

On the myriapods collected during the 'Skeat expedition' to the Malay peninsula, 1899-1900 / by F.G. Sinclair (formerly F.G. Heathcote).

Contributors

Sinclair, F. G. 1858-
Royal College of Surgeons of England

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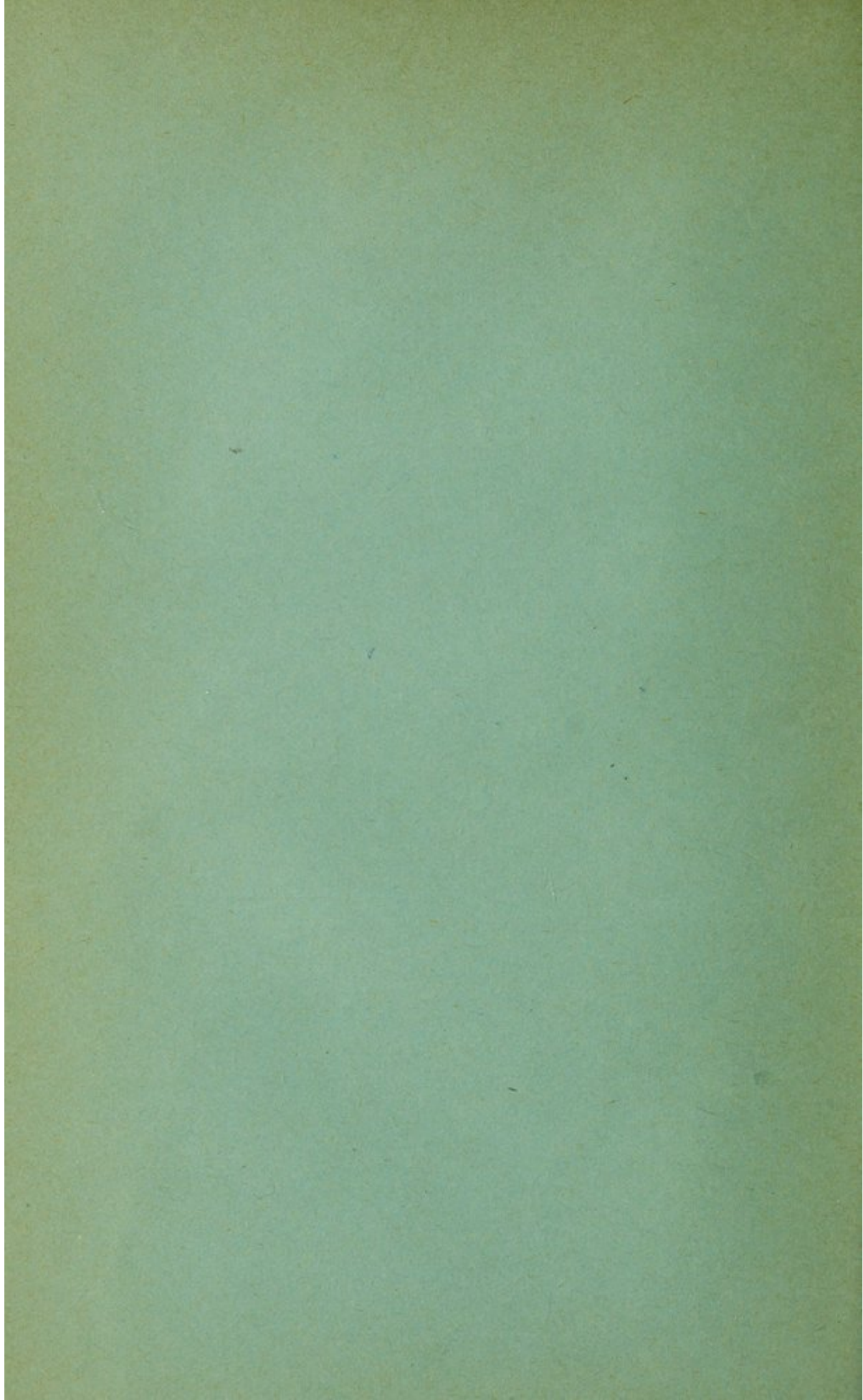
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[From the PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON,
December 3, 1901.]

On the Myriapods collected during the "Skeat Expedition",
to the Malay Peninsula, 1899-1900. By F. G. SINCLAIR
(formerly F. G. HEATHCOTE), M.A., F.L.S., Trinity
College, Cambridge.

(Plates XXX.-XXXII.¹)

When my friend Mr. Harmer asked me to report on this collection of Myriapods, I hesitated to undertake the task on account of my want of experience in species-work. I could not, however, resist the temptation of making acquaintance with several forms that I have long wished to examine, so I acceded to his request, and have found the work most interesting.

The fact that the places from which the specimens were collected are all new ground, renders it necessary to describe many forms as new species; but where it seemed at all possible to me to do so, I have described specimens as varieties rather than species, and this I have done deliberately, because a study of the literature has

¹ For explanation of the Plates, see p. 532.

convinced me that our knowledge of the Indo-Australian Myriapods is very fragmentary, and does not as yet suffice to allow of a satisfactory division of the groups into species.

Attems, in his excellent work on the Myriapods collected by Prof. Kukenthal in the Malay Archipelago, says that in most Myriapods there is a want of characteristic distinctions confined to a species, and in this I thoroughly agree with him. The only species-character which at present seems satisfactory is the form of the copulatory apparatus. There is, however, much practical inconvenience in resting too much upon a single character which is confined to one sex; and our knowledge of the differences between male and female is at present so imperfect, that it is easy to see how much confusion may arise. Moreover, we see from Verhoef's investigations that there may be considerable variations in the copulatory apparatus at different ages. Pocock too, in his work on the Myriapoda of the Mergui Archipelago, has pointed out that other characteristics vary extremely with age. Under these circumstances, I rather hope that my descriptions and figures may be of use to future observers than expect that my species may prove permanent. The consideration that we can have no satisfactorily defined species of Indo-Australian Myriapods until we have a better acquaintance with their numerous variations of form, and especially some knowledge of the differences due to different ages of individuals, must be my excuse for extending the present paper to what seems an undue length. It will be observed that I have described one or two peculiarities that are evidently individual malformations. Some of the questions raised by Mr. Bateson's book on Variation ('Materials for the Study of Variation,' 1894) seem to me to render any such peculiarities worth recording, and, so far as I know, very few such have been noticed by authors.

This collection contains examples of 40 species, of which 16 are already known, 15 are varieties of known species, and 9 are new. The Polydesmoidea are the most numerous, and the number of species of Chilopoda are few. This may be partly due to the difficulty of capturing the latter. As I know, from personal experience, it is no easy matter to collect a large and lively *Scolopendra*. The manner in which some of them have been taken is shown by a noose of thin grass round the neck of one specimen. The way in which another has been taken may be guessed from the fact that it is completely flattened.

The specimens were collected in the months of May, June, August, and September at the following places:—

April.

Patalung State. . . .	Koh ha. Pätälung (on shore of "Inland Sea"). Tapelung.
Patani (District of Patani State).	Patāni.

[2]

May.

Jalā (District of Patani State). Bukit Bēsar or Indragiri (mountain, about 3000 ft.).
Bukit Jalā (hills near Biserat).
Gua Gambar (*lit.* "Image Cave," in hills near Biserat).

June.

Raman (District of Patani). Kĕkābu, Bukit Balor.
Gua Glap, or "Dark Cave," near Biserat, Bukit Grib(?).
Patani (District of Patani State). Gua Tanan.

August.

Kĕlantān State Kuala Aring.

December.

Perak State Gunong Inas (mountain, a little under 6000 ft.).

Examples of the following species were collected at:—

Patalung State	Koh ha	<i>Rhyncoproctus proboscideus.</i>
	Patalung	<i>Spiroholus sanguineus.</i>
	Tapelung	<i>Platyrhacus beccarii.</i>
		<i>P. subalbus.</i>
		<i>P. setosus.</i>
		<i>Strongylosoma skeatii.</i>
		<i>Sphæropæus modigliani.</i>
		<i>Spirostreptus sanguineus.</i>
Patani (District of Patani State).	Patani	
Jala (District of Patani State).	Bukit Besar	<i>Platyrhacus pfeifferæ.</i>
		<i>Strongylosoma nodulosum.</i>
		<i>Spirostreptus sanguineus.</i>
		<i>Ostostigma aculeatum.</i>
	Bukit Jalā	<i>Platyrhacus kelantanicus.</i>
		<i>P. malaccanus.</i>
		<i>P. xanthopus.</i>
		<i>Cambala calva.</i>
Raman (District of Patani State).	Gua Gambar	<i>Scutigera longicornis.</i>
Patani State	Kekabu, Bukit Balor.	<i>Doratonotus cavernicola.</i>
	Gua Glap, Bukit Grib(?).	<i>Doratonotus cavernicola.</i>
Kelantan State	Gua Tanan	<i>Siphonophora longirostris.</i>
	Kuala Aring	<i>Platyrhacus kelantanicus.</i>
		<i>Thyropygus javanicus.</i>
		<i>T. weberi.</i>
		<i>Spirostreptus rubripes.</i>
		<i>Ostostigma orientale.</i>
		<i>O. aculeatum.</i>
		<i>Mecistocephalus punctifrons.</i>
Perak State	Gunong Inas	<i>Platyrhacus humberti.</i>
		<i>P. marginellus.</i>
		<i>Strongylosoma bipunctatum.</i>
		<i>S. coarctatum.</i>
		<i>Julus birmanus.</i>
		<i>Glomeris infuscatus.</i>
		<i>Scolopendra aringensis.</i>
		<i>Ostostigma orientale.</i>
		<i>Scutigera longicornis.</i>

I have used Silvestri's names for the parts of the under-lip, thinking them the clearest and most convenient.

DIPLOPODA.

Order HELMINTHOMORPHA.

Sub-Order COLOBOGNATHA.

SIPHONOPHORA LONGIROSTRIS Silvestri. (Plate XXX. figs. 1-3, 5.)

From Kuala Aring, Kelantan State.

Silvestri's description is very short, but I think that this species must be identical with the one from New Guinea described by him, or, at any rate, very closely allied.

Length 45 mm., width 3 mm. Number of somites 93.

Colour red-yellow, shading into pale yellow from the sixth somite to the head; legs pale yellow.

Head with long, slender, curved beak. Antennæ a little longer than the beak; terminal joint large and rounded, other joints equal. Antennæ and head covered with close-set hairs.

1st tergite curved where it joins the head, broad, about double the length of the succeeding tergite. Keeled like the others.

Pores situated on the keel. The side below the keel runs straight down to join the pleuræ at a fairly sharp angle, thus making the shape of the body rather square than cylindrical.

Legs very short and thickly haired; joints about equal, ending in a blunt claw.

Anal valves rather small, one sternite behind the anus without legs and divided by a median longitudinal furrow. Body tapering very gradually before and behind.

PLATYDESMUS KELANTANICUS, sp. nov. (Plate XXX. figs. 4, 6-9.)

From Kuala Aring, Kelantan State.

Colour dirty brown; head clear yellow; legs and sterna pale yellow.

The largest specimen has 79 somites; length about 50 mm. by 5 mm.

The smallest 77 somites; length 43 by $4\frac{1}{2}$ mm.

Head heart-shaped, small, covered with very fine short hairs. Antennæ (fig. 9) short and thick, nearly equal joints, the second being a little the longest.

The hypostoma (fig. 8) has the maxillæ large, inframaxilla single, large at base, contracting rapidly to a spike-shaped elongation, which extends almost the whole length of the hypostoma; galeæ small; small cardines; basals normal; maxilla furnished with a few bristles at the anterior edge.

Mandible with a long slender shaft, then a short movable joint, then a pectinated terminal portion (see fig. 7) consisting of a row of bristles supported by a slender shaft which has a ring at some distance from the end which looks like a joint, but is, I believe, immovable.

1st tergite. Differs much from the others, it is longer than the head, roughly semicircular in shape, not so broad as the others, and without keels; it is covered with large wart-like tubercles and smaller granules. The larger tubercles are arranged in two groups, so as to leave a clear space free in the direction of the longitudinal furrow.

2nd tergite. Prolonged into two keels, which are, however, shorter than the succeeding ones. Like the first tergite it shows a disposition to be tuberculated, as in addition to the two dorsal tubercles which enclose the dorsal furrow there are a number of smaller tubercles near the large ones. This arrangement of the tubercles forms an interesting gradation between the third tergite, smooth but for the two large dorsal tubercles, and the first tergite with its two groups of tubercles arranged in the same position as the two dorsal ones in the other somites.

The remainder of the somites resemble one another closely. The keels are long and bluntly pointed, the posterior angle being the most acute; they cover the short legs completely. The shape of the body rises with a steep slope to the back, where there are two large tubercles with a wide depressed space between them, along which there runs a deep longitudinal furrow. Each tubercle has a small tubercle projecting from its base (pores?). The bases of the legs are close together and are attached to a free sternal plate. Outside the legs are the spiracles, each on a small tubercle. The median dorsal furrow is continued right up to the tail, and the dorsal tubercles, though smaller in the last two somites, are still present.

Sub-Order POLYDESMOIDEA, Pocock.

Family POLYDESMIDÆ.

Genus PLATYRHACUS C. Koch.

PLATYRHACUS HUMBERTI, var. nov. (Plate XXX. figs. 10-13, 15.)

Label: "Gunong Inas, Perak. A scent of HNC. The palest coloured of the three largest specimens squirted out fluid from inter-segmental pores; all emitted."

There are three female specimens of this species, all from the same locality, and differing considerably in size and colour. I have no doubt that they are a variety of the species described by Pocock as *humberti*, but as they do not correspond exactly, I will give a full description.

Length 107 mm., greatest breadth 14 mm.

Body narrowed anteriorly and posteriorly.

Colour very deep chocolate, extreme edges of keels and of anal plate flavous. Legs and sterna same chocolate-colour but lighter.

Head thickly granular; shallow frontal furrow; upper lip with row of bristles, each proceeding from a small tubercle.

1st tergite slightly wider than head, the lateral contour of the

latter forming one curve with sides of tergite. Anterior border nearly straight, sides of tergite rounded; anterior edge raised into a ridge along which a row of tubercles is arranged, the ridge is carried round the side of the tergites; posterior margin with eight tubercles arranged in a row; at the lateral margin there are more tubercles, but flattened and irregular. The surface of the tergite is covered with smaller tubercles arranged irregularly, and there is an irregular transverse row of some larger tubercles.

2nd tergite is narrow and curved forward and downward, the edge of the keel being rounded.

3rd tergite does not project so much downward and forward; the anterior and lateral margins meet so as to form a fairly acute point, the posterior margin rounding-off into the lateral.

4th tergite. Anterior margin nearly straight; forms a subacute angle with the lateral, the posterior forming an obtuse angle with the latter. On this tergite one can see the first beginning of the basal shoulder.

5th to 10th tergites: the angle formed by the anterior and lateral margins becomes gradually more of a right angle.

11th tergite. From the 11th tergite the posterior angle begins to project, and at the 15th it has the form of a spine.

12th tergite. From the 12th the lateral edge of the keel shows signs of being lobed.

16th tergite. At this somite the lateral edge of the keel shows five lobes, which are distinct on the 17th. The last three tergites show three rows of tubercles; on the 15th the third row becomes confused with the smaller tubercles which cover the surface, but the two posterior rows may be traced more or less easily up to the first.

The *stigmata repugnatoria* are placed nearly in the middle of the keel at a distance of about 2 diameters from the edge.

The *anal plate* is rounded posteriorly, and shows six raised longitudinal ridges differing in length and arranged symmetrically.

The *sub-anal plate* is triangular, and is armed near the apex with two long papillæ, each of which bears a long seta. The edges of the anal valves are not very strongly marked, and have two pairs of setiferous tubercles near the margins. Outside of the valve are two more setiferous tubercles, arranged symmetrically with the internal ones.

Sterna are coriaceous, and without spines or furrows.

At the base of each leg there is one tubercle on the internal side and two on the external side. In the anterior region of the body these tubercles (the external ones) show an irregularity of arrangement; the two posterior ones are arranged in a straight line from the base of the leg to the under surface of the keel; the anterior two are arranged parallel to a line connecting the bases of the legs.

The legs and antennæ are hairy.

Another specimen is $82\frac{1}{2}$ mm. long and $12\frac{1}{2}$ mm. broad.

The third specimen is $87\frac{1}{2}$ mm. long and $12\frac{1}{2}$ - $15\frac{1}{2}$ mm. broad. Colour dirty brown on dorsal surface, with semicircular patch of pale testaceous colour on the dorsal margin of the last eleven somites (probably due to injury). Legs, antennæ, and sterna are pale testaceous, with some darker markings on the antennæ and legs.

PLATYRHACUS MARGINELLUS Silvestri. (Plate XXX. figs. 14, 17, 18, 20, 22.)

From Gunong Inas, Perak State.

This is probably the species described by Silvestri, and found in Sumatra; but as his description is very short, it will be better to give a full account of the animal. The specimens are two, a male and a female. The latter is considerably the largest.

Colour dark brown, almost black, the extreme edges of the keels and of the anal sternite being pale; the antennæ and legs yellowish brown, but darker than the edges of the keel, probably in the living animal they might answer to Silvestri's description of "rufescentibus."

Length 52 mm.; length of antennæ about 5 mm.

Breadth of 1st tergite	mm. $4\frac{1}{2}$ -5	Breadth of 6th tergite	mm. $7\frac{1}{2}$
" 2nd "	6 - $6\frac{1}{2}$	" 15th "	7
" 3rd "	$6\frac{1}{2}$ -7	" 17th "	$6\frac{1}{2}$
" 4th "	7 - $7\frac{1}{2}$	" 18th "	5
" 5th "	$7\frac{1}{2}$ -8	" 19th "	$4\frac{1}{2}$

Head narrow; antennæ long; frontal sulcus deep, extending from between the antennæ to the margin of the first somite.

1st tergite elliptical in shape, the lateral edges of the somite extending considerably beyond the sides of the head. Anterior margin with tuberculate ridge, which extends round a considerable part of the sides of the tergite. A row of tubercles along the posterior margin, and two distinct rows across the middle.

2nd tergite projects hardly at all forward or downward; anterior, posterior, and lateral margins distinct; three distinct rows of tubercles.

The shoulder of the keel quite distinct on the third somite; in the ninth the anterior angle is acute, while it is obtuse in the tenth. The pores lie nearly in the middle of the keel and at a considerable distance ($1\frac{1}{2}$ diameters) from the margin.

Edges of keels with a distinct margin. Posterior margin of keels not clearly serrated before the 15th somite. The posterior angle forms a very short tooth which does not reach the anterior surface of the succeeding keel. The anal sternite is much rounded, and shows little trace of the longitudinal ridges. Sterna smooth.

The copulatory foot of the male shows the two claws opposed to one another, one being longer than the other. The copulatory foot is long and slender. The shape of the body is rather convex, and the keels slightly upturned.

PLATYRHACUS KELANTANICUS, sp. nov. (Plate XXX. figs. 19, 21, 24, 25, 31.)

From Kuala Aring, Kelantan State.

Length 80 mm., greatest breadth 12 mm. Length of antennæ 8 mm.; space between antennæ $1\frac{1}{2}$ mm.

Breadth of 1st tergite	mm. 8	Breadth of 16th tergite	mm. $11\frac{1}{2}$
" 2nd "	11	" 17th "	$10\frac{1}{2}$
" 3rd "	11	" 18th "	9
" 4th "	12	" 19th "	$7\frac{1}{2}$
" 5th "	12		

As may be seen from the measurements, this Myriapod tapers abruptly before and behind.

Colour. The colour (in spirit) is very peculiar, being a reddish brown, almost like brick-dust. In the centre of each prozonite there is a thick, well-defined, longitudinal black line. This line does not extend the whole length of the prozonite, but there is anteriorly a narrow space free from black. In the tergum, between the keels, the black spreads out into a sort of blotch, extending from the base of one keel to the base of the other; leaving, however, the posterior part of the keel almost free. The legs and sterna are the same colour, but lighter.

Head rather narrow; the frontal furrow deep and wide, extending between the antennæ. Upper lip indented in the middle and armed with six bristles, each arising from a tubercle. Just above the upper lip is a deep semicircular compression with four setiferous tubercles on its upper edge. The whole head is rough and densely granular. The space between the antennæ is narrow; the antennæ are thickly covered with hair; first two joints less hairy and lighter in colour; end joint blunt and smooth; frontal furrow extends back to margin of first tergite.

1st tergite. Anterior margin rounded, with ridge, along which are arranged ten very distinct tubercles and more tubercles which are not distinct, but are mixed up with the smaller tubercles with which the rest of the tergite is studded. Behind the ridge there is a depression. The ridge is not carried round the lateral edges. The posterior margin is furnished with twelve very distinct tubercles. The margin is rather rounded-off, but there is an approach to a straight line on the surface that goes to meet the curve from the anterior margin in a blunt point. On the prozonite between the first and second keels there is a thin black line which extends from the posterior margin to the anterior.

2nd tergite projects forward and downward. Points of keels rounded. Row of twelve distinct tubercles on hinder margin; two fairly distinct rows in front of hinder row.

3rd tergite does not project so far forward and downward; lateral margin of this tergite straight, making an acute angle with the anterior margin. Two rows of tubercles can be made out.

4th tergite. Posterior margin of the keel is distinct, making an

obtuse angle with the lateral margin, which makes an acute angle with the anterior. There is only one row of tubercles.

5th tergite. First trace of shoulder; keel almost carries on the slope of the tergum. The keel starts from very high up, so that the whole surface makes a very gentle curve.

8th tergite. The anterior angle is acute, in the next somite it is obtuse. The little teeth on the posterior margins of keels are visible on the 9th somite. On the last two somites the posterior margin of the tergite is elevated into a ridge. The anal tergite shows little trace of the longitudinal ridges so conspicuous in some other species, its margin is also little lobed. The anal valves are very flat, and are provided with the usual setiferous tubercles. The sterna are coriaceous and without furrows. The posterior keels are very slightly bilobed.

PLATYRHACUS: var. of KELANTANICUS. (Plate XXXI. figs. 32-34, 42, 56.)

From Bukit Jalā, Jalā District.

Length 83 mm. Length of antennæ 10 mm.; space between bases of antennæ a little over 1 mm.

	mm.		mm.
Breadth of 1st tergite	7	Breadth of 8th tergite	12½
" 2nd "	10½	" 13th "	12
" 3rd "	11	" 14th "	11½
" 4th "	12	" 16th "	11
" 5th "	12	" 17th "	10
" 6th "	12½	" 18th "	9
" 7th "	12½	" 19th "	8

Colour dark chocolate-brown, with broad longitudinal pale stripe along centre of back, including prozonites and extending on to first tergite. Keels pale, legs pale, sternites rather darker than legs, edge of anal plate and antennæ pale.

Head rather narrow; space between antennæ very narrow. Upper lip indented in the middle and armed with five bristles. A depression between the antennæ. A deep semicircular pit just above the upper lip, with four bristles along the edges. The frontal furrow does not come to the level of the antennæ. The antennæ are long, darker in colour near the end, and densely covered with short hairs, less densely at the 1st and 2nd joints. Surface of head covered with small tubercles. Frontal furrow comes to edge of first tergite.

1st tergite. Anterior edge straight with ridge followed by furrow, the ridge bearing twelve tubercles which do not extend to the angle of the tergite. The posterior margin is straight and bears ten tubercles; the margins both anterior and posterior are rounded-off at the sides to meet in a rounded angle. The width of the tergite is considerably greater than that of the head.

2nd tergite. Keels widely open, almost semicircular, ends projecting forward and downward, ends of keels rounded; two rows of tubercles distinct.

3rd tergite. Lateral margin of keel a straight line, angle rounded, keel with a straight narrow margin.

4th tergite. Posterior margin of keel distinct; anterior angle acute, only slightly rounded.

5th tergite. Anterior angle less acute, first shoulder.

8th tergite. In this tergite the anterior angle is nearly a right angle. The teeth on the posterior edge of the keels are first distinct on the 11th somite; on the anterior they are not distinct till the 15th. The anal tergite shows four longitudinal ridges, but they are not very distinct; the two external ones are only a thickening of the margin. The end of the plate is rounded and very indistinctly lobed, edges of anal valves very prominent.

Sterna smooth, but punctated. The tubercles on the external sides of the bases of the legs have a furrow between them which runs to the base of the keel.

PLATYRHACUS BECCARII, var. nov. (Plate XXXI. figs. 35, 36, 51, 60.)

From Tapelung, Patalung State.

A variety of the species described by Silvestri as *beccarii* from Sumatra.

There are three specimens of different ages forming an interesting series. The oldest is a female, and measures 85 mm.; greatest width 11 mm.

Body narrows somewhat abruptly in front of the 4th somite, more gradually behind.

Colour black in the middle of the body; keels, legs, and antennæ yellow; sterna yellow between the legs, darker under the keels.

Head granulated; frontal furrow deep. Space between antennæ 5 mm. Length of antennæ 7 mm.

1st tergite. Anterior and posterior margins straight; the anterior with a slight irregularity of the tubercles on the ridge, giving the appearance of a median indentation. Anterior margin with a ridge which is not carried round the edge; ridge studded with tubercles; posterior margin straight, with row of nine tubercles, with smaller ones in between. Centre of tergite nearly smooth, more tuberculous near the edge.

2nd tergite projecting forward and downward, narrow, with row of ten large tubercles on the posterior edge. Lateral margins rounded.

3rd tergite broader, and not projecting forward and downward so much; posterior row of tubercles not so marked. Antero-lateral angle of keel acute, but slightly rounded; postero-lateral obtuse.

4th tergite hardly points down at all. First beginning of shoulder.

5th tergite. Shoulder well-marked; anterior angle hardly acute.

7th tergite. The anterior angle of this tergite is a right angle, and behind this somite the anterior angle becomes more obtuse and the posterior more acute.

12th tergite. The 12th keel has the posterior angle produced into a spine, though not a long one. The postero-lateral margin of the keels is finely serrated after the 10th somite.

Anal tergite. The anal tergite is rounded at the posterior edge, and shows long longitudinal elevations resembling those on the anal tergite of *P. humberti*, but differently arranged. They each end posteriorly in a tubercle, which bears a seta. The edge of the tergite is indistinctly divided into five lobes.

Sterna. The sterna are non-sulcate, and slightly marked with wrinkle-like elevations. The anal sternite is triangular, with two long setiferous tubercles; the anal valves have strongly marked edges, with a single setiferous tubercle on the edge of each. There are no setiferous tubercles on the outside of the anal valves.

There is a single tubercle at the base of each leg on the internal side, and on the external side there are three in a row, the posterior tubercle being partly divided into two.

2nd specimen. 19 somites. Length 72 mm., width 19 mm.

The teeth on the posterior margin of the keels are visible on the 8th somite. The lobes on the keels and the marks on the anal sternite are all more prominent than in the older specimen.

3rd specimen. This specimen has only 18 somites. Length 62 mm., width $8\frac{1}{2}$ mm.

Colour clear brown-yellow; prozonites darker, almost chocolate; the colour of the whole body is darker anteriorly. The lobes of the keels are much more clearly marked, and the rows of tubercles more distinct. The markings on the anal tergite less ridged, and more like tubercles. The five lobes of the keels can be traced even on the 2nd somite. The pore is placed just interior to the second posterior lobe of the keel (that is, rather more posteriorly than in the older specimens).

PLATYRHACUS PFEIFFERÆ Humbert & Saussure. (Plate XXXI. figs. 37, 44, 45, 48, 50.)

From Bukit Besar, Jalā District.

Length 112 mm.

Width of 1st tergite	mm.	Width of 16th tergite	mm.
" 2nd "	$9\frac{1}{2}$	" 17th "	$15\frac{1}{2}$
" 3rd "	13	" 18th "	$14\frac{1}{2}$
" 4th "	$13\frac{1}{2}$	" 19th "	$12\frac{1}{2}$
" 5th "	14		$8\frac{1}{2}$
" 5th "	16		

Colour black, shading into testaceous at edges of keels and margin of anal tergite. Antennæ, legs, sterna, and most of the under surface of the keels chocolate.

Head rough, and covered with small tubercles. Frontal furrow deep, and widening out to a semioval depression between the antennæ. Upper lip with a semicircular depression above it, and four bristle-bearing tubercles along its edge. Length of antennæ $10\frac{1}{2}$ mm.

1st tergite. Anterior margin straight, with ridge but no distinct

tubercles; the ridge and whole tergite wrinkled and rough. The ridge is not produced along the lateral margin. Posterior margin straight and without a row of tubercles, but, like the anterior margin, wrinkled and rough. Lateral margins somewhat rounded, and coming to a blunt point nearer to the anterior than the posterior margin.

2nd tergite projects downward and forward; point rounded.

3rd tergite. Lateral margin nearly straight, forming an acute angle with the anterior and an obtuse with the posterior margin.

4th tergite more square, the anterior angle still rather obtuse.

5th tergite. Lateral margin still forms an acute angle with the anterior. The keel no longer points downward and forward, the keel arises high up so that the back is little convex.

6th tergite. The beginning of a shoulder appears.

7th tergite. A distinct shoulder; the antero-lateral angle nearly square.

The little teeth on the posterior margin of the keel can be observed in the 9th somite, but do not become conspicuous till the 13th. The posterior margin is never very much prolonged; it forms a short tooth but hardly a spine. The edge of the keel never becomes very distinctly lobed, though a trace of lobes can be observed in the posterior somites. The anterior angle of the keel only differs much from a right angle in the last four somites. The upper surface of the anal shield is marked with longitudinal ridges, as in *Pl. beccarii*, but the arrangement is somewhat different. The sub-anal region shows the six tubercles along the line of the valves, but only three outside the valves; the absence of the third is probably an individual variation.

PLATYRHACUS INSULARIS Humbert & Saussure, var. nov. (Plate XXXI. figs. 40, 41, 47, 52, 53.)

I believe this to be a variety of the species described by these authors, although it differs considerably from their description.

Length 95 mm. Length of antennæ $9\frac{1}{2}$; distance between bases of antennæ 2 mm.

Width of 1st tergite	mm.	Width of 16th tergite	mm.
9		$14\frac{1}{2}$	
„ 2nd „	11	„ 17th „	13
„ 3rd „	12	„ 18th „	11
„ 4th „	13	„ 19th „	8
„ 5th „	15		

Colour dark chocolate-brown, shading into lighter brown on the edges of the keels. Ends of antennæ rather darker than the bases. The extreme edge of the anal plate light-coloured. Beneath the keels, light near the edge, darker on the sides of the body; sterna and bases of legs light chocolate-colour; ends of legs darker.

Head covered with small smooth tubercles. Upper lip indented in the middle, and furnished with a row of six bristles. Just above the upper lip there is a triangular depression with three

bristles at the edges. The deep frontal sulcus does not quite reach to the level of the antennæ. Antennæ short.

1st tergite. Anterior margin very slightly indentate, straight, and furnished with a ridge with tubercles, but the tubercles are not very prominent or very distinct; the furrow behind the ridge is carried out into a depression which is bluntly triangular, and extends to near the middle of the tergite. The posterior margin is straight with some large tubercles on it, but, as in the anterior margin, the tubercles are confused and not prominent. The sides of the tergite are rounded-off so as to make a blunt point nearer the anterior than the posterior margin. The tergite is about the same breadth as the head, the curve of the head being continuous with that of the tergite.

2nd tergite. Is prolonged downward and forward so as to form an open V embracing the first tergite; the ends are rounded so as to form blunt points. On the posterior margin there is a short ridge covered with tubercles.

3rd tergite less prolonged forward and backward than the 2nd. The lateral margin is distinct and makes an acute angle with the anterior, though the point is rounded-off.

4th tergite. A trace of shoulder is apparent.

5th tergite. The shoulder is apparent, and the anterior angle is less acute.

6th tergite. Anterior angle nearly a right angle.

12th tergite. The minute teeth are visible on the posterior margin of the keel, those on the anterior margin are not visible distinctly till the 15th. After the 15th the keels begin to be directed backward, and there is a small tooth on the posterior angle, but this is never very big.

Anal tergite. The anal tergite shows only four of the longitudinal ridges in place of the six possessed by most of the other species. The sterna are smooth, though examination with a lens shows numerous small granules.

PLATYRHACUS MALACCANUS Peters. (Plate XXXII. figs. 63-65, 68, 87, 88.)

From large cave, Bukit Jalâ, Jalâ District.

Two perfect specimens and one broken, all female.

Length 80 mm. Length of antennæ 8 mm.; distance between bases of antennæ barely 2 mm.

Width of 1st tergite	mm. 8	Width of 6th tergite	mm. 13
" 2nd "	19	" 16th "	12
" 3rd "	11	" 17th "	11
" 4th "	12	" 18th "	10
" 5th "	11	" 19th "	8

Colour coffee-brown at edges of keels and anal tergite. Sterna and legs same colour but lighter.

Head. Upper lip with median indentation, three stiff bristles on

each side of the indented part. Just above the upper lip there is a roughly triangular depression with four bristles at the edges. The frontal furrow does not come to the level of the antennæ. The surface of the head is covered with granules and tubercles. Posteriorly the frontal sulcus comes close to the edge of the 1st tergite.

1st tergite. Anterior border curved, marginal ridge covered with tubercles, depression behind it. There are twelve distinct tubercles on the ridge, towards the sides the tubercles become confused and indistinct. The tergite is wider than the head. The posterior margin has eight distinct tubercles; it is slightly indented in the middle. The marginal ridge does not extend to the sides. The lateral margins are cut so as to make the shape of the tergite roughly hexagonal. The whole surface of the tergite is covered with irregular tubercles.

2nd tergite widely opened, and not coming much below the first. Three irregular rows of tubercles can be distinguished. The ends of the keels are bluntly rounded.

3rd tergite projects less downwards than the 2nd, no regular rows of tubercles can be distinguished except at the posterior edge, where there are fourteen tubercles arranged somewhat irregularly. The lateral edge of the keels begins to be straight instead of curved.

4th tergite. There are nineteen tubercles on the posterior margin. Anterior angle still acute. No trace of shoulder.

5th tergite. Shoulder present; anterior angle still acute. The anterior angle is not quite a right angle till the 8th. The anterior edge of the keel is very slightly if at all convex; in the 9th the posterior edge begins to be concave. The first beginning of the posterior hook is just visible in the 6th somite. The teeth on the posterior margin are first visible on the 10th, those on the anterior not till the 13th. The posterior hook is never very pronounced.

The *anal sternite* is indistinctly 5-lobed; the longitudinal ridges, of which only four are present, are not very pronounced. The sterna are smooth and granulated, without a transverse furrow.

PLATYRHACUS SUBALBUS Pocock.

From Tapelung, Patalung State.

Length 84 mm., greatest width 11 mm.

PLATYRHACUS XANTHOPUS Pocock.

From Bukit Jalâ, Jalâ District.

Genus STRONGYLOSOMA Brandt.

STRONGYLOSOMA NODULOSUM Attems, var. nov. (Plate XXXII. fig. 89.)

From Bukit Besar, Jalâ District, and Kuala Aring, Kelantan State.

Length 33 mm., width 3 mm.

This species closely resembles the one from Borneo described

by Attems under the name *nodulosum*. There are, however, some important differences in the Malay specimens.

Colour and shape as in Attems's description. The furrow between the pro- and metazonites, which Attems describes as "deutlich geperlt," shows no signs of any pearls or tubercles even under a high power. Neither can I identify the "kleine kurze Wülste" on the pore-bearing segments, though there are certain pores or marks in the chitinous integument which may possibly represent them. Neither can I find any sign of the cross-shaped impression in the ventral plate.

The sub-anal plate has two setiferous tubercles in the same place as in *Platyrhacidae* and the two pairs of setiferous tubercles at the sides of the anal valves. The copulatory foot is shown in the figure.

STRONGYLOSOMA (ORTHOMORPHA) FUSCOCOLLARIS Pocock. (Plate XXX. fig. 23, and Plate XXXII. fig. 81.)

From Gunong Inas, Perak State. Male.

This specimen is, I think, identical with that from Tenasserim described by Pocock. The colour is, however, slightly different. The last joint of the antennæ is dark brown; the head, antennæ, and first tergite yellow-brown; extreme edge of first tergite pale. On each somite just above the keel there is a cluster of small pale spots. The rest of Pocock's description applies.

STRONGYLOSOMA BIPUNCTATUM, sp. nov. (Plate XXX. fig. 16, Plate XXXI. figs. 43, 61, and Plate XXXII. figs. 90, 95.)

From Gunong Inas, Perak State, and Kuala Aring, Kelantan State.

Length 52 mm., width 6 mm.

Colour of head dark brown, shading into yellow on the upper lip; under part of head yellow; a patch of yellow just behind each antenna. Antennæ yellow, with the distal parts of the joints shading into brown; last joint dark brown.

1st somite dark chocolate-brown, ends of keels and posterior margin of tergite yellow; ventral parts yellow.

2nd somite same, but with brown patch on lower ventral part of keel. Two pale spots on the prozonite.

The *3rd & 4th somites* resemble the 2nd. On the 5th the pale posterior margin is wanting, the chocolate-brown extending to the edge. On the cylindrical prozonite there are two large pale spots separated by a dark line. These spots are shaped like the half of an oval and extend from the anterior margin of the prozonite for about two-thirds of its length; they are visible up to the 18th somite.

The *tail* is pale at the posterior end, while at the anterior it shows a pale band divided by a median longitudinal dark stripe. At the sides of the anterior end it is chocolate. The ventral surface of the tail is pale and the anal valves chocolate.

The body tapers anteriorly and posteriorly.

Head. Upper lip with a semicircular indentation, edged with

small tubercles. Surface of head covered with short stiff hairs, especially towards the upper lip. Frontal furrow deep, reaching from posterior of head to the level of antennæ. Antennæ reaching to 3rd tergite.

1st tergite 2 mm. long by 5 mm. broad. Keels well developed; angle sharp, about on a level with the keel. Edges of keel not so much bent upwards as those of the 2nd somite. The anterior margin of the keel is rounded-off, following the curve of the anterior margin of the tergite.

2nd tergite barely $1\frac{1}{2}$ mm. long by $5\frac{1}{2}$ broad. Keel much pointed posteriorly, the point reaching to about the middle of the succeeding somite. Edge of keel more turned up than in the first.

3rd & 4th tergites. Length $1\frac{1}{2}$ mm., breadth $5\frac{1}{2}$. External edges of keels curve upward; traces of the strong thick margin appear.

5th tergite. This tergite shows the shape and dimensions of the remaining ones. Its length is 2 mm. and breadth 6 mm. The contrast between it and the preceding ones is very great. Keels turned up at the edges and a thick margin on the anterior border. The tergite is divided by a well-marked transverse furrow reaching to the bases of the keels.

The *pleural keels* have the form of a ridge in the first four somites; in the fifth they become a tubercle.

The *anal tergite* has the form of a truncated cone, with two very prominent tubercles at the two corners.

The amount of taper towards the tail may be judged from the following measurements:—

16th tergite	6 mm.
17th	„ $5\frac{1}{2}$ „
18th	„ 5 „
19th	„ $3\frac{1}{2}$ „

Sterna smooth; the basal elevated portion, from which the legs arise, has a strongly marked median longitudinal furrow, which is still apparent in the last somite. The femur is $2\frac{1}{2}$ times as long as the trochanter.

STRONGYLOSOMA SKEATHI, sp. nov. (Plate XXXI. fig. 39, and Plate XXXII. figs. 96, 97, 100.)

From Tapelung, Patalung State.

Length about 22 mm., breadth $3\frac{1}{4}$ mm.

The specimens are difficult to measure, as they are tightly curled up; I do not, however, think the error is great.

Colour a dark ferruginous brown. Head, 1st somite, and the greater part of the antennæ almost black. Sterna, legs, keels, and two small circular spots just above the antennæ yellow. The back is ornamented with two pale stripes, which, in the keeled part of the somite, diverge, so that the posterior ends are considerably more separated than the anterior. On the cylindrical

part they are parallel. The tail is yellow, with a median band of the ferruginous ground-colour. The anal valves are dark-coloured.

Head with indented upper lip; surface covered with short stiff hairs. Frontal furrow well marked. The small circular pale spots above the antennæ are very conspicuous. Antennæ covered with short fine hairs.

1st tergite nearly semicircular in shape, very little keel. The margin is higher than that of the second, which it partly overlaps. The pale streaks are as clearly marked in the 1st somite as in the others, but anteriorly they converge and join at the extreme anterior edge.

2nd tergite has the posterior angle just marked, but not acute like the 3rd.

3rd tergite. Posterior angle acute and prolonged into a spine.

Pleural keels not much developed, distinguishable on the first three somites and dying away about the fifth.

There is no abrupt transition between the anterior somites and the rest of the body, but the somites increase gradually in size.

The keels are small, rounded anteriorly, and sharply spiniform posteriorly. The spine, however, does not surpass more than the half of the cylindrical part of the next somite. The sternum is smooth and without furrows in the cylindrical part of the somite, but has a median longitudinal furrow dividing the bases of the legs including the last pair. The sub-anal plate and valves have the usual tubercles and setæ. The tail has the form of a truncated cone with two small tubercles at the two posterior corners; also two tubercles and setæ a little before the end of the tail.

STRONGYLOSOMA COARCTATUM Saussure.

From Gunong Inas, Perak.

STRONGYLOSOMA SETOSUM Pocock.

A young animal with only 19 somites. From Tapelung, Patalung State.

Genus DORATONOTUS Pocock.

DORATONOTUS CAVERNICOLA, sp. nov. (Plate XXXI. fig. 54, and Plate XXXII. figs. 69-71, 73, 74, 78, 82.)

From Gua Glaf, dark region of cave, Bukit Grib, Raman District, and from Gua Tanan, Patani State.

Bears a great resemblance to the species described by Pocock as *armatus*.

Colour light brownish yellow throughout. Legs, sterna, and antennæ lighter.

The head and antennæ as in Pocock's species; the sixth joint of the antennæ is much the longest joint. The maxillæ (Silvestri) of the hypostoma are provided with two long appendices maxillares, each with about six spikes at the end. The external margins

of the keels, including the second, are divided into five clearly marked lobes, and after the 4th have a high raised tubercle, resembling a median keel. This keel is divided into three lobes when viewed from the side, and when looked at from the front is bifid. These lobes differentiate the species very clearly from *armatus*. The last tergite, too, does not project over the tail as it does in the latter species. The openings of the tracheæ are on small tuberculiform elevations just behind the bases of the legs. I have not been able to distinguish the pores, but have no doubt that they are as in *armatus*. The amount of material was too small to make so full an examination as I should have liked.

Sub-Order JULOIDEA Pocock.

CAMBALA CALVA Pocock, var. nov. (Plate XXXII. fig. 84.)

From Gua Gambar near Biserat, Jalâ District.

These specimens differ from the *Cambala calva* of Pocock in the absence of "the one complete and two very short crests above" the margin of the first tergite. The material being abundant, I was able to take off the first tergite and examine under a high power, but could not see any crest. The size of the largest specimen was about 35 mm. by $3\frac{1}{2}$. The specimens were too much curled to allow of the longitudinal measurements being very exact.

Number of somites 58. The 2nd and 3rd tergites fully crested, as described by Pocock. Five crests on dorsal surface between the two that bear the pores; 16 below them. In all about 23, but the most ventral are hard to make out as they are very feebly marked. The antennæ are situated on a slight elevation shown in the figure.

TRACHYJULUS CEYLANICUS Humbert, var. nov.

From about 5000 ft., Gunong Inas, Perak State.

The colour differs somewhat from Humbert's description, as there is no dark line visible; also the pore-bearing tubercles are not black but dark brown. The tubercles forming the ridges are not so sharp as in his figure, and the ridges on the first tergite are not quite so strongly marked.

Family SPIROSTREPTIDÆ.

Genus RHYNCOPROCTUS Pocock.

RHYNCOPROCTUS PROBOSCIDEUS Pocock.

From Koh ha, Patalung State.

Genus THYROPYGUS.

THYROPYGUS JAVANICUS Brandt.

From Kuala Aring, Kelantan State.

THYROPYGUS WEBERI Pocock, var. nov.

From Kuala Aring, Kelantan State.

The principal differences are in size and colour.

Somites 86. Length 115 mm. by 6 mm.

Colour piceous above, shading into clear yellow on the edge of the upper lip. Antennæ dark yellowish brown, with yellow rings at the joints. Somites piceous behind, the anterior part being dark greyish yellow. Legs fuscous. Valves black. Labrum indented, with six pores above the indentation. Eyes separated by a diameter and a half. Antennæ extending to the hind border of the second tergite. Frontal furrow extending to the level of the points of the eyes. Collum wide laterally, posterior angle slightly produced, inferior and anterior border with sulcus. Two short but deep sulci on the posterior border. Anal ring produced into a straight, short, blunt point.

SPIROSTREPTUS SANGUINEUS C. Koch.

From Patani District; Bekit Besar, Jalā District; Tapelung, Patalung State; and Bukit Jalā, Jalā District.

SPIROSTREPTUS ATERRIMUS Pocock.

From Kuala Aring, Kelantan State.

A larger specimen than Pocock's. Length 319 mm. by 15 mm. 68 somites.

SPIROSTREPTUS RUBRIPES, sp. nov. (Plate XXX. figs. 29, 30.)

From Kuala Aring, Kelantan State.

Colour black with red legs.

Head. Frontal furrow to level of eyes. Distance between angle of eyes less than a diameter. Antennæ short, the second joint longest. Eyes about 55. Superior crenulate ridge at back of head.

1st tergite comes to level of 2nd. Three striæ on posterior lateral margin. Anterior margin with ridge and furrow from level of eyes. Anterior angle obtuse, posterior slightly acute, posterior edge slightly emarginate. Three pores on upper lip.

In the other somites the striæ come close to the pore. The pore is situated close to the raised (posterior) part of the segment, which just in front of the pore juts out forwards and is slightly elevated. The anal tergite is produced into a short blunt point which does not project beyond the valves and curves downwards, following the curve of the valves.

This species seems to resemble *Thyropygus inferorum* of Silvestri, but far surpasses it in size and in the number of its somites.

SPIROSTREPTUS DORSO-LINEATUS, sp. nov. (Plate XXX. fig. 26.)

There are three female specimens of different ages. I shall describe the smallest first.

Length about 75 mm.

45 somites. Body tapering rather abruptly behind the head.

Colour. Head castaneo-piceous; 1st somite the same, growing

lighter towards the inferior angle, where it is almost yellow. Other somites: in front a greyish yellow, shading into a light ash-grey as far as the transverse furrow; after that the grey is darker, becoming almost black posteriorly. This dark grey behind the furrow is only continued down to the pores. Below the pores the colour behind the furrow is ferruginous, with a tinge of grey on the most anterior half. Legs and antennæ clear orange-yellow. There is a fine dorsal median longitudinal line of yellow along the whole back. End of anal spike and edges of valves orange-yellow.

Head. Frontal furrow to level of eyes; five labial pores. Space between eyes $1\frac{1}{2}$ diameters. Antennæ long, passing edge of 2nd tergite; second joint longest, last two shortest.

1st tergite. Postero-lateral edge striated; five striæ. Anterior edge rounded and distinctly emarginate. Lateral edge very narrow. Posterior edge straight. Other somites striated to level of pore. Concentric markings anteriorly. Transverse furrow well marked.

Anal spike short, sharp, and much upturned.

Specimen with 51 somites. The colouring is not so bright. The greys are not so dark and the ferruginous yellow is much more marked, the head especially being almost castaneous. The antennæ are longer, reaching the 4th somite.

Specimen with 53 somites. I believe this to be adult. Length 215 mm. by 13 mm. The colouring is not so bright as either of the first two specimens. The head is more black, the anterior part of the somites is more yellow-grey. The black-grey of the posterior part of the somite is continued further ventrally. Behind the posterior part of the somite there is a very narrow ring of castaneous. The thin line on the back is still apparent, but is black instead of yellow. The narrowing of the body behind the head is more apparent. The anal spike is somewhat blunter though still upturned. The antennæ are dark brown, with a pale yellow ring at the articulations. The legs are clear yellow, with a black patch on the anterior and posterior aspects of each joint, extending almost the whole length of the joint. The last joint is black all round. The effect of this is curious. If a leg is looked at from behind or from the front, it appears black with yellow rings at the articulations and the last joint black; when viewed from the side, it appears altogether yellow with a black top joint. The antennæ reach to the hind edge of the 2nd tergite. The second joint is the longest, the third longer than the fourth, the fourth longer than the fifth, and the last two are the shortest. The ventral grooves reach to the second joint of the legs.

Altogether this Myriapod must resemble *Sp. oatesii* Pocock rather closely. The points in which it differs are: the length of the antennæ; the number of ridges on the 1st tergite, though I suspect this to be a peculiarity which differs in different individuals; the length of the ventral grooves; and the anal process, which is distinctly upturned in this animal. The legs are fairly long, but

there is one conspicuous seta on the lower surface of each joint as described in *oatesii*.

SPIROSTREPTUS VITTATUS Pocock. (Plate XXX. figs. 27, 28.)

The colour of this specimen differs from that described by Pocock, especially in the legs, but the resemblances are so great that I think it must be regarded as a variety only, and not as a new species. I shall, however, give a fairly full description, as the points of difference may seem more considerable to others than they do to me.

Length 220 mm. by 12½ mm. Somites 85.

Colour. Head castaneo-piceous. 1st tergite castaneo-piceous; antennæ same. Other somites castaneo-piceous behind, paler, almost ochraceous in front. Anal somite and valves the same ochraceous colour, with the anal spike darker. Legs dark castaneous, but lighter than the head.

Head. Nearly smooth, slightly wrinkled below. Labial pores six, somewhat irregularly placed. Frontal furrow terminating at level of eyes. Eyes less than 60 but over 50, arranged in seven transverse series. Space between eyes a little less than a diameter. Antennæ reaching to end of 1st tergite; second joint the longest, the two end-joints slightly shorter than the third and fourth. Elevated striated ridge just below the edge of the 1st tergite; where the frontal furrow joins this ridge, the ridge projects a little to meet it and is cut away on each side of the projection so that the margin of the ridge is sinuous in the middle of the head.

1st tergite. Large and smooth, narrowed laterally, both borders being distinctly emarginate. The marginal sulcus extends to the eye; the anterior and posterior angles are rounded. It seems to me that the posterior angle is a little more rounded than in Pocock's figure. On the posterior edge there are three clear striæ and two more indistinct. Other somites with the transverse furrow very distinct, the portion of the somite behind it being very slightly higher than in front. Pore just behind the sulcus, the latter being sinuate at this point. The longitudinal striæ extend nearly but not quite up to the pore. Concentric markings on the front part of the somite. Ventral grooves small and short. Anal somite moderate in size, the projection coming to the level of the valves but not surpassing them. It is marked off from the rest of the tergite by a distinct constriction.

Legs long; one seta above and one below the claw; a few hairs on the lower surface of the joints.

There are five immature specimens of *Spirobolus* from Gunong Inas, Perak. It is not possible to determine the species without a greater knowledge than I possess.

JULUS BIRMANUS Pocock.

Two specimens. I do not think either of them is full-grown.

57 somites. About 40 mm.

Colour in male rather brown than grey, fine line down back. Head same colour; antennæ same colour; legs yellow.

Immature female lighter in colour, yellow, with the brown only showing at the top of the segments. Head and first few somites darker; antennæ dark.

Head with two pores on forehead. Eyes about seven rows. Lateral margin of 1st tergite rounded. The rest of Pocock's description answers, with the exception of the hinder border of the tergites, which is not pectinated so far as I can see.

As there is only one male example, I did not feel myself at liberty to dissect out the copulatory apparatus.

Order ONISCOMORPHA Pocock.

SPHÆROPEUS EVANSI, sp. nov. (Plate XXXI. fig. 57, and Plate XXXII. figs. 79, 80, 83, 91.)

Length 40 mm. by 20 mm.

Colour. Head and 1st somite piceous; rest of body piceo-castaneous on upper part of somites, shading into clear testaceous, with a green tinge irregularly blotched with black so as to have the appearance of tortoise-shell. Legs and antennæ the same greenish testaceous when seen by transmitted light. When seen as an opaque object, the hairs with which they are clothed give them a dull greenish-brown appearance.

Head somewhat conical in shape. On the upper lip there is a raised, smooth, black plate, cut out in the centre so as to form a single tooth with a depression on each side (fig. 20 *a*). The surface of the head is rough, punctuated and covered with bristles. There is an indentation in the middle of the forehead where it joins the middle of the 1st tergite. Eyes in a large round cluster. Antennæ with the last joint largest, and a large punctated pad at the end.

1st tergite smooth, curved, and not surpassing the eyes in breadth.

2nd tergite large, with straight anterior and posterior borders. There is a strong ridge on the anterior margin, accentuated from the level of the eyes, and becoming broader at the base posteriorly where it forms a broad depression, thickly covered with hairs. The raised smooth part of the tergite near the lateral extremity is emarginate and ends in a fairly sharp point. The depressed extension of the border furrow curves backwards beneath the 2nd tergite.

3rd tergite small and with a lancet-shaped extremity.

4th tergite with the anterior border cut away by a groove or depression which, like that of the second, is full of hairs, leaving the smooth part lancet-shaped.

5th tergite. The depression is more cut away so as to leave the lancet-point directed more backwards. In the 11th it is less cut away, and the point is rather square and truncated. In the 12th

there is no depressed groove; the terminal plate is large, rounded, and almost entirely of the peculiar tortoise-shell appearance.

The legs terminate in a strongly formed hook on one side of the truncated top and a blunt strong spine on the other. Along the internal side of the tarsal joint, below the hook, there are five strong spines. The legs are hairy.

Copulatory feet of the male (Pl. XXXII. figs. 79, 91). Posterior foot: The movable dactylus is long and slender, and composed of two segments of which the proximal is the longest. There is a pad beneath the proximal end of the terminal joint and beneath the distal end of the proximal joint. The immovable dactylus is broad and thin, not so long as the movable, and narrower at the proximal end. Anterior foot: Both movable and immovable feet are single-jointed. The immovable is thin and broad; the movable is stout and curved. There is a soft, hairy pad between them.

The *vulva* of the female consists of two parts on each side, one heart-shaped (see Pl. XXXI. fig. 57), with a slit from the upper end to near the middle; the other a short, stout cap. The copulatory apparatus seems to show a strong resemblance to that of *Sp. hercules*.

SPHÆROPŒUS HERCULES Brandt.

SPHÆROPŒUS MODIGLIANI Silvestri.

The fact of the copulatory feet and vulva corresponding to those drawn by Silvestri, together with the general resemblance to his description of the species from Sumatra, suffices to identify the species; but as his account of the animal shows some points of difference from the Malay specimen, I think the latter must be put down as a new variety.

Length 30 mm. by 16 mm.

Colour castaneous, with slight tinge of green in some lights. Antennæ and legs lighter.

Head broad; upper lip very slightly indented; antennæ very short and thick, with dotted pad at end, punctuated and hairy, especially on lower parts. Forehead with sinuous indentation where the edge of the 1st tergite fits in. Eyes in large circular spot.

1st tergite smooth, not very long; the raised part slopes down to meet the depressed part at a steep angle. In the middle of the back of the tergite, where this slope meets the marginal rim at the sides, there is a flat space between the slope and the marginal rim. The raised part has the shape of a very blunt lancet at the sides. The lower depressed part is bounded by the marginal rim.

3rd tergite. The 3rd tergite is very short and ends in a sharp lancet-point. On the 4th the edge of the lateral extremity is cut away by the lateral groove. The ventral groove is continued up to the penultimate tergite. The surface of the grooves is rough and covered with small tubercles, but is without hairs. The last tergite is smooth and polished like the others.

SPHÆROPŒUS EXTINGUUS Silvestri. (Plate XXXII. fig. 77.)

From Tapelung, Patalung State.

A much mutilated male specimen.

The correspondence of the copulatory feet with those drawn by Silvestri establishes the identity of the species. The colour, however, is different. It is completely black, the legs and antennæ alone having a slight tinge of brown. There is besides no trace of the five striæ described by Silvestri on the 2nd tergite. This and the last species seem to me to be very closely related.

GLOMERIS INFUSCATA Pocock.

From Gunong Inas, Perak State.

CHILOPODA.

SCOLOPENDRA SUBSPINIPES Haase. (Plate XXXII. figs. 66, 72, 75, 76, 99.)

There can, I think, be no doubt that the specimens belong to the species *subspinipes*; but, as in many of the Myriapods in this collection, there are small differences which need a description.

Length about 120 mm. by $7\frac{1}{2}$ mm.

Colour ochre, shading into faint orange on the underpart of the head and at the end of the body, and into dark dull green at the ends of the somites.

Head round, narrowed in front and cut off behind. Antennæ of 20 joints, reaching to the 4th somite. Maxillary coxæ with plates in contact, each with five teeth—two very small, one large and rounded, another two of medium size and well defined. The basal projection stout and without teeth. The two dorsal furrows are discernible on the 3rd somite.

The dorsal plates are margined after the 5th, but the margin is not strongly marked till the 8th. The pleural appendages have two sharply distinct spines, but on examination with a higher-power lens one sees another dark-coloured elevation at the side, which is an imperfect spine. The projection on the anal femur has four spines, two sharp and two not much elevated. The femoral spines are arranged on the internal and under sides of the femur, the two other sides being without them. They are arranged in longitudinal rows. Looking at the under surface and beginning from the outside, one counts 2, then 3, then 3; then passing to the inside beneath the spur there are 2 and 2. Besides the ones just described there are nine others. Of these two are small, two medium-sized, and five large. Both the small ones show the condition of the pleural appendages possessed by the specimen just described, viz., more than two spines at the end. In the case of these small young specimens there are two large spines and two small ones. In all the larger specimens there are only two spines. In all of them there are five maxillary teeth, except in one specimen, where there is another doubtfully distinguishable. The anal femoral spine also shows in the small specimens four spines at the end, while in the larger there are but two. In the larger animals the colour somewhat resembles a dull ochre or olive-brown, while the first two somites are clearer

in colour. In the largest the green tinge of the end of the somites is almost gone. The length of the largest specimen is 130 mm. without the anal legs; the length of the anal legs 25 mm. Smallest specimen 65 mm.; anal legs 15 mm. The number of spines on the legs varies from five to thirteen; there are, however, always two in a line beneath the femoral spine, looking at the animal from above, giving the appearance shown in Haase's plate.

SCOLOPENDRA HARDWICKII Haase, var. nov. (Plate XXXII. figs. 101, 102.)

Two specimens, the structure of which corresponds so closely with that described by Haase, that they must be put down as a variety of that species in spite of the great difference in colour.

Colour. A dark copper-colour all over, a little lighter on the ventral surface. Claws black.

Head broad and round, narrowed in front. Depression in front between the eyes, resembling a frontal furrow. Antennæ with 19 joints reaching to the 3rd somite. Poison-claws strong, with rather inconspicuous basal projection which has two small prominences. Maxillary teeth six, clear and regular. The plates on which the teeth are placed have a transverse furrow at their base. The top of the head is slightly punctated. The dorsal furrow begins from the 3rd somite. The margins of the dorsal plates begin from the 5th somite and are clear and prominent. Ventral furrows distinct. The rest of Haase's description applies, with the exception of the spine on the first metatarsal of the præanal legs. I can find no such spine in these specimens. Also the pleural appendages have two spines at their points.

The length of this specimen is 140 mm. by 12 mm. Anal legs 23 mm.

The second specimen is curiously malformed. The præanal leg on one side has the first two joints about the normal length, but thin and flat; they are followed by three very short thick joints. The anal leg on the same side is small and slender, smaller than any of the other legs and without any spines.

SCOLOPENDRA ARINGENSIS, sp. nov. (Plate XXXI. fig. 46, and Plate XXXII. figs. 67, 85, 86, 93.)

From Kuala Aring, Kelantan State.

This species bears a great resemblance to *Sc. meyeri* Haase, and I think is closely related to it. The points of difference are, however, sufficient to make it necessary to describe it as a new species.

Length 80 mm. by 8 mm. Anal claws 25. Antennæ 20-jointed. Length of head 7 mm.; breadth of head $6\frac{1}{2}$ mm.

Colour dark olive-green. Head and 1st somite dark brown with greenish tinge. The middle part of the tergites is rather brown than green, the green tinge being more apparent on the edges. The antennæ and legs are clear yellow-brown, but the anal legs are olive-brown with a green tinge after the first joint. The sternal plates are olive-brown.

Head smooth, slightly punctated, narrowed in front. Antennæ with 19 joints, extending to 4th somite. Maxillary teeth five on each plate, distinct. Basal projection with two black protuberances running into one another near the point and a distinct one near the base, at some distance from the other two. The maxillary palp with one centre claw and two small spines. The ventral furrows begin on the 3rd somite, the margins of the dorsal plates are distinct on the 8th. The long pleural appendages have two small spines one above the other, so that when looked at from above there seems to be a single spur. The anal legs are long and slender. The femoral spur is long and, like the pleural appendages, has two spines one above the other. Just posterior to the spur there is a single spine; posterior and inferior to that there is another, and two more on the other side. The præanal legs are without spines. The anal dorsal plate is 4 mm. broad and 5 mm. long, with a strong margin and cut away above the anal femora.

OTOSTIGMA ORIENTALE, var. nov. (Plate XXXI. figs. 49, 55, 58, 59, 62.)

From Kuala Aring, Kelantan State; and Gunong Inas, Perak State.

This beautiful little Myriapod seems to me to stand between *Ot. orientale* of Pocock and *Ot. nemorensis* of Silvestri.

Length 45 mm. by 4 mm. Anal legs 21 mm. Head $3\frac{1}{2}$ mm. by 4 mm. Anal dorsal plate $2\frac{1}{2}$ mm. by 2 mm.

Colour. Head and 1st somite reddish brown with green tinge at anterior edge of 1st somite and anterior end of head. Other somites metallic green, except last two somites, which have the same tinge as head. Legs pale green. Underside of head and pleural appendages red-brown. Anal legs with first joint pale green; next joint pale bluish green with dark blue band; 3rd, 4th, and 5th joints the same; end joint pale blue-green. Præanal with the first two joints pale green; next two pale bluish green with dark blue band; end joint pale green. Other legs with dark blue band on last two joints.

Head rather oval in shape, slightly punctated. Antennæ with 21 joints. Maxillary teeth three; two of these are close together, the third more remote. Basal protuberance with five small distinct teeth. Poison-claws long and thin. Margins of dorsal plates distinct on 9th plate; ventral furrows on 3rd. Anal dorsal plate with median longitudinal indentation. Pleural appendages with two spines at the end and one more remote. Anal legs long and thin; 4 spines in transverse row, then 3, then 3.

OTOSTIGMA ACULEATUM, var. nov. (Plate XXXI. fig. 38, and Plate XXXII. figs. 92, 94, 98.)

From Kuala Aring, Kelantan State.

This specimen agrees in many points with *Ot. aculeatum* of Haase, but has some differences.

Length about 50 mm. by 5. Anal legs 25. Head 4 mm. by $4\frac{1}{2}$.

Colour. Head and first segment ferruginous; rest dull olive-brown. Legs very pale, almost white. Pleural appendages ferruginous. Sterna pale.

Head. Length and breadth almost equal. Surface slightly punctated. Antennæ seventeen joints, reaching to four somites; end joints rather large, very distinct and pearl-like. The left-hand antenna shows an individual malformation. The first four joints are thick, then the antenna suddenly diminishes in size. In the right antenna the diminution in size is gradual.

Maxillary teeth. The outside one on each coxal plate is large and distinct; inside there are two fused and indistinct, and showing further imperfect division. The basal projection is indistinctly toothed and somewhat cut away at the base. The maxilipede shows a ridge edged with bristles from the claw to halfway up the first joint; the second joint has a projection on the underside (Pl. XXXII. fig. 94).

The pleural appendages are long and show three spines at the end and two some way down. The anal legs have spines 4, 5, 1, 5. The last four sternal plates are prolonged in the middle over the succeeding ones. The differences in the colour and proportion (great length of the anal legs) and in the arrangement of the spines render it questionable whether this specimen should not be regarded as a separate species.

There are two much younger specimens of the same species from Tapelung and Bukit Besar. The anal legs of one have a faint livid tinge at the end; the other has a dark greenish line down its back.

MECISTOCEPHALUS PUNCTIFRONS Newp.

From Kuala Aring, Kelantan State.

SCUTIGERIDÆ.

SCUTIGERA LONGICORNIS Haase.

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EXPLANATION OF THE PLATES.

PLATE XXX.

- Fig. 1. *Siphonophora longirostris*. Head from side, p. 508.
 2. " " " Head and first tergite from above.
 3. " " " Tail from below.
 4. *Platydesmus kelantanicus*. Segments 1, 2, 3, p. 508.
 5. *Siphonophora longirostris*. Leg, p. 508.
 6. *Platydesmus kelantanicus*. Tail, p. 508.
 7. " " " Mandible.
 8. " " " Hypostoma.
 9. " " " Antenna.
 10. *Platyrrhacus humberti*, var. Head and first tergite, p. 509.
 11. " " " Front of head.
 12. " " " Tail from above.
 13. " " " Tail from below.
 14. " *marginellus*. Copulatory foot, p. 511.
 15. " *humberti*. Keel, p. 509.
 16. *Strongylosoma bipunctatum*. Copulatory foot, p. 519.
 17. *Platyrrhacus marginellus*. Head, first and second tergites, p. 511.
 18. " " " Tail from below, p. 511.
 19. " *kelantanicus*. Tail from above, p. 512.
 20. " *marginellus*. Sixteenth keel, p. 511.
 21. " *kelantanicus*. Forehead, p. 512.
 22. " *marginellus*. Tail from above, p. 511.
 23. *Strongylosoma fuscocollaris*. Copulatory foot, p. 519.
 24. *Platyrrhacus kelantanicus*. Seventeenth keel, p. 512.
 25. " " " Head and first tergite.
 26. *Spirostreptus dorso-lineatus*. a. Tail; b. Head, p. 523.
 27. " *vittatus*. Head, p. 525.
 28. " " " Tail.
 29. " *rubripes*. Tail, p. 523.
 30. " " " Head.
 31. *Platyrrhacus kelantanicus*. Copulatory foot, p. 512.

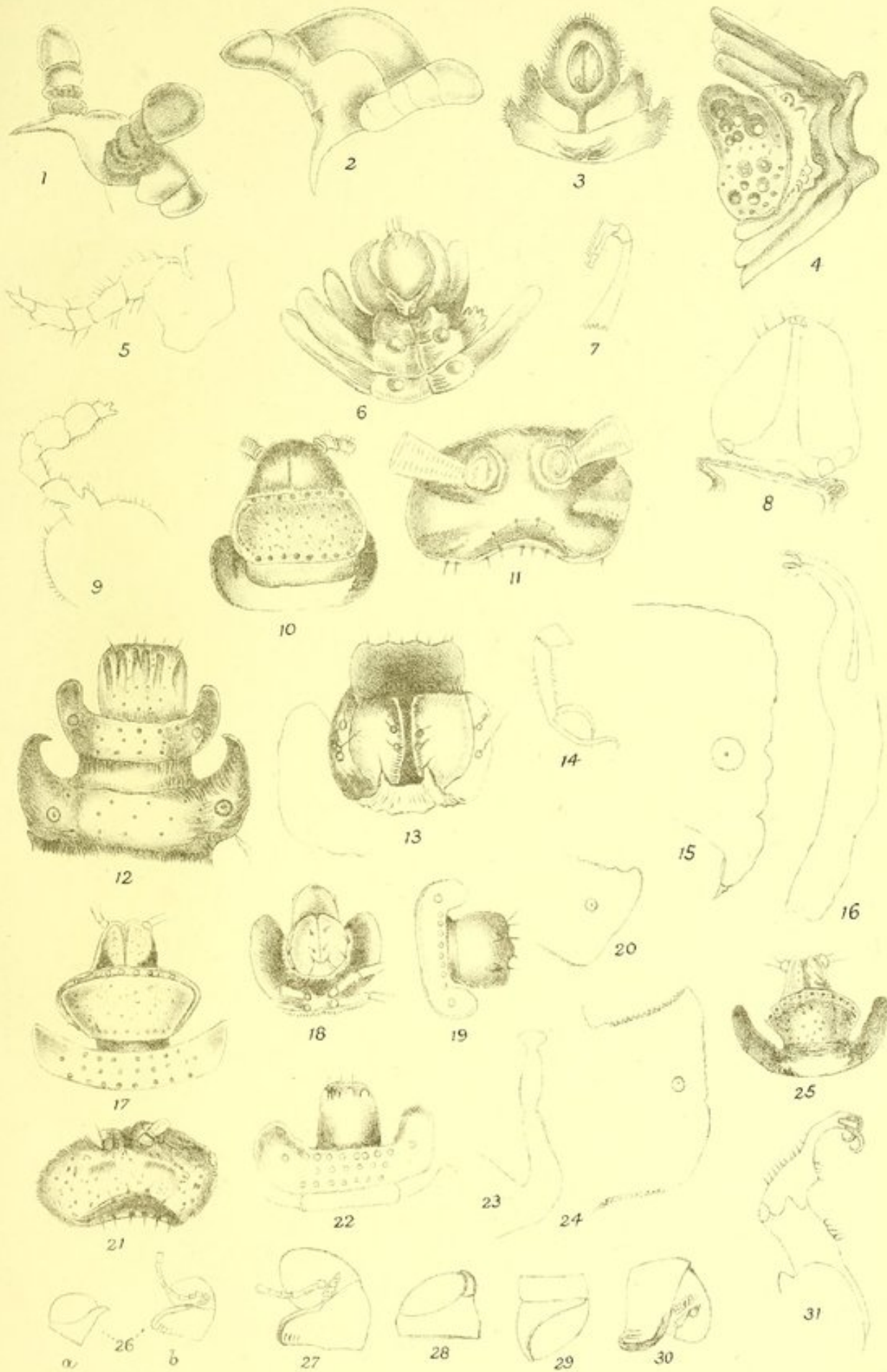
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- Fig. 32. *Platyrrhacus kelantanicus*, var. Forehead, p. 513.
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 34. " " " Seventeenth keel.
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 36. " " " Tail from above.
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 38. *Otostigma aculeatum*. Anal leg, p. 530.
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 41. " " " Head and first tergite.
 42. " *kelantanicus*, var. Copulatory foot, p. 513.
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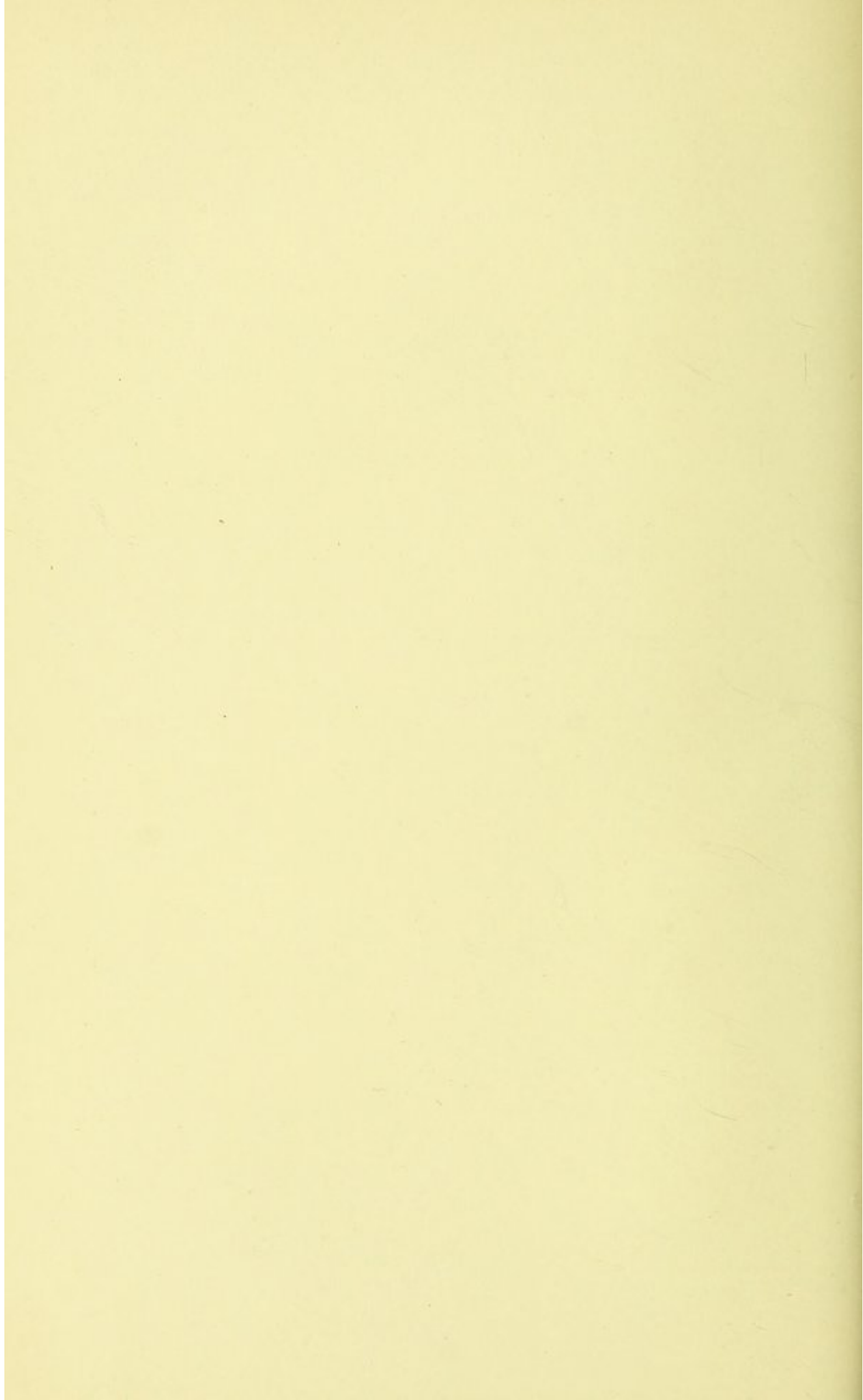
- Fig. 44. *Platyrrhacus pfeifferæ*. Tail from above, p. 515.
 45. " " Head from above.
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 47. *Platyrrhacus insularis*. Tail from below, p. 516.
 48. " *pfeifferæ*. Tail from below, p. 515.
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 50. *Platyrrhacus pfeifferæ*. Seventeenth keel, p. 515.
 51. " *beccarii*. Tail from below, p. 514.
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 53. " " Tail from above.
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 57. *Sphæropæus evansi*. Vulva, p. 526.
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 59. " " Pleural appendage.
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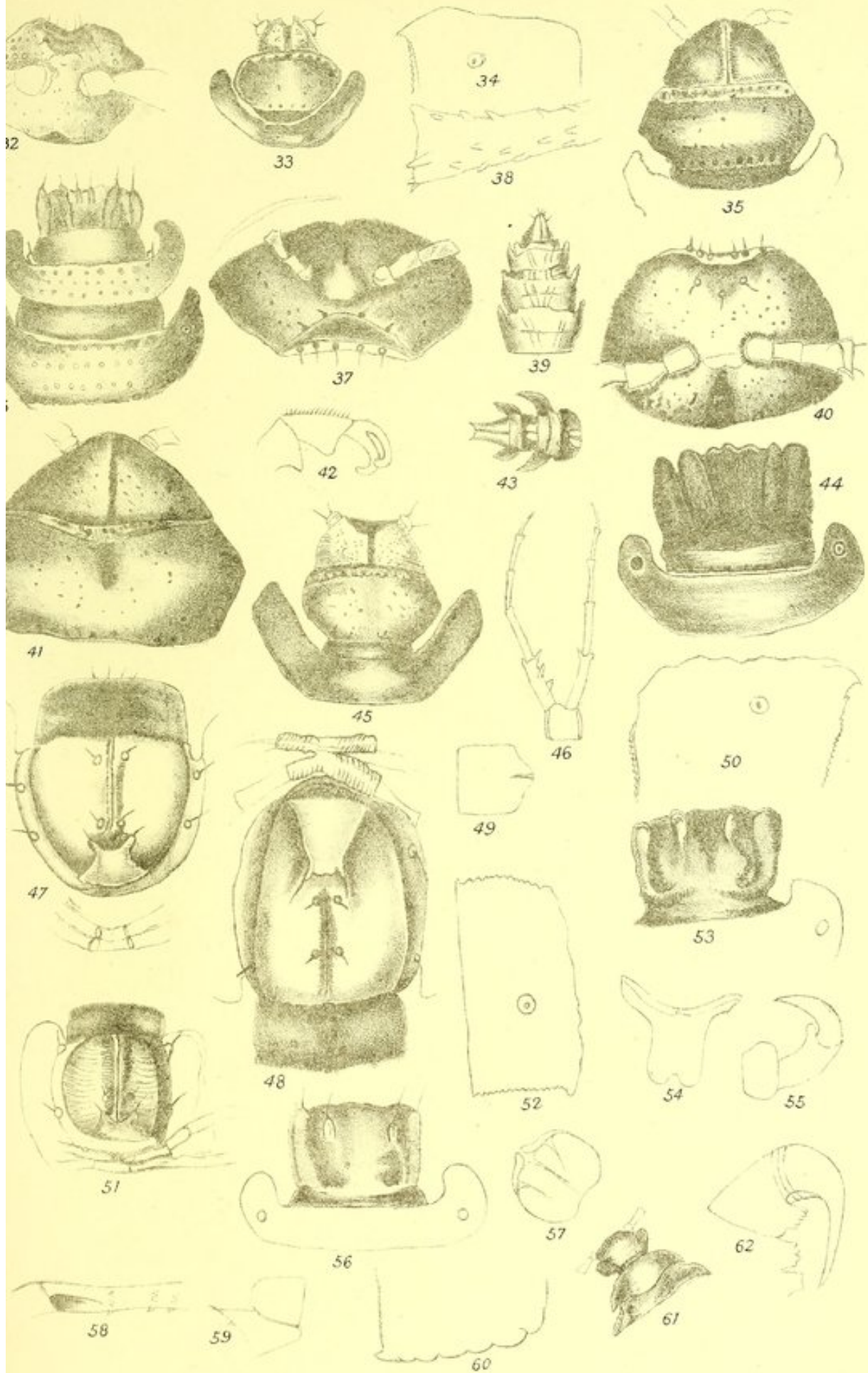
PLATE XXXII.

- Fig. 63. *Platyrrhacus malaccanus*. Forehead, p. 517.
 64. " " Head and first tergite.
 65. " " Tail from below.
 66. *Scolopendra subspinipes*. Maxillary teeth, p. 528.
 67. " *aringensis*. Femoral appendage, p. 529.
 68. *Platyrrhacus malaccanus*. Tail from below, p. 517.
 69. *Doratonotus cavernicola*. Whole animal, p. 521.
 70. " " First two segments.
 71. " " Tail.
 72. *Scolopendra subspinipes*. Anal legs from below, p. 528.
 73. *Doratonotus cavernicola*. Keel, p. 521.
 74. " " Sterna and spiracles.
 75. *Scolopendra subspinipes*. Femoral appendage, p. 528.
 76. " " Pleural appendage.
 77. *Sphæropæus extinctus*. Anterior copulatory foot, p. 527.
 78. *Doratonotus cavernicola*. Part of hypostoma (maxilla and maxillary appendages), p. 521.
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 80. " " Leg.
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 88. " " Hexagonal markings of surface magnified.
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 90. " *bipunctatum*. First three keels from below, showing pleural keels, p. 519.
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 101. *Scolopendra hardwickii*. Normal anal legs, p. 529.
 102. " " Malformed anal legs.

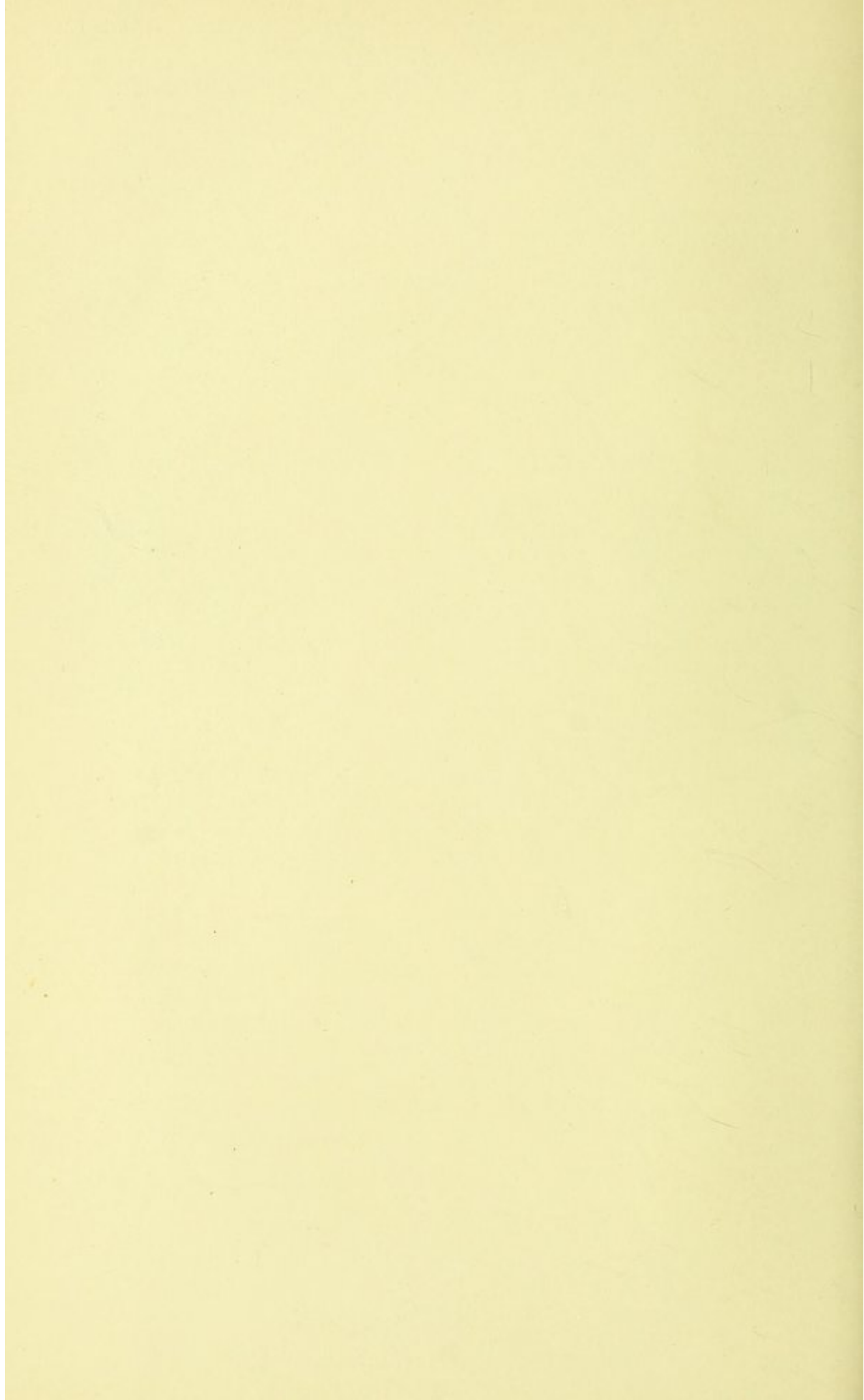


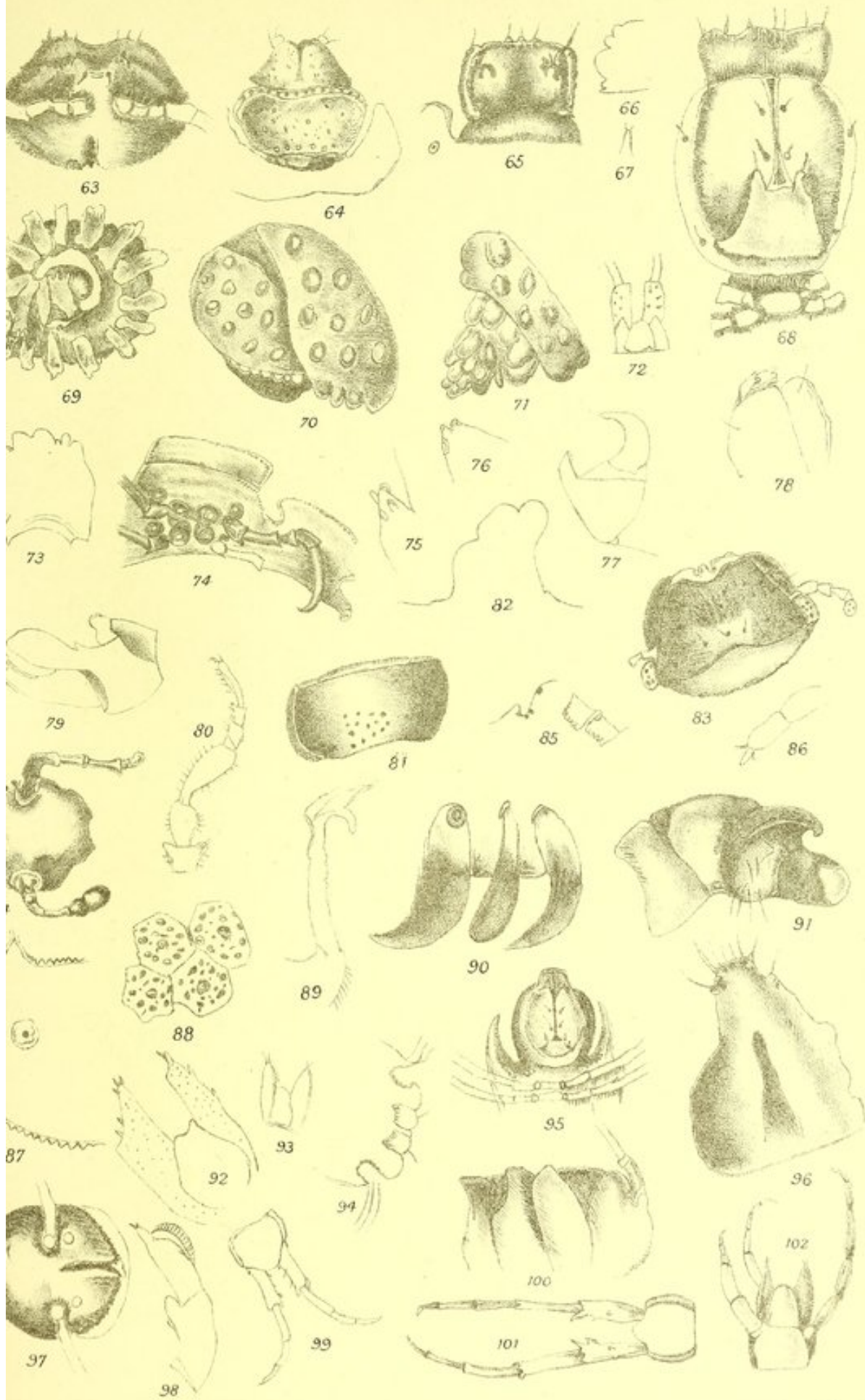
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