychia* and *Anisops* occur in South Africa. The former may always be recognisable by the basally contiguous eyes, a condition known in *Anisops* only in the Oriental *A. breddini* Kirk. *Buenoa* replaces *Anisops* in the New World, while *Paranisops* is a primitive form known only from New South Wales.

Anisops Spin.

Anisops Spinola, 1837, Ess. Hemip., p. 58.
,, Stål., 1865, Hemip. Afr., iii, p. 191.
,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 111.
,, Hale, 1923, Rec. S. Austr., M. ii, p. 400.
,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 2, p. 81.

Slender and usually small insects. Eyes large, but not contiguous posteriorly in any known African species. Anterior and intermediate legs fairly long. Posterior tarsus distinctly shorter than tibia. Wing with Sc fusing apically with Rs, R_1 absent, M meeting Rs, m-cu indicated, Cu_1+Cu_2 indicated by a broad, ill-defined area, A_1 well defined. (Plate XXIX, fig. 9.)

♂ anterior leg with a stridulatory comb at the base of the tibia, and a single-jointed tarsus bearing a pair of stout claws. Genital capsule boat-shaped. Parameres asymmetrical, the right one being a very

broad, leaf-like lobe, the left deeply excavated behind and hook-shaped (Jaczewski, *l.c.*). Aedeagus with a basal fairly well chitinised part, a wide middle portion which bears two slightly forwardly directed alae, the right being a little larger than the left, and a well-defined terminal part (*endosoma* of Pruthi, *l.c.*). Jaczewski's figure is probably from a preparation that is imperfectly erected. (Plate XXXIII, figs. 5, 6.)

♀ anterior tibia without comb, tarsus with a vestigial basal and two well-developed distal joints and bearing slender claws. Gonapophyses elongate, strongly chitinised.

The genitalia of the ♂, as Jaczewski has pointed out, are practically useless for the discrimination of species in this genus, which is the more to be regretted in view of the great number of closely allied species involved. The most important characters available are, however, drawn from the ♂ sex, and identification of ♀ specimens is often impossible. The following structures are most useful in characterising species :—

1. The relative proportions of the joints of the anterior leg of the ♂, the stridulatory comb, and the armature of the tibia.

2. A tubercle lying on the face just above the labrum in the ♂. In the majority of species and in the ♀♀ of all, this is a simple and often obsolete eminence. In others it is laterally compressed, flattened, or deeply excavate. The figure shows the excavated crateriform tubercles of *psyche* and *hancocki* (Ann. Mag. Nat. Hist. (10), i, pp. 159 and 163), the compressed tubercle of *jaczewskii*, and the condition in certain other species discussed under *A. sardea*.

3. The relative proportions of head, vertex, and synthlipsis.

4. The form of the third rostral joint of the ♂ (Jaczewski, *l.c.*), which in all species but one has a pair of lateral prongs on which the stridulatory comb is rubbed (Hale, *l.c.*).

The following key has been drawn up to include all the Ethiopian species known to me. This seems the wisest course to adopt in view of the number of species now known from that region.

Key to the Ethiopian Species of Anisops Spin.

1. (2) Posterior tibia over $1\frac{3}{4}$ times the length of the tarsus; brachypterous, elytra with a large, black, subapical patch (subgenus *Micranisops* n.)
apicalis Stål (S. Rhodesia, Caprivi Strip, Caffraria, and Central Africa).

2. (1) Posterior tibia less than $1\frac{3}{4}$ times as long as the tarsus; macropterous, elytra if pigmented not hyaline with a large, black, subapical patch.

3. (4) Third rostral joint of ♂ simple, without backwardly directed prongs (subgenus *Anisopoides* n.) . . . *aglaia* n. sp. (Cape, Transvaal).
4. (3) Third joint of rostrum of ♂ with backwardly directed prongs (subgenus *Anisops* s.s.).
5. (6) Head of ♂ produced anteriorly into a conspicuous cephalic horn *sardea* H.S. (S.W.A., N.W. Cape, N. Transvaal, Natal, and Central Africa).
6. (5) Head of ♂ not so produced.
7. (10) Anterior tarsus of ♂ less than twice as long as the longer claw.
8. (9) Head not more than 4 times as wide as vertex; stridulatory comb of 12–14 elements . . . *poweri* n. sp. (W. Cape, S. Transvaal).
9. (8) Head at least 6 times as wide as vertex; stridulatory comb of more than 20 elements . . . . . *leesoniana* n. sp. (S. Rhodesia).
10. (7) Anterior tarsus of ♂ at least twice as long as the longer claw.
11. (14) Facial tubercle deeply excavate and crateriform.
12. (13) Larger over 7 mm. long . . . . *hancocki* Hutch. (Uganda).
13. (12) Smaller under 6 mm. long *psyche* Hutch. (N. Transvaal, S. Rhodesia and Central Africa).
14. (11) Facial tubercle not excavate.
15. (18) Facial tubercle laterally compressed.
16. (17) Anterior tibia about 1½ times as long as tarsus *adonis* Hutch. (Central Africa).
17. (16) Anterior tibia about twice as long as tarsus *jaczewskii* Hutch. (N. Transvaal, W. Africa).
18. (15) Facial tubercle simple.
19. (20) Posterior margin of pronotum convex or at most flattened *letitia* n. sp. (E. Cape).
20. (19) Posterior margin of pronotum concave centrally.
21. (22) Large, over 9 mm. long *pellucens* Gerst. (S. Rhodesia, Central Africa).
22. (21) Medium sized and small, under 9 mm. long.
23. (24) Elongate, slender, and fusiform; stridulatory comb borne on a ridge which is transversely striated internally *gracilis* n. sp. (throughout S. Africa).
24. (23) Less elongate, stridulatory comb on an unstriated ridge or eminence.
25. (26) Upper edge of anterior tibia of ♂ armed with a row of very stout spinous hairs . . . *debilis* Gerst. (E. Cape, N. Transvaal, S. Rhodesia, P. E. Africa, and Central Africa).
26. (25) Upper edge of anterior tibia of ♂ with at most fine spinous hairs.
27. (28) Stridulatory comb very wide, rectangular, less than twice as long as broad. Deeply pigmented, greater part of scutellum black when fully coloured *ares* Hutch. (Uganda).
28. (27) Stridulatory comb narrower, at least twice as long as broad.
29. (30) Stridulatory comb subparallel sided of about 25 thin lamellae. Larger, 7 mm. or more long. Well pigmented. Scutellum bright orange and black when fully coloured *varia* Fieb. (general throughout S. and Central Africa).
30. (29) Stridulatory comb not subparallel sided, of 12 or fewer thicker lamellae. Smaller species under 7 mm. long. Scutellum less brightly coloured.
31. (32) Elements of comb seen from above elongate dumb-bell shaped (Plate XXXII, fig. 9). Anterior border of clavus crimson *amaryllis* Hutch. (E. Africa).

32. (31) Elements of comb seen from above lamelliform.
33. (38) Comb widest internal to middle.
34. (37) Anterior border of clavus whitish.
35. (36) Comb as in Plate XXXII, fig. 11, little narrowed internally
kampalensis Hutch. (Uganda).
36. (35) Comb as in Plate XXXII, fig. 10, considerably narrowed internally
eros Hutch. (Uganda).
37. (34) Anterior border of clavus crimson when fully coloured. Comb as in Plate XXXII, fig. 4*a* . *praetexta* n. sp. (S. Rhodesia, Transvaal).
38. (33) Comb widest external to middle (Plate XXXII, fig. 2*a*)
hypatia n. sp. (W. Cape).

A. aphrodite Kirk. from West Africa is omitted as it is inadequately described. It is possible that *A. kampalensis* is a synonym of this species.

The natural arrangement of species in this genus, as in any other, presents considerable difficulties. Since there are certain definite trends of evolution to be observed in the genus, many slight resemblances are of more importance in determining affinity than striking, single ones. A rather indefinite group of species, viz. *adonis*, *jaczewskii*, *eros*, *psyche*, *amaryllis*, and *praetexta*, are characterised by small size, slight but characteristic pigmentation (the anterior angles of the scutellum, metanotum, and base of the dorsum abdominis being blackish, the rest of the scutellum tending to yellow or orange), fusiform build with a head very little narrower than the pronotum, fairly wide vertex and synthlipsis, and short anterior claws in the ♂.

It is not unreasonable to assume that these characters are primitive in the genus; moreover, in two species, *adonis* and *jaczewskii*, the stridulatory comb is of a very primitive type, consisting merely of a row of 7–9 short, very thick, peg-like hairs. Within this group certain alliances are obvious, *adonis* being very close to *jaczewskii*, *praetexta* to *amaryllis*, while *eros* is closer to these latter than to the others.

From a central group of this kind we can easily imagine lines of evolution which have given rise to various isolated species. Intensification of pigment has occurred in *varia* and *ares*, two rather similar species that are probably allied in spite of their very different combs. In the other members of the genus such pigment as is possessed by these more primitive members of the central group tends to be lost. The short claws, general body form, and small size are retained by *hypatia*, while *debilis* is not very far removed from them in its form and coloration. More specialised conditions are found in the isolated species *letitia* and the very elongate fusiform *gracilis*. The two

long-clawed species *poweri* and *leesoniana* have probably originated independently; in the former the vertex and synthlipsis are much wider than in the latter, which also has a more specialised comb.

In all these species there is clearly a tendency for the eyes to get larger and closer, the vertex and synthlipsis becoming narrower in consequence. In no African species of *Anisops* is contact actually achieved, but that condition is found in *Nychia* and the Oriental *A. breddini*, as well as in the Neotropical genus *Martarega*.

Starting from a form like *A. psyche* again in the central group, we can see how not only *A. hancocki* has arisen, but the mode of evolution of the cephalic horn of *sardea* and allied Oriental species. Finally, *pellucens* has developed in size alone, in which it rivals certain species of the *Notonectini*, but shows no other specialisations of note, the head with its wide synthlipsis being particularly primitive. The two subgenera *Micranisops* and *Anisopoides* contain each a single small species, and are probably early specialisations of the central group; the latter particularly in many of its characters is little removed from *A. hypatia*, with which it occurs.

The zoogeographical significance of the African species of the genus is discussed on p. 460.

The complete identification of species is usually only possible in the case of ♂ ♂. To assist in the determination of females of certain South African species the following table may be useful:—

(1) *apicalis* Stål.

Very short, subparallel. L. 4·5–5·0 mm.

Short posterior tarsi; brachypterous elytra, with subapical black spot.

(2) *sardea* H. S.

Subparallel and slender. L. 8·0–8·5 mm. Vertex longitudinally foveate, facial tubercle usually longitudinally impressed.

(3) *pellucens* Gerst.

Subparallel, robust, and known at once by its very large size. L. 10·5 mm.

(4) *letitia* n. sp.

Fusiform, rather robust. L. 8·0–9·0 mm. This species is at once known by the convex or slightly flattened posterior margin of the pronotum, which separates it from all known species.

(5) *gracilis* n. sp.

Very fusiform and slender. L. 7·0–8·0 mm.

(6) *varia* Fieb.

Rather robust. L. 6·5–7·5 mm. When fully mature brightly coloured, with an orange or orange and black scutellum, black metanotum and abdomen, and crimson flecking at the base of the elytra. The Central African *ares* resembles *varia* in these last characters, but has most of or all the pronotum and all the scutellum, save sometimes the anterior angles, black, whereas in *varia* the apex of the latter is always orange or orange-red.

(7) *praetexta.*

Fusiform, with a rather wide head. L. 6·0–6·5 mm. When fully coloured distinguished by the crimson anterior margins of the elytra, but cannot be separated without a ♂ from the Central African *amaryllis*, which also possesses this character.

Fourteen species of *Anisops* are described below as inhabiting Africa south of the Zambesi.

1. *Anisops* (*A.*) *sardea.*

Anisops sardeus	Herrich Schäffer, 1849, Wanz. Ins., ix, Tab. 294, fig. 904.*
Anisops sardea	Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 114.
,, ,,	Hesse, 1925, Ann. S.Afr. Mus., xxiii, p. 137.
,, ,,	Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 2, p. 83.
Anisops nivea	Spinola, 1837, Ess. Hemip., p. 58 (nec. Fabr., etc.).
Anisops productus	Fieber, 1847, Abh. Böhm. Ges. Wiss. (5) v, p. 16 (*nomen nudum*).
,, ,,	Fieber, 1852, Abh. Böhm. Ges. Wiss. (5), vii, p. 484.
,, ,,	Stål, 1865, Hemip. Afr., iii, p. 191.
Anisops producta	Poisson, 1926, Arch. Zool. Exp. Gen., 65, p. 181.
Anisops natalensis	Stål, 1858, O.V.A.F., xii, p. 89.

Yellowish or creamy white, scutellum and dorsum abdominis tending to orange, apex of the latter and abdomen ventrally black, often with a black line across the base of the scutellum.

* Mr. W. E. China writes: "There is some doubt as to the validity of Herrich Schäffer's name *sardea*, which was published in October 1849 . . . since the description is not quite in the proper style, and is apparently not binomial, *sardea* being written in ordinary type. The figure is, however, labelled *A. sardeus*, and the description refers to the figure, so that the valid name should be referred to the Tab. 294, fig. 904, and not to p. 41. . . ."

♂. Form subparallel.

Head produced forward in front to form a cephalic horn which, when viewed from above, is about half as long as the notocephalon (from the anterior margin of eyes forward and backward respectively), its sides convergent and bluntly rounded in front, below slightly excavated, with two longitudinal carinae throughout its length and two latero-longitudinal from the eyes forward. (Plate XXX, fig. 7.)

Width, head $\frac{1}{7}$–$\frac{1}{8}$ times less than that of pronotum.

Synthlipsis about $\frac{1}{20}$ the width of the head.

Third rostral joint with long, narrow, divergent prongs (Plate XXX, fig. 9). Pronotum $1\frac{2}{3}$ to twice as long as wide, smooth, with a row of hairs set $\frac{1}{4}$ of its length forward from the bisinuate posterior margin.

Scutellum $1\frac{1}{4}$ to twice as long as pronotum.

Anterior leg with tibia about $1\frac{2}{3}$ times as long as tarsus, which is about $2\frac{1}{3}$ times as long as the longer claw. Tibia rather stout, with about six short spines on its anterior margin, some of which are flattened and spatulate, and one short spine nearer the stridulatory comb. The latter, situated on a short ridge-like tubercle, is of 16–18 narrow plates, broadest at its proximal end and about $\frac{1}{5}$ of the length of the tibia (Plate XXXI, fig. 1). Tarsus with some stout spine-like hairs basally.

Intermediate tibia about twice as long as the first (1+2) tarsal joint, which is about twice as long as the third; claws very thin, almost as long as the latter.

Posterior tibia about $1\frac{1}{2}$ times the length of the tarsus.

♀. Form subparallel, normally about 4 times as long as wide. Head without cephalic horn, vertex about $\frac{1}{4}$ of the width of the head and just over twice to 4 times as wide as the synthlipsis. Facial tubercle slight, but often distinctly impressed longitudinally (Plate XXX, fig. 8). Notocephalon longitudinally foveate anteriorly, vertex very slightly swollen in front of the fovea. Anterior leg with tibia about twice as long as the first (1+2) tarsal joint or a little more, the latter about twice as long as the third or a little less, longer claw about $\frac{2}{3}$ of the latter.

Intermediate leg as in ♂ but with claws shorter.

Length: ♂, 8·5–9·0 mm.

♀, 8·0–8·5 mm.

Cape.

Klober, Setagoli dist., dam, Jan. 1927 (Miss B. Lamb).

Victoria West, 2 ♀♀, probably *sardea* (Albany Museum).

Natal.

Durban (Marley, S.A.M.).

Transvaal.

Rietfontein, Boksburg div., large pan, 27, iv, 1928 (G.E.H.).

Brakpan, Boksburg div., small muddy pan, 1 ♀, 6, v, 1928 (G.E.H.).

Brakpan, large pan, 9, vi, 1928 (G.E.H.).

Plat River, Waterberg dist., 6–18, iv, 1905 (C. Swierstra, T.M.).

Limpopo River, Main Drift and Gorge near Messina, pool and backwater, 27–29, v, 1927 (G.E.H.).

South-West Africa.

Otjituo, 1 ♂ (S.A.M.).

Onoolonga, 1 ♀ (S.A.M., *vide* Hesse, *l.c.*).

Kuisib region (Stål, *l.c.*).

Also recorded from South-West Africa by Seiner (*vide* Hesse, *l.c.*).

This species has been the subject of an elaborate morphological monograph by Poisson (*l.c.*), to which the reader is referred for further anatomical information. Poisson regards *sardea* as a maritime species, and in his distribution map shows it occupying the coast-line of the greater part of Africa, save the extreme south. I cannot help suspecting that this distribution is largely due to our ignorance of the water bugs of Central Africa, just as the coastal distribution of names in maps of Africa of the early Victorian period bore witness to the then existing knowledge of the interior of that continent. The occurrence of the species near Messina, at least 300 miles from the sea, argues against a maritime distribution.

The cephalic horn, which is shared to a greater or less degree by the males of certain other species, appears to be a development of the dorsal region of the facial tubercle. In the Japanese species *A. genji* Hutch. (Ann. Mag. Nat. Hist. (9), xix, p. 377) the ventral part of the tubercle is hollowed out, forming a broad groove which is carinated in a way very reminiscent of the ventral surface of the horn in *sardea*. A prolongation of the head just above this groove would give a condition as in *sardea*. The condition of *genji*, moreover, seems to be derived from the simple tubercle through the flattened tubercles found in *aldabrana* Dist. and *vitrea* Sign, and the more advanced crateriform state of *psyche* Hutch. All these conditions are shown in the figures of facial tubercles (Plate XXX, figs. 2–5). It is noteworthy that this species is the only one in which the tubercle of the ♀ is in any way impressed. An incompletely developed cephalic horn is found in ♂ nymphs (l. 6·2 mm.) from the Plat River (Plate XXIX,

fig. 13). *A. sardea* is found outside the Ethiopian region, in the countries bordering on the Mediterranean, and in the western parts of Asia. Its wide distribution makes its absence in the extreme south of Africa all the more remarkable.

2. *Anisops* (*A.*) *pellucens* Gerst.

Anisops pellucens Gerstaecker, 1873, in C. von der Decken's Reisen in Ost. Afrika, iii (2), p. 424.
Anisops nivea Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 111 (part).
„ „ Hutchinson, 1928, Ann. Mag. Nat. Hist. (10), i, p. 164.

Yellowish white.

Fusiform, widest about the first quarter of the elytra, *i.e.* before the middle of the insect.

♂ head slightly narrower than pronotum and about 7 times as wide as the vertex, which is just over $1\frac{1}{2}$ times as wide as the synthlipsis. Anterior $\frac{2}{3}$ of the notocephalon, with fovea between two raised areas, the fovea spreading out behind the latter. Facial tubercle simple. Prongs of third rostral joint broad and moderately long. (Plate XXX, fig. 10.)

Pronotum just over $1\frac{1}{2}$ times as wide as long, with a few long pale hairs anteriorly and a row of short hairs set about $\frac{1}{5}$ in from the posterior margin. Posterior margin markedly concave centrally.

Scutellum subequal in length to pronotum.

Anterior leg with tibia just under $\frac{1}{2}$ as long again as tarsus, which is about $3\frac{1}{2}$ times as long as the longer claw. Tibia with four conspicuous bristles on the basal half of its anterior margin and a bristle row set along the anterior part of the inner surface ; posterior margin with three elongate hairs basally ; stridulatory comb set rather transversely, of about twenty-four plates arranged regularly and compactly, slightly widened just distal to its centre. (Plate XXXI, fig. 2.)

Intermediate leg with tibia about $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about $1\frac{1}{2}$ times the third ; longer claw just over $\frac{1}{2}$ the latter.

♀ head about $\frac{1}{6}$ narrower than the pronotum and about 6 times as wide as the vertex, which is just over $1\frac{1}{2}$ times the synthlipsis. (Plate XXIX, fig. 2.)

Scutellum slightly shorter than the pronotum.

Anterior leg with tibia rather over twice the first (1+2) tarsal joint, which is from just over $1\frac{1}{2}$ times to twice the third ; claw rather shorter than the latter.

Intermediate leg with tibia about $2\frac{1}{2}$ times the first (1+2) tarsal joint, which is about $1\frac{1}{3}$ times the third or less; claw just under $\frac{1}{2}$ the latter

Length: ♂, 10 mm.
♀, 10·5 mm.

Southern Rhodesia.

1 ♂, 3 ♀♀, Ngamo, near Gwaai, July 1927 (Miss E. L. Stephens).

A. pellucens Gerst., described from Mombasa, was placed by Kirkaldy as a synonym of *nivea* Fabr. Since it is almost certain that the latter species must be dismembered and many of its synonyms revived, I have thought best to refer these specimens to *pellucens*, with which they appear conspecific.

My single Asiatic example of *nivea*, from India, is clearly a very different insect, but as it is unfortunately a ♀ no diagnostic characters can be made out; its length is but 9 mm.

3. *Anisops* (*A.*) *letitia* n. sp.

Yellowish-white, with apical part of dorsum abdominis and venter abdominis dark.

Fusiform, less than 4 times as long as wide, broadest before the middle, at about the first fourth of the elytra; pronotum narrower than the greatest width of the body, but slightly wider than that of the head and eyes.

Head and eyes large; notocephalon with a longitudinal depression between two slightly swollen areas along its anterior half, not reaching vertex and spreading out posteriorly before another indefinite raised area. Facial tubercle well marked and often impressed at the sides. Vertex about $\frac{1}{4}$ as wide as head and eyes and $2\frac{1}{2}$–$3\frac{1}{2}$ times as wide as the synthlipsis. Pronotum smooth with a few pale hairs, less than twice as wide as long, longer than the scutellum in some specimens (type) shorter in others, carinated posteriorly, the carina not reaching the posterior margin and variably produced anteriorly; posterior margin convex, or at most slightly flattened, not sinuate or emarginate. (Plate XXIX, fig. 3.)

Scutellum fairly rugosely punctured.

♂. Third joint of rostrum with short prongs. (Plate XXX, fig. 11.)

Anterior tibia just over $\frac{1}{2}$ as long again as the tarsus, which is about $2\frac{1}{2}$ times as long as the longer claw. Tibia rather flattened, anterior margin with three spinous hairs basally, posterior margin with two of its basal hairs elongate.

Stridulatory comb very small, about $\frac{1}{20}$ of length of tibia, subparallel sided, of about sixteen lamellae. Tarsus with a spinous hair and a few very small peg-like hairs basally. (Plate XXXI, fig. 3.)

Intermediate tibia just under $2\frac{1}{3}$ times as long as the first (1+2) tarsal joint, which is about $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as the third; the latter about twice as long as the longer claw.

Posterior tibia $1\frac{1}{3}$ times as long as the tarsus.

♀. Eyes slightly less prominent than in the ♂.

Anterior tibia shorter than in ♂, nearly $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long again as the second longer claw, rather over $\frac{1}{2}$ as long as the latter.

Intermediate tibia just over twice as long as the first (1+2) tarsal joint, which is just under $1\frac{1}{4}$ times as long as the third, the latter being about $2\frac{2}{5}$ as long as the longer claw.

Posterior tibia about $1\frac{1}{3}$ times as long as the tarsus.

Length : 8–9 mm.

Cape.

Howieson's Poort, near Grahamstown, pool in stream bed, at bottom, 13, iii, 1926, 5 ♀ ♀, 2 ♂ ♂, all slightly teneral (G.E.P.).

This very distinct species may be recognised at once by the convex or straight posterior border to the elytra and the small stridulatory comb. It is evidently very local.

4. *Anisops* (*A.*) *gracilis* n. sp.

Pearly or creamy white, eyes grey or brown, apex of dorsum abdominis darkened, often with a dorsal orange spot in the darkened area.

Legs pale, anterior and middle femora darkened at the base. Fusiform, widest between the first third and middle of the elytra (*i.e.* about the middle of the body), generally more than 4 times longer than wide. Narrowed very slightly from the middle to the pronotum, which at its widest is about $\frac{1}{10}$ or less wider than the head.

Notocephalon very slightly and evenly rounded between the eyes, with little or no indication of a central longitudinal depression ; facial tubercle moderately developed.

Vertex about $\frac{1}{5}$ as wide as the head and eyes at their widest and from 3–5 times as wide as the synthlipsis.

Pronotum with an irregular transverse row of long pale hairs about $\frac{1}{4}$ of its length from the posterior margin ; about $1\frac{5}{6}$ times as wide as long, posterior margin slightly bisinuate.

Scutellum $1\frac{1}{2}$ times as long as the pronotum, or a little more.

♂. Third rostral joint with short, thick, somewhat curved prongs. (Plate XXX, fig. 12.)

Anterior tibia about $1\frac{3}{4}$ times as long as the tarsus, which is about twice as long as the longer claw. Tibia somewhat flattened, inner margin with a thick spine-like hair apically and three short peg-like hairs along the shaft, outer margin with four to five long hairs basally.

Stridulatory comb of about twelve narrow lamellae, situated on a prominence which is produced forward into a triangular ridge with transverse striations on its inner side. (Plate XXXI, fig. 4.)

Intermediate tibia a little more than twice as long as the first (1+2) tarsal joint; third tarsal joint $\frac{1}{2}$ or $\frac{2}{3}$ as long as the first and about twice or a little more as long as the longer claw.

♀. Anterior tibia twice as long as the first (1+2) tarsal joint, which is about $1\frac{3}{4}$ times as long as the third; claw about $\frac{3}{4}$ as long as latter. (Allotype 66 : 32 : 19 : 15.) Intermediate leg much as in male.

Length: 7·0–8·0 mm.

Cape.

Durbanville, Cape Flats, dam, 1 ♀, 30, iv, 1927 (L.M.S.).

Wellington, ponds, 15, v, 1927; 15, v, 1927 (L.M.S.).

Swellendam, dams and pond, 12, xii, 1926 (G.E.H.).

Oudtshoorn, dam, 28, xii, 1926 (G.E.H.).

George, dam, 26, xii, 1926, single dead specimen (L.M.S.).

Knysna, pond at Concordia, 23, xii, 1926 (G.E.H.).

Assegaibosch, pool in stream behind hotel, 12, i, 1926 (G.E.P.).

Grahamstown, College House, dam, 6, iii, 1926 (G.E.P.).

Alice, vlei at S.A. Native College Farm, 23, ii, 1926; very common (types) (G.E.P.).

Pirie Mission, pool in stream bed, 3, iii, 1926 (G.E.P.).

King Williamstown, backwater of Buffalo River, 12, ii, 1926 (G.E.P.).

East London, pool in stream bed below Native Location, 13, ii, 1926 (G.E.P.).

East London, larger pond in park, 15, ii, 1926 (G.E.P.).

East London (Lightfoot, S.A.M.).

Transvaal.

Barberspan, 6, iv, 1926 (G.E.H.).

Potchefstroom, 25, iii, 1928 (G.E.H.).

Florida, lake, 12, ii, 1927 (G.E.H.)

Yokskei River, dam near Johannesburg-Pretoria Road, 27, ii, 1927 (G.E.H.).

Birchleigh, dam, 28, iv, 1928 (G.E.H.).

Louis Trichardt, dam, 24, v, 1927 (G.E.H.).

Limpopo River, Main Drift and Gorge near Messina, 27–29, v, 1927 (G.E.H.).

Southern Rhodesia.

Khami River below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

Cleveland Dam near Salisbury, 2, vii, 1927 (G.E.H.).

Banza Halt, Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).

Life-history.*

Nymph 6·2 mm. (last nymphal instar, presumably 5th); Alice, 23, ii, 1926 (G.E.P.).

Head slightly narrower than pronotum, just over 4 times as wide as the vertex, which is 3 times the width of the synthlipsis.

Pronotum $2\frac{1}{2}$ times as wide as long and $\frac{5}{6}$ times as long as the mesothorax, lateral margins convex, posterior margins slightly and evenly concave, sides of prothorax deeply excavated below, save in the extreme posterior region. (Plate XXIX, fig. 14.)

Anterior leg with tibia $1\frac{1}{3}$ times as long as tarsus, which is almost $4\frac{1}{2}$ times as long as claws.

Intermediate leg with tibia $1\frac{1}{4}$ times as long as tarsus, which is just over $5\frac{1}{2}$ times as long as claws.

Posterior tibia just under $1\frac{1}{4}$ times as long as tarsus.

The nymphs of *Anisops* can be distinguished from those of *Nychia* by the posterior tarsi, which are distinctly shorter than the tibiae. It is unlikely that any means of distinguishing the species of the nymphs of this genus could be elaborated. The ♂ nymph of *sardea*, however, shows a partially developed cephalic horn. The full-grown nymph of *pellucens* could presumably be identified by its large size. It would be interesting to know to what extent the nymphs of *A.* (*Micranisops*) *apicalis* show the characteristic shortness of the posterior tarsi.

* The life-history of an Australian species, *A. hyperion* Kirk., has been studied in detail by Hale (Rec. S. Aust. Mus., vol. ii, p. 405, 1923). Five nymphal instars occur.

5. *Anisops* (*A.*) *poweri* n. sp.

Ivory white, dorsum abdominis grey, apically grey with traces of an orange spot.

Fusiform, widest across the first anterior fifth of the elytra, *i.e.* in front of the middle of the body. Pronotum $\frac{1}{6}$–$\frac{1}{7}$ wider than head and eyes.

♂ about 4 times as long as broad.

Vertex a little over $\frac{1}{4}$ of the breadth of the head and 3–4$\frac{1}{2}$ times as wide as synthlipsis.

Notocephalon with a slight fovea between two low carinae ; these fuse more or less in front and are faintly indicated running down the face to form the prominent facial tubercle, which shows traces of a longitudinal impression. Third rostral joint with moderately long divergent prongs. (Plate XXX, fig. 13.)

Pronotum 1$\frac{1}{2}$–1$\frac{2}{3}$ times as wide as long, with irregularly placed hairs near the posterior margin. Scutellum variable, almost as long as, or longer than, the pronotum.

Anterior tibia about twice as long as, or a little longer than, the tarsus ; longer claw $\frac{2}{3}$–$\frac{6}{7}$ times as long as the latter ; anterior margin of tibia with a few thickened spinous hairs basally, posterior margin with two basal hairs elongated ; comb of twelve to fourteen lamellae ; anterior margin almost straight, posterior widely convex, so that the comb is narrowed at either end ; claws slightly curved. (Plate XXXI, figs. 6, 6*a*.)

Intermediate tibia a little more than twice as long as the first (1+2) tarsal joint, which is a little less than twice as long as the third, the latter being about $\frac{1}{6}$ longer than the claws.

Posterior tibia about 1$\frac{1}{5}$ times as long as the tarsus.

♀ about 3$\frac{1}{2}$ times as long as broad.

Width of head 3$\frac{1}{3}$–3$\frac{2}{3}$ that of the vertex, which is 3–4 times the synthlipsis ; facial tubercle present but not foveate. Head and pronotum slightly shorter and broader than in male, the latter 1$\frac{6}{7}$–2$\frac{1}{10}$ times as wide as long

Scutellum variable, from rather shorter than to 1$\frac{1}{4}$ times as long as the pronotum.

Anterior tibia 1$\frac{1}{2}$ times as long as the tarsus ; proximal joints of latter about 1$\frac{2}{3}$ times as long as the distal, which is a little longer than the claws.

Intermediate leg with tibia longer and third tarsal joint and claws shorter than in the ♂.

Length : ♂, 6·3–6·8 mm.
♀, 6·3–7·1 mm.

Cape.

(*Type*, *allotype*, and *paratypes*), Kimberley, 1, vi, 1912 (Power, S.A.M.).

Ceres, pond, one very teneral, 5–6, xii, 1927 (G.E.H.).

Avontuur, duck pond, 6, i, 1927 (G.E.H.).

Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).

Orange Free State.

Aliwal North, small dam on north bank of Orange River, Rouxville dist., 5, v, 1928 (G.E.P.).

Knoffelspruit, north bank of Orange River, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

Diep Kloof, north bank of Orange River, Rouxville dist., pool in stream, 9, v, 1928 (G.E.P.).

Transvaal.

Rivonia, near Johannesburg, stream, 10, vi, 1927 (G.E.H.).

Yokskei River, dam on Johannesburg-Pretoria Road, 27, ii, 1927 (G.E.H.).

This species is at once distinguished from all save *leesoniana* by the immense development of the anterior claws of the ♂.

6. *Anisops* (*A.*) *leesoniana* n. sp.

♂. Yellowish white.

Fusiform, widest at about first $\frac{1}{4}$ of the elytra, *i.e.* before the middle of the body.

Head slightly narrower than pronotum, about 7 times as wide as the vertex, which is 3 times as wide as the synthlipsis. Notocephalon smooth, facial tubercle obsolete.

Third joint of rostrum with rather short wide prongs. (Plate XXX, fig. 14.)

Pronotum smooth, just under twice as wide as long; posterior margin markedly concave centrally.

Scutellum just under $\frac{1}{2}$ as long as the tarsus, which is $1\frac{2}{3}$ times as long as the longer claw; anterior margin of tibia with a row of very short bristles basally above the stridulatory comb and several more elongate hairs among very short fine ones distally; stridulatory comb on a prominent eminence, narrow, elongate, slightly narrowed distally, of numerous (23) narrow regularly arranged lamellae; claws practically straight. (Plate XXXI, fig. 7.)

Intermediate leg with tibia just over twice as long as the first

(1+2) tarsal joint, which is just under $\frac{1}{2}$ as long again as the third, the latter about $1\frac{2}{3}$ times as long as the longer claw.

Posterior tibia just over $1\frac{1}{5}$ times as long as tarsus.

Length : 5·8 mm.

Southern Rhodesia.

1 ♂ (type), Cleveland Dam near Salisbury, 2, vii, 1927 (G.E.H.).

This distinct species resembles *poweri* in the very elongate anterior claws of the ♂; they are, however, less curved than in the latter species. The structure of the head is, moreover, very different in the two species. I have much pleasure in naming this species in honour of Mr. H. S. Leeson, to whom I owe opportunities of examining this and other important localities in the Salisbury district.

7. *Anisops* (*A.*) *debilis* Gerst.

Anisops debilis Gerstaecker, 1873, in C. von der Decken's Reisen in Ost-Afrika, iii (2), p. 425.

„ „ Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, p. 86.

Ivory white, eyes, venter, apex of abdomen, and often an ill-defined pronotal area black. Anterior and intermediate femora with a black longitudinal stripe, middle of abdomen dorsally, base of pronotum and base of scutellum orange in some specimens.

Subparallel between pronotum and middle of elytra.

Head about $\frac{1}{10}$ narrower than the maximum width of the pronotum.

Notocephalon with slight or no traces of a longitudinal depression, vertex $\frac{1}{5}$–$\frac{1}{6}$ of the width of head and eyes.

Pronotum with a few pale hairs posteriorly, usually about twice as wide as long.

Scutellum about $1\frac{1}{2}$ times as long as pronotum, but both are variable.

♂. Vertex 3–4·5 times as wide as synthlipsis. Prongs of third rostral joint fairly long and divergent. (Plate XXX, fig. 15.)

Anterior tibia $1\frac{1}{3}$–$1\frac{2}{3}$ times as long as the tarsus, the latter about $2\frac{1}{2}$ times as long as the longer claw. Posterior margin of tibia with three elongate basal hairs, anterior margin with a row of about six thick spinous hairs, the second from the base being more internal than the others. Comb narrow, slightly curved, of about twenty lamellae, situated on a well-marked eminence. (Plate XXXI, fig. 5.)

Intermediate tibia about twice, or a little more, as long as the first (1+2) tarsal joint, which is about $1\frac{3}{4}$ times as long as the third, the latter $2\frac{2}{3}$ times as long as the longer claw.

Posterior tibia $1\frac{1}{4}$ times as long as tarsus.

♀ usually larger, with rather shorter eyes.

Vertex $2\frac{4}{5}$–4 times as wide as synthlipsis.

Anterior tibia about twice as long as the first (1+2) tarsal joint, which is rather less than twice as long as the third, claw about $\frac{3}{4}$ as long as the latter.

Intermediate leg much as in ♂.

Length : ♂, 6·5–6·8 mm.

♀, 6·8 mm.

Cape.

East London, pool in stream bed and pond in park, 13–15, ii, 1926 (G.E.P.).

Pirie Bush, 1 ♂ (A. N. Stenning, B.M., 98, 191).

Transvaal.

Louis Trichardt, dams, 24–26, v, 1926 (G.E.H.).

Limpopo River, " gorge " and Main Drift near Messina, 27–29, v, 1927 (G.E.H.).

Southern Rhodesia.

Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

Balla-Balla (Mrs. S. Jones, B.M., 1914, 476).

Great Zimbabwe, 1 ♂, 7, vii, 1927 (G.E.H.).

Bechuanaland Protectorate.

Kazungula, junction of Zambesi and Linyanti Rivers, 1 ♀, 14, vii, 1927, probably *A. debilis* (G.E.H.).

Portuguese East Africa.

Magude (C. J. Swierstra, T.M.).

This species is evidently very widespread in Central Africa. I have received a long series from Kampala, Uganda, taken by Mr. G. L. R. Hancock. Jaczewski describes what is clearly an identical insect from Dakar, French Senegal, and it is on his authority that I adopt the name *debilis* Gerst. The original description of *debilis*, based on a single ♀ from Mombasa, is unsatisfactory but contains nothing inconsistent with Jaczewski's identification.

8. *Anisops* (*A.*) *varia* Fieb.

Anisops varius		Fieber, 1852, Abh. Böhm. Ges. Wiss. (5), 7, p. 483.
,,	*varia*	Kirkaldy, 1899, Ann. Soc. Ent. Fr., lxvii, p. 106.
,,	,,	Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 119.
,,	,,	Lindberg, 1922, Not. Ent., ii, p. 47.
,,	,,	Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 1926, p. 90.
,,	*perpulcher*	Stål, 1858, Oefr. Vet. Ak. Fork., xx, p. 89.
,,	,,	Stål, 1865, Hemip. Afric., iii, p. 192.
,,	,,	Kirkaldy, 1899, Ann. Soc. Ent. Fr., lxvii, p. 106.
,,	,,	Schumacher, 1913, Jenaische Denkschriften, xvii, p. 83.
,,	,,	Hesse, 1925, Ann. S.Afr. Mus., xxiii, p. 136.
var. *sugillata*		Fieber, 1852, *ibid.* (*varius*).
var. *scutellata*		Fieber, 1852, *ibid.* (*varius*).
var. *kalahariensis*		Schumacher, 1913, *ibid.* (*perpulcher*).
var. *plumbeus*		Schumacher, 1913, *ibid.* (*perpulcher*).

Subparallel or very slightly fusiform, 3–3½ times as long as broad, the ♀ being more robust than the ♂.

Head about ⅓ narrower than the greatest width of the pronotum. Notocephalon in its central part with a narrow longitudinal fovea, often ill defined, between two longitudinal slightly raised areas passing over the vertex but not reaching the synthlipsis.

Vertex ⅕–⅔ as wide as head and eyes and 2·8–3·7 times as wide as synthlipsis. Facial tubercle moderately developed.

Pronotum 1·5–1·8 times as wide as long ; smooth and shining, with a longitudinal fovea in its central region, variably developed, but certainly present in the living insect and not due to shrinkage *post mortem* ; with a sparse hair row about ¼ of the length of the pronotum from the posterior margin ; the latter slightly but widely concave centrally.

Scutellum smooth and shining, variable in length, sometimes shorter and never more than ½ as long again as pronotum.

♂. Third rostral joint with fairly long divergent prongs. (Plate XXX, fig. 17.)

Anterior tibia 1⅓–1½ times as long as tarsus, which is 3–3½ times as long as the longer claw ; anterior margin of tibia with a row of fine

spinous hairs which are longer in the proximal portion; posterior margin with three basal hairs, elongate, stridulatory comb subparallel-sided, more than twice as long as wide, of about twenty or more lamellae, of which the apical ones are the widest. (Plate XXXII, fig. 1.)

Intermediate tibia rather more than twice as long as the first (1+2) tarsal joint, which is $1\frac{1}{2}$ times as long as the third, the latter being rather more than twice as long as the longer claw.

Posterior tibia about $1\frac{1}{4}$ times as long as the tarsus.

♀ normally slightly longer and more robust than the ♂, with a somewhat shorter head.

Anterior tibia twice as long as the first (1+2) tarsal joint, which is $\frac{1}{2}$ as long again as the third; claw rather more than $\frac{1}{2}$ as long as the latter.

Intermediate leg much as in ♂.

Length: ♂, 6–7·0 mm.

♀, 6·5–7·5 mm.

The above description is based on South African material from the Cape and Transvaal, referred below to *A. varia scutellata* Fieb. This species has been the source of much confusion. Fieber described two varieties of his *A. varius* without distinguishing a type form. Through the kindness of Mr. W. E. China I am able to give a transcription of the descriptions of these two colour forms (Abh. k. Böhm. Ges. Wiss., (v), 7, p. 483, 1852).

" *α sugillata.*

" Pronotum vorn mit rothem Fleck. Schild schwarz, Ende und Rander röthlich. Rückenschienen gelblich, 2–3 am Grunde, schwarz. Schildrand röthlich gelb. Länge, $3\frac{5}{6}$ Lin. *Anisops sugillatus* Mus. Berol.

" Aus Afrika, Ambukhol (Ehrenberg).

" *β scutellata.*

" Pronotum gelblichweiss. Schild schwarz, der Rand und Spitze gelblich. Rücken schwarz. Schildrand gelblich. Spitz der Oberlippe geröthet.

" **Schild zuweilen ockergelb.*

" *Anisops scutellatus* Mus. Berol. Länge, $3\frac{1}{2}$ Lin. Aus Asien in der Umgegend des Sinai, von Ehrenberg gesammelt."

The first locality and form must presumably be taken as the type locality, and form respectively, there being nothing in the rest of the description to invalidate such a course.

In 1858 Stål described *A. perpulcher* from " Caffraria."

The description given in the Hemiptera Africana (iii, p. 192) is as follows :

" Anguste oblongus, stramineo-albidus ; scutello pallide rufescente-testaceo ; metanoto, macula transversa segmentorum dorsi abdominis, maculis pectoris ventreque nigris ; thorace impressione longitudinale media, anterius abbreviata, instructo. Long. 7, Lat. 2 mm."

Kirkaldy (Ann. Soc. Ent. Fr., lxviii, p. 106, 1899) states that *perpulcher* Stål is a synonym of *varius* Fieber. The former name has, however, been used for material from South-West Africa in the more recent works of Schumacher and Hesse. The former describes two varieties of the species as new. Dr. A. J. Hesse has very kindly transcribed these descriptions for me, which are abridged and translated below.

var. *kalahariensis*. As *perpulcher* but the red colour lacking. Lobatsi, Oct. 1904 (L. Schultze).

var. *plumbeus*. As *perpulcher* but with head, pronotum, scutellum, and elytra lead-grey. Kamaggas, July 1904 (L. Schultze).

These two varieties may for the present be disregarded, for, as will be shown below, they are almost certainly based on series of teneral specimens.

I have examined a large number of individuals from many African localities and summarise the variation as regards size and colour as follows :

1. Egyptian Sudan. Darfur, El Fasher (B.M.).

Length : 7·5–8·0 mm.

Pronotum in nearly every specimen with a conspicuous red fleck on its anterior margin.

This form, both in its perfect agreement in size and colour as well as in its occurrence in the Sudan, may be referred to the typical form (i.e. *sugillata* Fieb.).

2. Kenya Colony (B.M.).

Length : 6·0–8·0 mm.

Pronotum in at least the larger specimens with a red fleck. Many individuals are teneral, so it is not certain exactly how they vary in colour.

3. Nyasaland. Blantyre (B.M.).

Length : 7·0 mm.

No fleck.

4. Southern Rhodesia (G.E.H.).

Length : 6–8·2 mm.

Three very large ♂ specimens (7·2–8·2 mm.) from the Khami River have the red fleck.

5. Transvaal and Cape Province.

Length : 6·0–7·5 mm.

All fleckless.

It is clear that as we proceed from the Sudan southwards we pass from an area inhabited by a large form with a conspicuous red fleck on the pronotum (typical *varia=sugillata* Fieb.) to one inhabited by a smaller fleckless insect (*perpulcher* Stål). In the intermediate region, comprising a large part of Central Africa (*e.g.* Kenya, Southern Rhodesia), large and small, flecked and fleckless individuals occur side by side.

The problem is, however, complicated by the conditions north of the Sudan. From the Sinai region Fieber had specimens (*scutellata*) which were small (3½ lin.=7·3 mm.) and in general correspond with Stål's description of *perpulcher*, though probably slightly teneral. Unfortunately I have not seen any specimens from the Sinai Peninsula, but a single example marked Sidi Jaber (which Mr. China tells me is undoubtedly Sidi Gaber, a suburb of Alexandria) is exceedingly like South African material and very different from the Sudanese series. It seems, therefore, that in the extreme cases we may recognise two subspecies.

A. varia varia Fieber =var. *sugillata* Fieber.

Length : 7·5–8·5 mm.

Red fleck on the anterior margin of the pronotum nearly always well developed and probably always indicated in fully coloured specimens. Sudan.

A. varia scutellata Fieber =*A. perpulcher* Stål.

Length : 6–7·5 mm.

Red fleck always absent.

Sinai Peninsula, Egypt, South Africa.

The intermixture of the two forms to the south is clearly shown in the series from Kenya and Khami ; size and development of the fleck are evidently correlated in such mixed populations, and the latter is apparently caused by a fluid containing dissolved pigment in the living insect.

To the north no material is available to show the intergradation.

It would be interesting to know if the two areas occupied by *scutellata* are entirely discontinuous.

In South Africa alone *A. varia scutellata* shows considerable variability, which is complicated by the very slow development of adult coloration. The white colour of the freshly emerged adult is retained for many days after the last ecdysis, though the chitin is entirely hardened. A white specimen taken at Mowbray, Cape Flats, on 21, i, 1927, and kept by Miss L. M. Starke, did not obtain its full adult coloration till 10, ii, 1927. It is probable that the varieties described by Schumacher were based on series of specimens which, apparently fully mature, had not yet completed the slow changes necessary in the assumption of adult coloration; *plumbeus* probably represents an early white stage not well preserved; *kalahariensis* a comparatively late condition. I have examined a number of specimens which would agree exactly with the descriptions, but which are undoubtedly merely teneral.

This slow development of colour has precluded any consideration of geographical variation within South Africa, but it is quite clear that no definite raciation occurs. There is, however, a definite correlation between amount of black, *e.g.* on the scutellum, and sex; female specimens nearly always having more black pigment than males. The following data from one series may be given as an example as they are all particularly full coloured (Table Mt., 31, i, 1926).

Scutellum orange, 3 ♂ ♂, 1 ♀.

Scutellum orange, black anteriorly, 2 ♂ ♂, 2 ♀ ♀.

Scutellum black with orange border, 12 ♀ ♀.

Cape.

Table Mountain, pool above Window Gorge, 31, i, 1926 (G.E.P.).

Silvermine Valley, Cape Penin., 7, v, 1927 (L.M.S.).

Constantia Nek, Cape Penin., 15, xi, 1927 (L.M.S.).

Roxana Vlei, Mowbray, Cape Flats (*v. supra*), 21, i, 1927 (L.M.S.).

Crawford Vlei, Cape Flats, 2, i, 1926 (G.E.P.).

Mulders Vlei, Cape Flats, 12, vi, 1927 (L.M.S.).

Durbanville, Cape Flats, 30, vi, 1927 (L.M.S.).

Du Toit's Kloof, 16, iv, 1927 (L.M.S.).

Wolseley, teneral (white), 10, xii, 1926 (G.E.H.).

Matroosberg, 3500 ft., Ceres div., Jan. 1917 (Lightfoot, S.A.M.).

Swellendam, dams, 16–17, xii, 1926 (G.E.H.).

Oudtshoorn-Montagu Pass Road, drift, 24, xi, 1925 (G.E.P.).

Cango Caves, pool in stream bed, 29, xii, 1926 (G.E.H.).

Groenkop, Wilderness, near George, pond, 9, xii, 1926 (G.E.H.).
Concordia, near Knysna, pond, 23, xii, 1926 (G.E.H.).
Prince Albert Road, 1916 (Haughton, S.A.M.).
Kimberley, 1, vi, 1912 (Power, S.A.M.).
Riemvastmak, Gordonia, vii, 1925 (Barnard, S.A.M.).
Kamaggas, Namaqualand (type *plumbeus*), vii, 1904 (Schultze, *fide* Schumacher).
Avontuur, duck pond, 6, i, 1927 (G.E.H.).
Assegaibosch, dam, 13, i, 1927 (G.E.H.).
Wittelsbosch, pool, in boggy streams, teneral (white, legs blackish), 9, i, 1927 (G.E.H.).
Grahamstown, dam, 6, iii, 1926 (G.E.P.).
Blaauwkrantz Valley, 9, iii, 1926 (G.E.P.).
Lushington Valley, Pt. Alfred Road, 11, iii, 1926 (G.E.P.).
Alice, Tyumie River and vlei, 23, ii, 1926 (G.E.P.).
Pirie Mission, pond and pools in stream bed, 3, iii, 1926 (G.E.P.).
East London, pools, 13–14, ii, 1926 (G.E.P.).
Aliwal North, radio baths, 6, v, 1928 (G.E.P.).
Avoca Farm, Witteberg Mountains, Barkley East dist., pool in stream, 3, v, 1928 (G.E.P.).

Orange Free State.

Aliwal North, dam on north bank of Orange River, Rouxville dist., 5, v, 1928 (G.E.P.).
Knoffelspruit, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

Transvaal.

Witpoortjie, Krugersdorp dist., pools in stream, 11, xi, 1926 (G.E.H.).
Fontaineblaauw, Klein Yokskei River, 1, viii, 1926 (G.E.H.).
Fount Grove, 27, viii, 1905 (T.M., Swierstra).
Woodbush Villa, iv, 1915 (T.M.).
Louwscreek, iii, 1920 (T.M., G. v. D., and A.R.).
Plat River, Waterberg dist., 6–18, iv, 1905 (T.M., Swierstra).
Wemmer Pan, Johannesburg, 10, v, 1928 (G.E.H.).
Rietfontein Pan, Boksburg dist., 31, iii, 1928, etc. (G.E.H.).
Avenue Pan, Benoni, 6, v, 1928 (G.E.H.).
Brakpan, Small Pan, 6, v, 1928 (G.E.H.).
Blaauwwater Pans, Lake Chrissie, 27, ii, 1928 (G.E.H.).
Acorn Hoek (S.A.M.).
Waterval Boven, pools near river, 15–16, iv, 1927 (G.E.H.).
Louis Trichard, dam, 24, v, 1927 (G.E.H.).
Limpopo River, main drift, near Messina, 28, v, 1927 (G.E.H.).

Bechuanaland Protectorate.

Lobatsi (type *kalahariensis*), 6, x, 1904 (Schultze, *fide* Schumacher).

Mookane, x, 1904 (Schultze, *fide* Schumacher).

Ku Gudie (between Phitsane and Kooa), i, 1905 (Schultze, *fide* Schumacher, *l.c.*).

Southern Rhodesia.

Khami River, below ruins near Bulawayo (3 ♂ ♂ form *varia*; 3 ♂♂, 1 ♀ form *scutellata* *), 27, vi, 1927 (G.E.H.).

Bulawayo (S.A.M.).

101 Mile Halt, Gwelo-Fort Victoria Railway, 5, vii, 1927 (G.E.H.).

Great Zimbabwe, 7, vii, 1927 (G.E.H.).

Morgenster Mission near Great Zimbabwe, 7, vii, 1927 (G.E.H.).

Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

Natal.

Ifafa, 26, x, 1926 (C. Ackerman, Natal Museum).

South-West Africa.

"Namaqualand, Great Karasberg (Schultze), Chamis, Berseba (Schultze), Damaraland, Otjituo (M. Exp.)," Hesse (*l.c.*, p. 137).

9. *Anisops* (*A.*) *hypatia* n. sp.

Ivory white, dorsum abdominis greyish, apically with indications of a subapical orange spot.

Fusiform, but rather wide anteriorly; a little less than $3\frac{1}{2}$ times as long as wide.

Greatest width between the first $\frac{1}{5}$ and first $\frac{1}{4}$ of the elytra, *i.e.* in front of the middle of the body.

♂ head as wide as, or a little wider than, the pronotum, 4–5 times as wide as the vertex which is $3\frac{1}{5}$–4 times the synthlipsis. Notocephalon with a very slight longitudinal fovea; facial tubercle moderately developed. Third rostral joint with long thin prongs. (Plate XXX, fig. 16.)

Pronotum about twice as wide as long, posterior margin concave centrally, with a few hairs about $\frac{1}{5}$ of its length from the latter.

Scutellum $1\frac{1}{10}$–$1\frac{1}{4}$ times as long as pronotum.

Anterior tibia just over $1\frac{1}{3}$ times as long as the tarsus, which is $2\frac{1}{2}$–4 times as long as the longer claw. Tibia with a row of slightly

* There seems no valid reason why the varietal names used to designate subspecies or geographical races in the extreme parts of the range of a species should not be used to indicate the two forms where they are found together in an intervening region.

thickened short hairs along its inner margin and three long basal and a row of short hairs along the outer margin, stridulatory comb well developed on a low ridge-like eminence, of about thirteen elements, dilated externo-basally. (Plate XXXII, figs. 2, 2*a*.)

Intermediate tibia twice or more as long as the first (1+2) tarsal joint, which is $1\frac{1}{5}$–$1\frac{2}{3}$ as long as the third, the latter twice as long as the longer claw.

♀ head slightly narrower than the pronotum, about $4\frac{7}{8}$ times as wide as the vertex, which is about 3 times as wide as the synthlipsis.

Notocephalon with a longitudinal fovea between low carinae more clearly marked than in the ♂.

Anterior tibia rather more than twice as long as the first (1+2) tarsal joint, which is about $1\frac{1}{2}$ times as long as the third, the latter twice as long as the claw, or rather less.

Intermediate leg with tibia twice as long as the first (1+2) tarsal joint, which is $1\frac{1}{2}$ times as long as the third, the latter twice as long as the longer claw.

Length : ♂, 5·2–6·0 mm.
♀, 6·0–6·5 mm.

Cape.

Kirstenbosch, Cape Penin., 16, ix, 1926 (L.M.S.).

Crawford Vlei, Cape Flats, 26, i, 1926 (G.E.P.).

Aldermans Farm, Fir Grove, Cape Flats, 24, v, 1926 (G.E.P.).

Banhoek Stellenbosch, pond at Bloem Erf., 22, xii, 1925 (G.E.P.).

Brink's Farm, between Wellington and du Toit's Kloof, 15, iv, 1927 (L.M.S.).

George, large dam, 26, xii, 1926 (G.E.H.).

Knysna, duckpond at Veldschoens Drift, 21, xii, 1926 (G.E.H. *types*).

Concordia, near Knysna, pond, 23, xii, 1926 (G.E.H.).

Brackenhill Sta., near Knysna, pond, 22, xii, 1926 (G.E.H.).

Alice, vlei on Native College Farm, 1 ♂, 23, ii, 1926 (G.E.P.).

10. *Anisops* (*A.*) *psyche* Hutch.

Anisops psyche Hutchinson, 1928, Ann. Mag. Nat. Hist. (10), i, p. 159.

Notocephalon and legs greyish-yellow, scutellum dull orange, fading to yellowish posteriorly and with two black spots partially covered by the pronotum just within the anterior angles.

Subfusiform, widest at about the first $\frac{1}{3}$ of the elytra, *i.e.* about the middle of the insect, but very little, if at all, narrower across the posterior part of the pronotum.

♂ pronotum about $\frac{1}{7}$ wider than the head, which is just over 4 times as wide as the vertex, the latter about twice the synthlipsis. Notocephalon with a central longitudinal line of a few punctures. Facial tubercle deeply excavated from below, leaving a pair of oblique ridges bounding the upper margin of a cup-shaped depression, and bent upwards towards the vertex anteriorly. Third rostral joint with moderately long prongs. (Plate XXX, fig. 20.)

Pronotum about twice as wide as long or a little less, smooth, finely punctured, and with pale hairs posteriorly; posterior margin slightly concave centrally. Scutellum about $1\frac{1}{3}$ times as long as pronotum.

Anterior leg with tibia just under $\frac{1}{2}$ as long again as tarsus, which is about 3 times the longer claw, or rather less; anterior margin of tibia with two spinous hairs basally and two widely separated peg-like hairs centrally; posterior margin with three basal hairs elongated; stridulatory comb ovoid, of eleven rather thick lamellae. (Plate XXXII, fig. 3.)

Intermediate leg with tibia as long as the first (1+2) tarsal joint or rather more, the latter $\frac{1}{2}$ as long again as the third, or slightly more, the latter rather under twice the longer claw.

Posterior tibia just under $1\frac{1}{3}$ times the tarsus.

♀ slightly more robust posteriorly than the ♂.

Facial tubercle obsolete.

Anterior leg with tibia rather more than twice as long as the first (1+2) tarsal joint, which is rather under twice the third; longer claw a little shorter than the latter.

Intermediate leg with tibia rather more than twice the first (1+2) tarsal joint, which is twice as long as the third, or slightly more; claw about $\frac{1}{2}$ as long as the latter.

Length: 5·5 mm.

Transvaal.

Louis Trichardt, dam, 1 ♂, 26, v, 1927 (G.E.H.).

Southern Rhodesia.

Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

101 Mile Halt, Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).

Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

This species was originally described from specimens taken by Mr. G. L. R. Hancock at Kampala, Uganda; Dr. F. O. Stohr has also sent me *A. psyche* from Munshiwemba, Ndola, Northern Rhodesia. It is therefore probably a widespread and common Central African species.

11. *Anisops* (*A.*) *praetexta* n. sp.

Head, pronotum, and scutellum greyish-white; metanotum and dorsum abdominis black; elytra hyaline, anterior margin and posterior part of sutural margin of clavus lined with crimson.

♂ fusiform but little narrowed anteriorly, widest at about the first $\frac{1}{4}$ of the elytra, *i.e.* before the middle of the body. Head about $\frac{1}{11}$ narrower than the pronotum and about 7 times as wide as the vertex, which is 3–3$\frac{1}{2}$ times as wide as the synthlipsis. Facial tubercle slight, simple, notocephalon with a very slight fovea anteriorly. Third joint of rostrum with relatively long divergent prongs, slightly swollen basally. (Plate XXX, fig. 19.)

Pronotum just over twice as wide as long; smooth, with scattered pale hairs at about $\frac{1}{5}$ of its length from the posterior margin, which is concave centrally.

Scutellum about $\frac{1}{2}$ as long again as pronotum or rather less. Anterior leg with tibia about 1$\frac{1}{3}$ times as long as tarsus, which is about 3 times as long as the longer claw; anterior margin with a row of six strong spinous hairs with very small spines set between them; posterior margin with three basal hairs elongated; stridulatory comb of twelve lamellae, the distal six transversely elongate, particularly the 8th, 9th, and 10th. (Plate XXXII, figs. 4, 4*a*.)

Intermediate leg with tibia rather over twice as long as the first (1+2) tarsal joint, which is rather under $\frac{1}{2}$ as long as the third, the latter about twice as long as the longer claw.

Posterior tibia 1$\frac{1}{4}$–1$\frac{1}{3}$ times as long as tarsus.

♀ head $\frac{1}{8}$–$\frac{1}{9}$ narrower than the pronotum, about 6 times as wide as the vertex, which is 2–2$\frac{1}{2}$ times as wide as the synthlipsis. Facial tubercle slight, simple.

Scutellum about $\frac{1}{2}$ as long again as the pronotum or rather more.

Anterior leg with tibia rather over twice as long as first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long as the third; longer claw rather more than $\frac{1}{2}$ the latter.

Intermediate leg with tibia about twice as long as the first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long again as the third; claw about $\frac{1}{2}$ the latter.

Length: ♂, 5·5–6·0 mm.
♀, 6·0–6·5 mm.

Transvaal.

♂ ♂, ♀ ♀, Louis Trichardt, 24–26, v, 1927 (G.E.H.).

1 ♂, Messina, pool in sandy bed of Limpopo, near Main Drift, 28, v, 1927 (G.E.H.).

Southern Rhodesia.

♂, ♀ (*type* and *allotype*), Morgenster Mission near Great Zimbabwe, 7, vii, 1927 (G.E.H.).

♀, Great Zimbabwe, 7, vii, 1927 (G,E.H.).

♂, ♀, Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

This series from Louis Trichardt are all teneral, lacking even the crimson anterior border to the elytra; they are, however, firm and well chitinised, so that probably in this species as in *varia* (*vide supra*) the full coloration takes some days or even weeks to develop.

A. praetexta is clearly very close to *A. amaryllis* from East Africa (Hutchinson, *l.c.*), differing chiefly in the wider comb. From *A. eros* it may be distinguished, as may *amaryllis*, by the comb as well as by the crimson anterior border to the elytra, possessed by both *praetexta* and *amaryllis*. Teneral specimens, such as those from Louis Trichardt, closely resemble *hypatia* externally; in that species, however, the comb is widest antero-basally instead of postero-apically.

12. *Anisops* (*A.*) *jaczewskii* Hutch.

A. jaczewskii Hutchinson, 1928, Ann. Mag. Nat. Hist. (10), i. p. 304.
A. vitrea Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, p. 88 (*nec* Signoret).

Notocephalon dark yellowish-grey, pronotum grey, scutellum tawny orange, paler posteriorly and with two large black spots just within the anterior angles (showing through the posterior part of the pronotum), black; metanotum and abdomen, showing through the hyaline elytra, black. Subfusiform, widest between the first $\frac{1}{4}$ and first $\frac{1}{3}$ of the elytra, *i.e.* before the middle of the body.

♂ head about $\frac{1}{8}$ narrower than pronotum and just $5\frac{1}{2}$ times as wide as the vertex, which is $2\frac{3}{4}$ times as wide as the synthlipsis.

Anterior part of notocephalon with slight traces of a longitudinal groove. Facial tubercle laterally compressed and somewhat ridge-like. Third rostral joint with short, stout, widely divergent prongs. (Plate XXX, fig. 18.)

Pronotum just over twice as wide as long; smooth, posterior margin bisinuate. Scutellum about $\frac{1}{2}$ as long again as pronotum.

Anterior leg with tibia about twice as long as tarsus (27 : 14), which is just over twice as long as the longer claw ; anterior margin of tibia with three stout spines, the most distal just beyond the middle, finer ones lie proximal to them and one stout one apically ; posterior margin with three basal hairs elongate ; stridulatory comb of nine to ten peg-like slightly transverse elements. (Plate XXXII, figs. 5, 8.)

Intermediate leg with tibia twice as long as first (1+2) tarsal joint, or a little more, the latter about $1\frac{1}{3}$ times the third, which is just under twice as long as the longer claw.

Posterior tibia $1\frac{1}{3}$ times as long as the tarsus.

♀ head about $\frac{1}{6}$ narrower than the pronotum and $4\frac{3}{4}$–$5\frac{1}{2}$ times the vertex, which is about $2\frac{1}{2}$ times as wide as the synthlipsis.

Anterior leg with tibia about $2\frac{1}{2}$ times the first (1+2) tarsal joint, which is rather more than $1\frac{1}{2}$ times to rather less than twice the third ; claw about $\frac{2}{3}$ of the latter.

Intermediate leg with tibia $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about $1\frac{1}{3}$ times the third ; claw $\frac{1}{2}$ the latter.

Length : ♂, 5·0 mm.
♀, 5·6 mm.

Transvaal.

Limpopo River, Main Drift, near Messina, pool in sand of flood-bed, under shadow of a rock with *A. sardea* and *A. debilis*, 28–9, v, 1927 (G.E.H.).

A. jaczewskii is exceedingly close to *A. adonis* Hutch., but differs in the shorter anterior tarsus of the ♂, the tibia being about twice as long as that joint in the former species and $1\frac{1}{2}$ times in the latter. In *adonis*, moreover, the synthlipsis is rather wider and the spines are situated on the distal rather than the proximal $\frac{2}{3}$ of the anterior margin of the tibia.

My specimens from the Limpopo, as I have pointed out elsewhere (*l.c.*), are apparently conspecific with a series taken by Jaczewski at Dakar, French Senegal, and referred by him to *vitrea* Sign. So far the species has not been taken in the intervening region, which includes the localities for *adonis* (Nigeria and Uganda).

13. *Anisops* (*Anisopoides*) *aglaia* n. sp.

Yellowish- or greyish-white, apex of abdomen darker, especially in ♀. Scutellum orange basally in some specimens from Grahamstown and the Lake Chrissie area.

♂ fusiform, rather more than $3\frac{1}{2}$ times as long as wide; greatest width between first $\frac{1}{4}$ and first $\frac{1}{3}$ of the elytra (*i.e.* before the middle of the body).

Head about $\frac{1}{10}$ narrower than the pronotum and rather over 4 times as wide as the vertex, which is 3 to just under 4 times as wide as the synthlipsis. Notocephalon with a slight longitudinal fovea, not reaching the vertex or synthlipsis, between two slightly raised longitudinal carinae.

Facial tubercle moderately developed and simple. Third rostral joint simple, without prongs. (Plate XXIX, fig. 4.)

Pronotum about $1\frac{3}{4}$ times as wide as long, and but little shorter than the scutellum, posterior margin bisinuate.

Anterior tibia $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as the first tarsal joint, which is over 3 times as long as the longer claw. The upper part of the inner surface of the tibia flattened to form a slightly concave elliptical area, bounded below by the ridge which in other species bears the stridulatory comb and covered with minute spine-like spatulate hairs; stridulatory comb within this area of seven to nine peg-like elements. (Plate XXXII, figs. 7, 7*a*.)

Intermediate tibia about twice as long as the first (1+2) tarsal joint, which is just over $\frac{1}{2}$ as long again as the third; the latter just under twice as long as the longer claw (type 38 : 17·5 : 11 : 6).

♀ larger and more parallel-sided than the ♂, with a shorter head and smaller eyes. Head 4 to nearly 5 times as wide as the vertex, which is about 3 times as wide as the synthlipsis.

Anterior tibia about twice as long as the first (1+2) tarsal joint, which is more than $1\frac{1}{2}$ times as long as the third; longer claw $\frac{1}{2}$ as long as the latter or a little more (allotype 37 : 18 : 10 : 6).

Intermediate tibia about twice as long as the first (1+2) tarsal joint, which is almost twice as long as the third; longer claw over $1\frac{1}{2}$ times as long as the latter.

Length: ♂, 6·5 mm.
♀, 7·5 mm.

Cape.

Wynberg Reservoir, Table Mountain, very abundant, 16, x, 1926 (L.M.S.).

Mowbray, Cape Flats, vlei at Roxana, very abundant (*type*, *allotype*, and *paratypes*), 21, i, 1927 (G.E.H.).

Crawford Vlei, Cape Flats, 1 ♂ among *A. hypatia*, 26, i, 1926 (G.E.P.).

Alderman's Farm, Firgrove, Cape Flats, 1 ♂ among *A. hypatia*, 24, v, 1926 (G.E.P.).

Stormberg, Albert dist., dam, 28, iv, 1928 (G.E.P.).

Dordrecht, dam 2 miles east of; Wodehouse dist., 30, iv, 1928 (G.E.P.).

Grahamstown, College House Dam, 6, iii, 1926 (G.E.P.).

Transvaal.

Randfontein, dam, 1 ♂, 8, v, 1927 (G.E.H.).

Rietfontein, pans Boksburg dist., large pan, 27, iv, 1928 (G.E.H.).

Lake Chrissie, in *Potamogeton*, in 5–10 ft. of water, 26, ii, 1928 (G.E.H.).

Blaauwwater, pans near Lake Chrissie, 27, ii, 1928 (G.E.H.).

Breyten, Bothasrust pan, 27, ii, 1928 (G.E.H.).

This species is distinguished from all known species of *Anisops* by the simple third rostral joint of the ♂, which lacks the basal extensions so characteristic of this genus and *Buenoa*. Perhaps in correlation with this the form of the anterior tibia of the ♂ is also peculiar, with its small stridulatory comb reminiscent of that of *jaczewskii* and *adonis*, set at the side of a large ovate flattened area. On account of the simple third rostral joint it seems advisable to remove *aglaia* to a separate subgenus *Anisopoides* n. Superficially this insect is exceedingly like *A.* (*A.*) *hypatia*.

14. *Anisops* (*Micranisops*) *apicalis* Stål.

Anisops apicalis Stål, 1855, O.V.A.F., xxii, p. 89.
„ „ Stål, 1865, Hemip. Afric., p. 192.
„ „ Kirkaldy, 1904, Wien Ent. Zeit., xxiii.
„ „ Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 2, p. 91.

Greyish- or yellowish-white, abdomen in life red latero-ventrally, posterior legs tinged with reddish, elytra hyaline with a large subapical black patch. (Plate XXIX, fig. 5.)

♂ fusiform, short and broad, widest between first $\frac{1}{4}$ and $\frac{1}{3}$ of the elytra, *i.e.* before the middle of the body. Head slightly narrower than the pronotum, 4–$6\frac{1}{2}$ times as wide as the vertex, which is 3–$3\frac{1}{4}$ times as wide as the synthlipsis. Facial tubercle very slight. Notocephalon with a longitudinal fovea in its anterior portion, ending in front and behind in a very slight swelling on the vertex. Third rostral joint with rather short prongs. (Plate XXX, fig. 21.)

Pronotum $2\frac{3}{4}$–$3\frac{1}{4}$ times as wide as long, markedly produced between the eyes anteriorly, smooth with a line of pale hairs in the posterior region; posterior margin almost straight, very slightly concave centrally.

Scutellum about $\frac{1}{2}$ as long again as the pronotum.

Anterior leg with tibia just under $1\frac{1}{3}$ times as long as tarsus, which is $2\frac{1}{2}$–$4\frac{1}{2}$ times the longer claw. Tibia with three basal hairs on the posterior margin, elongate, and with a row of very short, slightly thickened hairs along the anterior margin; comb subelongate, slightly narrowed proximally, of eleven very well-marked lamellae. Tarsus with four very fine hairs in a row on the proximal $\frac{1}{2}$ of the inner surface. (Plate XXXII, fig. 6.)

Intermediate leg with tibia just over twice as long as the first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long again as the third, the latter twice as long as the longer claw. Posterior tibia nearly twice as long as the tarsus (24 : 13).

Brachypterous, membrane of the elytra very small, wings reduced, reaching to about the level of the centre of the black elytral spot.

♀ larger and more robust than ♂.

Pronotum about $2\frac{1}{3}$–$2\frac{3}{4}$ times as broad as long.

Scutellum from slightly longer to $1\frac{2}{3}$ times as long as the pronotum.

Anterior leg with tibia about twice as long as first (1+2) tarsal joint, which is $\frac{1}{2}$ as long again as the third, the latter $\frac{1}{2}$ as long again as the longer claw, or a little less.

Intermediate leg with tibia rather under $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is slightly longer than the third; claw rather less than $\frac{1}{2}$ the latter.

Posterior leg as in ♂.

Length: ♂, 4·0 mm.
♀, 4·5–5·0 mm.

Southern Rhodesia.

Cleveland Dam near Salisbury, 2, vii. 1927 (G.E.H.).
Fort Victoria, 5, vii, 1927 (L.M.S.).

Caprivi Strip.

Kabulabula, vlei near Linyanti River, 16, vii, 1927 (G.E.H.).
" Caffraria " (Stål *type*).

This species is apparently very widely spread in Central Africa, being recorded by Jaczewski from Dakar, French Senegal, while Mr. G. L. R. Hancock has sent me specimens from Kampala, Uganda.

Jaczewski (*l.c.*, p. 93) says, " This species differs so strongly from

the other representatives of the genus that it could be even placed with some certainty in a separate subgenus; the genital armature does not show, however, greater differences." I had written my key placing *apicalis* in a new subgenus *Micranisops* before Dr. Jaczewski's paper came into my hands, and in spite of his diffidence I have adhered to this separation. The genus *Buenoa*, which may stand with good reason, has very similar genitalia to *Anisops*, thus these structures do not offer even generic characters in the *Anisopini*, save in the genus *Nychia*. The short posterior tarsi, the brachypterous wings and elytra, and the black spot on the latter are so unlike what is found in any other species of the genus that I believe this course is entirely justifiable.

Nychia Stål.

Nychia Stål, 1858, Eugenie's Resa, p. 268 (type *limpida*).
,, Stål, 1868, Hemip. Afric., iii, p. 190.
,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 124.
Antipalocoris Scott, 1872, in Marshall, Ent. Month. Mag., viii, p. 244 (type *marshalli*).

Eyes meeting internally along at least $\frac{1}{6}$ of their length, and with two emarginations in their posterior border viewed laterally; face produced very slightly between the eyes dorsally and slightly depressed between them just above the labrum.

Prothorax widely excavated laterally.

Anterior and intermediate legs short, tarsi trimerous in the ♂, the basal joint minute, apparently monomerous in the ♀, posterior legs long, tarsus hardly shorter than tibia, two-jointed and with a single claw. Anterior tibia and two distal tarsal joints with apical combs of bristles. (Plate XXXII, fig. 13.)

Wing with venation greatly reduced, Sc and R unbranched, almost contiguous, M apparently represented only by a small basal portion, Cu_1 moderately developed basally, Cu_2 well developed, but not chitinised basally, A_1 well developed. (Plate XXIX, fig. 8.)

♂ genital capsule boat-shaped with a small ventral knob, slightly asymmetrical along its dorsal border. Parameres asymmetrical, the right-hand one styliform, the left a simple lobe. Aedeagus well chitinised basally, with a central membranous part which bears two asymmetrical alae basally, simulating long parameres, and sac-like appendix external apically, on the left side of which the apical part of the aedeagus (? endosoma) lies spirally coiled. (Plate XXXIII, figs. 1–4).

♀ gonapophyses feebly chitinised and short.

1. *Nychia limpida* Stål.

Nychia limpida	Stål, 1858, Eugenie's Resa, p. 268.
,, ,,	Horvath, 1918, Ann. Mus. Nat. Hung., p. 143.
Antipalocoris marshalli	Scott, 1872, in Marshall, Ent. Month. Mag., viii, p. 244.
Nychia marshalli	Kirkaldy, 1901, Ann. Mus. Genova, xl, p. 809.
,, ,,	Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 125.
,, ,,	var. *sappho*, Kirkaldy, 1901, Ann. Mus. Genova, xl, p. 809.
,, ,,	var. *atavia*, Hale, 1925, Ark. för Zoologi., 17A, No. 20, p. 17.
? *Nychia infuscata*,	Paiva, 1918, Rec. Ind. Mus., p. 282.

N. limpida limpida (Stål).

White, eyes dark red-brown, pronotum somewhat browner than the rest of the body in some specimens. Notocephalon often with a double row of darker mottlings, or in fluid-preserved specimens reddish-brown.

Greatest breadth of the head and eyes $3\frac{1}{2}$–$3\frac{3}{4}$ times the vertex; eyes meeting across the notocephalon.

Pronotum very transverse, about $3\frac{1}{2}$ times as long as wide, transversely wrinkled, with a few pale hairs posteriorly.

♂. Anterior legs with tibia 2–$2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about twice as long as the third; longer claw about $\frac{1}{2}$ as long again as the latter.

Intermediate leg with tibia 2–$2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is $1\frac{1}{3}$ to twice as long as the third; longer claw about $1\frac{2}{3}$ times as long as the latter.

♀. Anterior legs with tibia about $1\frac{2}{3}$ as long as the monomerous tarsus, which is rather more than $1\frac{1}{2}$ times as long as the longer claw.

Intermediate leg with the tibia $1\frac{2}{3}$ times as long as the monomerous tarsus, which is about $1\frac{1}{3}$ times as long as the longer claw.

Macropterous form.—Scutellum very large, somewhat raised, and in one male specimen with a pair of smoky brown patches just within the anterior angles.

Elytra dirty yellowish-white, with an indefinite line inside the costa, continued almost to the base, and widest at its basal end, and another inside subcosta spreading out basally, smoky.

Apex of elytra, and in one female specimen the corial margin of the clavus, also of this colour.

Brachypterous form.—Pronotum much as in the preceding. Scutellum reduced with concave latero-posterior margins.

Elytra with the corium, clavus, and membrane not distinguishable, with a straight internal edge, not overlapping apically ; translucent white with a very narrow smoky band along the costa and a smoky tip. Wings shred-like.

Length : ♂, 5 mm
♀, 6 mm.

Macropterous form.

Cape.

1 ♂, Swellendam, dam, 16, xii, 1926 (G.E.H.).
2 ♀ ♀, Pirie Mission, stream, 3, iii, 1926 (G.E.P.).
1 ♂, East London, Second Creek, Buffalo River, 17, ii, 1926 (G.E.P.).

Transvaal.

3 ♂ ♂, 3 ♀ ♀, Limpopo River, at gorge near Messina, 27, v, 1927 (G.E.H.).

Southern Rhodesia.

2 ♂ ♂, Khami River, below ruins near Bulawayo, 27, vii, 1927 (G.E.H.).

Brachypterous form.

Cape.

Oudtshoorn, dam, 28, xii, 1926 (G.E.H.).
Cango Caves, pond in stream-bed, 29, xii, 1926 (G.E.H.).
Lushington Valley, Kowie Road, 11, iii, 1926 (G.E.P.).
Debe Nek, stream in forest, 27, ii, 1926 (G.E.P.).
East London, pond in park, Second Creek, 15–16, ii, 1926 (G.E.P.).

Transvaal.

Randfontein, dam, 8, v, 1927 (G.E.H.).
Rivonia, near Johannesburg, 5, vi, 1927 (G.E.H.).
Waterval Boven, river, 15–16, iv, 1927 (G.E.H.).
Plat River, Waterberg dist., 6–14, iv, 1905 (C. Swierstra, T.M.).
Louis Trichardt, dam, 26, v, 1927 (G.E.H.).
Limpopo River, at gorge near Messina, 27, v, 1927 (G.E.H.).

Southern Rhodesia.

Khami River, below ruins near Bulawayo, 27, vi, 1927 (G.E.H.).
Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

Northern Rhodesia.

Maramba River, near Livingstone, 12, vii, 1927 (G.E.H.).

form *sappho* Kirkaldy.

Elytra with a black spot just within the internal margin. (Plate XXIX, fig. 6.)

Cape.

♀ ♀, Oudtshoorn, dam, 28, xii, 1926 (G.E.H.).

♀ ♀, Lushington Valley, Kowie Road, 11, iii, 1926 (G.E.P.).

♀ ♀, Debe Nek, Mnqesha River, 1–2, iii, 1926 (G.E.P.).

♀ ♀, Pirie Mission, 3, iii, 1926 (G.E.P.).

♀ ♀, East London, Second Creek, 16, ii, 1926 (G.E.P.).

Transvaal.

2 ♀ ♀, Potchefstroom, dam, 25, iii, 1928 (G.E.H.).

Southern Rhodesia.

♀, Makabusi River, near Salisbury, 3, xii, 1927 (G.E.H.).

Nychia limpida bantu n. subsp.

Macropterous form.—Prothorax behind the eyes, mottling on the scutellum, anterior margin of the clavus, corium save for fine veins, and embolium except the anterior part of the internal margin, greyish-black, membrane in type greyish-black, in paratype milky anteriorly.

Brachypterous form.—Corium with a greyish-black longitudinal band on its outer margin and in one specimen with a band from the base on to the disc of the corium greyish (this band is opaque white in other ♀ specimens of *Nychia* and probably represents an area just outside the clavo-corial suture), embolium greyish-black, anteriorly and internally yellowish.

Macropterous form.

Caprivi Strip.

2 ♀ ♀ (*type* and *paratype*), Kabulabula, vlei near Linyanti River, 16, vii, 1927 (G.E.H.).

Brachypterous form.

Bechuanaland Protectorate and Caprivi Strip.

♀, Kazungula, junction of Linyanti and Zambesi, 14, vii, 1927.

♂, ♀, Linyanti River, four hours above Kasane, 15, vii, 1927.

2 ♀ ♀ (*paratypes*), Kabulabula, vlei near Linyanti River, 16, vii, 1927 (G.E.H.).

Northern Rhodesia.

1 ♀, Zambesi, between Katombora and Kazungula, 14, vii, 1927 (G.E.H.).

Variation and Distribution of Nychia limpida.

The genus *Nychia* was founded by Stål in 1858 to contain a single species *N. limpida* from China. This species is (*fide* Horvath, *l.c.*, 1918) synonymous with *Antipalocoris marshalli* Scott (=*N. marshalli* Kirk.). *N. limpida* has been recorded under one or other of these specific names from Corsica, Abyssinia, Congo, Ceylon, New Guinea, and China. In 1918 Paiva described a second species, *infuscata*, from the marginal zone of the Inle Lake, Shan States, Burma. No differences in structure are described by which the species can be differentiated, and *infuscata* is probably but a subspecies of *limpida*; its colour characters are discussed below.

The first macropterous specimen of this widespread species was recorded by Kirkaldy in 1901 from New Guinea, a single individual occurring with a series of eighteen brachypterous specimens of his form *sappho*. In 1925 Hale described the macropterous form as var. *atavia*, from a pair taken in the Kimberley district of North-West Australia by Mjöberg. Of the structural characters given to distinguish *atavia* from the type the facial fovea is illusionary, being due to shrinkage in drying and shown by a number of brachypterous specimens in my collection. For the rest, my macropterous specimens agree structurally with his description and figures, save that the inner margin of the embolium runs rather more parallel with the costa than in the latter.

No other macropterous specimens appear to be known, though the data recorded above show that this form is not very rare in South Africa, particularly in the Northern Transvaal and Rhodesia. Form *sappho* was described as above stated from eighteen brachypterous specimens taken in New Guinea, Kirkaldy at the same time recording a single individual among a series of the typical form from Lake Dembel, Abyssinia. Unfortunately the sex of none of the specimens is recorded. A series of eighteen suggests that both sexes were present, but it is possible that the smaller ♂ ♂ had been rejected as nymphs. All my South African specimens are brachypterous females. While in many localities in the Cape it is exceedingly common, this variety is practically absent from collections made outside that province. Among Transvaal specimens two, the only adults taken, from Potchefstroom belong to it, and so does a single one from Rhodesia, in which the spot is very poorly developed. In the Cape specimens

there is considerable variation in the size of the latter ; the specimen figured (Plate XXIX, fig. 6) illustrates its maximum development. The following figures show the relative abundance of type and variety in two localities, where adequate series were taken.

	♂.	♀ type.	♀ *sappho.*
Oudtshoorn, 28, xii, 1926 . .	6	1	5
Lushington Valley, 11, iii, 1926 .	7	9	10

Paiva records a *sappho* form in his description of *N. infuscata.* " In some specimens there is a small black spot near the middle of the inner margin of each elytron."

N. limpida bantu appears to be a local race that has developed in the Upper Zambesi and Linyanti River systems. It may extend south in suitable localities along the eastern edge of the Kalahari, for specimens from Randfontein show a considerable amount of black on the outer part of the corium, and are really intermediates between the *bantu* and typical *limpida.* Rhodesian specimens also show a little darkening in this region in some specimens ; curiously enough this is practically absent in two from the Maramba River near Livingstone. Forty miles further west the black-banded *bantu* occurs.

The macropterous specimens of *bantu* are evidently very similar to *atavia,* the coloration of which is described thus : " Clavus shining transparent, narrowly margined with smoky brown, and with a patch of the same colour at outer anterior angle ; claval suture pale ; corium smoky brown, paler towards posterior margin, and with a shining whitish longitudinal vein arising at the anterior angle, extending for whole length of corium and posteriorly meeting the membranal suture ; embolium streaked with smoky brown, almost as long as the corium ; membrane dull milky white, laterally smoky brown ; suture dark brown." Similarly, brachypterous specimens of *N. l. bantu* are extremely similar in coloration to *infuscata* Paiva, in which the elytra are described as " whitish transparent ; corium white, next to embolium a broad longitudinal band extending the whole length and a short discal one (sometimes almost absent) united with the other at the base, extending to a little before the middle of the corium fuscous ; the latter apically dull white. Embolium yellowish-white, the outer margin dark fuscous." These forms differ from *bantu* in the dark markings being brownish rather than blackish-grey, but I have had some doubt as to the advisability of establishing a new name ; the apparent difference in tint, the geographical discontinuity, and the racial status of *bantu* finally led me to take such a course.

The following is a schematic classification of these forms ; it is to be taken as provisional and somewhat speculative.

A. *Macropterous forms.*

1. Corium white with an indefinite smoky line inside its outer margin, and another inside the corio-claval suture.

N. limpida limpida, Africa, etc.

2. Corium chiefly smoky brown.

N. l. infuscata (=*atavia* Hale), Australia.

3. Corium chiefly greyish-black.

N. l. bantu, North-West part of South Africa.

B. *Brachypterous forms.*

1. Corium almost entirely white.

N. l. limpida, Africa, Corsica, China, etc.

2. Corium with a brown marginal and a brown discal stripe.

N. l. infuscata, Burma.

3. Corium with a blackish marginal and, rarely, a greyish discal stripe . . . *N. l. bantu*, North-West part of South Africa.

4. Elytra with a black spot near the middle of the inner margin, otherwise 1 or 2 . . *N. l. limpida* or *l. infuscata*, form *sappho*.

It will be noted that the brachypterous forms are always less pigmented than the macropterous, save that form *sappho* is only known among the former.

Life-history.—From the structure of the female genitalia we may conclude that the eggs are attached to submerged surfaces, but not inserted in the stems of aquatic plants as is the case in *Anisops*.

Nymphs.—L. 3 mm. Backwater of Buffalo River, Kingwilliamstown, 21, ii, 1926 (G.E.P.).

Eyes not contiguous on the notocephalon ; width of head and eyes about 4 times the vertex, which is $4\frac{1}{3}$ times as wide as the synthlipsis. Pronotum slightly broader than head and eyes, $3\frac{1}{4}$ times as wide as long ; obtusely produced forward between the large eyes, which considerably encroach on the anterior margin on either side. Prothorax deeply excavated laterally. Mesothorax about $1\frac{1}{4}$ times as long as prothorax.

Anterior tibia $1\frac{1}{4}$ times as long as the tarsus, which is $1\frac{3}{8}$ times as long as the longer claw.

Intermediate tibia $1\frac{1}{2}$ times as long as the tarsus, which is $1\frac{1}{3}$ times as long as the longer claw.

Posterior tarsus slightly longer than tibia.

L. 4·8 mm. (♀, last instar), Waterval Boven, 15, iv, 1927 (G.E.H.).

Eyes not contiguous on the notocephalon; width of head and eyes 4 times the vertex, which is 8 times the synthlipsis. Pronotum 3 times as wide as long, somewhat wider than the head; the large eyes encroaching on its anterior margin more than in the previous specimen (Plate XXIX, fig. 15). Mesonotum just over $\frac{1}{2}$ as long again as the pronotum.

Anterior leg with tibia $1\frac{1}{4}$ times as long as the tarsus, which is $1\frac{1}{2}$ times as long as the longer claw.

Intermediate leg with the tibia just under $1\frac{1}{4}$ times as long as the tarsus, which is $1\frac{5}{8}$ times as long as the longer claw.

Posterior tibia and tarsus subequal.

The nymphs of *Nychia*, though not showing the characteristic contiguity of the eyes on the notocephalon so conspicuous in the adult, may always be distinguished from those of *Anisops* by the form of the pronotum, in particular of its anterior margin, and by the posterior tarsi, which are as long as, or longer than, the tibiae. The ratio of the vertex to the synthlipsis is rather variable in mature nymphs. In a second specimen from Waterval Boven (l. 4·2 mm., ? mature ♂ nymph) it is 4 : 1; in one from Potchefstroom, 25, vii, 1928 (l. 4·0 mm.), about 8 : 1; in one from the Lushington Valley (l. 4·8 mm.), 4 : 1.

Subfam. Pleinae.

A single genus is now included in this subfamily, *Helotrephes* Stål, formerly grouped with *Plea*, having been removed by Esaki and China (Tr. Ent. Soc. Lond., 1928) and placed along with two remarkable new genera, *Idiocoris* and *Paskia* from Lake Tanganyika, in a separate family, the *Helotrephidae*.

Plea Leach.

Plea Leach, 1817, Trans. Linn. Soc., xii, p. 11.
„ Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 126.
„ Hale, 1923, Rec. S. Aust. Mus., ii, 3, p. 421.
Ploa Stephens, 1829, Cat. Brit. Ins., ii, p. 354.
Ploea Douglas and Scott, 1876, Cat. Brit. Hemip., p. 61.

Very short, broad, and deep. Head transverse; pronotum subhexagonal, transverse. Pronotum and elytra reticulo-punctate; wings reticulate.

Antennae three-jointed. All femora simple. Anterior and intermediate tarsi with a minute proximal and two longer distal joints ;* posterior tarsi with a minute proximal and two long, subequal, distal joints. Posterior legs not markedly flattened and but moderately more hairy than the other two pairs.

Elytra subtriangular, with clavus and corium alone well defined ; membrane flange-like, that of the right elytron fitting over that of the left, forming a closing mechanism (Hungerford, Kans. Univ. Sci. Bull., xi, Dec. 1919, pl. xxv), while apically the left elytron overlaps the right. Wing dilated apically along the anterior border. All veins colourless ; Sc, Rs, M_{1+2}, and A_1 well chitinised ; R lying just below Sc ; R_1 obsolete ; Rs bent down and then gradually up again, not meeting Sc ; M_{1+2} lying close below Rs, distally bent down and branching ; M_{3+4} apparently indicated near the base of the wing fusing with Cu_1, below which lies the feebly indicated Cu_2 ; A_1 much as in other members of the family ; A_2 obsolete ; no r-m. The homologies of the lower median and cubital region are not clear, but might be investigated in more pigmented specimens than I have at my disposal. (Plate XXXIII, fig. 9.)

♂ genital capsule elongate boat-shaped, with a conspicuous knob at the posterior end of the ventral surface ; anterior part of dorsal border slightly asymmetrical. Parameres twisted and asymmetrical, the right being bent over capsule, the left somewhat spirally twisted away from it. Aedeagus with a pair of asymmetrical alae ; apex directed to the right and bearing a strongly chitinised knob and spine (Plate XXXIII, figs. 13, 14).

♀ gonapophyses elongate and well chitinised.

Plea may always be recognised by its short broad form and small size. The posterior legs, though not such efficiently constructed swimming organs as those of the *Notonectinae*, nevertheless are used in the same way.

The asymmetrical genitalia of the ♂, the three-jointed antennae, the tendency to reduction in the number of tarsal joints in the anterior and intermediate legs, and the simple femora, all indicate a closer alliance with the *Anisopini* than with the *Notonectini*.

The genus *Plea* contains fifteen to twenty very closely allied species, the adequate separation of which is a matter of the greatest difficulty. Kirkaldy (Wien Ent. Zeit., xxiii, p. 126, 1904) is the only author

* This statement is incorrect, as Mr. W. E. China has pointed out to me that the number of tarsal joints differs in different species (*vide* a forthcoming paper by China and Esaki).

who has attempted to give a key to the genus, but the attempt is most unsatisfactory. After taking off *liturata* Fieb. and the New World species the remaining Old World species are grouped according to whether they have a distinct or indistinct longitudinal stripe on the vertex. Since pale specimens, perhaps passing through a prolonged teneral period, perhaps slightly pigmented varieties, of both *pullula* Stål and *leachi* McGr. and Kirk., species in the "distinct" group, may show no sign of the head stripe, the character is only applicable to deeply pigmented specimens, though undoubtedly useful. The whole genus is in need of a thorough revision, in which the ♂ genitalia would have to be considered, though these organs do not show the striking interspecific differences found in some genera. Two species occur in South Africa which may be separated thus :

1. (2) Smaller, not exceeding 2 mm. in length. . *pullula* Stål.
2. (1) Larger, 2·2–2·3 mm. in length . . *piccanina* n. sp.

Plea pullula Stål.

Plea pullula Stål, 1855, Oefv. Vet. Ak. Förk., p. 89.
,, ,, Stål, 1865, Hemip. Afr., iii, p. 192.
,, ,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 128.

Head dirty yellowish-white, with a tawny or dark brown longitudinal stripe on the vertex, often obsolete or absent in the paler specimens, in the darkest broad, well-defined, extending back about half of the length of the head posteriorly ; punctate, the punctures of the posterior part of the head in the darkest specimens dark brown ; central portion of vertex bearing stripe smooth and slightly raised ; eyes deep violet-brown ; least interocular width of notocephalon a little more than half the greatest width of head and eyes.

Pronotum irregularly reticulo-punctate save for two partially fused areas just inside the anterior margin ; cinereous with a narrowly piceous anterior border and a row of black punctures within it, discal punctures often brown ; or whole pronotum greyish-white ; $1\frac{1}{2}$–$1\frac{2}{3}$ times as wide as long.

Scutellum greyish or yellowish-white, widely and irregularly punctate, the punctures brown in dark specimens ; slightly wider basally than long, and $\frac{2}{3}$–$\frac{3}{4}$ as long as the pronotum.

Elytra reticulo-punctate save for a subcostal line, greyish-white with brown punctures posteriorly varying to cinereous, with basal part of claval margin, apical part of corio-claval suture, most of the posterior part of the corium, and most of the corial punctation dark brown. Elytral angle in profile as figured. (Plate XXXIII, fig. 9.)

Legs testaceous or testaceous brown, apex of tibiae and tarsi slightly darker.

Anterior tibia just over twice as long as tarsus, which is about twice as long as claws.

Intermediate tibia under twice as long as tarsus, which is about twice as long as claws.

Posterior tibia rather over 2½ times as long as the first tarsal joint, which is subequal in length to the second; the latter twice as long as the claws.

♂. Right clasper dilated apically in some specimens. Left clasper broad and somewhat sickle-shaped. (Plate XXXIII, fig. 13.)

Length: 1·5–2·0 mm.

CAPE.

Swellendam, dam, 17, xii, 1926 (G.E.H.).

Knysna, pond at Belvedere, 24, xii, 1926 (G.E.P.).

Alice, vlei, 23, ii, 1926 (G.E.P.).

Kingwilliamstown, backwater of Buffalo River, 21, ii, 1926 (G.E.P.).

TRANSVAAL.

Witpoortje, Krugersdorp div., pools, 12, ix, 1926 (G.E.H.).

Florida, lake, 31, x, 1926 (G.E.H.).

Birchleigh, in *Potamogeton*, in dam, 28, iv, 1928 (G.E.H.).

Brakpan, weeds in pan, 14, iv, 1928 (G.E.H.).

Goedeverwachting near Lake Chrissie, reed pan, 17, v, 1928 (G.E.H.).

Louis Trichardt, dam, 24, v, 1927 (G.E.H.).

This species is easily distinguished from the next by its smaller size. It has, moreover, a somewhat less obtuse elytral angle in profile than have *piccanina* and *leachi* McGr. and Kirk. (*minutissima* auct.), and the punctuation, especially of the scutellum, is more irregular and sparse. Stål (Hemip. Afr., iii, p. 192) says: "*P. pullula* Stål. Long. 2, Lat. 1, mill . . . Patria: Caffraria (Mus. Holm.). *P. minutissimae* maxime affinis minor, minus dense, licet distinctius, punctata."

This brief comparison leads me to suppose that it is the smaller of the two South African species which is to be referred to *pullula*; *piccanina* is subequal in size to *leachi* (i.e. *minutissima*) and quite as densely punctate.

Dark specimens of *pullula* have a thick, well-defined head stripe

which confirms my identification, for Kirkaldy places this species along with *leachi*, *hovana* Kirk. from Madagascar, and *brunni* from Australia, in the section of his key containing Old World species with a distinct head stripe. He records *pullula* from Zanzibar, Madagascar, and Mauritius, but in view of the confusion in this genus, too much reliance should not be placed on these records. It is possible that *ugandana* Horv. (Ann. Hist. Nat. Mus. Nat. Hung., xvi, 1918, p. 140) is a very dark form of this species.

Plea piccanina n. sp.

Head greyish-white to pale greyish-yellow with a short, broad, diffuse, tawny stripe extending over the vertex a short way on to both face and notocephalon. Punctate; central part, at least of tawny stripe, smooth and slightly raised. Face with traces of two very short longitudinal carinae below the stripe and in a line with its edges. Eyes deep violet-brown, narrowest interocular distance half the greatest width of head and eyes. Pronotum reticulo-punctate, except for two partly fused, anterior, lightly rugose areas; cinereous brown anteriorly, with a row of black punctures just within the anterior border; punctures of disc grey to black; darker posteriorly, or whole pronotum whitish-grey; $1\frac{1}{3}$–$1\frac{2}{3}$ times as wide as long.

Scutellum greyish or yellowish-white varying to brown, with the centre pale; punctate with an antero-median smooth area; slightly wider basally than long, and $\frac{2}{3}$–$\frac{3}{4}$ as long as the pronotum.

Elytra reticulo-punctate save a subcostal line; greyish-white with dark punctures posteriorly, varying to cinereous with blackish punctures, paler at the base of the corium and centrally on the clavus, with brown between the punctuation along the basal part of the corio-claval suture, spreading across the corium to its outer margin, and posteriorly near the internal angle of the latter. Elytral angle in profile as figured. (Plate XXXIII, fig. 7.)

Legs testaceous, brown; apex of tarsi slightly darkened.

Anterior tibia twice as long as tarsus, which is about $2\frac{1}{2}$ times as long as claws.

Intermediate tibia rather under twice as long as tarsus, which is about $2\frac{1}{2}$ times as long as claws.

Posterior tibia $2\frac{1}{2}$ times as long as the first tarsal joint, which is subequal in length to the second; claws about half the latter.

♂. Right paramere beak-shaped and twisted, little if at all dilated apically.

Left paramere curved and twisted, but not sickle-shaped. (Plate XXXIII, fig. 12.)

Length : 2·2–2·3 mm.

Cape.

Table Mountain, Hely Hutchinson Reservoir, 27, xii, 1925 (G.E.H.).
Camps Bay, pool, 29, v, 1927 (L.M.S.).
Princess Vlei, pool, 12, i, 1926 (G.E.P.).
Crawford Vlei, 26, i, 1926 (G.E.P.).
Knysna, pond at Veldschoen's Drift, 21, xii, 1926 (G.E.H.).

Transvaal.

Randfontein, dam, 8, v, 1927 (G.E.H.).
Witpoortje, Krugersdorp div., pool, 12, ix, 1926 (G.E.H.).
Florida, lake, 31, x, 1926 (G.E.H.).
Lake Chrissie, pool in stream-bed at north end, 19, v, 1928 (G.E.H.).
Waterval Boven, river, 16, iv, 1927 (G.E.H.).

This species resembles in size, profile, and general appearance the Western Palaearctic species *P. leachi* McGr. and Kirk. so closely that its specific distinction may perhaps be called in question. The only structural differences apparent are that in the latter the head is very slightly more produced between the eyes anteriorly and that the left paramere is more sickle-shaped, while the right paramere is more dilated anteriorly in *leachi* (Plate XXXIII, fig. 14). The great geographical separation of the two forms finally has led me to consider them as distinct species.

In Kirkaldy's grouping *piccanina* would fall among those Old World species having a short, indistinct, vertical stripe, *leachi* having a distinct one. Many pale (perhaps teneral) specimens of the latter have little or no indication of this marking, and the difference between such individuals and pale specimens of *piccanina* is in this respect quite unappreciable.

2. Fam. CORIXIDAE.

Aquatic Hemiptera modified for swimming with the ventral surface below. Somewhat flattened and slightly convex dorsally. Rostrum very short and hardly distinguishable from the face. Anterior legs with tarsi 1—or rarely 2—segmented, the proximal joint being flattened and fringed with bristles (pala). Intermediate legs long and thin. Posterior legs flattened and fringed with hair.

The *Corixidae* are very specialised bugs, and are at once distinguished by the form of the beak. The abdomen of the male is more or less asymmetrical in all the genera, and usually bears on the 6th tergite

a curious, multiple, comb-like organ called the strigil. In the very primitive Australasian genus *Diaprepocoris* this apparatus is compound, being composed of two elements. The males of this family stridulate in various ways. In *Micronecta minutissima* L., a European species, the movements of the abdomen which accompany the chirping sound that the species can produce make it practically certain that the strigil is being used, probably scraping on the edge of the undersurface of the right elytron. In no other genus have we any direct evidence that the strigil is concerned with sound production. In *Corixa panzeri* Fieb. the sound is produced by the rubbing of a roughened area on the anterior femur against the side of the head. The same appears to be true of *Sigara* (*S.*) *germari* Fieb. and *S.* (*S.*) *praeusta* Fieb. In *Cymatia coleoptrata* F. I believe the sound is produced by the pala of one of the anterior legs being drawn across the stridulatory area of the opposite femur. A résumé of all published information on this question will be found in Butler—A Biology of the British Hemiptera Heteroptera (London, Witherby, 1923). No observations of the mechanism of stridulation have been made on African species, but *Micronecta scutellaris* (Stål) and *M. citharistia* n. sp. are known to produce a sound very similar to that of *Micronecta minutissima*.

The ♂ genitalia of the *Corixidae* have been described recently by Pruthi (Tr. Ent. Soc. Lond., 1925, p. 185), Jaczewski (Ann. Zool. Mus. Pol. Hist. Nat., 1924, T. iii, z. 1–2, p. 8), and others, so that a further account is unnecessary. It may be pointed out, however, that in the *Corixinae* the 7th abdominal segment is deeply cleft on the side remote from the strigil, and that in *Micronecta* a portion is cut off on the left-hand side of this tergite and lies as a kind of flap covering the genitalia. This "free portion" varies much in form in the different species and is of some systematic importance.

Enderlein (Kungl. Sven. Vet. Ak. Hand., 1912, xlviii, 3) and later Jaczewski (*l.c.*, p. 3) divide the family into two* subfamilies both of which occur in South Africa. The latter's arrangement is here adopted.

1. (2) Antennae three-jointed. Scutellum exposed. Posterior claw inserted at the apex of the last tarsal joint.

* In the light of Hale's researches a third should almost certainly be instituted for *Diaprepocoris* Kirk., which differs from the other *Corixidae* in its two-jointed anterior tarsi, the presence of ocelli, the large scutellum, and the peculiar stridulatory apparatus of the ♂.

[Since the above was written this has been done by Lundblad, Ent. Tid., 1928, p. 9. G.E.H. 9, i, 1929.]

♂. Sternite of the 9th abdominal segment truncate posteriorly. Upper clasper not forming a sheath for the aedeagus.

Micronectinae Jacz. (*Sigarinae* End.).

2. (1) Antennae four-jointed. Scutellum almost or completely hidden by pronotum. Posterior claw inserted before the end of the apical joint of the tarsus.

♂. Sternite of the 9th abdominal segment produced posteriorly into a grooved process. Upper clasper (right in South African genera) forming with the latter process a sheath supporting the aedeagus.

Corixinae End.

Subfam. Micronectinae.

These are all small water-bugs arranged in two genera, *Micronecta* Kirk. in the Old World, *Tenagobia* Berg. in the New.

Micronecta Kirk.

Micronecta Kirkaldy, 1897, Entom., p. 260.
,, Hale, 1922, R.S., Aust. M., ii, 2, p. 323.
Sigara Fabricius, 1794, Ent. Syst., iv, p. 59 (part).

Scutellum small, covered by the pronotum only at its anterior margin. Posterior margin of pronotum convex or straight, never roundly emarginate or concave. Strigil present in ♂, on the right-hand side of the 6th abdominal tergite.

In the present paper seventeen species of this genus are recorded, all but two of which appear to be undescribed. Many of the species can only be separated by the genitalia of the ♂, which organs have hitherto only been described in the few species which Jaczewski has examined. The following key aims at the separation at least in the ♂ ♂ of all these forms, but where a sufficient amount of material exists to justify dissection before a detailed examination of external characters is made, it will be found quicker to determine these insects by first mounting the genitalia of a ♂ and comparing them with the figures on Plates XXXIV–XXXVI, after which the description of the species may be consulted. Many species doubtless remain to be discovered in Central Africa.

Key to the South African Species of Micronecta Kirkaldy.

1. (2) Synthlipsis more than ½ as wide as head and eyes
dorothea n. sp. (S. Transvaal).
2. (1) Synthlipsis less than ½ as wide as head and eyes.
3. (26) Macropterous forms.

4. (15) Larger, over 2·5 mm. long.
5. (6) Head and eyes more than $2\frac{1}{2}$ times as wide as synthlipsis
hessei n. sp. (S.W.A.).
6 (5) Head and eyes not more than $2\frac{1}{2}$ times as wide as synthlipsis.
7. (10) Pronotum sparsely and finely pubescent.
8. (9) Left clasper of ♂ with a smooth terminal flange *scutellaris* Stål (S. Africa).
9. (8) Left clasper of ♂ with a toothed terminal flange
perdita n. sp. (N. Transvaal).
10. (7) Pronotum not pubescent on disc.
11. (12) Posterior margin of pronotum pubescent
druryana n. sp. (Upper Zambesi and Linyanti Rivers).
12. (11) Posterior margin of pronotum not pubescent.
13. (14) Pronotum wider than head and eyes . . *winifreda* n. sp. (W. Cape).
14. (13) Pronotum narrower than head and eyes . *gorogaiqua* n. sp. (Cape).
15. (4) Smaller, not exceeding 2·5 mm. long.
16. (23) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ well developed.
17. (18) Pronotum 3·5–4 times as wide as long *monomatapae* n. sp. (S. Rhodesia).
18. (17) Pronotum less than 3·5 times as wide as long.
19. (20) Left clasper of ♂ a regular flattened triangular plate (Plate XXXVI, fig. 2*c*) . . . . . *uvarovi* Jacz. (Natal, S. Rhodesia).
20. (19) Left clasper not as above.
21. (22) Free portion of 7th abdominal tergite of ♂ with a concave posterior border (Plate XXXV, fig. 4*a*)
browni n. sp. (W. Transvaal, S. Rhodesia, S.W.A.).
22. (21) Free portion of 7th abdominal tergite of ♂ gradually narrowed posteriorly, the inner angle obsolete (Plate XXXV, fig. 7*a*)
bleekiana n. sp. (Linyanti River, S. Rhodesia, N. Transvaal).
23. (16) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ obsolete or absent.
24. (25) Left clasper of ♂ styliform, membranous apically (Plate XXXVI, fig. 3*b*)
piccanin n. sp. (S. Africa).
25. (24) Left clasper of ♂ sigmoid, chitinous throughout (Plate XXXVI, fig. 4*b*)
youngiana n. sp. (E. Transvaal).
26. (3) Brachypterous forms.
27. (34) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ well developed.
28. (31) Smaller species, under 2 mm. long.
29. (30) Left clasper of ♂ short, denticulate and slightly sigmoid apically (Plate XXXV, fig. 5*b*) . *quewalepele* n. sp. (Linyanti River, Caprivi Strip).
30. (29) Left clasper of ♂ sigmoid, not denticulate (Plate XXXV, fig. 6*b*)
simillima n. sp. (Linyanti River, S. Rhodesia).
31. (28) Larger species, 2·0–2·5 mm. long.
32. (33) Elytra mottled, dark greyish-brown, and stramineous. Left clasper of ♂ styliform, denticulate . . . *butleriana* n. sp. (E. Cape).
33 (32) Elytra not mottled. Left clasper of ♂ auriculate
citharistia n. sp. (E. Cape, O.F.S., S. Transvaal).
34. (27) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ obsolete or absent . . . . . *piccanin* n. sp. (S. Africa).

1. *Micronecta scutellaris* (Stål).

Sigara scutellaris Stål, 1858, Oefv. Vet. Ak. Förh., p. 319.
Micronecta signoreti Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, p. 102, *nec* Reut.
,, *thomaseti* Jaczewski, 1927, Ann. Mag. Nat. Hist., (9), xx, p. 443.

Head pale yellow or yellow-brown with a dark or reddish-brown longitudinal stripe not reaching back to the posterior margin and two spots on the vertex nearer the eyes than the centre of the latter, all these markings obsolete in some specimens ; pronotum greyish-brown ; scutellum light greyish-brown ; elytra greyish ; base of clavus greyish ochreous, remainder of clavus with traces of a darker inset border ; corium with very faint confluent longitudinal darker lines ; intermediate leg yellow ; apex of tarsus concolorous or very slightly darkened.

Head subequal in width to pronotum, sometimes slightly narrower, sometimes slightly broader, and from $2\frac{1}{5}$ to nearly $2\frac{1}{2}$ times as wide as the synthlipsis. Pronotum rather shorter than head, about 3 times as wide as long, finely and sparingly pubescent throughout, slightly rugose, posterior border convex.

Scutellum rather more than $\frac{1}{2}$ as long as pronotum.

Macropterous. Line from internal angle of right corium on to membrane slightly sigmoid. Subcostal furrow $\frac{3}{4}$ of length of elytron.

Intermediate leg with tarsus about $\frac{1}{2}$ as long again as claws, which are slightly longer than tibia.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous lobe, a well-developed inner lobe, and a concave margin between them. (Plate XXXIV, fig. 1*a*.)

Right clasper with a slender shaft slightly dilated basally. (Plate XXXIV, fig. 1*b*.)

Left clasper flattened, slightly bent, flanged apically, the flange untoothed save for the base of its outer margin. (Plate XXXIV, fig. 1*c*.)

Length : ♂, 3·4–3·8 mm.
♀, 3·7–4·5 mm.

Cape.

Bergvliet, Cape Flats, 3, i, 1926 (G.E.P.).
Princess Vlei, Cape Flats, 12, ix, 1926 (L.M.S.).
Lakeside Vlei, Cape Flats, 19, i, 1927 (G.E.H.).
Zeekoe Vlei, Cape Flats, 24, iv, 1927 (L.M.S.).

Swellendam, 24, xi, 1925 (G.E.P.).
Oudtshoorn and district, 24, xii, 1926 (G.E.H.).
Brackenhill Sta., Knysna Forest, 22, xii, 1926 (G.E.H.).
Prince Albert Road, 1916 (Haughton, S.A.M.).
Potfontein, 3, iv, 1927 (L.M.S.).
Kimberley, 1, vi, 1912 (Power, S.A.M.).
Grootfontein (Purcell, S.A.M.).
Riemvastmak, Gordonia, vii, 1925 (Barnard, S.A.M.).
Avontuur, 6, i, 1927 (G.E.H.),
Assegaibosch, Humansdorp div., 13, i, 1927 (L.M.S.).
Wittelsbosch, Humansdorp div., 9, i, 1927 (G.E.H.).
Port Elizabeth, Baakens River, 18, iii, 1926 (G.E.P.).
Alice, 23–24, ii, 1926 (G.E.P.).
Debe Nek, 2, iii, 1926 (G.E.P.).
East London, 1915 (Lightfoot, S.A.M.), 13–15, ii, 1926 (G.E.P.).
Stormberg, Albert dist., dam, 28, iv, 1928 (G.E.P.).
Dordrecht, Wodehouse dist., dam 2 miles east of, 30, iv, 1928 (G.E.P.).
Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).
Aliwal North, Radio Baths (*vide infra*, p. 465), 5–6, v, 1928 (G.E.P.).

Orange Free State.
Knoffelspruit, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

Transvaal.
Florida, 14, viii, 1926 (G.E.H.).
Wemmer Pan, Johannesburg, 31, vii, 1926 (G.E.H.).
Waterval Boven, 15, iv, 1927 (G.E.H.).

Natal.
Umhlali, i, 1913 (Barnard, S.A.M.).
Weenen (*M. thomaseti* Jacz.), xi, 1923 to i, 1924 (H. P. Thomaset, *fide* Jaczewski).

Southern Rhodesia.
Nyombi on Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
101 Mile Halt on Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
? ♀ Matopo Dam, 10, vii, 1927 (G.E.H.).
? ♀ ♀ Zimbabwe, 7, vii, 1927.

South-West Africa.
Kuisip River Territory (Stål *type*).

Outside our area I have examined specimens from Zomba (Cameron, 25, iv, 1900) in the University Museum of Zoology, Cambridge, kindly lent me by Dr. Hugh Scott. These Nyasaland *scutellaris* are all rather large (4–4½ mm.), while the Rhodesian series lack the larger specimens found in the Cape in many localities. Jaczewski has recorded this species under the name of *M. thomaseti* from Dakar, French Senegal, so it is probably widely distributed throughout Africa. The specimens recorded from Grootfontein, S.W.A., by Hesse (Ann. S.A.M., xxiii, p. 138) were taken, so Dr. Hesse tells me, at Grootfontein in Cape Province by Purcell, who never collected in South-West Africa. Hesse's other record is described under *M. hessei* n. sp. below.

This species is one of the commonest and most widely distributed water-bugs in South Africa. Like most species of the genus it is found chiefly on the muddy bottom of open shallow water either stagnant or slowly flowing.

This insect is clearly identical with *M. signoreti* Jacz., later redescribed as *M. thomaseti* Jacz. In the earlier paper Jaczewski figures the parameres, which agree with those of the present insect. I have no hesitation in ascribing the latter to *scutellaris* Stål on account of its size and of the three markings on the vertex (vertice saepissime fusco-trilineato . . . Long. 4½ mm.).

2. *Micronecta perdita* n. sp.

Head dirty yellow with three greyish longitudinal stripes, strongest anteriorly on the vertex, fading out posteriorly before reaching the margin, obsolete in some specimens; pronotum dull grey-brown, paler along posterior margin; elytra dull grey-brown; clavus with paler basal border concolorous with scutellum, remainder of clavus with traces of a darker inset border; corium with traces of four darker brown confluent longitudinal lines; intermediate legs pale yellow throughout.

Head very slightly narrower than the pronotum and not more than 2½ times as wide as the synthlipsis. Pronotum ½ as long again as head or longer, more than 2½–2⅔ times as wide as long, with a few faint transverse wrinkles, very finely pubescent, posterior margin convex.

Scutellum ½–⅗ times as long as pronotum. Macropterous; vein from internal angle of right corium on to membrane slightly sigmoid. Subcostal furrow nearly ½ of length of elytron. Intermediate leg

with tarsus just over $\frac{1}{2}$ as long again as the tibia; claws rather longer than the latter.

♂. Free portion of 7th abdominal tergite with a prominent outer setigerous angle, a prominent, though rounded, inner angle, and a concave posterior margin between them. (Plate XXXIV, fig. 2*a*.)

Right clasper slightly dilated proximal to the middle and before the apical bend. (Plate XXXIV, fig. 2*b*.)

Left clasper flattened, slightly bent, flanged apically, the flange bearing scale-like denticulations. (Plate XXXIV, fig. 2*c*.)

Length: ♂, 3·2 mm.
♀, 3·5 mm.

Transvaal.

2 ♂ ♂, 7 ♀ ♀ (*type*, *allotype*, and *paratypes*), Limpopo River, Main Drift, near Messina, pool in sandy bed of river, 28–29, v, 1927 (G.E.H.).

Very close to *M. scutellaris* but slightly smaller and with a toothed flange to the left clasper.

3. *Micronecta hessei* n. sp.

Micronecta scutellaris Hesse, 1925, Ann. S.Afr. M., xxiii, p. 138 (part).

Head greyish-yellow, with an indefinite longitudinal brown stripe on the vertex; pronotum grey-brown; elytra greyish; clavus pale basally, remainder of clavus with a faint irregular brown inset border; corium grey with indications of four broken longitudinal brown lines; intermediate leg pale throughout. Head very slightly wider than pronotum and rather more than $2\frac{1}{2}$ times as wide as synthlipsis. Pronotum about $1\frac{2}{5}$ times as long as head and rather under 3 times as wide as long, glabrous, very finely and sparsely punctured, posterior margin convex.

Scutellum rather more than $\frac{1}{2}$ as long as pronotum. Macropterous. Pale line from internal angle of right corium on to membrane, curved.

Intermediate leg with tarsus $1\frac{2}{3}$ times as long as tibia and just over $1\frac{1}{3}$ times as long as claws.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous angle, a prominent, though rounded, inner angle, and a concave posterior margin between them. (Plate XXXIV, fig. 3*a*.)

Right clasper very slightly dilated proximal to the middle of the shaft. (Plate XXXIV, fig. 3*b*.)

Left clasper flattened, slightly bent, flanged apically, the flange denticulate on the outer edge only. (Plate XXXIV, fig. 3*c*.)

Length : 3·0 mm.

South-West Africa.

♂ (*type*), Kambele Falls, on Kunene River, March 1923 (S.A.M., Mus. Exp.). The single specimen on which this species is based is one of four originally mounted on one card and referred to *scutellaris* by Hesse. *M. hessei* may be at once recognised by its narrow synthlipsis. This structure is wide in the three ♀ specimens with which it was associated, and they look superficially like small specimens of *scutellaris* (l. 3 mm.), with unicolorous elytra. It is possible that ♂ specimens would indicate that they are referable to an undescribed species.

4. *Micronecta gorogaiqua* n. sp.

Head brownish-yellow, with a central longitudinal stripe of tawny brown. Pronotum grey-brown, paler posteriorly. Elytra grey-brown, base of clavus yellowish-brown, remainder of clavus and corium with obscure darker mottlings. Intermediate leg dark yellow, apex of tarsus and base of claw dark brown.

Head slightly wider than the pronotum and $2\frac{1}{4}$–$2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum slightly longer than the head, about 3–$3\frac{1}{2}$ times as wide as long, finely rugose, glabrous ; anterior and posterior margins evenly and equally convex.

Scutellum about $\frac{5}{8}$ times as long as the pronotum. Macropterous. Pale line from inner angle of right corium on to membrane nearly straight. Subcostal furrow $\frac{1}{9}$ of length of elytron.

Intermediate leg with tarsus $\frac{1}{2}$ as long again as tibia, or slightly more ; claw a little longer than the latter.

♂. Free portion of the 7th abdominal tergite with a very prominent outer setigerous angle, a rounded inner angle, and an emarginate posterior border between them. (Plate XXXIV, fig. 4*a*.)

Right clasper strongly curved and somewhat flanged in the region of the curvature. (Plate XXXIV, fig. 4*b*.)

Left clasper with a short shaft which is slightly twisted and denticulate apically. (Plate XXXIV, fig. 4*c*.)

Length : 2·7 mm.

Cape.

♂, Durbanville, Cape Flats, 30, iv, 1927 (L.M.S.).

♂, Paarl, Mountain Reservoir, 22, x, 1927 (L.M.S.).

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Oudtshoorn, 28, xii, 1927.

Orange Free State.

♀, Knoffelspruit, Rouxville div., pool in stream, 8, v, 1928 (G.E.P.).

3 ♀ ♀, Diep Kloof, Rouxville div., pool in stream, 9, v, 1928 (G.E.P.).

The specimens from the Orange Free State are rather dark; no ♂ is available, but the identification is fairly certain.

Three specimens from Portuguese East Africa (Magude, C. J. Swierstra, T.M.) belong to a species which might run down to *gorogaiqua* in the key. The head is as wide as, or a little wider than, the pronotum, and about $2\frac{1}{8}$ times as wide as the rather wide synthlipsis; the intermediate legs are entirely yellow. In general *facies* this insect is perhaps nearer *winifreda* or *druryana* than the present species, but it is undoubtedly distinct from any *Micronecta* that I have seen. The absence of a ♂ specimen compels me reluctantly to leave it, the only member of its genus known from that part of Africa, undescribed.

5. *Micronecta winifreda* n. sp.

Head yellow with an orange or greyish clouding on the vertex, and variable indications of orange longitudinal stripes internal to the eyes.

Pronotum grey-brown, scutellum grey-brown, latero-apically paler. Elytra grey-brown, base of clavus greyish-yellow, remainder of clavus with traces of darker inset border, corium with traces of three darker longitudinal lines. Intermediate leg pale or orange yellow, apex of tarsus and base of claw grey or dark brown.

Head narrower than the pronotum and $2\frac{1}{6}$–$2\frac{1}{3}$ as wide as the synthlipsis.

Pronotum $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as head and $2\frac{1}{2}$–$2\frac{3}{4}$ times as wide as long, glabrous, slightly transversely rugose, posterior margin less convex than anterior and often flattened centrally.

Scutellum rather more than $\frac{1}{2}$ as long as pronotum. Macropterous. Pale line from internal angle of right corium on to membrane almost straight. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Intermediate leg with tibia and claw subequal, and tarsus about $1\frac{1}{4}$ times as long as the latter.

♂. Free portion of 7th abdominal tergite with a sub-prominent outer

setigerous angle, a fairly well-defined rounded inner angle, and a slightly concave posterior border between them. (Plate XXXIV, fig. 5*a*.)

Right clasper rather broad distally. (Plate XXXIV, fig. 5*b*.)

Left clasper styliform, dilated and membranous apically. (Plate XXXIV, fig. 5*c*.)

Length : 2·3–3 mm.

Cape.

♂, ♀ ♀, Durbanville, Cape Flats, 30, iv, 1927 (L.M.S.).

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Swellendam, 16, xii, 1926 (G.E.H.).

3 ♀ ♀, Doorns River, between Oudtshoorn and Montagu Pass, 24, xi, 1925 (G.E.P.).

♂, Oudtshoorn Dam, 28, xii, 1926 (G.E.H.).

♀, River above Schoeman's Hoek, Oudtshoorn, 29, xii, 1926 (G.E.H.).

6. *Micronecta druryana* n. sp.

Head dark greyish-yellow, with a central brown stripe not reaching back to its posterior margin and two indefinite brown spots on the vertex, which may be continued up on to the head as tawny stripes ; in some specimens these markings are very indistinct. Pronotum pitchy brown, paler marginally ; scutellum and elytra pitchy brown, basal margin of clavus paler, corium with traces of darker bands. Intermediate leg yellow, very slightly and gradually darkened towards the apex of the tarsus.

Head slightly narrower, or subequal in width to pronotum and just over twice as wide as synthlipsis (type 74 : 35).

Pronotum rather less than twice as long as head, just over $2\frac{1}{2}$ times as wide as long, faintly and irregularly transversely rastrate, glabrous save the convex posterior margin, which is finely pubescent. Scutellum $\frac{3}{5}$–$\frac{2}{3}$ as long as pronotum.

Macropterous. Pale line from inner angle of right corium on to membrane very slightly sigmoid ; subcostal furrow about $\frac{5}{11}$ of length of elytron.

Intermediate leg with the tarsus from just over $1\frac{1}{2}$ to nearly twice as long as tibia, which is rather shorter to rather longer than claws.

♂. Free portion of the 7th abdominal tergite with a prominent setigerous outer angle, a rounded inner angle, and a slightly concave posterior border between them. (Plate XXXIV, fig. 6*a*.)

Right clasper markedly dilated in the basal half of the shaft and less so apically, with a well-defined narrowing between the dilations. (Plate XXXIV, fig. 6*b*.)

Left clasper styliform, somewhat dilated, and with scale-like denticulations apically. (Plate XXXIV, fig. 6*c*.)

Length : ♂, 3·0 mm.
♀, 3·2 mm.

Northern Rhodesia.

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Katombora, backwater of Zambesi, 14, vii, 1927 (G.E.H.).

Bechuanaland Protectorate.

♂ ♂, ♀ ♀, Kazungula, mouth of Linyanti River, 14, vii, 1927 (G.E.H.).

♂ ♂, ♀ ♀, Sailodelo, above Kabulabula, Linyanti River, 14, vii, 1927 (G.E.H.).

This species is probably common throughout the Linyanti and Upper Zambesi River systems, and is named in honour of Mr. and Mrs. Drury of Kasane.

7. *Micronecta dorothea* n. sp.

Head dirty greenish- or greyish-yellow, with a darker spot on the vertex, which may be obsolete or may be slightly produced backwards as a stripe ; pronotum very dark greyish-brown, posterior margin and scutellum paler ; elytra dark greyish-brown, base of clavus concolorous with scutellum, corium with faint indications of longitudinal blotches ; intermediate legs greyish or brownish-yellow, femur paler, tarsus not darkened apically.

Head and eyes wider than pronotum and just over $1\frac{3}{4}$ times as wide as the synthlipsis.

Pronotum rather shorter than the head and just under $3\frac{1}{2}$ times as wide as long, slightly rugose, disc glabrous, posterior border convex with very short pubescence.

Scutellum rather more than $\frac{1}{2}$ as long again as pronotum.

Macropterous, Pale vein from the inner angle of the right corium on to the membrane sigmoid. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Intermediate leg with the claw and tibia subequal, and the tarsus $1\frac{1}{2}$–$1\frac{3}{4}$ times as long as the latter.

♂. Free lobe of 7th abdominal segment with definite setigerous and

inner angles both slightly rounded, and with a convex posterior border between them. (Plate XXXV, fig. 1*a*.)

Right clasper slightly dilated before the middle and gradually narrowed throughout the bend. (Plate XXXV, fig. 1*b*.)

Left clasper styliform, flattened, somewhat dilated apically on the outside, and with small denticulations on the distal half. (Plate XXXV, fig. 1*c*.)

Length : 3 mm.

Transvaal.

Randfontein (*type*, *allotype*, and *paratypes*), dam, 8, viii, 1926, and 8, v, 1927 (G.E.H.).

Florida, near Johannesburg, 14, viii, 1926 (G.E.H.).

Birchleigh, dam, in *Potamogeton*, 28, iv, 1928 (G.E.H.).

" Pan 2," Lake Banagher, near Lake Chrissie, 8, v, 1928 (G.E.H.).

8. *Micronecta butleriana* n. sp.

Head yellow, irregularly blotched with orange. Pronotum dark grey-brown, paler centrally. Elytra dark greyish-brown with a broad band along the basal margin of the clavus, the base of the corium and an indefinite area on the membrane pale stramineous, covered with fine hairs, which are in general dark on the dark regions, pale on the pale. Intermediate leg yellow, apex of tarsus and base of claw darkened.

Head slightly wider than the pronotum and about $2\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum $\frac{2}{3}$ or less as long as the head, rather over $4\frac{1}{2}$ times as wide as long, glabrous, slightly rugose longitudinally, posterior margin slightly thickened, almost straight or very slightly convex.

Scutellum subequal in length to pronotum.

Brachypterous. Wing reaching just beyond middle of the elytra. Pale line from internal angle of right corium on to membrane, straight, confluent with margin of reduced membrane basally. Subcostal furrow $\frac{4}{5}$ of length of elytron.

Intermediate leg with tibia and claw subequal, tarsus just under $\frac{1}{2}$ as long again as either.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous angle, a rounded inner angle, and an emarginate posterior border between them. (Plate XXXV, fig. 2*a*.)

Right clasper a very little dilated and slightly and evenly bent subapically. (Plate XXXV, fig. 2*b*.)

Left clasper styliform, somewhat dilated apically, with scale-like denticulations in the distal half. (Plate XXXV, fig. 2*c*.)

Length : 2·0–2·5 mm.

Cape.

Alice, Tyumie River, 24, iii, 1926 (G.E.P.).

Howieson's Poort, near Grahamstown, 13, iii, 1926 (G.E.P.).

Debe Nek (*type*, *allotype*, and *paratypes*), stream in forest, near Mnqesha, 14, ii, 1926 (G.E.P.).

East London, reservoir, pools " 1 and 2," Westbank (G.E.P.).

This species is distinguished at once superficially by its piebald appearance, and is nearly always larger than the variegated forms of *M. piccanin*. It is named in honour of the late E. A. Butler, my master in hemipterology.

The specimens from " pool 1," East London, are smaller and paler than any others, and present a curious contrast when compared with those from " pool 2." No sharp distinction, however, can be made out, and the genitalia show that there is but a single species involved. The two pools appeared to be identical except in size, " 2 " being larger, and no environmental influences were obvious that might account for the differences. (Notebook, G.E.P.).

9. *Micronecta monomatapae* n. sp.

Head yellow, with a faint longitudinal median tawny stripe. Pronotum dark grey-brown with paler margins, at least posteriorly. Elytra grey-brown with pale pubescence, base of clavus paler, corium with traces of darker mottling. Intermediate leg yellow, apex of tarsus darkened.

Head slightly wider than the pronotum and just under $2\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum subequal in length to head, $3\frac{1}{2}$–4 times as wide as long, very finely rugose, posterior border slightly convex. Scutellum somewhat shorter than pronotum.

Macropterous. Pale line from the inner angle of the right corium on to the membrane almost straight. Subcostal furrow just over $\frac{1}{2}$ as long as elytron.

Intermediate leg with tarsus $\frac{1}{2}$ as long again as tibia, claw slightly shorter than the latter.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous angle, a less well-marked inner angle, and a very

slightly concave posterior border between them. (Plate XXXV, fig. 3*a*.)

Right clasper not conspicuously dilated nor constricted, except apically. (Plate XXXV, fig. 3*b*.)

Left clasper styliform, straight, with scale-like denticulations apically. (Plate XXXV, fig. 3*c*.)

Length : 1·9–2·0 mm.

Southern Rhodesia.

3 ♂ ♂ (*type, paratypes*), Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

2 ♂ ♂, Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

The Salisbury specimens differ from the typical series described above in having slightly longer heads.

10. *Micronecta browni* n. sp.

Pale greyish-brown, head yellowish or yellow with a slight trace of a darker or orange longitudinal stripe. Elytra with basal margin of clavus pale, remainder of clavus with a faintly indicated brown inset border, corium with about three faint brown longitudinal stripes, tending to coalesce anteriorly, and obsolete in some specimens.

Intermediate leg yellowish, concolorous throughout.

Head and eyes slightly narrower than the pronotum and about $2\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum subequal to, to $\frac{1}{2}$ as long again as head, and from just over $2\frac{2}{3}$–3 times as wide as long, convex, glabrous, posterior margin as convex as the anterior.

Scutellum slightly more than $\frac{1}{2}$ as long as the pronotum.

Macropterous. Pale line from inner angle of right corium on to membrane straight. Subcostal furrow about $\frac{2}{7}$ of length of elytron.

Intermediate leg with tibia and claws subequal, tarsus $\frac{1}{2}$ as long again as either.

♂. Free portion of 7th abdominal tergite with a well-marked setigerous outer angle, a less well-marked inner angle, and a slightly concave posterior border between them. (Plate XXXV, fig. 4*a*.)

Right clasper narrow, pointed, slightly dilated subapically. (Plate XXXV, fig. 4*b*.)

Left clasper styliform, with a scoop-like bend subapically, distal end with fine denticulations. (Plate XXXV, fig. 4*c*.)

Length : 2–2·5 mm.

Transvaal.

♂ ♂, ♀ ♀, Barberspan, common at edge of pan, 6, iv, 1928 (G.E.H.).

South-West Africa.

4 ♂ ♂, 5 ♀ ♀ (*type*, *allotype*, and *paratypes*), Kalkfontein, Gr. Namaqualand, April 1924 (J. S. Brown, S.A.M.).

1 ♂, 2 ♀ ♀, Asab, Gr. Namaqualand, 1924 (J. S. Brown, S.A.M.).

Southern Rhodesia.

Matopo Dam, near Bulawayo, 10, vii, 1927 (G.E.H.).

Khami River, below ruins near Bulawayo, 10, vii, 1927 (G.E.H.).

This species is easily recognised by the sigmoid apical part of the left clasper, which in sublateral view is often more pronounced than in the figure. Externally it cannot be separated from macropterous *piccanin*.

11. *Micronecta quewalepele* n. sp.

Head dull yellowish, with a central dark elongate spot on the vertex and faint brown spots just inside each eye. Pronotum grey-brown; base of clavus paler, remainder of clavus with traces of a dark inset border; corium with faint confluent longitudinal darker lines. Intermediate leg pale yellow with apex of tarsus slightly darkened.

Head very slightly wider than pronotum and $2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum very slightly longer than head and about $3\frac{2}{3}$ times as wide as long, finely transversely rugose, with scattered pubescence best marked on the posterior margin, which is convex.

Scutellum rather shorter than pronotum.

Brachypterous. Wings shred-like, reaching to beyond the middle of the elytra. Pale line from internal angle of right corium on to membrane nearly straight. Subcostal furrow $\frac{5}{1\frac{1}{2}}$ of length of elytron.

Intermediate leg with tarsus just under twice as long as tibia, which is rather shorter than claws.

♂. Free portion of 7th abdominal tergite with very rounded angles and an indefinite concave border between them. (Plate XXXV, fig. 5*a*.)

Right clasper narrowed in its middle and somewhat dilated in its distal part. (Plate XXXV, fig. 5*b*.)

Left clasper substyliform, wide, with scale-like denticulations in the distal half, tip rather suddenly bent. (Plate XXXV, fig. 5*c*.)

Length: 1·7 mm.

Caprivi Strip.

1 ♂ (*type*), Linyanti River, between Kasane and Kabulabula, 14, vii, 1927 (G.E.H.).

Taken with *M. simillima* and a single ♂ of *M. bleekiana* in the shallow region at the edge of the river.

12. *Micronecta simillima* n. sp.

Head dirty yellowish-grey with a darker median, and two fainter lateral stripes just internal to each eye. Pronotum grey-brown, basal margin of clavus paler, remainder of clavus with traces of a dark inset border, corium with irregular indications of dark longitudinal lines.

Intermediate leg very pale yellow with faint traces of darkening at the apex of the tarsus.

Head very slightly wider than pronotum and $2\frac{2}{3}$ times as wide as the synthlipsis.

Pronotum slightly longer than head, $2\frac{1}{2}$ times as wide as long, finely transversely rugose, with scattered pubescence, posterior margin convex.

Scutellum about $\frac{1}{2}$ as long as pronotum.

Brachypterous. Pale line from internal angle of right corium on to membrane, short, almost straight. Subcostal furrow about $\frac{5}{11}$ of length of elytron.

Intermediate leg with tarsus rather less than twice as long as tibia, the latter rather shorter than claws.

♂. Free portion of 7th abdominal tergite with a prominent setigerous outer angle, a rounded and rather feeble inner angle, and a slightly concave posterior border between them. (Plate XXXV, fig. 6*a*.)

Right clasper with a flange-like dilation in the proximal two-thirds. (Plate XXXV, fig. 6*b*.)

Left clasper substyliform, apex markedly sigmoid, broad, form of tip somewhat variable. (Plate XXXV, fig. 6*c*.)

Length : 1·7 mm.

Caprivi Strip.

♂ (*type*), Linyanti River, between Kasane and Kabulabula, 14, vii, 1927 (G.E.H.).

Southern Rhodesia.

3 ♂ ♂, Khami River, below ruins near Bulawayo, 21, vi, 1927 (G.E.H.).

The type was taken with the type of *M. quewalepele*, a single ♂ of *M. bleekiana*, and four ♀ ♀. The latter, which from their size might belong to either of the two former, are almost certainly referable to *simillima*, with which they agree in the width of the synthlipsis. The pronota in these specimens are $2\frac{6}{7}$–3 times as wide as long, *i.e.* intermediate between the types of *simillima* and *quewalepele*. Both these characters are probably variable, and it is dangerous to attempt to name females in mixed series, or to attempt a separation of such from *M. piccanin* f. *piccanin*.

13. *Micronecta bleekiana* n. sp.

Head pale greyish-yellow with an indefinite tawny stripe on the vertex, or with a brown stripe and two tawny patches just within the eyes; pronotum and elytra light brownish-grey; the posterior margin of the former pale, clavus with an anterior pale margin, remainder with traces of a darker inset border, corium with indications of four confluent longitudinal darker bands; intermediate leg pale yellow; tip of tarsus and base of claw greyish.

Head slightly narrower than the pronotum and rather under $2\frac{1}{2}$ times as wide as the synthlipsis (type 51 : 22).

Pronotum about $2\frac{1}{2}$ times as wide as long, distinctly longer than the head, very minutely rugose, slightly and very finely pubescent, posterior margin convex.

Scutellum about $\frac{1}{2}$ as long as the pronotum.

Macropterous. Pale line from internal angle of right corium on to membrane almost straight. Subcostal furrow about $\frac{5}{11}$ of length of elytron.

Intermediate leg with tarsus $\frac{1}{2}$ as long again as tibia or rather less, claw a little shorter than the latter.

♂. Free portion of 7th abdominal segment gradually narrowed posteriorly towards the setigerous lobe with very little indication of an internal angle. (Plate XXXV, fig. 7*a*.)

Right clasper very slightly dilated in the basal part of the shaft. (Plate XXXV, fig. 7*b*.)

Left clasper somewhat flattened basally, slightly bent and grooved apically, the distal half ornamented with small scale-like denticulations. (Plate XXXV, fig. 7*c*.)

Length : 2·5 mm.

Caprivi Strip.

♂ (*type*), ♀♀ (*allotype* and 4 *paratypes*), vlei at Kabulabula, Linyanti River, 16, vii, 1927 (G.E.H.).

♂, Linyanti River, between Kasane and Kabulabula, 14, vii, 1927 (G.E.H.).

Southern Rhodesia.

♂, ♀♀, Drift over Hunyani River, near Salisbury, 3, vii, 1927 (G.E.H.).

♂♂, ♀♀, Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

Northern Transvaal.

♂♂, ♀♀, Limpopo River, Main Drift near Messina, 28, vi, 1927 (G.E.H.).

Named in honour of Miss D. F. Bleek, to whom I am indebted for much valuable information relating to the country of the Upper Zambesi.

14. *Micronecta citharistia* n. sp.

Head yellow with a longitudinal brown stripe, which is somewhat dilated on the vertex; pronotum grey-brown; elytra grey-brown, base of clavus paler, remainder of clavus with a faint and irregular inset darker border, corium with two obsolescent longitudinal lines anastomosing to form faint blotches basally, centrally, and apically, and a darker suffusion near the inner angle, all very faint; intermediate leg pale yellow, hardly, if at all, darker at the apex of the tarsus.

Head as wide as, or a little wider than, the pronotum and about $2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum slightly shorter than the head, 3–$3\frac{1}{2}$ times as wide as long, glabrous, slightly irregularly rugose, posterior margin convex.

Scutellum from $1\frac{1}{3}$–$1\frac{3}{4}$ times as long as pronotum.

Brachypterous. Wings reaching to about second third of abdomen; pale line from internal angle of right corium on to membrane practically straight. Subcostal furrow $\frac{5}{12}$ of length of elytron.

Intermediate leg with tarsus about $\frac{1}{2}$ as long again as the tibia and $1\frac{1}{4}$–$1\frac{1}{3}$ times as long as the claw.

♂. Free portion of 7th abdominal tergite with a well-marked outer setigerous angle, a very rounded inner angle, and no definite border between them. (Plate XXXVI, fig. 1*a*.)

Right clasper very slightly dilated beyond middle and very little bent. (Plate XXXVI, fig. 1*b*.)

Left clasper very broad and flattened, with well-developed basal lobes, apex minutely denticulate. (Plate XXXVI, fig. 1*c*.)

Orange Free State.

Knoffelspruit, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

Diep Kloof, Rouxville dist., pool in stream, 9, v, 1928 (G.E.P.).

Cape.

Pool in stream below Cango Caves, Oudtshoorn dist., 29, xii, 1926 (G.E.H.).

Teafontein, near Grahamstown, Sept. 1910 (Nurse A. M. Leppan).

Debe Nek, Mnqesha River, 2, iii, 1926 (G.E.P.).

Dordrecht, Wodehouse dist., dam 2 miles east of, 30, iv, 1928 (G.E.P.).

Transvaal.

(*Type*, *allotype*, and *paratypes*), Fonteinblaauw, near Johannesburg, 1, viii, 1926, and 9, iv, 1927 (G.E.H.).

Dunswart, Boksburg dist., 15, v, 1927.

The specimens from Teafontein are paler, have slightly longer heads, and a rather short, broad, external basal lobe on the left clasper. The occurrence of typical specimens at Debe Nek makes it unsafe to distinguish their form as a southern race.

My attention was first drawn to this species in the Klein Yokskei River at Fonteinblaauw by hearing its stridulation, which is similar to that of *Micronecta minutissima*.

15. *Micronecta uvarovi* Jacz.

Micronecta uvarovi Jaczewski, 1926, Ann. Mag. Nat. Hist. (9), xx, p. 494 (figs.).

Head yellow, with a central tawny stripe and two faint brownish spots just internal to each eye; pronotum greyish-brown, paler posteriorly; scutellum greyish-brown; elytra brownish-grey, anterior margin of clavus paler, remainder of clavus with traces of an inset border, corium with very faint linear dark markings; intermediate leg yellow, slightly darkened at apex of tarsus.

Head very slightly narrower than pronotum, just over $2\frac{1}{2}$ times as wide as synthlipsis.

Pronotum just under $\frac{1}{2}$ as long again as head and just over $2\frac{1}{2}$ times as wide as long, slightly flattened centrally, with indications of a faint longitudinal carina, minutely and irregularly rugose, finely pubescent, posterior margin convex.

Scutellum slightly shorter than head.

Macropterous. Pale line from internal angle of right corium on to membrane straight. Subcostal furrow $\frac{5}{11}$ of length of elytron.

Intermediate leg with tarsus about $1\frac{2}{3}$ times as long as tibia, which is slightly longer than claws.

♂. Free portion of 7th abdominal tergite with a well-defined rounded setigerous outer angle, a very rounded inner angle, and a short, indefinite, concave border between them. (Plate XXXVI, fig. 2*a*.)

Right clasper much dilated subapically. (Plate XXXVI, fig. 2*b*.)

Left clasper with shaft flat, subtriangular, apico-externally, with a few minute spines. (Plate XXXVI, fig. 2*c*.)

Length : 2·2 mm. (2·5 mm., *fide* Jaczewski).

Natal.

(*Type* and *paratypes*), Weenen, xi, 1923 to i, 1924 (Thomaset, *fide* Jaczewski).

Southern Rhodesia.

♂, Drift over Hunyani River near Salisbury, 3, vii, 1927 (G.E.H.).

My specimen was associated with three specimens of *M. bleekiana*, with which it might easily be confused superficially. The genitalia are very distinctive, and have allowed me to identify the Salisbury individual described above with Jaczewski's species, of which he has figured these organs.

16. *Micronecta piccanin* n. sp.

Brachypterous form.—Head pale yellow with a median longitudinal tawny line; pronotum grey-brown; scutellum yellowish-grey; elytra grey-brown, base of clavus yellowish-grey, corio-claval suture narrowly black, outer margin of membrane often darkened; intermediate leg pale yellow, apex of tarsus and base of claw slightly darkened; abdomen below yellowish-grey in ♀, dark except apically in ♂.

Head slightly wider than the pronotum and $2\frac{1}{4}$ times as wide as the synthlipsis.

Pronotum $3\frac{1}{3}$–$4\frac{1}{3}$ times as wide as long and about $\frac{2}{3}$ as long as the head, glabrous, slightly transversely wrinkled, posterior border very slightly convex.

Scutellum almost as long as pronotum.

Wing rudiments reaching to about the second third of the abdomen, pale line from inner angle of right corium on to membrane subobsolete. Subcostal furrow $\frac{2}{5}$ of length of elytron.

Intermediate leg with tarsus about twice as long as the tibia or a little less, claws from rather longer than tibia to $\frac{1}{2}$ as long again (type, 5 : 10 : 7·5).

♂. Free portion of 7th abdominal tergite with the outer setigerous angle obsolete, the posterior part being formed from the inner angle, which is rounded. (Plate XXXVI, fig. 3*a*.)

Right clasper with a flange-like dilation along the shaft, the apical part of which appears straight. (Plate XXXVI, fig. 3*b*.)

Left clasper styliform, apex membranous. (Plate XXXVI, fig. 3*c*.)

L. 1·7 mm.

Macropterous form.—Head about $\frac{3}{4}$ as long as pronotum, the latter about $2\frac{3}{4}$ times as wide as long. Membrane and wings fully developed ; pale line from internal angle of right corium on to the former slightly curved posteriorly. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Length : 2·2 mm.

This species is exceedingly variable in colour. The following names are proposed for colour forms.

form *piccanin*. (Plate XXXVI, fig. 5.)

The typical form has been described above—some slight departure from this coloration occurs in most series of individuals which must undoubtedly be considered as belonging to this form. Usually some individuals are found which have two linear spots on the corium more or less dark. These spots foreshadow the heavier black pigmentation of the forms *audax* and *perversa* described below. They occur in all the longer series mentioned below, save from Debe Nek. The Pirie Forest specimens are uniformly rather different from any others ; the ground colour of the elytra is pale, there are two spots on the clavus and several on the corium. Examination of material from Swellendam and Ceres suggests that the black spots tend to be better developed on the corium of macropterous than brachypterous specimens. None of these forms is sufficiently well marked to require varietal names.

The typical form seems to be absent from the Cape Peninsula and Flats. The most westerly specimen, recorded from Paarl below, has black on the corium, and is transitional to F. *audax*, with which it occurred.

Cape.

brachypt., Paarl, Mountain Reservoir, 22, xi, 1927 (L.M.S.).

brachypt., Du Toit's Kloof, 16, iv, 1927 (L.M.S.).

6 macr., 1 brachypt., Wolseley, Ceres Road, stream, 9, xii, 1926 (G.E.H.).
brachypt., Ceres, 9, xii, 1926 (G.E.H.).
3 macr., 8 brachypt., Swellendam, 16–17, xii, 1926 (G.E.H.).
brachypt., Oudtshoorn River, 28, xii, 1926 (G.E.H.).
brachypt., below Cango Caves, 29, xii, 1926 (G.E.H.).
brachypt., river above Schoeman's Hoek, 29, xii, 1926 (G.E.H.).
brachypt., Avontuur, 6, i, 1927 (G.E.H.).
brachypt., Assegaibosch, Kromme River, 8, i, 1927 (G.E.H.).
brachypt., Alice, 24, ii, 1926 (G.E.P.).
brachypt. (*type*, *allotype*, and *paratypes*), Debe Nek, stream in forest, 27, ii, 1927 (G.E.P.).
brachypt., Pirie Forest, second drift above dam, 19, ii, 1926 (G.E.P.).

Transvaal.

brachypt., Randfontein, 8, viii, 1926 (G.E.H.).
brachypt., Witpoortje, Krugersdorp div., 2, iv, 1927 (G.E.H.).
1 macr., Rivonia, near Johannesburg, 7, xi, 1926 (G.E.H.).
2 macr., 3 brachypt., Northumbria, near Johannesburg, 6, ii, 1927.
brachypt., Fonteinblaauw, near Johannesburg, 9, iv, 1927 (G.E.H.).
2 macr., 21 brachypt., Waterval Boven, river, 16, iv, 1927 (G.E.H.).
brachypt., Louis Trichardt, irrigation trench and dam, 21–24, v, 1927 (G.E.H.).
2 macr., Louis Trichardt, drift over stream, 26, v, 1927 (G.E.H.).

Natal.

1 brachypt., Ifafa, 26, x, 1926 (C. Ackerman, Natal Museum).

Southern Rhodesia.

brachypt., Zimbabwe, stream, 8, vii, 1927 (G.E.H.).

form *pardina* n. (Plate XXXVI, fig. 6.)

Clavus with small black spots, particularly in its anterior part; corium with black spots arranged roughly in four or five irregular rows, and partially confluent in some specimens.

Cape.

♂ ♂, ♀ ♀, brachypt., Durbanville Flats, 30, v, 1927 (L.M.S.).
♂, ♀ ♀, brachypt., Cape Flats (S.A.M.).
♀, macr. (*type*), Swellendam, dam near station, 16, xii, 1926 (G.E.H.).

form *tigrina* n. (Plate XXXVI, fig. 7.)

Sublateral parts of pronotum, a stripe on clavus along the corio-claval suture and three stripes on the corium black.

Cape.

♀, brachypt. (*type*), Alice, Tyumie River, 23, ii, 1926 (G.E.P.).

form *audax* n. (Plate XXXVII, fig. 1.)

Sublateral parts of pronotum, posterior angle of clavus, corio-claval suture, an elongate spot in the anterior angle of corium, two confluent spots on the corium, the outer one more anterior, and the membrane subapically, black.

Cape.

♂ ♂, ♀ ♀, brachypt., Kirstenbosch, pool in Nat. Botanic Garden, 5, ii, 1927 (L.M.S.).

♂, ♀, brachypt. (*type* and *allotype*), Grabouw, Palmiet River, 7, iv, 1926 (G.E.P.).

1 ♂, 2 ♀ ♀, Paarl, Mountain Reservoir, 22, x, 1927 (L.M.S.).

♀, brachypt., Ceres, 9, xii, 1926 (G.E.H.).

A single specimen from Zimbabwe has the heavy corial markings of the succeeding two forms, but the clavus has no basal black spot. The apical spot, however, is very diffuse, and covers the greater part of the clavus. The other specimens in the series are *piccanin*.

form *variegata* n. (Plate XXXVII, fig. 2.)

As *audax*, but with a black blotch at the base of the clavus as well as in its posterior angles. Corial markings confluent, solid, and heavier.

Cape.

♂ ♂, ♀ ♀, brachypt. (*type*, *allotype*, and *paratypes*), Swellendam.

2 ♂ ♂, 2 ♀ ♀, brachypt., George, Zwart River, 19, xii, 1926 (G.E.H.).

The specimens from George show partial confluence of the claval spots and are therefore transitional to *nigroclavata*.

form *nigroclavata* n. (Plate XXXVII, fig. 3.)

As *variegata*, but with clavus entirely black save a narrow line along the corio-claval suture.

Cape.

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Wittelsbosch, backwater of a river among Palmiet, 9, i, 1927 (G.E.H.).

♂ ♂, ♀ ♀, Assegaibosch, Kromme River, 8, i, 1927 (G.E.H.).

In the Wittelsbosch series three specimens among twenty-two are macropterous.

form *perversa* n. (Plate XXXVII, fig 4.)

Spot in posterior angle of clavus, corio-claval suture, a short line just within the latter on the corium and an irregular inset triangular border to the remainder of the latter black.

Cape.

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Assegaibosch, Kromme River and Stream, 8–12, i, 1927.

A curious and very large brachypterous individual may be mentioned here. Though 2·5 mm. long it appears to belong to *piccanin*, its ♂ genitalia being quite characteristic. The corio-claval suture is markedly dark, and there is a black border to the rest of the internal as well as the external border of the corium ; the clavus is unmarked. Its colour pattern on the whole suggests an intermediate between *perversa* and typical *piccanin*, the markings of the corium are more peripheral than in the former (Debe Nek, stream in forest, 27, iii, 1926 (G.E.P.)).

It will be noted from the foregoing that a definite series of forms *audax*, *variegata*, and *nigroclavata* occur in the coastal region of the Cape Province along with typical *piccanin*, and that the darkest member of the series occurs in the east, while the least dark is found in the west. The other forms appear to be distributed sporadically, though *pardina* is apparently racial on the Cape Flats. This insect would probably lend itself to genetical research.

17. *Micronecta youngiana* n. sp.

Head dull yellow ; pronotum greyish-brown, paler marginally ; elytra grey-brown, base of clavus paler, apical angle of clavus with a faint darker cloud, external part of corium greyish-yellow with a dark cloud in the middle of the margin, disc of corium with two ill-defined, broad, linear, darker markings ; intermediate leg pale yellowish, apex of tarsus and claw brownish.

Head subequal in width to pronotum and just over twice as wide as the synthlipsis.

Pronotum $3\frac{1}{4}$–$3\frac{3}{4}$ times as wide as long and distinctly longer than head, glabrous, very faintly rugose, posterior margin very slightly convex.

Scutellum $\frac{1}{2}$–$\frac{2}{3}$ as long as pronotum.

Macropterous. Pale line from inner angle of right corium on to membrane slightly sigmoid. Subcostal furrow $\frac{2}{3}$ of length of elytron.

Intermediate leg with tibia subequal to, or a little longer than, the claws; tarsus twice as long as the latter or a little less.

♂. Free portion of 7th abdominal tergite with a very well-developed, acutely-rounded, internal angle, and an obsolete setigerous angle. (Plate XXXVI, fig. 4*a*.)

Right clasper very flattened. (Plate XXXVI, fig. 4*b*.)

Left clasper strongly sigmoid, chitinised throughout. (Plate XXXVI, fig. 4*c*.)

Transvaal.

2 ♂ ♂, 5 ♀ ♀, Waterval Boven, edge of river, 15, iv, 1927.

This species occurred with *M. piccanin* at one locality between the hotel and the waterfall. Collections of *piccanin* made at other spots along the river show no admixture with *youngiana*. The latter may be roughly separated in the field by its slightly more variegated coloration.

I have much pleasure in associating this species with my friend Mr. R. G. N. Young, who was present at its capture.

Subfam. Corixinae.

This subfamily includes moderate-sized or small species included in rather more than a dozen genera, of which but two are South African.

1. (2) Pronotum and elytra unicolorous.

Anterior femur with simple pubescence basally in both sexes. Strigil borne on a posterior projection of the 6th abdominal tergite, which overlaps the 8th . . . . . *Agraptocorixa* Kirk.

2. (1) Pronotum and elytra with black transverse markings. ♂ with a stridulatory area of modified hairs on the inside of the anterior femur. Strigil hardly overlapping the 7th abdominal tergite.

Sigara F.

Agraptocorixa Kirk.

Corixa (*Agraptocorixa*) Kirkaldy, 1898, Ann. Mus. Civ. Sto. Nat. Genov. (ii), xix, p. 144.

„ „ „ 1899, Entom., xxxii, p. 194.

Agraptocorixa Kirkaldy, 1906, Tr. Am. Ent. Soc., xxxii, p. 117.
,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 1, p. 18.
,, ,, 1926, *Ibid.*, v, ii, p. 94.
,, ,, 1927, Ann. Mag. Nat. Hist. (9), xx, p. 439.

Pronotum and elytra unicolorous. Pronotum lightly and irregularly rugose. Elytra neither rastrate nor punctate. Inner boundary of left membrane well defined. Posterior tarsi pale throughout. Anterior femur with a simple pubescent basal area in both sexes. Strigil present on a posterior projection of the right side of the 6th abdominal segment, overlapping the 8th tergite. Moderate to large species (6–11 mm. long).

This genus is recorded from Somaliland (*gestroi* Kirkaldy), Sudan (*dakarica* Jacz.), and French Senegal (*senegalensis* Jacz. and *dakarica* Jacz.) in Africa, from Madagascar (*impicta* Bergr.*), and from India, Java, and Sumatra in the Oriental Region (*hyalinipennis* F.). A single new species is found in Africa south of the Zambesi. For a further discussion of the genus, see Jaczewski (1926, *l.c.*, p. 94).†

Agraptocorixa swierstrai n. sp.

♂. Head yellowish, posterior dorsal margin dark brown. Notocephalon with a row of irregularly placed punctures along the inner margin of the eye running down into the face, and another row more central to this, which becomes irregular and obsolete on the face.

Face with a flattened area below and extending a little up between the eyes, covered with long, fine, pale hairs. (Plate XXXVII, fig. 5.)

Pronotum nearly twice as wide as long ; lateral angles acute, with a faint, low, longitudinal carina which does not reach the anterior margin ; greyish-yellow, without markings, lightly punctured with a vestiture of short sparsely-placed hairs, which are longer than the rest.

Scutellum just exposed behind the pronotum between the bases of the elytra, somewhat pubescent.

* Kirkaldy (Ann. Ent. Soc. Fr., 1899, p. 104) refers to *C. impicta* Bergroth *in litt.*, and states that it belongs to *Agraptocorixa*. I regret I am unable to find any description of this species, and suspect *impicta* to be a *nomen nudum*.

† Lundblad (Ark. för Zool., 20A, No. 6, 1928) has recently placed the Australian *Porocorixa* Hale as a synonym of *Agraptocorixa* Kirk. This renders my generic diagnosis partially invalid, as some of the Australian species do not exhibit the specialised posterior position of the strigil.

Elytra dark greyish-yellow, without markings, covered with a vestiture of short and conspicuous hairs.

Wings developed.

Anterior trochanter without a hair pencil; femur with inner surface pubescent in the proximal half, distal half with small spines which at the boundary of the pubescence are modified to form a short comb of about four spines, while two are enlarged at the apical end; external surface of femur pubescent except apically. Pala over twice as long as tibia, very flat, wide, and pointed, with a row of seventeen to twenty pegs; claw serrated basally. (Plate XXXVII, fig. 8.)

Intermediate legs with short spines, tarsus rather less than $\frac{1}{2}$ as long as tibia and about $\frac{3}{4}$ as long as the claw (type 61 : 34 : 43).

Posterior femur dorsally with a longitudinal band of spinous hairs near the inner margin in the distal part (Plate XXXVII, fig. 6); ventrally with proximal pubescent area, and distal non-pubescent area with short spines enlarged to form a spine row on the outer margin (Plate XXXVII, fig. 7); inner margin with a group of about four spines and a tuft of hairs subapically.

Strigil on the right-hand side, borne on a posterior projection of the 6th abdominal tergite, which reaches back and lies over part of the 8th tergite (Plate XXXVII, fig. 9); irregularly ovoid, with nine rows of plates (Plate XXXVII, fig. 10).

Right clasper broad, rather short, and styliform. (Plate XXXVII, fig. 12.)

Left clasper large and beak-shaped. (Plate XXXVII, fig. 13.)

♀ head as in ♂, but with hairy area not flattened.

Pala narrower and without pegs.

Xyphus very small and obtusely rounded (damaged by pinning in ♂ ♂). (Plate XXXVII, fig. 11.)

Length : 9–10 mm.

Portuguese East Africa.

2 ♂ ♂, 7 ♀ ♀ (*type*, *allotype*, and *paratypes*), Magude, 16, vii, 1915, C. J. Swierstra (T.M.).

This species would be determined as *A. senegalensis* in Jaczewski's key. From this species it differs only in the greater number of comb plates in the strigil (9 instead of 5). Both differ from *gestroi* Kirkaldy in having the intermediate claws longer than the tarsus. *A. dakarica* Jacz. is a much smaller species (l. 7 mm.) with obtuse lateral pronotal angles.

Sigara Fabr.

Sigara Fabricius, 1775, Systema Entomologiae, p. 691,
„ Schumacher, 1924, D. Ent. Zeit., 1924, p. 337.
„ Jaczewski, 1927, Ann. Zool. Mus. Pol. Hist. Nat., vi, 1, p. 39.
Arctocorisa Wallengren, 1894, Ent. Tidskv., p. 159.
Callicorixa Jaczewski, 1924, Ann. Zool. Mus. Pol. Hist. Nat., T. iii, Z. 1–2, p. 29.

Pronotum and elytra yellow and black or dark brown, marked in transverse stripes or irregular guttulations. Pronotum rastrate, elytra rastrate or smooth, never punctate.

Posterior tarsi usually pale throughout. Strigil, if present, on the right side of the 6th abdominal tergite of the ♂, and hardly, if at all, overlapping the 7th.

Medium-sized species, 5–10 mm. long.

The genus *Sigara* as now understood (Jaczewski, *l.c.*) has been divided into two subgenera by Jaczewski, one the typical *Sigara*, the other *Anticorixa* Jacz. (Ann. Zool. Mus. Pol. Hist. Nat., iii, 1–2, p. 76), containing certain Palaearctic species (*sahlbergi* Fieb., *linnaei* Fieb., *moesta* Fieb., etc.) which resemble *Corixa* in a number of characters, particularly the trapezoidal lateral lobes of the prothorax, and undoubtedly form a natural group. This same author sinks *Callicorixa* B.-W. in *Sigara* Fabr. Such a course is entirely justified by his discovery of a species, *S. jensen-haarupi*, from the Argentine (*l.c.*, vi, 3, p. 253), in which there is no strigil, but which is clearly, from the shape of its right paramere, more closely allied to the other Neotropical species than to the group of Palaearctic ones formerly placed in the separate genus *Callicorixa*. It is, however, possible that the latter should be retained as a subgeneric name for *S. praeusta* Fieb. and its allies. The same author has also arranged the remaining Palaearctic species in a number of groups, but none of the Ethiopian forms known to me belong to any of these. The very broad-toothed right parameres, moreover, suggest a much closer alliance between the African forms and those described by Jaczewski from South America (*l.c.*, vi, 1, p. 3 ; iii, 3, p. 251). There is a tendency among these Neotropical and Ethiopian species for the rastration to be obsolete over part or all of the elytra and pronotum.

Relatively few species of *Sigara* are known from the Ethiopian region, and but four have occurred in South Africa.

Key to the South African Species of Sigara (s.str.) Fabr.

1. (2) Pubescence on the distal part of the under surface of the posterior femur not reaching the centre of the latter in the mid-line *meridionalis* (Wallgr.).
2. (1) Pubescence on distal part of the under surface of the posterior femur reaching at least to the centre in the mid-line. Head not produced forward.
3. (4) Larger 6·5–7 mm. long. Pala of the ♂ darkened externally *sjöstedti* (Kirk.).
4. (3) Smaller 5–6 mm. long.
5. (6) Pronotum with eight pale transverse lines. Facial impression of the ♂ with a median tubercle on its upper border . . *contortuplicata* (Kirk.).
6. (5) Pronotum with seven pale transverse lines. Facial impression of ♂ without a tubercle . . . . . *ceres* n. sp.

1. *Sigara* (*S.*) *sjöstedti* (Kirk.).*

Arctocorisa sjöstedti Kirkaldy, 1910, Wiss. Erg. Schwed. Exp. Kilimandjaro, etc. II Gerridae, Corixidae, and Notonectidae, p. 12.

? *Corisa pectoralis* Fieber, 1851, Abh. Böhm. Ges. Wiss., v, p. 52.

Head yellow or brownish; pronotum black with about eight pale transverse lines, some of the first five usually divided, anastomosed, or broken; elytra black; clavus with entire yellow transverse lines anteriorly, the rest of its area, the corium, and the right membrane with very fragmented vermiculate yellow lines which are not arranged in longitudinal series, cuneus with a little dark marking, left membrane less strongly marked than right externo-basally, fading to milky interno-apically; thorax and abdomen below pale testaceous yellow, sometimes clouded with grey.

Head with vertex anteriorly obtusely rounded, posterior margin slightly produced backwards in the mid-dorsal line.

Pronotum about $1\frac{2}{3}$ times as wide as long, rounded posteriorly, lateral angles very obtuse, median longitudinal carina traceable through one-half to the whole of its length, rastrate.

Elytra with a vestiture of sparsely placed hairs; clavus but not corium rastrate.

Xyphus acute but rounded apically. (Plate XXXVIII, fig. 1*b*.)

Intermediate leg with the claw about $1\frac{1}{4}$ times as long as the tarsus, which is about $\frac{2}{3}$ as long as the tibia.

Posterior femur dorsally with a well-marked subtransverse row of hairs basally and a couple of small spines in the distal region; anterior margin with about four well-developed spines distally; posterior margin with a row of about four spines and long hairs subapically; ventrally with the pubescent proximal area reaching the

* Since the above was written, Lundblad (Ark. för Zool., 20A, No. 8, 1928) has published an exhaustive redescription of this species.

middle in the mid-line, with a few scattered spines near the posterior margin in the glabrous distal part. (Plate XXXIX, fig. 1*a* and *b*.)

♂. Facial impression moderate, extending up and slightly narrowed between the eyes, reaching to about ½ the length of the interocular space as seen from below ; anterior margin indefinite, without carina, tubercle, or thickening. (Plate XXXVIII, fig. 1*a*.)

Anterior trochanter without a hair pencil.

Pala somewhat arched, narrowed apically, with a curved row of about twenty-five teeth, posterior part blackened.

Strigil elongate with four to five rows of teeth. (Plate XXXVIII, fig. 1*c*.)

Right clasper with an irregular crest and ventrally toothed apex. (Plate XXXVIII, fig. 5.)

Length : 6·5–7 mm.

Cape.

Constantia Nek, 15, xi, 1926 (L.M.S.).
Lakeside Vlei, 19, i, 1927 (G.E.H.).
Grabouw, Palmiet River, 7, iv, 1926 (G.E.P.).
Wellington, pools, 15, v, 1927 (L.M.S.).
Wolseley, small stream, 5, xii, 1926 (G.E.H.).
Ceres, 5–6, xii, 1926 (G.E.H.).
Swellendam, 12, xii, 1926 (G.E.H.).
Oudtshoorn, river above Schoeman's Hoek, 29, xii, 1926 (G.E.H.).
Knysna, pond, 21, xii, 1926 (G.E.H.).
Parkers Sta., Knysna Forest, 22, xii, 1926 (G.E.H.).
Avontuur, pond, 6, i, 1927 (G.E.H.).
Wittelsbosch, Humansdorp div., 11, i, 1927 (G.E.H.).
Blaauwkrantz Valley, near Bathurst, 9, iii, 1926 (G.E.P.).
Pirie Mission, pool in stream bed, 2, iii, 1926 (G.E.P.).

Transvaal.

Randfontein, dam, 8, viii, 1926 (G.E.H.).
Witpoortje, Krugersdorp dist., 12, ix, 1926 (G.E.H.).
Waterval Boven, pool near river, 15, iv, 1927 (G.E.H.).
Lake Chrissie, pool in dried stream bed, 9, v, 1928 (G.E.H.).
Moordrift, Waterberg dist., ix, 1924 (G. van Dam, T.M.).
Plat River, Waterberg dist., 6–18, iv, 1905 (C. J. Swierstra, T.M.).
Limpopo River, pool in river bed, Main Drift near Messina, 28, v, 1927 (G.E.H.).

Southern Rhodesia.

Khami River, below ruins near Bulawayo, 27, vi, 1927 (G.E.H.).
Nyombi, on Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
Great Zimbabwe, 7, vii, 1927 (G.E.H.).

South African material appears to be indistinguishable from a series from Kampala, Uganda, sent to me by Mr. G. L. R. Hancock, which I have no hesitation in identifying with *Sigara* (*S.*) *sjöstedti* Kirk. The type came from the Kilimandjaro region. Fieber's *pectoralis* is described from a ♂ in the Berlin Museum and is probably conspecific, in which case the name has priority over *sjöstedti*. It is stated to have the body below an ochreous white with a black centre to the xyphus. This coloration I have never seen in *sjöstedti*, but *Sigara* is a notoriously variable genus. The palae in *pectoralis* are described in these words, "palis cultratis, basi non productis, dorso arcuatis, nigrofuscis," which answers tolerably well to those of *sjöstedti*. Fieber's figure of the pala, however, shows an elongate narrow structure unlike the face of that of any *Sigara* known to me, and I cannot help thinking that the drawing represents the organ edge on. Fieber's locality is "Promontorium Bonae Spei," an indefinite term; the type presumably still exists at Berlin,* and its examination would at once show if my suspected synonymy is correct.

2. *Sigara* (*S.*) *meridionalis* (Wallgr.).

Corisa meridionalis Wallengren, 1875, Defr. Ak. Vet. Förk., xxxiii, p. 136.

Head dark brown; pronotum black with seven to eight pale lines, the anterior ones tending to divide and anastomose; elytra black with yellow markings, clavus with yellow transverse markings, entire, anteriorly fragmented, and sometimes forming three longitudinal series posteriorly; corium with very fragmented yellow markings sometimes broken into four ill-defined longitudinal series, inner angle of corium black; suture of membrane narrowly brown, right membrane with fragmented vermiculate markings, left membrane paler, fading to yellowish interno-apically. Greyish-yellow below, base of abdomen darker. Pronotum $1\frac{4}{5}$ times as wide as long, posteriorly obtusely rounded; lateral angles subrectangular; carina conspicuous on the anterior fifth or quarter, just traceable posteriorly; rastrate.

Elytra with a conspicuous vestiture of sparsely placed hairs; clavus feebly but distinctly rastrate; corium not rastrate.

Intermediate tarsus about $\frac{5}{6}$ as long as the claws, which are slightly shorter than the tibia. Posterior femur dorsally with a few hairs

* Dr. Lundblad (*in litt.*) informs me that the type is lost but that the Fieberian collection contains *sjöstedti* from the Cape, collected "by Krebs . . . who collected *pectoralis* there." He agrees that the former species should be treated as a synonym of the latter.

basally and a row of about five spines distally near the posterior border ; anterior border with three spines in its distal half ; posterior border with a row of about four spines and long hairs subapically ; ventrally with proximal pubescent area not reaching the middle in the mid-line, area covered with spines except at its anterior margin. (Plate XXXIX, fig. 2.)

Xyphus subequilateral, apex obtusely rounded. (Plate XXXVIII, fig. 2*b*.)

♂. Head produced in front between the eyes as a rounded subacute prominence, about ½ as long as the median length of the notocephalon between the eyes ; slightly produced backward in the mid-dorsal line. (Plate XXXIX, fig. 5.)

Facial impression elongate ovoid ; extending almost to the anterior margin of the produced head and fairly deep, particularly in its anterior half ; with two slightly raised elongate areas in its posterior half ; anterior edge definite, but without tubercle or carina. (Plate XXXVIII, fig. 2*a*.)

Pala elongate cultrate, slightly bent upwards and downwards on either side of the mid-line, with a single row of about twenty-three pegs (Plate XXXIX, fig. 8). Anterior trochanter without a hair pencil.

Strigil ovoid, with four to five tooth rows. (Plate XXXVIII, fig. 2*c*.)

Right clasper suddenly dilated subapically, gradually and then suddenly constricted with a large tooth-like angle within the apex. (Plate XXXVIII, fig. 6.)

Length : ♂, 6–6·8 mm.
♀, 7–7·5 mm.

Cape.

Constantia Nek, 19, xi, 1926 (L.M.S.).

Lakeside Vlei, Cape Flats, 11, ix, 1926 ; 9, x, 1926 (L.M.S.) ; 19, i, 1927 (G.E.H.)

Princess Vlei, Cape Flats, 12, i, 1927 (G E H.).

Zeekoe Vlei, Cape Flats, weedy pool, 24, x, 1926 (L.M.S.).

Ronde Vlei, Cape Flats, 20, i, 1928 (G.E.H.).

Athlone, Cape Flats, pools near sewage farm, 9, iv, 1927 (L.M.S.)

Durbanville, Cape Flats, 30, iv, 1927 (G.E.H.).

Swellendam, dams, 16–17, xii, 1927 (G.E.H.).

George, dam, 26, xii, 1927 (G.E.H.).

Knysna, pond and slow stream, 20–21, xii, 1927 (G.E.H.).

Assegaibosch, dam, 13, i, 1927 (G.E.H.).

Kimberley, 1, vi, 1912 (S.A.M., Power).

Potfontein, 3, vi, 1927 (L.M.S.).
Klober, Setagoli dist., dam, i, 1927 (Miss B. P. Lamb).
Stormberg, Albert dist., dam, 28, iv, 1928 (G.E.P.).
Dordrecht, Wodehouse dist., 30, iv, 1928 (G.E.P.).
Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).

Orange Free State.
Orangia, Smithfield, 1910 (S.A.M., Kannemeyer).

Transvaal.
Christiana (Wallengren type).
Avenue, Boksburg dist., pan, 6, v, 1928 (G.E.H.).
Reitfontein, Boksburg dist., large pan, 27, iv, 1928 (G.E.H.).
Breyten, pan at Bothasrust, 27, ii, 1928 (G.E.H.).
Rooiplatt, Pretoria dist., 20–23, ii, 1920 (Dr. Breyer, T.M.).
Lake Chrissie, dead ♀ on shore, 25, ii, 1928 (G.E.H.); 1 ♀, shallow water, north end, 19, v, 1928 (G.E.P.).
Pan 3, Lake Banagher, near Lake Chrissie, Ermelo dist., 18, v, 1928 (G.E.H.).

This species appears to be confined to the western and central parts of South Africa. It is found living, as at Rondevlei and Pan 3, Lake Banagher, in waters far more salt than recorded for any other South African species. While the specimens from the former locality are normal, 2 ♂♂ and 2 ♀♀, from the latter pan, which is less salt, are very small (♂, 5·8 mm.; ♀, 6·1 mm.).

3. *Sigara* (*S.*) *contortuplicata* (Kirk.).

Corixa contortuplicata	Kirkaldy, 1908, Entom., 41, p. 15.
Corisa irrorata	Fieber, 1851, Abh. Böhm. Ges. Wiss., v, p. 52; *nec* H.S. 1850 (*fide* Kirkaldy).
,, ,,	Wallengren, 1875, Oefv. Ak. For., xxxiii, p. 135.

Arctocorisa hieroglyphica Hesse, 1925, Ann. S.Afr. M., xxiii, p. 137.

Head yellow to brown; pronotum black with eight pale lines slightly split, anastomosing, or broken; elytra with clavus black with yellow transverse lines, which are entire anteriorly and very fragmented posteriorly; corium with yellow fragmented vermiculate markings, the black breaks forming a longitudinal line near the internal angle, which is black; membrane suture very narrowly brownish, right membrane dark with vermiculate yellow markings, left membrane less dark in its externo-basal half, fading to milky in its interno-apical half.

Head obtusely rounded anteriorly, slightly but definitely produced backward in the mid-dorsal line.

Pronotum $1\frac{4}{5}$ times as wide as long, rounded posteriorly, lateral angles obtuse, median longitudinal carina well marked in the anterior third, hardly traceable posteriorly, rastrate.

Elytra with a vestiture of sparsely placed short hairs ; clavus with faint indications of rastration, which is absent from the corium.

Xyphus subequilateral and somewhat rounded apically. (Plate XXXVIII, fig. 3*b*.)

Intermediate leg with tarsus rather shorter than the claws, which are rather shorter than the tibia.

Posterior femur dorsally with a little pubescence in the anterior part of its base and with a row of about seven short spines near the posterior border distally ; anterior border with three spines distally ; posterior border with a row of about four spines and long hairs subapically ; ventrally with proximal pubescent area reaching the middle in the mid-line and with scattered spines distally that tend to form a median row. (Plate XXXIX, fig. 3.)

♂. Facial impression fairly deep, wide, extending up between the eyes with a small carinate tubercle in the middle of the anterior margin. (Plate XXXVIII, fig. 3, and Plate XXXIX, fig. 6.)

Pala cultrate, slightly bent forward about $\frac{1}{3}$ from the apex, with a single row of about twenty-two pegs. (Plate XXXIX, fig. 9.)

Anterior trochanter with a small pencil of elongate thickened hairs. (Plate XXXIX, fig. 11.)

Strigil irregularly subquadrate with four tooth rows. (Plate XXXVIII, fig. 3*c*.)

Right clasper irregularly semilunate with a subsidiary tooth within the apex. (Plate XXXVIII, fig. 7.)

Length : 5–6 mm.

The above description is based on Transvaal specimens. Fieber's type of *irrorata* must have been much paler, and was probably teneral. He describes the pronotum as having eight brown lines, and the general colour as white with brown markings. The only specimen which approaches this condition in the material before me is one from Henkries, Bushmanland, but the size, disposition of the markings, and locality, "Promontorium Bonae Spei," though somewhat vague, lead me to believe that the species here described is rightly named.

The colour is exceedingly variable. Some of my darkest specimens are from the Cape Flats. In a series from Crawford Vlei nearly all have the ground colour deep black and show a considerable reduction

of the dark yellow markings on the corium, while the yellow lines of the pronotum are about $\frac{1}{2}$ as wide as the dark intervening ones. Among several dark specimens from a pool near Princess Vlei is a single female in which the pale and dark bands of the pronotum are subequal in width, the ground colour dark brown, and the markings pale greyish-yellow. Similar though less marked extremes occur in a series from Swellendam. Variation in black pigmentation is found in many European species of *Corixidae*, and is probably due to environmental influences (Hutchinson, Hemiptera-Heteroptera, pt. i, Fauna of Wicken Fen, iii, Cambridge, 1926, pp. 249–251). The occurrence of extremes in the same series may be due to migration of certain individuals from one piece of water to another.

The specimen from South-West Africa recorded by Hesse as *hieroglyphica* is a teneral female, but appears to belong to this species. I know of no evidence that *A. hieroglyphica* Duf. occurs in Ethiopian Africa.

Cape.

Constantia Nek, 15, xi, 1927 (L.M.S.).
Princess Vlei, Cape Flats, 12, i, 1926 (G.E.P.).
Crawford Vlei, Cape Flats, 26, i, 1926 (G.E.P.).
Frazerdale, Mowbray, Cape Flats, 19, ix, 1927 (L.M.S.).
Durbanville, Cape Flats, 30, iv, 1927 (L.M.S.).
Du Toit's Kloof, 16, iv, 1927 (L.M.S.).
Wellington, ponds, 15, v, 1927 (L.M.S.).
Ceres, pond, 6, xii, 1927 (L.M.S.).
Swellendam, dams, 17, xii, 1927 (G.E.H.).
George, dams, 26, i, 1927 (G.E.H.).
Knysna, stream and pond, 20–24, xii, 1927 (G.E.H.).
Avontuur, pond, 6, i, 1927 (G.E.H.).
Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).
Alice, vlei at S.A.N.C. farm, 24, ii, 1927 (G.E.P.).
Pirie Mission, pool, 2, iii, 1926 (G.E.P.).
Kimberley, 1, vi, 1912 (S.A.M., Power).
Klober, Setagoli dist., dam, i, 1927 (Miss B. Lamb).
Henkries, Bushmanland, x, 1911 (S.A.M., Lightfoot).

Orange Free State.

Aliwal North, small dam on north bank of Orange River, Rouxville dist., 5, v, 1928 (G.E.P.).

Transvaal.

Christiana (Wallengren).

Koster, x, 1924 (G. van Dam, T.M.).

Randfontein, 2, iii, 1926 (G.E.H.).

Florida, 14, viii, 1926 (G.E.H.).

Wemmer Pan, near Johannesburg, 31, vii, 1926 (G.E.H.).

Rietfontein, Boksburg dist., 27, iv, 1928 (G.E.H.).

Avenue, Boksburg dist., pan, 6, v, 1928 (G.E.H.).

Moordrift, Waterberg dist., 1, x, 1924 (G. van Dam, T.M.).

Limpopo River, pool in bed, Main Drift near Messina, 28, v, 1927 (G.E.H.).

South-West Africa.

♀, Narelis, Damaraland (Hesse, *l.c.*).

This species appears to be confined to South Africa, where it is widely distributed.

4. *Sigara* (*S.*) *ceres* n. sp.

Pronotum brownish-black with seven pale transverse lines, the posterior one short and inconspicuous, entire, and with little or no branching or coalescence; elytra brownish-black, clavus with transverse yellow markings, which are entire in the anterior angle but very fragmented on the disc and posteriorly; corium with fragmented transverse pale lines, the dark breaks forming an indefinite longitudinal line near the outer margin and another near the internal angle, which is itself dark, the fragmentation otherwise irregular; cuneus dark with yellow markings, right membrane blackish-brown with vermiculate fragmented transverse yellow lines, left membrane in its external part like the right but paler, fading to milky white on the interno-apical lobe; thorax and abdomen beneath yellowish, abdomen of the male with greyish-black clouding, save on the margins of the segments.

Head obtusely rounded in front.

Pronotum about $1\frac{3}{5}$ times as broad as long, with the lateral angles obtusely rounded, the median longitudinal carina conspicuous anteriorly and just traceable throughout, rastrate.

Elytra not rastrate, with a sparse but conspicuous vestiture of short hairs.

Xyphus subequilateral, rounded apically. (Plate XXXVIII, fig. 4*b*.)

Intermediate leg with tibia and claws subequal, tarsus just over $\frac{5}{7}$ as long as the latter (♂, 17 : 12·5 : 17; ♀, 17 : 13·5 : 18).

Posterior femur dorsally, with a subtransverse row of hairs basally

and two small spines in the distal region ; anterior margin with three well-developed spines distally ; posterior region with a row of three spines and long hairs subapically ; ventrally with proximal pubescent area reaching well beyond the middle in the mid-line and with a few scattered spines in the glabrous distal region. (Plate XXXIX, fig. 4.)

Facial impression wide but not very deep, reaching up between the eyes, but without a knob or carina on its anterior margin. (Plate XXXVIII, fig. 4*a*.)

♂. Pala cultrate and slightly arched, with a single row of twenty-two pegs. (Plate XXXIX, fig. 10.)

Anterior trochanter without a hair pencil.

Strigil irregularly ovoid with six rows of plates. (Plate XXXVIII, fig. 4*c*.)

Right clasper dilated before the apex and with a very large tooth just below the dilation. (Plate XXXVIII, fig. 8.)

♀. Pala cultrate and slightly arched.

Length : ♂, 4·5 mm.

♀, 5·0 mm.

♂, ♀ (*type* and *allotype*), Laaken Vallei, Matroosberg, 3500 ft., Ceres div., i, 1917 (S.A.M., Lightfoot).

Superficially this species might be mistaken for *contortuplicata*, but beside the secondary sexual differences given above it is recognisable by its smaller size and seven pronotal lines. It appears to be a very local insect ; I was unable to find it either at Ceres or in the mountains west of Mitchell's Pass.

III.—ZOOGEOGRAPHY.

Though the two families which form the subject of this paper are relatively small and somewhat arbitrarily associated in its title, certain facts of interest emerge from a study of the distribution of their component species. For the purpose of such a study we may group these species as follows :—

1. *Pan-Ethiopian.*

Species occurring throughout the whole of South Africa and also known and probably widespread in Central Africa.

Enithares sobria Stål.

Anisops (*A.*) *varia* Fieb.

Plea pullula Stål.
Micronecta scutellaris Stål.
Micronecta piccanin n. sp.*
Sigara (*S.*) *sjöstedti* Kirk.

2. *Central African.*

Species occurring in Central Africa and reaching to various latitudes in South Africa, but not inhabiting the south-west part of the Cape Province. The localities give the known limits southward and westward of each species.

Enithares v-flavum Reut., South Transvaal; East Cape.

Enithares chinai Jacz., East Transvaal; East Cape. (Plate XL, map 1.)

Anisops (*A.*) *sardea* H.S., South Transvaal; West Cape to Victoria West; South-West Africa. (Plate XL, map 2.)

Anisops (*A.*) *pellucens* Gerst., Southern Rhodesia.

Anisops (*A.*) *debilis* Gerst., North Transvaal; East Cape. (Plate XL, map 3.)

Anisops (*A.*) *psyche* Hutch., North Transvaal.

Anisops (*A.*) *kaczewskii* Hutch., North Transvaal.

Anisops (*Micranisops*) *apicalis* Stål, Southern Rhodesia; ? Natal.

Nychia limpida Stål, Southern Transvaal; Cape west to Swellendam. (Plate XL, map 4.)

Agraptocorixa swierstrai n. sp., Portuguese East Africa.

3. *South African Endemics.*

Species recorded only from south of the Limpopo and often with a restricted range. Some of these may have to be transferred to other sections as knowledge of their distribution increases.

Anisops (*A.*) *letitia* n. sp., East Cape.

Anisops (*A.*) *poweri* n. sp., Cape; South Transvaal. (Plate XL, map 5.)

Anisops (*A.*) *hypatia* n. sp., West Cape. (Plate XL, map 3.)

Anisops (*Anisopoides*) *aglaia* n. sp., Cape; South Transvaal. (Plate XL, map 5.)

Plea piccanina n. sp., Cape.

Sigara (*S.*) *meridionalis* Wallgr., Cape; Orange Free State; South Transvaal. (Plate XL, map 5.)

Sigara (*S.*) *contortuplicata* Kirk., Cape; Transvaal; ranges into S.W.A.

* An Abyssinian record of this species will be given in another place.

Sigara (*S.*) *ceres* n. sp., West Cape.
Micronecta dorothea n. sp., South Transvaal.
Micronecta winifreda n. sp., West Cape.
Micronecta gorogaiqua n. sp., West Cape.
Micronecta butleriana n. sp., East Cape.
Micronecta citharistia n. sp., South Transvaal and East Cape. (Plate XL, map 5.)
Micronecta youngiana n. sp., East Transvaal.

4. *Generally distributed South African Species not hitherto found North of the Zambesi.*

Anisops (*A.*) *gracilis* n. sp., Cape; Transvaal and Southern Rhodesia.

5. *Rhodesian.*

Species occurring in Rhodesia, Bechuanaland Protectorate, South-West Africa, parts of the Transvaal, etc., but not yet recorded from Central Africa.

Anisops (*A.*) *leesoniana* n. sp., Southern Rhodesia.
Anisops (*A.*) *praetexta* n. sp., Southern Rhodesia; North Transvaal.
Micronecta druryiana n. sp., Upper Zambesi and Linyanti Rivers.
Micronecta bleekiana n. sp., Linyanti River; Southern Rhodesia; North Transvaal.
Micronecta monomatapae n. sp., Southern Rhodesia.
Micronecta uvarovi Jacz., Southern Rhodesia; Natal.
Micronecta browni n. sp., Southern Rhodesia; West Transvaal; and South-West Africa.
Micronecta quewalepele n. sp., Linyanti River.
Micronecta simillima n. sp., Southern Rhodesia and Linyanti River.
The South-West African species *Micronecta hessei* n. sp. belongs to a similar geographical category.

6. *Species occurring in West Tropical Africa and South-West Cape.*

Notonecta lactitans Kirk. (Plate XL, map 6.)

An examination of the number of species occurring in circumscribed and tolerably well-worked areas throughout Africa suggests very strongly that the genus *Anisops* has its headquarters in Central Africa.

	Kampala. Uganda. (G. L. R. Hancock.)	S. Rhodesia.	N. Trans-vaal.	S. Trans-vaal.	E. Cape.	W. Cape.
A. sardea .	+	+	+	+	—	+
A. pellucens .	+	+	—	—	+	—
A. letitia .	—	—	—	—	+	—
A. debilis .	+	+	+	—	+	—
A. leesoniana	—	+	—	—	—	—
A. poweri .	—	—	—	+	+	+
A. gracilis .	—	+	+	+	+	+
A. hancocki .	+	—	—	—	—	—
A. ares . .	+	—	—	—	—	—
A. varia .	—	+	+	+	+	+
A. hypatia .	—	—	—	—	—	+
A. praetexta .	—	+	+	—	—	—
A. eros . .	+	—	—	—	—	—
A. kampalensis	+	—	—	—	—	—
A. psyche .	+	+	+	—	—	—
A jaczewskii .	—	—	+	—	—	—
A. adonis .	+	—	—	—	—	—
A. (Aoid.) aglaia	—	—	—	+	+	+
A. (M.) apicalis	+	+	—	—	—	—
No. of species	10	9	7	5	6	6

It is, moreover, very doubtful if any other part of the world can boast as many species as the country round Kampala investigated by Mr. Hancock.

This Central African assemblage contains a mixture of primitive and specialised forms and may well be the cradle of the majority of the modern representatives of the genus. Unfortunately in the case of the other genera so few species are known, and so little work has been done on Central African forms, that such an analysis is quite impossible.

If we consider the species grouped as Central African, we find that they have reached very different points in a hypothetical dispersal from the central part of the Continent. An examination, moreover, of the distributions of some of the better known species indicates that foremost colonisation has proceeded more rapidly along a coastal belt than across the interior of the country.* The beginning of such an invasion is perhaps shown by *Agraptocorixa swierstrai*, a species which, though not actually known from Central Africa, belongs to a typically Central African genus. Later stages in the spread of water-

* *Cf.* Hewitt, J., "Facts and Theories on the Distribution of Scorpions in South Africa," Trans. Roy. Soc. S. Afr., xii, p. 249, 1924.

bugs into South Africa are illustrated by *Enithares chinai* (Plate XL, map 1); *Anisops debilis* (Plate XL, map 3); and *Nychia limpida* (Plate XL, map 4). In all probability the species grouped as Pan-African may be regarded as Central African species that have completed their southward dispersal. The coastal route that the majority have taken is perhaps determined by the lower rainfall, perhaps by the lower temperature of the interior (*vide infra*). On the whole, the latter explanation seems more probable, for in the temperate South-Eastern Transvaal, which should not be far from the migration route, are a number of " pans " containing fairly permanent water, but possessing an essentially South rather than a Central African assemblage of water-bugs (*A. varia*, *A.* (*Aoid.*) *aglaia*, *S. meridionalis*, and *M. scutellaris*).

There is some indication that two species are invading South Africa from the west. These are *Anisops sardea* (Plate XL, map 2), a widespread Ethiopian, Mediterranean, and West Asiatic form, and *Micronecta browni*, so far known only from South-West Africa, South Rhodesia, and West Transvaal.

Of the endemic South African species none show any Australasian affinities, nor are they a markedly primitive assemblage. Only one quite peculiar form occurs, viz. *Anisops* (*Anisopoides*) *aglaia*. The most remarkable distribution found among the South-West Cape forms is undoubtedly that of *Notonecta lactitans*, the discontinuity of which has been discussed in detail (p. 366). *A. gracilis* is perhaps an endemic South African form now spreading northward; more probably it has been overlooked in Central Africa. The Neotropical affinities of all the Ethiopian species of *Sigara* have already been emphasised.

IV.—ECOLOGY.

1. Rainfall and Colonisation.

South Africa is a dry country, more than half of the area under consideration having a rainfall less than 20 inches per annum. Moreover, nearly the whole country has its rain very unevenly distributed throughout the year and prolonged droughts are frequent. The life of any animal inhabiting fresh waters is, therefore, precarious, and we have no evidence that the water-bugs of the two families under consideration have any means of withstanding the drying up of their habitat, save that of taking to their wings when these are fully developed. The chief natural aquatic habitats of the country are

provided by, on the one hand, rivers and streams, and the pools left in their courses when they dry up in winter; and, on the other, by vleis and pans. These latter are large depressions temporarily or permanently filled with water which occur in some areas (Cape Flats, West Transvaal, and North-West Orange Free State, East Transvaal) and are probably the result of wind erosion.

Four endemic species, viz. *Anisops* (*A.*) *poweri*, *Anisops* (*Aoid.*) *aglaia*, *Sigara* (*S.*) *meridionalis*, and *Micronecta citharistia*, seem characteristic of the drier central part of South Africa. All occupy much the same territory, which has for the most part a rainfall of under 30 inches per annum (Plate XL, fig. 5). *M. citharistia*, however, only occurs in the eastern part of this area. *A.* (*Aoid.*) *aglaia* and *S.* (*S.*) *meridionalis* are essentially pan species (Plate XLI, fig. 4), also occurring now in dams; the other two naturally occur in pools in streams. (Plate XLI, fig. 5.)

Since the European colonisation of the country, natural habitats have been greatly supplemented by dams and reservoirs, so that in the place of irregular streams and pools we have now large bodies of standing permanent water. The importance of such constructions in opening up the country to water-bugs as well as civilised man is shown by the fact that, of the localities enumerated in this paper, no less than 38, or 36·2 per cent., are artificial. This proportion would be greatly increased if more localities in the Karroo and other very dry areas had been examined. It is not improbable that the distribution of several species (e.g. *Nychia limpida*, of which the most westerly record in the Cape is a single macropterous ♂ from a dam at Swellendam) may have been facilitated in this way, and changes may be expected to occur in the future. The construction of roads necessitating "drifts" in rivers (Plate XLI, fig. 8) has also helped to produce many shallow, less swiftly flowing reaches, very much favoured by *Micronectae*, especially *M. scutellaris*.

2. Standing and Running Water.

While the majority of species for which adequate data exists seem to occur both in standing water and in pools and more slowly moving parts of streams, two have only been taken in entirely standing water:

A. (*Aoid.*) *aglaia*,
Micronecta dorothea,

and a third, *S.* (*S.*) *meridionalis*, is almost confined to such.

On the whole, standing water appears to offer a better medium than flowing, but a few species are usually associated with the latter. In the forefront of these we have the genus *Enithares* of which *v-flavum* and *chinai* are usually, and *sobria* frequently, taken in the backwaters and slower flowing parts of streams and rivers (Plate XLI, fig. 7). A typical habitat of *E. v-flavum* and *E. sobria* is also shown in the photograph of the bank of the stream in Witpoortje Kloof, near Johannesburg (Plate XLI, fig. 4), where these two species were associated with *Anisops varia scutellata*. *Nychia limpida*, moreover, is frequently a denizen of running water. An interesting example of the partition of species between moving and standing water was afforded by the Limpopo River and the pools in its flood-bed near Messina. Two localities were visited. At one of these, known as the Gorge (Plate XLI, fig. 2), the river passes through a rocky channel opening out lower down. In the quieter parts of the river in this channel *Nychia l. limpida* was common, and quite a number of macropterous specimens were taken. Since this form is very rare in collections, but three examples being recorded in the literature, one cannot but suppose that it was unusually abundant here, as in certain other South African stations (*vide supra*). Since the river suffers immense annual changes and in summer is a raging torrent rising above the rocky banks seen in the photograph, it is probable that many of the *Nychiae* perish, and those which have wings would have, theoretically at least, a chance of reaching some of the pools found in the surrounding district in the rainy season. Some such consideration may perhaps explain the apparently unusual abundance of the very rare macropterous form in South Africa. *Anisops sardea* also occurred in this locality sporadically, and just below where the river widened somewhat a small colony of *A. debilis* was discovered much closer in to the shelter of the bank than the *Nychiae*.

Some miles lower down, where the river-bed spreads out into a band of sand half a mile broad (Plate XLI, fig. 1), through which flows an irregular shallow stream, different conditions obtained. In parts of the stream itself *E. chinai* occurred, while in shallow, recently formed pools *Micronecta bleekiana* was common. The most remarkable assemblage of forms, however, was found in a small pool, not 15 feet across, which had formed round a large boulder. A small tree growing in the sand not far off indicated that this part of the flood-bed, though in the very middle, had been undisturbed for some months. The following species occurred in this pool :

Enithares chinai.
Anisops sardea.
Anisops debilis.
Anisops gracilis.
Anisops varia scutellata.
Anisops jaczewskii.
Micronecta perdita.
Micronecta bleekiana.
Ranatra sp.
Belostomid nymphs.

The majority of the specimens of *Anisops* were taken under the shade of the boulder. The *Ranatra* was taken on a small dead bush that had been washed into the pool.

The colonisation of new localities is effected with remarkable rapidity. A large pan at Rietfontein, which had remained dry for some years, filled up in December 1927 and January 1928. By April 1928 large numbers of water-bugs, many newly emerged and teneral, were found, comprising the following :

A. (*A.*) *sardea.*
A. (*A.*) *varia.*
A. (*Aoid.*) *aglaia.*
S. (*S.*) *contortuplicata.*
S. (*S.*) *meridionalis.*
M. scutellaris.

Of these species *Anisops* (*A.*) *sardea* occurs in pans at Brakpan, and *Anisops* (*Aoid.*) *aglaia* is otherwise known in the Witwatersrand area on single specimen. The bugs were swimming mostly in small areas of clear water between the derelict terrestial plants, in which an aquatic vegetation is springing up (Plate XLI, fig. 3). Few were found in the central open pool, where the water is somewhat deeper.

3. Temperature.

Conditions in Central and South Africa probably differ more in temperature than in any other way. The surface temperature of Tanganyika is stated to be about 26° C. (Esaki and China, Tr. Ent. Soc., l, 1927, p. 292). Smaller bodies of water in this latitude must regularly reach higher temperatures. The maximum temperature reached by the surface water of Florida Lake, a small artificial body of water near Johannesburg, in the summer 1927–28 was 22·5° (Miss J. F. M. Schuurman, *unpublished observations*), while, according to

Barnard, the very shallow waters in which *Phreatoicus capensis* lives on Table Mountain vary from 7° C. (July) to 20° C. (January).* My own observations, made sporadically, fall within these limits, but in a pool near Princess Vlei *Plea piccanina* and *Sigara* (*S.*) *contortuplicata* were taken in water at about blood temperature (12, i, 1926, G.E.P.).

The following observations on the fauna of the baths at the hot springs at Aliwal North are not without interest in this connection (30, iv, 1928, G.E.P., notebook).

" There are three hot baths of gradually decreasing temperature and a fourth small shallow pool for children to paddle in.

" (1) Where spring emerges, surrounded on three sides by reeds, very deep. Temperature just under 34° C. (said to be 95° F.=35° C. at source of spring); Ph between 8·4 and 8·6. Much whitish slimy growth round edges. No apparent life except one small water-beetle.

" (2) Lower rectangular cement-sided bathing-pool with diving boards, etc. Temperature 32° C.; Ph not taken. *Chironomus* larvae in mud and slime, a few *Micronecta scutellaris*, but no other bugs, and I was unable to find any beetles.

" (3) Lowest bathing-pool also rectangular and with diving boards —on surface numerous large gyrinids, in water *Micronecta scutellaris* and *Anisops varia*, the latter in swarms in a shaded corner by steps, but also in sun. A large water-beetle; I did not catch any smaller ones, however; *Chironomus* larvae. Temperature, 29·5° C.; Ph=C. 8·5°.

" (4) Small shallow paddling pool, *Gerris* and gyrinids at surface, *Anisops varia*, a small water-beetle, numerous aeschnid dragonfly larvae, *Chironomus* larvae. I was unable to catch any *Micronecta scutellaris*, but they doubtless occurred; said to be frogs. Temperature 20° C."

An analysis of the water has been published (Hahn in South and East African Year Book and Guide, 1926, p. 541), here converted from grains per gallon to grams per litre.

Li_2CO_3	·012	grm. per litre.
$CaCO_3$	·106	,, ,,
$MgSO_4$	·028	,, ,,
NH_3	·044	,, ,,
K_2CO_3	·013	,, ,,
$CaCl_2$	·116	,, ,,
NaCl	·875	,, ,,
SiO_2	·015	,, ,,
NaBr	·0017	,, ,,
CO_2	·074	,, ,,

* Trans. Roy. Soc. S. Afr., xiv, p. 203, 1927.

The great contrast between the faunae of 2nd and 3rd of the pools appears to be due to temperature, as they were extremely similar in every way. It would appear that *Anisops varia scutellata* is unable to live permanently in water at 32° C., and *Micronecta scutellaris* at 34° C. A sample from (3) was found to be ·019 N for chloride, the above analysis giving ·017 N, so dilution does not seem to have occurred.

If these temperatures are really the upper limits in nature of the species in question, they are remarkably low. Plateau (*vide* Brues, Animal Life in Hot Springs, Quart. Rev. Biol., ii, 2, p. 189) states that at Vichy *Notonecta glauca* and *Nepa cinerea* occur at 45° C., though in the laboratory the upper limits for the two species were 37·5° C. and 43° C. respectively.

4. Illumination.

While, in general, species of *Anisops* are found in shady places, specimens of *Anisops varia scutellata*, of which this is certainly true, were not found to be negatively phototropic in the laboratory. Both *Anisops varia scutellata* and *Sigara contortuplicata*, when illuminated with a strong electric light, may react by leaving the water and flying off in the direction of the light. In an experiment with these two species eight specimens of the latter left the dish and flew directly to the light in a very short time of each other. The specimens of *varia* reacted more slowly, and of the three one failed to leave the water at all. The reaction is not simply a tropism directing the line of movement of the insect, but a complex reflex involving leaving the water and spreading the wings. In *Anisops*, moreover, the whole body has to be turned over before the insect can emerge dorsal side uppermost.

Large migrations of water-bugs have been frequently recorded, but this incidence is so far unexplained. The behaviour of the specimens of *Sigara contortuplicata* recorded above can only be compared to such a migration on a small scale, and in all probability unusually intense sunlight is the stimulus for such migrations. The apparent negative phototropism of *Anisops* spp. in nature may perhaps be explained by movement into cold from warmer water; experimental investigation of this subject would be interesting.*

* Poisson (C. R. Assoc. Fr. Av. Sci.; Liége, 1924, p. 985), however, states that increase in temperature is a cause of flight and gives interesting threshold temperatures. He also notes that these insects fly on warm thunderous evenings, and attributes this to the electrical condition of the atmosphere. In my experiments practically no increase in temperature occurred.

5. Chemical Composition.

The following data, collected for purposes outside the present work, may be usefully tabulated here. The extreme range of hydrogen-ion concentration, roughly determined colorimetrically, and of salinity determined by titration with $AgNO_3$, is given for all species for which determinations exist.

Species.	Ph Range.	Salinity Range (normality).
N. lactitans .	Table Mt. 4·9, Cape Flats 8·9.	
E. sobria .	Witpoortje 7·0 . . .	Witpoortje *traces.*
E. v-flavum .	Witpoortje 7·0 . . .	Witpoortje *traces.*
A. sardea .	Rietfontein 7·1 . . .	Rietfontein ·0004 N.
A. gracilis .	Birchleigh 7·0, Barberspan 9·2	Birchleigh ·000125 N, Barberspan ·0106 N.
A. varia scutellata	Wemmer Pan 4·0, Blaauwwater 9·2	Rietfontein ·0004 N, Blaauwwater ·021 N.
A. aglaia .	Table Mt. 5·9, Blaauwwater 9·2	Table Mt. *traces,* Blaauwwater ·021 N.
P. pullula .	Brakpan 7·1, Goedeverwachting 8·2	Brakpan ·00175 N, Goedeverwachting ·0234 N.
M. scutellaris .	Knoffelspruit 6·9, L. Chrissie 9·2	Birchleigh ·000125 N, L. Chrissie ·01.
M. dorothea .	Birchleigh 7·0, Grassdale 8·6 .	Birchleigh ·000125 N, Grassdale ·010.
M. gorogaiqua	Knoffelspruit 6·9, Diepkloof 8·9	
M. citharistia.	Knoffelspruit 6·9, Diepkloof 8·9	
M. browni .	Barberspan 9·2 . . .	Barberspan ·0106 N.
S. sjöstedti .	Pool near L. Chrissie 7·0. .	Pool, L. Chrissie ·0005 N.
S. meridionalis	Rietfontein 7·1, Pan 3, L. Banagher 9·1	Rietfontein ·0004 N, Rondevlei ·416 N.
S. contortuplicata	Wemmer Pan 4·0, Breyten 8·8.	Rietfontein ·0004, Breyten ·001 N.

The wide range of hydrogen-ion concentration tolerated by many species is most striking. The scanty data forthcoming suggest that it is on the acid rather than the alkaline side that any restriction by this factor should be sought for. Several species, however, *N. lactitans*, *A. varia scutellata*, *A. aglaia*, and *S. contortuplicata*, occur in water whose Ph is less than 6·0, and the first and fourth of these occur at the edge of the Wemmer Pan where Ph=4·0. This body of water is polluted by mining operations, being rich in sulphate from the decomposition of sulphides on the mine dumps around. The acidity is probably due to $NaHSO_4$. The central part of the Pan has the Ph of 3·4 and is practically devoid of any life; at the edge, where surface waters dilute those of the Pan, are found these bugs and dragonfly and dipterous larvae. *M. scutellaris* formerly occurred,

but has now (May 1928) disappeared; unfortunately the Ph was not determined when this species was found. *N. lactitans* must travel in the Cape from acid water to alkaline, from very fresh to somewhat more salt. All the Cape vleis are highly alkaline (Professor L. T. Hogben, *private communication*); unfortunately no data exist for the localities in which this species breeds. *S. meridionalis* is the only species which lives in water of which the chloride content is really high (L. Banagher, pan 3, ·235 N., Ronde Vlei, ·416 N.), none of the other species occurring in water much more than $\frac{1}{50}$ normal. It must be remembered, however, that many of these alkaline and slightly salt waters have a high bicarbonate content, so that the osmotic pressure is higher than the Cl content suggests. A more extended study of the animal ecology of these localities is in preparation. Poisson* has shown that *S. lugubris* Fieb., *N. viridis* Delc., etc., in Europe occur in brackish water, because in these species the egg is able to hatch in fairly high concentrations of salt. Investigation with *S. meridionalis* might yield similar results.

6. Vegetation.

The depth of a pond is a matter of considerable importance to the *Corixidae*, for being insects which live habitually on a solid substratum rather than poised in the water as does *Anisops*, or at the surface like *Notonecta* or *Enithares*, the distance to be traversed to obtain a new supply of oxygen is a matter of some importance.

As I have pointed out elsewhere (Nat. Hist. Wicken Fen., vol. iii, p. 248, Cambridge, 1926), the presence of weeds in a pool may provide a sort of false bottom on which numerous individuals of this family can live. Lake Chrissie provides a striking example of this. *A.* (*Aoid.*) *aglaia* and *Micronecta scutellaris* occurred not at the wind-swept and exposed shore, nor in the open water in the centre of the lake, but living in a dense zone of *Potamogeton* growing in about 5–10 feet of water some distance from the margin. Here these insects would have an abundant food-supply, shelter in storms, and, for *M. scutellaris*, a substratum within easy reach of the atmospheric air. On the whole, large lakes, unless supplied with quiet inlets or, as in this case, abundance of vegetation, are unsuitable for water-bugs. It is interesting to note that the only bugs inhabiting fresh waters which can be legitimately called "oceanic" are the two genera *Idiocoris* and *Paskia* described by Esaki and China from Tanganyika (*l.c.*), in

* C. R. Assoc. Fr. Av. Sci.; Liége, 1924, p. 983.

which the spiracles are closed and respiration of dissolved oxygen presumably occurs.

Though the presence of weed may make certain otherwise impossible localities habitable, the South African species of both *Notonectidae* and *Corixidae* are most usually found in small pieces of open water, large masses of water plants impoverishing the fauna. Exceptions to this rule are the two species of *Plea* which, unlike the other *Notonectidae*, appear to live climbing on weed and swimming about among it, and *Micronecta dorothea*, which at Birchleigh dam (Plate XLI, fig. 6) was found almost exclusively in dense *Potamogeton*, while *Micronecta scutellaris* here occurred in open water between reeds.

7. Conclusion.

While a number of the more important ecological factors which might determine the existence of any given species in a locality have been reviewed, none throw very much light on the matter. Possibly this is because the effect of different organisms, and especially the members of the water-bug population, on each other has not been studied. Very little, for instance, is known about the food-cycles of the *Notonectidae* and *Corixidae*. The latter are said to be microphagous by Hungerford, and to eat mosquito larvae, etc., by Hale. The former are certainly predatory ; I have observed the species of *Anisops* found at Rietfontein feeding on a large Ostracod which is plentiful in shallow water among vegetation. Still less is known about the animals which feed on these insects. Butler refers to a bittern, in the stomach of which were found entire specimens of *Notonecta glauca* (Biol. Brit. Hemip. Het., London, 1923, p. 562) ; possibly *N. lactitans* is eaten by water-birds at the Cape. *M. browni* probably forms part of the diet of the microphagous flamingoes at Barberspan. If the present study is of assistance in elucidating such ecological problems by future students its purpose will have been fulfilled.

V.—EXPLANATION OF PLATES.

Plate XXVII.

FIG.

1. *Notonecta* (*Paranecta*) *lactitans* Kirk. Head and pronotum.
2. ,, ,, ,, ,, Apex of intermediate femur.
3. ,, ,, ,, ,, Wing.
4. *Enithares chinai* Jacz. Head and pronotum.
5. ,, *sobria* Stål. Wing.
6. ,, ,, ,, Anterior leg of ♂.

Plate XXVIII.

1. *Notonecta* (*P.*) *lactitans* Kirk. ♂ genital capsule.
2. ,, ,, ,, ,, ♂ aedeagus ; *s.* internal stay.
3. ,, ,, ,, ,, ♂ paramere.
4. *Enithares chinai* Jacz. ♂ genital capsule.
5. ,, ,, ,, ♂ paramere.
6. ,, *sobria* Stål. ♂ genital capsule.
7. ,, ,, ,, ♂ paramere.
8. *Enithares v-flavum* Reut. ♂ genital capsule.
9. ,, ,, ,, ♂ paramere.

Plate XXIX.

1. *Anisops* (*A.*) *sardea* H.S. ♂ head and pronotum.
2. ,, ,, *pellucens* Gerst. ♀ head and pronotum.
3. ,, ,, *letitia* n. sp. ♂ head and pronotum.
4. ,, (*Anisopoides*) *aglaia* n. sp. ♂ rostrum.
5. ,, (*Micranisops*) *apicalis* Stål. Elytron (right).
6. *Nychia limpida limpida*, form *sappho* Kirk. ♀ elytron (left).
7. ,, ,, ,, Stål. Head and pronotum.
8. ,, ,, ,, ,, Wing.
9. *Anisops* (*A.*) *varia scutellata* Fieb. Wing.
10. *Notonecta lactitans* Kirk., Nymph, ?3rd instar ; head and prothorax.
11. ,, ,, ,, ,, 5th instar ; head and prothorax.
12. *Enithares sobria* Stål, Nymph, ?5th instar ; head and prothorax.
13. *Anisops* (*A.*) *sardea* H.S. ♂ last instar nymph ; head and prothorax.
14. ,, ,, *gracilis* n. sp. Last instar nymph ; head and prothorax.
15. *Nychia limpida limpida* Stål. Last instar nymph ; head and prothorax.

Plate XXX.

1. *Anisops* (*A.*) *jaczewskii* Hutch. ♂ facial tubercle.
2. ,, ,, *vitrea* Sign. ♂ facial tubercle.
3. ,, ,, *aldabrana* Dist. ♂ facial tubercle.
4. ,, ,, *hancocki* Hutch. ♂ facial tubercle.

FIG.

5. *Anisops* (*A.*) *psyche* Hutch. ♂ facial tubercle.
6. ,, ,, *genji* Hutch. ♂ facial tubercle.
7. ,, ,, *sardea* H.S. ♂ facial tubercle.
8. ,, ,, ,, ,, ♂ facial tubercle.
9. ,, ,, ,, ,, ♂ 3rd rostral joint.
10. ,, ,, *pellucens* Gerst. ♂ 3rd rostral joint.
11. ,, ,, *letitia* n. sp. ♂ 3rd rostral joint.
12. ,, ,, *gracilis* n. sp. ♂ 3rd rostral joint.
13. ,, ,, *poweri* n. sp. ♂ 3rd rostral joint.
14. ,, ,, *leesoniana* n. sp. ♂ 3rd rostral joint.
15. ,, ,, *debilis* Gerst. ♂ 3rd rostral joint.
16. ,, ,, *hypatia* n. sp. ♂ 3rd rostral joint.
17. ,, ,, *varia scutellata* Fieb. ♂ 3rd rostral joint.
18. ,, ,, *jaczewskii* Hutch. ♂ 3rd rostral joint.
19. ,, ,, *praetexta* n. sp. ♂ 3rd rostral joint.
20. ,, ,, *psyche* Hutch. ♂ 3rd rostral joint.
21. ,, (*Micranisops*) *apicalis*. ♂ 3rd rostral joint.

Plate XXXI.

1. *Anisops* (*A.*) *sardea* H.S. ♂ anterior leg.
2. ,, ,, *pellucens* Gerst. ♂ anterior leg.
3. ,, ,, *letitia* n. sp. ♂ anterior leg.
4. ,, ,, *gracilis* n. sp. ♂ anterior leg.
5. ,, ,, *debilis* Gerst. ♂ anterior leg.
6. ,, ,, *poweri* n. sp. ♂ anterior leg. 6*a* comb.
7. ,, ,, *leesoniana* n. sp. ♂ anterior leg.

Plate XXXII.

1. *Anisops* (*A.*) *varia scutellata* Fieb. ♂ anterior leg.
2. ,, ,, *hypatia* n. sp. ♂ anterior leg. 2*a* comb.
3. ,, ,, *psyche* Hutch. ♂ anterior leg.
4. ,, ,, *praetexta* n. sp. ♂ anterior leg. 4*a* comb.
5. ,, ,, *jaczewskii* Hutch. ♂ anterior leg.
6. ,, (*Micranisops*) *apicalis* Stål. ♂ anterior leg.
7. ,, (*Anisopoides*) *aglaia* n. sp. ♂ anterior leg. 7*a* comb.
8. ,, (*A.*) *jaczewskii* Hutch. Comb.
9. ,, ,, *amaryllis* Hutch. Comb.
10. ,, ,, *eros* Hutch. Comb.
11. ,, ,, *kampalensis* Hutch. Comb.
12. ,, ,, *gracilis* n. sp. ♀ apex of anterior leg.
13. *Nychia limpida limpida* Stål. ♂ apex of anterior leg.

Plate XXXIII.

r.p.=right paramere ; *l.p.*=left paramere ; *r.a.*=right ala ; *l.a.*=left ala ; *a.i.*=appendix interna ; *a.e.*=appendix externa ; *g.o.*=genital opening.

FIG.

1. *Nychia limpida limpida* Stål. Aedeagus.
2. ,, ,, ,, ,, Genital capsule.
3. ,, ,, ,, ,, Left paramere.
4. ,, ,, ,, ,, Right paramere.
5. *Anisops* (*A.*) *poweri* n. sp. Genital capsule.
6. ,, ,, ,, Aedeagus, antero-lateral aspect.
7. *Plea piccanina* n. sp. Profile of elytron.
8. ,, *pullula* Stål. Profile of elytron.
9. ,, ,, ,, Wing.
10. ,, ,, ,, Genital capsule.
11. ,, ,, ,, Aedeagus.
12. ,, *piccanina* n. sp. Parameres.
13. ,, *pullula* Stål. Parameres.
14. ,, *leachii* M'Gr. and Kirk. Parameres.

Plate XXXIV.

a=free portion of 7th abdominal tergite ; *b*=right paramere ; *c*=left paramere.

1. *Micronecta scutellaris* Stål. ♂ genitalia.
2. ,, *perdita* n. sp. ♂ genitalia.
3. ,, *hessei* n. sp. ♂ genitalia.
4. ,, *gorogaiqua* n. sp. ♂ genitalia.
5. ,, *winifreda* n. sp. ♂ genitalia.
6. ,, *druryana* n. sp. ♂ genitalia.

Plate XXXV.

1. *Micronecta dorothea* n. sp. ♂ genitalia.
2. ,, *butleriana* n. sp. ♂ genitalia.
3. ,, *monomatapae* n. sp. ♂ genitalia.
4. ,, *browni* n. sp. ♂ genitalia.
5. ,, *quewalepele* n. sp. ♂ genitalia.
6. ,, *simillima* n. sp. ♂ genitalia.
7. ,, *bleekiana* n. sp. ♂ genitalia.

Plate XXXVI.

1. *Micronecta citharistia* n. sp. ♂ genitalia.
2. ,, *uvarovi* Jacz. ♂ genitalia.
3. ,, *piccanin* n. sp. ♂ genitalia.
4. ,, *youngiana* n. sp. ♂ genitalia.
5. ,, *piccanin*, form *piccanin* n. Right elytron.
6. ,, *piccanin*, form *pardina* n. Right elytron.
7. ,, *piccanin*, form *tigrina* n. Right elytron.

Plate XXXVII.

FIG.

1. *Micronecta piccanin*, form *audax* n. Right elytron.
2. ,, *piccanin*, form *variegata* n. Right elytron.
3. ,, *piccanin*, form *nigroclavata* n. Right elytron.
4. ,, *piccanin*, form *perversa* n. Right elytron.
5. *Agraptocorixa swierstrai* n. sp. ♂ face.
6. ,, ,, Posterior femur, dorsal view.
7. ,, ,, Posterior femur, ventral view.
8. ,, ,, ♂ pala.
9. ,, ,, ♂ portion of abdomen bearing strigil.
10. ,, ,, ♂ strigil.
11. ,, ,, Xyphus.
12. ,, ,, ♂ right paramere.
13. ,, ,, ♂ left paramere.

Plate XXXVIII.

a=face of ♂; *b*=xyphus; *c*=strigil.

1. *Sigara* (*S.*) *sjöstedti* (Kirk.). *a*, *b*, and *c*.
2. ,, ,, *meridionalis* (Wallgr.). *a*, *b*, and *c*.
3. ,, ,, *contortuplicata* (Kirk.). *a*, *b*, and *c*.
4. ,, ,, *ceres* n. sp. *a*, *b*, and *c*.
5. ,, ,, *sjöstedti* (Kirk.). Parameres.
6. ,, ,, *meridionalis* (Wallgr.). Parameres.
7. ,, ,, *contortuplicata* (Kirk.). Parameres.
8. ,, ,, *ceres* n. sp. Parameres.

Plate XXXIX.

1. *Sigara* (*S.*) *sjöstedti* (Kirk.). Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
2. ,, ,, *meridionalis* (Wallgr.). Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
3. ,, ,, *contortuplicata* (Kirk.). Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
4. ,, ,, *ceres* n. sp. Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
5. ,, ,, *meridionalis* (Wallgr.). ♂ profile of face.
6. ,, ,, *contortuplicata* (Kirk.). ♂ profile of face.
7. ,, ,, *sjöstedti* (Kirk.). ♂ pala.
8. ,, ,, *meridionalis* (Wallgr.). ♂ pala.
9. ,, ,, *contortuplicata* (Kirk.). ♂ pala.
10. ,, ,, *ceres* n. sp. ♂ pala.
11. ,, ,, *contortuplicata* (Kirk.). ♂ anterior trochanter.

PLATE XL.—Distribution Maps.

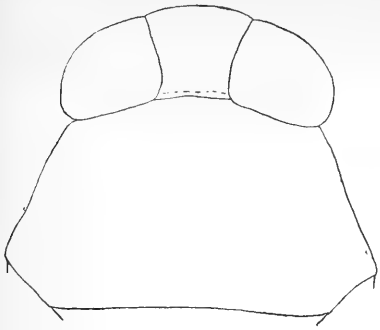
MAP.

1. *Enithares chinai* Jacz. In S. Africa.
2. *Anisops* (*A.*) *sardea* H.S. In S. Africa.
3. „ „ *debilis* Gerst. and *Anisops* (*A.*) *hypatia* n. sp. In S. Africa.
4. *Nychia limpida* Stål. In S. Africa.
5. *Anisops* (*A.*) *poweri* n. sp., *Anisops* (*Anisopoides*) *aglaia* n. sp., *Sigara* (*S.*) *meridionalis* Wallgr., and *Micronecta citharistia* n. sp. In S. Africa.
6. The subgenera *Notonecta* and *Paranecta*. In the African continent.

PLATE XLI.

FIG.

1. Flood-bed of Limpopo River, Main Drift near Messina.
2. Limpopo River " Gorge," near Messina; locality for *Nychia l. limpida*.
3. Rietfontein Pan, Boksburg div., Transvaal; locality for *Anisops* (*A.*) *sardea*, *Anisops* (*A.*) *varia*, *Anisops* (*Aoid.*) *aglaia*, etc.
4. Stream in Witpoortje Kloof, Krugersdorp, Transvaal; locality for *Enithares v-flavum*, *Enithares sobria*, and *Anisops* (*A.*) *varia scutellata*.
5. Diep Kloof, Rouxville dist., Orange Free State. Pool in stream; locality for *Anisops poweri* and *Micronecta citharistia*.
6. Birchleigh dam, Pretoria dist., Transvaal; locality for *Micronecta dorothea* in *Potamogeton* and *Micronecta scutellaris* in open water between the reeds.
7. Makabusi River near Salisbury, Southern Rhodesia; locality for *Enithares chinai*, *E. sobria*, *Nychia limpida*, *Micronecta monomatapae*, etc.
8. Drift in stream below Cango Caves, Oudtshoorn dist.



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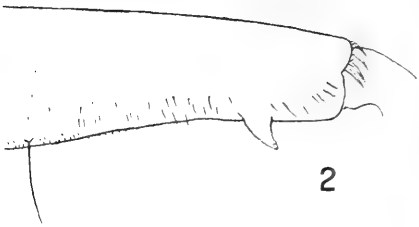

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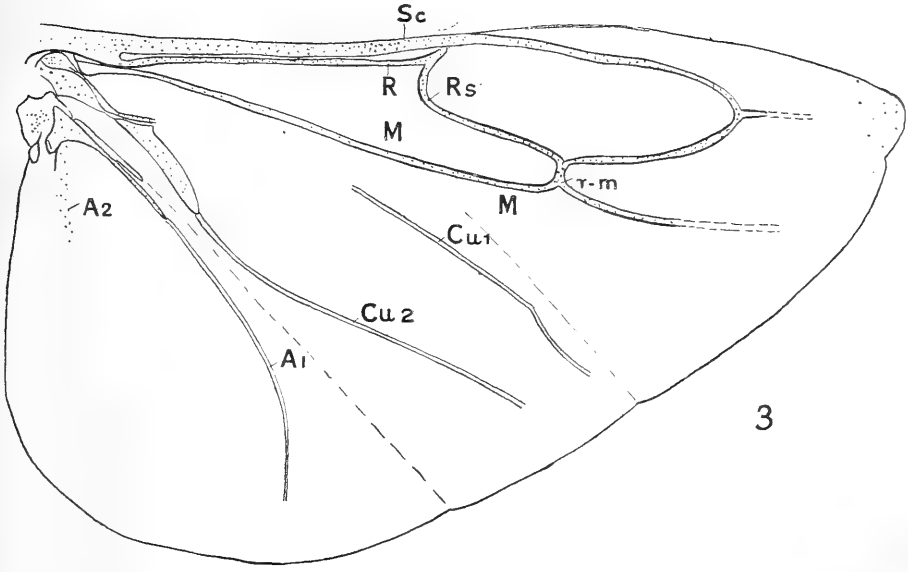

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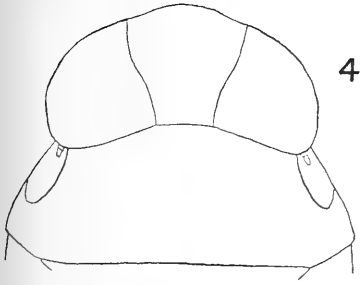

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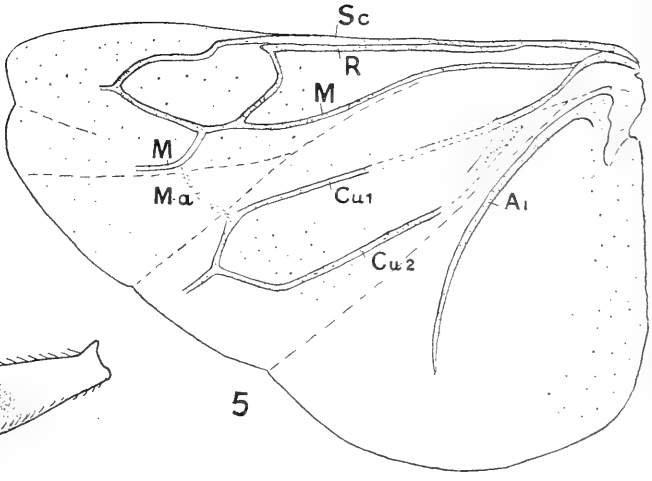

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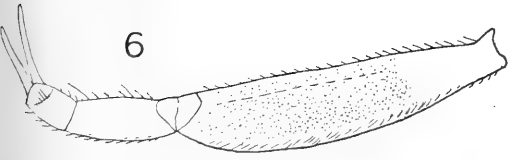

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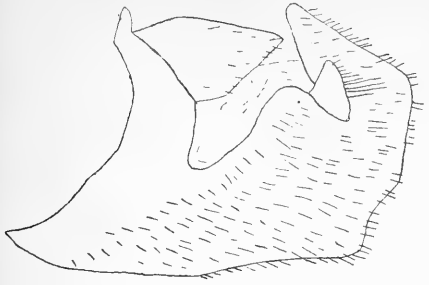

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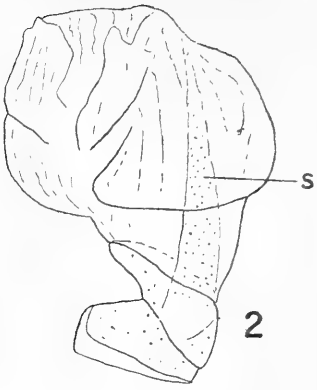

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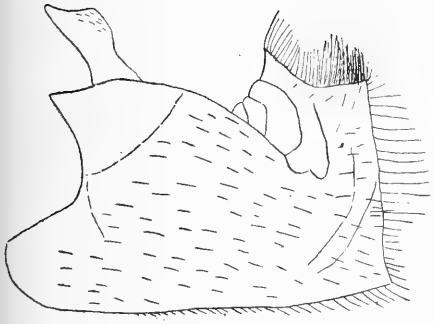

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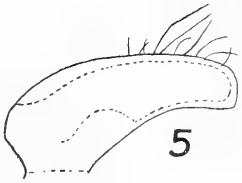

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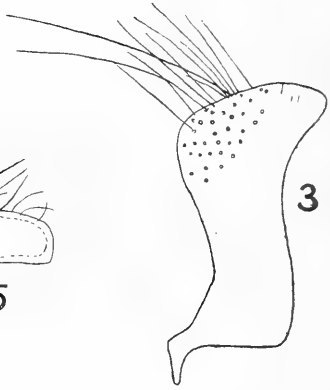

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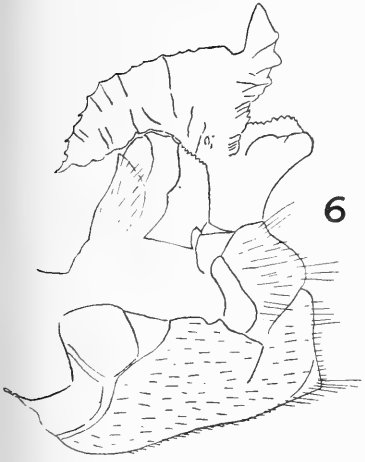

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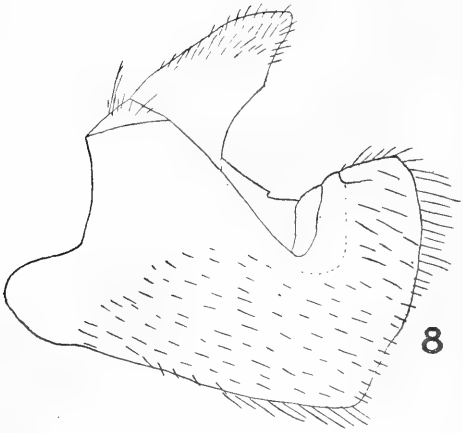

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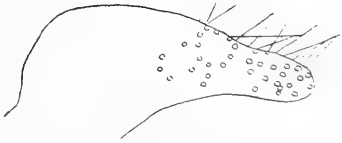

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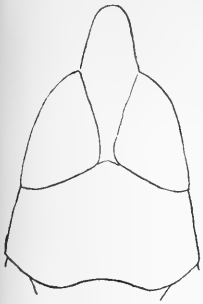
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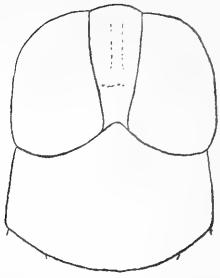
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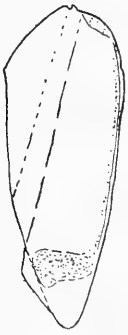
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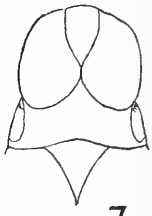
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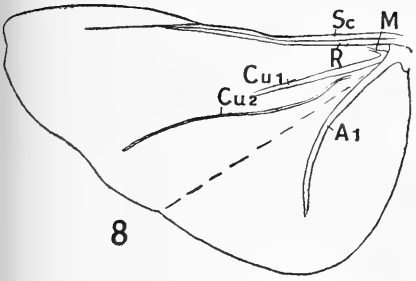

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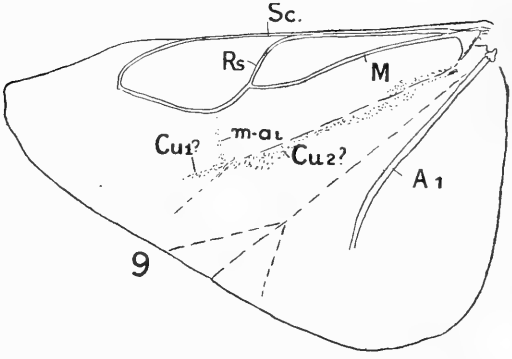

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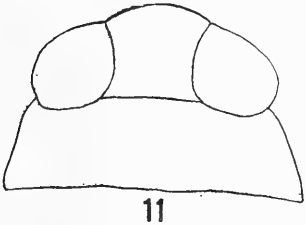
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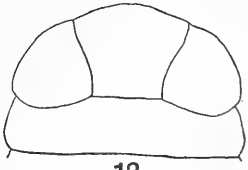
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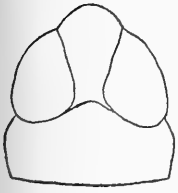
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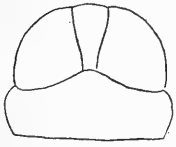
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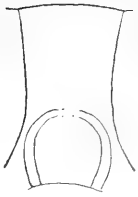

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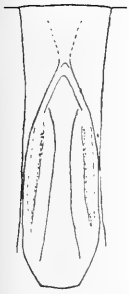

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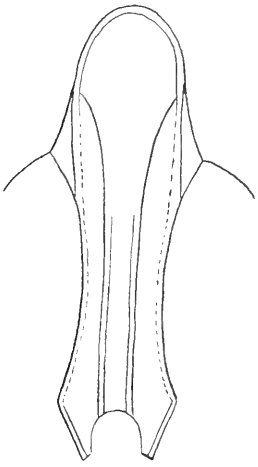

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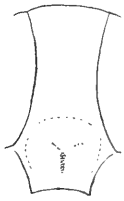

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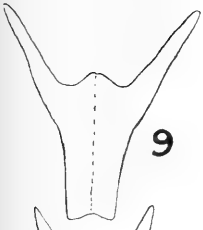

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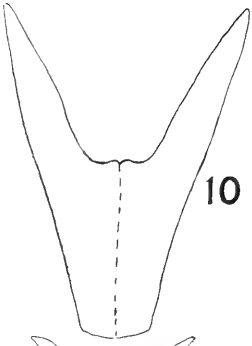

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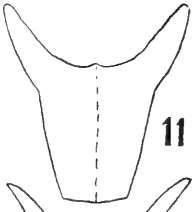

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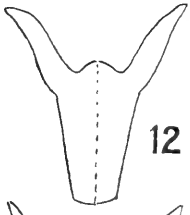

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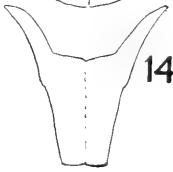

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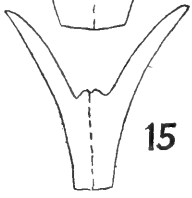

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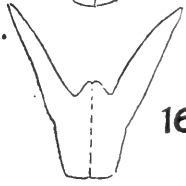

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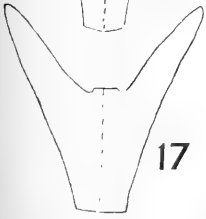

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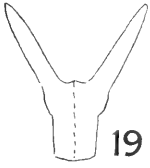

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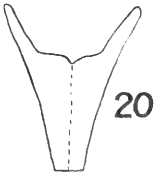

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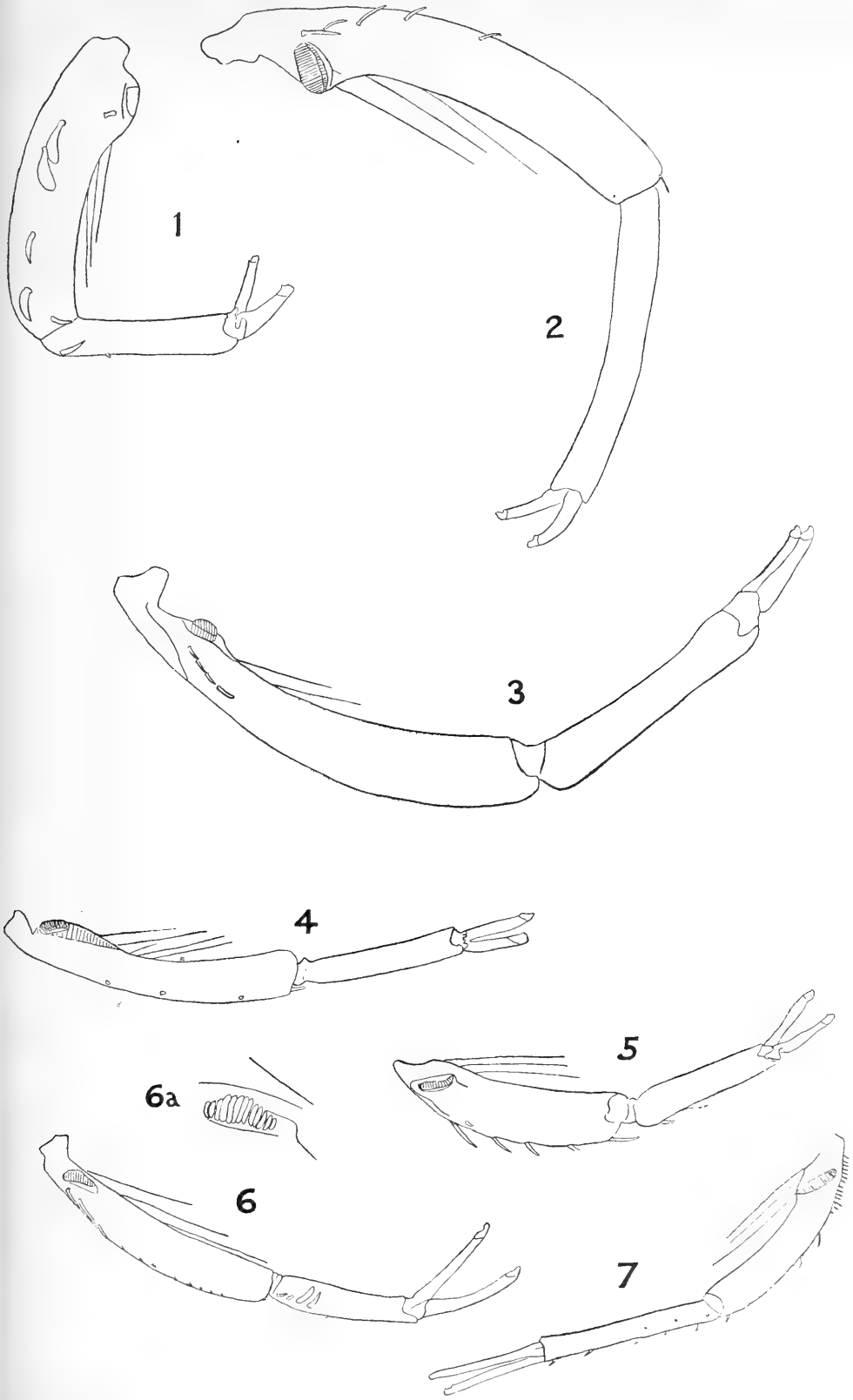

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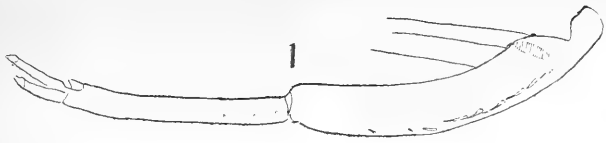
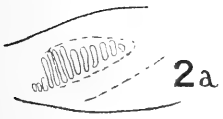
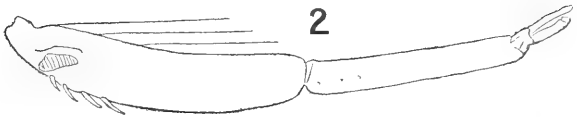
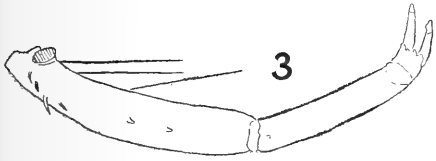
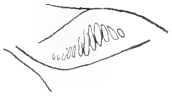
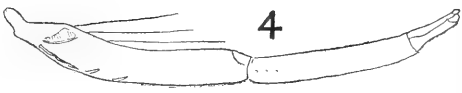


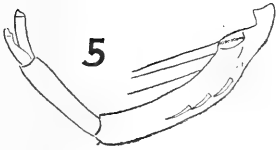


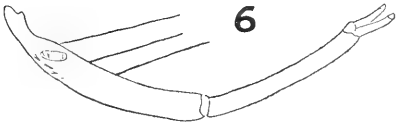


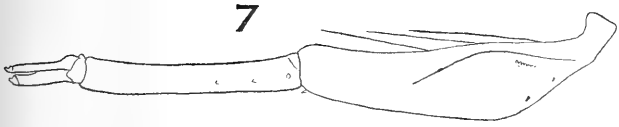


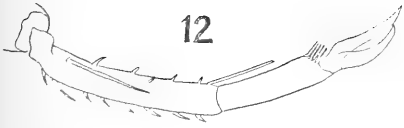


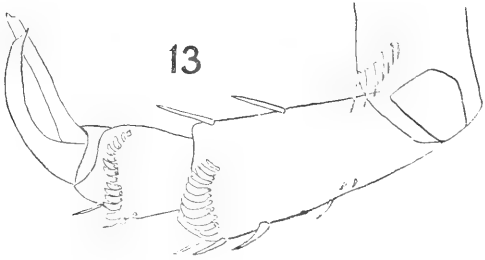




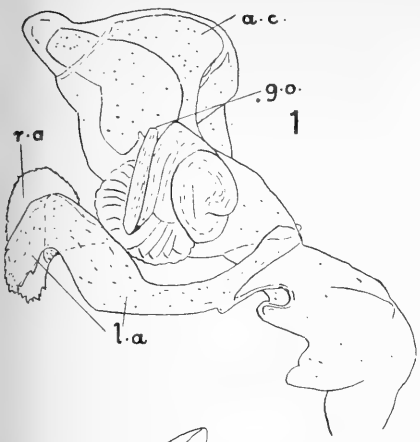








SOUTH AFRICAN NOTONECTIDAE.



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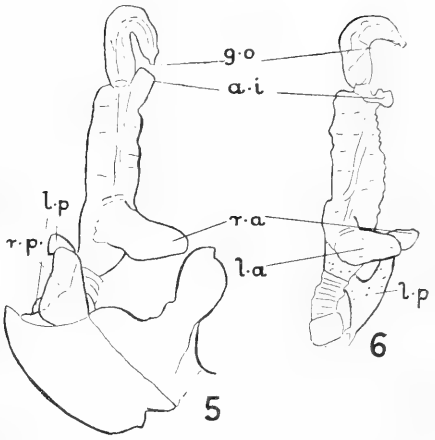

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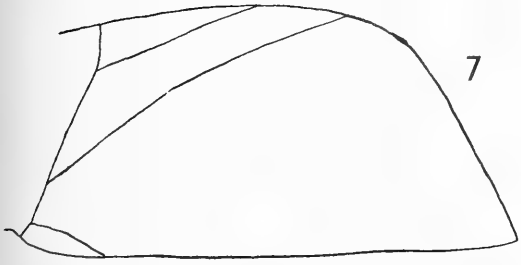

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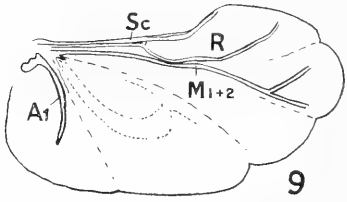

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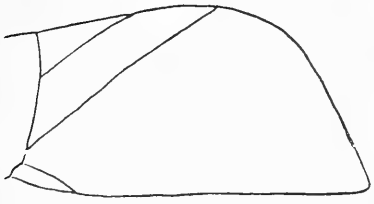

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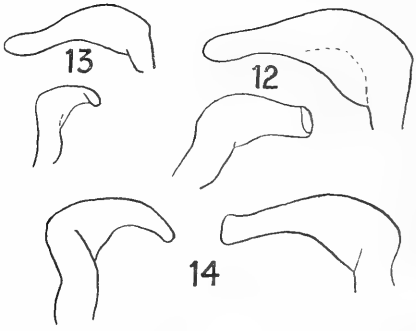

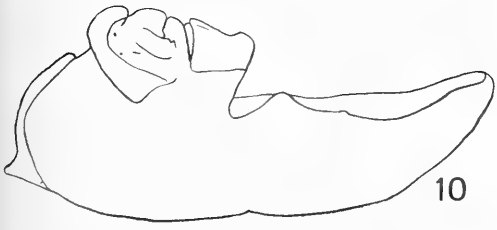

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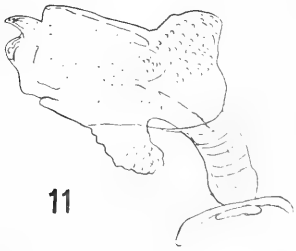

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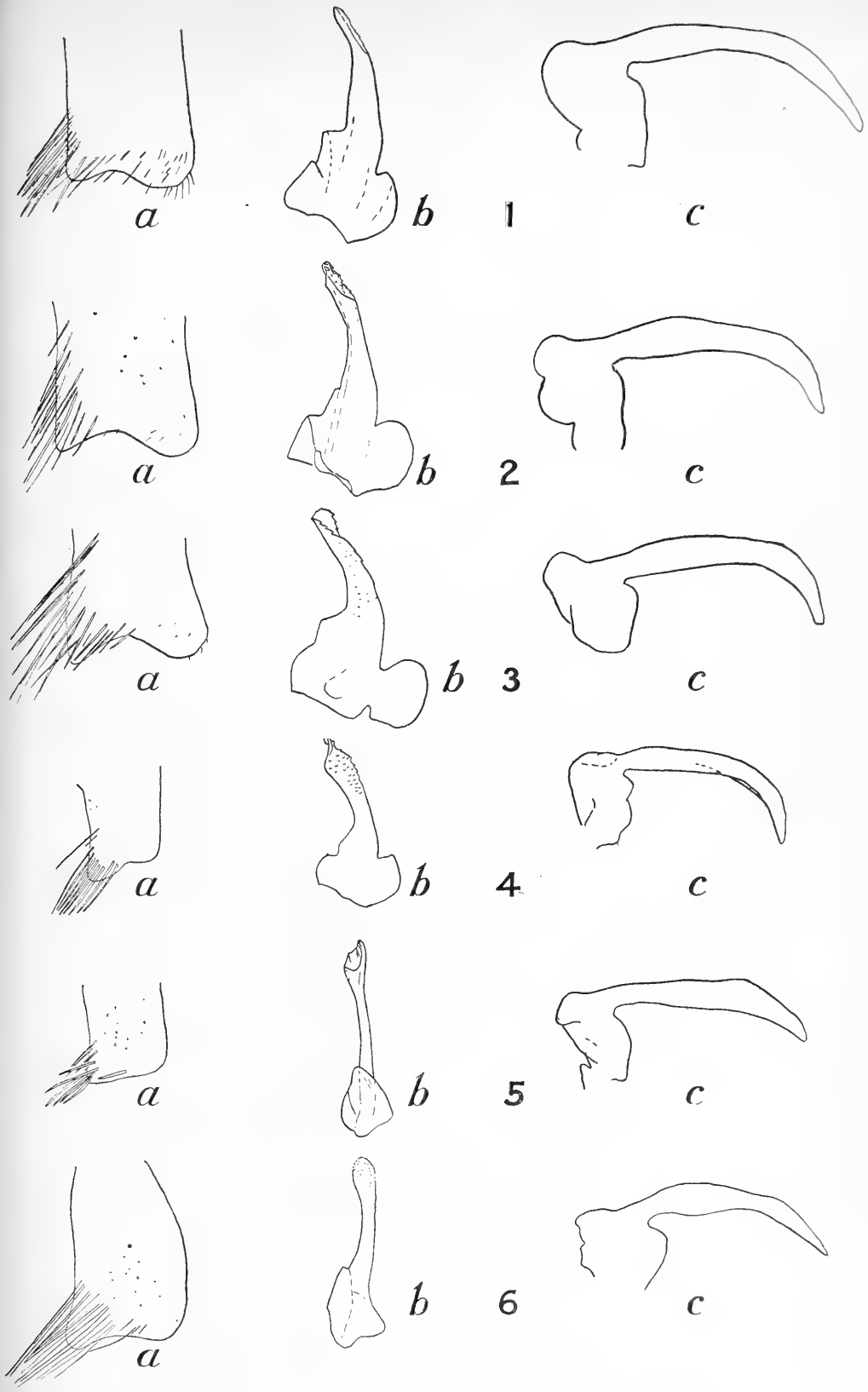
SOUTH AFRICAN NOTONECTIDAE.



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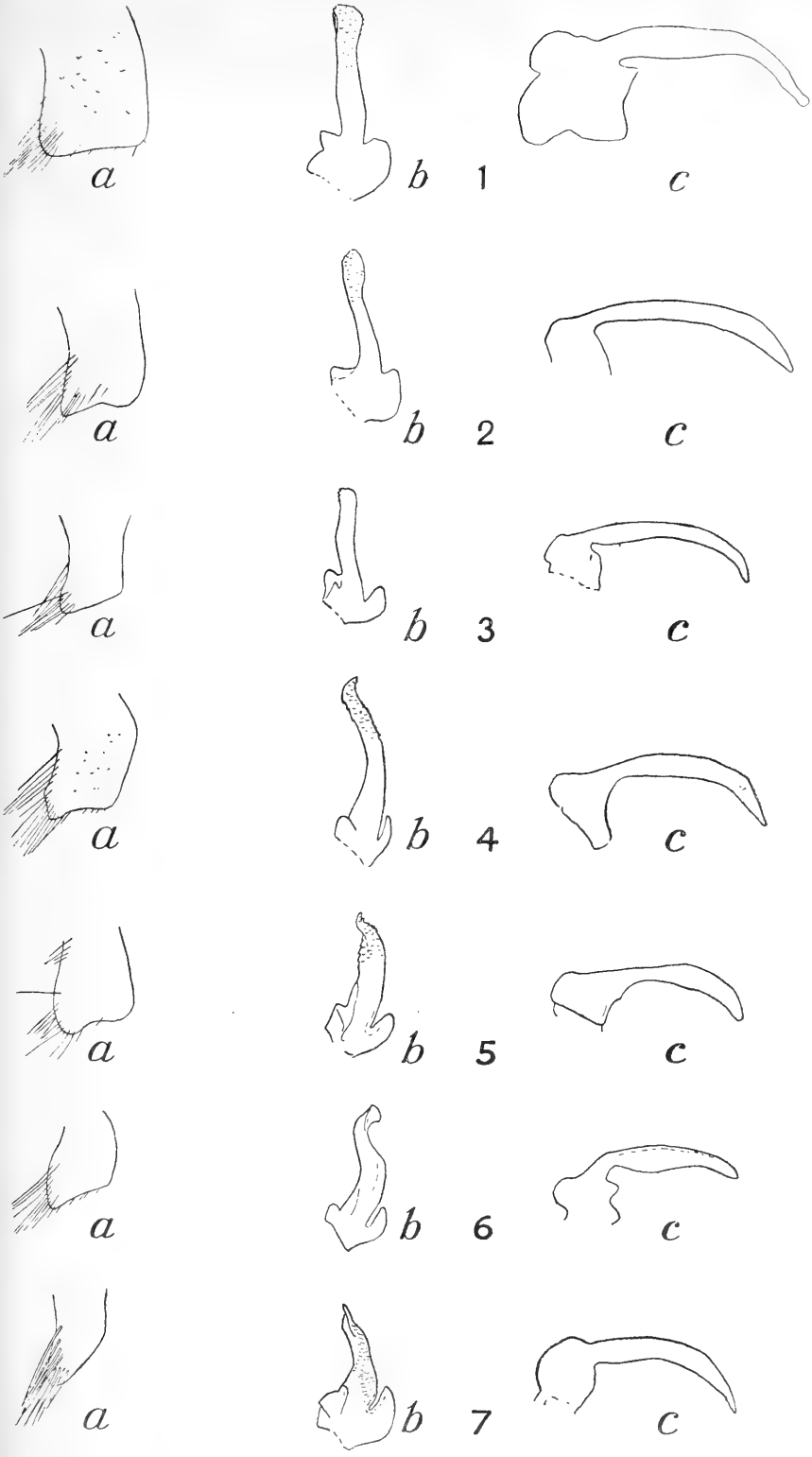

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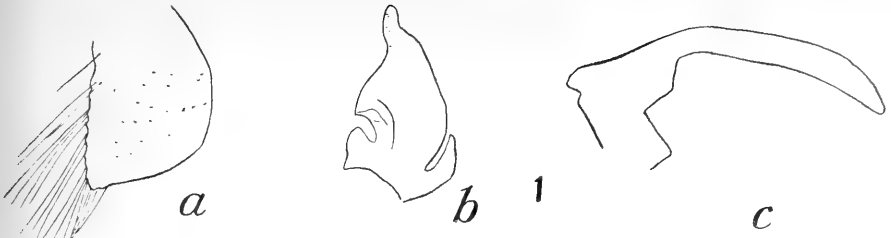

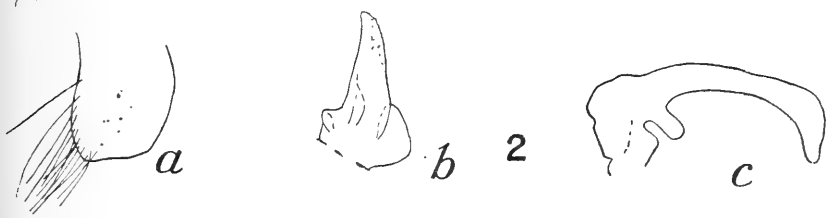

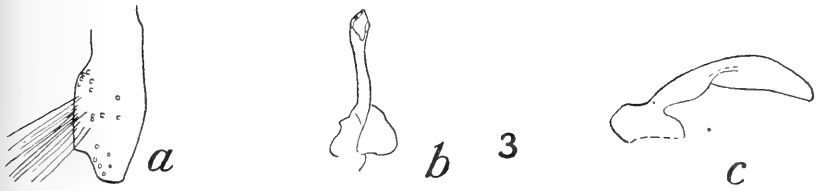

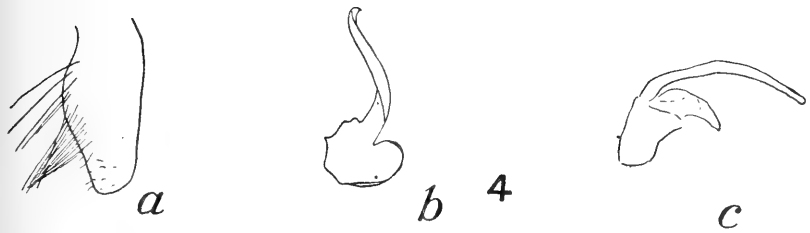

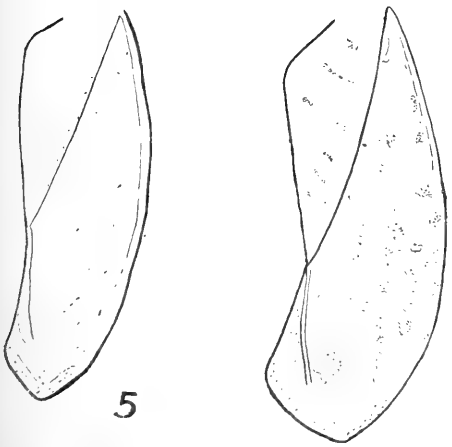

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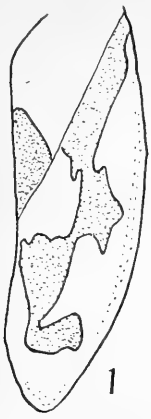
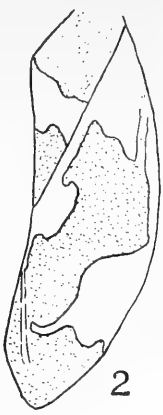
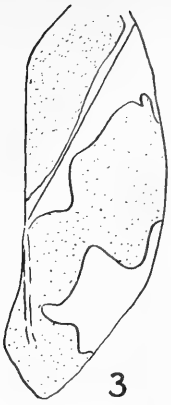
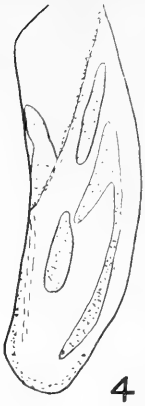
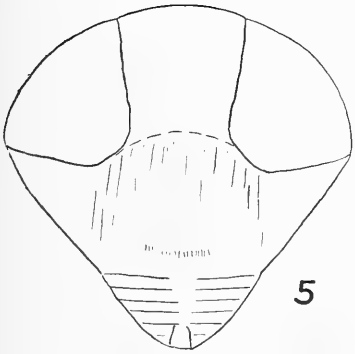
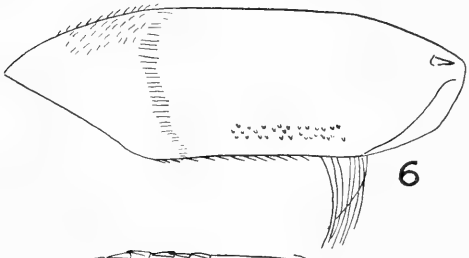


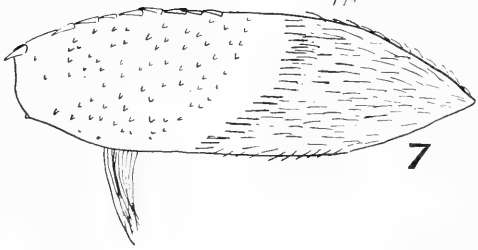


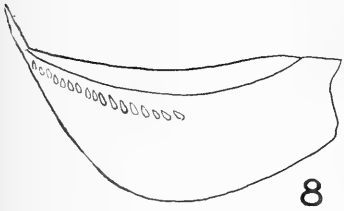


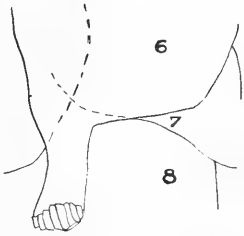


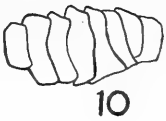


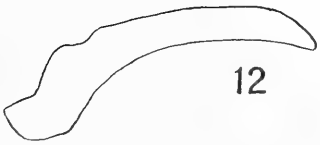


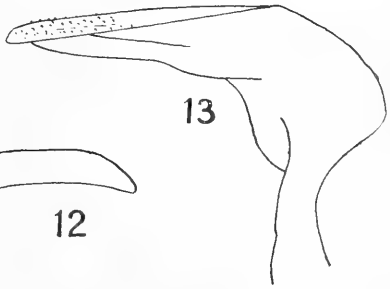




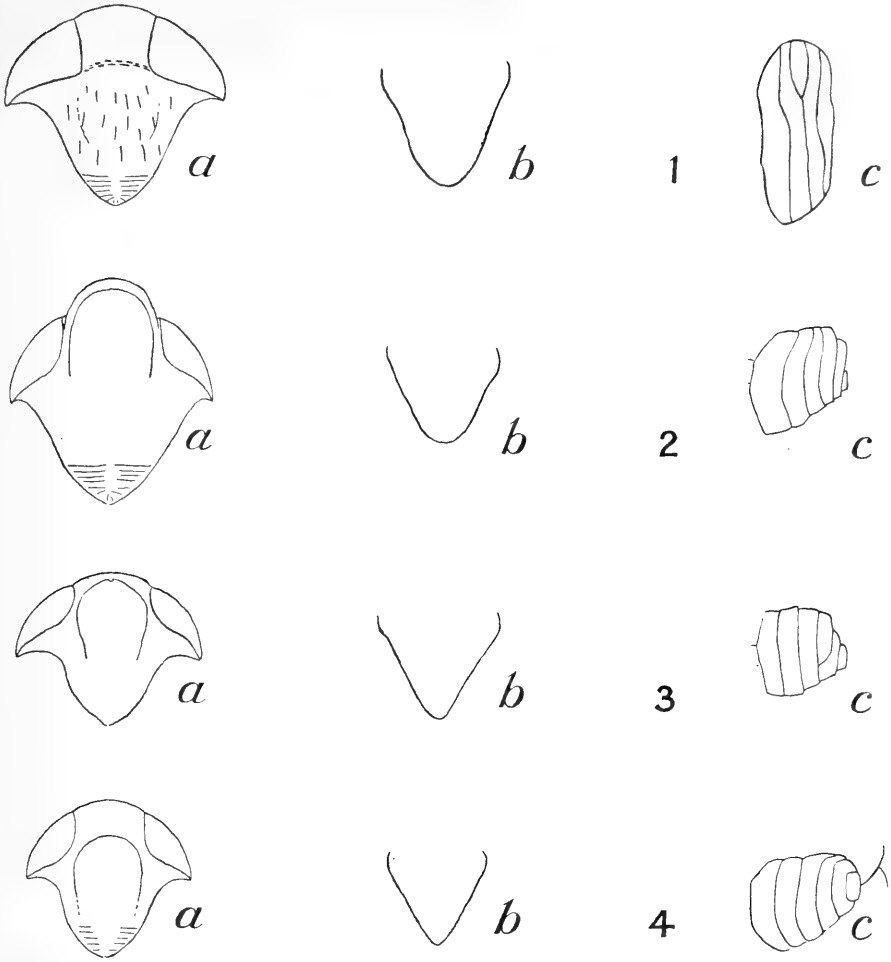








SOUTH AFRICAN CORIXIDAE.



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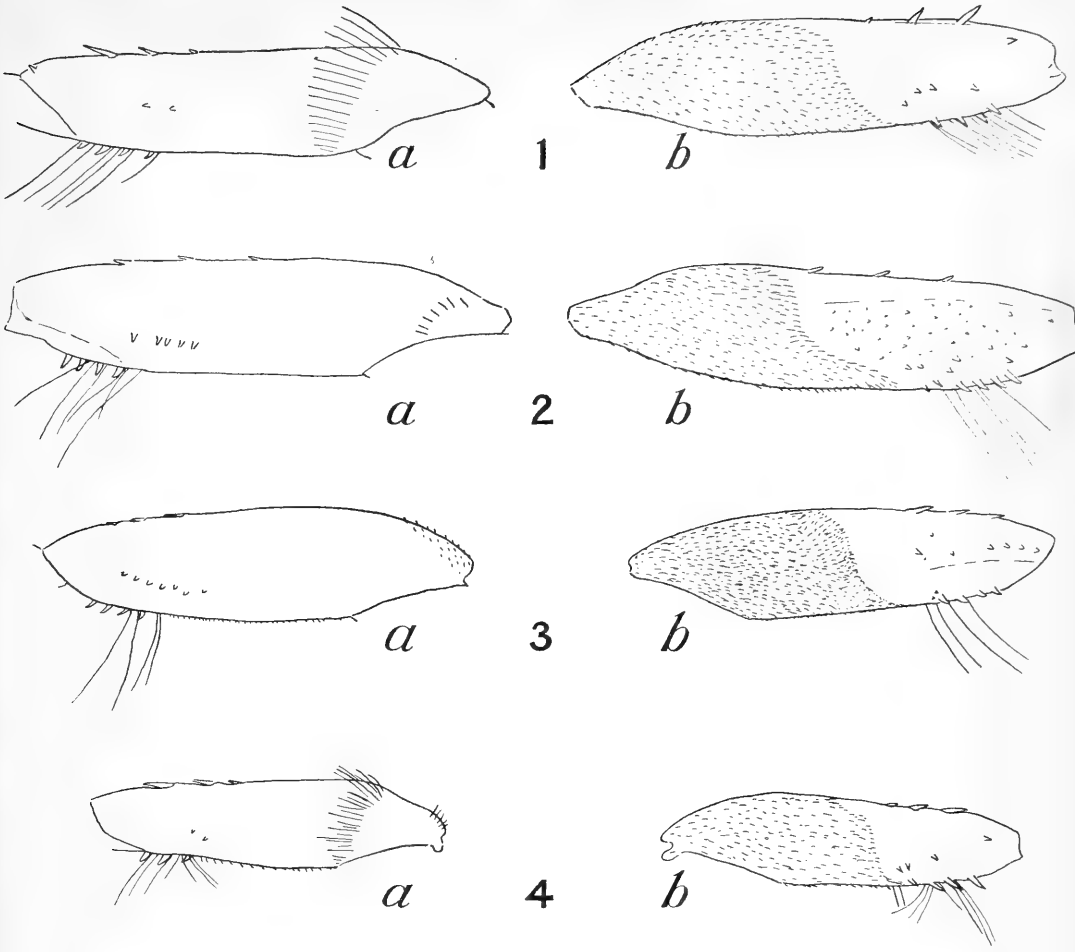


SOUTH AFRICAN CORIXIDAE.

1

● *E. chinaï.*

2

● *A. sardea.*

3

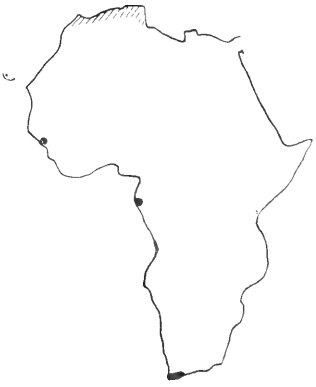
● *A. debilis.*
○ *A. hypatia.*

4

○ *N. l. limpida.*
● *N. l. limpida*, form *sappho* (with type).
* *N. l. bantu.*

5

∴ *A. poweri.*
● *A. (Aoid.) aglaia.*
× *S. meridionalis.*
○ *M. citharistia.*



6

//// *Notonecta* s.str.
● *Paranecta.*

SOUTH AFRICAN NOTONECTIDAE AND CORIXIDAE: DISTRIBUTION MAPS.

G. E. H. photo.

1

G. E. H. photo.

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G. E. H. photo.

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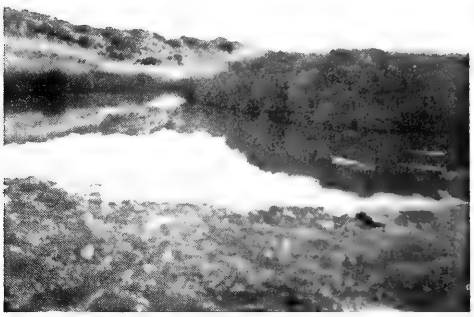

G. E. H. photo.

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G. E. H. photo.

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G. E. H. photo.

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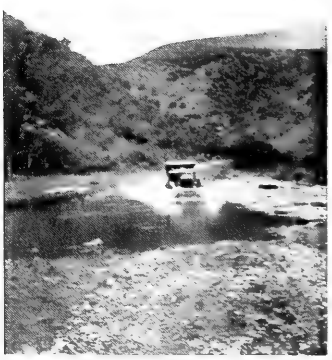
Gertrude Moss photo.

7



Winifred Simon photo.

8

SOUTH AFRICAN NOTONECTIDAE AND CORIXIDAE: SOME HABITATS.

12. *Some New Species of Curculionidae from South Africa and South West Africa.*—By A. J. Hesse, B.Sc., Ph.D., F.E.S., Assistant, South African Museum, Cape Town.

(With Plates XLII, XLIII.)

The following descriptions of new species of *Curculionidae* are from material collected in South Africa, Rhodesia, and South West Africa by collectors in different parts of the country and by members of the Museum staff, who have also acquired a large number of new and interesting species on their expeditions to Damaraland, Ovamboland, and the Kaokoveld between 1916 and 1926, and to Portuguese East Africa in 1924.

Most of the descriptions of the new species of *Brachycerus* are from specimens labelled and designated as types by the late Dr. L. Péringuey, which he did not himself describe or of which his descriptions in manuscript form are too fragmentary to publish. The types of all the *Curculionidae* described by Dr. Péringuey in the Trans. S. Afr. Phil. Soc., vols. i–iv, 1885–1888 and 1892, and deposited in his private collection, have subsequently been transferred by the late author himself to the South African Museum collections.

I wish to express my thanks to the members of the Museum staff and to the private collectors who have contributed to the material described in this paper, and also to Dr. Guy A. K. Marshall of the Imperial Bureau of Entomology, London, for his kind advice in the description of the new species.

The figures are free-hand drawings by myself. S.A.M.=South African Museum and M.Exp.=Museum Expedition.

Altogether 27 new species are described in this paper. These are :—

Brachycerinae, tribe *Brachycerini*: *Brachycerus angustus* (Pér. in litt.) sp. nov., Natal.
,, *approximans* (Pér. in litt.) sp. nov., Orange Free State.
,, *damarensis* sp. nov., S.W. Africa.
,, *koebergensis* (Pér. in litt.) sp. nov., Cape.
,, *meracus* (Pér. in litt.) sp. nov., Cape.

Brachycerinae, tribe *Brachycerini* :	*Brachycerus rhodesianus* (Pér. in litt.) sp. nov.,	Rhodesia, Transvaal.
	,, *rikatlensis* (Pér. in litt.) sp. nov.,	Delagoa Bay.
	,, *verruculosus* (Pér. in litt.) sp. nov.,	Cape.
Tribe *Brotheini* :	*Synthocus maculipes* sp. nov.,	S.W. Africa.
	,, *tuberculatipennis* sp. nov.,	S.W. Africa.
	Brotheus carinatus Mshl., ♂,	Cape.
Byrsopinae	*Byrsops noordhoekiana* sp. nov.,	Cape.
Rhytirrhininae	*Spartecerus confragosus* sp. nov.,	S.W. Africa.
	,, *pallidus* sp. nov.,	,,
	,, *simulator* sp. nov.,	,,
	Rhytirrhinus admirandus sp. nov.,	Cape, Transvaal.
	,, *dolosus* sp. nov.,	Cape.
	,, *inopinus* sp. nov.,	Cape.
	Gronops capensis sp. nov.,	Cape.
	Hyomora varia sp. nov.,	Cape, N. Cape, Transvaal.
Erirrhininae	*Derelomus atratus* sp. nov.,	Natal.
	,, *incognitus* sp. nov.,	Cape.
	,, *postfasciatus* (Mshl. in litt.) sp. nov.,	Cape.
	,, *rhodesianus* sp. nov.,	Rhodesia.
	,, *rugosicollis* sp. nov.,	Zululand.
Attelabinae	*Scotopsinus bituberculatipennis* sp. nov.,	Zululand, Transvaal.
	Pleurolabus damarensis sp. nov.,	S.W. Africa.
Apoderinae	*Apoderus spinipes* sp. nov.,	P. E. Africa, Rhodesia.

Sub-fam. BRACHYCERINAE.

Tribe Brachycerini.

Gen. Brachycerus Oliv.

Brachycerus Olivier, Encycl. Méth., vol. v, p. 181, 1790.
,, Bovie, Gen. Ins., Fasc. 99, p. 10, 1910.
Dyerocera Pascoe, Tr. Ent. Soc. Lond., p. 334, 1887.

Brachycerus angustus (Pér. in litt.) sp. nov.

(Pl. XLII, fig. 4.) ♀ Type, S.A.M.

Black, elongate, ovate, densely covered with dull greyish or brownish scaling above and with dull greyish scaling below, the scales with a slight silvery or bronzy sheen, especially on the undersurfaces. Head

with the vertex and forehead densely covered with scaling, paler laterally, with scattered punctures, each with a short depressed dark seta, with the lateral and undersurfaces below the eyes also covered with dull silvery grey scaling, with scattered punctures anteriorly; eyes without a supra-orbital ridge; rostrum about as long as prothorax, about $2\frac{1}{2}$ times as long as head, slightly curved, with the incision between it and the head shallow, only slightly evident basally above, more distinct laterally in front of the eyes, with the sides gradually widening from base to beyond middle at level of genae, across the apical margins of which it is the widest, with the upper surface slightly convex above scrobes, slightly depressed basally and about at the same level as head, with a slight callus basally on each side in front of the eyes, converging basally and forming more or less a ∩-shaped basal ridge, the callus with scattered punctures and short, depressed setae, with a distinct wavy, central carina, extending from base to epistome, with a punctured ridge laterally on each side above scrobe, the ridges not reaching the apex and extending basally, they converge slightly, stopping abruptly at about $\frac{1}{4}$ the length of rostrum from base, where there is a foveate depression antero-laterally in front of basal ridges on each side, with the surface densely covered with dull greyish scaling, the scales having a distinct silvery sheen on the carina and ridges, with scattered punctures, more or less hidden by scaling, the ridges and punctures with dark brown, depressed setae; epistome large, semicircular, smooth, shining, with the lateral bounding margins carinate, the anterior margin slightly sinuate, with a deep semicircular depression medially and a tuft of two or three long, reddish-brown setae on each side at ends of depression, with a few coarse punctures in a foveate depression externally and apically to lateral bounding margins, each with a reddish-brown seta, the apical setae being the longest; genae densely covered with silvery grey scaling, with large separated punctures, each with a dark brown depressed seta, the setae on ventral margin towards the apex being longer and reddish brown, the dorsal margin more or less ridge-like, with the apex smooth, more or less carinate; mandibles shear-like, bidentate, projecting beyond mentum, more or less shining, with the inner basal part and basal part of teeth finely, rugosely, punctured, the part external to the basal, prominent, central, carinate elevation longitudinally rugose and coarsely punctured, the punctures towards apex with long, reddish-brown setae, a distinct mandibular scar present; mentum trapezoidal, with the corners rounded, more or less depressed in middle (filled in with dirt), with the anterior marginal

part raised, punctured, and with long, reddish-brown setae; submentum without a peduncle, with a long, reddish-brown seta on each side near its apical margin; antennae densely covered with dull greyish scaling, with circlets of dark setae around the apices of funicular joints, the scape and around the club, absent on joint 1 above and below, with joint 2 shorter than 1 (behind) and shorter than 3, joint 3 slightly shorter than 1 (behind), club elongate, not ovate, not broader than joint 7 of funicle, equally broad throughout its length, truncated basally and truncately bevelled apically, with a small, sharp point nearer the anterior apical margin; prothorax broader than long, bisinuate anteriorly, with the medial, apical margin arcuate, with the sides rounded, about as broad apically as basally, with the basal margin feebly sinuate, slightly sunk below level of disk, with the upper surface slightly convex, postero-laterally, slightly raised on each side, medially, basally, slightly depressed, centrally, apically, slightly, foveately depressed, set with small, shining irregular tubercles, those medially, discally being smaller and more depressed than those laterally and antero-laterally, medial, central part of disk almost free of tubercles, each tubercle with a long, flattened, depressed, dark brown seta, directed more or less towards the centre of prothorax, the tubercles laterally with a distinct puncture on the dorsal margin, bearing the seta, interstices densely covered with dull greyish scaling, with a paler, more silvery grey, central line, more or less subcarinate basally, the inferior lateral surfaces with paler scaling and with scattered deep punctures; elytra elongate, oval, more than $1\frac{1}{2}$ times as long as broad, basally narrower than prothorax, the sides slightly rounded, broadest at about middle, with the upper surface convex, with rows of foveae, rows 1, 2, 6, 7, 8, and 9 more or less with regular foveae, those on 1 small, row 9 basally, and row 8 more depressed, with foveae on rows 3, 4, and 5 more or less irregular, each fovea with a dark brown seta on its anterior raised margin and projecting over it; interval 1 without any tubercles, but with a row of separated dark brown, suberect setae; interval 2 with a row of separated, subtubercular prominences not reaching the base and ceasing at summit of declivity, each with 2 or 3 long, flattened, dark brown setae; intervals 3 and 5 more or less costate, each with a row of large, separated tubercles, those in basal half vaginated and more or less depressed, becoming more conical and closer together in 3 on the declivity, with the basal ones in both intervals confluent, costate, more so in 3, 5 ceasing just behind summit of declivity, each tubercle with some pale

setiform scales and a bundle of long setae in the pore, the setae being dark brown to beyond middle, pale yellowish or reddish brown on declivity and also on basal ones of 5 ; interval 4 subcostate, with a row of separated, small tubercles, not reaching the base and ceasing just before summit of declivity, each tubercle with 2 or 3 flat, suberect setae ; interval 6 with a row of rounded, flattened, shining tubercles, not reaching the base and becoming smaller towards apex, ceasing at about summit of declivity, each tubercle with some pale, setiform scales and a short, depressed, brown seta in the pore ; interval 7 confluent with 9 basally, with a fairly large, shining, black, rounded, prominent, humeral tubercle, then with a row of obsolete tubercles or barely visible prominences and 2 or 3 apical tubercles, the last one being prominent, conical, situated very close to those on 3 and continuous with interval 5 ; interval 8 devoid of tubercles, but with a row of separated, very short, pale, depressed setae ; interval 9 with 3 or 4 rounded, shining, flattened, basal tubercles and 2 or 3 apical ones, continuous with 3 ; interval 10 represented basally only as a row of small, flattened, separated, obsolete tubercles ; the interstices as well as most of the tubercles densely covered with dull greyish scaling having a bronzy or silvery sheen, each individual scale ring-like, with a dark central part, with a broad, basal, transverse fascia from interval 5 to interval 5 more or less darker ; undersurface densely covered with dull greyish scaling, with a distinct silvery or bronzy, metallic sheen ; metasternum coarsely punctured, each with a pale yellowish or reddish-brown seta, with antecoxal folds present ; abdomen with coarse, separated punctures on ventrites 1, 2, and the apical segment, each with a pale reddish-brown seta, those on apical segment with slightly darker setae ; ventrites 3 and 4 with finer, scattered punctures, each with a pale yellowish or reddish-brown seta, ventrite 1 feebly sinuate apically, ventrite 2 slightly raised medially above 3 and 4, broader laterally than either 3 or 4, about as broad as both together, ventrites 3 and 4 with the apical margins slightly sinuate, ventrite 3 sunk a little below level of 2 and 4, narrower laterally than 4 ; legs thick, densely covered with dull greyish scaling, with a silvery or bronzy sheen, the femora with scattered punctures, those on the apices coarser, each puncture with a short, dark, or a longer, pale yellowish-brown seta ; tibiae slightly compressed laterally towards apex, more or less carinate dorsally towards the apex, subscabrous ventrally, with separated punctures and dark or pale brownish setae, the setae on under and inner surfaces longer, with the inner apical angles produced into a

sharp mucro, better developed on anterior ones, with a tuft of orange-coloured setae in front of it, with the outer apical angles not produced, obtusely angulated and rounded, with the apical margins covered with golden-yellow, velvety, sericeous, fine setae; tarsi with dark and pale setae above, joints 1, 2, and 3 with a broad, conspicuous pad-like tuft of fine, long, velvety, sericeous or floss-like setae below on each side, joint 4 with separated orange-yellow or golden setae below, arranged more or less in longitudinal rows, claws with a long, reddish-brown seta at the base below. From a single ♀.

Length (excl. head), 16 mm.

Breadth, 7 mm.

Hab.—South Africa. No exact locality cited (probably Natal *).

Brachycerus approximans (Pér. in litt.) sp. nov.

(Pl. XLII, fig. 2.) ♀ Type, S.A.M.

Ovate, black, densely covered with pale brownish ochraceous scaling, variegated with brownish and white scaling above, with the undersurface and legs more uniformly pale. Head broad, densely covered with pale ochraceous scaling, vertex with small distant punctures more or less arranged transversely in rows, each puncture with a dark brown seta, forehead deeply excavated, more coarsely punctured (the punctures often hidden by scaling), each puncture with a dark brown seta, with a central more or less denuded carina not reaching the base, but extending to an arcuate, transverse, raised line joining 2 bosses, one on each side, each composed of an aggregate of a few small tubercles; eyes with a prominent supra-orbital ridge and with the dark brown setae near the margin of ridge slightly longer; rostrum about as long as prothorax, with the incision between it and head deep and distinct antero-laterally before eyes, the dorsal area narrower basally than across the genae at about middle, thence rapidly narrowed to apices of mandibles, in profile with the part in front of the epistome almost perpendicular (when mandibles are apposed) and parallel to basal incision and posterior margin of genae, with the mandibles (except part projecting), lower margin of scrobe, the posterior and ventral genal margins thus almost forming a square, with the upper surface slightly convex, with indistinct punctures and fairly long suberect brown setae, covered with dense scaling, uneven owing to a central, smooth, often undulating carina, extending

* Dr. Guy A. K. Marshall informs me that there are five examples in the British Museum labelled Natal and one labelled ?Cape.

from a small tubercular elevation basally to near the epistome, a deep incision laterally and parallel to the basal incision, separated from the latter by a prominent, vertical ridge, projecting dorsally as a denuded tubercle and connected with the small central basal tubercle by a raised line, with a large tubercle on each side above the scrobe at about middle and a smaller one dorsally on each side connected to the former by a ridge and also to the central carina apically, thus enclosing a deep, foveate depression anteriorly on each side, with the epistomal margin slightly raised and punctured, each puncture with a dark suberect seta and separated by carinate margins ; the epistome small, subtriangular, with the lateral bounding margins raised and carinate, the anterior margin feebly arcuate, with a few setae laterally on each side ; genae densely covered with pale scaling, apical part of dorsal margin carinate, with small distant punctures, each with a forwardly directed dark brown seta ; mandibles shear-like, straight in front, bidentate, well developed, projecting well beyond mentum, rugose, with dark brown setae antero-laterally to medial carina, a distinct mandibular scar present ; mentum transverse, oblong, more or less transversely depressed in basal half, the anterior raised part with a few dark brown erect setae and with a faint raised medial line ; submentum with a peduncle and a row of a few stiff setae near anterior margin ; antennae densely squamose, with a circlet of distant setae on the apex of the scape and each of the funicular joints except no. 1, with the club large, oval, infuscated in the middle, with dark brown setae and terminating in a sharp point, joint 2 of the funicle very slightly shorter than 1 (behind), subequal to or slightly longer than 3 ; prothorax broader than long, broadest across middle, with the upper surface scrobiculately punctured, each puncture with a suberect dark brown seta, and densely covered with pale brown ochraceous scaling, with the anterior margin bisinuate, medially slightly sinuate, basal margin truncate, with the lateral angles obtusely prominent, with the dorsal part raised into 2 longitudinal ridges, composed of denuded rugae and confluent or separate tubercles, the posterior one of which on each side is connected with an irregular row of smooth tubercles extending obliquely downwards and forwards towards ocular lobes, centrally a raised line of dense white scaling, laterally with a second row of smooth, round tubercles, extending obliquely downwards and more or less parallel to the first row, the second and third tubercles being larger and projecting more, thus forming the lateral angles of prothorax, with still a third row of about 4 small black glabrous tubercles laterally along

base, and being continuous above coxae as a few small tubercles with row 1 in front and with often a row of very small tubercles intramarginally antero-laterally, with the lateral angular part covered with paler scaling, and the upper part with more brownish scaling; elytra oval, slightly longer than broad, retuse posteriorly, with the upper surface convex, reticulately foveate, with a regular row of foveate punctures on each side of suture, and the foveae on the inflexed margins more regular, each fovea with a backwardly directed dark brown seta near anterior margin, those on the disk being larger and more distinct than those on inflexed margin, the intervals with rows of shining black tubercles; interval 1 more or less costate, with a row of small, compressed, elongate tubercles, each with a long, dark brown seta, the tubercles becoming more rounded and distant and often smaller on the declivity, ceasing about half-way down the declivity; intervals 2 and 4 with a row of very large vaginated and fasciculated distant tubercles, with those at the base confluent, more costate, with those on the declivity towards apex very much smaller and with pale setae, those on interval 4 being feebly fasciculate and provided with pale setae from before middle to apex, the row itself being slightly oblique posteriorly; interval 3 with an irregular row of aggregates of 2 or 3 small, sometimes transversely situated small compressed tubercles, each aggregate with a single long, dark seta, the tubercles become smaller on declivity, not extending to apex and not reaching the base; intervals 5, 6, 7, and 8 each with a row of smooth, shining, round, flat tubercles, each with a small, dark or pale seta on the sutural side, the setae becoming smaller and more indistinct from 5 to 8, row 5 more or less oblique, with the tubercles not reaching the base and extending apically to opposite summit of declivity, 6 oblique, with the tubercles slightly larger than the others and beginning in a prominent conical humeral tubercle, continuous apically with interval 4, row 7 oblique, beginning some distance away from base and ceasing long before apex, row 8 oblique basally, then horizontal, being continuous apically with interval 2, row 9 basally with 2 or 3 large tubercles only, the elytral margin in the apical half on each side with a row of small tubercles to apex, each with a long, pale seta; interstices with dense pale, pale brownish ochraceous and brownish scaling, the basal part, a transverse fascia before middle and along intervals 2 and 4 between the tubercles brown, a broad transverse fascia from humeral tubercle to humeral tubercle and some patches discally on interval 2 and along 3 whitish, the inflexed margins pale; undersurface densely covered with pale scaling, punctured,

each puncture with a dark brown seta; metasternum with a feeble fold in front of posterior coxae; ventrite 1 very feebly sinuate apically; ventrite 2 about equally broad laterally to 4; ventrite 3 sunk a little below level of 2 and 4, slightly shorter laterally than 2 or 4; apical ventrite with larger punctures postero-laterally and apically; legs densely covered with pale scaling, with scattered dark brown setae; tibiae with the anterior and intermediate ones slightly compressed, with the inner apical angles produced into a long, sharp process, with a tuft of setae above it and with a crest of stiff, dense setae extending obliquely inwards from the inner apical process on anterior tibiae, with the outer apical angles produced into a long process, well developed on anterior ones, but often poorly on intermediate ones and very poorly or absent on posterior ones, where the apex is more bevelled along outer edge; tarsi squamose, with long, dark brown setae dorsally, joints 1, 2, and 3 each with a dense tuft of dark setae apically on each side below and a few small setae ventrally (especially on 1), apical joint with more or less 2 rows of distant setae on each side ventrally, claws without a lateral seta. From 4 ♀♀.

Length (excl. rostrum), $8\frac{1}{2}$–12 mm.

Breadth, 5–7 mm.

Hab.—Orange Free State—Parys (Alston).

This species belongs to the *facietatus*, *emeritus*, and *karooensis* group.

Brachycerus damarensis sp. nov.

(Pl. XLIII, fig. 4.) ♀ Type, S.A.M.

Ovate, black, with the head, basal half of rostrum, antennae, genae, the basal part of prothorax, the foveae on the elytra, the undersurfaces and legs with tawny, brown or velvety-brown scaling. Head broad, convex, coriaceous, with scattered punctures, each puncture with a dark seta, the punctures on the vertex not visible, densely covered with dark velvety-brown scaling, more visible and scattered on forehead, the forehead steep, covered with paler, more squamose scaling, and with a faint central raised, often denuded line; eyes without any supr-aorbital ridges; rostrum broad, very slightly shorter than prothorax, the basal incision between it and the head very deep laterally before eyes, the dorsal area increasing in width from base to level of epistome, where it is about two times as broad across the genae as the base, with the upper surface slightly convex, slightly

depressed basally, with a large prominent conical elevation on each side basally, with a deep elongate (often irregular) transverse foveate depression or sulcation laterally and in front of the basal tubercles more or less parallel to basal incision, with a central more or less undulating carina, distinct basally, indistinct apically where it extends to a transverse, slightly arcuate, punctured ridge at about middle of rostrum, which joins a lateral prominent thick ridge on each side above scrobe, extending from the foveate depression in front of basal tubercle to near apex, with a distinct central carina on the apical half, extending from the transverse ridge to epistome and separating a large foveate depression on each side, with the basal half of rostrum to transverse ridge densely covered with tawny or brownish scaling, with some scattered punctures on each side of the central carina and laterally above scrobes, each puncture with an erect or suberect dark brown seta, the basal elevations and the lateral ridges with dark brown setae, those on the ridge being more curved and more depressed, the basal foveate depressions with scattered, long, erect dark brown setae, the apical half of rostrum above coriaceous, black, not covered with scaling, coarsely scrobiculately punctured, the punctures with dark erect setae, the epistomal margin raised, carinate, and densely punctured; epistome subtriangular, with the lateral bounding margins carinate and punctured, basally continuous with apical central carina on rostrum, with the anterior margin slightly sinuate, the surface shining and with a few small scattered punctures (one distinct one on each side apically), each with a small dark brown seta; genae prominent, with the dorsal margin ridge-like, prominent, with distant punctures more or less separated by ridges, each puncture with a dark brown seta, those on the apical half being longer, the apical half densely covered with fulvous or tawny scaling, with a slight transverse basal foveate depression, bounded behind by a ridge forming the ventral margin of scrobe and extending posteriorly projects behind as a striking lobe-like prominence, very prominent in some specimens (especially ♂), not so prominent in some ♀♀; mandibles shear-like, bidentate, the inner tooth larger, with the central carinate part very prominent basally, with the upper surface finely punctured on the inner side basally and at base of two teeth, coarsely, rugosely punctured outwardly, each puncture with a dark brown seta, the setae in the antero-lateral and intramarginal foveate part much longer, apices of mandibles projecting much beyond mentum, a distinct mandibular scar present; mentum more or less trapezoidal, with the corners rounded off, the lateral margins carinate,

less so the basal one, with the surface coriaceous, with a deep or shallow foveate depression on each side, separated by a central raised part or carina, with the anterior raised part broad, punctured, the punctures provided with long, dark setae ; submentum with a small peduncle ; antennae densely covered with dark brown scaling, with dark brown setae arranged in circlets round the apical parts of the funicular joints and around the club, which is oval and terminates in a sharp point, with pale sericeous pubescence apically (which appears pale or whitish only when viewed in profile, otherwise dark brown velvety), with joint 2 of the funicle very slightly shorter than 1 (behind) subequal to 3 in length, but slightly narrower apically, 3 slightly longer than 4 ; prothorax more or less hexagonal, broader than long, bisinuate anteriorly, with the apical margin arcuate medially, the true basal margin deeply sunk below level of disk and feebly sinuate, the basal margin of raised part bisinuate, with the lateral angles tubercularly prominent and a tubercular elevation basally on each side, with the upper surface more or less plane, with an anterior raised, laterally lobed, rugosely punctured, sulcated, and shining callus, each puncture with a depressed, dark seta, with a central longitudinal shallow groove behind the callus, containing a short carina anteriorly (often indistinct), set with irregular, separated, rounded, smooth, and shining tubercles, those bordering the medial groove and those on the lateral angles and posterior elevations as well as the sides being larger, each tubercle with a depressed or suberect dark seta near its anterior or upper lateral margin, with the broad anterior margin and ocular lobes dull opaque-black and free from tubercles, with some tawny or brownish scaling on the basal elevations and basal part of medial groove ; elytra ovate, narrower basally than the prothorax, apically retuse, the sides rounded, broadest at about the middle, with the upper surface convex, coriaceous, reticulately foveate, the foveae arranged in more regular rows on inflexed part and along the sutural row, arranged more or less in a circle round the tubercles on intervals 3, 4, 5, and 6, with row 1 disappearing or becoming very much compressed apically on the declivity, each fovea with a short, backwardly directed, dark seta on the anterior ridge and with traces of tawny or brownish scaling, the intervals with rows of tubercles and slightly converging basally and apically ; interval 1 with a more or less regular row of small, flat, rounded, and often compressed tubercles, those towards the base becoming very small and indistinct, those just before the declivity often larger and flatter, interval 1 on the one side not parallel to interval 1 on the

other side, but converging basally and apically, thus leaving a distinct, smooth, and broader, medial, sutural band, each tubercle with 1 or 2 backwardly directed reddish-brown setae ; interval 2 slightly more elevated, often subcostate, with the tubercles larger, more or less irregular in the middle, where they are often closer together and more conical, the tubercles ceasing on the declivity or becoming very indistinct and confluent with 1 towards apex, each tubercle with 1 or 2 reddish-brown setae ; intervals 3 and 5 with fairly large, conical, more or less irregularly arranged tubercles, more regular apically on the declivity, each tubercle with a prominent bundle of long reddish-brown or orange-coloured setae, the tubercles at base of 3 being confluent and prominently costate, those on 5 being slightly so or not at all, interval 3 extending to apex and 5 ceasing at the summit of declivity ; interval 4 with an irregular row of conical tubercles, more or less duplicated, each tubercle with 1 or 2 long, reddish or orange-coloured setae, the interval being continuous on the declivity with 6 ; interval 6 with a more or less regular row of conical tubercles, each provided with 1 or 2 long, orange-coloured setae ; intervals 7, 8, and 9 with rows of regular or (in some specimens) irregular, smooth, shining, rounded, and slightly flattened tubercles, often close together and thus more or less duplicated, 8 continuous apically with 3, the tubercles on 7 ceasing before apex, those on 9 becoming more prominent and costate near apex, where they also join the apical part of 3, the tubercles with a minute and often absent seta, the setae towards the apex being longer, reddish brown, and duplicated ; interval 10 represented in basal half by a regular row of small, rounded, shining, distant tubercles ; the apical part of suture, as well as the elytral margins, covered with dense tawny or brownish scaling ; undersurface with tawny, greyish or brownish scaling, more or less rubbed off or darker medially on the abdomen and apical segment ; metasternum coarsely punctured (especially before coxae), each puncture with a reddish seta, no distinct antecoxal folds ; abdomen with the ventrites coarsely punctured, ventrites 1 and 2 more so, the apical one more rugosely punctured, the punctures with reddish or tawny setae, ventrite 1 with the apical margin sinuate, ventrite 2 broader laterally than either 3 or 4, ventrite 3 sunk below level of 2 and 4, very slightly narrower laterally than 4, the apical ventrite as well as 3 and 4 comparatively larger in ♀, the apical ventrite slightly depressed medially apically in ♂ ; legs with dense tawny, brownish or velvety-brown scaling, with the tibiae often slightly darker in colour ; femora with short, dark or reddish-brown scattered

setae, with the apices more or less punctured; tibiae more or less compressed, subcarinate dorsally, more or less subscabrous in apical half, with scattered, dark brown and reddish setae, which are longer below, with the inner apical angles bluntly produced into a subprominent process, covered with dense, golden yellow, velvety and sericeous fine setae, extending round the apex, the outer apical angles rounded, not produced into a sharp process; tarsi densely covered with dark, velvety-brown or tawny scaling, with scattered dark setae above, with joints 1, 2, and 3 provided with a shallow (often indistinct) groove below, small dark setae and a dense pad-like tuft of fine, golden yellow, velvety and sericeous setae apically below on each side, the apical joint with more or less 3 rows of dark setae below and dense fine, golden setae apically, claws with a long, lateral, basal seta below and 2 shorter ones, one on each side near the base above. 1 ♂ is slightly smaller than the other and the ♀♀. From 4 ♀♀ and 2 ♂♂.

Length (excl. rostrum), 19–26 mm.

Breadth, 10–14 mm.

Hab.—S.W. Africa (Damaraland)—Outjo (M. Exp.), N.E. Damaraland (Eriksson).
(Ovamboland)—Kunene River (M. Exp.).

This species was obtained from the roots of *Aloe zebrina*, on which it probably feeds. It is probably allied to *cornutus* Linn.

Brachycerus koebergensis (Pér. in litt.) sp. nov.

(Pl. XLIII, fig. 7.) ♂ Type, S.A.M.

Black, ovate, densely covered with pale ochraceous and whitish scaling. Head convex, the vertex with scattered punctures, each with a dark seta, more or less covered with dense pale scaling, forehead sloping, with a central foveate depression, bounded on each side by a fairly broad denuded ridge, the surface with coarse punctures, each puncture with a dark erect seta and covered with pale scaling; eyes with a supra-orbital ridge, produced posteriorly into a prominent conical point, with the dark setae on the ridge and in the punctures at its base, erect, and much longer than those on the rest of the forehead; rostrum to the apices of the mandibles very slightly longer than the prothorax, the incision between it and the head distinct, much deeper antero-laterally in front of the eyes, with the dorsal area gradually widening from base to beyond middle, broadest across the genae, thence rapidly narrowed to apices of mandibles, with the upper

surface convex, the basal part medially raised into a tubercular prominence higher than level of forehead, with a foveate depression on each side in front of it, with a more or less wavy denuded central carina, extending from basal tubercle to epistome, the surface uneven owing to small foveate depressions on each side of carina, containing punctures and long, dark, erect setae, surface densely covered with pale ochraceous scaling; epistome triangular, with the lateral bounding margins carinate and bearing a row of stiff, dark setae on the outside, the 2 or 3 at the apex being more prominent and longer, with the anterior margin slightly sinuate, with a row of stiff, erect, dark setae in the depression near and more or less parallel to the anterior margin, the lateral ones on each side being longer; genae densely covered with pale ochraceous scaling, with some scattered punctures bearing dark, forwardly directed setae, those on the ventral margin being stouter and much longer, with a distinct small, denuded, tubercular prominence on the posterior ventral aspect, the dorsal margin not carinate anteriorly; mandibles shear-like, bluntly bidentate, straight in front, projecting much beyond mentum, punctured laterally to the medial carinate ridge, each puncture with a dark seta, those laterally being thicker and longer, with a tuft of setae closer together antero-laterally on each side, a distinct mandibular scar present; mentum transverse, more or less kidney-shaped, coriaceous, with a shallow foveate depression on each side, separated by a central raised part, with the anterior part raised and bearing a few erect, dark setae, some long ones on each side, the posterior margin slightly elevated laterally; submentum without a peduncle, with a row of setae near its anterior margin, 4 or 5 of which are very long and stout, projecting downwards some considerable distance; antennae densely covered with brownish scaling, with dark setae, arranged in circlets round the apical parts of the funicular joints (except on joint 1, which bears no setae) and on the club, with joint 2 of the funicle longer than 1 (behind) and longer than 3, the club darker, oval, acuminate, produced into a point, not so bevelled off on one side apically as in many other species; prothorax broader than long, about as broad apically as basally, with the apical margin bisinuate, medially apically slightly sinuate, with the sides gradually widened to about middle, where it is widest across the prominent lobe-like and rounded lateral angles, thence abruptly narrowed and more or less parallel, with the basal margin arcuate, with the upper surface convex, with a prominent raised ridge on each side dorsally, connected apically by the medial, elevated, apical margin and at about middle by a transverse ridge, thus

enclosing an anterior and a posterior foveate depression, both of which contain a central carina, the carina in the anterior one with a few small, black, shining granules, the dorsal ridges with deep foveate punctures, separated by denuded rugae and bearing dark suberect setae, the dorsal surface lateral to the ridges pitted or honeycomb-like with large foveate punctures, each fovea with a short, dark seta near the margin, the lateral angles composed of 4 or 5 large black tubercles, extending obliquely downwards and forwards and with a slight ridge composed of 2 or 3 smaller tubercles just below it, with a row of 4 or 5 small, rounded, shining, separated tubercles on each side laterally along the base and a few small ones anteriorly, arranged more or less round the lateral prominences, with the entire surface densely covered with pale ochraceous scaling, with the golden-yellow cilia on the smooth ocular lobes conspicuous ; elytra oval, with the basal margin sinuate, the sides slightly rounded, broadest at about middle, and the apical part retuse, with the upper surface convex, with rows of irregular foveae, each fovea with a short or minute dark, seta anteriorly ; intervals 1 and 2 with a row of very small, separated, shining granules, becoming inconspicuous and ceasing beyond middle and on declivity ; intervals 3 and 5 each with a row of very large conical tubercles, the basal half of 3 being prominently costate, the tubercles on 3 vaginated, with their lateral faces smooth, black, and shining, becoming smaller towards apex on declivity, each tubercle with a tuft, arranged more or less as 2 bundles, of very long, dark, stout setae, the setae pale on the declivity, the tubercles on 5 with only their outer faces smooth, black, and shining, more conical, not vaginated, each with a bundle of very long, pale setae, the setae on the 3 basal ones being dark ; interval 4 narrow, costate from before middle to declivity (often continued as a narrow costate line to apex), with a row of separated, small, shining, rounded tubercles, ceasing at summit of declivity and becoming smaller anteriorly cease some distance from base, each tubercle with a short, dark, backwardly directed seta a little distance behind it ; interval 6 costate from before middle to opposite summit of declivity, with a row of separated, small, rounded, shining tubercles (slightly larger than those on 4), ceasing a good distance away from base ; interval 7 with a row of fairly large tubercles (smaller than those on 5), the first or humeral tubercle very prominent, conical, with its lower face smooth, black, and shining, with a tuft of long pale setae above, the second and third tubercles less prominent, but also projecting, and with their outer faces glabrous, shining, the rest flattened, black, shining, continuous

apically with interval 5; interval 8 with only 3, 4, or 5 separated, flat tubercles, the first one behind humeral tubercle; interval 9 with a row of larger, shining, black, flattened tubercles, those on basal half being larger, more elongate and closer together, then 2 widely separated ones and a few more rounded apical ones, the last of which bears long, pale setae, and is continuous with intervals 4 and 3; interval 10 represented basally as 4 or 5 small, rounded, and separated tubercles; the upper surface densely covered with pale ochraceous scaling, brownish along suture from middle to apex, along intervals 3 and 4 and between intervals 5 and 6; undersurface densely covered with pale scaling; metasternum without any antecoxal folds, with long, scattered, dark setae; abdomen with scattered, dark setae, ventrite 1 sinuate apically, ventrite 2 slightly broader laterally than either 3 or 4 and raised above their level, ventrite 3 very slightly narrower than 4 laterally, the apical ventrite with a broad, fairly deep, transverse depression on the apical half in ♂; legs densely covered with pale scaling (the tibiae more brownish on upper surfaces), with fairly long, conspicuous, dark, separated setae, more or less absent on apical half of the ventral surfaces of femora, slightly denser and longer on ventral surfaces of tibiae; tibiae with the inner apical angles produced into a long process, with a crest of dense setae above anterior ones, but with only a tuft of short setae over the intermediate and posterior ones, with the outer apical angles rounded, not produced into a process; tarsi densely covered with pale brownish scaling, with long, dark setae above on first 3 joints and also below on apical joint, with a tuft of long, dark setae apically below on each side of joints 1, 2, and 3, claws without a lateral, basal seta. From 2 ♂♂.

Length (excl. head), 10 mm.

Breadth, 6 mm.

Hab.—Cape Colony—Koeberg, near Cape Town.

This species is related to *inordinatus* Fhs., but differs by not having a central carina on the head, the absence of a transverse row of 4 tubercles near the base of the rostrum and by the absence of the produced outer apical angles on the tibiae, etc.

Brachycerus meracus (Pér. in litt.) sp. nov.

(Pl. XLII, fig. 3.) ♀ Type, S.A.M.

Black, oval, densely covered with dull greyish, whitish, and cinnabar-red scaling. Head with the vertex densely covered with dull greyish

scaling, more or less hiding some scattered punctures, each with a dark brown seta, forehead slightly excavate, with a smooth, central carina, more distinct basally, with the surface covered with dense cinnabar-red scaling, with a few scattered punctures, each with a dark, suberect seta ; eyes large, with prominent carinate supra-orbital ridges, raised above level of forehead, the ridges with small, scattered punctures and short, suberect, dark setae ; rostrum about twice as long as head, about as long as prothorax, plump, with the incision between it and the head deep and distinct antero-laterally in front of eyes, with the anterior margin of incision (basal margins of rostrum) ridge-like, with the sides gradually widening from base to near apex, where it is widest across genae and epistome, with the upper surface slightly convex, basally slightly elevated above level of forehead, with a distinct, raised, smooth, often shining, central carina, extending from base to near epistome about opposite the level of anterior part of scrobes, where it divides into 2 more or less wavy ridges, enclosing a few large punctures, each ridge continuous apically with apical margin on each side of epistome, with a depression laterally on each side in front of basal ridges and above scrobes, and a prominent, conical, tubercular elevation on each side in front of lateral depressions and above scrobes at about middle, the tubercle extending backwardly and inwardly as a faint ridge, with a slight foveate depression on each side of central carina and in front of tubercles, with small, scattered punctures, each with an erect or recurved, short seta, with the entire surface more or less densely covered with dull greyish scaling, the scaling dorsally at the base being cinnabar-red ; epistome small, semicircular to subtriangular, with the lateral bounding margins thick, smooth, punctured, carinate, the anterior margin almost straight, feebly arcuate, with a tuft of 2 or 3 dark erect setae laterally on each side, with the deep foveate impression laterally on each side of bounding margins punctured and setiferous, the apical setae being the longest ; genae prominent, densely covered with greyish scaling, with scattered punctures, each with a short, dark seta, with the apical part of the dorsal margin carinate ; mandibles shear-like, bidentate, with the apices truncate, with the medial longitudinal carina sharp, sinuate, and extending to apex of apical tooth, with the mandibular surfaces external to it punctured, each puncture with a dark, erect seta, mandibles comparatively short, projecting only slightly beyond mentum, with a mandibular scar ; mentum trapezoidal, with the corners rounded, with a shallow foveate depression on each side, separated by a central raised or carinate part, not

reaching the base, with the apical part raised and punctured, each puncture with a stiff, dark seta; submentum without a peduncle, with a few setae more or less arranged in a row near its apical margin; antennae slightly compressed laterally, covered with dense, dark, greyish scaling and dark setae arranged in circlets around the apical parts of joints and club, with joint 2 shorter than 1 (behind), slightly shorter than 3, joint 3 slightly shorter than 1 (behind), club rectangular, about as broad apically as basally, slightly broader than joint 7, slightly flattened on anterior surface, with the bevelled apex terminating in a point; prothorax broader than long, bisinuate anteriorly, with the dorsal apical margin feebly arcuate, the ocular lobes well developed, the sides at about the middle produced into an angular, tubercular prominence, slightly broader basally than apically, with the basal margin more or less truncate, with the upper surface convex, with an anterior, central, foveate depression, reduced from middle to base into a groove containing a central ridge, reaching neither the apex nor the extreme base, with a tuberculated ridge bounding the apical fovea on each side and an oblique tuberculated ridge on each side discally in basal half on each side of central groove, the tubercles on the ridges smooth, shining, often confluent and more or less transverse, rugae-like, each with a recurved, dark brown seta, laterally 2 to 6 shining tubercles more or less arranged in an irregular, oblique row on a ridge, one of which, situated at about the middle, is larger and projecting prominently outwards, with a few, flattened, rounded, shining tubercles laterally in a row along base on each side and a few shining granules arranged more or less round the lateral prominence anteriorly, with a glabrous granule on each side above and slightly behind the large lateral tubercle, with a few scattered, pit-like, foveate punctures laterally and around lateral angles, with a few smaller ones in foveate depression and in groove on each side of medial ridge, the surface densely covered with greyish scaling, the fovea and the medial posterior ridge as well as the lateral parts with dense white scaling, the dorsal ridges with dense cinnabar-red scaling and some orange-red scaling on the posterior oblique ridges and extending obliquely downwards to the lateral prominences; elytra only very slightly longer than broad, slightly narrower basally than the prothorax, retuse apically, the sides slightly rounded, broadest at about middle, with the upper surface convex, with rows of foveae, those along rows 1, 7, 8, and 9 more or less regular, those along rows 2, 3, 4, 5, and 6 more irregular, each fovea with a dark brown, slender, erect seta on its transverse anterior margin, the

intervals with rows of tubercles ; intervals 1, 3, and 5 each with a row or a few small tubercles, 1 with only 2 or 3 small tubercles or granules (often entirely absent) beyond middle just before summit of declivity, each with a backwardly directed dark seta, 3 with often only 2 or 3 tubercles at summit of declivity or with a row of small tubercles (smooth and shining externally) beginning at about middle and extending to near apex, where they become continuous with those on interval 8, the tubercles being larger and closer together at summit of declivity, decreasing in size down the declivity, where they are either small, granular, or entirely absent, each with a fine, erect, dark seta, 5 without any tubercles or only 2 or 3 small ones at about middle ; intervals 2, 4, and 6 each with a regular row of large, subconical, separated, compressed tubercles, those on 1 slightly larger, the basal ones being confluent, boss-like, costate, and multigranular, the rest in the row with their lateral faces smooth and shining to slightly down the declivity from where they decrease in size to the apex, each with a number of backwardly directed, dark setae above, the number of setae decreasing from basal ones to apical ones, 4 with the basal ones confluent, costate, and prominent, the rest in the row with only their external faces smooth and shining, extending to near apex, each with 3 to 5 dark, depressed setae, 6 with the tubercles smooth and shining on their external faces, with the first or humeral tubercle large, conical, projecting outwards, the others decreasing in size and ceasing at about level of summit of declivity, the apical ones closer together, each with 2 to 4 dark, depressed setae above ; intervals 7, 8, and 9 each with a more or less regular row of rounded, flattened, shining tubercles, 7 with 3 or 4 separated tubercles, not reaching the base and apex, 8 with the tubercles not reaching the base and decreasing in size towards the apex is continuous with 3, 9 with the tubercles reaching the base, where they are larger, with those near apex slightly wider apart, continuous apically with 2 ; interval 10 represented basally only as a short row of 4 or 5 flattened, shining tubercles ; interstices densely covered with greyish or whitish scaling, with the upper surfaces of the tubercles on the declivity on interval 2, those on intervals 4 and 6 with dense chalky-white scaling, the basal confluent tubercles on intervals 2 and 4 and the spaces between or the bases of the tubercles along 2, 4, and 6 with dense cinnabar-red scaling, with an infusion of orange-coloured scaling along the bases of the upper surfaces of the tubercles along 2, 4, and 6 ; undersurfaces densely covered with dull greyish scaling ; metasternum with scattered

punctures and dark setae, with slight antecoxal folds ; abdomen with scattered punctures and dark setae ; ventrite 1 feebly sinuate apically, ventrites 2, 3, and 4 more or less subequal laterally, ventrite 3 very slightly sunk below level of 2 and 4, apical ventrite with a slight foveate depression apically in both ♂ and ♀, the ventrite is, however, comparatively smaller, the apical margin more truncate and the foveate depression more transverse in ♂ ; legs densely covered with greyish scaling, the femora with a faint subapical annulation slightly paler, more whitish, with scattered, short, dark brown setae ; tibiae with scattered dark brown setae, the setae being more slender and slightly longer than those on femora, with the inner apical angles produced into a sharp mucro, with the outer apical angles on the intermediate and anterior ones produced into a broad, rounded, prominent process, better developed in ♀ ; tarsi with a circlet of dark, separated setae apically and dorsally on joints 1, 2, and 3, and a tuft of only a few, dark, stiff setae on each side apically below, joint 4 with 3 or 4 circlets of dark setae dorsally and 3 setae in a row on each side below, claws without a basal seta. The ♂ specimen is slightly smaller than the ♀♀. From 1 ♂ and 2 ♀♀.

Length (excl. head), 6–7½ mm.

Breadth, 4–5 mm.

Hab.—Cape Colony—Constantia (Cape Peninsula).

Brachycerus rhodesianus (Pér. in litt.) sp. nov.

(Pl. XLII, fig. 1.) ♂ Type, S.A.M.

Black, ovate, densely covered with pale ochraceous, mud-coloured, earthy to reddish-brown and dark scaling. Head convex, densely covered with mud-coloured or earthy-brown scaling, with scattered punctures, more or less hidden by the scaling, each with a short, dark, depressed seta, with a slight depression laterally above each eye ; eyes with a slight, smooth, supra-orbital ridge, more visible posteriorly ; rostrum about as long as or slightly longer than prothorax, separated from head by a transverse impression, the sides very gradually widening from base to very near apex, where it is widest across the genae and epistome, with the upper surface densely covered with mud-coloured, earthy, or reddish-brown scaling, slightly convex above scrobes, slightly depressed basally between the basal elevations, with an angularly rounded, raised basal protuberance or ridge on each side, raised above level of forehead and eyes, with the lateral margins of the dorsal area ridge-like, subcarinate, and even carinate (in specimens

where the indumentum has been removed), more so above scrobes, extending from basal ridges slightly inwards and then outwards, forming a slight prominence on each side just above apical end of scrobe, with a very short central apical carina, often more distinct in ♂, joining the posterior angle of epistome, with the lateral parts above scrobes more or less steep, slightly impressed before eyes, with the upper surface punctured, the punctures (hidden by scaling) each with a short, erect, or suberect dark seta ; epistome small, ∩-shaped, subtriangular to triangular (especially in some ♂♂), with the lateral bounding margins smooth, carinate, the anterior margin sinuate, with a medial semicircular depression, with 2 or 3 dark, stout setae at the ends of the depression on each side apically, with an apical foveate depression, containing a few deep punctures and dark setae laterally on each side and external to bounding margins, the apical setae being the longest ; genae ovate (rostrum in profile), convex, not projecting prominently outwards, the dorsal margin apically feebly carinate, punctured, the punctures with a short, dark seta and densely covered with mud-coloured or earthy-brown scaling ; mandibles shear-like, bidentate, projecting beyond mentum, with the central basal part raised, ridge-like, where the anterior margin of epistome is slightly raised on each side to cover it, in profile they are not straight in front, with the lateral, basal parts uneven, owing to rugae and a few coarse punctures with setae, without a mandibular scar ; mentum transverse, more or less kidney-shaped, with a foveate depression on each side, separated by a central, raised, carinate part, the carina often not well developed or not reaching the base, with the anterior part raised and punctured, each puncture with a stiff, long, dark seta ; submentum without a peduncle ; antennae densely covered with earthy-brown or mud-coloured scaling, with circlets of setae around the funicular joints and the club, with joint 2 subequal to or slightly longer than 1 (behind) (♀) subequal to or slightly shorter than 1 (behind) in ♂, with joint 3 slightly shorter than 1 (behind), and shorter than 4, with joint 4 about as long as 2 in ♂ subequal or even shorter in ♀, club elongate, very gradually widening from base to apex, where it is broader than joint 7 of funicle, often more club-like and comparatively wider apically in some specimens, the apex more bevelled off on dorsal part, thus showing a deep U-shaped sinuation on dorsal apical margin, enclosing a slight depression, the apex with sericeous pubescence, the apex of club terminating in a sharp point opposite the U-shaped sinuation ; prothorax broader than long, bisinuate apically, with the medial, apical margin arcuate,

the apical part constricted intramarginally, especially laterally, the sides roundly ampliated, with the basal margin truncate, sunk below level of disk, with the upper surface convex, with 3 apical, foveate depressions, one centrally and separated from a lateral one on each side by a distinct ridge, the lateral ones more or less confluent with the lateral apical constriction, with a central furrow, extending from apical fovea to base, where it is deep, distinct, and groove-like, the medial part of furrow often absent or shallow, with often a shallow depression laterally on each side at about middle of disk, the surface more or less uniformly covered with pit-like punctures, each with a short suberect seta on its margin, densely covered with mud-coloured or earthy-brown scaling and indumentum, which often hides all signs of punctures; elytra roundly ovate, with the sides slightly more rounded in ♀, retuse posteriorly, convex above, reticulately foveate above, the foveae on rows 1, 7, 8, and 9 more regular, those on 2, 3, 4, 5, and 6 more irregular, more or less having the appearance of being arranged in a circle round the tubercles on intervals 3, 4, 5, and 6, each fovea on disk with a minute, dark seta on its anterior margin and projecting over it, the intervals with regular rows of separated, smooth, rounded, shining tubercles, each with a dark, erect seta postero-laterally at its base on the sutural side and often closely pressed to it; interval 1 devoid of tubercles; interval 2 with the tubercles not reaching the base and stopping on the declivity; interval 3 with the basal ones confluent, costate, and with a brush-like tuft of velvety-black or dark-brownish erect setae, with 4 or 5 basal tubercles before the middle, often larger and closer together than the rest in the row; interval 4 with the tubercles not reaching the base and continuous apically with 8 or often with 7 too; interval 5 with the tubercles reaching the base, the few basal ones more prominent and costate, continuous apically with 7 or ceasing in angle formed by 7 and 4; intervals 7, 8, and 9 with the tubercles slightly more flattened and closer together, with 7 and 9 confluent basally, with those on 9 often becoming smaller, wider apart, even disappearing beyond middle, but reappearing again at apex, where they are continuous with interval 3; interstices densely covered with black, mud-coloured, pale ochraceous, earthy-brown and reddish-brown scaling, a broad sutural band between intervals 3 and 3 on each side on declivity, a broad basal patch between intervals 3 and 5, often extending beyond middle, as well as some patches discally and along interval 2 pale ochraceous or mud-coloured to earthy-brown or reddish-brown, the rest of the surface with black scaling; undersurface densely covered

with mud-coloured or dull earthy-brown scaling; metasternum with scattered punctures, each with a dark seta, with a distinct, ridge-like, antecoxal fold laterally on each side; abdomen punctured, more coarsely on ventrite 1 and ventrite 5, with dark setae, ventrite 1 with the apical margin almost straight, feebly sinuate, ventrite 2 medially, transversely, ridge-like and raised, subequal to 4 laterally, ventrite 3 sunk below level of 1 and 2 and 4 and 5, slightly more so in ♂, much narrower laterally than either 2 or 4, apical ventrite slightly depressed basally on each side, comparatively larger in ♀, apically, centrally, slightly depressed and apically more truncate in ♂; legs densely covered with mud-coloured or dull earthy-brown scaling, the femora with the anterior ones slightly thicker than the others, the posterior ones more curved, flattened (especially basally) on inner surfaces, with scattered, short, dark setae and a few separated coarse punctures apically, the setae below slightly longer and more erect; tibiae with separated, dark setae, those below longer, with the inner apical angles produced into a sharp mucro, better developed on anterior and intermediate ones, with a tuft of dark setae above each and a crest of dark setae on anterior ones on inner surfaces apically, with the outer apical angles on anterior and intermediate ones produced into a broad, rounded, prominent process, better developed and longer in ♀, absent in both sexes on posterior ones; tarsi with scattered, dark setae above, joints 1, 2, and 3 with a tuft of dark setae on each side apically below, joint 4 with a row of 3 dark setae below on each side and often 2 or 3 subventral ones in a row lateral to these, claws without a basal seta. From 10 ♀♀ and 5 ♂♂.

Length (excl. head), 8–11½ mm.

Breadth, 4⅔–6½ mm.

Hab.—Transvaal—Shiliowane, Zoutpansberg.
Leydsdorp (J. Naughton).
Rhodesia—Bulawayo (Selous).
Matopos (Sheppard). (*Type* from here.)

This species is related to *costatus* Ghl., from which it differs by the more rounded, convex, not tuberculate, less laterally-angulated prothorax, and by the more prominent and larger tubercles on the elytra, etc.

Brachycerus rikatlensis (Pér. in litt.) sp. nov.

(Pl. XLII, fig. 5.) ♀ Type, S.A.M.

Black, ovate, with sparse, separated, pale scaling above, with concentrated patches of yellow scaling on prothorax, elytra, the

legs, and abdomen. Head broad, coriaceous, minutely and densely punctured on vertex, each puncture with a minute dark seta, the forehead with some coarse, deep, scattered punctures, each with a short, erect seta; eyes with a prominent, lobe-like, punctured supra-orbital ridge anteriorly; rostrum plump, about as long as prothorax, a little more than two and a half times as long as head, with the incision between it and the head deep and sulcate, Λ-shaped from a dorsal view and extending down antero-laterally in front of eyes, the incision is interrupted dorsally at the apex of Λ by a short central carina, joining forehead to basal part of rostrum, with the sides gradually widening from base to beyond middle, opposite the genae, where it is the widest, thence rapidly narrowed to apices of mandibles, with the basal margin bounding the basal incision, ridge-like, slightly raised, but not above level of forehead, produced basally into an angular or lobe-like part fitting into Λ-shaped basal incision, with the upper surface honeycomb-like, scrobiculate, set with deep punctures, each with a short backwardly directed dark seta, more or less plane or slightly depressed in basal half, the sides of dorsal area slightly raised, ridge-like above the scrobes, with a foveate depression on each side towards the apex, separated by a slightly raised, central, carinate ridge, extending from about middle to epistome; epistome more or less semicircular to subtriangular, with the lateral bounding margins carinate and punctured, the surface shining, with a few punctures on the depression, the anterior margin sinuate, with a deep, sulcate depression on each side laterally of the bounding margins, often bearing 1 or 2 long, dark setae apically; genae coarsely punctured, each puncture with a forwardly directed seta, dorsal margin not carinate apically, only slightly raised; mandibles shear-like, bidentate, longitudinally rugose and punctured external to prominent medial carinate part, projecting beyond mentum, with a vestige of a terminal mandibular scar; mentum transverse, oblong, with a foveate depression on each side, separated by a central carina, with the anterior part raised, punctured, and with a few long setae; submentum with a short peduncle; antennae with sparse brownish scaling, with short, dark setae, arranged in circlets around the apical parts of funicular joints and club, absent on 1 and scape, with joint 2 shorter than 1 (behind), subequal to 3, the club oval, often more elongate in ♂, terminating in a sharp point; prothorax more or less hexagonal, broader than long, with the anterior margin bisinuate, the medial apical part slightly arcuate, with the lateral angles tubercularly prominent, the true basal margin truncate, slightly sunk

below level of disk, about as broad basally as apically, with the upper surface convex, honeycomb-like, scrobiculate, pitted, each pit with a short, suberect seta on its side, with roundish, shining tubercles laterally on the margins of the pits, those forming the lateral angles more prominent and larger, each tubercle with a puncture, containing a short, dark brown seta, discally and apically with 2 costate ridges, punctured anteriorly and enclosing an elongate, deep, central, foveate depression, which interrupted medially, is continued in basal half as a deep, central sulcation, often bounded on each side by some smooth, elongate or confluent, flattened tubercles, the apical foveate depression in some with a faint central carinate line, with a patch behind each eye and one on each side basally in line with it, as well as the inferior surfaces above the coxae of dense yellow scaling; elytra oval, the sides slightly more rounded in ♀, apically retuse, with the upper surface convex, with more or less regular rows of foveae on striae 1, 2, 7, 8, and 9, and more or less irregular rows on striae 3, 4, 5, and 6, with a small tubercle or granule, bearing a pale seta on anterior raised margin of each fovea along striae 1, 2, 3, 4, and 5, the granules decreasing in size beyond middle, becoming indistinct or disappearing on declivity and laterally on inflexed margins, the intervals with regular, often irregular rows of shining tubercles; interval 1 with a row of small, separated, shining, smooth tubercles, those in basal half more elongate and those posteriorly on the declivity to apex becoming more rounded, smaller, each tubercle with a puncture and a short depressed seta; intervals 2, 4, and 6 each with a row of separated, rounded, shining tubercles, each with a puncture and a depressed seta, those on 2 becoming smaller apically on declivity, ceasing some way down the declivity or just before apex, 4 often continuous apically with 8, those on 6 not reaching base and ceasing in angle formed by junction of 5 and 7 at about level of summit of declivity, 2 and 4 often with the tubercles arranged irregularly or with very small tubercles; intervals 3 and 5 more costate, with a row of large, shining tubercles, larger than the others, those in basal half larger, more elongate, with the few at the base prominent, more or less confluent, those beyond middle on declivity becoming smaller, more conical, 3 continuous apically with 9 and 5 with 7, each tubercle with 2 or 3 confluent punctures and 2 or 3 dark, depressed, backwardly directed setae; interval 7 reaching the base, with often a few larger tubercles in basal half; intervals 8 and 9 with a row of smooth, shining, rounded, flattened tubercles; interval 10 represented as a row of rounded, flattened tubercles, extending from base to about

middle; interstices bare or with sparse, scattered pale scales, with dense pale yellowish or yellow scaling along intervals 3 and 5 from base to middle or beyond middle and often basally along 7; metasternum covered laterally with a patch of dense yellow scaling, coarsely punctured, each puncture with an orange-red seta, with slight antecoxal folds; abdomen with scattered coarse punctures, each with an orange-red or reddish-brown seta, with ventrite 1 slightly sinuate apically, ventrites 2, 3, and 4 with a spot laterally and apically on each side of yellow scaling, ventrite 2 very slightly longer or subequal to 4 laterally in ♀, distinctly longer in ♂, ventrite 3 sunk below level of 2 and 4, more so in ♂ and laterally narrower than 4, apical ventrite comparatively larger in ♀, with a slight central, apical, foveate depression in ♂, more truncate apically in ♂; legs with a patch of yellow scaling and orange-red setae on coxae, the undersurfaces and a subapical annulation on the femora, the basal two-thirds of the tibiae (excepting the extreme base) covered with dense yellow scaling; femora more or less scabrous, the outer surface of the anterior ones granulate, with scattered punctures, the apices more coarsely punctured, each puncture with either a dark brown, reddish-brown, or orange-red seta; tibiae subscabrous, with scattered dark brown or reddish-brown setae, the anterior and intermediate ones slightly, laterally compressed in apical half, with a carinate dorsal edge, more carinate apically, where it is continuous with edge of outer apical angle, with the inner apical angles produced into a sharp process, with a tuft of reddish-brown or orange setae external to it and on anterior ones with a crest of setae above it, with the outer apical angles on anterior and intermediate pairs produced into a broad, rounded process, broadly, lobately rounded, better developed on anterior ones and in ♀, in ♂ blunter, more broadly rounded, edge of the outer apical angles with fine orange-red setae, the posterior tibiae with the apex bevelled off, the 2 margins with fine orange-red seta, the dorsal angle obtusely angulated; tarsi with scattered setae above, with a tuft of brownish or orange-red setae apically below on each side on joints 1, 2, and 3 and a row of setae below on each side on joint 4, claws without a basal, lateral seta. From 4 ♀♀ and 3 ♂♂.

Length (excl. head), 10–14 mm.

Breadth, 6–8½ mm.

Hab.—S.E. Africa (Delagoa Bay)—Rikatla.

Brachycerus verruculosus (Pér. in litt.) sp. nov.

(Pl. XLII, fig. 7.)

Black, ovate, covered with small separated whitish and pale brownish squamose scales, the scales often almost entirely abraded. Head with the vertex coarsely, closely punctured, each puncture with a depressed seta, forehead not depressed, with coarser punctures, further apart, with the upper surface often covered with sparse white or pale scaling; eyes without a supra-orbital ridge; rostrum broad, head and rostrum together about as long as prothorax, with the basal transverse incision between it and the head distinct, but not deep, laterally gradually widening from base to near apex, where it is broadest across the genae, with the upper surface slightly convex, raised above level of head, with a prominent, outward and slightly upward, often backward directed cornu or conical tubercle at the base on each side, with a faintly raised, carinate, finely punctured line, extending from the base of each inwardly to the basal incision from which point there also extends a central, basal carina to between the tubercles or a little way down in front of them, the sides of this upper dorsal area more or less parallel or only slightly widening from base of tubercles to epistomal margin, slightly, transversely depressed before epistome, with the surface honeycomb-like, scrobiculately punctured, the punctures with short, stout, dark setae, with often sparse, whitish or greyish scaling; epistome small, subtriangular, with the lateral bounding margins carinate and the anterior margin sinuate, with a few, long, dark setae laterally on each side and a long, dark seta on the surface of epistome on each side near anterior margin; genae scrobiculately punctured, each puncture with a forwardly directed, short, dark brown seta, covered with sparse greyish scaling, dorsal margin not carinate apically, only slightly raised; mandibles shear-like, bluntly bidentate, more or less shining anteriorly, with the part outside to medial basal raised line rugosely punctured, apices projecting beyond mentum, with no visible mandibular scar; mentum oblong, transverse, deeply depressed behind, with the anterior part raised, punctured; submentum with a short peduncle; antennae covered with greyish, separated scales, with dark setae arranged in circlets around funicular joints and club, absent on joint 1, with joint 2 shorter than 1 (behind) and very slightly shorter than 3, club oval, terminating in a very sharp terminal point; prothorax broader than long, with the anterior margin deeply bisinuate, the

medial apical margin more or less truncate, overhanging the head, with the lateral angles prominent, angularly rounded, with the basal margin truncate, with the upper surface convex, with an apical, foveate depression, bounded on each side by a scrobiculately punctured ridge, which also bounds an apical, smaller fovea on each side, with a shallow, central furrow, containing a carina extending from apical fovea to base, scrobiculately punctured discally, the punctures bearing short, stout, dark setae, with the lateral angular part and under-surfaces more or less tubercular, the dorsal surface of the tubercles with a pit bearing a short, dark, depressed seta, the interstices without scaling or with sparse whitish or greyish scaling, often concentrated medially as a central line and laterally on the lateral angles; elytra ovate, with the sides slightly more rounded (in ♀ specimen), the apex retuse, broadest at about the middle, with the upper surface convex, minutely and densely punctured (more apparent when scales are absent), with more or less regular rows of punctures in the striae or sulci on the disk, each puncture with a small, depressed, dark seta, the punctures laterally larger, more foveate and not in straight rows; intervals 1 and 2 about as broad as the striae, convex or slightly convex to beyond middle on declivity, with a row of separated punctures (often absent), each with a dark, depressed seta; intervals 3 and 5 convex, more or less costate, with a row of large, rounded, verrucose, separated tubercles, each with a few short setae, the basal 2 or 3 confluent on 3, not so prominent on 5, the apical ones on declivity on 3 decreasing in size to apex, where they are closer together, interval 5 ceasing near apex; interval 4 continuous apically with 8, often wavy, with a row of small, separated, minutely punctured, subtubercular prominences, ceasing on declivity, each with a puncture and a dark seta, in the ♀ specimen with only a row of separated punctures, each with a short, dark seta; interval 6 with a row of minutely punctured tubercles, distinct in ♂♂, obsolete in ♀, joining 8 at about the level of the summit of declivity, each with a short seta; interval 7 continuous basally with 9 and behind this with 3 or 4 large tubercles, obsolete in ♀, then a few smaller, shining ones or a shining subtubercular ridge, extending to angle formed by junction of 6 and 8; interval 8 not reaching base and extending as a shiny ridge (♀) and more or less as a subtubercular ridge (♂), the tubercles being visible only as separated, small, shining bosses, each with a short, dark setae (in ♀ only as a row of punctures bearing setae); interval 9 as a shiny, subtubercular ridge (♂), the tubercles becoming more obvious and distinct apically, where the interval is continuous

with 3, in ♀ as a ridge with a row of punctures only; interval 10 represented in basal half as a shiny ridge, parallel to margin, ceasing opposite sinuation in elytral margin at about the middle; apical part of elytral margins on each side with a row of small, shining, rounded, separated tubercles; interstices bare or covered with small, separated, whitish scales, concentrated as bands along and between intervals 4 and 5 and 6 and 7, with more brownish scaling along striae 2, 3, 5, 7, 8, and 9; undersurfaces covered with sparse, separated, whitish scales; metasternum coarsely punctured, each puncture with a short, dark seta, with a distinct antecoxal fold; abdomen coarsely punctured, each puncture with a seta, with the ventrites in the same plane, ventrite 1 almost straight apically, ventrite 2 subequal to or very slightly longer than 3 laterally, but shorter than 4, apical ventrite in ♂ with a distinct, central, apical foveate depression; legs more or less denuded, or densely covered with white or pale scaling, more concentrated as a subapical annulation on femora; femora with scattered punctures, coarser, subscabrous apically, each with a short, dark seta, the anterior femora more or less subgranulate on their outer surfaces; tibiae coriaceous, subscabrous (when scales are abraded), with scattered punctures, each with a dark seta, the anterior and intermediate ones slightly compressed apically and with a subcarinate dorsal hue (obsolete in ♀), with the inner apical angles produced into a sharp process, with also a small process bearing a tuft of setae external to it, thus giving the inner apical angle the appearance of being bidentate, the outer apical angles on anterior and intermediate ones produced into a blunt process, broadly, lobately rounded, better developed in ♀, in ♂ blunter, more broadly rounded, rounded but not produced on posterior ones; tarsi densely covered with whitish scaling, with dark setae above joints 1, 2, and 3 and also below on 4, with a tuft of dark setae on each side apically below on joints 1, 2, and 3, claws without a basal, lateral seta. The ♀ specimen of Dr. H. Brauns is slightly shorter than the ♂♂. From 2 ♂♂ and 1 ♀.

Length (excl. head), $8\frac{1}{2}$–10 mm.

Breadth, 5–$5\frac{1}{3}$ mm.

Hab.—Cape Colony—Touws River (Purcell).
Prince Albert (Purcell).
Willowmore (Dr. H. Brauns).

According to Gyllenhal's description, *B. polyophthalmus* Guér. is very closely related to this species, and seems to differ chiefly by the absence of a central furrow containing a carina on the prothorax.

Tribe Brotheini.

Gen. Synthocus Schoen.

Synthocus Schoenherr, Gen. Curc., vi, 2, p. 408, 1842.
,, Marshall, Tr. S. Afr. Ph. Soc., vol. xviii, p. 89, 1907.
Daulaxius Pascoe, Tr. Ent. Soc. Lond., p. 333, 1887.

Synthocus maculipes sp. nov.

(Pl. XLIII, fig. 1.) Type, S.A.M.

Colour black, with ashy grey scaling, with a central basal stripe on the rostrum, a broad lateral stripe on the prothorax extending on to the elytra on each side, and a transverse patch at the apex of the disk white; elytra with a small or very large more or less quadrate black patch in the middle, and the scutellar part as well as the space between intervals 4 and 6 pale brownish.

Prothorax as broad as long or very slightly broader than long, sides with a very slight subdorsal angulation, broadest near base, narrowed anteriorly and dorsally compressed towards apex, base slightly arcuate, with the upper surface subconvex basally, irregularly punctured and with scattered black setae, with a transverse apical impression containing 3 shallow foveae, with the margins of the basal punctures more or less velvety-black, and the sides obscurely punctured; elytra oblongo-ovate, basal margin as broad as prothorax, anterior margin feebly sinuate, shoulders rounded, sides slightly rounded, apical declivity steep and angulated dorsally, with the upper surface slightly depressed as far as interval 4, then sloping sharply to interval 6, with irregular rows of large punctures and with the suture slightly raised; intervals 3 and 5 each with a short, oblique basal costa, the former of which is velvety-black and setiferous; interval 4 with a row of 5 or 6 small tubercles more or less parallel with the suture and ending at the declivity; interval 6 with a row of conical tubercles ending at the apex; inflexed margins with rows of foveae; mesosternum with a tubercle; intermediate coxae contiguous, and the intercoxal part of the abdomen about as broad as one of the intermediate coxae; legs grey, with conspicuous brown mottling and scattered dark setae; tibiae not scabrous, the inner apical angle with a short spine and the outer angle not produced; tarsi more or less slender. From two specimens.

Length (excl. head), $6\frac{1}{2}$–$6\frac{2}{3}$ mm.

Breadth, 4 mm.

Hab.—S.W. Africa—Damaraland, Outjo (M. Exp.).

This species is related to *ovampoensis* Mshl., from which it differs by the different coloration, the depressed discal part of the elytra, the absence of a tubercle on the declivity on interval 2, the smaller size, and the shorter more or less straight spine on the tibiae. Superficially it resembles *mashunus* Mshl. in coloration.

Synthocus tuberculatipennis sp. nov. Type, S.A.M.

Colour black, with dense grey scaling, upper surface darker, undersurface lighter, with the T-shaped carina on the head, the central furrow and lateral margins of the prothorax whitish.

Head with a central T-shaped carina; prothorax about as broad as long, the sides slightly rounded, with an obtuse subdorsal tubercle situated just behind the middle on the more or less raised and impunctate lateral margins, broadest across the subdorsal tubercles, slightly narrowed antero-dorsally and constricted at the apex, anterior margin slightly raised, with the upper surface convex behind, irregularly punctured and sparsely covered with dark setae, with a distinct narrow central furrow and a broader one on each side becoming foveate apically, the anterior part transversely impressed, with the sides obscurely and irregularly punctured; elytra oblongo-ovate, only very slightly longer than broad, the basal margin truncate and not broader than the prothorax, shoulders rounded, sides slightly rounded, the declivity moderately steep and rounded dorsally, with the upper surface convex, with regular rows of foveate punctures on the disk; interval 2 costate basally and obtusely tuberculate posteriorly, the tubercles being continued to near the apex, the largest one being at the summit of the declivity; intervals 3 and 5 with an oblique tubercular basal callus, the latter having a row of small, distant tubercles; interval 4 with a row of conical tubercles beginning at the level of the basal callus on interval 3 and ending at the declivity; interval 6 with a row of conical tubercles from the shoulder to the apex, where there is also a tubercle on each side between the last apical tubercle and the suture (though not in line with those on interval 2); inflexed margins with rows of shallow punctures; mesosternum with a small tubercle; intermediate coxae contiguous and the intercoxal part of the abdomen a little broader than an intermediate coxa; legs stout, with dense grey scaling and dark setae; tibiae subcompressed, not scabrous, the interior apical angle with a small slightly curved spur, the outer angle rounded and feebly produced; tarsi stout. From a single specimen.

Length (excl. head), $7\frac{1}{3}$ mm.
Breadth, $4\frac{1}{2}$ mm.
Hab.—S.W. Africa—Ovamboland, Onolonga (M. Exp.).

This species belongs to the category of *plagosus* Pér. and *stolatus* Pasc., but differs by its smaller size, more conical tubercles, different colour, and from its nearest ally *stolatus* by its non-scabrous and subcompressed tibiae, very much smaller size, and more conical tubercles on interval 6.

Gen. Brotheus Steph.

Brotheus Stephens, Illustr. Brit. Ent., vol. iv, p. 152, 1831.
Marshall, Tr. S. Afr. Ph. Soc., vol. xviii, p. 106, 1907.
Ixodus Pascoe, Journ. Linn. Soc. Lond. Zool., vol. xi, p. 448, 1872.

Brotheus carinatus Mshl.

1907. Marshall, Tr. S. Afr. Ph. Soc., vol. xviii, p. 110, pl. vi, fig. 14.

Description of ♂ :

Head, prothorax, and colouring like described ♀. Elytra short, broader than long, the basal margin trisinuate and not broader than base of prothorax, shoulders obtuse and not dilated laterally, sides subparallel, declivity abrupt forming a pentagon, being bordered on all sides by an elevated transverse carina, which is sinuated towards the base, where it crosses the suture at the top of the declivity ; upper surface with an oblique, curved, elevated carina passing from near the shoulder and meeting the posterior carina (or basal carinate sides of pentagonal declivity) a little nearer the suture than to the dorsal margin ; from this point there also passes a crenellated carina parallel to the suture down the declivity to the apex, the dorsal margin also with a crenellated carina from the shoulder to the apex of the declivity, and at the base of each elytron 2 short, oblique calluses, one on each side of the dorsal carina ; the spaces between the carinae are depressed (especially laterally) and with coarse, irregular punctures along the carinae both on the upper surface and the declivity. From a single specimen.

Length of ♂, 5 mm.
Breadth of ♂, 4 mm.
Allotype of ♂ in the private collection of Dr. Andreae, Cape Town.
Hab.—Cape Colony—Cape Town (Dr. Andreae).

This ♂ and a ♀ were caught in copulation by Dr. Andreae, who kindly submitted the specimen to me for description. As the unique

type of the ♀ of *carinatus* Mshl. is in our collection, there was no difficulty in the correct identification of the ♀. The ♂ differs only in the shape of the elytra, which possesses an abrupt pentagonal declivity enclosed by transverse carinae, as in the case of *pumilus* Mshl, from which it differs by having a less depressed declivity, by having a carina on each side on the declivity parallel to the suture, and by the oblique curved carina from the shoulder not meeting the posterior carina so near the suture.

Sub-fam. BYRSOPINAE.

Gen. Byrsops Schoen.

Byrsops Schoenherr, Gen. Curc., ii, p. 408, 1834.
,, Marshall, Tr. S. Afr. Ph. Soc., vol. xviii, p. 60, 1907.

Byrsops noordhoekiana sp. nov.

(Pl. XLII, fig. 8.) ♀ Type, S.A.M.

Colour black, with earth-brown or grey scaling, the elytra with 2 small, basal patches and a larger quadrangular sutural one before the middle of velvety-brown scales; sometimes the elytra are deeper in colour, black, with 2 basal patches and the larger sutural one deep velvety-black.

Head distinctly but sparsely punctuated, with 2 distinct oblique frontal carinae which unite anteriorly with the ocular ridges, with the forehead foveate; rostrum feebly convex, with a feeble central carina, more distinct basally and disappearing apically, with a few punctuations laterally basally on each side of the carina on the upper surface; prothorax as broad as long in ♂, slightly broader than long in ♀, sides slightly ampliated about middle, ocular lobes prominent but not markedly dilated, with the upper surface coarsely punctured, with a continuous central furrow, bordered by 2 distinct more or less straight or feebly undulating carinae, the anterior transverse impression with a distinct fovea on each side of the furrow, with deep, separated punctures on the sides; elytra ovate, shoulders prominent, more sloping in ♂, sides slightly rounded, the posterior declivity steep, more or less abrupt, with the upper surface with more or less regular rows of punctures between suture and interval 4 on each side, and with irregular punctures on the surface between intervals 4 and 6; intervals 2 (beyond middle), 4, and 6 with prominent variable conical or elongate tubercles, those near the summit of

the declivity being often larger, especially in ♂; interval 2 more or less costate to about middle; interval 3 with a basal callus parallel with interval 2; interval 4 with rather elongate tubercles in some specimens, especially in ♂; interval 5 with a prominent humeral tubercle; inflexed margins with regular rows of large, deep punctures and the intervals subcostate; legs with dense, grey scaling and short, dark setae; tibiae with the inner apical angles sharply mucronate; posterior tarsi with joint 1 slightly longer than 2; ♀ with no anal tubercle and larger than ♂. From several specimens.

Length (excl. head), 5–8½ mm.

Breadth, 3–5 mm.

♂ allotype in the private collection of Dr. Andreae, Cape Town.

Hab.—Cape Colony—Noordhoek, Cape Peninsula (Dr. Andreae).

This species, although variable, can easily be distinguished from the very similar *sulcicollis* Ghl. by the very feeble central carina on the rostrum, the less rugosely punctured prothorax, the less carinate ridges bordering the central furrow, by the more or less regular rows of finer punctures on the elytra (not with the characteristic reticulate structure of *sulcicollis* Ghl.), by the more elongate tubercles, the basal costate part of interval 2, the less oblique basal callus on interval 3, and the absence of an anal tubercle in ♀. According to Dr. Andreae this species is semiaquatic, found in species of *Chara* (growing in brackish swamps), even feeding and crawling under water. The black variety was found in the neighbourhood, but away from water.

Sub-fam. RHYTIRRHININAE.

Gen. Spartecerus Schoen.

Spartecerus Schoenherr, Gen. Curc., ii, p. 421, 1834.
,, Lacordaire, Hist. Nat. Ins. Coleop., vol. vi, p. 298, 1863.

Spartecerus confragosus sp. nov. Type, S.A.M.

Black, covered with uniform earth-brown, dark purplish-brown, or earth-brown, variegated with dark purplish-brown scaling.

Head strongly convex, densely covered with scales, separated from rostrum by a deep, transverse incision, forehead and small supra-ocular elevations with a few scattered, black, suberect setae; rostrum very thick, the basal part swollen, more or less rounded, elevated above forehead, more or less parallel-sided in basal half, the genae gradually dilated, the depth being equal to the median width, with the upper

surface foveately depressed just before antennal insertions, the lateral margins of the fovea being often subangularly elevated, with a central carina on the apical part, extending from the transversely raised apical margin of the fovea to epistome, and separating the apical part into 2 foveate depressions, the basal half and the elevated margins of the foveae set with low granules, each bearing a black recumbent seta, the genae with scattered, white recumbent setae, with an oblique furrow subparallel with the scrobe, the epistome nearly as long as broad, with the carinae sharp and distinct, forming an acute angle ; antennae with joint 1 of the funicle about as long as 2 and 3 together, 2 slightly longer than 3, joints 4, 5, 6, and 7 transverse and equal, 7 connate with club, club deep ferruginous brown ; prothorax as broad as long, moderately rounded at sides, broadest at about middle, shallowly constricted near apex, the base slightly arcuate, slightly broader than apex, apex roundly produced dorsally, ocular lobes very prominent, with the upper surface almost plane, unevenly set with small, rounded, separated tubercles, more or less aggregated in a boss-like elevation on each side basally, tubercles absent from a transverse impression near the apex just in front of the middle, and a transverse more or less arcuate narrow furrow or sulcus behind middle, as well as from a shallow longitudinal furrow just behind the eye laterally on each side, sides with only a few separated tubercles on upper half, interstices covered with overlapping earth-brown or dark purplish-brown scaling, the tubercles often alone being dark purplish-brown, each bearing a small, depressed, black seta ; elytra oblong, conjointly sinuate at base, sloping obliquely from base to the distinctly projecting humeral angle, thence parallel-sided almost to apex, broadly subtruncate apically, with the upper surface slightly convex, the striae with regular rows of shallow, subquadrate foveolae, stria 2 slightly curved owing to the inward curve of interval 3, striae 3 to 6 distinctly curved, with the intervals uneven and curved ; intervals 1, 2, 4, and 6 narrow, only very slightly convex, interval 1 with a row of small, distant tubercles beyond middle to apex or about midway down the declivity, the largest being at the summit of declivity, intervals 4 and 6 with a few small, distant, obscure granules ; intervals 3, 5, and 7 costate, prominent, 3 and 5 markedly curved inwards before middle, with a row of small tubercles, often duplicated (each with a pale or black recumbent seta), increasing in size beyond middle, those on the former beginning in a prominent, subtuberculate, basal callus and ending at the summit of declivity in a large, multituberculate boss, those on the latter ending in a large,

prominent, conical tubercle at the apex of intervals 6 and 7, interval 7 beginning in a prominent, conical, humeral tubercle is more or less costate to beyond middle, with only a few distant, setiferous granules; intervals 8 and 9 on the inflexed margins forming a prominent subapical callus on each side with interval 3; interstices densely covered with overlapping, uniform, earth-brown or dark purplish-brown scaling, or with the scutellar region, the basal half and tubercles of intervals 3 and 5, an obscure and irregular transverse band beyond middle, the basal parts of the inflexed margins, and along the suture on the declivity of dark purplish-brown scaling; undersurface with dense, earth-brown or dark scaling, and scattered, white or pale setae; legs with dense, earth-brown or dark purplish-brown scaling, with a paler subapical annulation on the femora, and also with scattered, white and dark setae. From seven specimens.

Length (excl. head), $10\frac{2}{3}$–12 mm.

Breadth, $5\frac{1}{2}$–$6\frac{1}{2}$ mm.

Hab.—S.W. Africa—(Kaokoveld)—Kamanyab, Warmbad, Kaross. (M. Exp.).

(Ovamboland)—Kunene R. (M. Exp.).

This species is related to *rudis* Fahr., *nasalis* Mshl., and *trisulcatus* Hart. From *rudis* it may at once be distinguished by the inflated rostrum. From its nearest ally *nasalis* it may be distinguished by the less inflated rostrum, the distinctly costate and tuberculate intervals 3 and 5 which end in very large, prominent, conical bosses, and by the presence of a distinct, conical, humeral tubercle. Superficially it resembles *trisulcatus*, but the latter has no inflated rostrum, no distinct tubercles on the prothorax, has a larger humeral tubercle and 2 or 3 distinct conical tubercles on interval 7.

Spartecerus pallidus sp. nov.

(Pl. XLII, fig. 6.) Type, S.A.M.

Black, densely covered with pale ashy-grey to calcareous white scaling.

Head with the vertex convex, narrow; forehead with a broad, deep, central furrow, more foveate anteriorly and shallower posteriorly, bordered by a prominent, carinate ridge, which is transversely connected by means of a tuberculate ridge at about the middle to the supra-ocular ridges on each side, thus dividing the lateral parts of forehead on each side into 2 foveate depressions, the supra-ocular ridges prominent, angularly elevated, the entire surface with dense, white

or greyish overlapping scales, the few granules on transverse ridges, and the supra-ocular ridges with scattered, dark, recumbent setae; rostrum thick, separated from the head by a slight, transverse incision, the sides subparallel, about as broad medially as deep, the genae only slightly dilated apically (dorsal view), with the upper surface slightly convex, densely covered with ashy-grey or white overlapping scales, with a broad, central furrow, without any carina, slightly narrowed basally and continuous with central frontal furrow, bordered by an elevated, granular or tuberculated ridge, raised basally to level of ridges on forehead, beginning basally in a tubercle or small, tuberculated boss and ending at apex in a more or less prominent tubercle, with a central carina on apex, bifurcating basally into 2 transverse ridges, dividing the apical part into 2 foveae behind epistome, the small, irregular tubercles on the borders of furrow with short, suberect, black setae, the epistome nearly as long as broad, with the carinae sharp, forming an acute angle, the genae with dense, white scaling and scattered, dark setae, with a short furrow subparallel, with scrobes on its lower half; antennae with short, dark setae, with joint 1 of the funicle as long as 2 and 3 together, 2 slightly longer than 3, joints 4, 5, and 6 transverse, 7 connate with club, club black; prothorax slightly broader than long, constricted apically, the dorsal apical margin slightly raised, feebly roundly produced, the basal margin truncate, the ocular lobes well developed, the sides subangularly rounded, then gradually narrowed to base, broadest just before or at about middle, with the upper surface slightly convex, densely covered with white or ashy-grey, overlapping scales, unevenly set with small, rounded, separated tubercles, each with a short, black seta, more or less aggregated together on each side near base in a boss-like elevation or a large tubercle, leaving an indication often obscure of a central furrow, and a slight transverse impression near apex, as well as an oblique impression on each side in front of basal tubercles continuous antero-laterally with the apical constriction free from tubercles, laterally with small, rounded tubercles only on subangularly, rounded sides; elytra more or less quadrate, only very slightly longer than broad, the apical margin subtruncate or feebly sinuate, set with vibrissae, as broad as base of prothorax, then gradually sloping to small, humeral tubercle, shoulders subangularly rounded, sides slightly rounded, very gradually narrowed posteriorly, subtruncately rounded apically, broadest just before or at about middle, with the upper surface convex, with regular rows of foveate punctures; interval 1 more convex beyond middle and apically, with a row of small, distant

tubercles, becoming larger beyond middle at summit of declivity; intervals 2, 4, and 6 very feebly convex, 2 and 4 convex on basal half and with a few distant granules, 6 with only a few small, distant tubercles; intervals 3, 5, and 7 very convex, costate, prominent, with rows of tubercles often irregularly arranged, 3 with a basal, tuberculated callus, then with a row of small, distant tubercles which become larger and often closer together beyond middle, the largest being at summit of declivity, and with 2 or 3 smaller ones to about midway on the declivity, interval 5 distinctly curved, with a row of larger tubercles, beginning basally in a multituberculate callus and often duplicated and irregular beyond middle, ceasing at summit of declivity, 7 slightly curved, more costate basally, where the tubercles are more or less aggregated, beginning in a distinct, conical, humeral tubercle, and with no tubercles beyond middle; intervals 8, 9, and 10 slightly convex, devoid of tubercles; interstices with dense, dull, or ashy-grey scaling, with the tubercles often denuded and dark, each with a dark seta, with often a small spot of velvety-black scales on each side on interval 3 at about middle; undersurface with dense, white scaling, and with scattered, white setae, with some scattered, dark setae on segments 1 and 2 of the abdomen; legs with dense, white scaling, and with scattered, pale and dark setae, the tibiae more or less scabrous. From six specimens.

Length (excl. head), 8–9½ mm.

Breadth, 5–6 mm.

Hab.—S.W. Africa—(Ovamboland)—Mafa, Namakunde, Ondongua (M. Exp.).

Spartecerus simulator sp. nov. Type, S.A.M.

Black, with dull greyish scaling above, paler calcareous white below, with ochraceous scaling on head, rostrum, the central furrow and lateral basal parts of the prothorax; the base, a transverse band at middle, another obscure one beyond middle on elytra, with yellowish scaling, variegated with velvety black; the shoulders and interval 5 beyond middle to the tubercle often reddish or ochraceous. These colour markings are often obscure and the entire insect is dull greyish.

Head with vertex convex, narrow, the forehead with 4 deep foveae, the 2 lateral ones and medial anterior one broader than smaller posterior one, separated by prominent raised ridges, the entire surface covered with dense, overlapping, ochraceous scales, the frontal ridges continuous anteriorly with the prominently, elevated,

supra-ocular ridges, the ridges and supra-ocular ridges with scattered, depressed, dark setae; rostrum thick, longer than head, shorter than prothorax, separated from head by a transverse incision, the genae gradually dilated, with the upper surface convex, more or less elevated just before antennal insertions to the level of forehead, with a broad, central furrow continuous basally with the deep, median, frontal fovea, becoming shallower apically and ceasing above antennal insertions, with a small foveate depression basally on each side, separated from central furrow by the basal carinate margins of the furrow, which become thicker apically, the basal half with dense, ochraceous scaling, the raised margins of furrow with scattered, dark setae, with the apex slightly depressed behind epistome, the genae foveately depressed below scrobes, bordered by a raised ridge below, subcarinate, prominent and angularly rounded apically where they join the epistomal carinae, covered with whitish scaling and scattered, dark setae; antennae with joint 1 of the funicle about as long as 2 and 3 together, 2 slightly longer than 3, joints 4, 5, and 6 more or less subequal, slightly shorter than 7, which is connate with the club, club black; prothorax very slightly broader than long, as broad as long at apex and base, sides subangularly dilated anteriorly, broadest before middle, thence gradually narrowed to base, constricted apically, with the dorsal apical margin slightly raised and feebly sinuate, the basal margin slightly arcuate, with the upper surface more or less plane, slightly transversely impressed apically, rugosely impressed, leaving a central furrow, the borders of the furrow, the apical margin, and the rugae with scattered, depressed, dark setae, the interstices as well as the rugae densely covered with overlapping scales, antero-laterally and discally with dull grey scales, the furrow and the basal lateral margins with yellowish or ochraceous scaling, a short sub-basal line laterally on each side reddish ochraceous, more often the upper surface is dull grey, with paler scaling in furrow, the undersurface with dense, calcareous, white scaling; elytra almost quadrate, only very slightly longer than broad, anterior margin conjointly sinuate, then obliquely sloping to the prominent and rounded shoulders, broadest across shoulders, sides gradually narrowed posteriorly, apically subtruncate and retuse, with the upper surface slightly convex, more or less plane, with regular rows of foveate punctures; interval 1 costate apically on declivity; intervals 2, 4, and 6 plane or only very faintly convex; intervals 3, 5, and 7 convex, costate, slightly curved, subgranular, with a row of dark and pale depressed setae, 5 slightly more costate, and ending in a large, prominent, sharp, conical tubercle, 7 beginning

in a humeral blunt tubercle and ceasing subapically; interval 9 basally elevated into a subhumeral boss, and apically continuous with interval 3 to the apex; interstices with dense grey scaling, with the basal part of the humeral tubercle and interval 5 with yellowish scaling, often with reddish ochraceous scaling, with a transverse basal part from suture to interval 3, a transverse band just before or at about middle from suture to interval 5, and another narrow transverse band beyond middle from suture to interval 3 or 5 of yellowish scaling, variegated or ocellated with velvety-black scaling, especially along interval 3, with often reddish or ochraceous scaling along interval 5 beyond middle to near tubercle, the inflexed margins with white scaling; undersurface with dense white or greyish scaling and scattered white setae, and 2 spots of black scales near the middle line on each of the segments 2, 3, and 4 on abdomen; legs with dense white scaling and scattered white and dark setae, with a spot near the base, a fainter subapical annulation on the femora, and a median dorsal spot on the tibiae, with dark brownish scaling; tibiae with dark setae below. From four specimens.

Length (excl. head), 7–7½ mm.

Breadth, 4½–5 mm.

Hab.—S.W. Africa (Ovamboland)—Mafa, Namakunde, Ondongua (M. Exp.); by Eriksson, 1891.

This species is most nearly related to *mendax* Pér. and *quadratus* Gerst., from both of which it may be distinguished by the absence of a central carina in the rostral furrow, by the prothorax being angularly dilated near the apex and not at the middle.

Gen. Rhytirrhinus Schoen.

Rhytirrhinus Schoenherr, Disp. Meth., p. 162, 1826.
,, Lacordaire, Hist. Nat. Ins. Coleop., vol. vi, p. 302, 1863.

Rhytirrhinus admirandus sp. nov.
?♂ and ♀ Type, S.A.M.

Black, covered with leaden grey or pale bluish-grey scaling, with parts of the prothorax, a broad, medial, sutural band on the elytra, and the spots on the legs with dark, deep purplish-blue or dark purplish-brown scaling, with a submetallic sheen. Many specimens are, however, more sombre, covered with earth-brown indumentum, with

only the sutural band on the elytra and the spots on the legs dark, deeper, slightly cuprescent brown.

Head concealed from above by the median anterior prothoracic lobe, forehead excavated, with dark purplish-brown scaling, with the supra-ocular lobes or ridges high and angularly pointed, the vertex with leaden grey or pale bluish scaling, and with the central pointed triangular part elevated and projecting into excavation; eyes with the posterior margin almost straight; rostrum curved, covered dorsally with dark purplish-brown scaling and laterally with leaden grey scaling, with the upper surface convex, with a very faint narrow central furrow, bordered on each side by a row of 3 or 4 ocellate spots of leaden grey scaling, each with a short, dark seta, the apex with a few dark setae on the sides, the tip black and shining; antennae dark ferruginous, with the scape barely touching the eye, gradually clavate apically, with joint 1 of the funicle the longest, shorter than club, 1 and 2 together longer than the rest together, 2 longer than 3, and 3 very slightly longer than 4, joints 4, 5, and 6 bead-like, subequal, 7 transverse, club fuscous, with faint silvery pubescence; prothorax about as long as broad, with the anterior part produced into a rounded lobe concealing the head, with its margins, except for the apex, strongly raised, with a few scattered dark setae along the edges, with the lateral parts strongly raised into a rounded lobe or a tuberculated lobe on each side, with a smaller tubercle behind each, the tubercles with short dark setae, the basal margin deeply bisinuate, the medial lobe-like part projecting over scutellum, with the upper surface deeply transversely impressed apically behind anterior lobe, more or less convex in basal half, in the middle of base 2 short ridges meeting posteriorly on the small posterior lobe, each beginning in a tubercle, with another smaller tubercle in front on each side at about middle, and a very small one on each side between the ridge and the lateral margins, the infero-lateral sides with 2 small tubercles obliquely under lateral lobes, the entire surface with dark purplish-brown scaling, except for an apical central fascia, the space between the basal ridges, the lateral lobes and apices of small lateral tubercles and the prosternum covered with leaden grey or pale bluish-grey scaling; elytra oblong, with the basal margin trisinuate, the shoulders oblique, angularly rounded and prominent, broadest across humeral angles, the sides gradually narrowed to apex, conjointly rounded apically, with the upper surface convex, with regular rows of small indistinct punctures, covered with scaling, and intervals 1, 3, 5, and 7 with rows of tubercles, each bearing a dark seta; interval 1 feebly

convex, with a complete row of small granular or conical distant tubercles, the largest often being at the summit of the declivity; intervals 3 and 5 more convex, costate, each with a row of 6 or 7 large conical or rounded distant tubercles, the first one being a little distance away from the base; interval 7 convex, with a large costate lobe-like triangular humeral tubercle, a smaller one behind it and beyond middle, with a few small rounded distant ones; interval 2 very feebly convex, hardly visible, with 2 or 3 granules in basal half; interval 4 feebly convex, with a large costate tubercle at base only; interval 8 with a subhumeral tubercle at base just below and behind humeral tubercle, and interval 9 often with a small tubercle near apex; interval 10 more costate basally, with indications of 2 small rounded tubercles; interstices with dense leaden grey or pale bluish-grey scaling discally from interval 3 to 7 and laterally on inflexed margins, with a broad sutural band from base to beyond middle, the posterior faces of the tubercles and the basal parts on the inflexed margins with deep purplish-blue or dark purplish cuprescent brown scaling, with a slight submetallic sheen; undersurfaces with more or less sparse leaden grey scaling; legs densely covered with leaden grey or pale bluish-grey scaling; femora with the intermediate and posterior ones laterally compressed basally, with the dorsal edges sharp and carinate, and the inner faces almost flat, with some basal spots, a subapical and subbasal annulation of dark purplish-brown scaling, with scattered dark setae, and with sparse longer pale setae on undersurfaces only; tibiae uncinate, with 2 dorsal spots or bands of purplish-brown scaling and scattered dark setae surrounded by small rings of leaden grey scales, as well as some longer setae below. ? ♂♂ smaller than ♀♀. From thirteen specimens.

Length (excl. head), 3–4½ mm.

Breadth, 1½–2½ mm.

Hab.—Cape Colony.—Cape Town, Constantia (Dr. Purcell). (*Type* from here.) Stellenbosch (Dr. Péringuey).

Transvaal.—Leydenburg (Distant).

This species comes near and superficially resembles *lobaticollis* Mshl., but it is much smaller, is differently coloured, has only a faint central furrow on the rostrum, the prothorax is not so concave and not so markedly lobed, and the small tubercles on interval 1 form more or less a complete row, there being no markedly large confluent ones on summit of declivity. Further, joint 1 of the funicle is much shorter than the club, and there are no parallel ridges on the vertex, as is the case in *lobaticollis*.

Rhytirrhinus dolosus sp. nov. Type, S.A.M.

Dark piceous or piceous brown, with variable scaling, dark or ashy grey, often discoloured, often with a paler spot or transverse fascia on each side at the summit of declivity on interval 3.

Head concealed from above, the vertex convex, rugulose, with a central spot or fascia of white scales, the forehead with vermicelliform rugae, depressed, often with ashy-grey scaling, with a deep furrow above each eye, but no supra-ocular ridges ; rostrum curved, parallel-sided in the basal half, only slightly dilated at apex, with the upper surface slightly convex, trisulcate, the lateral sulci slightly wider and deeper, the borders of the sulci each with a row of pale or dark recumbent setae, the prominence at base on each side feeble, not well developed, with a lateral furrow above scrobe and a less distinct one below it ; antennae ferruginous, the funicle often paler, more testaceous, with joint 1 of the funicle about as long as 2, 3 and 4 together, 2 about as long as 3 and 4 together, 3 a little longer than broad, 4, 5, and 6 bead-like, subequal, 7 broadest, transverse, club about as long as joints 3 to 7 ; prothorax very slightly broader than long, with the apex feebly constricted, slightly roundly produced dorsally, the sides rounded, broadest at about middle, the base slightly broader than apex, the basal margin truncate, with the upper surface convex, rugosely punctured, set with small rounded granular separated tubercles, each with a pale or dark depressed seta, leaving a central furrow, broader and more foveate apically, and a less distinct one on each side, distinctly foveately impressed apically, free from tubercles, the median apical fovea bounded on each side by a high narrow costa formed of agglomerated setiferous tubercles, the pleurae rugosely punctured, and with a few small granules and dark or pale setae, the interstices with obscure greyish or dark scaling, with a spot or short fascia in the anterior fovea, the ocular lobes and the anterior angles of the prosternum with white scaling ; elytra oblong, conjointly slightly sinuate at base, with the basal angles projecting forwards, feebly curved from basal angles to humeral angles which are subangularly prominent, rounded, from there more or less parallel-sided as far as the almost vertical declivity, where they are gradually conjointly rounded apically, the apices not being produced, broadest across humeral angles, with the upper surface slightly convex, with regular rows of foveolate punctures, the rows 3, 4, 5, and 6 being distinctly curved, with regular rows of short dark or pale depressed setae, situated on granules or small tubercles on the intervals, intervals

1, 3, 5, and 7 being distinctly costate ; interval 1 less costate than the others, with a rounded tubercle at base, then a row of small separated setiferous granules, beyond middle on declivity, with a row of small rounded tubercles, the largest being at the summit of declivity ; intervals 2, 4, 6, and 8 plane, with rows of setae only ; interval 3 with a large costate callus of agglomerated tubercles at base, then with a row of setiferous granules, with a few small tubercles beyond middle, and a large one at the summit of the declivity, followed by 1, 2, or 3 tubercles behind it ; interval 5 costate only some distance away from base, distinctly curved basally, with a few distant small tubercles beyond middle, where it ends at summit of declivity ; interval 7 more elevated basally than the others, where there is an elongate curved tuberculated costa, the humeral tubercle being the largest, then with a row of small tubercles ceasing slightly beyond interval 5 ; interval 9 convex and subcostate (with a few small rounded tubercles) apically only, where it unites near apex with interval 3 ; interstices with dark scaling or with dense greyish scaling, with a transverse spot at the summit of the declivity between intervals 1 and the large tubercle on 3, and some lateral subapical spots often with paler or white scaling ; undersurface closely punctured, with dark setae and with a spot on the mesosternal tubercle, a spot laterally on each side of mesosternum, a spot on the under surfaces of the coxae, and one laterally on each side of the abdominal segments 1 to 4 with white scales ; legs dark piceous or piceous red, tarsi ferruginous, with dense greyish or white slightly opalescent scaling, often with a paler subapical ring on femora, with scattered white setae ; tibiae uncinate, with long pale setae below and with 3 annulations or spots of dark scaling on the dorsal surfaces. From eighteen specimens.

Length (excl. head), 4–6 mm.

Breadth, $2\frac{1}{2}$–3 mm.

Two specimens labelled.

Hab.—Cape Colony—Cape Town (Raffray).

This species is probably the Southern representative of *namaquus* Mshl., which it very closely resembles. It is however smaller, is differently coloured, the rostrum is not strongly dilated apically and has feeble basal prominences, the prothorax is slightly broader than long and the anterior part only projects slightly over the head, the elytra are not abruptly constricted apically and not separately rounded, the shoulder-slopes are feebly curved, and there is no distinct and characteristic tubercle at summit on interval 5 giving the declivity a truncated appearance.

Rhytirrhinus inopinus sp. nov. Type, S.A.M.

Black, densely covered with tawny brown or pale brown scaling.

Head convex, with dense tawny and dark scaling, especially towards forehead, with a central stripe of white scaling, forehead foveately impressed anteriorly, with a few scattered large brown flat depressed setae behind impression, supra-ocular ridges absent, with only a few setae; rostrum gradually narrowed dorsally from base to apex, genae gradually dilated and distinctly visible from above, with the upper surface plane, more or less in line with forehead (side view), densely covered with tawny scaling, trisulcate, the borders of the sulci with a row of flat depressed white or brown setae, the lateral borders on each side with a tuberculiform basal prominence, each with a few white and brown setae, a lateral furrow above the scrobe, and a less distinct broader one below it, the genae with dense tawny scaling and scattered flattish and slender setae, those near the apex being longer, more bristle-like, the undersurface with slender setae and at least 2 very long and slender bristle-like ones; antennae with the scape covered with tawny scales and dark setae, the upper surface darkish in colour, funicle ferruginous, with more slender setae, the club with brownish pubescence, joints 1 and 2 elongate, 1 very slightly longer or subequal to 2, 3 slightly longer than 4, joint 4 very slightly longer than 5, joints 5 and 6 subequal, 7 the broadest, transverse; prothorax subquadrate in outline, broader than long, with the anterior dorsal margin feebly roundly produced, the sides with a prominent rounded tubercle just before middle, the anterior part being suddenly narrowed to apex and the posterior part very gradually rounded and narrowed to base, broadest across the tubercles, the basal margin truncate and broader than the apical margin, with the upper surface flat, densely covered with tawny brown scaling, set with fulvous or whitish flat depressed setae, which in basal half are situated more or less on a few indistinct small rounded granular tubercles, leaving a central furrow, shallow basally and broader more foveate apically, and a shallow lateral furrow on each side more foveate apically, the large central apical fovea bounded on each side by a high prominent subtubercular costa, ending just before the middle in a rounded tubercle in line with the lateral tubercles, the costa as well as the lateral tubercles with fulvous or whitish flat setae, slightly transversely impressed behind lateral tubercles on each side to central furrow; elytra more or less conjointly truncate or feebly sinuate anteriorly, the basal angles projecting slightly forwards, sloping

obliquely from basal to humeral angles, which are obtusely rounded, and from there parallel-sided as far as summit of the declivity, where it is gradually rounded and subapically abruptly constricted, with the apices slightly produced and separately rounded, with the upper surface slightly convex, densely covered with tawny-brown scaling arranged rosette-like round the punctures and intermixed with dark often obscure scales, with regular rows of punctures hidden by the scales, with the alternate intervals costate, with rows of small granular indistinct tubercles, each with a pale or fulvous flattened seta, the setae on intervals 3, 5, and 7 arranged more or less in 2 rows; interval 1 with a single row of setae, with a small prominent basal tubercle and another often larger one at the summit of the declivity, confluent with its neighbour; intervals 2 and 4 plane and without setae; interval 3 with an elongated more elevated basal costa and a large rounded multisetiferous tubercle at summit of declivity; interval 6 plane, with a single row of distant setae; interval 7 more costate than the others, with the basal part slightly broadened, more elevated and callus-like at the humeral angle; intervals 8 and 9 slightly convex, each with a single row of setae, 9 forming a prominent elevated callus, with scattered pale setae, near the apex where it unites with 3; undersurfaces with dense brownish scaling, scattered white setiform scales and dark setae; legs with dense tawny scaling, with scattered white and brown flattened setae, those on the undersurfaces of the femora and tibiae being pale, longer and more bristle-like, the tibiae uncinate, with a medial and sub-basal annulation of brown scaling on the dorsal surfaces. From nine specimens.

Length (excl. head), $7\frac{1}{3}$–$8\frac{2}{3}$ mm.

Breadth, $3\frac{1}{2}$–4 mm.

Hab.—Cape Colony—Robertson (F.P.).

This species is related to *angulicollis* Fåhr., but differs from Fåhraeus' description in not having the forehead trisulcate and the slightly different structure of the prothorax and also in its larger size.

Gen. Gronops Schoen.

Gronops Schoenherr, Disp. Meth., p. 157, 1826.

,, Lacordaire, Hist. Nat. Ins. Coleop., vol. vi, p. 304, 1863.

Gronops capensis sp. nov. Type, S.A.M.

Black, densely covered with dull blackish-brown scaling on the basal half of rostrum, head, prothorax above, and the discal two-thirds of the elytra, with dense white slightly opalescent scaling having a

bluish tint, on the apical half of the rostrum, the apical one-third of the elytra, the lateral inflexed margins, the undersurfaces and the legs, with a transverse band composed of 3 confluent spots at the summit of the declivity of creamy white scaling, and a large spot on each side at about the middle on the inflexed margins of greenish and yellowish iridescent scaling.

Head convex, with dense flat contiguous dark blackish-brown scales, with a central stripe of paler scaling, forehead with a deep central fovea, the supra-ocular ridges low, not reaching the hind margin of the eye, and with a few dark setae ; rostrum more or less parallel-sided from base to antennae, the apical part being slightly dilated, the dorsal outline not angulated but rounded at antennal insertions, with the upper surface slightly convex, closely punctured, the basal part to antennal insertions covered with contiguous dark brown scaling, with a central shallow furrow extending from fovea on forehead to beyond antennal insertions, where it is visible as a stria only, and a punctured furrow on each side, with a row of recumbent dark setae in each lateral furrow and on the borders of the central one, the apical part with white scaling, the apex punctured and each puncture with a white seta, the extreme apex black, the posterior angle of the lower edge of scrobe produced backwards into a blunt projection, the genae impressed laterally, densely covered with white scaling, and with a row of white setae on its lower margin ; antennae more or less dark ferruginous, with whitish pubescence, the scape with a few dark setae apically, joint 1 of the funicle about as long as the rest together, club brownish ferruginous ; prothorax slightly broader than long, about as broad basally as long, the sides broadest in front of middle and there strongly rounded, not angularly dilated, thence very gradually narrowed to base, being almost straight in basal half, with the upper surface densely covered with dull blackish-brown contiguous scales, a little paler along middle near the base, with separated large punctures more or less arranged in irregular rows, each with a very fine pale seta, leaving a central furrow and one on each side laterally, the furrows slightly broadened and more foveate apically, the undersurface with dense white scaling ; scutellum small, prominent, with white scaling ; elytra oblong, the shoulders subangularly prominent and rounded, thence more or less parallel-sided to summit of declivity, from where it is attenuated and narrowed to the conjointly rounded apex, broadest across the shoulders, with the upper surface slightly convex, densely covered discally in the basal two-thirds with dull blackish-brown contiguous scales, some of which

have a faint pale margin, with some scattered brownish cuprescent scales along the edge of the disk under the shoulders and along its apical border at the summit of the declivity, a small spot at about middle on interval 3, the inflexed margins and the apical part with white slightly opalescent scaling, having a bluish tint especially apically, with a transverse band at summit of declivity composed of a subtriangular spot on each side from intervals 3 to 7 confluent with a sutural spot, of cream-coloured scales, with a large spot on each side at about the middle on the inflexed margins of greenish and yellowish iridescent scales, with regular rows of punctures, the alternate intervals costate and with regular rows of small depressed setae, which are dark brown on the black part and white on the apical part; interval 1 slightly convex basally, costate only beyond the middle on declivity, with the setae ceasing anteriorly just before middle; interval 3 more costate than the others, higher and prominently costate at summit of declivity, thence very slightly convex to apex, with the seta on the white spot at middle white; interval 5 more costate beyond middle and with a small tuberculous elevation at the summit of the declivity, and joining interval 9 subapically; interval 7 less costate than the others, projecting subangularly at the shoulder; intervals on the inflexed margins indistinct and very feebly convex; undersurface covered with dense white scaling as far as can be seen in carded specimen; legs with dense white slightly opalescent scaling with a faint bluish tint, with scattered white setae, the tibiae with longer and more slender setae below, a sub-basal annulation on the femora and a large spot on the dorsal surfaces of the tibiae with dark brown scaling. From a single specimen.

Length (excl. head), 4 mm.

Breadth, 2 mm.

Hab.—Cape Colony—Cape Town (Raffray).

This beautifully marked species is related to *oneili* Mshl., but it may be distinguished from the three other known species from S. Africa by its distinctive coloration.

Gen. Hyomora, Pasc.

Hyomora, Pascoe, Journ. Ent., ii, p. 421, 1865.

Eremnoschema Péringuey, Jenaische Denkschr., xiii, p. 418, 1908.

Hyomora varia sp. nov. Type, S.A.M.

Variable in size and colour, densely covered with cuprescent brown, pale brownish or pale opalescent scaling, variegated with pale pinkish

or greenish opalescent and iridescent scaling, the elytra often tesselated.

Head convex, densely covered with brown or pale brownish cuprescent or opalescent flat contiguous scales, forehead without or with a few scattered large punctures anteriorly and laterally ; rostrum very gradually narrowed from base to antennal insertions, thence very slightly dilated to apex, slightly curved, with the upper surface convex, densely covered with pale brownish or greenish slightly opalescent contiguous scales, with large separated punctures laterally, more or less arranged in 3 rows, each puncture with a brownish recumbent seta, with often an indistinct central stria or groove, with the apex beyond antennal insertions more or less bare, shining, black, and with fine brownish hair-like setae dorsally and longer laterally, the genae and the undersurface with some long hair-like pale setae apically, the scrobes lateral, extending to anterior margin of eye ; antennae ferruginous brown, with very fine pale brownish setae, the scape clavate apically and with a few pale scales, reaching the anterior margin of eye, joint 1 of the funicle elongate, about as long as the following 5 joints together, longer than club, joint 2 very slightly longer or subequal to 3 and 4 together, joints 3, 4, 5, and 6 bead-like, subequal, 7 the broadest, transverse, connate with club, the club with golden pubescence ; prothorax broader than long, slightly broader basally than apically, with the apical margin slightly broadly sinuate, and the basal margin subtruncate, the sides rounded, gradually narrowed apically, broadest at about middle, the ocular lobes moderate, with vibrissae, with the upper surface convex, feebly transversely impressed near apex, and with 3 feeble longitudinal impressions in basal half, closely set with large round punctures, each with a short dark depressed seta, the setae on the sides and pleurae being longer more bristle-like, where the punctures are also smaller, the interstices with dense brownish or pale cuprescent slightly opalescent and iridescent flat contiguous scales, often with a greenish or bluish tint, with a silvery metallic sheen on the pleurae, often with the antero-lateral margins and sides paler in colour ; scutellum small but distinct, triangular ; elytra ovate, with the basal margin conjointly slightly sinuate, shoulders rounded, sides rounded, broadest just before middle, gradually narrowed and conjointly rounded apically, with the upper surface convex, with regular rows of small punctures, ferruginous to dark ferruginous, with the intervals broad, more or less plane or feebly convex, with a row or often 2 irregular rows of dark or pale depressed setae on each interval, those on the shoulders

and laterally on the inflexed margins being longer, the intervals and interstices densely covered with cuprescent brown, dark brown, or pale opalescent and iridescent overlapping flat cycloid scales, variegated or tesselated discally with indistinct paler spots of opalescent scaling, with a more silvery or cuprescent submetallic sheen on the inflexed margins; undersurfaces punctured, densely covered with pale brownish or pale cuprescent contiguous scales, having a shiny silvery or coppery metallic sheen, with scattered pale setae, the dividing suture between segments 1 and 2 of the abdomen only distinctly visible laterally, the apical margins of segments 2, 3, and 4 with long flat cream-coloured scales; legs testaceous to dark ferruginous and the tarsi reddish or testaceous, densely covered with opalescent flat contiguous scales having a silvery white or cuprescent shiny metallic sheen; femora finely punctured dorsally and ventrally, with a few larger scattered punctures laterally near the apex, the punctures with pale setae, longer below; tibiae uncinate, with the apices transversely broadened, and their external apical margins with 5 or 6 testaceous flat dentate spines, the surfaces with scattered punctures and pale setae, longer below, the anterior and intermediate tibiae laterally compressed, the dorsal edges being sharp and carinate, the anterior ones being more outwardly dilated medially and with the external apical angle more produced; the tarsi not spongy below, setiferous, with the joints of equal width, joints 1 and 2 subequal, and each slightly longer than 3. From eleven specimens.

Length (excl. head), 4–6½ mm.

Breadth, 2–3½ mm.

Hab.—Cape Colony—?Constantia (Dr. F. Purcell).
Van Wyk's Vlei (Alston).
Hanover (Dr. F. Purcell).
Kimberley (J. Power).
Upington (Fr. R. Solier).
S. Transvaal—Vaal River (Alston). (*Type* from here.)

This species resembles *ditissima* Pér. (Eremnoschema), but can at once be distinguished by the rostrum not being trisulcate or distinctly unisulcate, by joint 2 of the funicle being much shorter and not subequal to or not very slightly shorter than 1, by the punctures on the elytra not being so large and foveate, by the intervals being much broader, by the presence of distinct dentate spines on the apical margins of all the tibiae, and lastly by joints 1 and 2 of the posterior tarsus being subequal and distinctly longer than 3 and not subequal to it, as in *ditissima*.

Sub-fam. ERIRRHININAE.

Gen. Derelomus Schoen.

Derelomus Schoenherr, Disp. Meth., p. 235, 1826.
„ Lacordaire, Hist. Nat. Ins. Coleop., vol. vii, p. 10, 1866.

Derelomus atratus sp. nov. ♀♂ Type, S.A.M.

Black, more or less shining, covered with silvery white setae; the head, apex of rostrum, and femora reddish brown; the antennae, elytra, and tibiae brownish ochraceous; a large subtriangular spot at base of elytra, the suture, a transverse fascia just behind middle, the lateral margins, and the apex black or blackish brown.

Head convex, with scattered fine punctuation, forehead with a central fovea, and more coarsely punctured; rostrum about as long as prothorax, very slightly curved, the sides more or less subparallel, with the upper surface convex, with a narrow central furrow, continuous basally with frontal fovea and extending to near apex, its borders shiny and carinate, with 3 shallow sulci with shiny carinate borders on each side, each with a row of punctures, the innermost and outermost ones continued to near apex as a few small separated punctures, the middle one ceasing at level of antennal insertions, the punctures with a very fine minute suberect white seta, the apex with a few separated small round punctures; antennae with very fine pale setae, the scape about as long as funicle and club together, reaching the eye, joint 1 of the funicle broader and longer than the remaining short subequal joints; prothorax broader than long, broader basally than long, with the apex shallowly constricted, the dorsal apical margin truncate and much narrower than the feebly bisinuate basal margin, the sides abruptly dilated just behind apical constriction, where it is also carinate, not serrated or denticulated, thence subparallel to base, with the upper surface convex, set with small round separated punctures, each with a short silvery-white depressed seta, denser laterally; scutellum minute and black; elytra ovate, with the basal margin feebly conjointly sinuate, broader than prothorax, the sides with the humeral angles rounded off, thence subparallel to beyond middle, gradually narrowed and conjointly rounded apically, with the upper surface convex, gradually declivous posteriorly, the striae with regular rows of punctures, with the intervals slightly convex, more so apically, and interval 9 more convex than the others, each with 2 irregular rows of short silvery white

curved setae, brownish ochraceous, with a large subtriangular basal spot from suture to interval 5 on each side, along the suture and interval 1, a transverse fascia extending across suture from stria 5 to stria 5, the apical part (margin excepted), and laterally along the inflexed margins, black or blackish brown; undersurfaces black; legs with scattered short silvery white setae, the femora reddish brown, the bases of the femora, the tibiae, and the tarsi brownish ochraceous. From a single carded specimen.

Length (excl. head), $2\frac{1}{3}$ mm.

Breadth, 1 mm.

Hab.—Natal—Estcourt.

This species is easily distinguishable from the other S. African species by its black colour.

Derelomus incognitus sp. nov. ♀♂ Type, S.A.M.

Elytra ochraceous; the head and prothorax more reddish ochraceous; the eyes, a fascia on each side of the prothorax, a sutural stripe, and a small indistinct spot on each side on the elytra black; the undersurfaces (as far as can be seen in carded specimen) dark.

Head convex, with a few scattered fine punctures on the vertex, forehead more coarsely punctured, with a slight central foveate impression; rostrum dark ferruginous, more or less black above scrobes in front of eyes, comparatively stout, slightly curved, about as long as head and prothorax together, the sides subparallel to the antennal insertions, thence very slightly dilated to apex, with the upper surface convex, with a very faint narrow central furrow, ceasing opposite antennal insertions, thence smooth to apex, with 3 shallow punctured sulci on each side, their borders shiny and subcarinate, the innermost and outermost sulci continued to apex, the middle one ceasing slightly before antennal insertions; antennae ochraceous, the club darker, with very fine pale setae, the scape slightly shorter than the funicle and club together, reaching the eye, joint 1 of the funicle about as long as the next 3 together, 2 slightly longer than 3, joints 3, 4, 5, 6, and 7 short, subequal; prothorax broader than long, with the apex very feebly constricted, the dorsal apical margin truncate and much narrower than the subtruncate basal margin, the sides carinate, suddenly dilated behind constriction, thence almost straight, very feebly rounded to base, with the upper surface convex, set with comparatively large separated punctures, with a broad slightly curved black fascia on each side, and a very

narrow smooth central carinate line in the basal half; scutellum small and black; elytra ovate, with the basal margin conjointly sinuate, slightly broader than prothorax basally, the basal angles feebly produced forwards, the shoulders rounded off, the sides very gradually widening to about middle, thence narrowed to the conjointly rounded apex, with the upper surface convex, gradually declivous posteriorly, the striae with regular rows of punctures, with the intervals broader than the striae, slightly convex, more so apically, interval 9 being more convex than the others and continuous with the prominent apical margin, each interval with more or less 2 rows of very minute punctures; the basal part, the suture along interval 1 to near the apex, and a small spot on each side at the middle on interval 5, black; legs ochraceous, with very fine scattered pale setae. From a single carded specimen ?♂.

Length (excl. head), about 2½ mm.

Breadth, 1 mm.

Hab.—Cape Colony—Cape Town.

This species is easily distinguished from the other S. African species by its distinct black markings.

Derelomus postfasciatus (Mshl. in litt.) sp. nov.

(Pl. XLIII, fig. 6.) ♂ and ♀ Types, S.A.M.

Brownish ochraceous, the prothorax and head often darker, more ferruginous brown; a transverse fascia or hour-glass-shaped fascia or a spot on each side on the elytra beyond the middle, black, blackish brown to reddish brown, with often the basal part also dark; the undersurface or often only the mesosternal part castaneous brown.

Head convex, rugosely punctured, forehead rugosely punctured, with a central foveate depression; rostrum ferruginous to reddish, slender, cylindrical and shining in ♀*, about as long as head and prothorax together, shorter, stouter, and broader in ♂*, and only about as long as prothorax, slightly curved, often more so in ♀, the sides very gradually narrowed in ♀ to antennal insertions, thence very slightly dilated to apex, more or less subparallel in ♂, with the upper surface convex, with 6 shallow sulci, their borders shining and carinate, the sulci coarsely punctured in ♂ and extending to the antennal insertions, the central carina in ♂ with a short distinct canalicule opposite antennal insertions, the apex in ♂ very finely punctured, the sulci with very fine punctuation in ♀, often ceasing beyond middle

* These differentiating characters I take as belonging respectively to ♂ and ♀.

and continued to antennal insertions as a row of very fine punctures, the carinae more indistinct and the central one only flattened, smooth or feebly canaliculate opposite antennal insertions, the apical part smooth and shining centrally, with very fine punctuation laterally; antennae inserted nearer apex in ♂ than in ♀, ochraceous to ferruginous red, covered with very fine minute silvery white setae, the club dark ferruginous brown, with the scape not reaching the eye, more slender in ♀ than in ♂, longer than the funicle and club together, with joint 1 of the funicle about as long as the next 2 together, 2 longer than 3, joints 3, 4, 5, 6, and 7 short, subequal but gradually widening apically; prothorax broader than long, with the apex constricted, the constriction shallowly visible dorsally, with the dorsal apical margin truncate and narrower than the subtruncate or feebly arcuate basal margin, the lateral margins carinate, the carina interrupted at the apical constriction, thence strongly carinate, gradually dilated to about middle, where it projects slightly outwards as a small rounded prominence, from there almost straight, very slightly rounded to base, broadest behind middle, with the upper surface more or less plane, subdepressed, evenly set with separated punctures throughout, often with a large dark or deep brownish discal spot, the prosternal part darker, punctuated; scutellum small but distinct; elytra ovate, with the basal margin conjointly broadly slightly sinuate, the basal angles feebly produced forwards, the shoulders rounded off, the sides very gradually rounded, gradually widening from shoulders to beyond middle, thence gradually narrowed again to the broadly conjointly rounded apex, broadest just behind middle, with the upper surface more or less plane, very slightly convex, gradually declivous posteriorly, with a transverse fascia or hour-glass-shaped fascia across suture behind middle from stria 6 to 6 or a spot on each side black, blackish brown to reddish brown, and often with the basal part also dark, with regular rows of punctures, each with a very minute pale seta, with the intervals broader than the striae, each with 2 rows of fine very minute pale setae; intervals 1, 2, 3, 4, 6, 7, and 8 slightly convex; interval 5 more convex, often more so in ♂; intervals 7 and 8 with a slight basal humeral callus; interval 9 strongly convex, more costate and continuous with the prominent apical margin; undersurface castaneous brown, often only the mesosternal part, with sparse punctuation and scattered minute pale setae, the mesosternum with a central fovea or canalicule, the suture between ventrites 1 and 2 broadly sinuate medially; legs with very fine minute scattered pale setae. From thirty-four specimens.

Length (excl. head), ♂ and ♀, 2–2⅔ mm.
Breadth, ♂ and ♀, 1–1½ mm.
Hab.—Cape Colony—Kentani (Miss Pegler).

This species is closely related to *ephippiger* Ghl., but is easily distinguished by its comparatively smaller size, the absence of a central dark line on the prothorax, and by the distinct and characteristic black transverse fascia on the elytra.

Derelomus rhodesianus sp. nov. ?♂ Type, S.A.M.

Brownish ochraceous, the head, the rostrum and prothorax more ferruginous; some small spots along the intervals on the elytra dark ferruginous brown.

Head convex, rugosely punctured, forehead rugosely punctured, with a feeble central foveate depression; eyes black; rostrum comparatively stout, about as long as prothorax and vertex of head together, slightly curved, the sides very gradually narrowed from base to antennal insertions, thence gradually dilated to apex, with the upper surface convex, with a few scattered scale-like setae basally, with a narrow central furrow continuous basally with the fovea on forehead and becoming wider opposite antennal insertions, from where it extends to near apex as a low central carina with a few small punctures on each side, with 3 shallow punctured sulci on each side, their borders being smooth, shiny, and carinate, the innermost and outermost sulci continued to near apex as a row of small punctures, the middle one ceasing abruptly slightly before the antennal insertions, the apex smooth, with a few small scattered punctures; antennae with very fine pale setae, the scape about as long as the funicle and club together, reaching the eye, joint 1 of the funicle broader and longer than each of the short remaining subequal joints, about as long as joints 2, 3, and 4 together; prothorax broader than long, with the apex constricted, the constriction visible dorsally, the dorsal apical margin truncate and much narrower than the slightly bisinuate basal margin, the sides carinate, feebly crenellated, abruptly dilated just behind the apical constriction, where it is also more carinate, thence subparallel to base, with the upper surface slightly convex, distinctly rugosely punctured, each with a small flat white seta, denser laterally; scutellum small but distinct; elytra ovate, with the basal margin feebly conjointly sinuate, broader than the prothorax, the sides with the humeral angle rounded off, thence subparallel to beyond middle, where it is gradually narrowed and broadly conjointly rounded

apically, with the upper surface convex, gradually declivous posteriorly, the striae with regular rows of punctures, each with a very minute pale seta, with the intervals slightly convex, more so apically, interval 1 apically and interval 9 being more convex than the others, each interval with 2 rows of minute punctures bearing minute depressed white setae; intervals 1, 2, 4, 6, and 8 each with a small elongated indistinct dark ferruginous brown spot just behind the middle; intervals 3, 5, and 7 each with 3 indistinct dark ferruginous brown spots; undersurface with scattered white flat setae; legs with scattered short white setae. From a single carded specimen, ?♂.

Length (excl. head), $2\frac{1}{2}$ mm.

Breadth, 1 mm.

Hab.—Rhodesia—Bulawayo (H. C. Pead).

This species belongs to the *signatus* Ghl. and *atratus* sp. nov. group, where the scape is about as long as the funicle and club together, and where joint 2 of the funicle is very short, subequal to the remaining joints. It is closer to *signatus*, but is distinguished from both species by its different colour and by the prothorax being rugosely punctured.

Derelomus rugosicollis sp. nov.

♂ and ♀ Types, S.A.M.

Ochraceous, with the head, rostrum, and prothorax brownish ochraceous.

Head convex, rugosely punctured, forehead rugosely punctured, with a deep central fovea; eyes black; rostrum comparatively stout, broader in ♂, more slender in ♀, about as long as head and prothorax together, distinctly curved, the sides almost straight, very gradually narrowed to level of antennal insertions, thence subparallel to apex in ♂, feebly dilated in ♀, with the upper surface convex, with a very narrow central furrow, continuous basally with frontal fovea and becoming wider opposite antennal insertions, from where it extends to near apex as a low central carina, indistinct in ♀ specimen, with a few punctures on each side, with 3 punctured sulci on each side, their borders being smooth, shiny, and carinate, the innermost and outermost ones continued to apex as a row of punctures, the outermost one being slightly narrower and also more sulcate beyond antennal insertions, the middle one ceasing abruptly slightly before antennal insertions, the punctures with a very fine golden seta, more visible in basal half, the apex with fine punctures and a few fine slender setae; antennae inserted nearer apex in ♂ than in ♀,

with fine yellowish setae, the scape barely touching the eye, about as long as funicle and club together, joint 1 of the funicle broader and longer than the others, about as long as 2, 3, and 4 together, 2 very slightly longer than 3, joints 3, 4, 5, 6, and 7 short, more or less subequal, gradually widening apically; prothorax broader than long, with the apical part slightly constricted, the constriction shallowly visible dorsally, the dorsal apical margin truncate and much narrower than the subtruncate or very feebly bisinuate basal margin, the sides carinate, the carina projecting dentately forwards on apical margin, dilated just behind constriction, where it is also more carinate, thence feebly rounded to base, with the upper surface slightly convex, with a shallow foveate depression centrally at the base, coarsely and closely rugosely punctured; scutellum small, brownish; elytra ovate, with the basal margin conjointly sinuate, slightly broader than prothorax, the shoulders angularly rounded off, thence slightly rounded and narrowed to the conjointly rounded apex, broadest at middle, with the upper surface convex, gradually declivous posteriorly, the striae with irregular punctures, more or less arranged in 2 rows, the intervals slightly convex, the alternate ones more convex, especially beyond middle and apically, interval 9 more convex than the others, and intervals 7 and 8 forming a raised humeral callus basally, each interval with more or less 2 rows of very minute yellowish setae; undersurface punctured, with scattered very fine yellowish setae; legs with very minute scattered yellowish setae. From two carded specimens.

Length (excl. head), $2\frac{3}{4}$–3 mm.

Breadth, $1\frac{1}{4}$–$1\frac{1}{3}$ mm.

Hab.—Zululand—Mfongosi (W. E. Jones).

This species is very near *rhodesianus* sp. nov., but is distinguished by its paler colour, the absence of spots on the elytra, the larger size, by having the alternate intervals distinctly more convex, and by having the punctures on the striae arranged irregularly more or less in two rows.

Sub-fam. ATTELABINAE.

Tribe ATTELABINI.

Group Phymatolabina.

Gen. Scotopsinus Voss.

Scotopsinus Voss, Ent. Zeit. Stett., Heft 1 and 2, p. 200, 1925.
Attelabus Linnaeus, Syst. Nat., ed. xii, p. 619, 1767.

Scotopsinus bituberculatipennis sp. nov.

(Pl. XLIII, fig. 3.) ♀ Type, S.A.M.

Ferruginous to dark ferruginous; the head, antennae,* prothorax, scutellum, circumscutellar margin, under surfaces, and the legs purplish red or darker, with a brassy metallic lustre; surface with a yellowish sericeous pubescence.

Head longer than broad, cylindrical, convex, rugosely punctured, with a posterior central canal extending backwards from a central fovea, the forehead slightly depressed, centrally basally foveate, rugosely punctured, medially obsoletely carinate, laterally subcarinate, the lateral carinae extending on to raised basal part of rostrum, where they converge opposite antennal insertions and disappear apically; eyes semiglobose, prominent; rostrum short, much dilated apically, basally slightly elevated between the antennal insertions, rugosely punctured; antennae inserted at about basal one-third of rostrum, with the scape and joint 1 of the funicle the broadest and longest, the scape slightly longer than joint 1, joint 2 the smallest, 3 longer than the rest, 4, 5, and 6 subequal, bead-like, 7 transverse, broader than long, the club large, oblong, velvety-black, with joint 1 a little longer but as broad as 2, joint 2 quadrate, 3 short; prothorax broader than long, narrowed apically, with the sides slightly rounded, the apical margin feebly sinuate, and the basal one slightly bisinuate, with the upper surface convex, transversely and gyrosely rugose, with 2 posterior slightly tubercular elevations and 2 anterior obsolete elevations enclosing a central furrow, and with a pit-like depression on each side at about the middle; scutellum short, broad, with a small subtuberiform elevation on each side, rugosely punctured; elytra about one and a half times as broad across the humeral calli as the prothorax, about two and a quarter times as long as the prothorax, with the shoulders rotundate and the humeral calli prominent, with their apices rounded, with the upper surface slightly transversely impressed behind the scutellum, more or less convex posteriorly, very rugose, with the circumscutellar margin on each side elevated and ridge-like, with a tubercle on each side of the suture just behind the transverse impression, with the intervals indistinct, irregular, and crenellated, interval 5 (?) costate basally and interruptedly costate posteriorly, the lateral ones more or less irregularly costate; pygidium and undersurface rugosely punctured; femora unarmed, densely and coarsely punctured, the anterior ones more

* In the specimen from Zululand the antennae and tarsi are black.

incrassate; tibiae slightly compressed, slightly ampliated towards the apices, ridged above, scabrous, dentate and setiferous below; posterior tarsi with joint 3 broader than 2. From three ♀♀.

Length (excl. head and rostrum), 4 mm.

Breadth, $2\frac{1}{4}$–$2\frac{1}{2}$ mm.

Hab.—Transvaal—Shiliowane (Rev. Junod). (*Type* ♀ from here.)
Zululand—Mfongosi (Misses Jones).

This species differs from the other species in this genus described from S. Africa by possessing only 2 tubercles on the elytra (those at the base being merely the raised circumscutellar margins). I can place this species nowhere else in this group except in the newly created genus *Scotopsinus* of Voss.

Group Attelabina.

Gen. Pleurolabus Jek.

Pleurolabus Jekel, Ins. Saund., ii, p. 197.
Attelabus Linnaeus, Syst. Nat., ed. xii, p. 619, 1767.

Pleurolabus damarensis sp. nov. ♀ Type, S.A.M.

Bluish black, feebly shining, legs with a bluish metallic lustre.

Head subquadrate, slightly longer than broad, cylindrical, very convex, rugosely punctured, obsoletely canaliculate posteriorly, forehead with an indication of an obsolete central carina; eyes semiglobose, shorter than space between them; rostrum short, about as long as head, dilated apically, raised basally between the antennal insertions; antennae inserted at about basal one-third of rostrum, finely setose, with the scape slightly longer than the globular joint 1 of funicle, joints 2 and 3 subequal and longer than the others, 4 slightly shorter than 3, 5 and 6 subequal, bead-like, joint 7 transverse, broader than long, the club ovate, velvety-black, with joint 1 longer but as broad as joint 2, joint 2 transverse, slightly broader than long, 3 about as long as 1; prothorax broader than long, narrowed apically and slightly constricted intramarginally, with the sides feebly rounded, the apical margin truncate and the basal one feebly bisinuate, with the upper surface slightly convex, densely rugosely punctured; scutellum short, broad, rugosely punctured; elytra about one and a quarter times as broad across the humeral angles as the prothorax, about two times as long as the prothorax, with their apices angularly rounded, the shoulders rotundate, the humeral calli elevated and

oblong, with the upper surface feebly transversely impressed behind the scutellum, convex posteriorly, with the longitudinal sulci indistinctly punctured, the intervals slightly elevated and very rugosely punctured; pygidium short, punctured; undersurfaces rugosely punctured; femora unarmed, rugosely punctured; tibiae subarcuate, ridged above, scabrous, dentate and setiferous below; posterior tarsi with joint 3 broader than 2. From a ♂ and a ♀.

Length (excl. head and rostrum), 4–5 mm.

Breadth, $2\frac{1}{2}$–$2\frac{3}{4}$ mm.

Hab.—S.W. Africa—Windhoek.

This species is allied to *exaratus* Boh., but is at once distinguished by its duller more black colour, by the obsolete canalicule on the head, by its rugosely punctured head and prothorax, which are not transversely strigose, and by the less costate, less regular, and apparently fewer costae and sulci. The intervals are much more rugosely punctured.

Sub-fam. APODERINAE.

Gen. Apoderus Oliv.

Apoderus Olivier, Ent., v, 81, p. 12, 1807.

Apoderus spinipes sp. nov.

(Pl. XLIII, fig. 2.) ♂ Type, S.A.M.

Carmine red (one ♀ is brownish ochraceous), smooth, shining, with the eyes, the extreme apex of rostrum, the antennae (often not the scape and joint 1), the tibiae, and the tarsi black (in two specimens only the front tibiae are dark).

Head large, obconical, longer than broad, convex, smooth, with the posterior part obsoletely canaliculate, the forehead sloping, bicanaliculate and finely punctured; eyes large, semiglobose; rostrum shorter than head, dilated apically, slightly raised basally between the antennal insertions, where it is canaliculate, with the 2 frontal furrows extending on to the raised part; antennae inserted slightly behind the middle of rostrum, with fine pallid setae, the scape much longer than the first globular joint of funicle, 2, 3, and 4 subequal, slightly longer than 1, 5, 6, and 7 the shortest, equal in length, but 7 is broader than long, the club with fine golden pubescence, with joints 1 and 3+4 subequal, 2 only slightly shorter, transverse; prothorax slightly broader basally than long, slightly constricted

apically and transversely near the base, with the apical margin sinuate and the basal one feebly bisinuate, with the upper surface convex, smooth, and centrally obsoletely canaliculate; scutellum short, broad, sometimes with a few minute punctures; elytra about one and a half times as broad across the humeral angles as the prothorax, about two and a quarter times as long as the prothorax, with the shoulders rotundate, the humeral callus prominent, smooth and oblong, with the apices rounded, with the upper surface transversely impressed behind the circumscutellar margin, slightly convex posteriorly, with regular rows of punctures, with the intervals slightly convex and very minutely punctured, with intervals 3 and 5 more or less costate basally and uniting apically they become prominently convex and continuous with 9; pygidium short, densely punctured; undersurface punctured; femora smooth, scabrous apically, with a prominent dentate spine subapically below; tibiae subarcuate, ridged above, scabrous, the posterior ones being medially slightly ampliated; posterior tarsi with joint 1 only slightly longer than 2, 3 and 2 subequal or 3 only slightly longer than 2. From three ♂♂ and two ♀♀.

Length (excl. head and rostrum), 4–5 mm.

Breadth, 2–2½ mm.

Hab.—Portuguese E. Africa—Nyaka, 20 miles N.W. of Inhambane (M. Exp.). (♂ *Type* from here.)

Rhodesia—Sebakwe (D. Dods).

EXPLANATION OF PLATES.

Plate XLII.

FIG.

1. *Brachycerus rhodesianus* (Pér. in litt.) sp. nov.
2. ,, *approximans* ,, ,,
3. ,, *meracus* ,, ,,
4. ,, *angustus* ,, ,,
5. ,, *rikatlensis* ,, ,,
6. *Spartecerus pallidus* sp. nov.
7. *Brachycerus verruculosus* (Pér. in litt.) sp. nov.
8. *Byrsops noordhoekiana* sp. nov.

Plate XLIII.

1. *Synthocus maculipes* sp. nov.
2. *Apoderus spinipes* sp. nov.
3. *Scotopsinus bituberculatipennis* sp. nov.
4. *Brachycerus damarensis* sp. nov.
*5. ,, *scutirostris* Germ.
6. ♂ of *Derelomus postfasciatus* (Mshl. in litt.) sp. nov.
7. *Brachycerus koebergensis* (Pér. in litt.) sp. nov.

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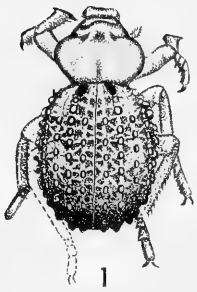
* As *scutirostris* Germ. was originally labelled as *promontorii* sp. nov. by Péringuey and bears some distant resemblance to *koebergensis* sp. nov. and *approximans* sp. nov., I have figured it here.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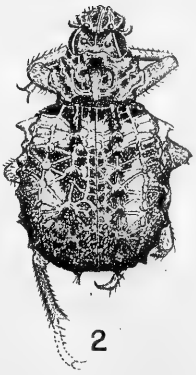
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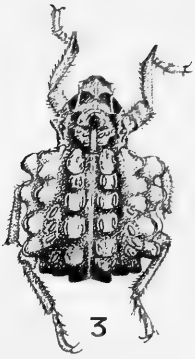
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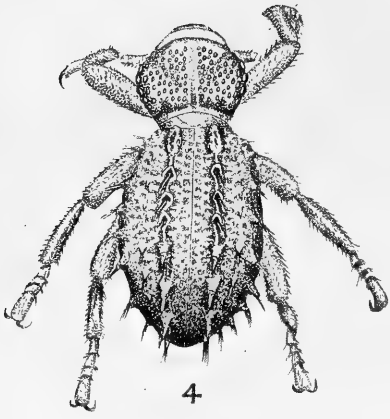
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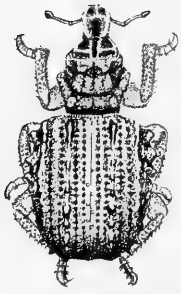
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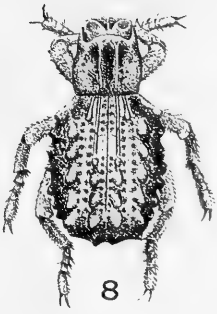
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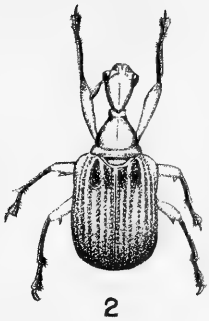

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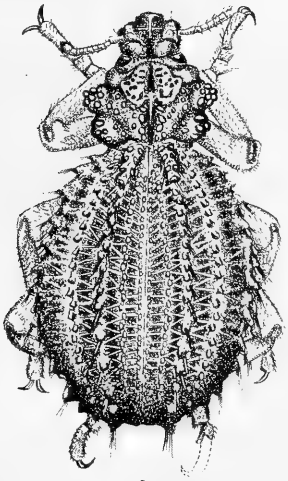

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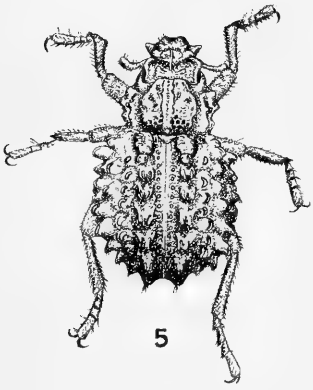

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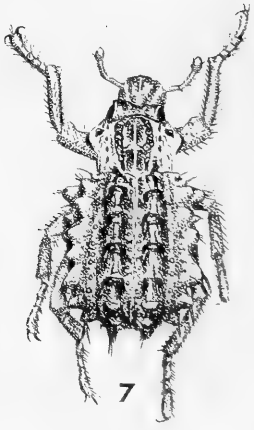

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