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BIOLOGIA
CENTRALI-AMERICANA.

CHILOPODA AND DIPLOPODA.

BY

REGINALD INNES POCOCK, F.Z.S.

1910.

Myriopoda

Chilopoda issued Dec. 1895, Jan. 1896

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BIOLOGIA CENTRALI-AMERICANA.

ZOOLOGIA.

Class CHILOPODA, Latr.

Subclass ANARTIOSTIGMA*.

[Silvestri, Ann. Mus. Genova, xxxiv. p. 622 (1895) = *Schizotarsia*, Brandt.]

Order SCUTIGEROMORPHA, nov.

Fam. SCUTIGERIDÆ, Gerv.

SCUTIGERA.

Scutigera, Lamarck, Syst. des Animaux sans Vertèbres, p. 182 (1801).

1. *Scutigera lincei*. (Tab. I. figg. 1, 1 a, b.)

Cermatia lincei, Wood, Proc. Ac. Phil. 1867, p. 42¹.

Scutigera mexicana, Sauss. & Humb. Miss. Sci. Mex., Myriop. pp. 112, 113, t. 5. fig. 3 (1872)².

Scutigera occidentalis, Meinert, Vid. Medd. Nat. Foren. 1886, pp. 105, 106³.

In this species the colours are somewhat variable. When the tints are well defined, the tergites are adorned laterally with a wide, deep green band, and with a much narrower band of the same tint in the dorsal middle line; this median band is not complete behind, just falling short of the stomata; the stomata-saddles are flavous or pale olivaceo-flavous, the colour being continuous with a wide band on each side of the middle line, separating the median from the lateral green band. The legs have their femora, patellæ, and tibiæ more or less distinctly ringed with deep green. Tarsi and antennæ ferruginous.

In some specimens the legs are nearly concolorous, of a deep green, and the bands of the dorsal surface become more or less fused.

Head very flat between the eyes; the posterior portion swollen laterally, flat in the middle, the median flat area being continuous with that between the eyes.

Tergites closely spicular, and very evenly convex, being hardly noticeably undulated at the sides; the stomata-saddles are ill-defined, and the stomata are inclined and short; the hinder borders of the tergites mesially emarginate.

* Written *Anartiostigmata* by Silvestri; but this form of the neuter plural is, I believe, etymologically incorrect. Compare *Echinoderma*, sometimes written *Echinodermata*.

Sterna mesially sulcate and, at least in the posterior half of the body, with the hind borders mesially emarginate.

Length up to about 19 millim.

Hab. NORTH AMERICA, Texas¹.—MEXICO, Chilpancingo 4600 feet, Omilteme 8000 feet, and Amula 6000 to 7000 feet, all in Guerrero (*H. H. Smith*), Oaxaca²; GUATEMALA, Volcan de Pacaya (*Stoll*); NICARAGUA, Granada³.

This species differs from the common North-American *Scutigera forceps* (Raf.), which is very closely allied to, even if not identical with, the common S.-European *S. coleoptrata*, in being of smaller size, in having its tergites more closely spicular and the head less flat; moreover, the median band of colour on the tergites of *S. forceps* extends over the stoma-saddles on each side of the stomata, instead of falling short of them as in *S. linceci*.

According to Mr. H. H. Smith these centipedes are found under logs and stones in damp places. They are exceedingly fragile, the legs breaking off at the least touch, so that it is almost impossible to secure perfect specimens.

2. *Scutigera nigro-vittata*. (Tab. I. figg. 2, 2 a.)

Scutigera nigro-vittata, Meinert, Proc. Am. Phil. Soc. 1886, p. 173¹.

Colour: upper surface black or very deep brown, with a wide, median, dorsal, flavous band extending from the anterior extremity of the labrum to the posterior extremity of the terminal tergite; this band crosses the middle of each half of the stoma-saddles and is uninterrupted except for a black patch on each stoma; the lateral portions of the head and the tergites just above the side-margins furnished with a fine irregular flavous band; sternal surface fulvous. The legs nigro-annulate, the femur adorned beneath with two rings—a proximal smaller, which is very incomplete above, and a distal larger, which is almost complete above; the patella with two wide rings and a fuscous distal extremity; tibiæ indistinctly biannulate; tarsi fulvous, concolorous.

Head with labral area sparsely hairy; region above it in front of the eyes deeply sulcate longitudinally, and furnished on each side of the sulcus with two longitudinal, subparallel, apically curved ridges, which posteriorly diverge and meet the inner angle of the eye; area between the eyes deeply scooped transversely; margin of the head raised and smooth.

Tergites smooth in the middle line, sparsely spicular elsewhere; the borders raised, spicular, the posterior border mesially emarginate; the stoma-saddles sparsely spicular, ill-defined, but much wider than long; posterior tergite with its hinder border not excised.

Sterna hairy, mesially sulcate.

Legs carinate and serrate.

Length 22 millim.

Hab. PANAMA¹.—VENEZUELA, Caracas.

This species was described by Meinert from Panama. The accompanying figure and description have been taken from an example sent to the British Museum by Dr. Ernst. This specimen was from Caracas, but Meinert's description applies so closely to it that in all probability it was taken from an example of the same species.

S. nigro-vittata may be at once separated from *S. linceci* by the marked difference in colour. Apart from this, however, the head and tergites are very differently

sculptured, the tergites being distinctly undulated laterally, and the interocular area of the head strongly scooped out transversely. In colouring it calls to mind *S. rugosa* of Newport, from East Africa, which has the same complete median dorsal flavous band, the same wide black band on each side of it, and the same strongly annulate legs. But the stomata in *S. rugosa* are not fuscous, and the tibiæ are more strongly annulate.

Subclass ARTIOSTIGMA*.

[Silvestri, Ann. Mus. Genova, xxxiv. p. 623 (1895).]

Order LITHOBIOMORPHA, nov.

[= *Unguipalpi*, Bollman, 1893; *Artiostigmata*, Silvestri, 1895.]

Containing the *Lithobiidæ* and *Cermatobiidæ*.

Fam. LITHOBIIDÆ, Newp.

LITHOBIUS.

Lithobius, Leach, Trans. Linn. Soc. xi. p. 381 (1814).

The following is a key to the identification of the species of *Lithobius* known to me:—

- a. The posterior angles of the ninth, eleventh, and thirteenth terga squared (about 30 ocelli and 30 antennal segments) *stolli*, sp. n.
- b. The posterior angles of the ninth, eleventh, and thirteenth terga produced.
 - a¹. Ocelli about 30 in number on each side (also about 30 antennal segments); claw of generative forceps of female trifold *aztecus*, H. & S.
 - b¹. Ocelli about 9 or 10 on each side; claw of female generative forceps simple.
 - a². Of very large size, over 30 millim., with about 60 antennal segments and 10 to 12 coxal teeth *macroceros*, sp. n.
 - b². Under 30 millim., fewer than 60 antennal segments, and (except in *L. decodontus*) with only 6 coxal teeth.
 - a³. Coxal teeth about 10, all alike, and normally formed *decodontus*, sp. n.
 - b³. Coxal teeth only 6, the external on each side spinuliform; anal legs of the male modified.
 - a⁴. Male with legs of the fourteenth pair unmodified; the first tarsal of the anal legs modified.

* I here use this term in a much wider sense than that proposed by Silvestri, to embrace all the Chilopoda that were called Holotarsia by Brandt.

- a*⁵. About 27 millim.; external coxal tooth on each side larger than the internal (for sexual character, see Tab. I. fig. 4 *d*) . . . *pontifex*, sp. n.
- b*⁵. About 18 millim.; external tooth on each side smaller than the others (for sexual character, see Tab. I. fig. 5 *c*) . . . *humberti*, sp. n.
- b*⁴. Male with legs of the fourteenth and fifteenth pairs modified; the first tarsal of the anal leg unmodified.
- a*⁶. Antennal segments about 40; angles of the seventh tergum not produced, with an elongate crest on the patella of the anal leg *vulcani*, sp. n.
- b*⁶. Antennal segments about 50; angles of the seventh tergum produced, with a rounded prominence on the patella of the anal leg.
- a*⁷. Tibia of the fourteenth pair in male much thicker than the patella, deeply grooved, and hairy above *godmani*, sp. n.
- b*⁷. Tibia of the fourteenth leg in male only a little wider than the patella *salvini*, sp. n.

1. *Lithobius macroceros*, sp. n. (Tab. I. figg. 3, 3 *a-d*.)

Colour of upper surface ochraceous or castaneous, anteriorly and posteriorly darker than mesially, the head castaneous; under surface and legs pale ochraceous or pale castaneous; antennæ darker in tint than the legs.

Body long, narrow, and nearly parallel-sided, shining.

Head a little wider than long, minutely and closely punctured, shining and smooth, lightly convex, with raised lateral and posterior margins; the frontal plate distinctly defined and conspicuously longitudinally grooved.

Eyes composed of 10 ocelli, 1+3, 3, 3; the posterior eye large, irregularly ovate, and widely separated from the rest, the superior ocelli of the cluster larger than the inferior.

Antennæ very long, more than half the length of the body, attenuate, composed of from 58 to 63 subcylindrical, thickly but shortly hairy segments, less thickly hairy quite at the base; apical segment always longer than the one that precedes it, but not thicker.

Coxal plate of maxillipedes smooth, shining, very indistinctly punctured, hairy in front, longitudinally depressed and sulcate throughout its length in the middle, the anterior border angularly excised in the middle, the margins of the excision lightly convex and sloped inwards, bearing on each side 6+6 or 5+5 minute sharp teeth, the external of which are smaller and more separated than the internal.

Tergites minutely and closely punctured throughout, distinctly wrinkled, but very much less wrinkled in front than behind, posteriorly sparsely hairy and roughened; the first six with rounded posterior angles and straight posterior borders, the seventh with its posterior angles slightly produced but not sharp, the posterior borders of the eighth, tenth, and twelfth straight and with the angles squared; the angles of the ninth, eleventh, and thirteenth produced and sharp, the angles of the fourteenth very slightly produced.

Sternites sparsely hairy, mesially and laterally impressed.

Legs long and slender; the first pair armed below as follows—0, 0, 0 (one posterior), 3 or 2 (one anterior), 1; the anal legs armed below as follows—0, 1, 3, 3, 2, or 0, 1, 3, 2, 1; the claw basally spurred, the coxa furnished with one superior and one lateral spine, the coxa of the fourteenth pair with one lateral spine, the rest of the coxæ unspined; coxal pores ovate, 6, 6, 6, 6, arranged in a single series.

Generative forceps in the female with a simple undivided claw, and two separated, diverging, basal spurs on each side.

Length up to 35 millim.; length of antenna of largest specimen 21 millim.

Hab. MEXICO, Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

Obtained under rotting wood &c. about the clearings and neighbouring forest (*H. H. Smith*).

2. *Lithobius pontifex*, sp. n. (Tab. I. figg. 4, 4 *a-d*.)

Colour: upper surface deep ochraceous; head, antennæ, and first tergite deep castaneous and polished; legs and lower surface clear olivaceous.

Body robust, scarcely attenuated anteriorly, strongly attenuated posteriorly.

Head a little wider than long, smooth, very finely and obscurely punctured, the frontal plate deeply grooved longitudinally and mesially, with raised margin.

Eyes composed of 11 ocelli, 1+3, 3, 4, the posterior and superior eyes subequal in size and larger than the rest, the inferior eyes the smallest.

Antennæ long, about half the length of the body, attenuate, composed of 53-56 short, subcylindrical segments, thickly hairy, sparsely so at the base, the apical segment longer, but not thicker, than the penultimate.

Coxal plate of maxillipedes sparsely punctured and hairy, its anterior border nearly straight and but little produced, scarcely excised in the middle line, bearing 3+3 minute, separated teeth, whereof the external is the largest and somewhat spiniform.

Tergites very finely punctured, and, with the exception of the first two, conspicuously wrinkled and sparsely hairy: from the first to the sixth with rounded angles and straight posterior border; the sixth with its angles produced and widely rounded; the seventh also with its angles widely rounded, but more produced than in the sixth; the ninth, eleventh, and thirteenth with their angles strongly produced and sharp; the eighth, tenth, and twelfth with straight or only very lightly emarginate posterior borders; the fourteenth with widely, but not deeply, emarginate border.

Sternites sparsely hairy, mesially and laterally impressed.

Legs: first pair absent; anal legs short, shorter than the fourteenth pair, stout, armed beneath as follows—0, 1, 3, 3, 1; the tibia very thick, thicker than the patella, its upper inner margin hairy, and deeply and widely grooved longitudinally, the groove bearing a conspicuous elongate prominence; the first tarsal segment also enormously enlarged, as wide as and a little longer than the tibia, piriform, narrowed behind, its upper surface deeply and widely excavated, the distal tarsal segment slender and terminated by a double claw; coxa of the anal leg armed with a single superior spine; fourteenth pair of legs of normal form, with unarmed coxa; coxal pores 5, 4, 4, 3, mostly very large and rounded.

Length 27 millim.; of antenna 12.5 millim.

Hab. MEXICO, Amula in Guerrero 6000 feet (*H. H. Smith*).

A single male specimen. This species differs from the preceding in the lesser number of its maxillary teeth and of its antennal segments.

3. *Lithobius humberti*, sp. n. (Tab. I. figg. 5, 5 *a-c*.)

Colour obscure ochraceous, with an olivaceous tint; head and antennæ with castaneous tint; legs and lower surface a little paler than the upper surface.

Body robust; a little narrowed anteriorly and posteriorly.

Head considerably wider than long, more convex than the body, very indistinctly punctured; the frontal longitudinal furrow shallow.

Eyes composed of 10 ocelli, 1+3, 3, 3, the posterior ocellus in contact with the anterior cluster; the superior and posterior ocelli larger than the inferior and anterior.

Antennæ long, a little more than half the length of the body, composed of 52 or 53 short subcylindrical segments, the apical segment longer, sometimes much longer, but not thicker, than the one that precedes it, thickly hairy, except at the base.

Coxal plate of maxillipedes smooth, hairy in front, with a deep median longitudinal sulcus, its anterior border not much produced, distinctly bilobed, the margins of the lobes directed inwards, each furnished with three sharp teeth, whereof the two internal are larger and stronger, and the external smaller and weaker.

Tergites smooth at the anterior end of the body, lightly wrinkled, and shortly hairy posteriorly: first to the fifth with rounded angles and straight posterior border; sixth and seventh with the angles produced, but

widely rounded internally, the posterior border being mesially emarginate; the ninth, eleventh, and thirteenth with the angles produced and sharp, the prolongation with straight inner edge; the eighth, tenth, twelfth, and fourteenth with widely emarginate posterior borders.

Sternites sparsely hairy, mesially and laterally impressed.

Legs adorned with long hairs; the first pair armed below as follows—0, 0, 1 (posterior), 1, 1; anal legs armed below 0, 1, 3, 2, 1 (♂), or 0, 1, 3, 3, 1 (♀), claw double, coxa unarmed; posterior coxæ unarmed; coxal pores rounded, 4, 4, 4, 3 with the proximal pore small (♂), or 5, 4, 4, 4 with the proximal pore not remarkably smaller than the next.

♂. Anal legs shorter and much stouter than the fourteenth pair; the tibia a little thicker than the patella and furnished at its distal end on the upper inner edge with a conspicuous nodular prominence; the proximal tarsal segment elongate-ovate, as thick as the tibia, with a conspicuous longitudinal groove on its upper inner edge; legs of the fourteenth pair normally formed.

♀. Anal legs long and slender, a little longer than the fourteenth pair, and normally formed; generative forceps with the proximal segment narrowed at the base, produced internally, and bearing two spurs, the lower of which is longer and stouter than the upper; the claw long, slender, curved, undivided, and armed basally with a small but conspicuous tooth.

Length up to 18 millim.

Hab. MEXICO, Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

Three specimens (2 ♂, 1 ♀), obtained under rotting wood &c. about the clearings and neighbouring forest (*H. H. Smith*).

This species is very closely allied to *L. pontifex*, from Amula, of which the male only is known. It is, however, very much smaller, and the two internal teeth on each side of the maxillary sternite are large, and the external tooth is either absent or very small; whereas in *L. pontifex* the two internal teeth are minute and smaller than the external. Again, in the male of *L. pontifex* the nodular prominence on the tibia of the anal leg is less projecting, and the groove on the first tarsal segment is much wider and deeper.

4. *Lithobius godmani*, sp. n. (Tab. I. figg. 6, 6 a-c.)

Colour ochraceous or castaneous, darker anteriorly; legs and ventral surface paler.

Body robust, attenuated posteriorly, shining.

Head a little wider than long, lightly convex, smooth, shining, indistinctly punctured, with deep anterior longitudinal frontal groove.

Eyes composed of 9 ocelli, 1+1, 3, 4; the posterior and superior ocelli subequal in size and larger than the rest.

Antennæ long, more than half the length of the body, composed of from 49–53 subcylindrical segments; hairy, but less hairy at the base; apical segment elongate, longer than the penultimate.

Coxal plate of maxillipedes sparsely hairy, mesially and longitudinally sulcate; its anterior border produced and bearing 3+3 teeth, whereof the two internal are large and stout, and the external slender, spiniform, and often absent.

Tergites in the anterior portion of the body smooth, lightly wrinkled in the posterior half, roughened and sparsely hairy: from the first to the sixth with rounded angles and straight posterior border; the seventh with its posterior border emarginate in the middle, and its angles produced, but very wide and scarcely sharpened; ninth, eleventh, and thirteenth with angles strongly produced and sharp; eighth, tenth, twelfth, and fourteenth with posterior borders only very slightly emarginate.

Sternites mesially and laterally impressed and hairy.

Legs: first pair armed below 0, 0, 2, or 1, 1, 1; anal legs about as long as the fourteenth pair, armed below 0, 1, 3, 3, 1, claw double; coxa with superior and lateral spines; coxal pores round, 5, 4, 4, 4, or 4, 3, 3, 3, the proximal pore small when the series consists of 4 or 5.

♂. Fourteenth pair of legs with the tibia enormously swollen and rounded internally and beneath, deeply and widely excavated above and hairy, with a tuft of hairs on the middle of the inner (posterior) edge of the excavation; anal legs with the tibia also swollen, but less swollen than in the fourteenth pair, distally excavated above, the excavation bearing an elongate superiorly flattened nodule.

♀. Fourteenth and fifteenth legs normally formed; generative forceps with a stout undivided claw; two basal spurs, of which the external is longer and stouter than the internal.

Length up to 19 millim.

Hab. MEXICO, Amula in Guerrero 6000 feet (*H. H. Smith*).

The male of this species may be at once separated from that of *L. pontifex* and *L. humberti* by the fact that the tibiæ of the fourteenth and fifteenth legs are enormously swollen, whereas in these others the fourteenth legs are normally constituted, and in the anal leg the tibia and proximal tarsal segment are enlarged. Again, in the female the claw of the generative forceps is stouter, shorter, and has no tooth at its base; whereas in *L. humberti* the claw is longer, more slender, and has a distinct tooth at its base.

5. *Lithobius salvini*, sp. n. (Tab. I. figg. 7, 7 a-d.)

Colour ochraceous or castaneous, darker anteriorly; legs and ventral surface paler; antennæ dark.

Body robust, attenuated posteriorly, shining.

Head a little wider than long, lightly convex, smooth, shining, not or very obscurely punctured, the frontal plate deeply furrowed longitudinally, with raised margin.

Eyes composed of 9 ocelli, 1+1, 3, 4; the posterior and superior eyes subequal in size and larger than the rest.

Antennæ long, more than half the length of the body, attenuate, composed of from 48 to 56 hairy, subcylindrical segments; less hairy at the base; apical segment varying in length, but always longer, but not thicker, than the segment that precedes it.

Coxal plate of maxillipedes sparsely hairy, mesially longitudinally sulcate, the anterior border nearly straight, and bearing 3+3 strong, sharp teeth, whereof the external is more slender, somewhat spiniform, and often absent.

Tergites not manifestly punctured; with the exception of the first, wrinkled, sparsely hairy, and roughened, more wrinkled and roughened towards the hinder end of the body: the first, second, third, fourth, and fifth, and often the sixth, with rounded angles and straight posterior border (in the fifth the border is lightly concave); the sixth, sometimes the seventh, ninth, eleventh, and thirteenth with their angles strongly produced, and posterior border deeply, but narrowly, emarginate; the eighth, tenth, twelfth, and fourteenth with the posterior border widely emarginate and the angles sharp. In younger specimens (15 millim. or less) the angles of the sixth tergite are rounded, and the posterior borders of the rest much less markedly emarginate.

Sternites mesially and laterally impressed, shortly and sparsely hairy.

Legs of moderate length; the first pair armed below as follows—0, 0, 1 (posterior), 1, 1; anal legs short, as long as the fourteenth pair, armed below 0, 1, 3, 3 or 2, 1, claw double; coxa with superior and lateral spine*; coxal pores 4, 3, 3, 3, arranged in a single series, large and round; coxæ of thirteenth and fourteenth with a superior spine.

♂. Tibia of fourteenth pair a little stouter than the patella, subcylindrical, with a conspicuous, short, ovate depression on the upper-inner surface at its distal extremity; tibia of anal leg also cylindrical and stouter than, or at least as stout as, the patella, with a somewhat similar, although much less conspicuous, depression.

* When these spines are invisible, their absence is probably to be attributed rather to mutilation than variability.

♀. With the fourteenth and fifteenth pairs of legs of normal form; claw of the generative forceps stout, not long, and undivided; two basal spurs on each side, of which the external is considerably longer and stouter than the internal.

Length up to 26 millim.; average length about 21 millim., with antennæ measuring about 11.5. In one specimen, measuring 26 millim., the antennæ are not more than half the length of the body.

In young specimens (*i. e.* males in which the fourteenth and fifteenth pairs of legs are unmodified, and females in which the generative forceps is only half-formed) the coxal pores are 3, 2, 2, 2.

Hab. MEXICO, Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

Obtained under rotting wood &c. about the clearings and neighbouring forest (*H. H. Smith*).

The males of this species may be easily recognized from those of *L. godmani* by the difference in the form of their posterior legs. But the females are very hard to determine. Possibly the two species may prove to be identical; in which case we shall have an interesting instance of dimorphism in the males. I think, however, that, provisionally at least, it is wiser to regard the two as distinct, at all events until a larger series of the females are forthcoming for examination.

In the case of females not associated with males, I have referred all those from Omilteme to *L. salvini*, and those from Amula to *L. godmani*.

6. *Lithobius vulcani*, sp. n. (Tab. I. figg. 8, 8 a, 8 b.)

Colour castaneous.

Head weakly punctured; frontal plate distinct, with conspicuous median groove.

Eyes composed of about 9 ocelli, 1+1, 3, 3.

Antennæ of moderate length, composed of 41 segments.

Coxal plate of maxillipedes with anterior edge lightly emarginate, armed with 3+3 evenly spaced teeth, whereof the external is slender and has the appearance of being a movable spinule.

Terga smooth: ninth, eleventh, and thirteenth with produced angles; the fourteenth posteriorly emarginate, the rest of the posterior borders straight.

Legs: spine-armature of first, 0, 0, 0, 1, 1; the fifteenth leg a little longer than fourteenth, armed below with 0, 1, 3, 3, 1 spines, claw double; the coxal pores uniserial, small, circular, 4, 4, 4, 3.

♂. Legs of the fourteenth pair with the tibia much thicker than the tarsal segments, and thicker in the middle than at the two ends; the tibia of the anal leg also slightly thickened, a little flattened posteriorly on its inner side, and from the middle of the flattened area there rises a low crest, which terminates abruptly behind.

Generative appendages represented by two short, rounded processes.

Length 17 millim.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

In the same bottle as that which contained the above described male there was a female measuring 19 millim., with 36 antennal segments, 5, 6, 6, 5 coxal pores, two long subequal spurs, and a simple claw on the generative forceps, but otherwise agreeing with the typical male. Another smaller specimen, a male, which may be an immature form of the one described, has only 32 antennal segments, and the anal legs unmodified.

In its male sexual features, *i. e.* in having the tibiæ of the fourteenth and fifteenth

legs modified, and the tarsi of the fifteenth unmodified, *L. vulcani* agrees with *L. godmani* and *L. salvini*. It may be recognized by having a smaller number of antennal segments, the angles of the seventh tergite not produced, and in the different structure of the anal leg of the male.

7. *Lithobius decodontus*, sp. n. (Tab. I. figg. 9, 9 a, b.)

Colour castaneous.

Head nearly smooth; about 9 or 10 ocelli on each side; frontal plate defined and mesially sulcate.

Antennæ elongate, furnished with 41 or 42 short cylindrical segments.

Coxal plate of maxillipedes with anterior border deeply notched in the middle, convex on each side of it, and armed with 6+4 small subequal teeth.

Posterior terga lightly wrinkled and sparsely hirsute: the angles of the ninth, eleventh, and thirteenth strongly produced, the posterior border of the seventh noticeably emarginate, of the eighth, tenth, and twelfth nearly straight, but becoming gradually emarginate towards the hinder end of the body.

Legs: first pair armed below, 0, 0, 0, 1, 1; coxæ of the last three pairs armed with a superior spur, those of the last two furnished in addition with a lateral spur; coxal pores uniserial, small, circular, 5, 5, 5, 5; anal legs long, slender, longer than the preceding pair, armed below 0, 1, 3, 3, 2; claw double.

♂. Fourteenth and fifteenth pairs of legs unmodified, generative appendages represented by a pair of rounded tubercles.

Length about 20 millim.

Hab. GUATEMALA, Volcan de Acatenango (*Stoll*).

One male example. A second male, from Quezaltenango, which has the anal legs broken off, agrees with the one described in most characters, but it differs in having the distal segment of the tarsus noticeably shorter as compared with the proximal segment. I consequently expect that the two are specifically distinct.

This species differs from *L. pontifex*, *L. humberti*, *L. godmani*, and *L. salvini* in the dentition of its maxillary coxæ, its unmodified anal legs (in male), and the smaller number of its antennal segments.

8. *Lithobius stollii*, sp. n. (Tab. I. figg. 10, 10 a-c.)

Colour fusco-olivaceous, with traces of a dorsal median longitudinal band.

Head and terga smooth, sparsely punctured.

Antennæ long, hirsute, composed of 27 elongate cylindrical segments.

Eyes composed of about 26 ocelli.

Coxal plate of maxillipedes with anterior border transverse, shallowly notched, the inner half of each side furnished with three small, evenly spaced teeth, of which the external is a little the largest.

The ninth, eleventh, and thirteenth *terga* with squared angles; the eighth, tenth, twelfth, and fourteenth with their posterior borders slightly emarginate.

Legs: those of first pair armed below as follows—0, 0, 2, 2, 1; coxa of twelfth armed with one upper spine, coxæ of thirteenth to fifteenth furnished with an external lateral spine as well; the anal legs longer than the preceding pair, armed below as follows—0, 1, 3, 2, 1; claw simple; coxal pores uniserial, elongate as in adult *L. forficatus* (Linn.), 9, 8, 8, 8.

Generative forceps of female with two pairs of spurs and simple pointed claw.

Length 27 millim.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

A single female example.

9. **Lithobius aztecus.** (Tab. I. figg. 11, 11 *a-c.*)

Lithobius aztecus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 156 (1869)¹; Miss. Sci. Mex., Myriop. pp. 116, 117, t. 5. fig. 4².

Colour: upper surface uniformly castaneous, or more commonly ochraceo-castaneous, and darker anteriorly and posteriorly; lower surface ochraceous with olivaceous tint; apex of legs and of antennæ paler.

Body moderately robust, attenuated posteriorly, shining.

Head a little wider than long, finely punctured, the frontal longitudinal groove absent.

Eyes composed of about 30, mostly rounded ocelli, arranged in about five rows; the posterior ocellus the largest.

Antennæ short, not half the length of the body, hairy, sparsely so at the base, composed of about 30 short subcylindrical segments; the apical segment elongate, longer than the penultimate.

Coxal plate of maxillipedes finely punctured, longitudinally sulcate in the middle, its anterior border moderately produced, nearly straight, bearing 7+7 or 6+6 small subequal teeth, of which the internal are close set and the external more separated.

Tergites lightly wrinkled and sparsely hairy; from the first to the sixth with straight posterior border and rounded angles; the seventh with its angles slightly produced; the eighth, tenth, twelfth, and fourteenth with squared angles, and posterior borders straight, or only very lightly emarginate; the ninth, eleventh, and thirteenth with angles produced and sharp.

Sternites smooth, mesially impressed in the posterior half, and with fainter lateral impressions, the posterior sternites and coxæ pubescent.

Legs: the first pair armed below, 0, 0, 2, 2, 1; anal legs long, longer than the fourteenth pair, which extend only as far as the middle of their proximal tarsal segment, armed below, 0, 1, 3, 3, 2; claw double; coxæ of thirteenth, fourteenth, and fifteenth armed with one superior and one lateral spine, coxæ of eleventh and twelfth armed with a superior spine; coxal pores in a single series, elongate, 6, 7, 7, 5 to 4, 6, 6, 4.

♂. Anal leg with femur marked beneath with a single longitudinal groove; patella much widened, deeply and widely excavated above, with two longitudinal grooves beneath; tibia and tarsal segments of normal form.

♀. Femur and patella of anal leg with a single inferior groove, all the segments of normal size and shape; generative forceps with two subequal, subparallel, basal spurs on each side, and a stout trifold claw.

Length up to 24 millim; average length of adult about 19 millim.

Hab. MEXICO, Omilteme 7000 to 9000 feet, and Sierra de las Aguas Escondidas 9500 feet, both in Guerrero (*H. H. Smith*), Eastern Cordillera¹; GUATEMALA, Antigua and Tecpam (*Stoll*).

The original description of this species is somewhat meagre, but it applies sufficiently well to these examples from Omilteme as to leave very little doubt in my mind that they are rightly to be named *L. aztecus*. The species may be at once recognized by its short antennæ and large number of ocelli. Mr. Smith's specimens were found under decaying logs, in damp thick forest, and also in the clearings.

The following Central-American species are unknown to me:—

Lithobius mystecus.

Lithobius mystecus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 156 (1869); Miss. Sci. Mex., Myriop. p. 117 [excl. t. 5. fig. 5] (1872); Stuxberg, Öfv. Vet.-Akad. Förh. xxxii. 3, p. 32 (1875).

- “Colour ferruginous brown; the last segment of the legs paler.
 “Smaller than *L. aztecus*; the head with almost the same form, but divided in front by a deep groove, which renders it a little bilobate; the frontal sulcus distinct.
 “Antennæ longer than in *L. aztecus*, more hairy, thinner at the base, composed of from 40 to 46 segments.
 “Maxillary coxæ sulcate throughout, with three spiniform teeth on each side.
 “Eyes small, composed of from 8 to 10 ocelli.
 “Body with its tergites as in *L. aztecus*.
 “Anal legs shorter than in *L. aztecus*, not sulcate below.
 “Coxal pores round, in a single row, 4, 4, 5, 4. Length 18 millim.

“*Hab.* MEXICO, Eastern Cordillera.”

This description appears to have been drawn up from examples of both sexes, since Humbert and de Saussure state that they had five males and three females before them. And as they make no mention of variation in the form of the posterior legs in the male, it is necessary to conclude that no variation was presented. In which case *L. mystecus* differs materially from all those others described here, which agree with it in possessing a large number of antennal segments and a small number of ocelli.

Fig. 5 on tab. 5 of Humbert and de Saussure's last great work on the American Myriopoda, which is ascribed to *L. mystecus*, is doubtlessly erroneously named. It appears to me to be beyond all question the figure of *L. toltecus*, the following species; for not only does the figure show the modified anal leg as it is described in *L. toltecus*, but the line which represents the natural size of the specimen, which is magnified in the full figure, is of the length not of *L. mystecus*, but of *L. toltecus*.

Lithobius toltecus.

Lithobius toltecus, Humb. & Sauss. Miss. Sci. Mex., Myriop. p. 118 [t. 5. fig. 5].

- “Testaceous. Of small size. The head swollen, divided in front by a deep groove, bilobed between the antennæ. No frontal sulcus.
 “Antennæ long, composed of 40 or 42 segments.
 “Maxillary coxæ divided by a strong sulcus, not lobate, its anterior border transverse, subangular, but not divided, with two spiniform teeth on each side, and sometimes a trace of a third.
 “Eyes composed of 9 ocelli, arranged in three longitudinal rows, the upper of which is composed of 4, the middle of 3, the lowest of 2; the size of the eyes increasing from below upwards, and from before backwards.
 “Anal legs with fourth and fifth segments [tibia and first tarsal] swollen; the first tarsal dilated, with its upper surface bearing a curved projection, which renders the segment bifurcate at its posterior end, the internal face bearing a deep elongate depression, from the lower border of which there runs a longitudinal row of long hairs. The sixth segment short and lightly swollen. Length 12 millim.

“*Hab.* MEXICO, Eastern Cordillera.”

It appears from this description that *L. toltecus* resembles *L. salvini* and *L. godmani* in having the fourteenth pair of legs in the male unmodified, and the tibial and first tarsal of the anal legs swollen. But in neither of the two here described as new is there any bifurcation of the posterior extremity of the first tarsal segment of the anal leg, such as appears to exist in Humbert and de Saussure's species.

Lithobius saussurei.

Lithobius saussurei, Stuxberg, Öfv. Vet.-Akad. Förh. xxxii. 2, p. 71, and 3, p. 32 (1875).

- “ *Head-plate* cordate, about as long as wide, with semicircularly rounded sides, smooth, sparsely clothed with hairs.
- “ *Antennæ* tolerably long, not extending to the middle of the body, composed of 27 scantily hairy segments, the apical segment not much longer than the penultimate.
- “ *Coxæ* of the second pair of maxillary feet armed with 5+5 very black, short, strong teeth, with a moderately deep median notch.
- “ The anterior tergites more lightly, the posterior more conspicuously wrinkled, but not granular, nearly smooth; ninth, eleventh, and thirteenth with produced angles; seventh with its posterior margin deeply sinuate in the middle. Coxal pores 5, 6, 7, 6, large and round.
- “ *Legs* of the first pair armed (beneath) with 2, 3, 1 spines.
- “ Anal legs short, moderately swollen, with two claws, armed (beneath) with 1, 3, 3, 1 spines; coxa armed with a single lateral spur.
- “ Claw of the generative forceps in the female obsolete trifold, the median lobe not much longer than the lateral; two pairs of spurs.
- “ Colour castaneous or brown.
- “ Length of body 23 millim., of antennæ 9, of anal legs 6-7.”

Hab. MEXICO, Orizaba (*Saussure*).

I suspect that this species will prove to be synonymous with *L. aztecus*. The description was taken from a single female specimen, and no mention is made of the existence of sulci on the lower surface of the anal legs. Moreover, there are said to be only ten teeth on the maxillary coxæ. The first of these characters, however, may well have been overlooked, and no great importance is to be attached to the second.

Lithobius mexicanus.

Lithobius mexicanus, Perbosc, Rev. Zool. 1839, p. 261¹.

Hab. MEXICO, Vera Cruz¹.

This species is compared by its author to *L. forficatus* (Linn.), and is described as differing from it solely in having 11 ocelli instead of from 21 to 40. It is said to be 26 millim. long, and 3 millim. broad.

Unless the type is still extant, there is little hope that *L. mexicanus* will ever be identified. Judging by the number of its eyes, it belongs to the section of which *L. pontifex* may be looked upon as the type.

Order SCOLOPENDROMORPHA, nov.

[= *Scolopendridæ* of authors.]

Fam. SCOLOPENDRIDÆ (sensu stricto).

Body composed of 21 leg-bearing segments. Head furnished on each side with 4 distinct ocelli. Legs with the tarsal segments two-jointed.

This family may be divided into two subfamilies—the Alipedinæ for the S.-African genus *Alipes*, which has the distal segments of the anal legs enormously expanded and flattened, and no claw on the tarsus; and the Scolopendrinæ, in which the anal legs are normally constructed.

Subfam. SCOLOPENDRINÆ, Newp.

Excepting for the elimination of *Alipes* (*Eucorybas*), I use this subfamily in the same sense as that employed by Bollman (Bull. U.S. Mus. 1893, p. 165). It includes the Cormocephalinæ and Heterostominæ (=Rhysidinæ, Silvestri, 1895) of Newport.

SCOLOPENDRA.

Scolopendra, Linnæus, Syst. Nat. (1735).

The following is a synopsis of the species of *Scolopendra* here recognized:—

- a.* The first tergite not marked in front with a transverse sulcus.
- a*¹. Anal legs usually longer and thinner, not armed beneath with more than 2 or 3 spines *subspinipes*, Leach.
- b*¹. Anal legs shorter, stouter, armed beneath with not fewer than 9 spines.
- a*². Femur of anal legs armed with from 13 to 15 spines, all the tergites except the anterior 4 or 5 with raised edges, all the legs with tarsal spurs *morsitans*, Linn.
- b*². Femur of anal leg armed with about 23 spines, the anterior legs without spurs and at least only the posterior terga marginate *pygmæa*, sp. n.
- b.* The first tergite with a conspicuous sulcus in its anterior half.
- a*³. The femora of all the legs and the patella of the anal legs spined *gigas*, Leach.
- b*³. The femora of all the legs, except the anal, and the patella of the anal unspined.
- a*⁴. With fewer than 20 antennal segments; head with a pair of shallow impressions *pomacea*, Koch.
- b*⁴. With more than 20 antennal segments; head not impressed.
- a*⁵. Tarsi of all the legs unspined *punctiventris*,
- b*⁵. Tarsi of nearly all the legs spined. [Newp.]
- a*⁶. All the tergites, except the anal, with unraised margins and only obsoletely bisulcate; few spines on the anal femur *sumichrasti*, Sauss.

- b*⁶. The tergites completely bisulcate and at least those at the hinder end of the body with raised edges.
- a*⁷. Tibiæ of anal leg gradually narrowed posteriorly, tarsi slender; anal pleuræ with long processes. *tenuitarsis*, sp. n.
- b*⁷. Tibiæ of anal leg parallel-sided; pleuræ shorter.
- a*⁸. Head with two fine sulci; distal segments of the first maxillipedes inferiorly produced. *heros*, Girard.
- b*⁸. Head not bisulcate; first maxillipedes normal.
- a*⁹. Coxal plate of second maxillipedes (poison-jaws) densely punctured in front; prosternal plates prominent. *pachygnatha*, sp. n.
- b*⁹. Coxal plate smooth; prosternal plates normal.
- a*¹⁰. Of larger size, ferruginous, with the hind borders of the terga dark green *copeana*, Wood.
- b*¹⁰. Smaller, usually of a more uniform green tint *viridis*, Say.

1. *Scolopendra morsitans*.

Scolopendra morsitans (Linn.), Kohlr. Arch. f. Naturg. 1881, 1, pp. 104-112¹ (? all the synonymy).
Scolopendra brandtiana, Gervais, Ins. Apt. iv. p. 280².

Hab. MEXICO, Tampico¹ and Vera Cruz^{1 2}. (Artificially introduced.)

This well-known species is found in almost all tropical and subtropical countries.

2. *Scolopendra subspinipes*. (Tab. II. fig. 9.)

Scolopendra subspinipes, Leach, Trans. Linn. Soc. xi. p. 383¹; Kohlr. Arch. f. Naturg. 1881, 1, p. 96²; Meinert, Proc. Am. Phil. Soc. xxiii. p. 202 (1886)³; Vid. Medd. Nat. Foren. v. 1886, p. 126⁴.

Hab. MEXICO (*Eisen*); CENTRAL AMERICA⁴. (Artificially introduced.)

This species, like *S. morsitans*, is found in the tropical and subtropical parts of both Eastern and Western hemispheres. According to Meinert⁴, it occurs in Central America. The Mexican example, from which the figure here published has been taken, was submitted to me for identification by Dr. Gustav Eisen.

3. *Scolopendra gigas*.

Scolopendra gigas, Leach, Trans. Linn. Soc. xi. p. 383.

Hab. HONDURAS.—SOUTH AMERICA; JAMAICA.

For the synonymy of this species and references to its literature see Porath, Bih. Sv. Vet.-Akad. Handl. iv. 7, p. 5 (1876); Kohlrausch, Arch. f. Naturg. 1881, 1, p. 119; Meinert, Proc. Am. Phil. Soc. 1886, p. 191.

S. gigas, the largest of the Centipedes, occurs in Jamaica and in the northern parts of S. America. According to Meinert (Vid. Medd. Nat. Foren. 1886, p. 125), the Copenhagen Museum possesses an example from Honduras.

4. *Scolopendra pygmæa*, sp. n. (Tab. II. figg. 8, 8 a-c.)

Colour pale olivaceous or pale ochraceous, sometimes with indications of a darker median longitudinal dorsal band; posterior pleuræ and maxillipedes ferruginous.

Body slender and parallel-sided.

Head not sulcate, with its posterior margin straight and meeting, but scarcely overlapping, the first tergite.

Antennæ attenuate, moderately long, composed of from 20 to 26 segments, whereof the basal 4 are nearly naked and the rest pubescent.

Maxillipedes: prosternal plates somewhat long, separated in the middle and sometimes diverging, the anterior border a little oblique and bearing 4 (3) teeth, whereof the three internal are short and close together, and the external separated and more slender; femoral tooth small, sharp, and bifid.

Tergites more equal in size than is usual, the first not anteriorly sulcate, with two fine anteriorly abbreviated posterior longitudinal sulci, a little longer than the second, but shorter than the third; the second to the twentieth strongly bisulcate, and with simple unraised margins.

Sternites strongly bisulcate and faintly impressed laterally and mesially.

Anal somite: tergite narrow, about as long as wide, nearly parallel-sided, with raised margins, posterior border produced, with median longitudinal sulcus; pleuræ furnished with an anterior inferior porous area as in *Cryptops*, superior and posterior portion smooth, the pores numerous, larger and smaller, and close set, process slender and elongate, with one lateral, four apical or subapical spines, and sometimes one superior spine, the posterior border of the pleuræ furnished with one or two spines; sternite long and narrow, a little narrowed posteriorly, with rounded angles; legs long and stout, the patella and tibia being about as thick as the femur; femur armed with about 23 small spines arranged in longitudinal series approximately as follows—2 on the upper-inner edge, 2 on the inner surface, 5 and 4 on the under-inner edge, 5 and 5 on the under-outer edge; the inferior surface sometimes without spines in the middle and depressed in front, the process short and bifid; the patella, tibia, and proximal tarsal segment with upper inner edge internally produced and rounded, the under inner edge flattened; both tarsal segments thick and sparsely pubescent, not armed with a spine, claw with two spurs.

Legs with claws spurred; tarsi of sixteenth to twentieth unspined, the rest with a minute spine; the twentieth pair of legs considerably larger than the nineteenth, as in *Cryptops*, the distal tarsal segment more than half the length of the proximal.

Length up to 37 millim.

Hab. MEXICO, Amula 6000 to 7000 feet (*H. H. Smith*).

In this species the first tergite presents no transverse arched sulcus behind the head-plate. It is further remarkable for the rounded, swollen appearance of the segments of the anal legs.

The description has been drawn up from the examples from Amula, but in the British-Museum collection there are others obtained at San Diego (Texas) by Mr. William Taylor, which appear to belong to the same species. These examples show that the four tergites at the hinder end of the body may have raised margins and that the first tergite is not always bisulcate behind.

It is possible that the species is based upon young individuals; but apart from their small size the specimens examined appear to be adult. At all events, they may be readily recognized from all the other Central-American species, as may be seen from the synoptical table.

5. *Scolopendra pomacea*. (Tab. II. figg. 7, 7 a.)

Scolopendra pomacea, C. Koch, Syst. d. Myr. p. 170. 33 (1847)¹; Die Myr. i. p. 65, fig. 56 (1863)².

Scolopendra chichimeca, Saussure, Mém. Soc. Phys. Genève, xv. p. 386, t. 7. fig. 44 (1860)³; Humb. & Sauss. Miss. Sci. Mex., Myriop. p. 132, t. 5. fig. 13 (1872)⁴.

Scolopendra olmeca, Humb. & Sauss. Rev. et Mag. Zool. 1869, p. 157⁵; Miss. Sci. Mex., Myriop. p. 129, t. 5. figg. 7, 7a⁶.

Colour: upper surface olivaceous, under surface ochraceous or olivaceous; legs wholly ochraceous or distally olivaceous (in specimen from Cuernavaca).

Body robust, attenuated in front and behind, wider in front than behind.

Head large, about as wide as long, not sulcate but conspicuously punctured, considerably overlapping the first tergite; with a pair of shallow impressions in its posterior half.

Antennæ short, attenuate, composed of 18 segments, of which the basal 4 are naked and the rest pubescent.

Maxillipedes punctured; prosternal plates long, almost contiguous, almost square, with nearly straight anterior border, furnished with 4 blunt teeth, whereof the three internal are fused, and the external separate; femoral tooth of normal size, not dentate.

Tergites punctured; the first with a deep anterior transverse sulcus; the second to the twentieth bisulcate; seventeenth to the twenty-first with raised margins.

Sternites smooth, from the second to the twentieth bisulcate.

Anal somite: tergite wider than long, not sulcate; *pleuræ* closely porous throughout, a single spine on its posterior margin, the process moderately long, smooth, armed apically and subapically with 4 spines; *sternite* with lightly convex and converging lateral margins, and straight posterior margin; *legs* moderately long, femur armed with about 15 or 17 spines, arranged in longitudinal series approximately as follows—2 on the upper-inner edge, 3 on the inner surface, 4 or 6 on the under-inner edge, and 3 and 3 on the under-outer edge; the middle of the under surface without spines, the process stout, of moderate length and tipped with two spines; tarsus unspined, claw spurred.

Legs: the twentieth pair with unspined tarsus, the rest with spined tarsus; claws spurred.

Length to 58 millim.

Hab. MEXICO¹⁵ (*Geddes*, in *Mus. Brit.*), Puebla (*Saussure*⁶, *Botteri*⁴), Cuernavaca in Morelos 5200 feet (*Saussure*⁶, *H. H. Smith*).

According to Humbert and de Saussure this species frequents the plateau of Mexico, occurring at Cuernavaca and Puebla. *S. pomacea* may be recognized from the other indigenous Central-American species by its shorter antennæ. These appendages are composed of only 17 or 18 segments, whereas in the others there are always more than 20.

The above description is taken from a specimen in the British Museum obtained by Mr. Geddes, which has unfortunately but one anal leg; I am consequently unable to test the constancy of the spine-armature of the femur of this appendage. The spines in Koch's specimen seem to be fewer in number, since he indicates them as only 12, arranged as follows—from above downwards 2, 3, 3, 2, 2. In the above-described example they are 2, 3, 3, 3, 3, being two in excess; but I do not think this is sufficient to distinguish the specimens specifically. There is, however, one other objection that may be alleged against my opinion that *S. pomacea* and *S. chichimeca* are identical. This is Koch's statement that the neck-plate in his specimen is without impressions. But I venture to think that he is here referring to the absence of punctures or of the two longitudinal grooves which characterize the rest of the terga, and not to the absence of the deep anterior transverse sulcus. This sulcus he probably never saw, owing to the retraction of the head-plate, which his figure indicates.

The determination of *S. olmeca* as the same species is based upon the absence of

diagnostic characters in Humbert and de Saussure's description, and upon my possession of a specimen of *S. pomacea* from Cuernavaca, whence *S. olmeca* was obtained.

6. *Scolopendra punctiventris*. (Tab. II. figg. 6, 6 a-c.)

Scolopendra punctiventris, Newport, Ann. & Mag. Nat. Hist. xiii. p. 100 (1844)¹; Trans. Linn. Soc. xix. p. 387 (1845)²; Cat. Myr. Brit. Mus. p. 33 (1856)³; Gervais, Ins. Apt. iv. p. 277 (1847)⁴.

Scolopendra inæquidens (Gerv.), Wood, Journ. Acad. Nat. Sci. Phil. (2) v. pp. 24, 25 (1863)⁵; Trans. Am. Phil. Soc. xiii. pp. 162, 163⁶ (?? *inæquidens* of Gerv.).

Scolopendra woodii, Meinert, Proc. Am. Phil. Soc. xxiii. p. 198 (1886)⁷.

Colour: tergites olivaceous or ochraceo-olivaceous, with posterior margin, especially in the middle, deeper olivaceous; head, first tergite, and maxillipedes olivaceous or pale castaneous; legs ochraceous, posterior legs distally pale olivaceous; sternites ochraceous with olivaceous tint; antennæ pale olivaceous, distally paler.

Body moderately robust, but little narrowed in front and behind, smooth, polished.

Head longer than wide, ovate, with nearly straight posterior border, not sulcate.

Antennæ short, attenuate, composed of 17 segments, whereof the basal 6 or 7 are naked, and the next pubescent.

Maxillipedes smooth or very indistinctly punctured; prosternal plates almost in contact, long, about as long as broad, the anterior border oblique and cut out into four distinct teeth, whereof the three internal are approximate; femoral tooth large and subdentate.

Tergites: the first marked anteriorly with a transverse arched sulcus, and posteriorly with two fine, sub-parallel, longitudinal sulci; all the rest, except the anal, also marked with two longitudinal sulci; the first 16 or 17 with simple unraised margins.

Sternites smooth, except the first and last, strongly bisulcate.

Anal somite: tergite with a faint longitudinal sulcus; *pleuræ* furnished with larger and smaller, not close-set pores; the process long, slender, cylindrical, smooth, and tipped with four spines, without lateral spine; *sternite* with sides strongly converging posteriorly, straight or lightly concave hinder margin; *legs* somewhat short, only a little longer than the preceding pair, moderately stout, the femur armed with 9 or 11 spines—3 (1 superior) on the upper-inner edge, 2 on the under-inner edge, and 2, 2 in pairs on the under-outer edge, and sometimes 2 small spines at the proximal end of the segment; process long, stout, and tipped with three spines; tarsus unspined, claw spurred.

Legs with spurred claws but with tarsi unspined.

Length up to 43 millim.

Hab. NORTH AMERICA⁴⁻⁷, Eastern States, Florida¹³.—MEXICO, Tampico in Tamaulipas (*Richardson*), Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

This species was described by Newport from a Floridan specimen which is still preserved in the British Museum.

Dr. Meinert⁷ records it from North and South Carolina, Virginia, and Massachusetts, so it is evidently not uncommon in the Eastern States of North America. Mr. Smith's specimens were found under rotten wood, &c., about clearings and in the forest.

There is no doubt that the synonymy given above is correct. The error of ascribing the species to *S. viridis* of Say is to be laid to Wood's charge. Dr. Meinert followed Wood without questioning his synonymy.

S. punctiventris may be recognized at once from *S. viridis* of Say by the entire absence of tarsal spurs on all the legs.

7. *Scolopendra tenuitarsis*, sp. n. (Tab. II. figg. 5, 5 a-d.)

Colour olivaceous or ochraceo-olivaceous; under surface deep ochraceous; antennæ and legs distally olivaceous.

Body robust and approximately parallel-sided.

Head about as wide as long, obscurely punctured, and with an indistinct median longitudinal sulcus, posterior border straight.

Antennæ short, attenuate, composed of about 22 segments, whereof the basal four are naked and the rest pubescent.

Maxillipedes obscurely punctured; prosternal plates elongate, contiguous, with straight anterior border, furnished with four blunt teeth, whereof the three internal are close together and the external separate.

Tergites: the first marked in front by a transverse sulcus, which is situated at some distance behind the posterior margin of the head; from the third to the twentieth bisulcate, the nineteenth, twentieth, and twenty-first with raised margins.

Sternites smooth, second to the twentieth bisulcate.

Anal somite: tergite with a median sulcus, much wider than long; *pleuræ* porous throughout, except the posterior border and the process, which are smooth, posterior border bearing one or two spines, the process long and slender, bearing one lateral and about six apical and subapical spines; *sternite* somewhat wide, its sides very gently converging, with straight or slightly concave hinder margin; *legs* of moderate length, the basal segments stout and the tarsal segments slender; femur flattish, but with rounded margins, armed with about 23 or 26 small spines, arranged in longitudinal series approximately as follows—2, and 1 beneath them on the upper-inner edge, 4 on the inner surface, 6 or 7 in two irregular series on the under-inner edge, 2 or 3 on the under surface, and 4 or 5 and 4 on the under-outer edge; the process well developed and tipped with two spines; the lower surface slightly excavated anteriorly; the patella parallel-sided, a little wider than the femur, with rounded margins, but lightly and widely excavated above; the tibia elongately piriform, its proximal end being much wider than the distal end, flat or lightly excavated above, sparsely pubescent; tarsal segments somewhat stout, but much slenderer than the tibia, cylindrical, pubescent, unarmed; claw spurred.

Legs with spurred claws, and, except the twentieth pair, with spined proximal tarsal segment.

Length 39 millim.

Hab. MEXICO, Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

Three examples, found under rotting logs. Unfortunately only one of them is furnished with its anal legs; it is consequently impossible to judge of the constancy of the peculiarities presented by these appendages. This character may be sexual, but at all events it serves to distinguish the specimen presenting it from all the others that have been hitherto described.

8. *Scolopendra heros*. (Tab. I. figg. 12, 12 a-c.)

Scolopendra heros, Girard, in Marcy's Rep. Expl. Red River, p. 272, t. 18 (1853)¹; also of Wood, Porath, Meinert, &c.

Scolopendra castaneiceps, Wood, Proc. Ac. Phil. 1861, p. 11²; Trans. Am. Phil. Soc. xiii. p. 156, t. 1. fig. 1³.

? *Scolopendra polymorpha*, Wood, op. cit.⁴ (testibus auctoribus).

? *Scolopendra mysteca*, Humb. & Sauss. Rev. et Mag. Zool. 1869, p. 157⁵; Miss. Sci. Mex., Myriop. p. 130 (1872)⁶.

Hab. NORTH AMERICA^{1 4}, Texas².—MEXICO^{5 6}, Presidio (*Forrer*), San Miguel (*coll. Eisen*).

This handsome species is so well known that no detailed description of it is here

necessary. Specimens that I have seen vary in size from 106 to 150 millim. The colour is very variable, shading from olive-brown to deep green, the head being sometimes greener, sometimes redder than the body. Those with the head and first segment red and the trunk green have been named *S. castaneiceps* by Wood. I have seen one of these specimens from San Diego, Texas, measuring 106 millim., captured by Mr. William Taylor; but in structural features it does not differ from another example from the same locality, which is olive-brown in colour and measures 140 millim.

A young specimen of the *S. castaneiceps*-type, from this same locality, measuring 36 millim. in length, has the anal legs exceedingly long and slender, their length equalling one-third of the length of the body and head.

From Mexico I have seen five specimens: two, without special locality (*Eisen coll.*), 135–150 millim., pale coloured; one from San Miguel (*Eisen coll.*), 145 millim., with greenish head and chestnut body; and two from Presidio (*Forrer*), 114–133 millim., with the hinder border of the terga green, the head greenish, the rest castaneous.

9. *Scolopendra copeana*. (Tab. II. figg. 1, 1 *a-d*.)

Scolopendra copeana, Wood, Journ. Ac. Nat. Sci. Phil. (2) v. p. 27 (1863)¹; Trans. Am. Phil. Soc. xiii. p. 165 (1865)².

? *Scolopendra pachypus*, Kohlr. Arch. f. Naturg. 1881, 1, p. 112³.

Hab. NORTH AMERICA, California^{1 2}, Texas.—MEXICO, Chihuahua (*Montagu-Kerr*), Tres Marias Is., Ventanas in Durango (*Forrer*), Amula in Guerrero 6000 feet (*H. H. Smith*).

This species, described by Wood from California, has been set down by both Meinert (Proc. Am. Phil. Soc. xxiii. p. 195) and Bollman (Bull. U.S. Nat. Mus. 1893, p. 175) as a synonym of *S. heros*. My opinion that the two should at all events be regarded provisionally as distinct is based upon the examination of a very large number of Californian specimens, submitted to me for identification by Dr. Gustav Eisen, all of which differ from the Texan specimens that I refer to *S. heros* in certain apparently constant characters. These characters are: (1) the absence of an angular tooth on the inferior edge of the last and penultimate segments of the palpi; (2) the absence of sulci on the head-plate; (3) the presence of a median stria on the anal tergite; (4) the shorter anal pleuræ, the posterior border being more nearly vertical and the process more slender and cylindrical. It may be added, moreover, that *S. copeana* seems seldom to attain the size characteristic of *S. heros*. I have, however, seen Californian specimens measuring 130 millim. in length (over 5 inches); but the average length is perhaps about 100 millim. The colour, too, as in *S. heros*, appears to be very variable, the trunk varying from olive-brown through various shades of green to chestnut, but the posterior portions of terga 2–20 are deeper green, which gives a characteristically

striped appearance to the animals. Moreover, the anal segment and all the legs are flavous or ochre-yellow, and the head-region is generally noticeably darker-coloured than the opposite end of the body. The variation in colour does not seem to be connected with distribution, since specimens from the same locality show immense individual variation.

It may be that this species will prove to be based upon young specimens of *S. heros*: but the evidence at my disposal does not support this supposition; for the large Californian specimens that I refer to *S. copeana* have all the appearance of being adult, and specimens from the same locality ranging from 90–130 millim. present no variation in the characters given above as distinguishing this species from *S. heros*; and, conversely, Texan specimens of *S. heros* ranging from 108–140 millim. are also alike in these particulars.

I may add that the species named *S. polymorpha* by Wood may prove to be the same as *S. copeana*, in which case the former name has the precedence. But *S. polymorpha* is unknown to me, and I must follow the example of my predecessors in adding it to the synonyms of *S. heros*.

I have examined fourteen specimens from Mexico: six, 78–85 millim., from Dr. Gustav Eisen's collection; three from Chihuahua (*Montagu-Kerr*), 70–93 millim.; two from Ventanas (*Forrer*), 65–91 millim.; one from Amula (*H. H. Smith*), 101 millim.; and two from Tres Marias Islands (*Forrer*), 78–85 millim.

The British Museum also has an example, 104 millim. in length, from San Diego, Texas, obtained by Mr. William Taylor.

Subsp. **gaumeri**, nov.

? *Scolopendra pachypus*, Bollman, Bull. U.S. Nat. Mus. no. 46, p. 198 (1893). (?? *pachypus*, Kohlr.)

Hab. BRITISH HONDURAS (*Colonial Exhibition*); HONDURAS, Bonacca I., in the Bay of Honduras (*Gaumer*).

This subspecies is based upon some specimens closely allied to the typical *S. copeana*, but possibly specifically distinct from it. They are, however, in rather a bad state of preservation, and I propose at present to regard them merely as a subspecies. They differ from *S. copeana* in the absence of a sulcus on the anal tergite, and in the greater shortness of the pleural process. Three specimens: one, the type, from Honduras, measures 104 millim.; two from Bonacca Island, 78–88 millim. It appears to me probable that the specimen recorded from Truxillo as *S. pachypus* by Bollman is a representative of this subspecies.

10. **Scolopendra sumichrasti**. (Tab. II. figg. 4, 4 a.)

Scolopendra sumichrasti, Saussure, Mém. Soc. Phys. Genève, xv. p. 385, t. 7. fig. 46 (1860)¹; Humb. & Sauss. Rev. et Mag. Zool. 1869, p. 157²; Miss. Sci. Mex., Myriop. p. 131³.

Colour of tergites olive-green or olive-brown; legs and antennæ pale olive-green, or ochraceous; head and maxillipedes more or less castaneous.

Head punctulate, with two fine striæ.

Antennæ with 23 or 24 segments, of which the basal 6 are naked; coxal plates of maxillipedes with the three internal teeth confluent.

Terga not distinctly sulcate, and, excepting the anal, with unraised margins; the anal without a median stria.

Sterna strongly bisulcate.

Anal pleuræ densely and finely punctulate; the process shortish, tipped with from two to four acute spines.

Anal legs longish, about three times as long as the head-plate, or rather more; claw spurred; tarsus unspined; femur armed with from six to eight strong sharp spines, not counting the process, which is robust and armed with two acute spines, the spines are disposed as follows: 2 or 3 in two rows on the upper-inner edge, 1 or 0 on the under-inner edge, and 4 or 3 in two rows on the under-outer edge.

Legs with spurred tarsi.

Length up to 140 millim.

Hab. MEXICO, Vera Cruz ^{1 2 3} (*Saussure*); BRITISH HONDURAS (*Mus. Brit., ex Colonial Exhibition*); GUATEMALA, Tucuru in Vera Paz, Livingston (*Stoll*).

This species resembles *S. heros* in size, but may be at once recognized by the unraised margins of its terga, the absence of sulci on these plates, and the smaller number and larger size of the spines on the anal legs.

De Saussure's description does not point out these distinctive characters, and it is suggested that *S. sumichrasti* may be based upon old examples of *S. mysteca*. But if *S. mysteca* be *S. heros*, as I suppose, de Saussure's conclusion will not hold, for Texan specimens of *S. heros* measuring 140 millim. do not resemble *S. sumichrasti*.

11. *Scolopendra viridis*. (Tab. II. figg. 2, 2 a-i.)

Scolopendra viridis, Say, Journ. Ac. Phil. ii. p. 110 (1821) ¹.

Scolopendra parva, Wood, Proc. Ac. Phil. 1861, p. 10 ².

Scolopendra azteca, Saussure, Mém. Soc. Phys. Genève, xv. p. 382, t. 6. fig. 41 (1860) ³.

Scolopendra otomita, Saussure, loc. cit. p. 383, t. 6. fig. 42 ⁴.

Scolopendra maya, Saussure, loc. cit. p. 384, fig. t. 7. 45 ⁵.

Scolopendra tolteca, Saussure, loc. cit. p. 384, t. 6. fig. 43 ⁶.

Hab. NORTH AMERICA, Georgia ^{1 2}, Florida ¹, Texas.—MEXICO, Ciudad in Durango (*Forrer*), Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*), plateau of Mexico ^{3 4}, Huitznopal, between Mextitlan and Tampico ⁵, and Puebla ^{3 7}, Cuautla in Vera Cruz ⁶ (*Saussure*), San Andres Tuxtla (*Mus. Brit.*); GUATEMALA, Quezaltenango, Volcan de Pacaya, Guatemala city, Antigua, San Miguel Uspantan (*Stoll*); COSTA RICA (*Rogers*).

The identity of the species that I have here called *S. viridis*, Say, is still, in my opinion, involved in much obscurity. I am not even sure that all the specimens I have referred to this species will prove to be co-specific; nor would I undertake in all cases to distinguish between this form and *S. copeana*.

As a very general rule the species is smaller than *S. copeana* (length about 50–60

millim.), of a much more uniform green tint, with shorter and stouter anal legs. The largest I have seen, a specimen from Omilteme, measures, however, 86 millim.

The specimen of which a coloured figure is given on Tab. II. fig. 2 is from San Andres Tuxtla. It and another were acquired by the British Museum in 1861, and according to a note in the register they were identified by de Saussure himself as *S. tolteca*. They are said, moreover, to be the types of this species. This, however, they clearly are not; for the types of *S. tolteca* came from Cuautla, Vera Cruz, and are said to vary in length from 80–85 millim., whereas the San Andres specimens are 70 and 75 millim. respectively. The smaller one is like the larger, except that the anal legs are thinner and the spinous process on the femur longer. This fact is interesting, inasmuch as the great length of this spinous process is one of the first characters to strike the eye as distinguishing de Saussure's figures of *S. azteca* and *S. otomita*, not to mention *S. maya* from *S. tolteca*. In fact, an examination of the available material seems to me to show that the structure of the anal somite, which usually furnishes trustworthy characters, cannot be safely used as a criterion for distinguishing the so-called species enumerated in the above synonymy. For instance, the pleural process may be longish or quite short, so also may the spinous process on the femur, and the anal legs may be stout and short or longer and thinner. I believe, in fact, that these organs vary considerably with sex and age. On Tab. II. figs. 2 c–2 h I have depicted the anal somite of three specimens of a *Scolopendra* selected from a large series that was obtained some years back at San Diego, Texas, by Mr. William Taylor. These figures, drawn to the same scale, well illustrate the variations that have just been mentioned. I may add, moreover, that other specimens from the same set further illustrate the same truth, scarcely any two of them being alike. These Texan specimens I cannot distinguish from the Central-American forms named *S. azteca*, *S. tolteca*, &c.; and, so far as I can ascertain, they are nothing but *S. viridis* of Say, which was described from Florida, and, according to Bollman, is spread over the South-eastern States of the Union as far to the north as Tennessee. The last-named author, moreover, distinguishes between *S. viridis*, which is found to the east of the Rocky Mountains, and *S. pachypus* of Kohlrausch, which occurs in California. I have not, unfortunately, seen specimens from California that are at all like *S. viridis*; but the thickness of the anal legs in *S. pachypus*, upon which Bollman relies, is, it appears to me, an untrustworthy character.

The arguments which thus lead me to consider that the Mexican species are to be called *S. viridis* of Say are founded upon the assumption that Wood and Bollman are correct in their identification of *S. viridis*. It must be remembered, however, that the species in question is based upon specimens presenting a most unusual type of coloration—that is, in having a green band down the back. This at least appears to me to be the case from reading Say's description, where he says the posterior segments are margined with yellow. Wood seems to me to have wrongly interpreted this statement,

since he supposed, although without grounds, that Say was referring to the posterior margin of the segments.

In the British Museum, however, there is a North-American specimen, without special locality, which agrees closely with Say's description; and since this form has never to my knowledge been figured, I take this opportunity of publishing a coloured drawing of it for comparison with the specimen of *S. viridis* from San Andres in Mexico (Tab. II. fig. 2*i*). The difference between the two is startling enough; but I presume, from the confidence with which *S. viridis* of Say has been discussed by those who have written upon the North-American species of *Scolopendra*, that this peculiar pattern of colouring is inconstant. Wood seems to have been well acquainted with specimens presenting it.

I may add that in Abbot's drawings of Georgian Aptera, vol. xv., there is a figure of a centipede agreeing almost exactly with Say's description of *S. viridis*. It has the antennæ deep greenish blue; the head and first segment deep olive-green, the rest of the segments with a green longitudinal median band and yellow sides; the anal legs olivaceous, the rest of the legs from the patella to the claw also deep green, but the femur yellow like the maxillipedes. Abbot only appears to have seen one specimen, that was taken under a log in April. He says it is a rare species, the smaller members of the genus [*S. parva*, of Wood] being oftenest met with.

The Mexican examples before me that I here refer to *S. viridis* have been received from the following localities:—Ciudad (*Forrer*) (one specimen, 59 millim. long); San Andres Tuxtla (two specimens, identified by de Saussure as *S. tolteca*); Omilteme (one example, 87 millim. long, anal leg 15 millim. long, with stout segments; brownish green in colour, with the hinder borders of the terga deeper green). Examples were obtained by Dr. Stoll in Guatemala at the following localities: Volcan de Pacaya (three specimens, 74, 52, and 42 millim. long); San Miguel Uspantan (one specimen, 43 millim.); Antigua (one specimen, 55 millim.); Guatemala city (four specimens, 78, 59, 47, and 45 millim.); and Quezaltenango (one specimen, 37 millim.).

The single specimen from Costa Rica measures 55 millim.

12. *Scolopendra pachygnatha*, sp. n. (Tab. II. figg. 3, 3*a*, *b*.)

Colour of trunk and legs uniform olive-green; anterior end of body, with antennæ, and posterior end of body ferruginous.

Head suborbicular, rather small, very weakly punctulate, not sulcate. *Antennæ* composed of 25 segments, whereof the basal 6 are naked. *Maxillipedes* with their coxal plate densely punctured and striate anteriorly, deeply sulcate behind; dental plates prominent, longish, diverging, quadridentate; femoral segments also basally coriaceous.

Terga smooth, scarcely punctured, from the second to the twentieth bisulcate, from the seventeenth to the twentieth marginate; *sterna* smooth, conspicuously bisulcate.

Anal somite small: *tergite* not sulcate; *pleuræ* densely punctulate, the process almost absent, very short, blunt, and tipped with many spinules; *sternite* narrow; *legs* longish and slender, the width of the segments less than half their length, angular process on the femur scarcely apparent, tipped with 1 or 2 spines; femur

internally armed with 6 or 7 spinules, 2 or 1, 3, 2, and below externally with about 8 spinules irregularly arranged; *tarsi* not spurred.

Tarsi of all the legs spurred.

Length 96 millim.

Hab. MEXICO, Mezquital del Oro, Zacatecas (*Buller coll.*).

A single specimen.

The following species are unknown to me:—

Scolopendra occidentalis.

Scolopendra occidentalis, Meinert, Proc. Am. Phil. Soc. xxiii. p. 197 (1886) ¹.

Hab. WEST COAST OF MEXICO (*Capt. Goff* ¹).

I cannot grasp the essential characters of this species from the diagnosis; but, so far as can be judged, it would fall under the heading *b*¹⁰ of the synoptical table given on pp. 13, 14, alongside of *S. viridis*, and it may prove to differ from *S. viridis* in having the anal legs long and slender, and the femora armed with 23 or 26 spines.

Scolopendra nicaraguensis.

Scolopendra nicaraguensis, Bollman, Bull. U.S. Nat. Mus. no. 46, p. 198 (1893) ¹.

Hab. NICARAGUA (*Bransford* ¹).

This species is based upon a specimen 90 millim. in length, which, according to Bollman, is related to *S. heros*, Girard, but has the anal legs thicker and shorter, the anterior 15 dorsal plates immarginate, and the anal plate shorter and wider. It is also said to be distinguishable from *S. pachypus*, Kohlr., by having the anal legs less crassate.

If worth a separate title, this form will probably prove to be at most only a subspecies of *S. azteca*, the Mexican form of *S. viridis*.

[CORMOCEPHALUS.

Cormocephalus, Newport, Trans. Linn. Soc. xix. p. 419 (1845).

Cormocephalus aurantiipes.

Cormocephalus aurantiipes, Newp. loc. cit. p. 420.

This species, which is typically Australian, no member of the genus to which it belongs having been previously obtained from any part of either North or South America, has been recorded by Meinert [Proc. Am. Phil. Soc. xxiii. p. 206 (1886)] from Guatemala. Probably, however, this locality is erroneous; but if correct we may safely assume either that the specimen was accidentally introduced or has been wrongly determined.]

PAROTOSTIGMUS, gen. nov.

I propose this new generic name for the American species of Centipedes which have hitherto been assigned to *Otostigmus*. A considerable number of these species have now been described, and they all agree amongst themselves, and differ from the Oriental members which belong to *Otostigmus* in the strict sense of the word, in having the anal pleuræ posteriorly truncate and the anal femora unarmed.

1. *Parotostigmus denticulatus*, sp. n. (Tab. II. figg. 10, 10 a-c.)

Colour (in alcohol) very variable, mostly of a greenish ochraceous tint with a bluish or reddish tinge of colour; shining, sometimes strongly, with metallic lustre.

Body slender, attenuated anteriorly and posteriorly.

Head a very little wider than long, convex, finely punctured, without sulci.

Antennæ short, composed of 17 segments, whereof the basal 2 are naked and the rest clothed with pubescence of a reddish tint.

Maxillipedes: *coxæ* lightly convex, mesially and longitudinally impressed posteriorly, faintly punctured; prosternal plates wider than long, almost contiguous and parallel, bearing four sharp subequal teeth; femur with conspicuous sharply bifid tooth.

Tergites finely and closely punctured, from the sixth bisulcate, all, except the last, with unraised margins, laterally wrinkled and marked between the sulci with two shallow, longitudinal grooves, the wrinkling being especially conspicuous in the posterior portion of the body; finely granular, either thickly and irregularly, or more sparsely, indistinctly, and subserially.

Sternites smooth and shining, very finely punctured, not sulcate, but marked more or less distinctly with four, an anterior and posterior median and two lateral, impressions.

Anal somite: *tergite* with raised margins, not sulcate, mesially impressed posteriorly; *pleuræ* thickly covered with larger and smaller pores, produced posteriorly into a smooth blunt process which projects a little beyond the lateral margin of the tergite, without trace of spines; *sternite* with converging margins, rounded angles, and straight posterior border, mesially impressed; *legs* without spines, of moderate length, the femur thicker distally than proximally, claw basally spurred; tarsus unspined.

Legs: claws spurred, proximal tarsal segment with a single spine, first pair of legs with an anterior tibial spine; in the posterior part of the body the legs are sometimes finely granular proximally.

Length up to 56 millim.

Hab. MEXICO, Amula 6000 to 7000 feet, and Omilteme 7000 to 9000 feet, both in Guerrero (*H. H. Smith*).

Several specimens, found under rotting wood in clearings and in the forest.

Judged by the formation of the dorsal plates, the species of this genus may for convenience be divided into two sections—the first comprising those in which the tergites, at least in the hinder half of the body, have elevated margins, and the second those in which all the tergites, except the anal, have simple margins. Into the former division fall *Otostigmus scabricauda* (Humb. & Sauss.) (= *O. appendiculatus*, Porat), from Brazil and Ecuador; *O. inermis*, Porat, from Buenos Ayres; *O. occidentalis*, Meinert, from Hayti; *O. brasiliensis*, Meinert, from Bahia; *O. sulcatus*, Meinert, from Monte Video; *O. kervillei*, Karsch, from Ecuador; and *O. spiculiferus*, Pocock, from St. Vincent. Whereas to the latter section belong *O. limbatus*, Meinert, from Buenos Ayres and Brazil, and the Mexican species above described.

P. denticulatus differs from *P. limbatus* in being wrinkled and granular above, the latter being described as "sublævis."

RHYSIDA.

Rhysida, Wood, Journ. Acad. Phil. v. p. 40 (1863).

The following synopsis will serve to show the diagnostic characters of the three Central-American species referred to *Rhysida*:—

- a. Femur of the anal leg armed with about 7 strong spines, 3 of which are arranged externally in a longitudinal series on its lower surface (terga in the posterior half of the body at least with elevated margins). *longipes*, Newp.
- b. Femur of the anal leg without spines.
- a'. Lateral margins of the terga in the posterior half of the body elevated (*testibus* Humbert & Saussure, and Meinert) *celeris*, Humb. & Sauss.
- b'. Lateral margins of all the terga, except the last, simple, and unraised *immarginata*, Porat.

1. *Rhysida immarginata*. (Tab. III. figg. 1, 1 a-c.)

Branchiostoma immarginatum, Porat, Bih. Sv. Vet.-Ak. Handl. iv. no. 7, p. 24 (1876) ¹.

Branchiostoma indicum, Kohlr. Arch. f. Naturg. 1881, 1, p. 67 ².

Branchiostoma gymnopus, Kohlr. loc. cit. ³.

Branchiostoma subspinosum, Tömösvary, Term. füzetek, ix. p. 65 (1885) ⁴.

Branchiostoma celebense, Haase, Abhandl. Zool. Mus. Dresden, no. 5 (1887), p. 86 (var. of *immarginatum*) ⁵.

Branchiostoma ceylonicum, Haase, loc. cit. (var. of *gymnopus*) ⁶.

Hab. MEXICO, Ciudad in Durango (*Forrer*); BRITISH HONDURAS, Stann Creek, Belize (*Robertson*); GUATEMALA, near the city (*Stoll*); NICARAGUA, Greytown (*Janson*); PANAMA, Volcan de Chiriqui (*Champion*).—ORIENTAL REGION.

This is, I believe, the correct synonymy of the species, to which are ascribed the Central-American examples. But seeing that others may possibly hold a different view as to the correctness of referring the New World examples to the Old World species, the following description of the American examples has been prepared as a check upon the determination of them:—

Colour olivaceous or ochraceous; legs pale green or testaceous; shining.

Head wider than long, somewhat coarsely and sparsely punctured, not sulcate, covered posteriorly by the first tergite.

Antennæ moderately long, composed of from 18–21 segments, of which the basal 2 and half the third are naked, and the rest pubescent.

Maxillipedes indistinctly punctured; prosternal plates not large, wider than long, slightly diverging, with convex border bearing four sharp teeth, of which the external is the smallest; femoral tooth large and subdentate.

Tergites smooth or at most lightly wrinkled, from the third or fifth bisulcate; margins simple and unraised.

Sternites smooth, without impressions and without sulci.

Anal somite: tergite without median sulcus, not impressed behind; *pleuræ* punctured throughout, produced into a longer or shorter stout process, which is terminated by two spines, without lateral or superior

spine; *sternite* broad, a little narrowed posteriorly, with lightly convex sides and an emarginate hinder border; *legs* long and slender, femur unarmed; tarsus not spined, claw with basal spurs.

Legs: first to seventeenth or eighteenth with two tarsal spurs, nineteenth and twentieth with one tarsal spur; first to the sixth with an anterior tibial spur; the first with an anterior patellar spur.

Length 52 millim.

All the names given above in the synonymical list were applied to examples from different parts of the Oriental Region. The characters, however, upon which the so-called species were established do not seem to be reliable. The Banda form, *R. gymnopus*, which has the anal femur unarmed and the pleuræ tipped with two spines, is identical with the Central-American examples here recorded; and *R. gymnopus* is connected with the typical *R. immarginata* by means of *R. ceylonica*, which has a few spines on the femur.

2. *Rhysida celeris*.

Branchiostoma celer, Humb. & Sauss. Rev. et Mag. Zool. (2) xxii. p. 202 (1870)¹; Mém. Mex.

Myr. in Mém. Soc. Phys. Genève, xv. p. 122, t. 6. fig. 16²; Kohlr. Arch. f. Naturg. 1881, 1, p. 69³; Meinert, Proc. Am. Phil. Soc. 1886, p. 183⁴.

Colour pale green or olivaceous, flavo-brunneous or ochraceous beneath; feet, except the posterior, and antennæ flavo-brunneous.

Body tolerably slender or more robust, nearly smooth.

Head suborbicular, immarginate, its posterior margin more or less covered.

Antennæ tolerably short, 20 (18–21) segments; except the first three segments, densely and shortly hairy, the median segments long or longish.

Prosternal teeth four on each side, arranged in pairs, somewhat blunt; coxal tooth almost smooth.

Anal legs very long, slender, unarmed.

Dorsal laminae, except the first four, marginate.

Posterior pleuræ manifestly rough, thickly porous, produced into a smooth, sharp angle, which is terminated by two spines.

Last ventral lamina tolerably wide, narrowed and with rounded sides, posteriorly manifestly sinuate.

Length 70 millim.

Hab. NORTH AMERICA, Carolina¹.—NICARAGUA, Polvon⁴ (*McNiel*).—ANTILLES, Jamaica⁴.

Recorded originally from Carolina by Saussure, but subsequently from Jamaica and Nicaragua by Meinert.

This species is unknown to me, but, apparently differs from *R. immarginata* in having some of its tergites margined.

3. *Rhysida longipes*. (Tab. II. fig. 11.)

Branchiostoma longipes, Newp. Trans. Linn. Soc. xix. p. 411 (1845)¹; and of later authors.

Hab. MEXICO, Mazatlan (*Forrer*).—ANTILLES.—E. INDIES.

This species has a wide range in the tropics, being not uncommon in both the East and West Indies.

Since two or three good descriptions of *R. longipes* have been published of late years, it is unnecessary to redescribe it here.

Fam. CRYPTOPIDÆ, nov.

(= *Plutoniinæ* + *Cryptopinæ*, Bollman, 1893.)

Body composed of 21 leg-bearing segments, as in the Scolopendridæ; but with eyes absent and the tarsi of all the legs, except the last two pairs, undivided.

Containing *Cryptops*, *Paracryptops*, *Theatops*, and *Plutonium*.

THEATOPS.

Theatops, Newport, Trans. Linn. Soc. xix. p. 409 (1845).

1. *Theatops spinicauda*.

Opisthomega spinicauda, Wood, Journ. Acad. Phil. v. p. 36¹; Trans. Am. Phil. Soc. xiii. p. 170²; Meinert, Proc. Am. Phil. Soc. 1886, pp. 208, 209³.

Hab. NORTH AMERICA, Illinois^{1 2}.—MEXICO, Acapulco³.

This species, described originally from North America, is recorded by Meinert from Acapulco.

Fam. SCOLOPOCRYPTOPIDÆ, nov.

Body composed of 23 leg-bearing segments; most of the terga nearly always bisulcate; the sterna either not sulcate or weakly bisulcate.

Head without eyes, overlapping the first tergite, which is strongly sulcate.

Maxillary coxæ without the distinct dental plates which characterize the Scolopendridæ.

Anal pleuræ, as in the Newportiidæ, furnished with a very long spiniform process.

Anal legs long and slender, the femur armed with only two spines; the tarsi as in the Scolopendridæ.

The *legs* from the first to the twenty-first pairs with the tarsi undivided.

Omitting for the present *Scolopendropsis*, of which the systematic position is a matter of doubt, this family contains but two genera, which may be recognized as follows:—

- a.* The seventh somite with a pair of stigmata SCOLOPOCRYPTOPS.
(Type *miersii*, Newp.)
- b.* The seventh somite without stigmata OTOCRYPTOPS, Haase.
(Type *rubiginosa*, L. Koch.)

Up to the present time the first-named has not been recorded from Central America, being known only from Santa Lucia, in the Lesser Antilles, and Brazil.

OTOCRYPTOPS.

Otocryptops, Haase, Abhandl. Zool. Mus. Dresden, no. 5, p. 96 (1887).

The well-established American species of this genus may be recognized by the following key:—

- a.* Margins of the head strongly raised; labial border almost straight; the tergites not bisulcate, the posterior, including the anal, with raised margins [*seaxpinosus* (Say).]
- b.* Margins of the head simple; tergites bisulcate and with raised margins.
- a*¹. Anal tergite with elevated side-edges; labial border produced, but not distinctly dentate [*gracilis* (Wood).]
- b*¹. Anal tergite with rounded unraised edges.
- a*². Labial border produced and quadridentate; head wider; claws with strong basal spurs *ferrugineus*, Linn.
- b*². Labial border straight or emarginate, not strongly dentate; head narrower; claws at most weakly spurred *melanostoma*, Newp.

1. **Otocryptops ferrugineus.** (Tab. III. figg. 2, 2 *a-c*.)

Scolopendra ferruginea, Linn. Syst. Nat. ed. 12, p. 1063¹.

Otocryptops ferrugineus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 463².

Hab. MEXICO (*Saussure*), Omilteme 7000 to 9000 feet, and Amula 6000 to 7000 feet, both in Guerrero (*H. H. Smith*).—ECUADOR; ANTILLES².

This species is also abundant in the West Indies and in the mountainous parts of Ecuador, but has not been recorded from the Southern States of North America. Mr. Smith's specimens were found under rotting wood, about clearings and in the forest.

For the full synonymy of this common species reference may be made to my paper upon the Chilopoda of the West Indies (*l. c.*).

2. **Otocryptops melanostoma.** (Tab. III. figg. 3, 3 *a-c*.)

Scolopocryptops melanostoma, Newp. Trans. Linn. Soc. xix. p. 406¹.

Otocryptops melanostoma, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 464².

Hab. GUATEMALA, near the city (*Stoll*).—BRAZIL¹; ANTILLES, St. Vincent².

For the rest of the synonymy, see Journ. Linn. Soc., Zool. xxiv. p. 464.

Fam. NEWPORTIIDÆ, nov.

Body composed of 23 leg-bearing segments, of which the terga are quadrisulcate and the sterna trisulcate, with traces of a median transverse sulcus; the posterior extremity of the sterna is defined by an arched transverse sulcus, the area thus defined being smooth and concealed beneath the anterior extremity of the following sternal plate.

Head without eyes, overlapping the first tergite.

Maxillary coxæ without distinct dental plates.

Pleuræ of the anal segment coarsely porous; the process long, slender, and simple.

Anal legs spinous, antenniform, the posterior tarsal segment being clawless and divided into many or few segments.

At present two genera only of this family have been established. They may be recognized as follows:—

- a.* The distal tarsal segment of the anal leg divided into many minute ill-defined segments SCOLOPENDRIDES, SAUSS.
(Type *mexicanus*, SAUSS.)
- b.* The distal tarsal segment of the anal legs divided into relatively few distinct, sharply-defined, long, cylindrical segments NEWPORTIA, Gervais.
(Type *longitarsis*, Newp.)

SCOLOPENDRIDES.

Scolopendrides, Saussure, Rev. et Mag. Zool. 1858, p. 546.

The following table will serve to show some of the differential characters of the species of this genus:—

- a.* Tibia of anal leg spined beneath; spines on the inner edge of the femur apparently as large as those on the lower surface of this segment *mexicanus*, H. & S.
- b.* Tibia of anal leg unarmed; spines on the inner edge of the femur much smaller than those on the lower surface.
- a*¹. Terga not mesially carinate.
- a*². The protarsus of the anal leg wider than the tarsus; the head transversely sulcate posteriorly; patella of anal leg armed beneath with two spines; transverse sulcus of first tergite semicircular [*ernsti*, Poc. — Venezuela and St. Vincent.]
- b*². The protarsus of the anal leg not wider than the tarsus; head not transversely sulcate; transverse sulcus of first tergite ovate; patella of anal leg armed with one inferior spine [*brevipes*, Poc.—Demerara.]
- b*¹. Terga mesially carinate; spine-armature of anal legs as in *S. ernsti*; head not transversely sulcate; sulcus of first tergite part of a circle; protarsus and tarsus of anal leg approximately equal in width *stolli*, sp. n.

1. *Scolopendrides mexicanus*.

Scolopendrides mexicana, Sauss. Rev. et Mag. Zool. 1858, p. 546¹.

Scolopocryptops mexicana, Sauss. Mém. Mex. Myr. in Mém. Soc. Phys. Genève, xv. p. 131, t. 7. fig. 48².

Newportia mexicana, Humb. & Sauss. Miss. Sci. Mex., Myriop. p. 138³.

Hab. MEXICO, Cordova¹⁻³.

This species is unknown to me in nature, but from de Saussure's figures and descriptions the following differential characters may be made out:—

In the anal legs, the femur, patella, and tibia are subequal in length and, taken together, longer than the tarso-metatarsus; the femur, patella, and proximal end of the tibia are densely hirsute; the upper inner edge of the femur is furnished with a row of four spines, the under surface with a row of four larger spines; patella armed beneath with a single median spine, and the tibia with three median spines; the proximal segment of the tarso-metatarsus is distally narrowed and passes into an indistinctly multi-segmented antenniform portion.

Nothing, unfortunately, is said about the arrangement of the sulci on the first tergite.

2. *Scolopendrides stollii*, sp. n. (Tab. III. figg. 4, 4 a-c.)

Colour pale castaneous, the terga slightly infuscate.

Head elongate, narrowed anteriorly, its posterior border strongly convex, its posterior half marked with two fine parallel striæ.

Antennæ rather short, attenuate, hirsute at the base, pubescent elsewhere.

Coxal plate of the maxillipedes narrowed and produced forwards in front, angularly excised.

Terga sparsely but noticeably punctured, the first marked anteriorly with an arched transverse groove, which reaches posteriorly to the middle of the plate, the area in front of and behind this groove marked with two parallel continuous sulci; the second only sulcate quite in front; the rest (*i. e.* to the twenty-second) normally marked with four sulci, but in addition furnished with a median longitudinal keel.

Sterna with the usual median groove and the lateral posteriorly abbreviated groove on each side, the transverse groove obsolete.

Anal somite: *tergum* neither sulcate nor carinate, its sides elevated and parallel, its posterior border a little produced mesially; *pleuræ* not closely punctured, the posterior process smooth, hirsute, moderately long, its apex slightly upturned; *sternum* wide, nearly parallel-sided, its posterior border straight; *legs* longish, about as long as the head and first eight terga; the femur, patella, and tibia subequal in length, the latter slightly the shortest; the protarsal segment about half as long as the tibia, the tarsus about as wide as the protarsus, almost as long as the femur and tibia taken together; the femur compressed and carinate below, hairy, notched and sulcate above, posteriorly its inner edge armed with a few minute spinules, armed below with a series of 5 or 7 spines, of which the 4 posterior extend at equal distances throughout the greater length of the segment, the rest being inconstant (1 on one leg, 3 on the other) and placed at the anterior end; *patella* also compressed below, armed in its anterior half with two spines, this segment also notched above posteriorly.

Rest of the legs hairy, the twenty-second pair long, very hairy, not spurred, with the tarsus completely divided; tarsi of the rest incompletely segmented, armed below with one spur, the tibia armed distally with two or three spurs.

Length about 35 millim.; of anal leg 10 millim.

Hab. GUATEMALA, Quezaltenango (*Stoll*).

This species, of which only a single specimen is known, may be easily recognized from *S. mexicanus* by having the inner edge of the anal femur and the lower edge of the tibia unarmed, and by the presence of two spines on the lower surface of the patella.

NEWPORTIA.

Newportia, Gervais, Insectes Aptères, iv. p. 298 (1847).

Synopsis of the known species of *Newportia* (excepting *N. azteca*).

- a.* The transverse sulcus of the first tergite evenly crescentic ;
the longitudinal sulci not bifurcating in front.
- a*¹. Femur of anal leg with 3 long inferior spines ; patella
unarmed [*pusilla*, Poc.—St. Vincent, W. Ind.]
- b*¹. Femur of anal leg with 4 long spines ; patella internally
armed with 2 spines.
- a*². Proximal tarsal segment of anal leg almost as long
as the tibial ; tarsus shorter and composed of a
few segments (? complete) [*monticola*, Poc.—Chimborazo.]
- b*². Proximal tarsal segment of anal leg about half the
length of the tibial ; the tarsus nearly as long as
the rest of the leg, composed of 11 segments . . . [*longitarsis*, Newp.—St. Vincent.]
- b.* The transverse sulcus of the first tergite distinctly angular ;
the longitudinal sulci bifurcating in front ; femur of
anal leg with 4 spiniform teeth.
- c*². Patella of the anal leg armed below with 3 spines in a
row, unarmed internally, proximal tarsal segment
only a little shorter than the tibia. *spinipes*, sp. n.—Omiteme.
- d*². Patella of the anal leg either unarmed beneath or
armed with only 1 spine ; its inner surface armed
with 1 or 2 spines.
- a*³. Patella of the anal leg unarmed beneath, the proximal
tarsal segment only a little shorter than the tibia . [*dentata*, Poc.—Andes of Ecuador.]
- b*³. Patella of anal leg with one spine beneath, the proxi-
mal tarsal segment about half the length of the tibia. *rogersi*, sp. n.—Costa Rica.

1. *Newportia azteca*.

Newportia azteca, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 158 (1869)¹ ; Miss. Sci. Mex.,
Myriop. p. 137, t. 6. fig. 20 (1872)².

Hab. MEXICO, Cordova^{1 2}.

This species may prove to be the same as that described below as *N. spinipes*. In many structural points the two are evidently closely allied ; but since Humbert and de Saussure say nothing about the spine-armature of the lower surface of the femur and patella of the anal legs, one is compelled to refer to the figure for information on this point : so far as can be judged, the four strong spines which project from the lower surface of the femur in *N. spinipes*, as well as in the other species of this genus (three in *N. pusilla*), are represented by about two much smaller spines ; and one certainly has no right to assume without further evidence that the authors overlooked such

conspicuous structures as the four spines in *N. spinipes*, nor that the artist intended to represent them by the two small spines he has figured. As for the patella, it certainly appears to be armed, as in *N. spinipes*, with three spines; but the middle one of these, instead of lying in the same straight line as the first and third, appears to be placed higher up upon the inner surface of the segment. So that if the spine-armature of the anal legs in *N. azteca* has been figured with even an approach to accuracy, we must conclude that *N. azteca* differs from all the species of the genus that have been established of late years.

2. *Newportia spinipes*, sp. n. (Tab. III. figg. 5, 5 a-d.)

Colour ochraceous, head and maxillipedes pale castaneous.

Body long, slender, and nearly parallel-sided.

Head about as wide as long, sparsely punctured and hairy, its margins not elevated, its posterior angles rounded, furnished posteriorly with two short anteriorly abbreviated sulci.

Antennæ composed of 17 segments, whereof the basal three are sparsely setose and the rest densely pubescent, the apical segment not longer than the penultimate.

Maxillipedes conspicuously punctured and hairy; *coxæ* with anterior border not produced, nearly straight, lightly excised in the middle line, and furnished on each side of the middle with one very short, very wide black tooth; the femur internally subdentate.

Tergites: the first marked before its anterior border by a strong angular groove, the area round the apex of the angle depressed; also furnished with two complete fine longitudinal sulci, which converge slightly in front of the transverse groove; posterior to the transverse groove the sulci bifurcate, the inner branches of each bifurcation running obliquely inwards to meet the angle of the transverse groove; the second tergite the smallest; from the second to about the tenth gradually increasing in size, from the tenth to the twenty-first subequal, twenty-second shorter and narrower, twenty-third still shorter and narrower; the second to the twenty-second with two complete longitudinal sulci, the third to the twenty-first with an oblique posteriorly abbreviated lateral sulcus, all (except the anal) with simple unraised borders; the *prescuta* distinct.

Sternites finely punctured, very long, longer than wide, much wider in front than behind, each largely overlapped posteriorly by the one that succeeds it, the posterior third of the sternite sloped backwards and upwards and defined by a fine transverse bisinuate sulcus; each marked by fine longitudinal subparallel sulci, a median and two lateral, the median sulcus abbreviated anteriorly and posteriorly, the internal of the lateral sulci abbreviated anteriorly, and the external, abbreviated posteriorly, runs from a point on a level with the posterior angle of the preceding sternite and terminates before reaching the transverse sulcus.

Anal somite: *tergite* with lightly convex subparallel sides, margins strongly raised, mesially impressed in its posterior half, the posterior border convexly produced; *pleuræ* furnished with many conspicuous pores, the posterior edge smooth, the process also smooth, slender, elongate, and tipped with a single spine; a few small scattered spines near the posterior border of the pleura, the posterior inner edge of the pleura, on the inner side of the articulation of the anal legs, is chitinous and has a convex serrate margin; *sternite* wider than long, narrowed posteriorly, its hinder border deeply and mesially emarginate; *legs* not hairy, the femur a little shorter but stouter than the patella, armed in the middle line below with four strong spiniform teeth, and externally and internally with many minute irregularly arranged spinules, the upper border furnished posteriorly with a median marginal notch, from which an abbreviated groove runs forwards; the patella shorter than the tibia, armed below in its anterior two-thirds with three spiniform teeth and furnished externally and internally with a few scattered spinules, also bearing a superior posterior notch; the tibia unarmed, except for a few minute spinules; the tarso-metatarsus composed of a proximal subcylindrical segment, equalling the patella in length, and a distal, antenniform portion composed of about 13 distinctly defined cylindrical segments, this distal portion being articulated to the superior half of the posterior articular surface of the proximal portion; tarso-metatarsus much longer than the femur, patella, and tibia taken together.

Legs with claws furnished with two basal spurs; tibia armed distally with an anterior and an inferior spine; tarso-metatarsus armed distally with a single inferior spine; the twenty-second pair of legs much longer and stronger than the twenty-first, with the tarso-metatarsus divided into two segments, whereof the proximal is longer than the distal; tibia and tarsus unspined; the tarso-metatarsus of the rest of the legs indistinctly bisegmented; the femur, patella, and tibia of all the legs armed inferiorly with one or more spinules. In one specimen the femur in the anterior three pairs of legs is furnished with many spinules, and in the other the twenty-second and twenty-third pairs of legs are densely pubescent distally.

Length up to 46 millim.; of anal leg 15 millim.

Hab. MEXICO, Omilteme 7000 to 9000 feet, and Sierra de las Aguas Escondidas 9500 feet, both in Guerrero (*H. H. Smith*).

Found under rotting logs, in clearings and in the forest.

3. *Newportia rogersi*, sp. n. (Tab. III. figg. 6, 6 a-d.)

Colour deep ochraceous, head and maxillipedes castaneous.

Body attenuated anteriorly and posteriorly.

Head marked with larger and smaller punctures, sparsely hairy; a little longer than wide, with widely rounded posterior angles, marked behind with two very short longitudinal sulci.

Antennæ composed of 17 segments; distal segments pubescent, basal two segments furnished with longer hairs.

Maxillipedes punctured like the head-plate; the coxæ with the anterior border lightly produced and nearly straight, bearing on each side of the middle line one wide very short plate-like tooth; femur not dentate.

Tergites smooth and shining; the first marked with a strong transverse angular sulcus, the area around the apex of the angle depressed; the area in front of this sulcus not longitudinally sulcate, the area behind it furnished with two longitudinal sulci, each of which bifurcates in front, the internal branch running to the apex of the angle of the transverse sulcus, the external meeting this sulcus at a point one-third of the distance from the angle; second and twenty-second tergites bisulcate, third to the twenty-first quadrisulcate, as in *Cryptops*; all, except the anal, with unraised margins; prescuta distinct and bisulcate.

Sternites wider in front than behind, each, except the first and last two, furnished with three longitudinal sulci—a median, more or less complete, and on either side a lateral anterior, which does not extend beyond the joint of the legs; each, except the twenty-first and twenty-second, overlapped by the one that is behind it, the covered portion marked by a deep, transverse, gently arched groove, the twenty-second without sulci.

Anal somite: *tergite* not sulcate, with raised lateral margins, posterior border convexly produced in the middle line; *pleura*, except the superior portion and the process, furnished with very many larger and smaller circular pores, the process elongate, slender, pointed and simple, the posterior surface internally chitinous and serrate; *sternite* narrowed posteriorly, with lightly concave posterior border; *legs* shorter, the femur, patella, and tibia subequal in length, the femur triangular in section, the posterior edge of the upper surface mesially notched, the superior internal edge furnished with about two rows of spicules, the under surface armed mesially with four enormous spiniform teeth; the patella subcylindrical, the inner surface armed in front with a smaller spiniform tooth, there being a similar spiniform tooth in the anterior half of the inferior surface; femur and patella internally hairy; tibia smooth, unarmed, and subcylindrical; tarso-metatarsus composed of from seven to twelve segments, the first (proximal segment) about half the length of the tibia and about equalling in length the second and third, all the segments of the antenniform portion very distinct, each being wider at its distal than at its proximal extremity; the tarso-metatarsus attenuate and a very little shorter than the femur, patella, and tibia taken together.

Legs distinctly hirsute; tarso-metatarsus undivided and unspined; claws spurred; tibia furnished with an anterior distal spine; the twenty-second pair only normally larger than the twenty-first, its tarso-metatarsus very indistinctly divided.

Length 32 millim.; of anal leg 7.5 millim.

Hab. COSTA RICA, Volcan de Irazu (*Rogers*).

This species is closely related to the preceding, but differs in the structure of its anal legs. Thus the proximal segment of the tarso-metatarsus is only about half the length of the tibia, while all its segments taken together are a little shorter than the femur, patella, and tibia of this appendage; the patella, moreover, is armed with only one spine beneath. In *N. spinipes*, on the other hand, the proximal segment of the tarso-metatarsus of the anal legs is almost as long as the tibia, and all its segments taken together are considerably longer than the femur, patella, and tibia; moreover, the patella is armed beneath with three strong spines.

Another species has been added to the genus *Newportia* whilst this paper was in the printer's hands. This is *N. balzani*, from Rio Apa, Paraguay, described by Sign. F. Silvestri in the *Annali del Museo Civico di Genova*, xxxiv. p. 767 (1895). From the description it is not easy to separate this species from *N. pusilla*, Poc., except in so far as it appears that the latter has the anal tarso-metatarsus composed of ten segments, while in *N. balzani* there are twelve subdivisions.

Order GEOPHILOMORPHA, nov.

[= *Geophilidæ* of authors.]

There cannot be much doubt that this order will prove to be divisible into several families.

GEOPHILUS.

Geophilus, Leach, Trans. Linn. Soc. xi. p. 384 (1845).

The Central-American species of *Geophilus* may be recognized by the following key* :—

- a. Anal sternite wide, wider than long; anal pleuræ without pores; head wider, with convex sides, maxillæ weaker, sides of the coxal plate largely overlapped by the pleura, the line of their union lying obliquely inwards and backwards *aztecus*, H. & S.
- b. Anal sternite narrow, parallel-sided; anal pleuræ porous; head long, parallel-sided, coxal plate of maxillipedes wider, the line of junction

* There is little doubt that the characters mentioned under headings *a* and *b* of the above table are worthy of generic rank, and in that case *G. aztecus* is the only species of the five that will fall into the genus *Geophilus*, of which *G. carpophagus*, Leach, is the type. The rest of the species will, I suspect, work out to be referable to *Mecistocephalus*, Newp.; but in any case they already have the two names *Pachymerium*, C. Koch, and *Polyericus*, Sauss. & Humb.

between it and the pleuræ nearly parallel to the long axis of the body, basal plate narrow, much narrower than the first tergite.

*a*¹. Anal tergite short and wide, covering the pleuræ in front *toltecus*, H. & S.

*b*¹. Anal tergite much longer, narrower, not covering the pleuræ in front; pleuræ distinctly porous above.

*a*². Coxæ of maxillipedes scarcely punctured; posterior legs shorter, stouter, the segments decreasing in length distally; under 30 mm. in length, and with fewer than 60 pairs of legs *stolli*, sp. n.

*b*². Coxæ of maxillipedes coarsely punctured; anal legs longer, the segments distally increasing in length; over 40 mm. in length, and with over 70 pairs of legs.

*a*³. Anal pleuræ weakly inflated, and not extending forward on each side of the anal prescutum *salvini*, sp. n.

*b*³. Anal pleuræ strongly inflated and extending forwards on each side of the anal prescutum *godmani*, sp. n.

1. *Geophilus aztecus*. (Tab. III. figg. 7, 7 *a-c*.)

Geophilus aztecus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 159 (1869)¹; Miss. Sci. Mex., Myriop. p. 140, t. 6. fig. 21 (1872)².

Colour ochraceous, legs testaceous, head and maxillary coxæ pale castaneous, the tergites sometimes marked in the anterior half of the body with a median wide fuscous band which becomes progressively less distinct towards the hinder extremity.

Body attenuated posteriorly, hairy.

Head a little wider than long, about as wide behind as in front, its anterior and posterior borders straight, lateral borders evenly and lightly convex from angle to angle, punctured and hairy; frontal suture not invisible.

Antennæ short, clothed with shorter and longer hairs, stout, only a little attenuated; the segments narrowed at the base, the apical segment subcylindrical, a little longer than the penultimate, abruptly narrowed and pointed at its apex.

Coxal plate of maxillipedes wider than long, its sides strongly converging posteriorly, chitinous lines incomplete, anterior border not dentate, lightly excavated, punctured and shortly hairy; pleuræ embracing the sides of the sternite, conspicuous from below; *jaws* short, largely overlapping the head at the sides, but scarcely overlapping it in front, the joint of the claw falling short of the anterior angles of the head.

Prebasal plate just visible, but very short. *Basal plate* wide and long, as wide posteriorly and as long as the first tergite, its anterior border lightly concave, its lateral borders strongly converging anteriorly.

Tergites, including the first, but with the exception of a few of the last, bisulcate; shining, sparsely hairy.

Sternites with a median longitudinal impression and a posterior transverse porous area.

Pleural prescuta larger than the tracheal sclerites which are in contact with the tergite.

Anal somite: tergite almost covering the pleuræ, a little wider than long, wider in front than behind, its sides gently converging posteriorly, with rounded posterior angles; *pleuræ* not inflated, smooth, without pores, at least on their uncovered portion, bearing a few rounded pores beneath the edge of the sternite; *sternite* wide, wider than long, with gently converging, lightly convex sides and straight or slightly concave hinder margin; prosternal pieces distinct; *legs* about as long as those of the preceding somite, composed of six segments and armed with a claw, thicker in the male.

Numbers of pairs of legs 57 and 59.

Length up to 52 millim.

Hab. MEXICO, Eastern Cordillera (*Saussure*^{1 2}), Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

2. *Geophilus toltecus*. (Tab. III. figg. 8, 8 a-c.)

Arthronomalus toltecus, Humb. & Sauss. Rev. et Mag. Zool. 1869, p. 159¹.

Arthronomalus (Polycricus) toltecus, Humb. & Sauss. Miss. Sci. Mex., Myriop. p. 143, t. 6. fig. 23².

Colour testaceous, slightly darker anteriorly; head and maxillipedes pale castaneous; shining.

Body attenuated posteriorly.

Head sparsely punctured, marked posteriorly by two anteriorly diverging shallow sulci; rather wider in front than behind, with straight anterior and slightly convex posterior border, evenly rounded angles, and nearly straight sides; nearly twice as long as wide; frontal plate distinct.

Antennæ of moderate length, clothed with shorter and longer hairs; the segments much narrowed at the base; apical segment ovate, slightly longer than the penultimate.

Basal plate narrow, but wider than long, narrower posteriorly than the first tergite, its sides strongly converging, mesially impressed; *prebasal plate* invisible.

Maxillipedes sparsely punctured and hairy; *coxal plate* mesially impressed, very nearly as long as wide, sides parallel, anterior border bearing two pointed teeth, without chitinous lines, the pleuræ, seen from below, very narrow; femur slender, with a single internal blunt tooth, largely overlapping the head at the sides; claw bearing a sharp basal tooth, only slightly overlapping the head in front, the joint being about on a level with the anterior angle of the head.

Tergites sparsely hairy, except the two first and the last two, bisulcate, some in the anterior half of the body, with two feeble impressions between the main sulci.

Pleural prescuta larger than the tracheal sclerites which are in contact with the tergites.

Sternites mesially impressed longitudinally, without distinctly defined porous area.

Anal somite: *tergite* about as long as wide, not covering the pleuræ posteriorly and laterally, narrowed posteriorly; *pleuræ* furnished with about 30 larger and smaller, more or less scattered pores, the pores set more closely together near the sternite; *sternite* narrow, longer than wide, its sides posteriorly converging, lightly impressed; *presternal sclerites* distinct; *legs* slender (in ♀), composed of six segments, a little longer than the preceding pair, the segments nearly cylindrical and furnished distally with a few long hairs, not armed with a claw; two anal pores.

Number of pairs of legs 51.

Length 40 millim.

Hab. MEXICO, Eastern Cordillera and Orizaba (*Saussure*^{1 2}), Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

3. *Geophilus godmani*, sp. n. (Tab. III. figg. 11, 11 a-c.)

Colour ochraceous; head and maxillipedes castaneous.

Head longer than wide, its sides subparallel, lightly convex posteriorly; posterior border straight, punctured, with two posterior longitudinal impressions.

Basal plate narrow, narrower in front than the head, its sides diverging posteriorly, a little wider than the head posteriorly, but much narrower than the first tergite; *prebasal plate* invisible.

Antennæ setose, short, the segments nearly cylindrical and decreasing in length distally, the apical segment a little longer than the penultimate.

Maxillipedes very large, as wide as the first tergite, largely overlapping the head laterally and anteriorly by at least the length of the claw; *coxal plate* punctured with a median longitudinal impression; chitinous lines absent, pleuræ just showing at the sides, the anterior border bidentate, the jaws directed straight forwards, parallel, punctured, the femur armed internally with a tubercle; the claw armed with a distinct basal internal tooth.

Tergites bisulcate, smooth.

Sternites with a median longitudinal impression.

Anal somite wider than the one that precedes it; the tergite narrow, oblong, narrower than its prescutal piece, longer than wide, nearly parallel-sided, a little narrowed distally. *Pleuræ* large, inflated, considerably

uncovered both above and below, closely porous throughout; *sternite* small, narrow, parallel-sided, longer than wide; *legs* in female long, slender, longer than the preceding pair, without a claw.

Number of pairs of legs 73-75.

Length up to about 50 millim.

Hab. MEXICO, Omilteme in Guerrero 7000 to 9000 feet (*H. H. Smith*).

This species and *G. toltecus* were taken in considerable numbers from beneath rotting logs at Omilteme. Until examined somewhat closely, the two appear identical; but *G. godmani* may, in reality, be easily recognized by its much narrower anal tergite and larger and more inflated anal pleuræ, not to mention the greater number of its legs.

4. *Geophilus salvini*, sp. n. (Tab. III. figg. 10, 10 *a-c*.)

Colour testaceo-ochraceous, with a median dorsal fuscous band more or less clearly defined in the anterior half of the body, but gradually disappearing posteriorly; head, antennæ, and maxillipedes pale castaneous.

Body slender, a little attenuated posteriorly.

Head polished, somewhat coarsely punctured, considerably longer than wide, its sides nearly straight and subparallel, convex and somewhat abruptly converging before the anterior and posterior border, posterior border straight.

Prebasal plate invisible; *basal plate* punctured, much wider than long, its sides straight and strongly converging, its posterior border narrower than the anterior border of the first tergite.

Antennæ short and thick, nearly evenly thick throughout, sparsely hairy at the base, thickly hairy distally; segments a little narrowed at the base, apical segment ovate and longer than the penultimate.

Maxillipedes shining, punctured; *coxal plate* mesially impressed, only a little wider than long, nearly parallel-sided, without chitinous lines, the anterior border bidentate; *jaws* long and somewhat slender, largely overlapping the head at the sides and a little overlapping it in front, the joint of the claw being about on a level with the anterior angles of the head, the femoral segment bearing a single internal distal blunt tooth, and the claw armed with a basal sharp tooth.

Tergites smooth, except the first and a few of the last bisulcate, the space defined by the sulci bearing a conspicuous impression on each side of the middle line, giving the tergites the appearance of being quadrisulcate; *prescuta* nearly as wide as the tergites, and not sulcate.

Sternites with a deep median impression and, in the anterior half of the body, shallow impressions on each side.

Pleural prescuta larger than the tracheal sclerites, which are in contact with the tergites.

Anal somite: tergite large, about as wide as long, narrowed posteriorly, not covering the pleuræ; *pleuræ* moderately inflated, furnished below with large somewhat scattered pores; *sternite* narrow, about twice as long as wide, its sides gently converging posteriorly; prosternal pieces distinct; *legs* short, a little longer than the preceding pair, furnished with longer and shorter hairs, composed of six segments, and not armed with a claw.

Number of pairs of legs 71.

Length about 43 millim.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*).

5. *Geophilus stoll*i, sp. n. (Tab. III. figg. 9, 9 *a-c*.)

Colour: body, legs, and antennæ pale yellow; head and maxillipedes pale castaneous.

Body narrowed posteriorly.

Head parallel-sided, coarsely punctured.

Antennæ narrowed distally, hirsute in their proximal half, much more closely and shortly hairy distally.

Maxillipedes sparsely hairy and punctured; *coxal plate* large, parallel-sided; its anterior border mesially rather deeply notched and weakly bidentate; the jaws largely overlapping the head laterally and in front, the joint of the claw, however, falling short of the anterior edge of the head-plate; the basal segment

with a very small inner tooth, the two following segments unarmed, the claw with a distinct tooth at its base.

Basal plate rather large, its length greater than half its anterior width, sparsely punctured, mesially impressed.

Tergites: the first scarcely bisulcate, the rest conspicuously so, sparsely hairy at the sides.

Sterna mesially impressed, posteriorly porous.

Anal somite: *tergite* elongate, its sides converging posteriorly, not covering the pleuræ laterally. *Pleuræ* porous anteriorly above, below, and laterally, smooth posteriorly; *sternite* narrow, narrower posteriorly; *legs* a little longer than the pair that precede them, clawless, moderately robust, stouter in the ♂ than in the ♀, and more densely hairy.

Number of pairs of legs—in ♂ 53, in ♀ 55.

Length up to 24 millim.

Hab. GUATEMALA, near the city (*Stoll*).

CHOMATOPHILUS, gen. nov.

1. *Chomatophilus smithi*, sp. n. (Tab. III. fig. 12.)

Body moderately robust, attenuated anteriorly.

Colour ochraceous, head and maxillipedes a shade darker.

Head elongate, narrow, a little longer than wide, narrowed slightly anteriorly, with lightly convex lateral margins and straight posterior margin, smooth.

Antennæ moderately elongate, thick at the base, gradually narrowed towards the apex, the segments cylindrical, not longer than wide, the apical segment ovate, a little longer than the penultimate.

Prebasal plate invisible; *basal plate* very wide, as wide anteriorly as the head, as wide posteriorly as the first tergite, with its margins converging.

Maxillipedes shining, punctured; the *coxal plate* large, with deep, distinct, chitinous lines, the anterior border straight, visible from above in the angle formed by the head and basal plate; *jaws* small and weak, entirely covered both laterally and in front by the head-plate; the femur short and unarmed, the claw moderately robust, curved, also unarmed.

Tergites smooth, lightly bisulcate, wider and about four times as long as the prescuta. Pleural prescuta large and round, much larger than the tracheal selerites which are in contact with the tergites.

Sternites finely punctured, flat, not sulcate, and without distinct porous areas.

Anal somite small; *tergite* triangular, as wide anteriorly as the one that precedes it; its sides rapidly converging posteriorly; *pleuræ* small, without visible pores, almost covered by the tergite above, and very largely by the sternite below; *sternite* very wide, nearly twice as wide as long, considerably wider than that of the preceding somite, with its lateral margins and posterior angles convex and its posterior border straight, the pleuræ projecting posteriorly slightly beyond it; *legs* short, a little longer than the preceding pair, the femur and coxa enlarged, the other segments moderately stout, cylindrical, pubescent, armed with a claw.

The rest of the *legs* thicker in the anterior than in the posterior half of the body, where they are moderately long and slender.

Number of somites 81.

Length about 45 millim.

Hab. MEXICO, Amula in Guerrero 6000 to 7000 feet (*H. H. Smith*).

A single example, probably a male. In its small and weak maxillipedes and large basal plate this new genus comes near *Himantarium*, but it differs from all known Geophilidæ in the remarkable width of the anal sternite.

CHOMATOBIUS.

Chomatobius, Humbert & Saussure, Miss. Sci. Mex., Myriop. p. 145 (1872).

1. *Chomatobius mexicanus*. (Tab. III. figg. 13, 13 *a-d*.)

Geophilus mexicanus, Sauss. Mém. Mex. Myr. in Mém. Soc. Phys. Genève, xv. p. 390, t. 7. fig. 49 (1866)¹.

Chomatobius mexicanus, Humb. & Sauss. Miss. Sci. Mex., Myriop. p. 145².

Hab. NORTH AMERICA, San Diego, Texas (*Mus. Brit.*).—MEXICO², Cordova¹.

ORPHNÆUS.

Orphnæus, Meinert, Nat. Tidschr. (3) vii. p. 17 (1870).

1. *Orphnæus brevilabiatus*. (Tab. III. figg. 14, 14 *a-d*.)

Geophilus brevilabiatus, Newp. Trans. Linn. Soc. xix. p. 436, no. 9 (1845)¹.

Geophilus lineatus, Newp. loc. cit. no. 10².

Geophilus bilineatus, Peters, Reise Mossam., Ins. p. 531, t. 23. fig. 4³.

Chomatobius brasilianus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxii. p. 205 (1870)⁴; Miss. Sci. Mex., Myriop. p. 146, t. 6. fig. 24⁵.

Orphnæus brasiliensis, Meinert, Nat. Tidschr. (3) vii. p. 20⁶; Proc. Am. Phil. Soc. 1886, p. 232⁷.

Orphnæus lividus, Meinert, loc. cit. p. 19⁸.

Orya xanti, Tömösvary, Term. füzetek, ix. p. 64 (1885)⁹.

Hab. MEXICO, Tampico in Tamaulipas (*Richardson*); HONDURAS (*Mus. Brit.*²); NICARAGUA, Polvon⁷; PANAMA⁷.—BRAZIL⁴, Rio Negro⁵.

This species is widely distributed in the tropical and subtropical parts of both Eastern and Western Hemispheres.

I have here added to the synonymy *Chomatobius brasilianus*, Humbert and Saussure.

NOTIPHILIDES.

Notiphilides, Latzel, Die Myriop. Österr.-Ungar. Monarch. i. p. 20 (1880).

1. *Notiphilides maximiliani*. (Tab. III. figg. 15, 15 *a-d*.)

Notiphilus maximiliani, Humb. & Sauss. Rev. et Mag. Zool. (2) xxii. p. 205 (1870)¹; Miss. Sci. Mex., Myriop. p. 141, t. 6. fig. 22 (1872)².

Notiphilides maximiliani, Latzel, Die Myriop. Österr.-Ungar. Monarch. i. p. 20 (1880)³; Meinert, Proc. Am. Phil. Soc. 1886, p. 232⁴.

Hab. MEXICO, Campeche (*Heller*^{1 2}), Teapa in Tabasco (*H. H. Smith*); GUATEMALA (*Meinert*⁴ & *Stoll*).—COLOMBIA; TRINIDAD.

Widely distributed in the northern parts of the Neotropical Region. The British Museum also has specimens from Colombia and Trinidad.

Class DIPLOPODA, Blainville.

Subclass CHILOGNATHA.

The known Central-American Diplopoda are referable to the following sections. On account of the diversity of opinion as to the value to be assigned to these sections, it is proposed in the following pages to designate them merely as "groups," setting aside the question as to whether they should take ordinal, subordinal, or superfamily rank:—

- a.* Mandibles degenerate or wholly suppressed; labral area of head pointed; eight pairs of legs in front of the legs of the seventh segment COLOBOGNATHA.
- b.* Mandibles not degenerate; labral region broadly truncated and emarginate; seven pairs of legs in front of the legs of the seventh segment.
- a*¹. Tergal plates furnished with three symmetrically disposed pairs of setæ; without scent-pores; sterna not coalesced with terga CHORDEUMOIDEA.
- b*¹. Tergal plates without such setæ; more or fewer with scent-pores; sterna, except on a few of the anterior segments, invariably coalesced with the terga (at least in the known Central-American species).
- a*². Number of segments great and inconstant in the species; from the fifth or sixth to the penultimate with a pair of scent-pores; phallopods of ♂ internal and derived from the posterior appendages of the seventh segment.
- a*³. Stipites (lateral plates) of gnathochilarium mesially in contact proximally IULOIDEA.
- b*³. Stipites of gnathochilarium widely separated proximally.
- a*⁴. Segments 1-5 with a single pair of legs SPIROBOLOIDEA.
- b*⁴. Segment 4 apodous, segment 5 with two pairs of legs SPIROSTREPTOIDEA.
- b*². Number of segments constant, 19 or 20; many without scent-glands; phallopods external, derived from anterior legs of seventh segment POLYDESMOIDEA.

Group I. COLOBOGNATHA.

Number of segments large and very variable within the species, with eight pairs of appendages in front of those of the seventh segment. None of the anterior segments apodous, the first four bearing one pair of appendages each, the fifth, sixth, seventh, and following segments, except the last two, which are limbless, with two pairs*. Head with its labral region narrowed or pointed distally; mandibles degenerate or suppressed; gnathochilarium narrowed distally, the mouth-parts being suctorial or

* I here adopt, at all events for the time being, the usual interpretation of the disposition of the appendages with reference to the segments, in preference to that put forward by Cook, who assigns a single pair of appendages to the first five segments, and two to each of the following segments, regarding the gonopods of the male as derived from the posterior pair of the seventh and the anterior pair of the eighth,

semisuctorial. Terga from the fifth to the penultimate with a pair of lateral scent-glands; pleural areas large, membranous or chitinized; sterna freely movable. Legs with coxal pouches. Both pairs of legs of 7th segment modified in the male, externally attached to distinct sternal plates lying in the same plane as those in front and behind, short and thick, consisting of six or seven segments, the posterior pair, constituting the phallopods, protected apically by the anterior pair.

Two families of Colobognatha are represented in Central America, viz. the Platydesmidæ and Siphonophoridæ, which are diagnosed below. Further research, however, will probably reveal the existence in this area of a third family, the Polyzonidæ, which has representatives both in North America, South America, and the West Indies. In the structure of the gnathites the Polyzonidæ are somewhat intermediate between the Siphonophoridæ and Platydesmidæ, the mandibles being distinct and bisegmented as in the latter, whereas the gnathochilarium has lost the distinctness of its sclerites as in the former. From both they differ in the form of the head, which is triangular, with one or more pairs of eyes and a relatively narrow frontal area between the bases of the antennæ. *Siphonotus*, which occurs in South America, has a single pair of ocelli; *Polyzonium* and *Octoglena* from three to four pairs in a subvertical series. *Polyzonium* has been recorded from Indiana and Tennessee; *Octoglena*, which is said to be distinguished from it by the emargination of the anterior tergite and the exposure of the eyes, from Georgia [see Bollman, Bull. U.S. Nat. Mus. no. 46, pp. 117, 137, 154, 187 (1893)].

Fam. PLATYDESMIDÆ.

Head broadly cordate, narrowed in the labral region, the edge of which is bluntly pointed. Antennæ lateral. Mandibles present, bisegmented. Gnathochilarium distinct, narrowed distally, but otherwise departing but little from the type characteristic of the Chilognatha, the lingual lobes and stipites with or without distinct terminal pieces; mentum large, L-shaped. Terga with median groove, two rows of tubercles, and large carinæ. Pleural area membranous. Penes perforating coxæ of second legs.

Distribution. Mediterranean Region; Central Asia (Amurland); Malacca, Sumatra; United States; Central America.

PLATYDESMUS.

Platydesmus, Lucas, Ann. Soc. Ent. Fr. (2) i. p. 51 (1843) (type *P. polydesmoides*); and subsequent authors.

Piestodesmus, Lucas, Rev. et Mag. Zool. 1849, p. 598 (type *P. moreleti*).

Characters as diagnosed below (p. 44).

Distribution. Central America.

instead of from the two pairs of the seventh segment. The question must still be regarded as open; and Cook's view may prove correct. But in a male specimen of *Platydesmus perpictus* I find 76 pairs of legs and 38 segments (excluding the last two) behind the phallopods, which gives two pairs of legs to each of the segments in question, as in other Helminthomorphous Chilognatha. Whereas, if Cook's interpretation be adopted, this specimen has only a single pair on the last leg-bearing segment.

The two species of this genus described by Lucas, namely, *Platydesmus polydesmoides* and *Piestodesmus moreleti*, were sufficiently distinct to justify fully at the time this author's view as to the generic value of their structural characters, de Saussure's statement to the contrary notwithstanding. The principal difference between the types of *Platydesmus* and *Piestodesmus*, apart from the much greater width of the body in the latter, lies in the form of the first tergal plate, which in *Piestodesmus* is greatly expanded in front so as to cover the head completely, whereas in *Platydesmus* it is widely excavated, leaving the summit of the head wholly exposed. The species described and seen by de Saussure seem in no respect to lessen the value of this structural character by supplying an intermediate stage between the two forms of the tergal plate in question. So far as this structure is concerned, *Platydesmus mexicanus* is a genuine *Platydesmus*, agreeing with *polydesmoides* and differing essentially from *Piestodesmus moreleti*. Nevertheless de Saussure's union of the two is justified, and shown to be correct by the evidence furnished by the species in the Godman and Salvin Collection. Amongst the Diplopods collected at Omilteme by Mr. H. H. Smith, I find the two species of *Platydesmus* described below as *P. hirudo* and *P. mesomelas*, which, with *P. marmoreus*, serve to bridge over completely the interval between the extreme forms first named by Lucas.

I am unable to find any justification for Bollman's statement (Bull. U.S. Nat. Mus. no. 46, pp. 137 & 188, 1893) that the type of *Piestodesmus* differs from that of *Platydesmus* in having two ocelli instead of one on each side of the head. Lucas describes the species as having two—that is to say, one pair of ocelli.

Bollman also states that the genus *Brachycybe*, H. C. Wood (Proc. Acad. Phil. 1864, p. 187; Trans. Amer. Phil. Soc. 1865, p. 230), agrees in all points with *Platydesmus*, except in being eyeless; and this feature he did not consider to be of generic value. Silvestri, however, kept the two distinct on account of it; but that a specific rather than a generic importance should be attached to the presence or absence of these organs is, in my opinion, established by the discovery of *Platydesmus guatemalensis*, which seems to differ from the typical and other species of *Platydesmus* only in this particular, apart, that is to say, from other characters of admittedly specific significance. Still I hesitate to follow Bollman and Brölemann in adding *Brachycybe* to the synonymy of *Platydesmus*. Bollman's description of *P. lecontei*, the type of the genus, supplies no data justifying the separation of the two; but Brölemann's diagnosis (Mém. Soc. Zool. Fr. 1900, p. 110, t. 57. figg. 69–77) assigns to this species two characters which are not found in any of the Central-American species of *Platydesmus* available to me for examination. These are: (1) the reduction in width of the sternal areas so that even in the mid-region of the body the coxal segments of the appendages of the right and left side are mesially in contact; and (2) the presence upon the sterna of a cariniform tubercle, which projects forwards in the middle line.

Until intermediate forms come to light, I think it expedient to keep the two genera distinct upon this basis. They may be contrasted as follows:—

- a.* Sterna triangularly contracted between the crural acetabula, so that the coxæ of the legs are in contact; furnished with a forwardly directed cariniform tubercle BRACHYCYBE.
- b.* Sterna not contracted between the crural acetabula, so that the coxæ of the legs on the right and left side are separated; not furnished with a cariniform tubercle PLATYDESMUS.

No species of *Brachygybe* have as yet been obtained from Central America. The probability of the existence of the genus in Mexico, however, is forcibly suggested by the record of *B. lecontei* from Georgia, Tennessee, and Arkansas, and of two others, *B. rosea*, Murray, and *B. californica*, Karsch, which may or may not prove identical with it, from California. The only representative of this group known to me, which appears to belong to *Brachygybe*, is a specimen from Corfu, identified by Verhoeff as *Platydesmus typhlus*, Daday. It is possible that all the Mediterranean species belong to *Brachygybe* and not to *Platydesmus*; but if the gnathochilarium is constructed as in *Dolistenus*, this can hardly be the case.

Synopsis of the Species *.

- a.* Head without eyes [first tergal plate as under *b*¹] *guatemalensis*, Bröl.
- b.* Head with a pair of eyes.
- a*¹. Anterior border of first tergal plate produced on each side into a forwardly projecting shelf more or less covering the head, and separated from its fellow of the opposite side by a longitudinal cleft or an acutely triangular narrow notch.
- a*². Colour black, the keels yellowish.
- a*³. First tergal plate completely covering the head, the edges of the laminæ forming a straight transverse line *moreleti*, Luc.
- b*³. First tergal plate not completely covering the head, the anterior edges of the two laminæ diverging obliquely outwards, not forming a straight line *mesomelas*, sp. n.
- b*². Colour brown, marbled with yellow bands and spots.
- a*⁴. In median dorsal line a pale stripe, which expands at intervals into four triangular patches; laminæ of first tergite much smaller, separated by a triangular notch in the middle line *marmoreus*, sp. n.
- b*⁴. Median dorsal line dark with a pale interrupted band on each side of it, formed of square or oblong patches; laminæ of first tergite large, separated in middle line by a narrow slit *perpictus*, sp. n.

* Excluding *P. polydesnoides*, Lucas.

- b*¹. Anterior border of first tergal plate widely emarginate, without any forwardly directed laminate expansion, anterior edge of the body of the segment uncovered in the middle line; head completely exposed.
- a*⁵. Evenly longitudinally banded above, the keels yellow, a narrow pale median dorsal stripe, the area between this stripe and the base of the keels uniformly black.
- a*⁶. Broader; sternal areas of segments in mid-region of body wider than length of two basal segments (excl. trochanter) of legs *hirudo*, sp. n.
- b*⁶. Narrower; sternal areas of segments narrower than length of two basal segments (excl. trochanter) . . . *lineatus*, sp. n.
- b*⁵. Pattern variegated, not consisting of evenly alternating bands of black and yellow, median dorsal stripe broken up, keels not uniformly yellow.
- a*⁷. Body wide, only about four times as long as broad; keels with one row of granules *mexicanus*, H. & S.
- b*⁷. Body narrow, at least six times as long as wide, both anterior and posterior row of granules extending almost to the extremity of the keels.
- a*⁸. Median dorsal band broken up into definite elongate triangular patches; anal tergum smaller; keels less granular *triangulifer*, sp. n.
- b*⁸. Median dorsal band not broken up into definite triangular patches; anal tergum larger, subquadrate; keels with granules in addition to those of the two normal rows *analisis*, sp. n.

1. *Platydesmus triangulifer*, sp. n. (Tab. IV. figg. 4, 4 *a-e*.)

Colour: dorsal area of segments blackish with pale median band, which is not of even thickness throughout but is broken up at fairly regular intervals into six elongate triangular expansions, being broadest upon the sixth, fifteenth, twenty-fourth, thirty-fourth, forty-fifth, and fifty-second segments; where the expansion occurs the black is reduced in width and intensity, and slightly diverges from the middle line; keel and lateral area of dorsal region of segments yellowish-brown, but the segments on which the median dorsal pale stripe is narrow ornamented with a much more clearly defined yellow spot between the median line and the base of the keel; last tergal plate yellowish-brown; head infuscate above, antennæ and legs yellowish.

Body moderately long and slender, about six times as long as broad (21 : 3.5). *Head* with eyes. *First tergite* widely emarginate in front; the thickened anterior rims of the lateral keels widely separated in the middle line. *Tubercles* on segments strong, those of posterior line about thirteen in number on each side, and extending right on to the keels. *Last tergite* relatively wide, but narrowed posteriorly, and surpassed by the keels of the preceding segment. *Sterna* of mid-region of body nearly or about as wide as basal segments of appendages. Number of segments 56-58.

Total length 21, width 3.5 millim.

Hab. GUATEMALA, Volcan de Acatenango (*Stoll*).

2. *Platydesmus analis*, sp. n. (Tab. IV. figg. 3, 3 a-g.)

Colour marbled; dorsal surface blackish in the middle, yellowish laterally, with a yellow spot in the centre of the fourteenth, twenty-second, thirty-second, fortieth, forty-sixth, and fiftieth segments; the keels of these same segments yellow; the rest of the keels deep brown with a yellow basal spot separated by a dark area from the yellow lateral portion of the dorsal surface; at the posterior end of the body the keels and median area are yellower than on the anterior segments; head, antennæ, and last tergal plate infusate; legs and sterna and infero-lateral area pale.

Body long and narrow, about nine times as long as wide (28:3). *First tergite* widely emarginate, with numerous granules. Both rows of *tubercles* on segments extending almost to extremity of keels and accompanied by others. *Last tergal plate* wide, its posterior extremity truncated and scarcely or only a little surpassed by the keels of the preceding segment. *Sterna* of mid-region nearly as wide as two basal segments. Number of segments 53-60.

Total length 28, width 3 millim.

Hab. GUATEMALA, ? Guatemala city (*Stoll*).

3. *Platydesmus hirudo*, sp. n. (Tab. IV. figg. 2, 2 a-e; Tab. V. fig. 1.)

♀. *Colour* black, with a narrow yellow dorsal line and yellow keels; head infusate, last tergal plate blackish; ventral surface and legs yellowish brown.

Body moderately broad, about or almost five times as long as wide (22:4.5). *Head* hairy, punctured, with two distinct ocelli; antennæ moderately long, incrassate, the segments narrowed or constricted at the base. *First tergite* with its anterior border scarcely produced, widely emarginate, and only lightly convex on each side of the middle line, leaving the summit of the head entirely uncovered; with two rows of tubercles, its median area not quite twice as long as the elevated median area of the second. Of the two rows of *tubercles* on the rest of the segments, the anterior consists of from about twelve to fourteen and extends along the median line of the keels; the posterior is much shorter, consisting of only five or six and scarcely reaching the keel. *Sterna* of the mid-region of the body rather shorter transversely than the length of the coxa and trochanter of the adjacent appendage. *Last tergal plate* oval, narrow behind, narrower than the keels of the preceding tergite, which project beyond it posteriorly; furnished with six setiferous papillæ, the outer on each side remote from the rest.

Total length of large specimen, ♀, 27, width 5.5 millim.; ♂, 20, width 4 millim.

Hab. MEXICO, Omilteme in Guerrero (*H. H. Smith*).

4. *Platydesmus lineatus*, sp. n. (Tab. IV. figg. 5, 5 a-g.)

Colour as in the preceding species, but with median dorsal stripe not so distinct, not evenly thick, with sinuous edge, expanding here and there in a way suggestive of what is seen in *P. triangulifer*.

Body relatively narrow and long, about six or seven times as long as wide (20:3). *Head* completely uncovered by the *first tergite*, which is widely emarginate but has its angles more rounded than in *P. hirudo*. Segments with two rows of *tubercles*, the anterior row extending to lateral margin of keel, the posterior consisting of about six on each side not passing on to keel. *Sterna* in mid-region of body a little narrower than length of two basal segments of legs (excl. trochanter), about as wide or a little wider than twice the length of the basal segment. *Last tergal plate* narrower than keels of preceding segment, which overlap it posteriorly. Number of segments 44-49.

Total length 20, width 3 millim.

Hab. MEXICO, Volcan de Orizaba (*Mus. Brit.*).

5. *Platydesmus mesomelas*, sp. n. (Tab. V. fig. 2.)

Colour as in *P. hirudo*, but without any yellow median dorsal stripe.

Body broad, about four times as long as wide (20:5). *Head* and *antennæ* as in *P. hirudo*, but the *first tergal plate* differently shaped, being much larger owing to the expansion of its anterior border over the head so

as to conceal it partially from above; this border is somewhat deeply notched in the middle line and on each side of the notch it diverges obliquely outwards and forwards, being slightly convex. The granules of the posterior row on the *terga* extend farther on to the keels, being more numerous than in *P. hirudo* and about a dozen in number. *Sterna* of the mid-region of the body wider than in *P. hirudo*, their transverse length being about equal to the length of the coxa and trochanter of the leg.

Total length, ♂, 20, width 5 millim.; ♀, 23, width 5 millim.

Hab. MEXICO, Omilteme in Guerrero (*H. H. Smith*).

6. *Platydesmus marmoreus*, sp. n. (Tab. V. fig. 3.)

Colour: head fuscous above, paler below; tergal plates dark yellowish brown, turning to paler yellow on the keels; in the dorsal middle line a pale stripe which expands in its course into four triangular patches, and on each side immediately behind the posterior angle of each patch there is a pair of conspicuous yellow spots lying towards the base of two of the keels; last tergal plate yellow; antennæ, legs, and sterna yellow.

Body rather wide, about four times as long as broad ($14:3\frac{1}{2}$). *Head* with distinct eyes. *First tergal plate* covering the head, its anterior border developed into a right and left lamina with convex inner angles and separated by a short acutely triangular notch; the anterior row of tubercles on this tergite lying nearly midway between its posterior and anterior borders. On the remaining *segments* the anterior row of *tubercles* extending along the middle of the keels, the posterior row stopping short at their base. *Last tergal plate* narrowly piriform, sublanceolate, much narrower than the keels of the preceding segment, which overlap it largely posteriorly and nearly meet in the middle line behind its apex. *Sterna* of the mid-region of the body wide, their width about equal to the length of the two basal segments of the legs. Number of segments 43.

Total length 14, width $3\frac{1}{2}$ millim.

Hab. GUATEMALA, Chalhuitz (*Stoll*).

This species has considerably larger laminae on the first tergal plate than *P. mesomelas*, and further differs in colour. In the latter respect *P. marmoreus* approaches *P. triangulifer*.

7. *Platydesmus perpictus*, sp. n. (Tab. IV. figg. 1, 1 a-j.)

Colour marbled; middle of dorsal area a rich dark brown extending to the base of the keels, but interrupted at tolerably regular intervals on each side of the middle line by conspicuous yellow patches, about nine in number, composed of spots of that colour upon two or three consecutive segments; keels mostly yellow, but those opposite the intervals between the yellow patches suffused with brown extending from the median portion of the segments, but often separated therefrom by indistinct paler spots; last tergal plate infuscate; head infuscate above; antennæ, legs, and ventral surface pale.

Body wide, about four times as long as broad. *Head* with eyes; completely covered. *First tergal plate* with its anterior border produced into a pair of large laminae, separated from each other in the middle line by a narrow longitudinal space. The two rows of *tubercles* on the segments extending nearly to the extremities of the keels. *Last tergal plate* narrowly oval, far surpassed posteriorly by the keels of the preceding segment. *Sterna* of the mid-region of the body very broad, wider than the two basal segments of adjacent legs, and about four times as broad as the length of the coxa. Number of segments in adult 47-65, more or less.

Total length of type 25, width 6.8 millim.; of a large specimen 30, with a width of 7.5 millim.

Hab. GUATEMALA, Senahu (*Champion*), Chalhuitz (*Stoll*).

There is also in the British Museum a specimen of apparently the same species from Belize, British Honduras.

The following species are unknown to me:—

8. *Platydesmus moreleti*.

Piestodesmus moreletii, Lucas, Rev. et Mag. Zool. 1849, p. 599, t. 17. figs. 1-1 d¹.

Colour: head fuscous, antennæ testaceous; first tergal plate fuscous, the remainder fuscous with reddish keels; legs testaceous.

Head with prominent eyes. *Antennæ* short and thick. *First tergal plate* large, its anterior border produced into a right and left shelf-like plate, forming a straight, transverse, anterior border and separated from each other by a narrow longitudinal triangular notch. *Body* broad, less than three times as long as wide (14:5), the two rows of tubercles on the terga subequal in extent, both passing nearly to the distal extremities of the keels. *Posterior tergal plate* narrow and piriform, pointed posteriorly. *Sterna* of mid-region of body wide, exceeding in width the length of the two proximal segments of the legs. Number of segments 41.

Total length 13.5-14, width 4.5-5 millim.

Hab. MEXICO, Tabasco (under stones) (*Morelet*¹).

9. *Platydesmus polydesmoides*.

Platydesmus polydesmoides, Lucas, Ann. Soc. Ent. Fr. 1843, p. 52, t. 3. i. figg. 1-8¹.

Colour: head fuscous above, pale below; antennæ pale; body yellowish, spotted with reddish-brown upon the sides, clear yellow in the median area.

Body rather narrow, about five times as long as wide. *Eyes* present. *First tergal plate* widely emarginate in front, leaving the head entirely uncovered. Posterior row of tubercles on *terga* only extending to base of keels. *Last tergal plate* narrowly piriform, surpassed posteriorly by the keels of the preceding segment. Number of segments 44.

Length 21, width 4 millim.

Hab. GUATEMALA¹.

P. polydesmoides is nearest to *P. triangulifer* and *P. lineatus*, but, so far as coloration is concerned, apparently differs from both. Neither description nor figure is sufficiently detailed to admit of its inclusion in the key to the species (*anteà*, p. 44).

Humbert and de Saussure also record it from Cordova, Mexico, but whether rightly or wrongly it is impossible to decide.

10. *Platydesmus mexicanus*.

Platydesmus mexicanus, Humb. et Sauss. Rev. et Mag. Zool. 1869, p. 156¹; Miss. Sci. Mex., Myr. p. 103, t. 2. figg. 5, 5 d-e².

Colour deep brown, keels not pale, except in young; median dorsal line pale and expanding at intervals into seven yellowish triangular patches, as in *P. triangulifer* and *P. marmoreus*, the keel on each side opposite the posterior angle of the patches also yellow; antennæ yellow.

Head with eyes. *Body* very broad, only a little more than four times as long as wide. *First tergal plate* emarginate in front, without any laminae, leaving the head entirely uncovered and the anterior edge of the median or cylindrical part of the segment visible. Posterior row of tubercles on *segments* not extending on to keels. *Last tergite* narrowly piriform, overlapped posteriorly by the keels of preceding segment. Number of segments in adult varying from 41-60.

Total length of adult 26, width 6 millim.

Hab. MEXICO, Eastern Cordillera¹, Sierra de Agua².

So far at least as pattern is concerned, this species resembles *P. triangulifer*, except in the colouring of the keels. In *P. triangulifer* these are pale, with those on each side of the body opposite the widest portion of the pale median triangular patches dark, exactly the converse obtaining in *P. mexicanus*. The latter, moreover, is a much broader-bodied form, resembling *P. perpictus* in this particular.

11. *Platydesmus guatemalensis*.

Platydesmus guatemalensis, Brölemann, Mém. Soc. Zool. Fr. 1900, p. 112, t. 7. figg. 78-82¹.

Colour: variegated reddish-brown and yellow; a median dorsal band formed of alternating yellow and brown rectangular patches, each patch extending over two adjacent segments; an exactly corresponding series of spots upon the keels, the intervening area of the segments deep brown; ventral surface pale.

Head without eyes. *Body* broad, almost four times as long as wide. *Segments* of substantially the same form as in *P. mexicanus*, furnished with two rows of tubercles, which become gradually effaced upon the keels. *Sterna* broad in the middle of the body and separating the legs widely. Number of segments 47. Total length 15, width 4 millim.

Hab. GUATEMALA (*Rodriguez*¹).

This species differs from all the Central-American forms known to me in the absence of eyes and also in colour. In the latter particular, as well as in proportions, it stands nearest to *P. perpictus*; but Brölemann's statement that the segments of *P. guatemalensis* resemble those of *P. mexicanus* enforces the conclusion that the first tergite is widely excavated in front and not laminate as in *P. perpictus*. Reference may be made to Brölemann's paper for admirable figures of generic characters of *Platydesmus*.

Another genus of this family, namely *Andrognathus* [Cope, Proc. Amer. Phil. Soc. 1869, p. 182; Bollman, Bull. U.S. Nat. Mus. no. 46, p. 187 (1893)], hitherto known from North America, will probably be found to extend at least as far south as Mexico, since the one species yet discovered occurs both in Virginia and Tennessee. This genus, unknown to me, is referred by Bollman and, following him, by Silvestri to the Platydesmidæ. It may be at once distinguished from *Platydesmus* by the suppression of the terminal process on the stipites and lingual lobes of the gnathochilarium, the absence of tubercles on the dorsal area, the large size of the keels of the fifth segment, and the pedunculated pores.

Fam. SIPHONOPHORIDÆ.

Head piriform, with a narrow pointed labrum. Mandibles obsolete; gnathochilarium with its sclerites indistinguishably fused, narrow and pointed distally, and forming with the labrum a pointed rostrum. Eyes absent. Antennæ lateral. Somites with thick chitinized pleuræ. Sternal areas compressed; basal segments of legs almost in contact in the middle line. Penes perforating coxæ of second legs.

Distribution. Neotropical and Oriental Regions.

Of the two genera that have been referred to this family, one only, *Siphonophora*,
BIOL. CENTR.-AMER., Diplop., November 1903.

has been hitherto discovered in Central America; the other, *Siphonocybe*, nov., is, however, represented in the Neotropical Region, as is testified by the presence of the typical species, *S. hartii*, Poc., in Trinidad [Ann. & Mag. Nat. (6) xv. p. 375 (1895)]. Hence it may be inferred that the genus also occurs at least in the southern parts of Central America and merely awaits discovery. It may be distinguished from *Siphonophora* by the presence of a tubercular prominence or keel, bearing the pore, on each side of the somites.

SIPHONOPHORA.

Siphonophora, Brandt, Bull. Acad. St. Pétersb. i. p. 179 (1836); and subsequent authors.

Characters as above.

Distribution. Neotropical and Oriental Regions.

Synopsis of the Central-American Species known to me.

- a. Rostrum short, much shorter than the head, which is wide and rounded;
 anterior border of first tergal plate lightly emarginate *globiceps*, sp. n.
- b. Rostrum long, subequal in length to the head, which is narrowly piriform;
 anterior border of first tergite deeply emarginate.
- a¹. Antennæ distinctly incrassate, a little surpassing the rostrum *brevicornis*, sp. n.
- b¹. Antennæ long, considerably surpassing the rostrum, and scarcely
 incrassate *cornuta*, sp. n.

1. *Siphonophora cornuta*, sp. n. (Tab. V. figg. 4, 4 a.)

♀. *Colour* a uniform yellowish-brown.

Head narrowly piriform. *Rostrum* long, about equalling the head in length. *Antennæ* long, when extended overlapping the extremity of the rostrum almost by the length of the two terminal segments; the segments relatively long, the fifth as long as wide, the basal segments nearly as thick as the distal: hence the antennæ are but slightly incrassate. *First tergal plate* with its anterior border deeply emarginate. Number of segments 91-100.

Length of large specimen 40, width 1.5 millim.

Hab. GUATEMALA, Volcan de Acatenango, 1200 feet above the forest, Volcan de Agua (*Stoll*).

2. *Siphonophora brevicornis*, sp. n. (Tab. V. figg. 5, 5 a.)

Colour as in *S. cornuta*.

Head, *rostrum*, and *first tergal plate* also as in that species; but the antennæ much shorter, only a little surpassing the rostrum, and very decidedly incrassate.

Number of segments in ♀ up to 74. Length of large ♀ 21, width 1 millim.

Number of segments in ♂ 55. Length 13 millim.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

A specimen from Omilteme in Guerrero (*H. H. Smith*) is doubtfully referred to this species. It has 59 segments, and measures 12 millim. in length.

Amongst the examples from the Volcan de Agua there are numerous smaller individuals which, provisionally at all events, I regard as immature females. They measure up to 15 millim. in length, and have as many as 58 segments; and differ from the type in having the rostrum narrower at the base and the head more constricted in front of the antennæ.

3. *Siphonophora globiceps*, sp. n. (Tab. V. figg. 6, 6 a.)

♀. *Colour* pale yellowish-white.

Differing from the two preceding and the following species in the subspherical head, which is much more abruptly constricted in front of the antennal sockets, and in the shortness of the rostrum, which is much shorter than the head and narrower at the base than is *S. cornuta*, *S. brevicornis*, and *S. mexicana*.
Antennæ short and strongly incrassate distally. Number of segments 71.

Length 21, width barely 1 millim.

Hab. GUATEMELA, Purula (*Stoll*).

The following species I have not seen:—

4. *Siphonophora mexicana*.

Siphonophora mexicana, Humb. et Sauss. Rev. et Mag. Zool. 1869, p. 155¹; Miss. Sci. Mex., Myr. pp. 105, 106, t. 2. figg. 7, 7 a-m².

In the length of the rostrum, the length and shape of the antennæ, and the emargination of the first tergite, this species seems to resemble *S. brevicornis*. But the typical example, which is a male, differs essentially from the male of *S. brevicornis* in its much larger size, measuring 29 millim. in length, and in possessing 102 segments.

Hab. MEXICO, Eastern Cordillera^{1 2}, Sierra de Agua near Orizaba².

Group II. CHORDEUMOIDEA.

Number of segments varying from 26 to 32, constant in the genera. Mouth-parts of the normal Chilognathous type: stipites widely separated posteriorly; lingual plates large; promentum triangular, not always separated from mentum. Head not tucked under the first tergal plate, which is hollowed behind for its reception. Tergal plates furnished with three pairs of stout or slender setæ issuing from tubercles. No scent-glands. No pleuræ. Sterna free. First, second, and fourth segments with one pair of legs; third apodous; fifth and sixth with two pairs, there being seven pairs of legs in front of those of the seventh segment. No true phallopods; first pair of legs of seventh segment greatly modified in male; posterior pair also modified and more or fewer of the preceding or succeeding appendages as well. Penes perforating coxæ of second legs.

Fam. CRASPEDOSOMIDÆ.

Segments 30. Eyes (when present) forming a compact triangular cluster.

Distribution. Holarctic, Mediterranean, and Sonoran Regions.

CLEIDOGONA.

Cryptotrichus, Packard, Proc. Am. Phil. Soc. xxi. p. 189 (1883) (nomen præocc.) (type *C. cæsiannulatus*, Wood).

Cleidogona, Cook and Collins, Ann. New York Acad. Sci. ix. p. 41 (1895).

Eyes well developed, forming a triangular patch on each side of the head. Antennæ very long; third segment longest. Mandible with 12 pectinate lamellæ. Gnathochilarium with triangular promentum; segments without keels; setiferous tubercles relatively small. Eighth legs of male consisting of two pairs of processes, the posterior articulated to the base of the anterior. Ninth legs of male 5-jointed, the two basal segments large, the three distal segments small, armed with a claw and forming a hook. Tenth and eleventh legs of male with coxal pouches; coxa of eleventh with conical processes. Segments 30.

Distribution. Eastern United States; Central America.

1. *Cleidogona godmani*, sp. n. (Tab. V. figg. 7, 7 *a-e*.)

Colour: segments brown, mottled with pale spots, which are sometimes restricted to the area round the setiferous tubercles; median dorsal line also pale; posterior border of segments and also the overlapped anterior border pale bluish-grey; head and antennæ infusate; legs pale, distally infusate.

Head hairy; eyes composed of about 26 ocelli. *Segments* smooth and shining, but very finely coriaceous, with an obliquely longitudinal crest above the infero-lateral angle; lateral setiferous tubercles larger than the rest, except at the posterior end of the body, where the three are subequal. *Sterna* with vertical anterior crest terminating in a downwardly directed spike. *Anal tergite* with lightly emarginate posterior border bearing a pair of long setiferous papillæ; two tubercles near the middle of its dorsal surface; anal valves with three marginal setæ in their upper half. *Anal sternite* semicircular, with two long setæ.

Leg of ninth pair in male with the basal segment long and divided into two subequal sclerites by a distinct joint, which appears to be absent in the other known species of the genus; its inferior edge lightly convex, with a basal triangular enlargement; its dorsal edge correspondingly concave, with an anguliform process near the proximal end; second segment fusiform, its upper edge lightly, its inferior edge more strongly convex, especially in its distal half; terminal finger-like process consisting of three segments, whereof the distal is much the longest. Leg of eighth pair stout basally, with two strong, posteriorly directed, subconical prominences; the terminal portion slender, of nearly even width throughout, recurved at an obtuse angle of about 100°, and abruptly narrowed and subhamate at the apex; its posterior aspect furnished with a distinct hyaline membranous fringe with frayed edges.

Length about 20 millim.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

2. *Cleidogona stolli*, sp. n. (Tab. V. figg. 8, 8 *a-c*.)

Very nearly allied to the foregoing species, which it resembles in colour, but smaller, and differing essentially in the secondary sexual characters of the male. *Leg* of ninth pair in male with basal segment much shorter than in *C. godmani* and undivided, with a larger, more quadrate, inferior basal prominence, a more strongly convex inferior edge, and a somewhat sharp constriction near its middle. Eighth leg with its basal half relatively much thinner than in *C. godmani*, and without the large prominences, its terminal portion more nearly the same width as the basal, narrowed and pointed apically when seen from below and recurved at a right angle, the hyaline membrane bordering its posterior side not fimbriated.

Length about 15 millim.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

The following species is unknown to me:—

3. *Cleidogona mexicana*.

Craspedosoma mexicanum, Humb. et Sauss. Rev. et Mag. Zool. 1869, p. 153; Miss. Sci. Mex., Myr. p. 59, t. 1. figg. 15, 15 a-l (1872)¹.

Cleidogona mexicanus, Cook and Collins, Ann. New York Acad. Sci. ix. p. 52, t. 6. figg. 105-109 (after Humb. & Sauss.)².

Hab. MEXICO, Eastern Cordillera¹.

C. mexicana was apparently based upon a single female specimen. It may prove to be the same as the form described above as *C. godmani*; but the difference in the locality, apart from other considerations, forbids the identification of the two, though there is nothing in the description of *C. mexicana* to prove their distinctness.

Group III. IULOIDEA.

Mandibles well developed. Gnathochilarium with the stipites enormously developed, expanded proximally and forming a long junctional suture in the middle line behind the oval or triangular promentum which separates the lingual lobes. Number of segments large and variable. Terga from the fifth or sixth with a pair of scent-pores. Pleuræ suppressed. Sterna united in pairs and usually fused to the adjacent terga. Third segment apodous. Phallopods in male formed of the posterior pair of appendages of the seventh segment; the anterior pair of this segment, and also sometimes the posterior pair of the sixth, modified as accessory sexual or copulatory organs. Legs of the first pair also modified. Seminal ducts terminating in a distinct penis behind the bases of the legs of the second pair.

Species belonging to two families of this group have been recorded from Central America, namely, the Iulidæ and Paraiulidæ. The former differ from the latter in having only four rows of mandibular pectinations; the legs of the first pair not enlarged, but with their terminal segments suppressed, those of the second leg normal in form; and the gnathochilarium unmodified in the male. In the female there are no distinct genital sclerites, and the appendages of the second pair are unmodified. It is probable, however, that the species referred to *Iulus* belong in reality to *Paraiulus*.

Fam. PARAIULIDÆ.

Mandibles with 9-10 rows of pectinations. Sternum of third legs attached to tergum of fourth segment.

First and second segments with one pair of legs, third apodous, fifth and sixth with two pairs.

♂. Legs of first pair very large, forming a couple of powerful six-jointed clawless claspers; those of second pair reduced in size and number of segments, palpiform (? sometimes suppressed), and attached to a large sterno-coxal plate, of which the posterior vertical side is hollowed for the reception and protection of the penis. Sternum and legs of the seventh pair unmodified. Gnathochilarium with promentum large, widely separating the lingual lobes, which are crescentically curved round it on each side.

♀. Legs of first pair but little modified in size and shape; those of second pair sometimes suppressed, sometimes retained as a pair of juxtaposed, clawless, reduced limbs. Generative orifices protected by a pair of large chitinous sclerites.

Distribution. North and Central America.

Only one genus of this family has been recorded hitherto from Central America. But amongst the representatives from this country that I have had an opportunity of examining there may prove to be material for two genera based upon secondary sexual characters of the female; and, so far as the North-American forms are concerned, the species known to me from descriptions and actual specimens suggest the possibility of establishing one or more genera distinct from *Paraiulus*. But the material at my disposal is not sufficiently extensive to permit satisfactory diagnoses, especially as two of the species (namely *P. pennsylvanicus*, Brandt, and *P. obtectus*, Bollman) have been made the types of two as yet uncharacterized genera, the former being named *Ptyoiulus* by Cook [Ann. N. York Acad. Sci. ix. p. 6 (1895)], and the latter (which has been twice, in two separate papers, described as a new genus) *Pseudoiulus* by Bollman [Ann. N. York Acad. Sci. iv. p. 32 (1887)]. *Pseudoiulus* was afterwards by its author discovered and stated to be based upon an immature stage. Nevertheless the name will have to be adopted if, in the future, it be found that the adult of *P. obtectus*, for which the Bloomington specimens may be regarded as representing the types, be generically distinct from *Paraiulus olmecus*.

PARAIULUS.

Parajulus, Humb. et Sauss. Rev. et Mag. Zool. 1869, p. 155; Miss. Sci. Mex., Myr. p. 93 (1872)
(type *P. olmecus*).

Paraiulus, Latzel, Myr. Oest.-Ung. Mon. ii. p. 55 (1884).

Parajulus, Bollman, Ann. N. York Acad. Sci. iv. p. 32 (1887).

? *Pseudojulus*, Bollman, loc. cit. (type *P. obtectus*, Bollm.).

? *Ptyoiulus*, Cook, Ann. N. York Acad. Sci. ix. p. 6 (1895) (type *P. pennsylvanicus*, Brandt).

The four Central-American species of which the genitalia are known have the following features in common:—

- ♂. Sterno-coxal sclerite of second legs furnished with a pair of juxtaposed forwardly directed processes; the rest of the appendage retained as a four-jointed limb widely separated from its fellow of the opposite side; posterior pair of appendages of seventh segment (phallopods) triramous.
♀. Appendages of second pair retained. Genital orifices strengthened with a pair of large sclerites.

Synopsis of the Species, based upon characters mostly observable without dissection.

Males.

- a. Inner (admedian) rami of anterior pair of appendages of seventh segment slender, attenuate, and apically pointed *stylifer*, sp. n.
b. Inner (admedian) rami of anterior pair of appendages of seventh segment stout in the basal half, slender in the distal, with the inner edge straight, the outer concavo-convex, and the apex blunt.
a¹. Legs of first pair only moderately inflated in the middle of their length . . . *olmecus*, H. & S.
b¹. Legs of first pair strongly inflated in the middle of their length.
a². Apex of admedian branch of anterior pair of seventh segment with a

- notch and spiniform process at the distal end on the inner side; posterior branch of posterior pair forming a broad lamella curved forwards apically; sterno-coxal plate of appendages of second pair shallowly emarginate behind *amulensis*, sp. n.
- b*². Apex of admedian branch of anterior pair of seventh segment without notch and spine; posterior branch of posterior pair slender, styliform; sterno-coxal plate of appendages of second pair deeply emarginate behind *aztecus*, sp. n.

Females.

- a*. Genital sclerites unjointed, inferiorly acuminate, not protected in front by a vertical unpaired plate, but succeeded by a T-shaped plate *amulensis*.
- b*. Genital sclerites bisegmented, protected in front by a vertical unpaired plate expanding at its inferior extremity; no separate T-shaped sclerite behind.
- a*¹. Distal segment of genital sclerites slender and projecting below the extremity of the anterior plate *olmecus*.
- b*¹. Distal segment of genital sclerites short, thick, obtuse, not projecting below the extremity of the anterior plate.
- a*². Pores less than their diameter from the sulcus; caudal process long and distally narrowed; third tergal plate inferiorly produced . . . *aztecus*.
- b*². Pores at least twice their diameter from the sulcus; caudal process triangular; third tergal plate not inferiorly produced *stylifer*.

1. *Paraiulus amulensis*, sp. n. (Tab. V. figg. 9, 9 *a-d*.)

♀. *Colour*: segments yellow above, with median dark central line; lateral surface fuscous above, yellow below; head and anterior segments blackish; anal segments yellow; legs yellow.

Head smooth; eyes forming a large triangular patch. *Antennæ* with segments from the second to the sixth decreasing progressively in length. *First tergite* with a single ridge above its lateral angle. *Segments* smooth and shining to the naked eye, but in reality finely striolate, the striolæ running longitudinally; anterior half of segments transversely grooved in front; posterior half longitudinally and obliquely grooved nearly up to the pore, which is well behind the transverse sulcus; the latter deep. *Sterna* smooth. *Anal sternite* broadly triangular; *anal tergite* furnished with a long and very acute caudal process. *Second segment* with its lower portion on each side produced inferiorly and inwardly in front of the *generative apparatus*. The latter consisting of a pair of large vertical plates, lightly convex in front, rounded above, with fairly straight outer margin, and acuminate below; the proximal half of the inner border of each in contact with that of its fellow of the opposite side, its distal half obliquely diverging so that an angular space is left between the two sclerites, the distal portion of the outer margin directed obliquely inwards, and where it meets the obliquely outwardly directed inner edge arises a short acuminate process projecting outwards and downwards. Behind these sclerites lies a transverse plate about six times as wide as long, with an anterior median angular notch and slightly recurved external angles. (Text-figg. 3, 3 *a*, p. 56.)

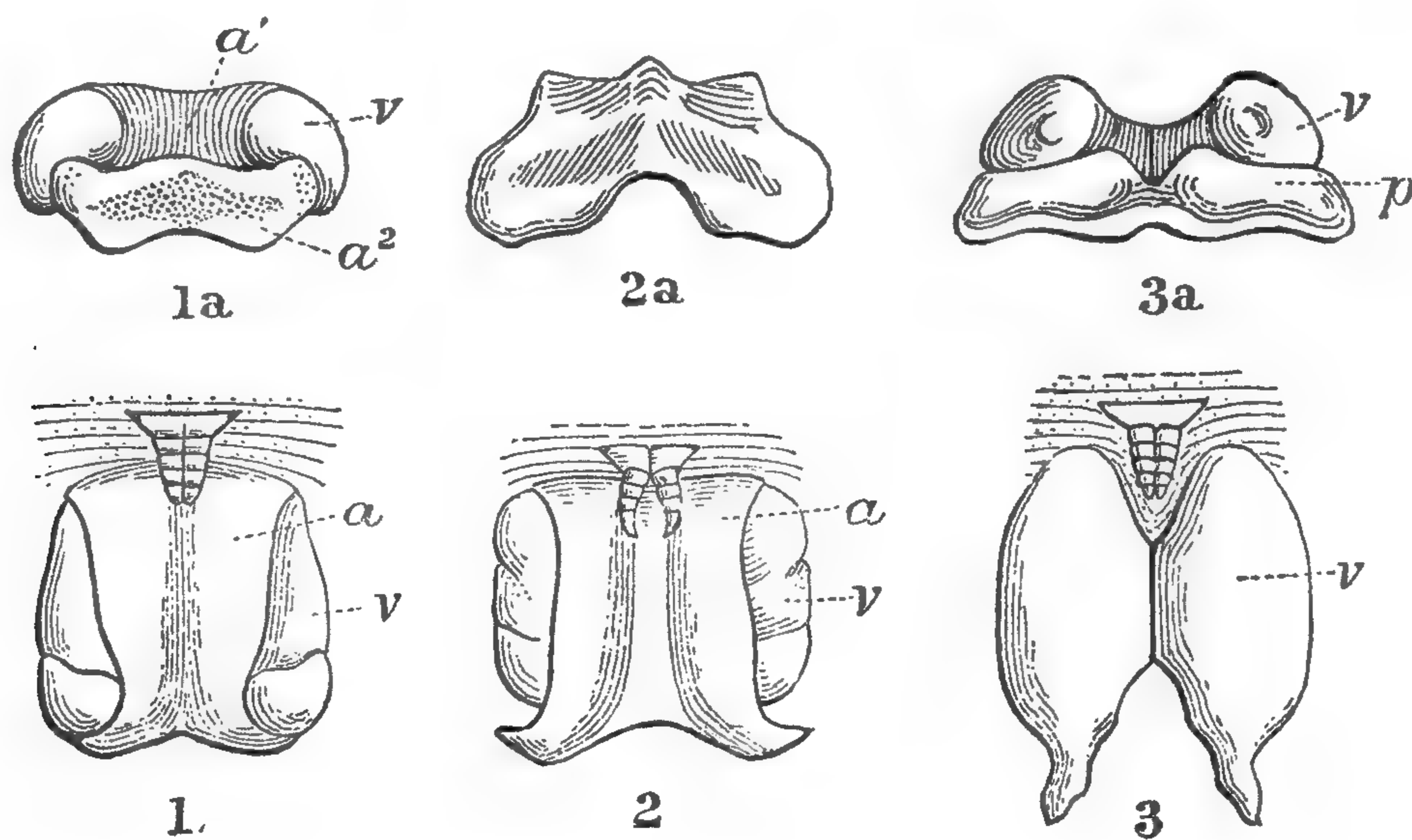
♂. Like the female in colour, sculpturing of tergites, &c.

First tergite very wide laterally, without ridge above marginal groove. *Second segment of mandible* with two subequal prominences. *Genital organs*: legs of first pair massive, especially the penultimate and antepenultimate segments, the former nearly as thick as long; the latter broad at the base, narrowing distally; distal segment small and shortly pedunculated. Legs of second pair with the median processes expanded at the distal end externally, the groove for the penis on the basal plate widely and shallowly concave, the palp longer than the median processes. Anterior pair of copulatory feet of seventh segment with their inner branches proximally clavate, the inner edge fairly straight, the outer strongly convex proximally,

concave distally, the apex slightly expanded and notched on the inner side; posterior pair of copulatory feet furnished with three branches—an outer, long and flagelliform; an inner, divided into two processes (an external short, an internal long, lightly geniculated and bent abruptly outwards at the apex); and a posterior, which is elongate, nearly parallel-sided, and curves downwards and forwards beneath the extremities of the other two. Number of segments about 50–51.

Length up to about 35 millim.

Hab. MEXICO, Amula in Guerrero (*H. H. Smith*).



Explanation of Figures.

Fig. 1. Dwarfed appendages of second segment and genital sclerites of *Paraiulus aztecus*, ♀: *a*, anterior plate; *v*, proximal segment of sclerite of vulva. 1 *a*. Inferior aspect of genital sclerites of same: *a'*, vertical and, *a*², horizontal portion of anterior sclerite; *v*, distal segment of sclerite of vulva.

Fig. 2. Dwarfed appendages of second segment and genital sclerites of *Paraiulus stylifer*, ♀: lettering as in fig. 1. 2 *a*. Inferior horizontal portion of anterior plate of the same.

Fig. 3. Dwarfed appendages and genital sclerites of *Paraiulus amulensis*, ♀: *v*, sclerite of vulva. 3 *a*. Inferior aspect of genital sclerites of same: *v*, extremity of sclerite of vulva; *p*, horizontal portion of posterior plate.

2. *Paraiulus aztecus*, sp. n. (Tab. V. figg. 10, 10 *a*, *b*.)

♀. *Colour* like that of *P. amulensis*.

Structure of segments &c. practically the same as in *P. amulensis*, but the pore close to, considerably less than its diameter away from, the transverse sulcus, which is slightly sinuous at the spot.

In sexual characters this species differs greatly from *P. amulensis*. The ventrally produced area of the second tergite is not so thick, its posterior border being more obliquely cut away; the ventral border of the third produced to almost the same extent, and embracing the genital apparatus behind; a distinct triangular space, revealing the genital apparatus, between the produced area of the two segments. Genital apparatus very distinct; it consists in front of a broad vertical plate narrowed inferiorly and longitudinally excavated; where it reaches the lower surface of the body it expands right and left and posteriorly into a transverse plate lying backwards in a horizontal plane, with emarginate posterior border, suboval lateral borders, and a deep median impression. This plate forms a complete partition between the two vulva-sclerites, besides protecting them below and in front; the vulva-sclerites are thick, massive, and formed of two segments, of which the inferior is the stouter and rounder of the two.

♂. *Genital organs*: legs of first pair thick, like those of *P. amulensis*; of the second pair also very much as in that species, but the groove for the seminal ducts on the sternal plate much more deeply emarginate, and the lateral expansion longer and narrower. Inner branches of anterior pair of gonopods of seventh segment much less expanded proximally, with the distal extremity narrow and not notched internally.

In the posterior pair of gonopods the posterior branch is short and styliform, the anterior ends distally in two vertically directed prongs, of which the outer is longer and subfiliform apically. Number of segments 48.

Length 31 millim.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

3. *Paraiulus stylifer*, sp. n. (Tab. V. figg. 11, 11 a.)

♀. *Colour* as in the preceding species, but the yellow more dominant.

Pores in mid-region of body more than twice their diameter from the sulcus. *Caudal process* shorter, triangular, but surpassing the valves.

Sexual characters much resembling those of *P. aztecus*, but with the inferior angle of the third tergal plate not produced inferiorly. Genital sclerites protected from before by a large vertical suboblong plate, not narrowed inferiorly, and with a vertical groove-like impression on each side of the middle line; inferiorly this plate expands to the right and left, and is carried backwards in a horizontal plane beneath the bisegmented genital sclerites, the horizontal plate forming a pair of oval expansions separated in the middle line behind by a deep and wide notch.

♂. *Sexual characters*. Legs of first and second pairs much as in *P. amulensis*. Inner branches of copulatory feet of seventh segment slender and pointed; the outer branch of the second pair shorter and more strongly curved than in the other species; the anterior branch broad, ending in two processes, of which the inner forms a long and strong inwardly directed spike; the posterior branch long and apically curved forwards, much like that of *P. amulensis*. Number of segments 46.

Length 25 millim.

Hab. GUATEMALA (*Stoll*).

The following species are unknown to me:—

4. *Paraiulus olmecus*.

Parajulus olmecus, Humb. et Sauss. Rev. et Mag. Zool. 1869, p. 155¹; iid. Miss. Sci. Mex., Myr. p. 95, t. 5. figg. 1, 1 a-g (♂ ♀) (1872)².

♀. *Colour* as in preceding species. *Pores* a little behind the sulcus. *Genital plates* formed upon the same plan as in *P. aztecus* and *P. stylifer*; the median unpaired plate described as quadrate with four deep emarginations, one dorsal, one ventral, and one on each side, suggesting the form of the letter X; the vulval sclerites themselves are widely separated and bisegmented, the distal segment being short, relatively slender, and projecting conspicuously below the level of the median sclerite, so as to recall somewhat in form the terminations of these plates seen in *P. amulensis*.

♂. For details of the *posterior appendages* of the seventh segment, reference must be made to the original figures, which clearly show the difference between these limbs and those of the three forms described above. Of the *anterior pair* the inner branch is proximally thicker even than in *P. amulensis*, while the distal half terminates as in *P. aztecus*, but curves more outwards; the legs of the first pair appear to be considerably thinner than in either of the three species described above. Number of segments 46-48.

Length 27 millim.

Hab. MEXICO, Moyoapan in the Eastern Cordillera^{1 2}.

5. *Paraiulus tarascus*.

Julus tarascus, Sauss. Mém. Soc. Phys. Genève, xv. p. 378, t. 7. fig. 52 (1860)¹.

Parajulus tarascus, Humb. et Sauss. Miss. Sci. Mex., Myr. p. 98 (1872)².

Hab. MEXICO, district of Angangueo, Michoacan.

BIOL. CENTR.-AMER., Diplop., November 1907.

This species was based upon a single female specimen. Subsequent examination proved it to possess the characters of the genus *Paraiulus*, and provoked the remark that it might be referred to the same species as *P. olmecus*. The uncertainty in this verdict leaves both specific names in an unsettled state, and it is a matter for regret that with the type-specimens available for comparison, no definite conclusion was arrived at. If the two forms are the same, the name *tarascus*, having nine years' priority, must supersede *olmecus*.

6. *Paraiulus filicornis*.

Julus filicornis, Sauss. Mém. Soc. Phys. Genève, xv. p. 377, t. 5. figg. 38, 38 a-d (1860)¹.

? *Julus filicornis*, Humb. et Sauss. Miss. Sci. Mex., Myr. p. 92 (1872)².

Hab. MEXICO, Vera Cruz^{1 2}, Cuernavaca².

It must be regarded as doubtful whether the specimens from Cuernavaca are specifically the same as the type from Vera Cruz.

From the description it appears that this species, whether one or more is of no great moment, was based upon an immature (*Pseudoiulus*) stage of *Paraiulus*.

In the case of the Cuernavaca examples the size, form, and coloration are said to be the same as in *P. olmecus*, and the statement that the first legs of the male are shorter and thicker than the others excludes the species from *Iulus* and places it in the same category as the immature form of *Paraiulus*. Moreover, since in other particulars the immature male of the latter genus does not appreciably differ from *Iulus*, and since the immature female resembles *Iulus* in all respects, no further justification need be sought for the assumption stated above.

The only structural character mentioned which sharply differentiates the Cuernavaca specimens from the types of *P. olmecus*, *P. amulensis*, *P. aztecus*, and *P. stylifer* is the position of the pores *in front of* the sulcus.

The description of the type from Vera Cruz enumerates no features opposed to the view that the specimen was an immature *Paraiulus*.

Number of segments in Vera Cruz specimens 47, length 28 millim.; number of segments in Cuernavaca specimens 43-44, length 20-23 millim.

7. *Paraiulus rasilis*.

Julus rasilis, Karsch, Zeitschr. ges. Naturwiss. (3) vi. p. 17 (1881)¹.

Hab. MEXICO, Puebla¹.

It is not possible by the description to differentiate this species from any of the foregoing. The statements that the segments are longitudinally sulcate up to the pores, which are situated behind the complete transverse sulcus, and that the caudal process is straight, subacute, and surpasses the anal valves, coupled with what is said regarding the appendages of the anterior somites, forcibly suggest that the types were immature males and female of some species of *Paraiulus*. Number of segments 48. Length 27 millim.

Group IV. SPIROBOLIDEA.

Resembling the Iuloidea in general form and structure, but chiefly distinguishable by the following features:—

The stipites of the gnathochilarium are widely separated proximally by a large undivided triangular plate, the mentum. None of the anterior segments are apodous; segments 1–5 bearing each a single pair of legs, the 6th with two pairs. No penis is present in the male. The copulatory apparatus is completely retractile.

Fam. SPIROBOLIDÆ.

Since the known genera of Spiroboloidea are referred to a single family, the characters of the latter are those of the higher group.

RHINOCRICUS.

Spirobolus (Rhinocricus), Karsch, Zeitschr. ges. Naturwiss. (3) vi. p. 68 (1881).

Rhinocricus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 485 (1893); Myriopoda in Max. Weber's Zool. Ergebniss, &c. pp. 389 & 391 (1894).

Type, *Spirobolus (Rhinocricus) parcus*, Karsch.

In 1893 I selected as the type of the genus *Rhinocricus* the species named *parcus*, which is unknown to me. Since *R. parcus* was based upon specimens from the island of Porto Rico, it is probable that the species resembles in all essential characters those that are referred to *Rhinocricus* in the following pages, especially those included under the headings subordinate to b^1 in the analytical key. It is not known whether the apical segment of the antenna in *R. parcus* has many or only a few sensory papillæ. This important feature should, if possible, be ascertained before a generic or subgeneric value be assigned, as it probably will be assigned, to the character in question.

The Central-American species of *Rhinocricus* known to me have the following features in common:—

Setiferous pores on labrum 2 + 2. Eyes widely separated, each consisting of a subcircular cluster of ocelli.

Lateral portion of first tergal plate widely rounded and not extending inferiorly so low as the inferior portion of the second. More or fewer of the segments bearing near their anterior border, which is concealed by the preceding segment, a pair of depressions of unknown function, known as scobinæ. Each scobina consists of a short usually transversely crescentic groove, behind which there is an area of varying extent covered with very fine transverse striæ. The phallopod of the copulatory apparatus consists of two segments, the distal of which terminates in two processes, the smaller and slenderer of which is the seminal style, while the stouter, which is laminate at least apically, is the guard. The median unpaired sternal or anterior plate of the coleopods is large and subtriangular, with its apex projecting inferiorly as low as the inferior end of the anterior or proximal of the two lateral paired laminæ.

Synopsis of the Species examined.

- a.* The normal sulcus defining the posterior portion of the terga obsolete dorsally, and replaced by a secondary sulcus which lies in front of the pore; distal segment of phallopod very short and stout, the seminal style slender, and the guard not shorter than the rest of the segment. . . . *omiltemæ*, sp. n.
- a*¹. The normal sulcus defining the posterior portion of the terga strong or weak

dorsally, but never replaced by a secondary sulcus lying in front of the pore; phallopod, where known, with its distal segment long and slender, the guard of the seminal style much shorter than the segment.

- b.* Scobina unspecialized, the extremities of the groove defining the impression turned outwards, *i. e.* away from each other; the striæ of the striate area very coarse, hardly more numerous and hardly finer than those of the adjacent area of the terga; the longitudinal striæ of the posterior portion of the segment extending at least as high as the pores. *olivaceus*, Newp.
- b*¹. Scobina specialized, the extremities of the groove incurled towards each other, thus forming a crescentic or subcrescentic impression; the striæ of the striate area very fine and numerous; longitudinal grooves of posterior portion of segments not extending halfway up to the pore.
- c.* Sensory papillæ on apical segment of antennæ very numerous, variable in number, and close-set.
- d.* Scobina very small and not extending posteriorly as far as the middle segment of the body; infero-lateral edge of first tergal plate not widely rounded, subangular, its anterior border slightly cut away. *rogersi*, sp. n.
- d*¹. Scobina large, extending posteriorly past the middle segment of the body; infero-lateral edge of first tergal plate evenly rounded.
- e.* Sternal plate of anal segment very short, longitudinally convex, and not or hardly longer than the sternal area of the preceding segment, its posterior border straight and transverse; dorsal area of the segments irregularly tubercular in front. . . . *marci*, sp. n.
- e*¹. Sternal plate of anal segment at least twice as long as the sternal area of the preceding segment, its posterior border angular or strongly convex; no tubercles on dorsal area of the segments.
- f.* Antennæ much longer than head; legs and antennæ dark, at least in their basal half. . . . *rixi*, sp. n.
- f*¹. Antennæ shorter or at least not longer than head; legs and antennæ uniformly pale.
- g.* Colour crimson; sternal plate of anal segment with convex posterior edge, and marked in front with a transverse groove. *aposematus*, sp. n.
- g*¹. Colour red, banded with green (? black); sternal plate of anal segment with angular edge and no anterior groove. . . . *tristani*, sp. n.
- c*¹. Sensory papillæ on apical segment of antennæ few in number (4-5) and widely spaced.
- h.* Scobinæ very wide, each about twice as wide as the area between them on the middle segments of the body; inferior horizontal area of second segment with a deep transverse groove behind the thickened anterior edge. . . . *scobinatus*, sp. n.
- h*¹. Scobinæ narrower, separated by a space which is not less than twice the transverse diameter of each; inferior horizontal area of second segment shorter, without any transverse groove behind the thin upstanding anterior edge.

- i.* Transverse sulcus, at least on anterior fourth of body, conspicuously pitted at least as high up as the pore.
- k.* Transverse sulcus obsolescent above the pores; only pitted up to the pores in the anterior fourth of the body; olive-black . . . *smithi*, sp. n.
- k*¹. Transverse sulcus strong and complete dorsally, pitted throughout in the anterior half of the body; segments transversely banded with red or yellow *aurocinctus*, sp. n.
- i*¹. Transverse sulci not pitted.
- l.* Elliptical area of scobinae small, narrower than striate area, and separated from the anterior edge of the segments by a space exceeding their transverse diameter in length; median and posterior area of segments smooth and polished *stolli*, sp. n.
- l*¹. Elliptical area of scobinae large, as wide as the striate area and close to the anterior border of the terga; at least the median area of the terga coriaceous.
- m.* First tergal plate encircled with yellow; tergal plate and valves of anal segment bordered behind with yellow . . . *atoyacus*, sp. n.
- m*¹. First tergal plate, and tergal plate and valves, not bordered with yellow *salleanus*, sp. n.

1. *Rhinocricus rogersi*, sp. n. (Tab. V. figg. 12, 12 *a*, *b*.)

Colour (in alcohol) rich olive-green, obscurely banded transversely, the segments ferruginous or yellowish-red beneath; legs yellowish; antennae pale olive-green banded with yellow.

Head smooth, shining; sulcus mesially obsolete; eyes consisting of five transverse rows of about thirty ocelli, separated by a space equalling at least four diameters. *Antennae* slightly shorter than the uncovered portion of the head, distally attenuate; sixth segment nearly as long as wide, narrower than the fifth but not longer; seventh much narrower than fifth or sixth. *Segments* smooth, shining, feebly striolate; the first with a short inferior lateral groove, its anterior border projecting just below the level of the eyes, obliquely cut away inferiorly, so that its lateral border is not so evenly and widely rounded as in the other species. Second segment not striate laterally below; posterior portion of its infero-lateral edge projecting convexly below the level of the anterior portion, striolate; posterior portion longitudinally grooved for a short distance inferiorly. Transverse sulcus strong laterally, extending over the dorsum as a shallow groove on all the segments except the anterior and posterior four or five, on which it is obsolete. Longitudinal groove behind pore very weak. *Scobinae* feebly developed, visible from the seventh or eighth to the fifteenth or sixteenth segments; the two transversely oval, quite close to the anterior edge of the segments, separated by a space equalling at least six times their transverse diameter, the striate area triangular. *Anal segment*: tergite scarcely covering summit of valves, the process rectangular. Valves with margins compressed, prominently convex; sternite triangular, its angle obtusely rounded.

Copulatory feet and phallopods of male as in figures (Tab. V. figg. 12 *a*, *b*). Number of segments 43-44.

Length about 80 millim.; greatest width 8; width at anterior end 7, width at posterior end of penultimate segment 6.5 millim.

Hab. COSTA RICA (*Rogers*).

This species is remarkable for the feeble development of the scobina and for the more angular shape of the lateral portion of the first tergal plate.

2. *Rhinocricus aurocinctus*, sp. n. (Tab. VI. figg. 1 *a-h.*)

Colour (in alcohol) of posterior area of segments yellow or red, anterior area also yellow or red, intermediate area deep olive-green, hence, when extended, the body appears to be narrowly banded with yellowish-red, when coiled to be broadly banded with that colour on account of the exposure of the yellow of the anterior area of the segments; first segment completely encircled with yellowish-red; anal segment deep olive-green, except the tip of the caudal prolongation which is yellow; antennæ and legs fusco-olivaceous, obscurely banded with yellow.

Head smooth. *Antennæ* much shorter than head, thinner, slightly attenuate; sixth segment slightly longer than wide, narrower than fifth; seventh small. *First tergite* evenly rounded laterally, without any emargination above the eye. Infero-lateral edge of *second* nearly horizontal, thickened in front of the sulcus. The remaining *segments* smooth above or weakly punctulated; the transverse sulcus very strongly developed and conspicuously pitted in the anterior half of the body, complete but less strongly pitted over the dorsum of all the segments except the second, sometimes the third and the penultimate. *Scobinæ* strongly developed, extending from about the ninth to about the fortieth segment, and on the segments of the mid-region of the body consisting of a pair of semicircular depressions, with the floor of the depression slightly raised, and succeeded by a triangular striated area; space between the depressions, which are close to the border of the terga, less than twice the transverse diameter of either. At the posterior end of the body the scobinæ are smaller and wider apart. *Anal segment*: tergite produced into a narrow caudal process overlapping the summit of the valves, the margins of which are much less prominently convex than in *R. rogersii*, while their edges are defined by a much stronger groove; anal sternite rectangularly pointed.

Copulatory organs and *phallopods* of male as in Tab. VI. figg. 1 *g, h.* Number of segments 59-60.

Length of ♀ 110 millim., width 10.5, anterior width 8; length of ♂ 81, width 7.5 millim.

Hab. MEXICO, Milpas in Durango (*Forrer*).

3. *Rhinocricus stollii*, sp. n. (Tab. VI. fig. 2.)

Colour olive-green, with a narrow darker transverse line along the posterior border of the terga; anterior portion yellow.

Head smooth. *Antennæ* shorter than head, scarcely attenuate, sixth segment almost as wide as fifth; seventh small. *First tergite* widely rounded. Infero-lateral edge of *second segment* horizontal, long, thickened in front. Remaining *segments* smooth and polished; anterior portion very finely striolate. Transverse sulcus absent on second segment, obsolete dorsally on the third and on the penultimate and antepenultimate, complete on the others. *Scobinæ* extending from about the ninth segment to the fifth from the posterior end, consisting of a pair of suboval grooves, well behind the border of the terga, from about four to six diameters apart; striolate area considerably wider and longer than the oval impression. A longitudinal groove behind the fovea on the posterior half of the body. *Anal segment*: tergite with a transverse dorsal groove, the caudal process elongate but not surpassing the summit of the valves, which are compressed and have strongly convex, prominent borders; sternite rectangularly triangular, large, with a transverse groove in its anterior half.

Number of segments 48.

Length 106 millim.; width of median segment 12, of anterior tergite 10, of penultimate tergite 7.

Hab. GUATEMALA, Chalhuitz (*O. Stoll*).

This species is chiefly remarkable for the small size of the elliptical area of the scobinæ as compared with the striate area, and by the relatively great length of the space between them and the anterior edge of the segments. The edges of the anal valves are also more prominent and convex than in the other species.

4. *Rhinocricus smithi*, sp. n. (Tab. VI. figg. 3 *a-f.*)

Colour uniform olivaceous or brunneo-olivaceous throughout.

Antennæ shorter than head; sixth segment shorter and narrower than fifth; seventh segment small. *First*

tergite widely rounded; *second* with its infero-lateral edge produced in front into a rounded excrescence. Remaining *segments* striolate and punctulate; transverse sulcus absent on second segment, obsolete or almost obsolete dorsally on the others; in the anterior fourth of the body deep and strongly pitted laterally up to the pore, the pits becoming gradually evanescent in the middle and posterior portions of the body; a longitudinal groove behind the pore on the posterior segments; anterior portion of segments sparsely striolate. *Scobinae* extending to about the fourth segment from the end, consisting of a pair of deep semicircular pits with raised floor close to the anterior edge of the segment and four or five diameters apart; striolated area elongate, narrower than the impressions, less triangular than usual. *Anal segment*: tergite produced slightly beyond the summit of the valves, which have their margins deeply grooved; sternite slightly acutely triangular.

Copulatory organs and *phallopods* of male as shown in Tab. VI. figg. 3 *e, f*. Number of segments 60–62. Length of ♀ up to about 140 millim., width 13·5, of anterior tergite 9·5; length of ♂ 102 millim., width 10·5.

Hab. MEXICO, Omilteme and Amoqueleca in Guerrero (*H. H. Smith*).

5. *Rhinocricus aposematus*, sp. n. (Tab. VI. figg. 4 *a–e*.)

♂. *Colour* (in alcohol) a washed-out red, when fresh probably brilliant blood-red throughout, with the anterior and inferior areas of the segments paler; legs and antennæ red like the head and body.

Antennæ thick, clavate, third segment about as wide as long; the sixth much wider than long, and wider than the fifth, seventh also very wide. *First segment* nearly smooth; anterior portion of the others finely striolate transversely, median and posterior portions finely striolate and coriaceous longitudinally. Transverse sulcus obsolete dorsally on the second segment, very weak upon the third and fourth, complete but weak upon the dorsum of all the segments, and evanescent at the posterior end of the body; the longitudinal pore-sulcus present. *Scobinae* extending from the eighth to about the sixth segment from the end; the pits oval, with the floor elevated, less than their transverse diameter from the anterior edge of the segments and separated by a space equalling about four times that diameter; at the posterior end, where they dwindle in size, the distance becomes relatively greater; the striate area triangular, narrowed behind, as wide in front as the impression. *Anal segment*: tergite with very short but distinct caudal process, transversely grooved at its base; valves with lightly compressed margins, their summits projecting considerably beyond the apex of the caudal process; sternite widely and convexly rounded, with a transverse groove in its anterior half. *Legs* mostly nearly hairless beneath, a bristle on the coxæ and two or three spines on the tarsus; first and second legs, and in a lesser degree the third, with all the segments bristly below.

Copulatory apparatus and *phallopods* as in Tab. VI. figg. 4 *a–e*. Number of segments 44. Total length 140 millim.; median width 15; width of first segment 12, of penultimate segment 11 millim.

Hab. COSTA RICA, Santa Clara (*J. Tristan*).

6. *Rhinocricus tristani*, sp. n. (Tab. VI. figg. 5 *a–d*.)

♂. Nearly allied to the foregoing, but differently coloured and much smaller.

Colour a darker red above, the median area of the segments from the dorsum to halfway below the pore deep olive-green, but the green gradually narrowing away below the pore, leaving the inferior portion of the segments yellowish-red; first segment green in the middle, bordered with red; upper half of head olivaceous; antennæ and legs clear yellow.

Antennæ thicker than in *R. aposematus*; the second segment scarcely longer than wide, the fifth and sixth at least twice as wide as long; fifth and sixth granular. *Segments* sculptured and sulcate as in that species. *Scobinae* also much the same, but the groove defining the elliptical impression incomplete in front and the floor more convex. *Anal segment*: tergite without groove at base of caudal process, which is apparently shorter on account of the lesser emargination of the two sides of the border, which converge to form the angle; margin of valves less compressed, their summits not quite covered by the tip of the caudal process; sternite very distinctly and obtusely angular, without transverse groove in its anterior half.

Phallopods and *copulatory apparatus* as in figures (Tab. VI. figg. 5 *c, d*). Number of segments 44. Total length 67 millim., median width 10; width of anterior 7·5, of penultimate segment 6.

Hab. COSTA RICA, Santa Clara (*J. Tristan*).

7. *Rhinocricus rixi*, sp. n. (Tab. VI. figg. 6 *a-e*.)

Allied to *R. tristani* and *R. aposematus*.

Colour (in alcohol) a nearly uniform dark mahogany-brown, perhaps nearly black when alive, on the posterior portion of the segments the anterior and inferior portions paler; legs and antennæ ferruginous distally. *Antennæ* clavate, as in *R. aposematus*; the fifth and sixth segments very distinctly granular. *Segments* with sculpturing and sulci developed much as in *R. tristani*, but less densely striolate, the posterior half of the posterior area smooth and shining, its anterior half marked with faint irregularly arranged longitudinal grooves. *Scobinæ* approximately as in *R. aposematus*. *Anal segment* as in *R. tristani*, but with the caudal process more emarginate laterally, though less so than in *R. aposematus*.

Phallopods and *copulatory apparatus* of male as in figures (Tab. VI. figg. 6 *d, e*). Number of segments 45. Total length 111 millim.; median width 12·5; width of first 10, of penultimate segment 7.

Hab. NICARAGUA, Chontales copper-mine (*R. Rix*).

8. *Rhinocricus salleanus*, sp. n. (Tab. VI. fig. 7.)

? *Julus aztecus*, Humbert et Saussure, Linn. Ent. xiii. p. 331 (1859); Mém. Soc. Phys. Genève, xv. p. 558, fig. 29 (1869).

? *Spirobolus aztecus*, Daday, Term. fuzetek, xvi. p. 103, t. 4. figg. 9-11 (1894).

♀. *Colour* (in alcohol) apparently olivaceous, with the posterior border of the segments ferruginous; legs and antennæ ferruginous.

Head punctulate and finely striolate above. *Antennæ* slightly attenuate apically, the sixth segment a little narrower than the fifth, slightly longer than wide; seventh segment much narrower than the fifth. *First tergite* densely and coarsely coriaceous; the remaining *segments* with the median and lateral areas also densely and coarsely coriaceous; transverse sulcus very deep and strong both laterally and dorsally, not pitted, almost obsolete on the dorsum of the second and penultimate segments, strong on the third and on the antepenultimate; pore-sulcus not distinct. *Scobinæ* well developed, consisting of a pair of deep semielliptical grooves defining a smooth oval area which is close to the anterior edge of the terga; distance between these impressions, at least on the anterior and median segments, not exceeding twice their transverse diameter; the striate area wide and convexly rounded behind; the posterior nine segments without scobina. *Anal segment*: tergite posteriorly angularly elongate, but not covering the summit of the valves; valves strongly compressed above; sternite large, triangular.

Number of segments 57.

Total length 88 millim.; median width 7·5; width of first 6·5, of penultimate segment 5.

Hab. MEXICO, Cordova (*fide de Saussure*).

The above-given description is taken from a single female specimen from Cordova in the British Museum, procured from M. Sallé, and purporting to be one of de Saussure's original examples. The evidence for this statement, however, is negatived by the length of the specimen, which is 88 millim., with a width of 7·5 millim.; the largest out of a number of specimens collected by de Saussure measuring only 65 millim. The localities de Saussure gives for *R. aztecus*—namely, Vera Cruz, Cordova, Orizaba, &c.—suggest the possibility of his having described more than one species under one name. This possibility and the discrepancy in size between M. Sallé's example and

those measured by de Saussure justify the view that this example should be regarded, at all events provisionally, as the representative of a distinct species.

Daday's determination of this species must also be regarded as doubtful. The figure he published of the copulatory apparatus indicates, though it does not finally prove, that his specimen was specifically distinct from all those described above of which the males are known, the sternal plate being more hammer-shaped than in any of the latter.

9. *Rhinocricus atoyacus*, sp. n. (Tab. VI. figg. 8 *a-c.*)

♂. *Colour* (in alcohol): head olivaceous; first tergal plate olivaceous, bordered with yellow, remaining segments deep olive-green with the posterior area yellow, anal tergite and anal valves also olive-green and bordered with yellow; legs yellow; antennæ olive-green banded with yellow.

Head finely striolate. *Antennæ* not incrassate; sixth segment about as wide as long and about as wide as the fifth; seventh segment much narrower than the fifth. *First tergite* finely coriaceous, widely rounded laterally. Remaining *segments* coarsely coriaceous; sulcus strong, complete and strong dorsally on all the segments except the second and penultimate. No distinct longitudinal sulcus behind the pore. *Scobinæ* extending to about the fourteenth segment from the end, consisting of a pair of deep crescentic grooves close to the anterior edge of the terga, on the median segments separated by a space which about equals their transverse diameter, more widely separated on the posterior segments; the striate area semioval. *Anal segment*: caudal process short, not covering the summits of the valves, which are compressed dorsally; sternite large, triangular.

Legs with a single seta on the underside of the segments; anterior legs without setæ; coxæ of third, fourth, and fifth legs with globular excrescences, larger on the third than on the fourth and on the fourth than on the fifth.

Phallopods and *copulatory organs* as in figures (Tab. VI. figg. 8 *b, c.*)

Number of segments 57.

Total length 66 millim.; median width 6; width of first 5, of penultimate segment 4.5.

Hab. MEXICO, Vera Cruz, Atoyac (*A. Dugès*).

This species is very nearly related to *R. salleanus*, the male of which is unknown to me.

10. *Rhinocricus scobinatus*, sp. n. (Tab. VI. figg. 9 *a-e.*)

Colour (in alcohol): head and first segments olive-green; the rest of the segments with the posterior portion ferruginous, the median area deep olive-black, gradually thinning out inferiorly below the pore; infero-lateral portion of median area and anterior portion of segments pale olivaceous; anal segment also pale olivaceous; legs and antennæ pale olivaceous or ochre-yellow.

Head punctulate and striolate. *Antennæ* short, attenuate; sixth segment a little longer than wide, narrower than the fifth, seventh much narrower than the fifth. *First tergite* coriaceous, widely and somewhat subquadrately rounded laterally. *Second segment* widely and transversely grooved beneath. Median and posterior area of remaining *segments* somewhat coarsely coriaceous; the transverse groove strong and complete dorsally on all the segments except the second and the anal segment. *Scobinæ* close to anterior edge of terga; each exceedingly wide, consisting of a widely crescentic groove defining posteriorly a smooth area; the striate area much wider than long, with evenly convex posterior border; distance between the scobinæ equal to about half their transverse diameter; scobinæ present and of fairly large size on the penultimate segment, on which they are separated by a space about equalling their transverse diameter.

BIOL. CENTR.-AMER., Diplop., *November* 1907.

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Anal segment: tergite with elongate somewhat pointed caudal process slightly surpassing the summit of the valves, which are strongly compressed in their upper half; sternite large and triangular.

Copulatory apparatus and *phallopods* as shown in Tab. VI. fig. 9 d.

Number of segments and measurements doubtful (specimen fragmentary).

Hab. GUATEMALA, Retalhuleu (*O. Stoll*).

This species is remarkable for the large size of the scobinæ and for their extension on to the penultimate segment. In the deepness and dorsal completeness of the transverse sulcus and the coarse coriaceous sculpturing of the terga it much resembles *R. salleanus*; but, apart from the scobinæ, differs from that species in having the first tergal plate much wider laterally and the inferior horizontal area of the second very distinctly longer. The caudal process also overlaps the summit of the valves.

11. *Rhinocricus olivaceus*, Newp. (Tab. VI. fig. 10.)

Spirobolus olivaceus, Newport, Ann. & Mag. Nat. Hist. xiii. p. 268.

Julus olivaceus, Gervais, Ins. Apt. iv. p. 184 (1847); Voyage de Castelnau, p. 20.

♀. *Colour* (dry specimen) deep olive-yellow; posterior border of segments ferruginous; legs and antennæ dark.

Head feebly striolate transversely and punctulated. *Antennæ* long, a little longer than the head, with the sixth segment a little shorter and narrower than the fifth. *Eyes* composed of about 30 ocelli in 5 rows. *First tergite* not evenly rounded, somewhat angular (perhaps shrivelled from drying). All the *segments* dorsally striolate; the transverse sulcus strong and complete dorsally even on the second segment; the lateral striæ on the posterior portion of the segments extending up to the pore; median area of segments laterally pitted and irregularly grooved transversely above; a conspicuous longitudinal sulcus in front of the pore and also behind it on the posterior portion of the body. *Scobinæ* but little differentiated, consisting of a transverse groove the ends of which are not turned inwards towards each other to form a crescent-shaped mark, but outwards parallel to the edge of the terga; behind the groove there are a number of coarse striæ which follow its curvature. *Anal segment* with caudal process narrowed and surpassing summit of valves; valves marginally compressed, with convexly produced edge. *Legs* longish.

Number of segments 42.

Length 170 millim.; median width 15, extreme width 12.

Hab. MEXICO, Oaxaca.

A single dried typical example in the collection of the British Museum.

R. olivaceus may be easily distinguished from the rest of the Central-American members of this genus, as well as from all other species known to me, by the undifferentiated condition of the scobinæ. So far as this organ is concerned, the species is of considerable interest as showing the process of formation of the scobinæ from normal transverse integumental grooves.

12. *Rhinocricus marci*, sp. n. (Tab. VI. fig. 11.)

♀. *Colour* (in alcohol) olive-green, with the posterior portion of the segments ferruginous; first tergal plate bordered with ferruginous; anal tergite and valves olive-green, not bordered; head olivaceous; antennæ olive-green, ringed with ferruginous; legs olive-yellow, perhaps dark green and ringed with ferruginous when fresh.

Head punctured; median sulcus deep, interrupted only for a short distance mesially. *Antennæ* short, slightly attenuate; second segment scarcely longer than wide, fifth nearly twice as wide as long, sixth narrower and not longer than the fifth, seventh about half the width of the fifth. *First tergite* punctured, widely rounded laterally; *second* with its inferior angle produced inferiorly, its lower horizontal area not transverse, scooped out. Anterior portion of remaining *segments* transversely sinuate in front, furnished behind dorsally with small anastomosing wart-like tubercles, which extend transversely across the segment from the level of the pores and encroach longitudinally upon the median portion; the latter coriaceous with close-set punctures; posterior portion similarly coriaceous in front, the punctures becoming scattered posteriorly and leaving the hinder border smooth and polished; the infero-lateral longitudinal striæ of this portion not extending halfway up to the pore and absent upon the second, third, and fourth terga. Transverse sulcus weak dorsally but complete, except on the second and penultimate segments, and scarcely traceable upon the third and fourth. *Scobinæ* present, extending to the seventh segment from the end, consisting of a pair of semilunar or crescentic impressions close to the edge of the terga, separated by a space varying in different regions according to the size of the impressions, from two to four times their transverse diameter, or considerably more on the posterior segments. *Anal segment*: tergite with short, sharp, rectangular caudal process, not covering the summit of the valves, which have strongly compressed margins; sternite very short, scarcely longer than the sternal area of the preceding segment, convex both longitudinally and transversely, and with its posterior border nearly straight and transverse.

Number of segments 44.

Total length 100 millim.; median width 11.5; width of first segment 9, of penultimate segment 7.5.

Hab. NICARAGUA, San Marcos (*E. Burns*).

Differs from all the Central-American species known to me in the extreme shortness and longitudinal convexity of the anal sternite and the irregular tuberculation of the dorsal area of the anterior portion of the terga.

13. *Rhinocricus omiltemæ*, sp. n. (Tab. VI. figg. 12 *a-c.*)

Colour: segments uniformly black, not banded; legs and antennæ yellow; head olivaceous, paler below.

Head finely striolate; sulcus very deep just above the labral excision; eyes large and subcircular. *Antennæ* not incrassate; sixth segment rather wider than long, about as wide as the fifth, seventh narrower than fifth; four sensory papillæ on the last segment. Body long, slender: first segment wider than second, and as wide as the median. *First tergite* widely rounded laterally; *second* with its infero-lateral edge projecting below. Remaining *segments* coriaceous, irregularly and weakly sulcate longitudinally; transverse sulcus becoming evanescent above the pore, replaced by a secondary sulcus rising in front of the pore and extending right over the dorsum of the segments; sides of segment obliquely sulcate in front of the transverse sulcus; the posterior portion longitudinally striate half-way up to the pore on the anterior segments; on the median and posterior segments the striæ extend only a short distance above the bases of the legs; a short longitudinal sulcus visible behind the pore. *Scobinæ* present, extending to about the fifteenth segment from the end, consisting of a pair of crescentic pits close to the anterior edge of the segments, separated by a space which is equal to about three times their transverse diameter; striate area relatively long and triangularly pointed behind. *Anal segment*: tergite produced into a relatively long caudal process which covers and slightly overlaps the summit of the valves; valves with margins scarcely compressed; sternite large, triangular.

Number of segments 48.

Total length 41 millim.; median width 3; width of first segment 3.3, of penultimate segment 2.3.

Hab. MEXICO, Omilteme in Guerrero (*H. H. Smith*).

This species differs from the remaining species here described under *Rhinocricus* in three striking characteristics, namely: the structure of the phallopods in the male,

the expansion of the first tergal plate, and the replacement of the transverse sulcus on the dorsum of the segments by a secondary sulcus lying in front of the pore. In this latter respect it resembles several of the species referred to this genus which have been described from the West Indies (see Journ. Linn. Soc., Zool. xxiv. pp. 499-505, 1893). The chief peculiarity about the phallopod is the shortness and thickness of the distal segment as compared with that of the other species of *Rhinocricus* here recorded, which does not exceed the length of the guard of the seminal style. A closely allied species has recently been made the type of a special subgenus, *Eurhinocricus* (*cf. infra*, p. 72, under *R. biolleyi*).

The following species of *Rhinocricus* are known to me only from descriptions and figures. The scobinæ were not examined, or at all events not described in detail, and only in the case of the species recorded by Brölemann have the number of sensory papillæ on the antennæ been mentioned and the structure of the gonopods illustrated. I have found it impossible on this account to include the species in the above-printed analytical key.

Only two of the species stand out as sharply distinguished from the rest, namely *R. hagedussii* of Daday and *R. dugesi* of Bollman, which are characterized by the presence of a long caudal process.

14. *Rhinocricus toltecus*.

Julus toltecus, Sauss. Linn. Ent. xiii. p. 331 (1859); Mém. Soc. Phys. Genève, xv. p. 554, fig. 27 (1860).

Spirobolus toltecus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 75.

Hab. MEXICO, Cordova.

The distinguishing characteristic of this species appears to be the form of the anal segment, which is neither compressed nor attenuated, but is hemispherically rounded. The posterior border of the sternal plate is lightly convex, and that of the tergal plate also lightly convex, with a very short median dentiform caudal process overlying the compressed margins of the anal valves.

Number of segments 63. Length 88, width 6 millim.

In all the other species of this genus described by de Saussure and Humbert the posterior extremity of the body is compressed and the tergal plate of the anal segment is triangular dorsally.

15. *Rhinocricus aztecus*.

Julus aztecus, Sauss. Linn. Ent. xiii. p. 331 (1859); Mém. Soc. Phys. Genève, xv. p. 558, fig. 29 (1860).

Hab. MEXICO, Vera Cruz, Cordova, Orizaba, &c.

As remarked above (p. 64) this species was based upon a large number of individuals. The antennæ are described as very short ("brevissimæ") and strongly compressed. The body is smooth, shining, finely shagreened or rather striolate. The transverse sulcus is strongly marked.

Number of segments 55 to 58. Length 63, width 6 millim.

16. *Rhinocricus zapotecus*.

Julus zapotecus, Sauss. Mém. Soc. Phys. Genève, xv. p. 559, fig. 30 (1860).

Hab. MEXICO.

According to de Saussure, this species inhabits the same localities in Mexico as *R. aztecus*, to which it is so closely allied that the distinctness of the two was, to the describer, a matter of doubt. It was described as being more attenuated anteriorly, *R. aztecus* being parallel-sided, and larger, the total length being 93 millim., as compared with 65.

17. *Rhinocricus totanacus*.

Julus totanacus, Sauss. Mém. Soc. Phys. Genève, xv. p. 561, fig. 31 (1860).

Hab. MEXICO, Orizaba.

Described as very nearly allied to *R. aztecus*, but larger and smoother, with a distinct though short caudal process and the transverse sulcus on the segments feeble and ornamented with close-set punctures. In both of these features it approaches *R. smithi* and *R. aurocinctus*, described above, but apparently differs from both in its more slender and cylindrical shape.

Number of segments 60. Length 100, width 8 millim.

18. *Rhinocricus chichimecus*.

Julus chichimecus, Sauss. Linn. Ent. xiii. p. 331 (1859); Mém. Soc. Phys. Genève, xv. p. 562, t. 5. fig. 32 (1860).

Spiroboldus chichimecus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 82.

Hab. MEXICO.

Allied to *R. aztecus*, but very much larger, and with the inferior striæ restricted to the area just above the base of the legs.

Number of segments 49-50. Length 120, width 13 millim.

19. *Rhinocricus brevicollis*.

Spiroboldus brevicollis, Voges, Zeitschr. wissen. Zool. xxxi. pp. 191, 192.

Hab. MEXICO, ? Mazatlan*.

Compared with *R. zapotecus* (Sauss.). The transverse sulcus of the segments is strong,

* The locality is given as "Misatlan," probably in mistake for Mazatlan or Misantla.

the area behind it being rugulose above and laterally and inferiorly sulcate. The anal tergal plate does not surpass the valves, which have swollen margins.

Number of segments 57–60. Length 90–110, width 6·5–7·5 millim.

20. *Rhinocricus angusticollis*.

Spirobolus (Rhinocricus) angusticollis, Karsch, Zeitschr. ges. Naturwiss. (3) vi. pp. 70, 71 (1881).

Hab. MEXICO, Puebla.

Segments with strong complete transverse sulcus. Scobinæ extending from the 9th to the 36th. The posterior area of the segments finely punctuated and striolated, sulcate beneath. Anal tergal plate produced into a subcylindrical process, slightly surpassing the valves, which are convex with deeply compressed margins.

Number of segments 43. Length 70–80 millim.

21. *Rhinocricus ferrugineus*.

Spirobolus ferrugineus, Daday, Term. füzetek, xii. p. 130 (1889).

Hab. PANAMA.

Robust, anteriorly attenuate. Segments with distinct sulcus, densely impresso-punctate. Tergal plate of anal segment widely acuminate posteriorly, not surpassing the valves, which are strongly marginate.

Number of segments 45. Length 122, width 15 millim.

This species appears to be unusually broad as compared with its length. In this respect it evidently differs markedly from *R. brevicollis*, Voges, and others, and approaches nearest to *R. chichimecus*, Sauss., but, in view of the contractility of the body in these and other Diplopods, perhaps no great reliance should be placed upon the character in question.

22. *Rhinocricus hagedussii*.

Spirobolus hagedussii, Daday, Term. füzetek, xii. p. 130 (1889).

Hab. PANAMA.

Slender, attenuated posteriorly. Segments lightly sulcate transversely, the posterior area smooth and polished above, sulcate nearly up to the pore laterally. Tergal plate of anal segment produced into an oblique depressed wide caudal process which far overhangs the valves. The latter compressed, not marginate.

Number of segments 52–53. Length 75–80, width 7·5 millim.

This species evidently differs from all those hitherto recorded from Central America in possessing a long caudal process produced considerably beyond the valves.

23. *Rhinocricus dugesi*.

Spirobolus (Rhinocricus) dugesi, Bollman, Bull. U.S. Nat. Mus. no. 46, pp. 190, 194 (1893).

Hab. MEXICO, Guanajuato (*Dugès*).

R. dugesi resembles *R. hagedussii* in possessing a long caudal process, but, judging from the description, may be distinguished from that species by having the anal valves very strongly margined.

Number of segments 50. Length 55, width 5 millim.

24. *Rhinocricus obesus*.

Rhinocricus obesus, Brölemann, Mém. Soc. Zool. Fr. 1900, pp. 107, 108, t. 7. figg. 59–65.

Hab. GUATEMALA (*Rodriguez*).

Judging by the shortness of the antennæ, the large number of sensory papillæ, and other characters, this species appears to be related to *R. tristani* and *R. aposematus*, but certainly differs from both. The posterior borders of both tergal and sternal plates of the anal segment are transverse and scarcely produced, and the guard of the phallopod in the male is bent at right angles to the axis of the style, lying across it almost at a right angle.

Number of segments 45–46. Length 99–100, width 12·5 millim.

Under the name *rubicundus*, Brölemann has described what he believes to be a variety of *R. obesus* from Cariblanco in Costa Rica (Ann. Soc. Ent. Fr. 1905, pp. 376–378). It seems to differ from the typical form in having the segments more distinctly sculptured with striolæ. Length from 106–143, width from 13·5–17 millim.

25. *Rhinocricus costaricensis*.

Rhinocricus costaricensis, Brölemann, Ann. Soc. Ent. Fr. 1905, pp. 375–6, t. 10. figg. 26–28.

Hab. COSTA RICA, Cariblanco.

Blackish, shining, with the antennæ and legs yellow. Antennæ very short and claviform, with many sensory papillæ. The posterior portions of the segments are shining and wrinkled along the sulcus, which is deep. The caudal process covers but does not surpass the valves, which have prominent and compressed but not sulcate margins.

Number of segments 44. Length 81, width 9·4 millim.

Apparently allied to *R. aposematus* and *R. tristani*, but differing from both in colour and in the form of the gonopods. The style of the phallopod is straight and very much shorter than the guard, which is very broad apically, with a somewhat rounded margin and a small dentiform process. The inferior portion of the sternal plate is narrow and linguiform.

26. *Rhinocricus nodosicollis*.

Rhinocricus nodosicollis, Brölemann, Ann. Soc. Ent. Fr. 1905, pp. 372-374.

Hab. COSTA RICA, Cariblanco (*Lankester*).

This species may be distinguished by a combination of the three following features, namely, the presence of only four sensory papillæ upon the terminal segment of the antennæ; a forward expansion of the first tergal plate to form a rounded lobe below the level of the eye; and the length of the caudal process, which projects considerably beyond the summit of the valves. The gonopods resemble somewhat those of *R. costaricensis*, but the inferior portion of the sternal plate is less abruptly narrowed and there is no spiniform tooth upon the apical expanded portion of the guard.

Number of segments 38-39. Length 61-69, width 7-8.3 millim.

It is mainly by the structure of the first tergal plate that *R. nodosicollis* may be distinguished at once from those described above, which resemble it in having a small number of antennary sensory papillæ. Brölemann apparently believed that the number of papillæ in these and other allied species was constant and always four. He even proposed to divide the genus *Rhinocricus* into two sections, named respectively Tetrarhabdi and Polyrhabdi, the former embracing the species with four papillæ and the latter those with many papillæ. But since four is not a constant number for the papillæ of the first group, the name proves to be ill-chosen. If a name be wanted, Oligorhabdi would be preferable. The character, nevertheless, is an extremely useful one for differentiating the numerous species of this difficult genus, and Brölemann is to be congratulated upon its discovery.

27. *Rhinocricus ocraceus*.

Rhinocricus ocraceus, Brölemann, Mém. Soc. Zool. Fr. 1900, pp. 124, 125, t. 8. figg. 115-119.

Hab. ISTHMUS OF PANAMA, Obispo (*coll. Gazagnaire*).

This species, which in all its characters appears to be a typical *Rhinocricus*, may be distinguished from the rest of the Central-American members of this genus known up to the present time by its very small size, the total length of the male being only 26 mm. and the width less than 3 mm. It is also remarkable for the form of the anal segment, the valves of which are simply rounded and neither compressed nor margined, their summit being covered by an almost tuberculiform caudal process.

The scobinæ extend to the 28th segment, that is to say considerably past the middle of the body, which consists of 44 segments.

28. *Rhinocricus biolleyi*.

Rhinocricus (Eurhinocricus) biolleyi, Brölemann, Ann. Soc. Ent. Fr. 1903, pp. 132-135, t. 1. figg. 1-6; op. cit. 1904, pp. 371, 372, t. 10. fig. 22.

Hab. COSTA RICA, San José and Cachi.—Cocos I.

This species, the type of the subgenus *Eurhinocricus* of Brölemann, must be nearly related to the form described above (p. 67) as *Rhinocricus omiltemæ*. The number of segments ranges from 45–49 and the length from 34–47 millim. As in *R. omiltemæ*, there are only four sensory papillæ on the antennæ, and the transverse sulcus of the segments is replaced dorsally by a secondary sulcus.

The subgenus *Eurhinocricus* rests upon the structure of the gonopods. One peculiarity, however, upon which Brölemann lays stress can hardly be given the importance he claims for it. This is the fact that the guard of the seminal style consists of two thick chitinous rods united by membrane. The guard may be seen to be constructed on a similar though not identical plan in such species of *Rhinocricus* as *R. smithi* and *R. aurocinctus*, two species which further resemble *R. biolleyi* and *R. omiltemæ* in having only four antennary sensory papillæ, a feature formerly considered by Brölemann to be also peculiar to the subgenus *Eurhinocricus*.

Although *R. biolleyi* is closely allied to *R. omiltemæ*, the two appear to differ at least in the shape of the sternal plate of the gonopods, the inferior process of this plate being much thinner in *R. omiltemæ* than in *R. biolleyi*. Judging, too, from the figures, the guard of the seminal style is longer as compared with the distal segment in the latter than in the former species.

OXYPYGE.

Oxygyge, Silvestri, Boll. Mus. Torino, xi. no. 254, p. 4 (1896).

Differs from *Rhinocricus* in having the summit of each anal valve produced into a conspicuous backwardly-directed spine.

Type, *O. varicolor*.

In spite of Brölemann's opinion that the above-mentioned character upon which *Oxygyge* is based is not of generic or even subgeneric value, I think the importance Silvestri attached to it may be reasonably admitted.

1. *Oxygyge varicolor*.

Oxygyge varicolor, Silvestri, Boll. Mus. Torino, xi. no. 254, p. 4 (1896).

Colour variable, either wholly blackish or blackish with two dorsal rows of pale spots and yellowish legs.

Eyes subcircular, consisting of about 30 ocelli. Anterior portion of segments smooth; posterior portion rugose, inferiorly striate; transverse sulcus complete. Scobinæ extending from the 2nd to the 42nd segment. Tergite of anal segment with short attenuate caudal process, not surpassing the valves, which have their margins undefined by a groove; sternal plate triangular. Sternal plate of gonopods semicircular, with its inferior edge produced into a subquadrate process. Phallopod as in typical members of *Rhinocricus*; the distal segment long and slender; the seminal style short; the guard wide, much longer than the style.

Number of segments 54. Length 50, width 4 millim.

Hab. ISTHMUS OF DARIEN, Punta Sabana and the forest near Lago de Pita (*Festa*).

BIOL. CENTR.-AMER., Diplop., September 1908.

SPIROBOLUS, Brandt.

Spirobolus, Brandt (in part.).

Spirobolus (s. s.), Pocock, Journ. Linn. Soc., Zool. xxiv. p. 484 (1893).

Type, *Spirobolus bungii*, Brandt (from China).

For characters of this genus, see *infra*.

Apart from sexual features, the differentiating characters of the Central-American species of this genus known to me may be tabulated as follows:—

- a.* Eyes large, each consisting of about 60 ocelli; interocular area only a little greater than the diameter of each cluster of ocelli *platyops*, sp. n.
- a*¹. Eyes smaller, the ocelli less well defined and only about 20 in number on each side; interocular area from three to four times the diameter of each group of ocelli.
- b.* Infero-lateral crests exceedingly strong and widely spaced even quite at the posterior end of the body, each crest projecting as a spiniform process beyond the edge of the tergal plates; sternal plate of anal segment acutely angular posteriorly *hoplomerus*, sp. n.
- b*¹. Infero-lateral crests weaker, more numerous, not projecting as strong spiniform processes, although sometimes forming a series of serrations; sternal plate of anal segment rounded or obtusely angled posteriorly.
- c.* Infero-lateral angles of the second and third tergal plates rectangular, that of the third not like that of the fourth, which is widely rounded *stolli*, sp. n.
- c*¹. Infero-lateral angles of the third tergal plate evenly rounded like the fourth, that of the second usually widely convex.
- d.* A second anterior transverse sulcus extending across the tergal plates from pore to pore in front of the normal sulcus.
- e.* Lateral portion of first tergal plate not widely emarginate inferiorly in front *tepanecus*, Sauss.
- e*¹. Lateral portion of first tergal plate widely emarginate inferiorly in front.
- f.* Normal transverse sulcus complete and stronger, at least laterally, than the secondary sulcus in front of it; legs yellow *mystecus*, Sauss.
- f*¹. Normal transverse sulcus weaker than the secondary sulcus in front of it on all the segments, sometimes almost obsolete; legs fuscous *monticola*, sp. n.
- d*¹. No secondary transverse sulcus on the tergal plates in front of the normal transverse sulcus, which may be almost obsolete.
- g.* Median and posterior portions of dorsal area of terga almost smooth, polished, not perceptibly punctured or longitudinally striolate; posterior inferior angle of second tergal plate rounded but rectangular, the posterior and inferior edges almost at right angles to each other *godmani*, sp. n.

- g*¹. Median and posterior portions of dorsal area of terga punctured and striolate, especially adjacent to the transverse sulcus; posterior inferior angle of second tergal plate obtusely rounded, the inferior edge oblique.
- h*. Antennæ and legs yellow; sculpturing coarser *fossulifer*, sp. n.
- h*¹. Antennæ and legs fuscous; sculpturing finer *amulensis*, sp. n.

Unfortunately Saussure and Humbert did not describe or figure the copulatory apparatus of the species recorded in their monograph, and in only three of the forms known to me are males available for dissection. These three differ markedly from each other in the structure of these organs, as the following tabulation attests:—

- a*. Sternal plate strongly arched, deeply concave above, much deeper in the middle than at the sides; anterior lamina of the coleopod mesially shallow, &c. *fossulifer*.
- a*¹. Sternal plate transverse, shallowly concave above, of even depth throughout; anterior lamina of coleopod large, deeper in the middle than at the sides, &c.
- b*. Posterior lamina of coleopod distally bifurcate; inferior processes of anterior lamina longer, a distinct semicircular emargination near the base externally *godmani*.
- b*¹. Posterior lamina of coleopod with curved undivided inferior angle; inferior processes of anterior coleopod shorter, no emargination externally near the base *stolli*.

So far as I can judge from the published descriptions of the anterior legs of the males, the species in which this sex has been examined may be distinguished by the structure of these appendages as follows:—

- a*. Coxæ of the legs from the fourth to the seventh pairs furnished with long apophyses, which equal in length the sum of the two succeeding segments *mystecus*, Sauss., ? *eximius*, Porat.
- a*¹. When coxal apophyses are present on the fifth, sixth, and seventh legs they are shorter than the sum of the two succeeding segments of these limbs.
- b*. Coxal apophyses of legs from the fourth to the seventh pairs lamelliform and apically bifid *tapanecus*.
- b*¹. Coxal apophyses of all the legs apically entire.
- c*. Coxal apophysis well developed only on third leg, where it forms a downwardly curved process *fossulifer*.
- c*¹. Coxal apophysis of third leg not larger than that of the fourth and fifth, and flat.
- d*. Coxal apophyses of all the legs very short, those of the third sub-equal to the rest *stolli*.

*d*¹. Coxal apophyses well developed, especially that of the fourth leg, which greatly exceeds in size that of the third.

e. Posterior angle of second tergal plate obtuse, anterior angle

acute *mexicanus*, Sauss.

*e*¹. Posterior angle of second tergal plate subrectangular *godmani*.

1. *Spirobolus platyops*, sp. n.

Colour (in alcohol) dark olive-black, with the first tergal plate bordered with yellow, the rest and the anal valves posteriorly bordered with yellow; head and antennæ olive-black; legs dark brownish-red, distally fuscous, with the tip of the tarsus clear yellow.

Head scarcely visibly sculptured; the median sulcus deep above and below, obsolete in the middle of the head, which is depressed; labral pores 3+3, 2 on each side close to the middle line and 1 remote. *Eyes* very large, forming an irregularly oval, transversely set mass of ocelli, about 60 in number and all well defined; distance between the eyes less than twice the diameter of either. *First tergal plate* coriaceous; neither the anterior nor the posterior borders of its lateral portion emarginate; the anterior border defined laterally as high as the eye with a distinct groove; the posterior border convexly rounded laterally above the angle. *Second segment* with its infero-lateral angle produced; both the anterior and posterior angles rounded, but the posterior much more obtusely so than the anterior, which projects lower in front. The remaining *segments* tolerably uniformly coriaceous; the anterior covered portion without distinct transverse grooves, the median portion pitted at least dorsally between the pores with oval crescentic or transversely elongate impressions and longitudinally striate inferiorly nearly up to the pore; the transverse sulcus defined up to the pore on each side, but scarcely traceable dorsally between the pores. No distinct median dorsal sulcus nor longitudinal sulcus behind the pores. *Anal segment* with tergal plate widely and obtusely angular behind the valves, lightly compressed towards the margin; sternum with evenly rounded posterior border.

Number of segments 59. Total length about 65 millim.; anterior width 6.5, median width 6.5, posterior width 5.5.

Hab. MEXICO, Mescalá.

This species is based upon a single female specimen, which differs markedly from all the Central-American examples of *Spirobolus* known to me in the large size of the eyes and the differentiation of the ocelli. In this, as in some other characters, *S. platyops* approaches the genus *Trigoniulus*, which, however, has only 2+2 labral punctures.

2. *Spirobolus hoplomerus*, sp. n. (Tab. VII. fig. 5.)

♀. *Colour* (in alcohol) dark olive-brown, with the posterior portion of the segments reddish-brown; first tergal plate bordered with reddish-brown; labral region and posterior portion of anal valves also reddish-brown; legs dark brown at base, clear brownish-yellow distally.

Head mostly smooth and polished, weakly punctured, more thickly and distinctly punctured above; labral pores 4-5. *First tergal plate* weakly punctured, shining; its anterior border biemarginate laterally, the upper and shallower emargination just behind the eye; the antero-lateral groove weak; the posterior border not laterally emarginate. *Second tergal plate* with its antero-inferior angle thickened and produced, its posterior angle obtusely rounded, the lateral area of the plate scarcely perceptibly grooved. *Third tergal plate* with evenly rounded infero-lateral angle. The anterior covered portion of the terga finely ridged transversely; the median portion closely and finely punctured and rugulose, especially in the shallow depression marking the junction of the median and posterior portions. Laterally the median portion is finely and obliquely crested or grooved at least halfway up to the pore. A varying number of these crests are continued across the posterior portion as strong ridges, which pass into tolerably widely spaced spines projecting beyond the edge of the tergal plates; these spines do not extend up as

high as the pore, and on the third and fourth tergal plates they take the form of rounded tubercles. The dorsal and lateral areas of the posterior portion of the terga are anteriorly rugulose, posteriorly nearly smooth. There is no distinct longitudinal groove either in the dorsal middle line or behind the pore. The transverse sulcus is almost lost dorsally in the sculpturing of the terga, but lies in the transverse depression. *Anal segment* with tergal plate finely punctured; its angular caudal portion sharply defined by a deep groove and much more coarsely and closely punctured; valves nearly smooth, finely punctured, with margins compressed; sternal plate angularly pointed.

Number of segments 44. Total length 112 millim.; anterior width 11, median width 14, width of anal segment 9.

Hab. GUATEMALA, Costa Cuca, Pacific slope (*O. Stoll*).

Although based upon a single female specimen, the characters of this species are well-marked. It appears to differ from all those hitherto described in the presence of the strong ridges terminating posteriorly in spines upon the lateral portion of the posterior area of the tergal plates. An indication of similar spine-armature is seen in *S. fossulifer*; but in the latter the ridges are much finer, and terminate posteriorly in fine serration. Two more features that may be mentioned are the acutely triangular sternal plate and the deep transverse sulcus that marks the caudal prolongation of the anal segment.

3. *Spirobolus stolli*, sp. n. (Tab. VII. figg. 3 *a-e*, 4.)

Colour piceous, or olivaceous with the posterior borders of the somites piceous, sometimes rufescent; legs and antennæ piceous or fuscous. *Body* nearly cylindrical.

Head finely punctulate above, with coarse punctuation below, 3 or 4 labral pores on each side, the vertical sulcus marked above and below, obsolete in the middle. *Antennæ* a little shorter than the head. *First tergal plate* with its anterior border sinuate on a level with the eye, the border defined by the groove straight, the posterior border of the lateral portion also nearly straight, the angle acute, rounded. The *second tergal plate* excavated below, the posterior angle rounded but rectangular, the anterior angle rounded and scarcely produced anteriorly. The *third segment* also with its postero-lateral angle convexly rectangular. The rest of the *segments* nearly smooth above, only very finely coriaceous and punctulate. The transverse sulcus complete or, in large examples, almost entirely obsolete dorsally; the pore-sulcus almost obsolete in adults. The *anal segment* large; the valves with their margins not compressed, or at most very slightly so; the sternal plate very obtusely angled or sometimes with merely a convex posterior margin.

♂ smaller and slenderer; the 7th somite a little swollen; the coxæ of 3rd to the 7th legs a little produced posteriorly, the dilatations subequal; the second and third segments of these same legs inferiorly crested.

Copulatory apparatus very like that of *S. godmani*; but the inferior processes of the anterior laminae are shorter, scarcely emphasised externally at the base by a notch, and the inferior angle of the posterior lamina is more curled and not bifurcate.

Number of segments 41-43. Measurements of large ♀: length 110 millim.; width 12, of first segment 10.5, of anal segment 9.3; height of anal segment 9.5, of median segment 10.2. Of ♂: length about 82, width 9.

Hab. GUATEMALA, Pachuta (*O. Stoll*).

Easily distinguishable from *S. godmani* by the difference in colour, the form of the first and second tergal plates, of the copulatory apparatus, &c.

Apparently allied to *S. tzendalus* of Saussure in the obsolescence of the transverse sulcus, the feeble development of the lateral striæ, the form of the first and anal tergal

plates, &c, but differing in the absence of a transverse sulcus on the head and in the presence of strong punctures above the labrum.

In size this species resembles *S. eximius*, Porat, which also came from Guatemala; but the two certainly appear to differ in the shape of the lateral portion of the first tergal plate, which is described as anteriorly emarginate in *S. eximius*, and also in that of the second, which is inferiorly obliquely truncate in the latter species. More especially does *S. stollii* differ from *S. eximius* in that the coxæ of the fourth to the seventh legs are only slightly produced.

A single female specimen of the same or of a closely allied species (fig. 4), from Costa Cuca, Guatemala (*O. Stoll*), differs from the typical examples in having the lateral sulci stronger and more widely spaced.

4. *Spirobolus godmani*, sp. n. (Tab. VII. figg. 1 *a-e*.)

Colour ferrugineo-olivaceous; legs and antennæ red; anterior border of the collum, posterior borders of the somites, and margins of valves with a narrow red band.

Head convex, smooth, and polished; the sulcus very feeble, with 3 or 4 labral pores on each side. *Antennæ* as long as the head. *Eyes* small, composed of from about 16 to 20 ocelli. *First tergal plate* smooth, very much narrowed laterally, with the anterior and posterior borders emarginate; a distinct groove. The *second tergal plate* infero-laterally expanded with sinuous edge, excavated below; its posterior angle rounded but rectangular; the anterior angle rounded and but little produced forwards. The rest of the *segments* smooth and polished dorsally, the anterior portion, however, finely striolate transversely; the lateral area of the segments behind the sulcus longitudinally striate, in front of it feebly obliquely striate. The transverse sulcus complete over the dorsum and well defined, the area behind it very slightly raised; a very feeble longitudinal sulcus marking the position of the pore behind. *Anal segment* very large (*cf.* measurements); the tergal plate posteriorly rounded or obtusely angled, covering but not surpassing the summit of the valves; valves with their margins lightly compressed.

♂. Smaller and slenderer, with the seventh somite dilated. Coxæ of the fourth legs produced into a long apophysis, the third, fifth, sixth, and seventh similarly but less conspicuously developed.

Copulatory apparatus with sternal plate shallow, very feebly emarginate; anterior lamina of coleopod produced inferiorly into an admedian sublinguiform process in contact with its fellow of the opposite side and emphasised externally at the base by a distinct semicircular notch; the posterior lamina almost semilunar, convex internally, concave externally, the inferior angle very distinctly bifurcate, the lower process of the fork longer than the upper.

Number of segments 42. Measurements of large ♀: length 87 millim.; median width 11; width of first tergal plate 9.3, of anal segment 7.5. ♂: length 62 millim., width 8.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

This species apparently differs from all those described and figured by Saussure, *S. tzendalus* excepted, in having the posterior angle of the second segment rectangular, not obtuse, and from *S. tzendalus* it seems to be distinguished by having the antero-lateral border of the first tergal plate emarginate instead of straight.

5. *Spirobolus fossulifer*, sp. n. (Tab. VII. figg. 2 *a-e*.)

Colour (in alcohol) piceous or ochraceous; legs and antennæ of the same tint as the body.

Head faintly transversely striolate, with 6 or 8 labral pores; the median sulcus obsolete in the middle. *First tergal plate* with the anterior border of the lateral angle perfectly straight, the posterior border convex.

The posterior angle of the *second segment* rounded and obtuse; the anterior angle also rounded and slightly produced. The rest of the *segments* striolate and somewhat coarsely punctured, especially along the groove where the transverse sulcus runs, the lateral surface closely but feebly striate, and posteriorly serrulate up to the pore; the transverse sulcus either entirely obsolete above or nearly so; not bifurcating above the pore. *Anal segment* large; the tergal plate wide and obtusely angled posteriorly, not quite covering the valves, which have lightly compressed margins; sternal plate with convex border.

Male slenderer, with the coxæ of the first and second legs unmodified; those of the third produced into a soft flexible short process; those of the fourth with a shorter blunter process, and of the fifth to the seventh unmodified.

Copulatory apparatus with the sternal plate strongly curved, concave above, deeper than in the other species and mesially impressed; the anterior laminae of the *coleopods* wider laterally than mesially, where they are punctured, and produced into a short downwardly directed process; the posterior lamina with its inferior angle strongly curved outwards. The *phallopod* with its proximal segment in the form of a long slender rod; the distal segment short, but longer than wide, laminate, externally geniculate at its base, its outer margin convex and finely serrate.

Number of segments 41 to 46. Length of large female specimen about 73 millim.; median width 8.7; width of first segment 7.7, of last 6, height of latter 6.2.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

Apart from the secondary sexual characters of the male, this species differs from all the Central-American species known to me in the coarse and very distinct punctuation of the posterior area of the segments. In this particular *S. fossulifer* seems to come nearest to *S. reptans*, Porat, from Guanajuato (*cf. infra*); but is doubtless distinct, for Porat described the second segment of *S. reptans* as being scarcely produced below the level of the inferior angle of the first.

6. *Spirobolus amulensis*, sp. n.

Colour (in alcohol): head, legs, antennæ, first and anal segments olivaceous; anterior and posterior borders of first and posterior borders of the other segments ferruginous.

Head smooth; 6 labral pores; sulcus mesially incomplete. Anterior border of lateral portion of *first tergal plate* very slightly emarginate; posterior border evenly convex. The posterior angle of the *second segment* convex and evenly rounded; the anterior angle scarcely at all produced in front, forming a continuous line with the anterior border of the segment. The rest of the *segments* dorsally punctulate, striolate, laterally weakly striate up to or nearly up to the pore, those at the hinder end of the body laterally serrulate; the transverse sulcus manifest, as high as the pore, not bifurcating above it; the anterior portion of the segments slightly but distinctly elevated, being separated from the posterior portion by a shallow depression, this difference of level being especially well marked in the anterior half of the body. *Anal segment* with tergal plate produced into a widely rounded process covering the summit of the valves, which are very lightly compressed; sternal plate obtusely triangular.

Number of segments 48. Length about 100 millim.; width 10, of first segment 8.5, of anal segment 6; height of anal segment 6.5, of body 9.8.

Hab. MEXICO, Amula in Guerrero (*H. H. Smith*).

This species may be distinguished from the rest here described by the smooth elevated ridge which crosses the anterior segments from side to side. It differs further from *S. tepanecus*, *S. mystecus*, and *S. monticola* in that the transverse sulcus does not bifurcate above the pore. Moreover, the anterior angle of the second segment is scarcely at all produced. From *S. fossulifer* it may be separated by the characters

enumerated in the above-given analytical Key. Three small female specimens from Ciudad in Durango, Mexico (*Forrer*), represent the same or a closely allied species. The number of segments varies from 44 to 47, and the length of the largest is 55 mm. and the width 7 mm.

7. *Spirobolus monticola*, sp. n.

Colour ferrugineo-olivaceous, the first tergal plate with a reddish-yellow band running along the dorsal portion of its anterior and posterior margin, a similar band on the dorsal portion of the posterior margin of the rest of the segments.

The *head* marked below with abbreviated vertical sulci. The *first tergal plate* with the anterior border of the lateral portion widely emarginate, the posterior border evenly convex. The *second* with its posterior angle rounded and obtuse, the anterior angle rounded and produced more forwards. The rest of the *tergal plates* distinctly punctulate and striolate throughout, laterally striate up to the pores, the transverse sulcus very feeble, represented by a slight depression; the dorsum marked by a transverse sulcus, which is continued from the level of the pore in front of the true sulcus. *Anal segment* small; valves small, with their compressed margins projecting far beyond the apex of the tergum.

Number of segments 45. Measurements: length 87 millim.; width 11.3, of first segment 8.5, of anal tergite 6.8; height of anal segment 7, of body 10.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

This species seems to resemble *S. mystecus* in the form of its first tergal plate, but the second segment is much less strongly produced inferiorly. It is also considerably stouter in build and more closely sculptured than the specimen from San Andres Tuxtla described below; but in this respect *S. monticola* resembles Saussure's examples of *S. mystecus*.

In the form of the inferior portion of the second segment, *S. mystecus* occupies a position intermediate between *S. tepanecus* and *S. monticola*.

8. *Spirobolus tepanecus*.

Julus tepanecus, Sauss. Linn. Ent. xiii. p. 332 (1859); id. Mém. Soc. Phys. Genève, xv. p. 568, t. 5. fig. 35 (1860).

Spirobolus tepanecus, Sauss. et Humb. Miss. Sci. Mex., Myr. pp. 88, 177 (1872).

Colour (in alcohol) olivaceous or ochraceo-olivaceous; the posterior border of the segments fusco-olivaceous; legs, antennæ, and lower surface ochraceous.

Head punctulate, with a complete median sulcus, the labral region roughened with punctures and grooves; eyes composed of about 26 ocelli arranged in four transverse rows. The *first tergal plate* laterally narrowed, the antero-lateral border nearly straight, the postero-lateral border with a slight notch above the angle. The *second segment* with the posterior angle of the inferior portion rounded and obtuse, the anterior angle strongly produced, the process forming a bluntly acute angle; the posterior border lightly notched, the base of the process bearing a deep fossa. The rest of the *segments* finely striolate and punctulate. The transverse sulcus strongly developed, bifurcating at the pore and extending over the dorsum as two parallel grooves, of which the posterior is the stronger; a weak longitudinal sulcus running backwards from the pore. The lateral surface striate nearly up to the pore; the posterior border of the lateral and inferior surface in the hinder part of the body finely serrate. The *anal tergal plate* distinctly but obtusely angled above, the margin of the valves projecting considerably beyond its apex; the sternal plate angular.

In the male the coxæ of the legs from the fourth to the seventh pairs are furnished with a lamelliform prolongation which is apically two-pointed.

Number of segments 44-47. Length of described ♀ 94 millim.; width 10, width of first tergal plate 8·7, of anal segment 6; height of latter 6·3.

Hab. MEXICO, Cordova.

The above-given diagnosis of the female is taken from an example in the British Museum which appears to be identical specifically with the specimens originally described by Saussure from the same locality. The information regarding the anterior coxæ of the male is derived from the Monograph published by Saussure and Humbert in 1872. From this it appears that the coxal dilatations are lamelliform, but differ from those of all the other Central-American species in being apically bifid.

9. *Spirobolus mystecus*.

Julus mystecus, Sauss. Mém. Soc. Phys. Genève, xv. p. 569, t. 5. fig. 36 (1860).

Spirobolus mystecus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 177 (1872).

Colour olivaceo-ochraceous, with ferruginous borders to the segments; legs pale.

Head as in *S. tepanecus*. *First dorsal plate* with its anterior border strongly emarginate, and not almost straight as in *S. tepanecus*; the anterior angle of the *second segment* considerably less strongly produced. The rest of the *segments* sculptured almost exactly as in that species. The *anal tergal plate* obtusely rounded, less acute than in *S. tepanecus*, and not covering the summit of the valves.

In the male the coxæ of the legs from the fourth to the seventh pairs prolonged in the form of a long styliiform appendix, which is almost or quite as long as the sum of the two succeeding segments of these legs.

Number of segments 47 (♀), 45 (♂). Length of above-described ♀ 92 millim.; width almost 10, of first tergal plate 8, of anal segment 6·2; height of latter 6·5.

Hab. MEXICO, Oaxaca [type], San Andres Tuxtla (*Mus. Brit.*).

The above-given description of the female is taken from a specimen from San Andres Tuxtla in the British Museum, which in most characters appears to agree with Saussure's cotypical examples, but is perhaps rather smoother.

Comparing the females of *S. tepanecus* and *S. mystecus*, Saussure says that the latter is very nearly allied to the former, but differs from it in having the lateral sulci on the segments extending higher, the second segment obliquely truncate and a little rounded at the apex, with the angles less produced, and the anal sternal plate transverse, truncate, and in the middle subemarginate. The subsequent discovery of the male of *S. tepanecus* showed that the two species might be readily distinguished by the form of the coxal processes of the anterior legs, those of *S. tepanecus* being lamelliform and bifid and those of *S. mystecus* elongate, styliiform, and with simple undivided apices.

The following species are known to me only from descriptions and figures:—

10. *Spirobolus mexicanus*.

Julus mexicanus, Sauss. Linn. Ent. xiii. p. 332 (1859); id. Mém. Soc. Phys. Genève, xv. p. 566, t. 5. fig. 34 (1860).

Spirobolus mexicanus, Sauss. et Humb. Miss. Sci. Mex., Myr. p. 177 (1872).

BIOL. CENTR.-AMER., Diplop., *September* 1908.

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Colour of living animal blackish ; when dried or preserved in alcohol paler, with the posterior borders of the segments darker.

Body robust, cylindrical, a little narrowed in front and behind. *Head* with several labral pores ; the sulcus mesially interrupted. *Antennæ* short and compressed. *Eyes* triangular, consisting of 5 horizontal rows of ocelli. *First tergal plate* with its inferior angle rounded, the anterior border concave, the posterior convex. The *second tergal plate* projecting far below the first, its inferior border very oblique, the anterior angle produced, a depression marking the surface of this portion of the somite. *Anal segment* obtuse ; the tergal plate obtusely angled, surpassed by the valves, which are punctured ; sternal plate very obtusely rounded. The rest of the *segments* punctulate, but smooth and shining ; the transverse sulcus very feeble, the area in front of it finely and obliquely striolate below, the corresponding area behind it longitudinally sulcate.

♂. *Coxa* of the first and second legs thick, large and swollen ; coxa of third terminated by a soft spine ; of the fourth to the seventh pairs produced into a blunt apophysis, diminishing in size posteriorly from the third to the seventh and not comparable to the long stylets of *S. mystecus*.

Number of segments 41-46 in ♂, 41-44 in ♀. Length 56 millim. (contracted), width 8 millim.

Hab. MEXICO, Cuernavaca, Cuautla, Hacienda of Atlahuazan near Yautepec.

11. *Spirobolus tzendalus*.

Julus tzendalus, Sauss. Mém. Soc. Phys. Genève, xv. p. 570, t. 5. fig. 37 (1860).

Spirobolus tzendalus, Sauss. et Humb. Miss. Sci. Mex., Myr. p. 178 (1872).

Described as very closely allied to *S. tepanecus* and *S. mystecus*, and especially to the latter, which comes from the same locality ; but differing in being larger, less coarsely striate, without any transverse sulcus on the segments, and in having the anal tergal plate rounded at the apex and not angled.

Number of segments 45. Length 100 millim., width about 11 millim.

Hab. MEXICO, Oaxaca.

Unfortunately the male of this species is not known. It is highly probable that the type was an old and large example of *S. mystecus*.

12. *Spirobolus eximius*.

Spirobolus eximius, Porat, Ann. Soc. Ent. Belg. xxxii. pp. 248, 249 (1888).

Colour (dry specimen) luteous or testaceous, with the median area of the segments spotted with ashy-black ; the summit of the head, the middle of the first tergal plate, the apex of the last tergal plate, and the margins of the valves fuscous ; legs and antennæ luteous, the latter sometimes annulated with ashy-black.

Head sparsely but deeply punctured, rugose, more coarsely above and below, median sulcus complete or interrupted ; labral pores 4 or 5 on each side ; *eyes* composed of about 25 ocelli. *First tergal plate* with infero-lateral portion triangular, the anterior border sulcate and lightly emarginate ; the posterior border straight or lightly emarginate. *Second segment* obliquely truncate infero-laterally. The rest of the segments sparsely punctate and coriaceous ; the transverse sulcus distinct ; the lateral sulci not extending so high as the pores and forming a serrulate margin to the sulci ; a distinct sulcus marking the pore and another fainter in the dorsal medial line. *Anal segment* short, rugose, very widely and obtusely angled posteriorly ; valves rugose, with thickened compressed margins ; sternal plate at most slightly angled.

♂. *Coxæ* of third to seventh legs strongly produced and flattened. *Copulatory organ* with sternal plate very small ; anterior lamina of coleopods very large, wide, acuminate apically ; posterior lamina apically incised and turned backwards.

Number of segments 44 to 48. Length of ♀ 95 millim. ; width 9.5, of first tergal plate 8. Length of ♂ 125 millim. ; width 12.5, of first tergal plate 11.2.

Hab. GUATEMALA (*Boucard*).

This species was believed by Porat to be very nearly allied to, if not identical with, *S. mystecus*, Sauss., but to differ in having the anal sternal plate rounded or angled, not emarginate, and the first tergal plate with its antero-lateral border less excavated.

13. *Spirobolus reptans*.

Spirobolus reptans, Porat, Ann. Soc. Ent. Belg. xxxii. pp. 250, 251 (1888).

Colour (dry specimen) brownish, posterior border of segments ferruginous or blackish; feet and antennæ fuscous.

Head shining, impressed with punctures and wrinkles; median sulcus interrupted; labral pores 4 to 5 on each side. *First tergal plate* with the lateral portion acutely triangular, anteriorly sulcate and emarginate. *Second tergal plate* scarcely extending below the level of the first and not excavated beneath. Rest of the segments strongly and equally punctate and coriaceous; transverse sulcus distinct but not deep; the lateral sulci extending up to the pores. *Anal segment* with tergal plate punctate, obtusely angled posteriorly; valves rugose, with margins compressed; sternal plate posteriorly rounded.

Number of segments 45–46. Length 60 millim.; width 7, of first tergal plate 6.

Hab. MEXICO, Guanajuato (*E. Dugès*).

This species seems to differ from all those here referred to *Spirobolus* in having the inferior margin of the second tergal plate produced scarcely below the level of the angle of the first, and since its margin is not thickened the segment does not present the appearance of being excavated below.

The following two species, which are unnamed and referred to the genus *Rhinocricus*, seem to belong without doubt to *Spirobolus*:—

Rhinocricus sp., Brölemann, Mém. Soc. Zool. France, xiii. p. 101, t. 7. figg. 66–68 (1900).

Hab. GUATEMALA (*Rodriguez*).

Rhinocricus ? sp., Brölemann, Bull. Soc. Zool. France, xxix. p. 190 (1904).

Hab. GUATEMALA (*Rodriguez*).

CYCLOTHYRPHORUS, gen. nov.

Nearly allied to *Spirobolus*, but with the valves of the anal segment strongly convex, their margins not compressed or sulcate, but incurved so as to form a re-entering angle or deep triangular groove where they meet in the middle line (Tab. VII. fig. 6 b). Lateral portions of the first tergal plate narrowed, triangular, leaving the mandible largely exposed.

Type, *C. salvini*.

In addition to the type-species, I refer tentatively to this genus the three forms described as *Spirobolus nietanus*, *heteropygus*, and *vulvanus*, which, so far as I can judge,

have the anal valves shaped as in *C. salvini*. The four seem to be distinguishable as follows:—

- a.* First tergal plate not extending so low as the second and not marked with an antero-lateral groove; no apophysis on coxa of third leg in male *salvini*, sp. n.
- a*¹. First tergal plate extending as low as the second and marked with a distinct antero-lateral groove.
- b.* First tergal plate less strongly emarginate laterally in front and marked with short longitudinal grooves behind, the angle rounded; (third leg of male with coxal apophysis) *heteropygus*, Sauss. & Humb.
- b*¹. First tergal plate widely excavated in front laterally, without any grooves behind; the angle acute.
- c.* Tergal plates smooth and shining; (third leg of male with coxal apophysis) *nietanus*, Sauss.
- c*¹. Tergal plates punctured and rugose *vulvanus*, Karsch.

1. *Cyclothyrophorus salvini*, sp. n. (Tab. VII. figg. 6 *a-d*.)

Colour (in alcohol) brownish or ochraceous, the posterior border of the tergal plates fuscous; legs and antennæ ochraceous.

Body long, slender, and subcylindrical. *Head* convex, smooth, the sulcus mesially interrupted, with 3+3 or 4+4 labral pores. *Eyes* very widely separated and ill-defined. *Antennæ* short, thick, compressed, and incrassate; the second and third segments about equal in length. *First tergal plate* with the lateral portion acutely angled, the posterior edge convex, the anterior manifestly emarginate and without trace of a sulcus. The *second tergal plate* projecting below the level of the first, but not inferiorly produced and not excavated below. The rest of the segments smooth and polished or lightly striolate and punctulate; the lateral sulci extending only a short distance above the legs; the transverse sulcus not extending up to the pore or at least never beyond it. *Pores* conspicuous, high above the middle of the side. *Anal segment* with tergal plate produced above into a wide, posteriorly rounded, caudal process covering the summit of the valves; the latter convex, with the margins not compressed, the posterior third of each curving abruptly inwards to meet that of the opposite side, forming a blunt termination to the body, the plane of the posterior portion of the valves being convex from above downwards, but flat or nearly so from side to side; sternal plate triangularly rounded.

Number of segments 49-53. Length up to 37 millim., width less than 3 millim.

Hab. MEXICO, Amula in Guerrero (*H. H. Smith*).

The following species, which are known to me only from the authors' figures and descriptions, appear to belong to this genus:—

2. *Cyclothyrophorus nietanus*.

Julus nietanus, Sauss. Mém. Soc. Phys. Genève, xv. p. 565, t. 5. figg. 33 *a-d*, *o* (1860).

? *Spirobolus nietanus*, Sauss. et Humb. Miss. Sci. Mex., Myr. p. 89 (1872).

Small, cylindrical, with the seventh and eighth segments dilated. *Head* polished, punctured below, with 5+5 or 4+4 labral pores. *First tergal plate* with its antero-lateral border widely emarginate, its inferior angle very acute and extending slightly below the level of the second, which is not produced

inferiorly below the level of the third. The remaining *segments* smooth and shining; the normal transverse sulcus complete and preceded by an additional complete sulcus; a well-marked longitudinal sulcus in front of and behind the pore. The lateral sulci or striæ strongly defined. *Anal segment* with tergal plate obtusely rounded, marked with a transverse rugulose groove; valves scarcely surpassing the tergal plate, strongly punctured, convex and not compressed marginally; sternal plate rounded.

♂. Sixth and seventh segments with their lower surfaces thickened and extending inferiorly. *Coxa of second leg* large; that of third leg bearing a long slender pointed process; coxæ of fourth, fifth, and sixth with a wide somewhat triangular apophysis.

Number of segments 44. Length 32 millim.

Hab. MEXICO, Cuernavaca.

This species may be distinguished at once from *C. salvini* by having the lateral portion of the first tergal plate very acutely angled, more strongly emarginate, deeply grooved, and extending at least as low as, if not lower than, the second. Also in the secondary sexual characters of the male, especially in the processes of the long coxal apophysis on the third leg and the marked expansion of the tergal plates around the copulatory apparatus.

It is possible that the specimens from Cuernavaca referred to *C. nietanus* by Saussure and Humbert in 1872 represent a distinct species, although from the same locality. They at least differ from the type in measuring 55 mm. as opposed to 32 mm. in length, and in having from 47 to 49 segments instead of 44.

3. *Cyclothyrphorus heteropygus*.

Spirobolus heteropygus, Sauss. et Humb. Rev. et Mag. Zool. 1869, p. 154; Miss. Sci. Mex., Myr. pp. 90, 177, t. 4. fig. 22 (1872).

♂. Blackish, the posterior border of the segments pallid in dried specimens. *Head* with 4+5 labral pores; *eyes* large and circular; *antennæ* tolerably slender. *First tergal plate* with its infero-lateral portion extending as low as that of the second and terminating in a rounded angle, with the anterior border a little emarginate and defined by a strong groove; with from 3 to 5 short grooves near its posterior border. Remaining *segments* with their posterior portion punctured, especially in the posterior half of the body; the lateral striæ or sulci very strong. *Pores* large. *Anal segment* with tergal plate short, rounded posteriorly, not surpassing the valves, which are punctured and have their borders neither compressed nor sulcate but evenly convex and forming at their junction a re-entering angle. ♂ (immature) with the coxæ of the legs of the third pair produced into long contiguous processes; those of the fourth to the seventh pairs showing a small swelling. Sixth and seventh segments swollen below.

Number of segments 49. Length 47 millim., width 3.6 millim.

Hab. MEXICO, Cuernavaca.

This species is said by Saussure and Humbert to be very like *S. nietanus*, which also came from Cuernavaca, but to differ in having the lateral portions of the first tergal plate much less narrowed and emarginate and provided with longitudinal sulci near its posterior margin and also in having the inferior sulci much stronger and extending up to the pores. It may also be added that the tergal plates are thickly punctured dorsally, whereas in *S. nietanus* they are described as smooth.

4. *Cyclothrophorus vulvanus*.

Spiroboles vulvanus, Karsch, Zeitschr. ges. Naturwiss. (3) vi. (liv.) p. 55 (1881).

Colour black, with the posterior borders of the tergal plates flavous.

Head nearly smooth, with 3 or 4 labral pores on each side; area between the antennæ impressed. *First tergal plate* with its lateral portion extending inferiorly as far as that of the second, narrowed, subacute, the anterior margin excavated and defined by a sulcus. The rest of the segments with the transverse sulcus not deep; the median portion very finely subrugose, sculptured with longitudinal striæ and scattered punctures; inferiorly striate, posterior portion slightly convex, sulcate beneath, sparsely impressed with punctures, marked with a median dorsal sulcus and a lateral sulcus behind the pore, which is placed behind the transverse sulcus. *Anal segment* punctured; tergal plate widely rounded; valves strongly convex, vulviform.

Number of segments 43. Length 30 millim.

Hab. MEXICO, Puebla (*Berckenbusch*).

So far as can be judged from the description, this species is very nearly related to *S. nietanus*. The form of the first tergal plate is not very, if at all, different in the two, and the conformation of the anal valves appears to be the same—that is to say, they are convex with the margins uncompressed and forming a re-entering angle where they meet, so as to conform to the type that Karsch described as “vulviform.” In size and number of segments the two species are also alike. Unfortunately Karsch says nothing about the secondary sexual character of the male, although both sexes were available for examination. *C. vulvanus* appears, however, to differ from *C. nietanus* at least in the distinct sculpturing of the tergal plates.

SPIROBOLELLUS.

Spirobolellus, Pocock, in Max Weber's Zool. Ergebnisse einer Reise in Niederl. Ost-Ind. 1894, p. 398.

For characters, see *infra*, p. 89.

This genus was based upon a single species, *S. chrysodirus*, from Sumatra. It is possible that the Central-American forms here referred to it may prove to be generically distinct; but until a revision of all the genera of this family has been taken in hand, I prefer to assign to *Spirobolellus* the three species described below. These may be distinguished as follows:—

- a. Larger, length up to or over 50 mm.: sculpturing very coarse and pitted; a well-developed caudal process; posterior lamina of coleopod entire inferiorly; first tergal plate very wide laterally, with the thickened anterior border largely overlapping the base of the mandible *richardsoni*, sp. n.
- a¹. Smaller, length only up to about 40 mm.: sculpturing comparatively weak; no caudal process; posterior lamina of coleopod deeply emarginate below, cut out into an outer stout and an inner slender more styliform process; first tergal plate much narrower laterally, and its anterior border less thickened and not concealing the basal segments of the mandibles.

- b.* Anterior lamina of coleopod with its inferior admedian angle produced into a distinct apically convex process; tarsi of third to the seventh pairs of legs swollen and armed with a minute claw *tylopus*, sp. n.
- b'*. Anterior lamina of coleopod not produced inferiorly into an admedian process; tarsi of all the anterior legs normal and armed with a strong claw *atriculus*, sp. n.

1. *Spirobolellus richardsoni*, sp. n. (Tab. VII. figg. 7 *a-e*.)

Colour a deep olive-black, with the borders of the first tergal plate, the posterior borders of the other terga and the apex of the tail, and the legs ferruginous or yellow; antennæ yellow, clouded with fuscous.

Head smooth, only slightly wrinkled, with 3+3 labral pores. *Eyes* subcircular, widely separated, consisting of about seventeen indistinct ocelli. *Antennæ* short. *First tergal plate* very wide laterally, overlapping to a great extent the mandibles and partially also the antennæ when lying back in the hollow of the mandibles; the inferior angles rounded; anterior margin wide and defined by a distinct groove. *Second tergal plate* wide inferiorly, where it is largely overlapped by the first, its inferior edge a little produced downwards. All the *segments* from the seventh to the penultimate with their median portion very coarsely sculptured from the summit almost down to the legs with larger and smaller close-set subcircular pits; the posterior portion smooth dorsally, somewhat coarsely striate and crested laterally and inferiorly, but not so high as the pore, these striæ continuous with the pitted sculpturing of the median portion of the terga; anterior portion only very finely striolate. The transverse sulcus of the terga distinct, but almost lost dorsally in the sculpturing; a longitudinal stria present behind the pores. *Anal segment* with its tergal plate less coarsely sculptured than the rest, rugulose, produced posteriorly into a rather wide and flat, apically rounded, caudal process which surpasses the summit of the valves; valves with the margins neither compressed nor sulcate; sternal plate with convex posterior border.

♂. Copulatory apparatus as figured on Tab. VII. figg. 7 *b, c*; the anterior lamina of the coleopod not produced inferiorly on the admedian side into a definite process; the posterior lamina subquadrate, not inferiorly excavated and divided into two processes; phallopod (Tab. VII. figg. 7 *d, e*) forcipate, the proximal segment ending in a spatulate process, the distal in a strongly curved slender process opposed to it; between them a slender styloform process.

Number of segments 45-46. Length of ♀ 5.6 millim., width about 5.5 millim.

Hab. MEXICO, Tampico in Tamaulipas (*Richardson*).

2. *Spirobolellus tylopus*, sp. n. (Tab. VII. figg. 8 *a-d*.)

Colour (in alcohol) dark slate-grey, with the posterior border of the tergal plates black; head and antennæ reddish-brown clouded with fuscous; legs almost wholly clear yellow.

Head with sulcus mesially obsolete, almost smooth; labral pores 2 to 4 on each side. *Eyes* composed of about 20 indistinct ocelli. *Antennæ* slightly incrassate, the segments subequal in length. *First tergal plate* much narrower laterally than in *S. richardsoni* and not concealing the mandible, extending, however, at least as low as the second; its anterior border somewhat widely emarginate, defined by a groove which passes from the level of the eye down and back to the postero-lateral angle, which is obtuse; antero-lateral angle rounded. Remaining *segments* without any definite transverse sulcus, but marked with a shallow depression which passes from side to side, over the segment behind the pores; posterior portion laterally longitudinally striate about halfway up to the pores, and irregularly striolate and feebly sculptured dorsally behind the smooth posterior margin; median portion much more definitely and coarsely sculptured or pitted with short transverse shallower and deeper grooves, frequently crescentic in shape; anterior portion not distinctly striate transversely. *Anal segment* with the tergal plate not produced into a caudal process, convex, scarcely even angled, although covering the summit of the valves; valves smooth, with margins unthickened and not in any way compressed; sternal plate obtusely triangular.

♂. Smaller than ♀, with seventh segment expanded. Legs of first and second pairs normal, with slender

tarsi and distinct claws; tarsus of third to seventh pairs of legs inflated, with minute claw; protarsus of third leg with distinct papilla (Tab. VII. fig. 8 *d*). Anterior lamina (proximal segment) of coleopod with its inferior edge produced internally into a longish bluntly-rounded process, projecting in front of the inner processes of the posterior lamina (distal segment) (Tab. VII. fig. 8 *a*). For other details of copulatory apparatus, see Tab. VII. figg. 8 *b, c*.

Number of segments about 40. Length of ♀ about 30 millim., width about 2.5 millim.

Hab. GUATEMALA, Tecpam (*Dr. O. Stoll*).

This species and the following differ in many structural characters from *S. richardsoni*, and will probably be considered as generically distinct. The principal differences are enumerated in the analytical table.

3. *Spirobolellus atriculus*, sp. n. (Tab. VII. figg. 9 *a-c*.)

♂. Closely resembling the preceding in colour, size, and most other characters, but easily distinguished by sexual characters. The tarsi and protarsi of the anterior legs are unmodified (Tab. VII. fig. 9 *c*) and the anterior lamina (proximal segment) of the coleopod is not produced inferiorly on the inner side into a distinct process, so that the inner processes of the posterior laminae are visible from the anterior aspect (Tab. VII. figg. 9 *a, b*).

Hab. GUATEMALA, Volcan de Agua (*Dr. O. Stoll*).

The following species appears to belong to this genus:—

4. *Spirobolellus nahuus*.

Spirobolellus nahuus, Sauss. et Humb. Rev. et Mag. Zool. 1869, p. 154; Miss. Sci. Mex., Myr. pp. 86, 177, t. 4. fig. 21 (1872).

Blackish. *Head* with 3+3 labral pores; *antennae* short. *First tergal plate* with its lateral portion triangularly truncate, the anterior border defined by a sulcus and slightly sinuous, not extending quite so far inferiorly as the second. Remaining *segments* with the posterior portion smooth and separated from the median portion by a punctured groove; the inferior striae moderately strong; pores in the middle of the posterior portion, marked with deep punctures. *Anal segment* with tergal plate obtusely angular, not surpassing the valves; margin of valves not compressed; sternal plate scarcely angular.

Male smaller than female, with coxæ of third, fourth, and fifth legs bearing a small protuberance.

Number of segments 35 in ♀, 32-37 in ♂. Length of ♀ 23, of ♂ 16 millim.

Hab. MEXICO, Sierra de Moyoapan, in the Eastern Cordillera.

This species seems to be closely allied both to *S. tylopus* and *S. atriculus*. It appears, however, to be a much smaller animal, but without definite information as to the structure of the copulatory apparatus further comparison is impossible.

The Central-American genera of Spirobolidæ admitted in the preceding pages may be distinguished as follows:—

- a.* Labral setal pores 2+2 on each side; first tergal plate widely rounded laterally and not extending inferiorly so low as the infero-lateral portions of the second; a pair of impressions followed by a striated area (scobinæ) present close to the anterior border of more or fewer of the tergal plates; sternal plate of copulatory apparatus very large, linguiform, sub-triangular, its median portion projecting inferiorly as low or almost as low as the anterior laminæ of the coleopods; phallopod slender, two-jointed, the terminal segment ending in a slender seminal style and a broader guard.
- b.* Summits of anal valves not produced into spiniform processes. RHINOCRICUS (p. 59).
b'. Summits of anal valves produced into spiniform processes OXYPYGE (p. 73).
- a'*. Labral setal pores variable in number, never constantly 2+2; first tergal plate usually narrowed and triangular, never widely rounded; no scobinæ; sternal plate of copulatory apparatus much smaller, usually narrow and transverse and never extending inferiorly in the middle line so low as the inferior admedian angles of the anterior laminæ of the coleopods; phallopod otherwise formed.
- c.* Valves of anal segment bent sharply inwards in their posterior portion and forming at their junction a deep groove or re-entering angle CYCLOTHYROPHORUS (p. 83).
c'. Valves of anal segment not bent sharply inwards posteriorly, their margins usually compressed, not forming a re-entering angle at their junction.
- d.* First tergal plate laterally narrowed, triangular, and not extending inferiorly so low as the infero-lateral portion of the second; sternal plate of copulatory apparatus not laterally bicornuate dorsally, but slender and narrow SPIROBOLUS (p. 74).
d'. First tergal plate less narrowed laterally and extending inferiorly as low as the infero-lateral portions of the second, which is thus concealed; sternal plate of copulatory apparatus elevated laterally on each side into a stout cornuate process SPIROBOLELLUS (p. 86).

Group V. **SPIROSTREPTOIDEA.**

Elongate vermiform Diplopods resembling the Iuloidea and Spiroboloidea in general form, the segments being numerous and variable in number, cylindrical and compact, with coalesced sterna, and each, with exception of the anterior five or six and the last, bearing a pair of scent-pores. Mouth-parts normal, the stipites or lateral plates of the gnathochilarium well developed and widely separated proximally by the promentum, but considerably wider proximally than in the Spiroboloidea, the promentum being correspondingly smaller. Segments 1 to 3 with a single pair of legs; segment 4 apodous; segment 5 with two pairs of legs. In the male the seminal ducts open upon a double penis behind the legs of the second pair, and the copulatory apparatus is retractile within the seventh segment. It consists either of distinct coleopods and phallopods, as in the Spiroboloidea and Iuloidea, or of a single pair of stout distally narrowed and biramous sclerites, the anterior ramus bearing the seminal duct.

So far as is at present known, the Central-American representatives of this group are referable to two families, the Spirostreptidæ and Nannolenidæ, which may be distinguished as follows:—

- a.* Median unpaired plate (promentum) of the gnathochilarium narrowed distally and continued forwards between the smaller anterior paired plates (lingual lobes), which are triangular, being broad in front and narrowed and divergent behind; the anterior portion of the promentum separated from the posterior larger part by a distinct transverse membranous line (the so-called suture); copulatory organs of the male consisting on each side of a large stout basal sclerite which distally divides into two branches, the posterior branch tipped with tactile setæ, the anterior bifid and partially membranous, bearing the seminal duct **NANNOLENIDÆ.**
- a*¹. Median unpaired plate (promentum) of the gnathochilarium only slightly narrowed distally and not continued forwards between the smaller anterior paired plates (lingual lobes), which are subquadrate and in contact almost throughout their length in the middle line; the promentum undivided; copulatory organs of the male consisting very distinctly of a long posterior limb, the phallopod, and of an anterior complicated bilaminate apparatus constituting the coleopod **SPIROSTREPTIDÆ.**

Fam. SPIROSTREPTIDÆ.

Bibliographical research for the correct generic name for the Central-American species of Spirostreptidæ shows that the nomenclature of the Neotropical genera of this family is in a state of confusion, which has arisen partly from the assumption, only recently abandoned, that the presence of pores upon the fifth segment is a generic character, partly from the inadequacy of the descriptions and figures of supposed generic features published by Silvestri, and partly from the pardonable disregard of Silvestri's genera by Brölemann, whose work in other respects leaves little to be desired.

In Silvestri's paper the American species which de Saussure and Humbert referred to the genus *Spirostreptus* are allocated to the following genera:—

Alloporus, Porat, Öfv. Vet.-Akad. Förh. 1872, no. 5, p. 43. Type *A. dissimilis*, Porat, from South Africa.

Archispirostreptus, Silvestri, Ann. Mus. Genova, (2) xiv. p. 776 (Apr. 1, 1895). Type *A. gigas*, Peters, from E. Africa.

Plusioporus, Silvestri, Boll. Mus. Torino, x. no. 203, p. 10 (Apr. 25th, 1895). Type *P. salvadorii*, Silv., from the Argentine.

Urotropis, Silvestri, Ann. Mus. Genova, (2) xvi. p. 171 (1896). Type *U. carinatus*, Porat, from the Cameroons (W. Africa).

Orthoporus, Silvestri, Boll. Mus. Torino, xii. no. 283, p. 7 (March 1, 1897). Type *O. diaporoides*, Silv., from Bolivia.

Diaporus, Silvestri, Boll. Mus. Torino, xii. no. 283, p. 8. Type *D. americanus*, Silv., from the Argentine.

Epistreptus, Silvestri, Boll. Mus. Torino, xii. no. 303, p. 4 (Oct. 1897). Type *E. oscenus*, Silv., from Ecuador.

Of these, *Alloporus*, *Archispirostreptus*, and *Urotropis*, based upon tropical African species, may for the present be put aside.

Of the rest, based upon Neotropical forms, *Plusioporus* has date priority. It was separated from *Alloporus* on the grounds that the phallopod is very long and attenuated and the first tergal plate is simply sulcate and not inferiorly incurved. But Silvestri's conception of *Alloporus* was taken at that time from a Paraguayan species he described as *A. americanus*, in which the phallopod is short and distally laminate, and the first tergal plate ridged and inferiorly incurved. In the type of *Alloporus*, however, the first tergal plate is not incurved or ridged (carinate) and the copulatory apparatus has not been described. Realisation of this fact possibly induced Silvestri to establish the genus *Diaporus* in 1897 for the species *americanus*, which he had previously referred to *Alloporus*. Now *Diaporus* was diagnosed as distinguishable from *Orthoporus* by the presence of pores upon the fifth segment; but since this is not a generic character, as Brölemann has shown, and since *Orthoporus* has page priority over *Diaporus*, it follows that *Diaporus* is a synonym of *Orthoporus*.

Epistreptus, apart from certain characters rather of specific than of generic value, was based upon the structure of the phallopod, which is distally bipartite, one branch being attenuated, the other laminate with a long attenuated process above the base externally.

Silvestri's genera are resolvable as follows:—

Plusioporus with the phallopod long, attenuated, and not branched.

Orthoporus with the phallopod shorter and distally laminate, but not otherwise branched.

Epistreptus with the phallopod long and at least biramous, or two-branched.

Now Brölemann (Revista Mus. Paulista, v. 1902) proposed three subgeneric names for certain South-American species of this group :

Scaphiostreptus (*loc. cit.* p. 150). Type: the species from Bahia identified by Brölemann as *S. fuscipes*, Porat, in which the phallopod terminates distally in a vase-shaped lamina, from the interior of which emerges the seminal style.

Gymnostreptus (*loc. cit.* p. 153). Type *G. perfidus*, Bröl., from São Paulo, which has the phallopod long, attenuated, and unbranched, although in other species it may be branched on the distal side of the seminal sinus.

Cladostreptus (*loc. cit.* p. 166). Type *C. sebastianus*, Bröl., from São Paulo, a species in which the phallopod is distinctly biramous (two-branched), the accessory branch arising on the proximal side of the seminal sinus.

The synonymical conclusions I deduce from the above-given analysis are as follows:—

1. *Gymnostreptus* is a synonym of *Plusioporus*.
2. *Scaphiostreptus* is a synonym of *Orthoporus*.
3. *Cladostreptus* is a synonym of *Epistreptus*.

With regard to the first two, I do not think there can be any doubt. In the case of the third an element of doubt is introduced by the possibility that the branching of the phallopod described in the type of *Epistreptus* may be of the nature that Brölemann has described in some of the species he referred to *Gymnostreptus*. In that case *Cladostreptus* will stand and not sink as a synonym of *Epistreptus*.

The fate of the South-American species referred by Silvestri to the genera *Archispirostreptus* and *Urotropis* must be left unsettled until a careful comparison has been made between the African and Neotropical representatives of this group to see if they be congeneric or not. It may be added, however, that the phallopod of *Urotropis carinatus*, Porat (Bih. Sv. Vet.-Akad. Handl. xx. pt. iv. no. 5, t. 5. fig. 50, 1894), resembles that of *Orthoporus*, except that it bears a long accessory branch. This is not the case in the species from Bolivia named *Archispirostreptus cameranii* (Boll. Mus. Torino, x. no. 203, p. 9, 1895), which Silvestri subsequently referred to *Urotropis* (Boll. Mus. Torino, xii. no. 283, p. 6, 1897) on account of the compressed and carinate nature of the dorsal surface of the anal tergal plate, this character being no doubt of specific and not of generic value.

As for the species referred to *Archispirostreptus*, some of them at all events do not appear to be generically separable from *Plusioporus*, since the presence of pores on the fifth segment is apparently the only distinctive feature of the last-named; and it may be that *Plusioporus* is a synonym of *Archispirostreptus*. Comparison between the African and American species will show. But *Archispirostreptus* itself may possibly have to give place to *Alloporus*. The types of these two so-called

genera are African; and the type of *Alloporus* was only dismembered by Porat from the African species he referred to *Spirostreptus*, a species to which Silvestri subsequently gave the name *Archispirostreptus*, because it possesses pores on the fifth segment. If this reasoning prove to be correct, the following synonymy will be established: *Alloporus* = *Archispirostreptus* = *Plusioporus* = *Gymnostreptus*. And if, following Brölemann's example, we refer all the Neotropical species to one genus with or without subgenera, that genus may have to take the name *Alloporus*. For the present at all events, however, since the subdivisions proposed by Brölemann appear to be definable forms, at least so far as the males are concerned, they may be accorded generic rank. All the Central-American species that he has recorded and that I have seen fall into his subgenus *Scaphiostreptus*, a section for which the oldest name appears to be *Orthoporus*.

ORTHOPORUS.

Orthoporus, Silvestri, Boll. Mus. Torino, xii. no. 283, p. 7 (1897).

Diaporus, id. ibid. p. 8.

Scaphiostreptus, Brölemann, Revista Mus. Paulista, v. p. 150 (1902).

Characters as above.

Distribution. Central and South America.

The Central-American species of this genus, hitherto recorded, resemble one another tolerably closely in external features, the principal superficial distinctions being differences of size, number of segments, and density of sculpturing. But within the limits of a single species considerable variation in these three particulars is met with. Even the leading character made use of in the analytical key, namely, the presence or absence of pores upon the fifth segment of the body, is difficult of detection in all cases, especially in those species where the pores are small and inconspicuous on all the segments. As is frequently the case in Diplopods, the best distinguishing features appear to be supplied by the copulatory apparatus of the males; but in cases where the structure of this organ is unrecorded it is impossible to determine with certainty and accurately to locate, according to their affinities, the Central-American species described by de Saussure and Humbert and Karsch. When the types of these are re-examined, it may be found that the species described as new by Brölemann and myself are in some cases the same as those established by our predecessors.

The seven species of this genus, of which I have seen examples, may be distinguished as follows:—

a. Pores present upon the fifth segment of the body.

b. Inferior portion of the first tergal plate somewhat abruptly inflected, the inflected area defined above by a distinct cariniform ridge, which ends behind in a smooth subtuberculiform prominence; the succeeding tergal plates also strongly ridged; anal sternal plate with posterior border scarcely angled.

- c.* Stouter; segments very finely and closely punctured and rugulose; anal tergal plate ending behind in a distinct tuberculiform process defined by a decided depression *typotopyge.*
- c*¹. Thinner; segments more coarsely punctured and rugose; anal tergal plate not ending behind in a distinct tuberculiform process *chiriquensis.*
- b*¹. Inferior portion of first tergal plate not abruptly inflected, not distinctly ridged, less deeply sulcate; anal sternal plate more distinctly angled *palmensis.*
- a*¹. Pores beginning upon the sixth segment.
- d.* Inferior portion of the first tergal plate strongly inflected and defined above by a ridge ending in a tuberculiform prominence *teapensis.*
- d*¹. Inferior portion of the first tergal plate at most only lightly inflected and not strongly ridged.
- e.* Number of segments 77 to 79; length varying from about 80 to 90 mm.; sculpturing of the segments intermediate between that of the two following species *amulensis.*
- e*¹. Number of segments varying from about 50 to 60; length (♂) about 50 mm.
- f.* Sculpturing of the dorsal portion of the posterior half of the segments coarse, consisting of punctures and anastomosing longitudinal ridges and punctures; the area just in front of the sulcus merely punctured and sharply defined by the fineness of its sculpturing from the posterior area behind the sulcus *striatulus.*
- f*¹. Sculpturing of the dorsal portion of the segments consisting merely of punctures; the area immediately in front of the sulcus and the whole area behind it alike in sculpturing *cordovanus.*

In the following table an attempt has been made to show how the males of various species in which the copulatory apparatus has been examined and figured may be separated from each other:—

- a.* Anterior lamina of coleopod with its distal extremity projecting forwards as a rounded prominence; the laminate expansion of the phallopod small and leaving the seminal style (flagellum) to a great extent exposed *confragosus.*
- a*¹. Anterior lamina of coleopod with its distal extremity not turned forwards, simply rounded, truncate or emarginate at the apex, the laminate expansion of the phallopod large and overlapping the seminal style.
- b.* Distal extremity of posterior lamina running out externally into a long and sharp spiniform process, which is scarcely defined by any basal constriction from the part of the lamina which bears it.
- c.* Distal extremity of the posterior lamina of the coleopod crescentic, its upper edge evenly concave, its lower evenly convex; ramus of upcurled portion of phallopod comparatively straight *chiriquensis.*
- c*¹. Distal extremity of the posterior lamina with strongly geniculate infero-internal angle, the inner and lower edges not forming an evenly convex curve; the spiniform process stouter; upcurled ramus of phallopod spirally twisted *striatulus.*

- b¹. Distal extremity of the posterior lamina of the coleopod not running out into a long sharp spiniform process; the external process, when present, short, usually stout, and commonly much narrower at the base than the part of the lamina which bears it.
- d. A rounded lamella projecting obliquely and externally from the distal end of the posterior lamina of the coleopod near its external margin *omalopyge*.
- d¹. No rounded lamella projecting from the anterior surface of the distal end of the posterior lamina of the coleopod.
- e. Distal end of the posterior lamina of the coleopod laterally compressed and bearing externally a stout blunt process which projects at right angles to it. *amulensis*.
- e¹. Distal end of the posterior lamina of the coleopod antero-posteriorly compressed, and usually expanded and lamelliform.
- f. A sharp and slender spine projecting obliquely outwards and downwards from near the supero-external angle of the elliptically expanded termination of the posterior lamina of the coleopod *teapensis*.
- f¹. A process, when present in the above-mentioned position, stout or slender, but projecting upwards or upwards and outwards.
- g. A short stout process projecting at right angles to the long axis of the lamina from the supero-lateral angle of its rounded lamellate distal end *cordovanus*.
- g¹. When a process projects from the above-mentioned position it is directed obliquely upwards.
- h. The distal end of the lamina but little expanded, but bearing externally a stout and strong upwardly curled hook. the external edge of which forms a continuous curve with the inferior edge of the part from which it arises, *palmensis*.
- h¹. Distal end of the lamina more expanded, not bearing a stout curved hook.
- i. Distal end of the lamina bearing a very short and stout process on the infero-external angle of its expanded end *typotopyge*.
- i¹. Distal end of the lamina bearing externally a slender sub-cylindrical subspiniform process.
- k. This process arising obliquely upwards and outwards from the supero-external angle of the rounded lamellate expansion, which has an evenly convex inner, lower, and outer edge *montezumæ*.
- k¹. This process arising from near the middle of the outer edge of the lamellate expansion, the infero-internal edge of which is obliquely cut away *rodriguezii*.

1. Orthoporus typotopyge.

Spirostreptus (*Scaphiostreptus*) *typotopyge*, Brölemann, Ann. Soc. Ent. France, lxxiv. p. 359, t. 9. fig. 17 (1905) ¹.

Colour: olive-black, the segments bordered with ferruginous; legs and antennæ ferruginous.

Head and first tergal plate smooth. Inferior area of first plate abruptly incurved and marked with ridges defined by grooves, the superior ridge forming a cariniform crest with a somewhat tuberculiform posterior enlargement. The crests on the succeeding segments thick. Posterior half of segments and area of anterior half immediately in front of the groove very finely and closely punctured. *Pores* beginning on the fifth segment. *Anal segment* with tergal plate marked posteriorly with a transverse depression marking off a somewhat nodular caudal prominence, which scarcely covers the summit of the valves; the latter with strongly compressed and prominent edges; sternal plate with posterior edge almost straight.

Number of segments 57–65.

Length, according to Brölemann, up to 121 millim., with a width of 7.20.

Hab. MEXICO, Ciudad in Durango (*Forrer*); COSTA RICA, La Palma, Surubres near San Mateo, Caché (*Biolley*¹), Cariblanco (*Lankester*¹).

The brief diagnosis given above is taken from a single female example, collected by Forrer at Ciudad, which, judging from the description, is indistinguishable from the specimens from Costa Rica assigned by Brölemann to *O. typotopyge*. This specimen has 57 segments, and about 75 mm. in length and 6.8 in width. According to Brölemann, the anterior lamina of the coleopod in the male is inferiorly emarginate; and the posterior lamina is distally expanded into an antero-posteriorly compressed plate, with strongly convex lower edge, and produced externally into a short, blunt, upwardly directed process.

2. *Orthoporus palmensis*.

Spirostreptus (Scaphiostreptus) typotopyge palmensis, Brölemann, Ann. Soc. Ent. France, lxxiv. p. 362, t. 9. fig. 18 (1905)¹.

Hab. COSTA RICA, La Palma (*Biolley*¹).

Described by Brölemann as easily distinguishable from the typical form of *O. typotopyge*, of which he considered it to be a subspecies, by having the inferior angles of the first tergal plate less sharply incurved and marked with shallower grooves, by having the sculpture of the segments coarser and more striolate, and by certain details in the structure of the copulatory apparatus—for example, the anterior plate of the coleopod is distally rounded, instead of being slightly concave, and the external process of the distal end of the posterior plate is slenderer and a little longer. The figures of this apparatus in the two forms show, however, very marked differences in the latter respect, for the whole distal extremity of the plate in question is shorter and much less expanded in *O. palmensis* than in *O. typotopyge*, and the external process in the former has the form of a strong, stout, upcurled hook, whereas in the latter it is merely a short, blunt projection. It appears also from the description that the posterior end of the anal tergal plate is less lobate and less sharply defined by the transverse groove, and that the margins of the anal valves, although compressed, are defined by a shallower depression in *O. palmensis* than is the case in *O. typotopyge*. These facts, coupled with the circumstance that specimens of the two forms were taken together at

La Palma at an altitude of 1600 metres, induce me to regard them as specifically and not as subspecifically distinct.

Number of segments 51-57. Length from about 70 or less to 97 millim., average width from about 5.5-6.5 millim.

In Mr. Godman's collection there are a number of female specimens I refer to this species, taken in Costa Rica by Rogers, and also others found at La Palma by Tristan and Biolley.

3. *Orthoporus chiriquensis*, sp. n. (Tab. VIII. fig. 2.)

♂. *Colour* (in alcohol) olivaceous with ferruginous posterior borders to the segments; legs and antennæ ferruginous or ochraceous.

Head and first tergal plate smooth. Inferior portion of the first plate abruptly incurved almost at right angles to the outer surface and marked with four ridges, the upper of which is strong and cariniform, and ends posteriorly in a rounded tuberculiform enlargement; the anterior angle rectangularly acute; the posterior angle also rectangularly rounded. Inferior edge of exposed segment of mandible lightly emarginate. The lateral ridges in the succeeding segments thick. The posterior area of the segments finely and closely punctured and substriolate and the adjoining area of the anterior portion in front of the transverse groove similarly punctured, so that these areas are not sharply demarcated by the nature of the sculpturing. *Pores* beginning on the fifth segment. *Tergal plate* of anal segment short, longitudinally convex above; not covering the summit of the valves, which have prominent, compressed margins.

Anterior lamina of coleopod long, its inferior edge quadrate; posterior lamina with its inferior portion antero-posteriorly compressed, forming a somewhat crescentic lamina which runs externally into a longish slender spiniform process.

Number of segments 57-60.

Length 85 millim., width 5.5.

Hab. PANAMA, Volcan de Chiriqui (*Champion*).

In many characters, especially in the abrupt incurvature and the thickness of the upper crest of the inferior portion of the first tergal plate, this species resembles *O. typotypyge* of Brölemann. The specimens of it, however, that I have seen differ from the one example here referred to *O. typotypyge* in being more coarsely punctured and in having the whole anal segment shorter, the tergal plate being more convex above, the depression less marked, and the caudal area behind it much less prominent and tuberculiform.

Especially does *O. chiriquensis* differ from *O. typotypyge* in the form of the inferior portion of the posterior lamina of the coleopod, which is crescentic and produced into a long and slender spine.

4. *Orthoporus teapensis*, sp. n. (Tab. VIII. fig. 4.)

♂. *Colour* (in alcohol) banded black and ferruginous; legs and antennæ yellowish.

Head and first tergal plate nearly smooth. The first tergal plate, however, distinctly rugose in its postero-lateral portions, its inferior area inflected and marked with about four ridges, the upper of which ends posteriorly in a strong cariniform tubercle; the anterior angle of this plate rectangular, the posterior obtusely rounded. Inferior edge of basal segment of mandible emarginate, the posterior lobe of the emargination acute but not much produced. Ridges on the segments immediately following the first thick, nearly as wide as the intervening spaces. The posterior area of the segments rugulose, very closely

and finely punctured and striate. The posterior portion of the anterior part of the segments similarly but a little more finely sculptured. *Pores* beginning on the sixth segment. *Anal segment* with its tergal plate longitudinally flat above, not covering the summit of the valves, which have compressed margins; sternal plate lightly convex along its posterior margin. *Anterior lamina* of coleopod short, its distal end narrowed and rounded. Distal end of posterior lamina elliptically rounded, antero-posteriorly compressed, and armed externally with a slender spiniform process, which projects obliquely downwards and outwards.

♀. Antero-inferior angle of first tergal plate slightly less prominent; exposed segment of mandible smaller. Number of segments 62-64 (♀), 65 (♂).

Length ♀ 82 millim., width about 6; ♂ 96 millim., width 6.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*).

5. *Orthoporus amulensis*, sp. n. (Tab. VIII. fig. 5.)

? *Spirostreptus fraternus*, Sauss. (*cf. infra*).

♂. *Colour* (in alcohol) dark brown, the segments obscurely banded, the anterior part being blackish and the posterior ferruginous; anal segment blackish; legs and antennæ yellowish.

Head and first tergal plate smooth. Inferior portion of the first plate not markedly incurved, marked with about four ridges, the upper of which is not posteriorly tubercular. The anterior angle rectangular, subacute, the posterior obtusely rounded. Lower margin of basal segment of mandible emarginate, the posterior lobe acute. The crests of the succeeding segments fine, narrower than the spaces between them. Posterior half of segments thickly punctured, finely ridged in front behind the sulcus; in front of the sulcus the anterior part is finely punctured, so that the two areas of the segments are marked off from each other by the difference in the coarseness of the sculpturing; the distinction, however, is less marked than in *O. striatulus* and more marked than in *O. cordovanus*. *Pores* beginning on the sixth segment. *Anal tergal plate* longitudinally convex above; obtusely rounded posteriorly and not covering the summit of the valves, which have compressed margins; anal sternal plate obtusely rounded. *Anterior lamina* of coleopod long, its inner distal angle slightly produced; distal end of posterior lamina laterally compressed, and produced externally into a short, blunt process.

♀ a little larger than ♂, with infero-anterior angles of the first tergal plate obtusely rounded, and the inferior edge of the basal segment of the mandible emarginate.

Number of segments 77-79.

Total length of adult from about 80 to 90 millim., width 4 to 4.5.

Hab. MEXICO, Amula in Guerrero (*H. H. Smith*).

This species may prove to be the same as the one described by de Saussure as *Spirostreptus fraternus*, as is forcibly suggested by the dimensions and the number of segments.

6. *Orthoporus cordovanus*, sp. n. (Tab. VIII. fig. 3.)

? *Spirostreptus otomitus*, Sauss. (*cf. infra*).

♂. Prevailing colour (in alcohol) olive-brown, with the posterior border of the terga ferruginous; legs and antennæ yellowish.

Head and first tergal plate smooth. Lateral portion of first plate not noticeably incurved, marked with four strong grooves and ridges, the latter, however, not showing tuberculiform enlargements on the posterior edge; posterior angle obtusely rounded; anterior angle rectangular and subacute. Inferior edge of basal segment of mandible emarginate, but the posterior lobe of the emargination not produced below the level of the anterior, and not rounded but subacute. *Pores* beginning on the sixth segment. Exposed area of median portion and the posterior portions of segments finely and uniformly punctulate and striolate. *Anal valves* compressed; anal sternal plate widely and obtusely rounded, not acute.

Anterior lamina of coleopod somewhat short; posterior lamina widely rounded inferiorly, with a short tooth-like process projecting at right angles to its longitudinal axis.

Number of segments 49.

Length about 50 millim., width about 4 millim. or a little over.

Hab. MEXICO, Cordova (*Mus. Brit.*).

A single typical example in the British Museum, received in 1861.

One of the localities given for de Saussure's *Spirostreptus otomitus* was Cordova. This fact suggests that at all events some of the specimens he described under that name may have belonged to the same species as the type of *O. cordovanus*; but there can be no certainty on this point.

7. *Orthoporus striatulus*, sp. n. (Tab. VIII. fig. 1.)

♂. *Colour* (in alcohol) a tolerably uniform brown; antennæ and legs yellow-brown.

Head and first tergal plate smooth. Inferior portion of the first plate not noticeably incurved, marked by four ridges separated by wide grooves; posterior angle obtusely rounded; anterior angle slightly obtuse. Inferior edge of exposed segment of mandible with its posterior angle somewhat strongly produced and widely rounded. *Pores* beginning on the sixth segment. Exposed area of median portion of segments finely punctulated and sharply defined from the posterior area, which is covered with a coarse sculpturing of anastomosing ridges separated by finely punctured grooves, the lateral striæ almost losing themselves dorsally in the sculpturing. *Anal valves* compressed; anal sternite obtusely rounded. *Anterior lamina* of coleopod elongate; posterior lamina inferiorly angular and produced externally into a long attenuate spiniform process.

Number of segments 61.

Length about 50 millim. or less, width about 4.

Hab. MEXICO, Tuxtla.

A single male specimen in the British Museum, received in 1861.

The only other member of this genus previously recorded from Tuxtla is *O. otomitus*, Sauss. (*cf. infra*), which, however, appears to differ from *O. striatulus* very decidedly in the less coarse sculpturing of the segments.

There are several places named "Tuxtla" in Mexico, so that the two species may be from different localities.

The following species are known to me only from figures and descriptions:—

8. *Orthoporus montezumæ*.

Julus montezumæ, Sauss. Linn. Ent. xiii. p. 330 (1859)¹; id. Mém. Soc. Phys. Genève, xv. p. 372, t. 6. fig. 39 (1860)²; Gervais, Voy. de 'Castelnau,' Myr. et Scorp. p. 24³.

? *Spirostreptus montezumæ*, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 69 (1872)⁴.

? *Spirostreptus montezumæ*, Voges, Zeitschr. wiss. Zool. xxxi. t. 13. fig. 33 (1878) (fig. only)⁵.

Colour (dried) yellow, banded with brown, probably blackish when alive. *Body* very long and slender.

Head rugulose inferiorly. *Antennæ* long and slender in both sexes, not compressed, reaching to the fifth or sixth segment of the body. *First tergal plate* marked laterally with three large oblique ridges and some very short grooves behind, the anterior border lightly emarginate above the anterior angle, which is almost rectangular; the posterior angle rounded. Ridges on the anterior segments strongly pronounced, but becoming gradually weaker and weaker posteriorly. Transverse sulci well marked. *Segments* punctured

and shagreened. *Anal tergal plate* short, obtusely angled, not overlapping the valves, the edges of which are prominent; sternal plate with posterior border obtuse.

Number of segments 72 ♂, 75 ♀.

Length up to 133 millim., width 8.

Hab. MEXICO, Vera Cruz, Orizaba ¹⁻⁴.

It is very doubtful if the specimen from the temperate parts of Mexico, doubtfully referred by de Saussure and Humbert to *O. montezumæ* in 1872, belonged in reality to that species. Amongst other differences that were pointed out, it may be noticed that it had only 64 segments.

It is also, I think, open to doubt whether the specimen identified by Voges as *O. montezumæ* was correctly named. This author gives a good figure of the copulatory apparatus, which seems to show that the species examined, whatever its name, differs from all the other Central-American forms here enumerated. His figure shows that the distal portion of the posterior lamina of the coleopod was expanded, antero-posteriorly compressed, with evenly rounded inferior edge and angles as in *O. cordovanus*, with a very similar external spiniform process; but this process instead of projecting at right angles to the long axis of the lamina as in *O. cordovanus* projects upwards and slightly outwards.

Since de Saussure says nothing about the presence or absence of the pores of the fifth segment in this species, it is impossible to guess at its place in the first of the two analytical keys given above. But his description of the ridges on the anterior tergal plates suggests that *O. montezumæ* may resemble *O. typotopyge*, *O. chiriquensis*, and *O. teapensis* in this particular.

9. *Orthoporus otomitus*.

Julus otomitus, Sauss. Linn. Ent. xiii. p. 330 (1859) ¹; Mém. Soc. Phys. Genève, xv. p. 374, t. 6. fig. 40 (1860) ²; Gervais, Voy. de 'Castelnau,' Myr. et Scorp. p. 24 ³.

Spirostreptus otomitus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 69, t. 3. fig. 1 (1872) ⁴.

Closely allied to *O. montezumæ*, but with the antennæ much shorter, not reaching beyond the third segment of the body and compressed.

Head smooth inferiorly. *First tergal plate* with its inferior portion a little incurved (*se repliant presque en dessous*), bearing three or four strong folds or ridges separated by deep grooves, the anterior angle obtuse, the margin not concave just above it; posterior angle less widely rounded than in *O. montezumæ*, judging from the figures. *Segments* punctured and striolate; the lateral longitudinal sulci less strong than in *O. montezumæ*. *Anal tergal plate* more obtuse posteriorly and the valves less compressed.

Number of segments 55-59.

Length not given, but said to be less than that of *O. montezumæ*.

Hab. MEXICO, Cordova, Vera Cruz, San Andres Tuxtla ¹⁻⁴.

This species was based upon female specimens, adult and immature.

The figures and description supply so many characters by which *O. otomitus* may be distinguished from *O. montezumæ* that there seem to be no good reasons for adopting the suggestion made by de Saussure and Humbert in 1872 that the former was based

upon immature examples of the latter, especially since de Saussure's words, "Nous possédons 8 individus de cette espèce [*O. otomitus*], mais la plupart jeunes . . .," leads to the inference that he had adult females of this species as he also had of *O. montezumæ*.

Nothing is known about the pores of the fifth segment either in this species or in the following, *O. fraternus*.

10. *Orthoporus fraternus*.

Julus fraternus, Sauss. Mém. Soc. Phys. Genève, xv. p. 374, t. 6. fig. 40 (1860)¹.

? *Spirostreptus fraternus*, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 70 (1872)².

Closely allied to *O. montezumæ*, but smaller and more slender, with the antennæ short and shaped as in *O. otomitus*, the third, fourth, and fifth segments being short. The ridges and grooves on the lower part of the anterior segments less pronounced than in *O. montezumæ*. *Anal tergal plate* so obtuse that it ceases to be terminated by an angle.

Number of segments 75.

Length 84 millim., width 4.

Hab. MEXICO, Yautepec.

This species was based upon a single female example.

In 1872 de Saussure and Humbert doubtfully referred to *O. fraternus* a specimen from Mexico, but without definite locality, which had the anal tergal plate more angular and possessed only 63 segments. It was 66 millim. in length and 4 in width.

11. *Orthoporus confragosus*.

Spirostreptus confragosus, Karsch, Zeitschr. Ges. Naturw. (3) vi. p. 44 (1881)¹.

Spirostreptus (Scaphiostreptus) confragosus, Brölemann, Ann. Soc. Ent. France, lxxiv. p. 367, t. 9. fig. 20, and t. 10. fig. 21 (1905)².

Colour brownish-black or olive-black, with the last segment and the ventral surface paler brown; the antennæ and legs yellowish. *First tergal plate* with its postero-inferior angle widely convex and but little marked; the anterior angle produced, more strongly so in the male than in the female, the margin above the angle slightly or more strongly concave; the inferior portion incurved and defined above by a ridge marked by the first groove, beneath which are many (6 or 8) longer and shorter grooves. *Segments* strongly sulcate, the area behind the groove and immediately in front of it densely and deeply sculptured with punctuation and striolæ, the latter running for the most part longitudinally. *Pores* small, beginning on the sixth segment. *Last segment* finely shagreened and more coarsely sculptured than the preceding segment; tergal plate feebly angular, and valves with strong marginal depression.

In the male the inferior angle of the mandible is somewhat strongly produced. The copulatory apparatus is different from that of all the Central-American species in which this organ is known in that the distal portion of the anterior lamina of the coleopods is produced forwards into a thick roundish projection; the posterior lamina bearing distally and externally a long, stout, bluntly-pointed process, projecting obliquely upwards and outwards from the inferior angle, which is not rounded, but geniculate and nearly rectangular. The peculiarity of the phallopod lies in the fact that the distal laminate enlargement is reduced to a narrow gutter leaving free a large part of the seminal style, which is stout and apically twisted.

Number of segments 61-66.

Length 78 millim. (♂) to 91 (♀), width 4.8 (♂) to 5.8 (♀).

Hab. COSTA RICA¹, San José (*Biolley*²).

The above-given diagnosis has been taken direct from Brölemann's description. Karsch's description taken from the type from Costa Rica furnishes no reason for doubting that Brölemann's identification of his specimens was correct.

This is evidently a very distinct species from the rest of the known Central-American *Orthopori*, especially in the form of the copulatory apparatus. Of the species known to me, the description seems to suggest similarity in certain particulars to *O. striatulus*, especially perhaps in the shape of the mandible in the male and the sculpturing of the posterior area of the terga. But in *O. striatulus* the infero-lateral portion of the first tergal plate is scarcely incurved and its anterior angle is obtuse and not produced. In the incurvature of the infero-lateral portion of the first tergal plate and its definition by a distinct ridge, as well as in the absence of pores from the fifth segment, similarity may be traced to *O. teapensis* from Tabasco; but the antero-inferior angle of the first plate is less produced in the latter and the copulatory apparatus is of quite a different form.

12. *Orthoporus ampussis*.

Spirostreptus ampussis, Karsch, Zeitschr. Ges. Naturw. (3) vi. pp. 43, 44 (1881)¹.

Colour black.

Head smooth above, rugose below. *First tergal plate* more widely rounded laterally than in *O. confragosus*, with 4-5 oblique sulci. *Segments* deeply sulcate, the upper surface punctate posteriorly. *Anal tergal plate* rugose, angularly rounded, not surpassing the valves, which have the margins narrowly compressed.

Number of segments and measurements unrecorded.

Hab. MEXICO, Puebla¹.

The description of this species furnishes no data by which it can be compared with other Mexican forms.

13. *Orthoporus festæ*.

Plusioporus festæ, Silvestri, Boll. Mus. Torino, xi. no. 254, p. 3 (1896)¹.

Colour reddish-black; antennæ and legs reddish or reddish-black.

First tergal plate with its infero-lateral portion defined by a keel-like ridge and trisulcate beneath it; the anterior angle acute, but rounded, the posterior obtuse. Anterior segments laterally carinate. Dorsal surface of the segments very minutely punctulate; the sulcus deep. *Pores* beginning on the fifth segment. *Anal tergal plate* but little angled; anal valves marginate; sternal plate short, wide, rounded.

Number of segments 49-54.

Length from 60-90 millim., width from 4-7.

Hab. PANAMA, Isthmus of Darien, Punta Sabana (*Festæ*¹).

This species was referred to the genus *Plusioporus* by Silvestri, but since only the female was known there appear to me to be no reasons for separating it generically

from *Orthoporus*. Silvestri regarded the presence of pores on the fifth segment as a generic feature; but I entirely agree with Brölemann's view that it has merely a specific significance, so far, at all events, as the Central-American species of *Spirostreptidæ* are concerned.

Judging from the presence of pores upon the fifth segment and of a cariniform ridge on the lateral portion of the first tergal plate, *O. festæ* would fall under Section "b" of the first analytical key given above. Of the two species under this heading, it apparently approaches *O. chiriquensis* in the form of the anal segment, and the two may be identical. Silvestri, however, makes no mention of the marked inflection of the inferior portion of the first tergal plate which is so noticeable in both sexes of *O. chiriquensis*, and further states that the head of *O. festæ* is marked with a pair of tolerably deep circular foveæ near the antennæ, which are not present in *O. chiriquensis*.

14. *Orthoporus rodriguezi*.

Spirostreptus rodriguezi, Brölemann, Mém. Soc. Zool. France, xiii. p. 104, t. 6. fig. 47, and t. 7. fig. 58 (1900)¹.

Spirostreptus (*Scaphiostreptus*) *rodriguezi*, Brölemann, Bull. Soc. Zool. France, xxix. p. 190 (1904)²; Ann. Soc. Ent. France, lxxiv. p. 362 (1905)³.

According to Brölemann's latest remarks upon this species it may be distinguished from *O. typotopyge* by the absence of pores upon the fifth segment, by being much smaller and slenderer, by having the posterior area of the segments less striolate and more visibly punctured—not because the punctures are coarser, but because the areas between them are less sculptured,—and by having the depression that defines the margins of the anal valves wider and deeper. A further difference is furnished by the shape of the distal portion of the posterior lamina of the coleopod, which has its inner angle obliquely cut away, and its external edge bearing a short but slender and subcylindrical spiniform process, which is divided obliquely upwards and outwards. This process is much thinner than that of *O. palmensis*.

Number of segments 65–68.

Length up to 80 millim., width not more than 4.

Hab. GUATEMALA (*Rodriguez* 1–3).

Subsp. *coriaceus*.

Spirostreptus rodriguezi, var. *coriaceus*, Brölemann, Mém. Soc. Zool. France, xiii. p. 106 (1900)⁴.

This subspecies was based upon a single female example, with the same history as the typical form, but differing from it in being markedly more rugose, in having the anterior border of the lateral portion of the first tergal plate lightly concave and the angle rectangular instead of obtusely angled, with the sulci above it weaker. The body, finally, is shorter and thicker.

Number of segments 63.

Length 60 millim.; width 4.30.

15. *Orthoporus omalopyge*.

Spirostreptus (*Scaphiostreptus*) *omalopyge*, Brölemann, Ann. Soc. Ent. France, lxxiv. p. 365, t. 9. fig. 19 (1905)¹.

In possessing pores upon the fifth segment this species falls into the same category as *O. typotopyge* and

O. palmensis. Brölemann, unfortunately, does not make his description comparative, and does not state clearly and concisely how this species may be distinguished from the others in the female sex. It appears to be most nearly allied to *O. palmensis*, but has the margins of the anal valves indistinctly compressed. The structure of the copulatory organ, however, serves to distinguish it at once from both, for the distal portion of the posterior lamina of the coleopod is less rounded and expanded and bears externally on its anterior face a broad roundish process which diverges at an oblique angle from the external edge, and the latter is not produced into a definite anguliform or spiniform process.

Number of segments 57-64.

Length from 50 (♂) to 83 (♀) millim., width from 3.30 (♂) to 4.80 (♀).

Hab. COSTA RICA, La Palma, Carrillo, Caché (*Biolley*¹).

Fam. NANNOLENIDÆ.

Divergent as this family appears to be from the Spirostreptidæ, the interval between them is to a great extent bridged by genera from various parts of the tropics. *Physiostreptus*, for example, described by Silvestri from Ecuador and made the type of the family Physiostreptidæ (Boll. Mus. Torino, xviii. no. 433, p. 14, 1903), has the copulatory apparatus constructed as in the Nannolenidæ and Pseudonannolenidæ, with the legs of the first pair in the male reduced to a single clawless segment in addition to the coxo-sternal plate; but the gnathochilarium is constructed as in the Spirostreptidæ. In the species described by Silvestri (*op. cit.* p. 9) as *Iulomorpha chilensis*, on the other hand, the copulatory organs have apparently distinct coleopods and phallopods as in the Spirostreptidæ, but the gnathochilarium is like that of *Epinannolene*, and, judging from Bollman's description, the same is true of the North-American genus *Cambala*.

Silvestri appears to regard the gnathochilarium as supplying characters of higher systematic value than the copulatory apparatus, for he associates the Physiostreptidæ with the Spirostreptidæ in the Spirostreptoidea, and refers *Nannolene* (*Epinannolene*) to the Cambaloidea. But it may be doubted if this opinion is sound, in view of the gradational variation towards the Spirostreptoid type of gnathochilarium presented by various genera of Cambaloidea. For example, in the tropical Old-World genera *Glyphiulus*, *Trachyiulus*, *Cambalopsis*, and *Cambalomorpha* (grouped as Cambalopsidæ by Cook in 1895, and as Trachyiulidæ by Silvestri in 1896) the anterior portion of the promentum which separates the lingual lobes is narrow and not separated from the main part of the sclerite—that is to say, the gnathochilarium in these forms nearly approaches the mean between that of the Spirostreptidæ and that of the genera *Cambala*, *Nannolene*, *Epinannolene*, and *Iulomorpha*, the Cambalidæ of Bollman, in which the anterior portion is defined behind by a membranous line or joint; and in the latter the gnathochilarium similarly lies nearly midway in point of structure between that of the Cambalopsidæ and that of the genus *Pseudonannolene*, the type of the family Pseudonannolenidæ, in which the anterior part of the promentum is not only separated posteriorly but is also wider and longitudinally bipartite.

These facts, taken in conjunction with somewhat similar gradational variation in the structure of the copulatory apparatus exemplified by *Spirostreptus*, *Iulomorpha* (*chilensis*), and *Pseudonannolene*, make it hardly possible to maintain the Cambaloidea as a group equivalent to the Spirostreptoidea. In this monograph, therefore, I have merely given family rank to the Central-American Cambaloid genus *Epinannolene*.

Since it is highly possible that some, perhaps all, of the American Spirostreptoid genera referred by Cook to the Cambaloidea (Ann. N. York Acad. Sci. ix. p. 6, 1895) will be discovered in Central America, I subjoin a key for their identification—using, without prejudice, the family names that have been proposed by my predecessors. The gnathochilarium has been taken as a basis for the classification, because it enables the females as well as the males to be distinguished :—

- a. Lingual lobes of gnathochilarium large, quadrate, and in contact throughout their length in the middle line as in the Spirostreptidæ; anterior legs of male with only one free clawless segment; copulatory apparatus as in Nannolenidæ and Pseudonannolenidæ . . . **PHYSIOSTREPTIDÆ**
(**PHYSIOSTREPTUS**).
- a¹. Lingual lobes of gnathochilarium narrowed posteriorly and separated throughout their length by a forward prolongation of the promentum, which is separated by a joint from the posterior portion of the plate.
- b. Anterior prolongation of the promentum narrow and entire.
- c. Segments of the body strongly carinate; eyes in a single series; copulatory apparatus with flagellum **CAMBALIDÆ (CAMBALA)**.
- c¹. Segments without trace of keels; eyes multiserial **NANNOLENIDÆ**.
- d. Copulatory apparatus with flagellum (? with distinct coleopods and phallopods); legs of first pair 4-5-jointed and clawless; no pores on the fifth segment **IULOMORPHA**.
- d¹. Copulatory apparatus consisting of a pair of biramous sclerites without flagellum. (? **NANNOLENE**.)
- e. No pores on the fifth segment; anterior leg of male clawless. **NANNOLENE**.
- e¹. Pores present on the fifth segment; anterior leg of male with a claw **EPINANNOLENE**.
- b¹. Anterior prolongation of the promentum wide and longitudinally bipartite; copulatory apparatus as in *Epinannolene*, and pores upon the fifth segment **PSEUDONANNOLENIDÆ**.

Of the Physiostreptidæ only one genus, *Physiostreptus*, containing one species, *P. ortonæ* from Guayaquil, has been recorded. The Cambalidæ also, as above defined, has but one genus, *Cambala*, and one species, *C. annulata*, Say, which has been recorded from various Eastern States of North America (see Bollman, Ann. N.Y. Acad. iv. p. 41, 1887). *Iulomorpha*, based upon the South-African species *I. kinbergi*, Porat (Öfv. Vet.-Akad. Förh. 1872, no. 5, p. 15), has been identified by Silvestri as also

occurring in S. America. It must be remembered, however, that the characters of the genus given above were taken from the South-American species and not from the South-African, of which the male sexual characters, apart from the structure of the first legs, are unknown. The family Pseudonannolenidæ contains the single genus *Pseudonannolene*, of which several species have been described from various parts of South America. The genus almost certainly awaits discovery in Central America.

The type of *Nannolene*, *N. burkei*, Boll., came from Ukiah, in California (Ann. N.Y. Acad. Sci. iv. p. 40, 1887). It is, in my opinion, very doubtful if the species referred by Brölemann to *Epinannolene* are generically distinct from it; but since the males of *N. burkei* described by Bollman were immature, the structure of the copulatory apparatus is unknown. The distinguishing characters between the two set forth in the above-given table are perhaps hardly of generic value, especially the presence or absence of the pores upon the fifth segment, a character which in the Neotropical species of Spirostreptidæ is only of specific importance. *Epinannolene*, therefore, can only be provisionally retained until *Nannolene* has been better described. There is very little doubt that the South-American species referred by Silvestri to *Nannolene* are congeneric with those that Brölemann assigned to *Epinannolene*.

EPINANNOLENE.

? *Nannolene*, Bollman, Ann. N.Y. Acad. Sci. iv. p. 39 (1887); id. Bull. U.S. Nat. Mus. no. 46, p. 57 (1893).

Epinannolene, Brölemann, Ann. Soc. Ent. France, lxxii. p. 135 (1903).

Form as in *Orthoporus*; the segments without crests. *Mandibles* with seven pectinate lamellæ. The anterior plate of the promentum not divided into a right and left portion by a longitudinal membranous line. Pores beginning on the fifth segment (in the known species).

Legs of the first pair in the adult male armed with a claw and composed of five segments.

Copulatory apparatus said to be composed of the two pairs of legs of the seventh segment, the anterior and posterior leg on each side soldered together into a single piece proximally, but separated distally to form an anterior and a posterior branch. The posterior branch digitiform and tipped with a tuft of bristles; the anterior branch stouter and terminating in two processes, an outer and an inner, the latter bearing the seminal duct.

The structure of the copulatory apparatus in this genus and in its ally *Pseudonannolene* offers some puzzling morphological features. According to Brölemann the apparatus is composed of the two pairs of appendages of the seventh segment, as in the Iuloidea, Spiroboloidea, and Spirostreptoidea. In these the anterior appendage on each side is modified to form a sheath, the coleopod, for the posterior appendage, the phallopod, which bears the seminal duct. In *Epinannolene*, however, according to Brölemann, the part of the apparatus which represents the anterior appendage bears this duct. But in view of the general similarity between *Epinannolene* and the Spirostreptoidea it seems hardly likely that such a fundamental difference should exist. I venture therefore to suggest, as an alternative to Brölemann's interpretation, that

in this genus only a single pair of appendages, namely the posterior pair, of the seventh segment is retained, this appendage being, as in the other allied groups, the phallopod, and that its apparent double nature, suggesting its composition of two appendages, is due to its being secondarily biramous. This suggestion involves the supposition that the appendages of the first pair, the coleopods of other groups, are suppressed. There are difficulties in the way of the acceptance of both views of the matter, and the question at issue will probably remain unsettled until the development of the apparatus in question has been worked out. The view above advocated as to the apparatus being composed of a single pair of appendages appears to be that of Silvestri, who in his description of *Physiostreptus* says: "Organum copulativum pari uno appendicium constitutum ut in *Pseudonannolene*" (Boll. Mus. Torino, xviii. no. 433, p. 14, 1903).

The two species of the genus *Epinannolene* recorded below are very closely related. Analysis of the descriptions yields no very satisfactory characters for distinguishing them, apart from the structure of the copulatory apparatus of the males. By means of this organ they may be distinguished as follows:—

- a.* Anterior branch of copulatory apparatus with the distal extremity bent and ending in two lamelliform processes, the external of which is denticulated on its inner edge [*pittieri.*]
*a*¹. Anterior branch of copulatory apparatus evenly narrowed distally, not bent, and terminating in two subsimilar spiniform processes *bicornis.*

[1. *Epinannolene pittieri.*

Epinannolene pittieri, Brölemann, Ann. Soc. Ent. France, lxxii. p. 136, t. 1. figs. 3–7 (1903)¹.

Colour dark brownish-red, sometimes palely annulated; legs dark coloured.

Body slender, shining. *Head* smooth; antennæ short, hardly surpassing the first segment. *Eyes* narrow, consisting of three rows of ocelli. *First segment* with its antero-inferior borders forming an evenly convex curve, marked with two strong grooves in addition to the marginal groove. *Segments* with their exposed portion very finely reticulated. The transverse sulcus distinct and marked with punctuations which are weak dorsally, stronger laterally; longitudinal striæ about five in number and confined to the inferior portion of the segments. *Sterna* smooth. *Anal segment* moderately long; tergal plate with its rounded posterior border covering the valves, the edges of which are not compressed but are furnished with three pairs of setæ. *Sternal plate* with its posterior edge transverse.

Number of segments 49–55.

Length 21–24 millim.; width 1–1.20.

Hab. COCOS ISLAND (*Biolley*¹).

This species is included here for comparison with *E. bicornis*; the locality, however, does not come within the limits of this work.]

2. *Epinannolene bicornis.*

Epinannolene bicornis, Brölemann, Ann. Soc. Ent. France, lxxiv. pp. 356–358, t. 9. fig. 16 (1905)¹.

Colour dark blackish-brown, annulated; legs yellowish.

First segment with only one sulcus in addition to the marginal one. Exposed portion of segments without

distinct sculpturing, except vague longitudinal striolæ. Transverse sulcus marked below the pore with semicircular striæ.

Number of segments 44.

Length 28 millim.; width 1.90.

Hab. COSTA RICA, Cariblanco 600 metres (*Biolley* ¹).

Group VI. STEMMIULOIDEA*.

Elongate vermiform Diplopoda, with a large and variable number of segments as in the Iuloidea, Spiroboloidea, and Spirostreptoidea, but with the body compressed and the segments not completely annuliform, the sternal plates being free as in the Colobognatha and the pleuræ separated from the terga posteriorly though united to them anteriorly. Mouth-parts with mandibles three-jointed; gnathochilarium with the promentum short and the lingual lobes correspondingly large, almost as wide, and in some cases (that is to say, in the males of some species) as long as the stipites, which are themselves subparallel-sided. Segments without any distinct transverse sulcus, obliquely striate longitudinally, the pores situated high up on the sides. One or two large ocelli on each side of the head. Legs composed of eight segments. In the males there is a long unpaired, apparently two-jointed, penis lying behind the legs of the second pair, which are modified to form a pair of hook-like processes; and the two pairs of appendages of the seventh segment are converted into a copulatory apparatus.

Distribution. Tropical America, Africa, and Ceylon.

The above-quoted characters of the group have been taken from Mr. O. F. Cook's paper (*Amer. Nat.* 1895, pp. 1111-1121).

Fam. STEMMIULIDÆ.

Characters of the group.

The little-known and comparatively small number of species belonging to this family have been referred to two genera, which may be distinguished as follows:—

- a.* A single ocellus on each side of the head; gnathochilarium alike in the two sexes STEMMIULUS.
*a*². Two ocelli on each side of the head; gnathochilarium different in the two sexes DIOPSIULUS.

So far as is known, *Stemmiulus* occurs only in Tropical America. The type is the species cited below. The genus *Diopsiulus* was proposed by Silvestri (*Boll. Mus. Torino*, xii. no. 305, p. 3, 1897) for the three Liberian species described by Cook, *D. bellus* being the type. The Ceylonese species, *S. ceylonicus*, Poc., no doubt belongs to *Diopsiulus*, as also in all probability does the species from Porto Rico described by Karsch as *S. compressus*, both these forms having two eyes on each side of the head.

* This group was inadvertently omitted from the table given on p. 41.

STEMMIULUS.

Stemmiulus, Gervais, Ann. Soc. Ent. France, (2) ii. p. xxviii (1844); Ann. Sci. Nat. (3) ii. p. 70, t. 5. fig. 11 (1844); Ins. Apt. iv. p. 200 (1847).

Stemmatoiulus, Cook, Silvestri.

1. *Stemmiulus bioculatus*.

Julus (Stemmiulus) bioculatus, Gerv. Ann. Soc. Ent. France, (2) ii. p. xxviii¹.

Stemmiulus bioculatus, Gerv. Ins. Apt. iv. p. 200, t. 34. fig. 7².

Stemmatoiulus bioculatus, Silvestri, Boll. Mus. Torino, xi. no. 254, p. 2 (1896)³; op. cit. xii. no. 305, p. 2 (1897)⁴.

Colour ashy-black.

Head with a vertical sulcus on the summit; antennæ long, the second segment the longest. *First tergal plate* with its sides angled and acute. *Last tergal plate* posteriorly angled, not surpassing the valves. *Legs* of first and second pairs with five segments, those of the second pair smaller than the first. In the male the legs of the first pair bear a spine on the lower side of the third and fourth segments; those of the second pair are short and three-jointed, the proximal segment being thick and the distal strongly attenuated and hairy at the base beneath. Legs of the third pair thicker than the others, with the claw wide. Anterior pair of appendages of the *copulatory apparatus* bicolumnar, the external column larger and hairy at the apex, with long flagellum rising from its base posteriorly; posterior pair of appendages very small.

Number of segments 42.

Length 26 millim.; width 1.8.

Hab. PANAMA, Darien, Punta Sabana (*Festa*^{3 4}).—COLOMBIA^{1 2}.

Group VII. POLYDESMOIDEA.

Body consisting of 19 or 20 segments in the adult (20 in all the known Central-American genera); each segment consisting of a compact ring, the sternal and pleural elements firmly united to the terga; the terga usually furnished with lateral outgrowths, laminate or tubercular, which carry the pores when present. Pores very variable, sometimes absent, but typically found upon the 5th, 7th, 9th, 10th, 12th, 13th, 15th to 19th segments. 20th segment with a caudal process varying in shape from square to cylindrical. 19th segment without *legs*; segments from the 5th to the 18th with two pairs of six-jointed legs; the 4th segment with a single pair of legs, and only two pairs of legs representing the 3rd, 2nd, and 1st segments. *Antennæ* consisting of only 7 distinct segments. *Eyes* absent. *Mouth-parts* well developed; mandibles bisegmented. Gnathochilarium with stipites widely separated by a triangular pronotum and two elongate lingual lobes. *Generative orifices* of the female lying behind the legs of the second pair. Generative ducts of the male perforating the coxæ or basal segments of the legs of the second pair, without any definite penis. *Copulatory organs* of the male composed of a pair of phallopods which are the modified anterior legs of the seventh segment; these emerge from a usually oval fossa and are generally exposed, rarely retractile; each consists of a basal segment or coxa, which is commonly provided with a slender curved process, the calcar, and of a distal segment carrying the seminal duct; these segments may be simple or highly complicated, sometimes showing division into three elements, the femoral, tibial, and tarsal, and sometimes quite undivided; the seminal style is long or short and is usually guarded by one or more processes or laminae. Coleopods absent; the posterior legs of the seventh segment being normal.

Distribution. Cosmopolitan outside the Arctic and Antarctic Zones.

The question of the classification of the Polydesmoidea, principally with regard to

the subdivision of this group into families, subfamilies, and genera, is one about which there still exists the widest divergence of opinion amongst systematists.

The most recent attempt to monograph the entire group is that of Attems (Denk. Akad. Wien, lxxvii. & lxxviii., 1900–1901). In this valuable and useful work only one family, the Polydesmidæ, is admitted. This is divided into the following subfamilies: (1) Strongylosominæ, (2) Sulciferinæ, (3) Leptodesminæ, (4) Eupolydesminæ, (5) Trachelodesminæ, (6) Eurydesminæ, (7) Oxydesminæ, (8) Eurytropinæ, (9) Cryptodesminæ, (10) Pyrgodesminæ, (11) Cyrtodesminæ, (12) Oniscodesminæ, (13) Sphæriodesminæ.

This classification, however, is open to criticism from several standpoints. In the first place, many of the names employed to designate the subfamilies are inadmissible. For example, Sulciferinæ cannot stand because of its derivation from the so-called new genus *Sulciferus*, which came into literature still-born. It was proposed for a number of species for which two generic names, viz. *Anoplodesmus*, Poc., and *Prionopeltis*, Poc., to which subgeneric rank was given, were already in use. It may be regarded as a synonym of either one or the other of these, and the group, which is probably valid and was dismembered from the Strongylosomatidæ of Cook, may be called the Anoplodesminæ or Anoplodesmidæ according to the fancy of authors. Similarly, the names Eupolydesminæ and Eurytropinæ cannot be maintained, because there are no such genera as *Eupolydesmus* and *Eurytropis* contained in the groups they respectively symbolise. Moreover, at least four of the genera referred to the Eurytropinæ had been previously made the types of special families by Cook; and one of these names, at all events, must take the place of "Eurytropinæ." The Eupolydesminæ must be called Polydesminæ or Polydesmidæ.

Another criticism that must be offered is that a considerable number of admittedly good genera, notably *Platyrrachus* and *Fontaria*, appear, in Attem's opinion, to be only doubtfully referable to the subfamilies to which they are attached. If special subfamilies had been made for their reception, or rather if family or subfamily names already proposed for them by Cook had been retained, a more satisfactory and consistent result would have been achieved. And justification for this course is amply forthcoming in the monograph under discussion; for if the differences between, for example, the Strongylosomini, Anoplodesmini (Sulciferini), Leptodesmini, Polydesmini (Eupolydesmini), and Trachelodesmini be taken as the criteria for groups of this rank, many of the doubtfully placed genera might have been logically accommodated in the same way; and results not very different from those obtained by Cook in 1896 would have been arrived at (Ann. N. York Acad. Sci. ix. pp. 4, 5). Although in this work Cook made no attempt to characterise the families he erected, their names, where based upon defined generic forms, must be retained, if the grouping of the genera into families or subfamilies be admitted.

In the present state of our knowledge of the Polydesmoidea it does not appear to me

to be very material whether family or subfamily rank is given to the groups into which the genera are capable of being classified ; nor is it very important that the said groups, whatever their systematic rank, should in every case be established upon equivalent characters. Where a large number of genera are affiliated by a single character in common, it is often convenient to give the assemblage the status of a subfamily or family ; and at the same time it is often expedient to withhold such rank, at all events temporarily, from a single genus, though it may differ from its nearest allies in characters of the same or even greater systematic value than those which in other cases have served as the basis for the groups of higher rank. An instance of this will be found in the following pages by comparing the Sphæriodesmidæ with the Chelodesmidæ. In the latter generic value is accorded to structural differences in the phallopod which are not of greater taxonomic importance than the structural differences presented by these organs in the Sphæriodesmidæ, to which only specific significance is given. When the Sphæriodesmidæ are better known it will probably be found that *Sphæriodesmus* may be conveniently broken up into several ; but for the present I prefer to keep all the species together under the one genus, although the variation in the phallopods is much greater than that admitted in any other genus recorded in this monograph.

Complete consistency in the estimate of characters can be gradually introduced with progress of knowledge ; and our acquaintance with many genera of Polydesmoidea is at the present time too incomplete to make finality in the classification of this group possible.

In this monograph I have retained in almost every case the families or subfamilies established by my predecessors where I have found these assemblages to be definable within the limits of the Diplopod fauna of Central America, leaving alone the further question as to their final admissibility until a complete revision of the Polydesmoidea of the world has been taken in hand by some competent systematic zoologist with sufficient time and material at his disposal for the task.

The subjoined analytical key to the families here admitted does not represent my opinions as to the affinities of these groups. For instance, although the Oniscodesmidæ and Sphæriodesmidæ fall under one heading, *a*, I believe with Cook that the spherical form of the body when rolled, with its concomitant structural variations that they have in common, has been independently acquired in the two cases. The Sphæriodesmidæ may, as Brölemann has suggested, be an offshoot of the Chelodesmid group ; whereas the relationships of the Oniscodesmidæ perhaps lie with the groups represented in Central America by *Lophodesmus* and *Peridontodesmus*. The latter may, perhaps, be related to the Chelodesmidæ, as also are the Strongylosomidæ and perhaps also the Platyrachidæ, through the genera forming the Euryurinæ.

- a.* Prozonites* suppressed on the ventral surface, represented dorsally by a short shelf which tapers away laterally; sterna extremely narrow, the legs basally almost in contact; dorsal surface convex, with keels nearly or quite vertical; the second or the third or the fourth tergal plates laterally enlarged; body capable of being spherically coiled.
- b.* Keels of the second segment greatly expanded laterally, considerably surpassing in size those of the rest of the body; antennæ incrassate, with sixth segment much shorter than fifth Fam. ONISCODESMIDÆ.
- c.* Pectinate rim of terga suppressed; segments smooth with areate posterior portion Subfam. ONISCODESMINÆ.
- c*¹. Pectinate rim of terga retained; upper side of terga granular or tubercular Subfam. CYRTODESMINÆ.
- b*¹. Keels of the second segment very narrow, but the keels of the third or of the third and fourth or of the fourth and fifth enlarged, much larger than those of the sixth and following segments; antennæ not incrassate, the sixth segment as long as the fifth Fam. SPHÆRIODESMIDÆ.
- d.* Keels of the third or of the third and fourth segments the largest Subfam. CYCLODESMINÆ.
- d*¹. Keels of the fourth or of the fourth and fifth segments the largest Subfam. SPHÆRIODESMINÆ.
- a*¹. Prozonites* retained both dorsally and ventrally as a tubular cylindrical prolongation of the metazonite*; keels of the anterior segments usually smaller than those of the mid-region of the body; rarely those of the second a little enlarged; body capable of being spirally, not spherically, coiled.
- e.* Antero-lateral border of the first tergal plate produced into a horizontally extended lamina which completely overlaps the head Fam. PYRGODESMIDÆ.
- e*¹. Antero-lateral border of the first tergal plate not laminate; the head not concealed.
- f.* Lateral and posterior borders of the keels from the second at least to the sixteenth segment armed with strong setiferous teeth; keels of second larger than those that immediately succeed them; antennæ short, clavate, and widely separated Fam. PERIDONTODESMIDÆ.

* The prozonite is the anterior usually cylindrical portion of the segment which is retractile to a greater or less extent within the metazonite of the segment in front; the metazonite being the posterior, leg-bearing, usually keeled portion.

- f*¹. Keels otherwise formed, never exhibiting a continuous postero-lateral series of large setiferous teeth; keels of second tergal plate not larger than of the third (excl. Strongylosomidæ); antennæ not markedly clavate, when short close together.
- g*. Keels of the second segment large, lower than the level of the first and third and projecting forwards beneath the angle of the first. (No indigenous Central-American species known.) Fam. STRONGYLOSOMIDÆ.
- g*¹. Keels of the second segment not enlarged, forming a continuous series with those of the succeeding segments and with the angle of the first.
- h*. Antennæ short and thick; caudal process wide, oblong, square or semicircular Fam. PLATYRACHIDÆ.
- j*. Margin of keels with no definite thickened porous area; pores with thickened rim, not insunk, and situated dorsally, at a varying distance away from the edge Subfam. PLATYRACHINÆ.
- j*¹. Margin of keels thickened, carrying the insunk pore, which has the margin much less noticeably thickened Subfam. EURYURINÆ.
- h*¹. Antennæ long and slender; caudal process triangular, with truncate apex, or sometimes subcylindrical Fam. CHELODESMIDÆ.
- k*. A spiniform process projecting from the distal end of the second segment of the legs . . . Subfam. XYSTODESMINÆ.
- k*¹. No spiniform process upon the second segment of the legs.
- l*. Phallopod with coxal calcar; its femoral segment without definite hair-lined depression; genital processes of second leg in male blunt and conical Subfam. CHELODESMINÆ.
- l*¹. Phallopod without coxal calcar; no hair-lined depression on the inner side of its femoral segment; genital processes of male elongate, stiliform Subfam. RHACHIDESMINÆ.

Fam. ONISCODESMIDÆ.

Body strongly convex and capable of being spherically coiled, the keels vertical or nearly so, with their lateral margin inferior. *Keels* of the second segment much dilated and greatly exceeding those of the other segments. *Pores*, when present, normal in number and situated on the dorsal surface of the keels.

Distribution. Central and South America; Sumatra.

BIOL. CENTR.-AMER., Diplop., October 1909.

Q

The Central-American genera of this group are referred to two subfamilies, which may be defined as follows:—

- a.* Segments smooth; their keel-bearing portion posteriorly elevated and divided into definite oblong areas by short longitudinal sulci; no pectinate rim on the posterior border of the segments ONISCODESMINÆ.
- a*¹. Upper side of the keel-bearing portion of the segments granular or tubercular and often thickly hairy; a distinct rim of fine pectinations on the posterior border of the segments CYRTODESMINÆ.

Subfam. *ONISCODESMINÆ*.

LIGIODESMUS, gen. nov.

Allied to *Oniscodesmus*, with the second segment much the largest of the series and expanded laterally. All the segments, with the exception of the first and last, marked with a transverse sulcus, behind which the tergal plates are ornamented with longitudinal sulci dividing their posterior portions into a number of oblong areas; these longitudinal sulci extend on to the keels. Pores on segments 5, 7, 9, 10, 12, 13, 15 to 19, situated near the middle of the upper surface of the keels. Tergal plate of the twentieth segment transversely oblong, about twice as wide as long and wider than the keels of the nineteenth segment which embrace it laterally.

Type, *L. pusillus*.

To the group to which Cook (Pr. U.S. Nat. Mus. xxi. pp. 454–456, 1898) restricted the family name Oniscodesmidæ, three genera were referred by him, viz.: *Oniscodesmus*, type *oniscinus*, Gervais & Goudot, from Colombia; *Lignydesmus*, type *rubriceps*, Peters, from Colombia; and *Detodesmus*, type *aurantiacus*, Peters, from Venezuela. The last two Attems does not admit as generically distinct from *Oniscodesmus*. This new form differs from all of them in having the tergal plate of the twentieth segment transversely oblong, twice as wide as long, wider than the keels of the nineteenth, and with its posterior border lobulate. In the case of the other species mentioned the tergal plate of the twentieth is minute in *Oniscodesmus*; and although larger and subspherical in *Lignydesmus* and *Detodesmus*, it is scarcely wider than long and barely as wide as the keels of the nineteenth which curve semicircularly round it. In the large size of the twentieth tergal plate the genus *Ligiodesmus* serves to connect the above-mentioned genera with those that Cook referred to the Cyrtodesmidæ, namely *Cyrtodesmus*, *Oncodesmus*, and *Cyliocyrtus*.

1. *Ligiodesmus pusillus*, sp. n. (Tab. VIII. figg. 6–6 e.)

Colour obscurely fuscous, keels paler, legs flavous.

Head punctulated. Antennæ moderately long, incrassate, the segments increasing in thickness to the fifth, which is longer than the second and fourth, and about as long as the third. Second tergal plate greatly expanded laterally, apparently as in *Detodesmus aurantiacus*, Peters, but differing from that species in having its posterior border distinctly areolate, as in the two species of *Oniscodesmus* and in *Lignydesmus rubriceps*. The pores not raised as in the latter, but sessile as in the two species of *Oniscodesmus*. Copulatory organs of the same type apparently as in *Detodesmus aurantiacus*, divided distally into two branches, the inner forming a recurved hook and terminating in the slender seminal

stile, the outer having the form of a foliated lamina which posteriorly sends upwards a long and slender process.

Length 6·8 millim., width 2·5.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*).

Subfam. *CYRTODESMINÆ*.

The two recorded Central-American genera of this group may be distinguished as follows :—

- a.* Pores present; tergal plate of twentieth segment quadrate, broader than long and not in any way concealed by the keels of the nineteenth; keels with a deep notch in the posterior border near the base ONCODESMUS.
- a*¹. Pores apparently absent in the type species; tergal plate of twentieth segment narrow, pointed, covered to a great extent by the enlarged and backwardly extended keels of the nineteenth segment; no notch at base of posterior border of keels CRYPTURODESMUS.

ONCODESMUS*.

Oncodesmus, Cook, *Brandtia*, 1896, p. 28; Pr. U.S. Nat. Mus. xxi. p. 458 (1898).

Allied to *Cyrtodesmus*, Gervais (*Ins. Apt.* iv. p. 92, 1847), but differing in having the *dorsal surface* of the segments distinctly tubercular and hairless instead of thickly hairy and closely granular; also in having the lateral portion of the second segment much more widely expanded and the *pores* sessile instead of being raised on definite papillæ.

Mr. O. F. Cook established this genus and differentiated it from *Cyrtodesmus* after a somewhat hurried examination of the types of *C. velutinus* and *C. granosus* in the British Museum. He appears to have overlooked the fact that the segments in the type of *C. velutinus*, to which he restricted the name *Cyrtodesmus*, are densely granular as well as hispid or hairy, for he merely describes them as being “densely velvety pilose,” and distinguishes *Oncodesmus*, based upon *C. granosus*, from *Cyrtodesmus* partly because “the surface of the segments, instead of being densely and uniformly hispid, is merely beset with coarse granules.” As a matter of fact, *C. velutinus* is granular and *C. granosus* tubercular. A difference, however, which he does not appear to have noticed is that the pores in *C. granosus* are sessile and not papillate. The type of *C. asper*, Peters, a species which Cook made the type of his genus *Cyliocyrtus*, also has the pores papillate and the segments hispid as in *C. velutinus*; but the segments are tubercular and the lateral portions of the second widely expanded as in *C. granosus*. It thus stands midway in its characters between the other two. In all of them the general form of the body is like that of *Ligiodesmus* and *Oniscodesmus*, but they differ totally in the sculpturing of the segments and in having a deep notch in the posterior border of the keels.

* Incorrectly given as *Omodesmus* in *Zool. Record*, 1898, Myr. p. 11.

1. *Oncodesmus granosus*.

Polydesmus granosus, Gervais & Goudot, Ann. Soc. Ent. Fr. sér. 2, ii. p. xxviii (1844) ¹.

Cyrtodesmus granosus, Gervais, Ins. Apt. iv. p. 93 (1847) ².

Oncodesmus granosus, Cook, Brandtia, 1896, p. 28 ³; Pr. U.S. Nat. Mus. xxi. p. 458 (1898) ⁴;
Silvestri, Boll. Mus. Torino, xi. p. 6 (1896) ⁵.

Colour very dark brown, tubercles clearer pale brown; cylindrical portion of segments white in front and below, but the posterior portion dark and pigmented, with three pale patches, one median and one on each side; legs and anal valves white; keels quite vertical; body compressed.

Length about 16 millim., width 4.

Hab. PANAMA ⁵.—COLOMBIA ^{1 2} (*Mus. Brit.*).

The only example of this form that I have seen is the dried type in the collection of the British Museum. It is partially coiled and therefore cannot be critically examined. The specimen from Panama referred by Silvestri to *O. granosus* may belong to a different species.

CRYPTURODESMUS.

Crypturodesmus, Silvestri, Boll. Mus. Torino, xii. no. 277, p. 1 (1897); Brölemann, Ann. Soc. Ent. Fr. xvii. p. 276 (1898).

Katantodesmus, Attems, Denk. Akad. Wien, lxxviii. p. 385 (1900).

Segments coarsely granular or tubercular above; keels, except of the second and (?) nineteenth segments, strongly shouldered at the base of their anterior border, but without any deep notch close to the base of their posterior border. *Pores* sometimes, at all events, present upon the dorsal area of the keels. Median tergal area and keels of the *nineteenth segment* coalesced to form a rounded shield-like sclerite, which completely covers the twentieth; tergal plate of the latter narrow and posteriorly pointed.

Distribution. Mexico and tropical parts of South America.

There appears to me to be no doubt that Attems was correct in his surmise that his genus *Katantodesmus* is identical with the earlier described *Crypturodesmus*. Attems refers *Crypturodesmus* (*Katantodesmus*) to the Oniscodesminæ and not to the Cyrtodesminæ, apparently because the caudal process is narrow and pointed, as it also is in the species of Oniscodesminæ known to him. But the width of the tail in *Ligiodesmus* above described, a genus apparently resembling *Oniscodesmus* in other particulars, shows that the character has not the value assigned to it by Cook and Attems. *Crypturodesmus* is unknown to me except from descriptions and figures; but its affinities appear to me to be rather with the Cyrtodesminæ than with the Oniscodesminæ.

It may be added that neither Attems nor Silvestri could detect the pores in the species available for examination, but that Brölemann discerned them in his *C. verrucosus* from Venezuela. Possibly this species should form the type of a special genus. It may be added that Brölemann, in defiance of laws of nomenclature, made

Crypturodesmus a subgenus of his later-described *Trigonostylus*; whereas if the type-species of the two be congeneric, the genus must take the name *Crypturodesmus*, with *Trigonostylus* as one of its subgenera, and *Crypturodesmus*, repeated, as the other. It appears to me, however, that the distinctive features of the two are worth full generic value. *Trigonostylus*, which has hitherto been recorded only from Venezuela, differs from *Crypturodesmus* in having the nineteenth segment normally constructed.

1. *Crypturodesmus targionii*.

Crypturodesmus targionii, Silvestri, Boll. Mus. Torino, xii. no. 277, p. 1 (1897) ¹.

Colour reddish-brown, paler beneath. *Head* with the antenna short and incrassate, the fifth segment the largest, the seventh and eighth the smallest. *Tergal plates* granular, furnished above with four longitudinal rows of tubercles. *First tergal plate* semicircular; keels of the second very wide, with rounded, somewhat forwardly projecting anterior angle, the posterior angle acute; succeeding keels entire, the postero-lateral angle with a rectangular incision. *Pores* undiscovered. *Anal sternal plate* semicircular.

Length 28 millim., width 5.

Hab. MEXICO ¹.

Fam. SPHÆRIODESMIDÆ.

Body strongly convex, capable of being spherically coiled, the keels vertical or nearly so, with their lateral borders inferior. *Head* absent. *Tergal plate* of the twentieth segment quadrate, surrounded anteriorly and laterally by the subrescentic tergal plate and keels of the nineteenth segment. Either the third or the fourth or the fourth and fifth *segments* laterally expanded and exceeding in size the corresponding portions of the succeeding segments. The second segment always small and embracing the first like a collar.

Distribution. Southern States of N. America; Central America; West Indies.

I include in this family the genera which Cook referred to the Sphæriodesmidæ, Desmonidæ, and Cyclodesmidæ, because the genera *Sphæriodesmus* and *Cyclodesmus* appear to be linked to a certain extent by *Cylionus*, and because the essential feature upon which the Desmonidæ were separated from the Cyclodesmidæ is not known to occur in the one Central-American genus, *Cyphodesmus*, referred by Cook to the Desmonidæ. Nevertheless, the genera in question may be conveniently classified in two subfamilies:—

- a.* Keels of third segment much smaller than those of the fourth, which are always larger than those which follow the fifth segment, and sometimes larger, sometimes a little smaller, than those of the fifth SPHÆRIODESMINÆ.
- a*¹. Keels of the third segment larger than those of the rest of the series, rarely equalled by those of the fourth; keels of the fifth not enlarged CYCLODESMINÆ.

Subfam. *CYCLODESMINÆ*.

The two Central-American genera belonging to this subfamily may be distinguished as follows:—

- a.* Segments with transverse crests surmounted with a series of tubercles;
fourth segment about equal to the third in size *CYPHODESMUS*.
*a*¹. Segments smooth, without crests and tubercles; fourth segment much smaller
than the third, which greatly exceeds the rest *CYCLODESMUS*.

CYPHODESMUS.

Oniscodesmus, Saussure, Mém. Soc. Phys. Genève, xv. p. 278 (1860) (nec *Oniscodesmus*, Gerv.).

Cyphodesmus, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 530; Cook, Pr. U.S. Nat. Mus. xxi. p. 466 (1898); Attems, Denk. Akad. Wien, lxxviii. p. 390 (1890).

This genus appears to have been examined only by the original describers of the typical and single known species.

Body comparatively narrow and elongated, convex and vaulted, but with the keels slightly inclined outwards; each segment with a transverse row of erect tubercles, larger on the summit than laterally. When the body is extended the keels are not in contact. *First tergal plate* much wider than long; the second crescentic, and with the keels but little extended laterally; third and fourth large and subequal; anal tergal plate relatively large subquadrate, with four large tubercles.

Secondary sexual characters unknown.

Distribution. Mexico.

1. *Cyphodesmus mexicanus*.

Oniscodesmus mexicanus, Sauss. Linn. Ent. xiii. p. 328 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 281, t. 1. fig. 2 (1860)².

Cyphodesmus mexicanus, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 530³; Sauss. & Humb. Miss. Sci. Mex., Myr. p. 23 (1872)⁴; and of subsequent authors.

Colour fuscous; integument finely granular. *Head* smooth; antennæ with subequal segments. *First tergal plate* with three tubercles on each side; second with five. *Third segment* with its keels strongly arched and sinuous, its anterior angle rounded and the posterior acute and directed backwards; marked with a crest, which becomes obsolete above; keels of the fourth large, inferiorly rounded, but with the posterior angle a little produced. Inferior margins of keels of the mid-region of the body rounded; those from the thirteenth segment backwards truncate and wide inferiorly. The tubercles borne upon a transverse crest, which is higher on the fifth segment than on the others. On the seventeenth and two following segments the dorsal tubercles become spiniform.

Length 20 millim., width 5.

Hab. MEXICO, Cordova¹⁻⁴.

CYCLODESMUS.

Cyclodesmus, Saussure & Humbert, Rev. et Mag. Zool. 1869, p. 149; Miss. Sci. Mex., Myr. p. 2 (1872), and of subsequent authors.

Surface of *segments* smooth and polished. Dorsum very convex; keels vertical, broad and subcontiguous.

Third segment much the largest of the series; its keels greatly expanded. Second segment crescentic; anal tergal plate broad, quadrate.

Distribution. Mexico and Jamaica.

1. *Cyclodesmus aztecus*.

Cyclodesmus aztecus, Sauss. & Humb. Rev. et Mag. Zool. 1869, p. 149¹; Miss. Sci. Mex., Myr. p. 24, t. 1. fig. 3 (1872)²; Carl, Rev. Suisse Zool. x. p. 678, t. 12. fig. 109 (1902)³.

Colour white. General form like that of *Sphæriodesmus*, but the *body* compressed and attenuated posteriorly.

Keels of second segment not surpassing the lateral angles of the first. Keels of the third with convex anterior and concave posterior borders; acute posterior and widely rounded anterior angle. Keels of fourth segment only a little larger than those of the fifth, rounded inferiorly. In the mid-region of the body the keels have straight and vertical posterior borders and rounded angles, but in the posterior half they are directed slightly backwards, with oblique posterior borders and acute posterior angles.

Length 5–6 millim., width 1.6.

Hab. MEXICO, Eastern Cordillera^{1 2}.

Subfam. SPHÆRIODESMINÆ.

The three described genera of this group, if *Colobodesmus* be admitted, may be contrasted as follows:—

- a.* Orifice of seminal duct of phallopod on a low eminence situated far behind the distal end of that organ COLOBODESMUS.
- a*¹. Orifice of seminal duct of phallopod on a longer or shorter process at or near the apex of the phallopod.
- b.* Posterior ventral border of segments, at least in posterior half of body, straight and transverse; the anterior tubercle remote from the base of the leg; keel of fifth segment markedly smaller than that of fourth . . . CYLIONUS.
- b*¹. Posterior ventral border of segments strongly convex or angled internally, oblique and concave externally; keel of fifth segment not smaller than that of fourth SPHÆRIODESMUS.

SPHÆRIODESMUS.

Glomeridesmus, Saussure, Linn. Ent. xiii. p. 328 (1858); Mém. Soc. Phys. Genève, xv. p. 276 (1860) (nec *Glomeridesmus*, Gerv.).

Sphæriodesmus, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 529, and of subsequent authors.

Characters as above.

Distribution. Central America.

Although females of the species of this genus may usually, at all events, be distinguished by slight differences in the shape of the body, some being more arched than others, especially at the posterior end, some broader, some narrower, by differences in the size and shape of the keels, by differences in the length of the individual segments of the antennæ and legs, and by the hairiness of these appendages, these

differences, nevertheless, are extremely difficult to express in writing, since they are mostly differences of degree. The males, on the contrary, present admirable secondary sexual characters in the structure of the legs of the first pair and of the phallopods, and in the relative width of the sternal areas adjacent to the socket which carries these organs. Fortunately, judging from the material of the genus that has been examined, males are more abundant than females, and in every species that has been described the principal secondary sexual characters of the males are known.

The following table, based upon characters other than those appertaining to sex, may perhaps be of some service in determining the forms that I have been able to examine; but I have been unable to include in it species of which I have not seen examples:—

- a.* Dorsal surface of segments comparatively coarsely rugose; fourth tergal plate somewhat strongly convex and abruptly raised behind its anterior rim . . . *coriaceus.*
- a*¹. Dorsal surface smooth or only finely rugulose; fourth tergal plate much flatter, lightly convex antero-posteriorly.
- b.* Posterior edge of the eighteenth segment forming an evenly rounded curve from the summit to the posterior angle of the keel—that is to say, the posterior border of the keel and of the dorsal portion meeting at a widely rounded angle.
- c.* Keels of the fourth segment forming a comparatively strong sigmoid flexure; keels of segments 6 to 9 comparatively broad *digitatus.*
- c*¹. Keels of the fourth segment with a much less pronounced sigmoid flexure; keels of segments 6 to 9 narrower.
- d.* Keels of the fourth narrower, the anterior angle less strongly rounded . . . *oniscus.*
- d*¹. Keels of the fourth broader, with the anterior angle more strongly rounded.
- e.* Colour olive-green: larger—length 27 mm., width 10 mm. *robustus.*
- e*¹. Colour sandy-white: smaller—length 15 mm., width 5 mm. *prehensor.*
- b*¹. Posterior edge of the dorsal portion of the eighteenth segment forming a distinct angle with the posterior border of the keel.
- f.* Posterior border of the keels lightly concave *stilifer.*
- f*¹. Posterior border of the keels straight *angustus.*

By the secondary sexual characters of the males the species enumerated below may be distinguished as follows:—

- a.* Tibio-femoral segment of phallopod markedly biramous—that is to say, with a long, stout, or slender, often thumb-like subsidiary branch, which is not very much shorter than the principal branch.
- b.* Phallopod very long and slender and comparatively straight; the two branches also long and slender, the main branch sinuously curved and undivided at the apex; the subsidiary branch projecting forwards, lightly curved at the base; femur of first leg with strong basal tooth; sternal areas of fifth, sixth, and seventh segments, and socket of phallopods, narrow *digitatus.*
- b*¹. Phallopod short and stout; sternal areas of fifth, sixth and seventh segments, and socket of phallopods, broader.

- c.* Apex of principal branch of phallopod, which is spatulate and widely rounded, bearing a pair of slender subspiniform processes; the subsidiary thumb-like branch broad, curved forwards and inwards, and arising from the inferior edge of the segment; rim of socket of phallopods elevated, but the crest dying away on each side on the sternal area; femur of first leg without basal tooth-like process *prehensor.*
- c*¹. Apex of principal branch of phallopod simple; subsidiary branch arising on the upper side of the segment; femur of first leg with basal prominence.
- d.* Tibio-femoral segment of phallopod straight and subcylindrical, the principal branch attenuate, pointed; subsidiary branch rising nearer the apex than the base of the segment; rim of socket of phallopod not elevated behind; process on femur of first leg low, the whole segment only lightly curved *angustus.*
- d*¹. Tibio-femoral segment very stout, strongly curved outwards, then inwards at the apex, which is spatulate and widely rounded; subsidiary branch thinner and rising nearer the base of the segment than in the preceding species; rim of socket of phallopod elevated all round posteriorly from the lateral tubercle; first leg very thick with a long basal tooth-like process and a smaller process on the two succeeding segments *robustus.*
- a*¹. Tibio-femoral segment of phallopod variable in length and thickness, simple or divided apically, but with the subsidiary branch occurring in the species mentioned under *a* represented apparently by a more or less conical or short spiniform tooth, by a low eminence, or altogether absent.
- e.* Apex of the phallopod distinctly bifid.
- f.* Axis of tibio-femoral segment subcylindrical and nearly straight, the organ not markedly upcurled distally; behind and on the inner side of the apex, which is somewhat lamellar but pointed below, there arises a longish slender hooked spiniform process; femur of first leg modified; sternum of seventh segment narrow; socket of phallopod raised into a semicircular crest just in front of the stigma and of the base of the legs *stilifer.*
- f*¹. Axis of tibio-femoral segment short or slender, but with a distinct upward curvature distally and no elongate hooked spiniform process.
- g.* Tibio-femoral segment comparatively short and stout, the subsidiary branch comparatively large and nearer the base than the apex of the segment.
- h.* Phallopod ending in two lobe-shaped processes; femur of first leg with distinct basal prominence *neglectus.*
- h*¹. Phallopod ending in an antero-posteriorly compressed lamella and a slender somewhat spiniform process external to it; femur of first leg unmodified; rim of socket of phallopod with semicircular crest in front of base of leg *oniscus.*
- g*¹. Tibio-femoral segment comparatively long and slender; the subsidiary process either small or absent; the apex divided into two small subequal processes; femur of first leg with basal process.

- i.* No subsidiary tooth or process on upper side of tibio-femoral segment of phallopod; the terminal processes pointed *medius.*
- i*¹. A distinct subsidiary tooth near the middle of the upper surface of the tibio-femoral segment; the terminal processes truncated *mexicanus.*
- e*¹. Apex of tibio-femoral segment of phallopod simple and undivided; subsidiary process represented by a broad excrescence.
- j.* Subsidiary process nearer the base than the apex of the segment, the portion beyond it long and slender; femur of first leg without basal process; socket of phallopods not extending laterally as far as the spiniform tubercle, the rim not raised; the sternal area between the legs very wide *coriaceus.*
- Subsidiary process nearer the apex than the base of the segment; the area beyond it comparatively short; femur of first leg with conical basal process *saussurei.*

1. *Sphæriodesmus oniscus*, sp. n. (Tab. VIII. figg. 8-8 *b.*)

♂. *Colour* (in alcohol) a uniform dark olive-green. *Segments* shining, but lightly punctured and coriaceous. *First tergal plate* wider than head, with lateral angles well developed and acute but apically rounded. Second shorter on each side than the third. Fourth expanded laterally to a comparatively small extent, its antero-lateral border weakly convexly produced, its posterior border only lightly concave, and its antero-inferior edge lightly rounded. Fifth with its lateral portion slightly wider than that of the fourth, its inferior edge rounded, its posterior border very lightly concave. Sixth about as wide laterally as that of the fourth, although differently shaped and slightly wider than that of the seventh. The posterior borders of the keels from the sixth to near the hinder end of the body in the same vertical straight line as the posterior border of the dorsal part of the segments; the two borders forming a widely rounded angle on the eighteenth. *Legs* beset with numerous short hairs.

In the male the first leg is a little thickened, but the femur has no excrescence or hollow inferiorly. *Sterna* of third, fourth, and fifth segments about as wide as the length of the second segment of the leg. Rim round socket lodging phallopods abruptly raised into a round crest on each side just in front of the coxa of the posterior leg of the seventh segment; the socket extending outwards to the adjoining spiniform tubercle. *Sternal area* between posterior legs of seventh segment much wider than length of second segment of leg. Basal segment of *phallopod* stout and laterally extended; distal segment projecting forwards parallel with that of the opposite side, abruptly curved upwards at the distal end, the termination slightly spatulate, with a short external process and a short recurved slender process. Near the base of the segment there rises a submembranous, pointed, compressed, triangular process.

Length 19 millim., width 7.

Hab. MEXICO, San Andres Tuxtla in Vera Cruz.

2. *Sphæriodesmus robustus*, sp. n. (Tab. VIII. figg. 7-7 *h.*)

♂. *Colour* olive-green. *Segments* shining, nearly smooth. Form of the *tergal plates* much like that of the preceding species, but the keel of the first less produced laterally, and of the second a little wider as compared with the third; the fourth with its keel also a little wider, its anterior border more rounded. On the fifth the sulcus defining the thickened rim does not extend beyond the middle of the lower edge. Posterior border of the keels in the same vertical line as that of the dorsal portion of the segments; those of the eighteenth forming a widely rounded angle.

First leg of male modified, thickened, a long dentiform tubercle at the base of the femur which is hollowed inferiorly and widely rounded above; a smaller hair-tipped tubercle on the lower side of the two succeeding segments. *Sternal areas* of fifth and sixth a little narrower than in the preceding species. Margin of *socket* of phallopods evenly elevated posteriorly and laterally. *Sternal area* between posterior legs of seventh segment much wider than length of second segment of leg. *Phallopods* with basal

segment widely extended laterally; distal segment short but very stout, biramous; the inferior branch broad, sinuously curved, with rounded spatulate apex, bearing inferiorly a short membranous process which is probably the seminal style; a long, thinner subsidiary branch projecting upwards and forwards.

Length 27 millim., width 9.5.

Hab. MEXICO, San Andres Tuxtla in Vera Cruz.

Although from the same locality as the preceding, and presenting the same colour and much the same shape of keels, this species differs essentially from it in its secondary sexual characters, as shown by the structure of the anterior legs of the male, of the phallopods, and of the rim of the socket in which the phallopods are lodged. These organs show that although the females might be difficult to distinguish, the males are widely divergent.

3. *Sphæriodesmus prehensor*, sp. n. (Tab. VIII. figg. 9, 9 a.)

In the shape of the body, the form of the segments and of the keels, very similar to *S. robustus* from San Andres Tuxtla, but much smaller and of a uniform whitish-grey colour. The lateral portions of the fourth and fifth segments are subequal in width, and on the fifth the marginal groove is continued along the inferior edge and upcurled at the posterior angle.

First leg of male but little modified, the femur (third segment) without tubercle and not excavated inferiorly. *Sterna* of fifth and sixth of about the same relative width as in *S. oniscus*; but the rim of the socket of the phallopods a little raised laterally carrying up the spiniform tubercle, the elevated edge gradually subsiding just in front of the coxal segment of the posterior legs of this segment of the body, which are separated by a sternal area about equal in width to the length of their second segment. *Phallopods* with basal segments stout, widely separated proximally but converging distally, with a tubercle on their anterior face; the distal (tibio-femoral) segment short and stout, biramous, the principal branch spatulate and bearing two short slender processes at the apex, the inner or inferior of these the larger of the two and hooked; the smaller or accessory branch rising from the lower side on the inner edge of the segment and blade-like and polliciform.

Length 15 millim., width 5.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

4. *Sphæriodesmus angustus*, sp. n. (Tab. IX. figg. 1-1 g.)

♂. *Colour* (in alcohol) pale olivaceous. *Body* noticeably narrowed posteriorly and gradually sloping downwards from about the sixteenth segment, not abruptly sloped quite at the posterior end. *Segments* smooth, shining. *Keels* of fourth segment with pronounced sigmoid curve, the anterior border strongly convex, the posterior correspondingly concave; keels of fifth slightly wider except at the extremity than those of the fourth. The posterior borders of the majority of the keels lightly convex and marked off from the dorsal portion of the segments by a slight notch, which becomes more distinct towards the posterior end of the body. The posterior angles of the keels from the sixth to the tenth segments rounded, from the eleventh to the fourteenth rectangular, from the fourteenth to the nineteenth becoming gradually more and more acute; posterior border of keel of eighteenth segment forming a decided angle with the posterior border of the dorsal portion of the segment. *Anal tergal plate* nearly as long as wide.

First leg of male a little modified, the femur hollowed on its inferior edge, with a low basal anguliform prominence. *Sterna* of fifth and sixth segments noticeably narrower than the length of the second segment of the legs. Socket of phallopods extending laterally almost to the spiniform tubercle, where its rim is a little raised and thickened, the rim not raised posteriorly. *Sternal area* between the legs of the posterior pair of the seventh segment narrow, about equal in width to the length of the second segment of the legs. *Phallopods* with basal segments not strongly convergent, distal segments stout,

subcylindrical, biramous, the inferior (principal) branch gradually narrowed and pointed, slightly sinuous and continuing the line of the main branch of the segment, the superior (subsidiary) branch projecting upwards and forwards, compressed and pointed, arising nearer to the tip than to the base of the segment. Length 17.5 millim., width 5.2.

Hab. GUATEMALA, Senahu in Alta Vera Paz (*Champion*).

5. *Sphæriodesmus stilifer*, sp. n. (Tab. IX. figg. 2-2 c.)

Colour testaceous or ochraceous. *Segments* lightly rugulose. *Body* elongate and narrow. *Head* with sulcus nearly obsolete. The fourth and fifth *segments* about equal in width, the keels of both with rather pronounced sigmoid flexure, the anterior borders strongly convex, the posterior correspondingly concave; the posterior borders of all the keels concave, those of the seventh to about the tenth the least so, those of the segments succeeding the tenth becoming gradually more and more concave towards the posterior end of the body; the posterior border of the keel of the eighteenth forming a distinct but obtuse angle with the posterior edge of the dorsal portion.

First leg of male modified; the femur with strongly convex upper border, hollowed lower border, and a large proximal conical process. *Sternum* of sixth segment narrow, much narrower than length of second segment of leg and only a little exceeding length of its basal segment. *Socket* of phallopods extending almost out to the dentiform tubercle, the edge just behind the tubercle raised to form a convex crest; the posterior edge not raised; *coxae* of the posterior legs of the seventh segment comparatively close together, separated by a space which is less than their width. *Phallopods* with distal segment subcylindrical, incurved apically, with a bifid tip; on the inner side near the tip there is a slender stiliform process bent at right angles; and above this is an erect spiniform tooth rising some little distance behind the extremity of the organ.

Length 15 millim., width 5.

Hab. COSTA RICA, Irazu (*Rogers*).

6. *Sphæriodesmus digitatus*, sp. n. (Tab. IX. figg. 3-3 d.)

Colour uniformly yellowish (in alcohol), white when dry. *Body* narrow and elongate, low, gradually sloped downwards posteriorly. *Segments* smooth and shining, at most minutely sculptured. *Keels* of fourth and fifth segments subequal in thickness and rather similar in shape except that the posterior angle of the fourth is more acute and the posterior border more concave; the notch on the inferior border of the keel of the fifth farther back than in other species. Posterior borders of the keels, except quite at the posterior end of the body, inclined slightly forwards, so that in the posterior half of the body, where the posterior angle becomes gradually more and more acute, the hinder border is lightly concave. Posterior border of keel of the eighteenth forming an evenly rounded angle with that of the dorsal portion of the segment.

First leg of male modified; the femur arcuate, concavo-convex, with a strong basal tooth-like tubercle. *Sternal areas* of fifth and sixth narrow, narrower than the length of the basal segment of the legs. *Socket* of phallopods extending nearly as far as the spiniform tubercle, the margin slightly raised in this region, elsewhere not raised. *Sternal area* separating the posterior legs of the seventh segment narrow, about equal to the length of the second segment of the legs, but these segments are themselves comparatively short. *Phallopods* long and slender; basal segments subcylindrical, not noticeably inclined inwards; distal segment long, slender, and cylindrical, biramous, the upper (subsidiary) branch thin and pointed, slightly curved, directed upwards and forwards so as to lie nearly parallel with the main branch, which projects straight forwards, is lightly sinuous and a little hooked at the tip; one or two longish bristles near its distal end externally.

Length 16 millim., width 4.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

7. *Sphæriodesmus coriaceus*, sp. n. (Tab. IX. figg. 4-4 b.)

Colour a fairly uniform testaceous. Form robust and convex as in *S. oniscus*. Segments very decidedly coriaceous and subgranular, much more coarsely so than in the other species. General shape of the segments and their keels very much as in *S. oniscus*, except that the second and third tergal plates have the anterior rim more strongly raised, as if the surface had been excavated just behind it, and the fourth, instead of sloping gradually and gently downwards from back to front, is somewhat abruptly depressed in its anterior portion, so that laterally the keels recall to a certain extent those of the Glomeridæ. Hairs on legs longer and fewer.

First leg of male unmodified. *Sterna* of fifth and sixth narrow, noticeably less in width than the length of the second segment of the legs, about as wide as the width of the first segment of the legs. *Socket* of phallopods small, not extending laterally nearly so far as the adjoining spiniform tubercle; its edge not raised. *Sternal area* between posterior legs of seventh segment about equal to length of second segment of legs. Basal segments of *phallopods* smaller, much less strongly inclined inwards; the distal segment stoutish in its proximal half, with a low eminence on its upper side; distal portion slender, attenuated, unbranched, strongly curled upwards and a little outwards, and ending in a simple point.

Length 20 millim., width 7.5.

Hab. GUATEMALA, San Juan in Alta Vera Paz (*Champion*).

The following species are known to me only from figures and descriptions:—

8. *Sphæriodesmus mexicanus*.

Glomeridesmus mexicanus, Sauss. Linn. Ent. xiii. p. 328 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 276, fig. 1 (1860)².

Sphæriodesmus mexicanus, Peters, Mon. Ak. Berlin, 1864, p. 529³; Cook, Pr. U.S. Nat. Mus. xxi. p. 462, t. 31. fig. 1 (1898)⁴; Attems, Denk. Akad. Wien, lxxviii. p. 390, t. 15. figg. 360, 361 (1900)⁵; Carl, Rev. Suisse Zool. x. p. 675, t. 12. figg. 102-104 (1902)⁶.

Colour black (when alive). *Segments* smooth and polished. *Body* parallel-sided, semicircularly rounded at the posterior end, strongly convex. *Keels* of fourth and fifth segments very similar in form, but, according to Cook's figure, those of the fourth slightly more slender and with the anterior border more strongly convex and the posterior more strongly concave. The keels of the rest of the segments apparently very like those of *S. oniscus*; the posterior border of the keel of the eighteenth forming a widely rounded angle with the posterior border of the tergal portion.

First leg of male modified; femur thick and arched, with a large basal tuberculiform tooth; the under side of the following segment hollowed basally. Tibio-femoral segment of *phallopod* with a submedian larger or smaller tooth above; its distal end somewhat abruptly curved upwards and backwards and subequally bifid apically.

Length 32-33 millim., width 12-13.

Hab. MEXICO, Cordova^{1 2}, Orizaba⁵, Vera Cruz⁴.

This species, the type of the genus, is the largest hitherto recorded, although not much larger than *S. robustus*, which it closely resembles in form. The phallopods of the two, however, are totally different. Unfortunately neither Cook, Attems, nor Carl give any information regarding the shape of the rim of the socket of the phallopods, nor of the width of the sternal areas of the sixth and seventh segments.

9. *Sphæriodesmus saussurei*.

Sphæriodesmus mexicanus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 21, figg. 1-1 e¹ (1872) (nec *S. mexicanus*, Sauss., 1859 and 1860).

Sphæriodesmus saussurei, Attems, Denk. Akad. Wien, lxxviii. p. 391 (1900)²; Carl, Rev. Suisse Zool. x. p. 677, t. 12. figg. 100, 101 (1902)³.

The typical examples of this species were provisionally referred by Saussure and Humbert to the young of *S. mexicanus*, although these authors pointed out that, in addition to being considerably smaller, they have the lobes of the fourth segment wider. On the evidence thus supplied Cook rightly supposed they would prove to be specifically, if not generically, distinct from *S. mexicanus*; and two years later Attems, without seeing the specimens, proposed to give them the new specific name *saussurei*. The original examples were subsequently examined by Carl, who found no specific features to distinguish them from *S. mexicanus* apart from those mentioned by Saussure and Humbert and certain structural details in the phallopod and the first leg of the male. The tubercle at the base of the femur of the first leg in the male is lower than that of *S. mexicanus*, the apical portion of the phallopod is much shorter and ends in a simple point, and the excrescence on the upper side of the distal segment is larger and blunter.

Length 16 millim., width 5.

Hab. MEXICO, Cerro de Escamela in the Eastern Cordillera.

10. *Sphæriodesmus neglectus*.

Glomeridesmus mexicanus, Sauss. Mém. Soc. Phys. Genève, xv. pp. 276-278 (1860) (in part.)¹.

Sphæriodesmus neglectus, Carl, Rev. Suisse Zool. p. 676, t. 12. figg. 107, 108 (1902)².

According to Carl, Saussure originally confounded two species, a larger and a smaller, under the name *Glomeridesmus mexicanus*. Specimens of the smaller, regarded by Saussure as young, are pale in colour, and have the keel of the fourth segment wider than in the larger one, *S. mexicanus*. In the first leg of the male, moreover, the basal process of the femur is lower and the fourth segment is evenly curved above. The phallopod, too, is quite different, being shorter and stouter and lightly bent upwards at the apex, which is divided into two broad processes, an outer stout at the base and narrowed and bluntly pointed at the apex, and an inner which is apically truncate, with a rounded lobe above; near the middle of the upper surface there is a lobate process with convex edges, a slightly constricted base, and an attenuated apex. Other secondary sexual characters are not described.

Length 24 millim., width 8.

Hab. MEXICO, Cordova¹.

11. *Sphæriodesmus medius*.

Sphæriodesmus medius, Carl, Rev. Suisse Zool. x. p. 675, t. 12. figg. 105, 106 (1902)¹.

Colour yellowish-white (in alcohol). As in *S. saussurei* and *S. neglectus*, the keels of the fourth segment are wider than in *S. mexicanus*.

The *first leg* of the male bears a long and sharp basal process on the base of the femur, and there is a much smaller process on the underside of the succeeding segment. The *phallopod* has no distinct hairy eminence on the proximal end of the basal segment, and the distal segment is elongate and semicircularly curved upwards, without any submedian process; but the tip is somewhat strongly bifid, both prongs being concavo-convex and gradually attenuated apically.

Length 20 millim., width 7.

Hab. GUATEMALA (*Oltramare coll.*).

CYLIONUS*.

Cylionus, Cook, Pr. U.S. Nat. Mus. xxi. p. 462 (1898).

Ventral surface of the *segments*, external to the articulation of the legs, with the posterior border much straighter than in *Sphæriodesmus*, only slightly sinuous and oblique in the anterior half of the body and becoming quite straight in its posterior half, with a small tooth and notch external to the posterior leg; the anterior spiniform tubercle farther away from the base of the anterior leg.

Body highly vaulted, distinctly compressed at the base of the keels, which, at least in the middle and posterior regions of the body, project slightly obliquely outwards and downwards. Most of the *keels* gradually narrowed and pointed; those of the fourth noticeably larger than of the fifth; those of the third at all events larger than in the genus *Sphæriodesmus*. For sexual characters, see the description of *C. constrictus* and also of *C. gracilis*.

Distribution. MEXICO.

The comparatively large size of the keels of the third segment and the small size of those of the fifth in this genus must be taken into consideration in judging of the possible relationships between *Sphæriodesmus* and *Cyclodesmus*, the third segment being the largest of the series in the latter. It must also be remarked that the phallopods of *C. constrictus* show considerable similarity to these same organs in *Cyclodesmus aztecus* as depicted by Carl (Rev. Zool. Suisse, x. p. 678, t. 12. fig. 109, 1902).

The typical species of this genus, *C. gracilis*, Sauss., is unknown to me, except from the description that Saussure and Humbert have published. It was also unknown to Cook, who proposed to separate it generically from *Sphæriodesmus*. I have therefore recharacterised *Cylionus* from the species described below as new, which in many of its characters unmistakably resembles *C. gracilis*. The two may be distinct generically; certainly they differ considerably in the structure of their copulatory organs. But in the present state of our knowledge it seems to me to be preferable to refer them to the same genus, rather than to erect another genus for this new species.

By the structure of the phallopods the two known species of *Cylionus* may be distinguished as follows:—

- a.* Phallopod terminating in two strongly incurved hooked processes, the upper bifid, the lower simple and pointed *gracilis*.
*a*¹. Phallopod terminally bent strongly upwards and outwards *constrictus*.

1. ***Cylionus constrictus***, sp. n. (Tab. IX. figg. 5–5*f.*)

Colour uniformly yellowish-white when cleared of adherent dirt. *Body* small and narrow, with the dorsal surface strongly convex and a shallow constriction at the base of the keels, which incline slightly outwards. *Antennæ* lightly incrassate; second, third, and sixth segments subequal and longer than the fourth and fifth. *First tergal plate* with postero-lateral border strongly arched, the lateral angle nearly rectangular. *Keels* of the second narrower and shorter than those of the third, which are comparatively large and extend inferiorly as low as those of the fourth, with anterior border convex and posterior border concave. Keels of fourth moderately large, much larger than those of the fifth, which are intermediate

* Omitted from the Zool. Record, 1898.

in size and shape between the keels of the fourth and sixth. The latter narrow and acutely angular with convex inferior edge. The five or six succeeding keels like them; but towards the posterior end of the body the keels become gradually broader and contiguous, the anterior angle becoming gradually more and more convex and the posterior more and more pointed and acute. The posterior border of the sixteenth inclined slightly backwards; that of the nineteenth forming an obtuse angle with the posterior border of the segment. Dorsally the segments are markedly depressed in front. Anal tergal plate moderately large, lightly compressed, with projecting inferior (posterior) border, hardly twice as wide as high; sternal plate with convex, bitubercular posterior margin. *Legs* with second segment much more than half the length of the third and longer than the fourth and fifth.

In the male the *legs of the first pair* are modified, the femur being stout and strongly convexly arched above, with a conspicuous dentiform tubercle near the base below. *Sterna* of fifth and sixth segments quite narrow; but the second segment of the legs long and curved slightly backwards to make room for the phallopods. *Socket* of phallopods very large and wide, its margin not noticeably raised; *sternal area* between the posterior legs of the seventh segment very narrow, scarcely exceeding the width of the basal segments of the legs. *Phallopods* widely separated by a submembranous area; basal segment stout, vertical, convex externally, concave internally for the lodgment of the distal segment, which arises on their inner aspect, and from the inferior view at least appear to be two-jointed; the proximal portion stout and short, with a posterior and an anterior tuft of bristles, the latter tuft overlapping the proximal end of the distal portion; the latter elongate, strongly convex, and distally curved upwards and outwards, with a hair-tipped excrescence at the base on the outer side and a fringe of hairs on the apex; the hollow of this is occupied by a less chitinised piece, which also ends distinctly in a pointed process, so that the segment in question is apically bifid.

Length 8 millim., width about 3.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

2. *Cylionus gracilis*.

Sphæriodesmus gracilis, Humb. & Sauss. Rev. et Mag. Zool. 1869, p. 149¹; Miss. Sci. Mex., Myr. p. 22, t. 1. figg. 2-2 l (1872)²; Attems, Denk. Akad. Wien, lxxviii. p. 391 (1900)³.

Cylionus gracilis, Cook, Pr. U.S. Nat. Mus. xxi. p. 463 (1898)⁴.

Apart from the original describers, no one seems to have seen examples of this species. It is not easy to extract from the description and figures any well-marked specific features to separate it from *C. constrictus*, except those presented by the structure of the phallopods, which are totally different in the two forms. It may be added, however, that the third tergal plate does not appear to be so long and wide laterally in *C. gracilis* as in *C. constrictus*. Judging from the figure of *C. gracilis*, the phallopods are rather less widely separated, and the distal segment arises much less markedly from the inner aspect of the proximal than in *C. constrictus*. The proximal portion of the distal segment also is much longer and bears two incurved processes, the inferior forming a simple pointed flagelliform hook, and the superior an equally strongly incurved apically bifid process. Other sexual characters are not recorded; but about the specific distinctness of the two forms there can be no doubt whatever.

Length 11 millim., width 2.5.

Hab. MEXICO, Moyoapan in the Eastern Cordillera¹⁻⁴.

COLOBODESMUS.

Colobodesmus, Brölemann, Ann. Soc. Ent. Fr. lxxiv. p. 347 (1905).

The name *Colobodesmus* was proposed by Brölemann for a species of this group apparently resembling *Sphæriodesmus* in external features, but separable from all the members of that genus in which the phallopods had been described by the structure

of those organs. So far as was known to Brölemann, the phallopod of *Sphæriodesmus*, apart from the basal segment, consisted of an elongated tibio-femoral segment with or without accessory branches and processes, but with the seminal duct opening upon the seminal style situated at or near the apex of the organ. But in *Colobodesmus* the large and stout femoral segment is followed by a very short subannuliform tibial segment, bearing a short and conical process upon which the seminal duct opens. Beyond this the tibia is produced into two relatively very large, somewhat lamellar, but irregularly shaped plates projecting far in advance of the orifice of the seminal duct, which is thus remote from the distal end of the phallopod.

Brölemann adds to his diagnosis of this genus the remark that the species described as *S. gracilis* by Saussure and Humbert appears to belong to *Colobodesmus*. If so, *Colobodesmus* is a synonym of *Cylionus*. On the other hand, there cannot be much doubt that *C. gracilis* and *C. constrictus* are congeneric; and the very considerable similarity that the phallopod of *C. constrictus* presents to the phallopod of *Cyclodesmus aztecus* (in which the seminal duct opens, according to Carl, just behind the tip of that organ) points to the existence of the same difference between *Cylionus* and *Colobodesmus* as between *Colobodesmus* and *Sphæriodesmus* with respect to the termination of the seminal duct.

In the new species of *Sphæriodesmus* described in the preceding pages I have not traced the course of the seminal duct and the position of its orifice. But the discovery of some of these species, notably of *S. prehensor*, shows that the structure of the phallopods is far more variable than Brölemann supposed. Nevertheless the structure of this organ suggests in all cases that the orifice of the seminal duct is subterminal. Even in *S. robustus* there seems to be a distinct seminal style in the hollow of the shovel-shaped termination of the phallopod. Brölemann unfortunately does not describe in *Colobodesmus* the shape of the posterior borders of the inferior surface of the segments, so that it is unknown whether his genus approaches *Sphæriodesmus* or *Cylionus*, or is unlike both in this respect.

1. *Colobodesmus biolleyi*, Bröl.

Colobodesmus biolleyi, Brölemann, Ann. Soc. Ent. Fr. lxxiv. p. 350, t. 8. figg. 8-12, t. 9. figg. 13, 14 (1905) ¹.

From the long description of this species it is difficult to pick out definite specific features apart from those belonging to the male sex. Brölemann says, however, that the anterior and posterior borders of the keel of the fourth segment are parallel, a statement which suggests that they are straight in a vertical line, and not convex and concave as in all the species of *Sphæriodesmus* and *Cylionus*. If they are curved in those genera they are not, strictly speaking, parallel. It also appears that the posterior angle of the keel is not in any sense produced, although acute. The first leg of the male has a large tuberculiform tooth on the base of the femur, and the latter segment is concave below, convex above. The socket of the phallopods is wide, as is also the sternal area between the posterior legs of the seventh segment.

Length (?), width up to 8.5 millim.

Hab. COSTA RICA, San José, Caché (*Biolley* ¹), Cariblanco (*Lankester* ¹).

BIOL. CENTR.-AMER., Diplop., October 1909.

S

Fam. PYRGODESMIDÆ.

Stylodesmidæ, Cook, Ann. New York Acad. Sci. ix. p. 5 (1895) ; Proc. U.S. Nat. Mus. xviii. p. 82 (1895) ; Amer. Nat. xxx. p. 418 (May 1896) (in part.).

Pyrgodesmidæ, Silvestri, Ann. Mus. Genov. (2) xvi. p. 192 (March 1896) (in part.).

Stiodesmidæ, Cook, Brandtia, v. pp. 20 & 25 (June 1896).

Pyrgodesminæ, Attems, Denk. Akad. Wien, lxviii. p. 375 (1900).

Decaporodesmidæ, Kenyon, Proc. Ent. Soc. Wash. iv. p. 299 (1899).

Anterior border of first tergal plate produced into a semicircular, grooved, and lobate crest completely concealing and overlapping the head and forming a continuous series with the keels of the succeeding segments ; central part of the plate elevated and much higher than the crest. Head with a densely granular frontal area. Antennæ clavate, the fifth segment the longest and thickest. Dorsal surface of segments elevated, granular, with some larger tubercles forming a pair of longitudinal crests *, one on each side of the middle line, frequently a similar but smaller crest between this and the base of the keels. Keels rising low on the sides, depressed or nearly horizontal, marginally grooved on the dorsal surface, with lateral and posterior borders lobate, the posterior lobe of the lateral border carrying the pore, when present, frequently on a papilla. Pores commonly suppressed on the 17th, 18th, and 19th segments, sometimes on others. Tergal plate of 20th segment moderately broad, not concealed by the keels of the 19th. Sterna very narrow. Basal portion of phallopods enlarged to form an arched hollow receptacle, in which the distal portion is more or less concealed.

Distribution. Tropical parts of America, Africa, and Asia.

I have adopted for this family the name *Pyrgodesmidæ* proposed by Silvestri, because, as Attems states, *Stylodesmus* appears to be a synonym of *Urodesmus* of Porat, and a family name must be derived from the one in use for one of the genera contained in that family. Again, even if in the future it be found that the type of *Stylodesmus* differs from that of *Urodesmus* in characters to which generic status can be given, it is quite possible that the view may be taken that *Urodesmus*, *Stylodesmus*, *Hercodesmus*, and others, in which the 19th segment is enlarged so as to conceal partially the reduced 20th segment, should constitute a family distinct from those genera, like *Lophodesmus*, *Pyrgodesmus*, and *Psochodesmus*, in which the 19th and 20th segments are normally constructed.

That this was the opinion of Cook in 1896, though not in 1895, appears from his latest paper on this group published in 'Brandtia,' where the family name *Hercodesmidæ* is given to the genera with abnormally formed posterior segments and *Stiodesmidæ* to those in which they present the usual conformation ; and it may be that his substitution of the name *Hercodesmidæ* for *Stylodesmidæ* was due to the discovery that *Stylodesmus* sinks into synonymy under *Urodesmus*. This, however, is not at all clear from his writings. In any case the name *Stiodesmidæ* is of later origin than *Pyrgodesmidæ* ; and the latter should, in my opinion, be used for the two genera recorded in this monograph, unless *Pyrgodesmus* with its single median turret-shaped dorsal processes

* In the Ceylonese genus *Pyrgodesmus*, Poc., the two crests of tubercles are represented by a high upstanding turret-shaped process.

be separated as a family from *Lophodesmus*, *Psochodesmus*, and others in which the dorsal area of the terga is furnished with two crests of enlarged granules. At the present time, however, this would be, in my opinion, an unnecessary proceeding.

The known Central-American genera belonging to this group may be readily distinguished as follows:—

- a.* Dorsal surface fairly uniformly covered with tubercles; the dorsal crests not coalesced on the 19th and 20th tergal plates; pores present on the keels of the 9th, 12th, and 16th segments LOPHODESMUS.
- a*¹. Dorsal surface not uniformly tubercular; the dorsal crests coalesced to form a single median crest on the 19th and 20th segments; no pores upon the 9th, 12th, and 16th segments DECAPORODESMUS.

Related to these two genera, and lying somewhat midway between them in the number of pores, is the genus *Psochodesmus*, Cook * ('Brandtia,' v. p. 25, 1896), the type species of which, namely *P. crescentis*, was from Florida; three others assigned to *Cryptodesmus* were subsequently described by Brölemann (Ann. Soc. Ent. Fr. lxxvii. p. 268, 1898) from Venezuela (see Attems, Denk. Akad. Wien, lxxviii. p. 370, 1900). Attems, however, places *Psochodesmus* in the Cryptodesminæ and *Lophodesmus* in the Pyrgodesminæ. Brölemann's species of *Psochodesmus* differ from the Central-American forms here referred to *Lophodesmus* in having the anterior border of the keels dentate and no pores on the keels of the 16th segment.

LOPHODESMUS.

Lophodesmus, Pocock, in Weber's Reise Niederl. Ostind. iii. p. 372 (1894); Attems, Denk. Akad. Wien, lxxviii. p. 377 (1900); Carl, Rev. Suisse Zool. x. p. 669 (1902).

Body convex, sometimes strongly elevated and compressed, with strongly inclined keels; keels small or large with lobate lateral margins, those of the second segment somewhat larger than those of the third and fourth segments. First tergal plate with its anterior edge produced into a horizontal crest completely covering the head and antennæ, its anterior border with ten lobes. Head strongly rugose on the frontal area. Antennæ short, thick, the fifth segment the longest and thickest. Segments tubercular, with a pair of dorsal crests formed of larger tubercles. Anal tergal plate broad; its margin with six lobes. Pores very distinct on segments 5, 7, 9, 10, 12, 13, 15, 16 †, carried on pale pedicels projecting from the posterior angle of the laterally bilobate keels. Legs short. Sterna narrow, sulcate. Phallopods with coxal segment protruding, enlarged to form a dome-shaped cavity facing inwards and lodging the terminal portion of the organ.

Type, *L. pusillus*, Poc.

Distribution. E. India (Flores and Java); CENTRAL AMERICA.

Two of the species here referred to *Lophodesmus* appear to belong unmistakably to that genus, but the third with the large laminate keels, more like those of *Cryptodesmus*, may possibly deserve generic distinction. I prefer, however, to leave it in this genus,

* Omitted from the 'Zoological Record.'

† In some specimens, at all events, minute pores appear to be retained on the dorsal side of the posterior lobe of the keels of the 17th, 18th, and 19th segments.

because the other known Central-American representatives have the body less elevated and compressed and the keels rather larger and less vertical than the typical form from Flores, and thus bridge over the interval, to a certain extent, between the latter and the larger species here described as *L. laminatus*.

Key to the Species.

- a.* Larger (11 mm. long and nearly 3 mm. wide). Keels widely extended and laminate, those of the 19th as broad as the tergal plate of the 20th and extending nearly as far backwards *laminatus.*
- a*¹. Smaller (not over 9 mm. long and about 1.5 mm. wide). Keels smaller, less extended, those of the second segment larger than those of the rest of the body; of the 19th smaller than the tergal plate of the 20th and not extending nearly so far backwards.
- b.* Antero-lateral lobe of the keels extending only a little beyond the level of the postero-lateral lobe, lobe on the posterior border defined by a deep notch . . . *celatus.*
- b*¹. Antero-lateral lobe of keels extending well beyond the level of the postero-lateral lobe; the lobe on the posterior border not defined by a deep notch . . . *perparvus.*

1. **Lophodesmus laminatus**, sp. n. (Tab. X. figg. 1-1 *g.*)

♂. *Colour*: upper surface a uniform blackish-brown; legs, antennæ, head (except forehead) testaceous.

Head punctured, the forehead furnished with a coarsely and closely granular patch. *Antennæ* short and thick, the fifth segment much the longest and thickest, the sixth very short. The whole of the *dorsal surface* covered with tubercles or granules. The *keels* depressed, covering the legs, continuous. The crest of the first projecting far beyond the head, with border convex and divided into 10 lobules and marked above with 9 sulci, which radiate backwards from the border. The upper surface of each segment furnished with two rows of large pointed tubercles, each row consisting of three tubercles, or rarely of two, when the posterior two unite. The keels projecting at right angles to the long axis of the body; their anterior and posterior borders parallel to each other and lying respectively in the same straight line with the anterior and posterior borders of the tergite; the anterior border furnished proximally with three rounded tubercles, distally entire, with a marginal sulcus, the anterior angle completely rounded, the lateral margin with a single deep notch prolonged into a groove; the posterior angle also rounded, but trilobate on the poriferous segments, the median lobe elongate, supporting the pore; the posterior border marked with three distinct notches which are prolonged into sulci on the dorsal surface and divide it into three lobes. *Anal tergite* wide, laminate, divided by four notches into five lobes, of which the median is itself bifid. *Sterna* narrow, sulcate. *Legs* thick; trochanter more than half the length of the femur.

Phallopods consisting of a pair of stout, convex, dome-shaped, basal segments, rounded outside, hollow within, in contact in the middle line and diverging from each other and possibly capable of being closed; the hollow of each facing that of the other and containing the distal portion of the organ, which fills the cavity and is in contact with that of the opposite side. Each consisting apparently of a single stout sclerite, which from its anterior aspect is seen to be deeply sulcate and to be bilobed apically, the external lobe more projecting than the internal; the former, when viewed from below, appears a rounded boss connected by a ridge with the smaller and lower internal lobe; when viewed from behind there is seen to be a crest, in contact with that of the opposite side, running vertically down the sclerite and terminating in a slight hook-like process. The posterior margin of the hollow formed by the proximal segment bears numerous stiff setæ. Legs of the third pair much thickened in the region of third segment. *Sterna* of the fifth segment with a median projection.

Length 11 millim., width 2.8.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*).

2. *Lophodesmus celatus*, sp. n. (Tab. X. figg. 2, 2 a.)

Colour blackish-brown above, with the cylindrical area of the segments pale; underside of segments from margin of keels to the base of the legs or thereabouts also blackish-brown; head pale, with exception of the frontal area, which is blackish-brown; antennæ and legs pale; sternal area with a median blackish-brown streak; anal sternal plate, valves, and underside of caudal process pale.

Head with frontal area prominent and coarsely granular. *Antennæ* short, second, third, and fourth segments subequal, fifth much the longest and thickest, sixth longer and thicker than the second and cylindrical, shorter than the fifth. *First tergal plate* high, strongly convex from above downwards; its anterior border ten-lobed, forming a shelf concealing the head, roughened with tubercles, of which two on the summit are considerably larger and two a little in advance somewhat larger than the rest. The rest of the segments high, strongly convex, but flattish above, with a series of three larger tubercles forming a crest on each side of the middle line and three others forming a much less distinct crest upon the side of the dorsal slope. *Keels* of second noticeably wider than the others and three-lobed, the anterior lobe the largest, the posterior the smallest; the anterior border entire, the posterior with a distinct lobate tooth. The rest of the keels laterally two-lobed; but the posterior lobe where it carries the pores trilobulate, the median lobule being the pore-pedicel; the posterior border with one well-defined but smaller lobe, which is the lowest and largest of a series of ill-defined lobes extending along the posterior border of the segments; anterior edge of keels sinuous, entire, but at the base passing into the lobulate anterior edge of the median portion of the segments; the anterior angle of the keels back to the 16th segment rectangular but rounded, of the 17th, 18th, and 19th more and more obtusely angled owing to the backward inclination of the keels; in the posterior half of the body the notch which defines the posterior lobe forms a deep fissure as in *Cyrtodesmus*. Anal tergal plate widely rounded, convex, and marginally six-lobed, the pale caudal process just protruding from beneath the median lobes.

Length 9 millim., width about 1.5.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

3. *Lophodesmus perparvus*, sp. n. (Tab. X. figg. 3, 3 a.)

♀. In general features closely resembling the preceding species, but smaller and with decided traces of a median lateral crest of larger tubercles beneath the dorsal crest, as in the typical species of the genus *L. pusillus*, and with the postero-lateral pore-bearing lobe of the keels much less distinctly trilobulate, the anterior lobule practically absent, so that the stout pore-pedicel is itself separated from the anterior lobe by a deepish notch; the anterior angle of the keels more widely rounded and the anterior lobe decidedly more prominent and projecting well beyond the pore; the posterior lobe of the keels defined by two shallow notches. The first tergal plate with two transverse rows, each consisting of four large tubercles.

♂. With secondary sexual characters as is *L. laminatus*; structural details of the phallopods not determined. Seminal processes of coxæ of second legs short and merely tuberculiform. Legs of third pair strongly thickened in the region of the third segment.

Length about 7 millim., width about 1.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

DECAPORODESMUS.

Decaporodesmus, Kenyon, Proc. Ent. Soc. Wash. iv. p. 299 (1899).

Oligodesmus, Gill, Proc. Ent. Soc. Wash. iv. p. 300 (1899) (nec *Oligodesmus*, Attems, Denk. Akad. Wien, lxxvii. p. 322, 1899).

Differing from *Lophodesmus* principally in having the pores suppressed on the 9th, 12th, and 16th segments, so that there are only five pairs of pores on the 5th, 7th, 10th, 13th, and 15th segments respectively, and in the coalescence of the dorsal rows of tubercles on the 19th and 20th tergal plates to form a single

median crest, and in the presence of two definite rows of tubercles on the dorsal surface external to the upper admedian row.

Type, *D. motzoronginis*, Kenyon.

Distribution. MEXICO.

Kenyon made a special family for the reception of this genus, but it obviously falls into line with the genera *Pyrgodesmus*, *Lophodesmus*, *Urodesmus*, and others, for which the group-name Pyrgodesminæ had been previously proposed.

1. *Decaporodesmus motzoronginis*.

Decaporodesmus motzoranginis (sic), Kenyon, Proc. Ent. Soc. Wash. iv. p. 299 (1899) ¹.

Colour brown above, lighter below. *Keels* prominent, not decurved, with outer margins bilobed. First tergal plate with ten tubercles on either margin of the crest overhanging the head. Keels of second segment projecting forwards; the rest projecting outwards, except at the posterior end, where they incline more and more backwards. Last tergal plate pointed (?), marginally 5-tuberculate. Dorsal crest consisting of two or three tubercles and increasing in height posteriorly. The crests converging on the 18th segment, and uniting on the 19th and 20th to form a median crest which projects considerably backwards. Between these crests and the base of the keels there are two rows of simple tubercles, the inner of these rows more prominent than the outer.

Length about 8 millim., width ?

Hab. MEXICO, Motzorongo in Vera Cruz (*Bruner* ¹).

Fam. PERIDONTODESMIDÆ, nov.

Antennæ widely separated, the distance between them about equal to the length of their three basal segments, clavate, the sixth segment the longest and thickest. *First tergal plate* small, without keels. *Segments* 2 to 19 with well-developed, nearly horizontal keels, the lateral and posterior edges of which are armed with strong teeth each tipped with a bristle, the median area of the segments with three rows of setiferous tubercles. Keels of second segment much larger than those that immediately succeed them. *Pores* normal in number, placed above the lateral border of the keels in their posterior half. *Caudal process* triangularly pointed; sternal plate with broad truncate posterior border. *Sternal areas* moderately wide. *Legs* with sixth segment longer than the third. *Phallopods*, where known, of a very special type and different from those of all described Polydesmoids.

Distribution. CENTRAL AMERICA.

Cook ('Brandtia,' v. pp. 15-16, 1896) suggested that the genus *Peridontodesmus* might belong to the Xystodesmidæ, a family of which the characters do not appear to have been categorically detailed. It was established for several genera based upon species from tropical West Africa and South America, amongst the latter being *Trachelodesmus*, Peters. I cannot, however, find any evidence of relationship between *Peridontodesmus* and *Trachelodesmus*. Rather does it appear to me possible that *Peridontodesmus* is allied to *Cryptodesmus*, of which the type, according to Cook's selection, is *C. olfersii*, Brandt. In the latter, according to this author ('Brandtia,' p. 19, 1896), the terga have three rows of setiferous tubercles, the lateral and posterior margins of the keels are sinuato-dentate, the pores are normal and submarginal, the antennæ are

clavate, and the first tergal plate has an anterior row of granules—features which are also possessed by *Peridontodesmus*. The latter, however, is obviously a more primitive type, as is shown by the small size of the first tergal plate and the width of the sternal areas; and it may well be that *Peridontodesmus* is allied to the ancestral type from which *Cryptodesmus* is descended; but since no intermediate genera are, so far as I am aware, known, and since the structural differences between them are considerable, I see no course open at present but to regard *Peridontodesmus* as the type of a distinct family.

PERIDONTODESMUS.

Peridontodesmus, Silvestri, Ann. Mus. Genova, (2) xvi. p. 197 (1896); Attems, Denk. Akad. Wien, lxxviii. p. 358 (1900).

Integument coriaceous. *Head* without frontal sulcus. *Antennæ* rather widely separated, moderately long, incrassate to the sixth segment, which is much the largest of the series, third segment much longer than the second or fourth. *First tergal plate* transversely subelliptical, much wider than the head, but not covering it anteriorly; its anterior edge finely, its lateral angle more strongly toothed. *Keels* of the other segments large, horizontal, high on the sides, so that the dorsal surface is moderately flat, with untoothed anterior border and strongly toothed lateral and posterior borders; the metazonites with three transverse rows of small setiferous tubercles; a shallow groove lying between the first and second rows; a few small setiferous tubercles on the upper side of the keels; the large marginal teeth also bearing setæ. *Pores* normal in number, but small and placed just above the edge of the postero-lateral tooth. *Anal tergal plate* triangular, pointed, the terminal portion not constricted. *Valves* flattened, lightly convex above, flattened inferiorly; margins very feebly thickened. *Anal sternal plate* wide, sides strongly converging, posterior border straight; setæ widely separated. *Sternal areas* longer than wide, but not narrow. *Legs* with second segment long, nearly as long as the third, which is shorter than the sixth.

Phallopods with coxal segment very large, fused anteriorly to its fellow of the opposite side, with long curved calcar in the normal position and a second calcar projecting inwards from its outer edge; distal segment very stout at the base, narrowed distally and tapering into a longish flagelliform process; attached to its lower surface there is a stout, crescentically curved rod, which tapers posteriorly into a shorter flagelliform process and anteriorly into a much longer and thinner curved flagellum. On the inner side of the thickened portion of the distal segment there arises a subcylindrical piece which projects forwards at first, then narrows and curves abruptly downwards on the inner side of the two forwardly directed flagella, is sinuous distally, and ends in a point. This is probably the seminal style. Genital processes of second leg of male short, with blunt apex.

Type, *P. woodianus*.

Distribution. CENTRAL AMERICA.

The male-characters of the typical species of this genus, *P. woodianus*, are unrecorded, those given above being taken from the males of the species from Guatemala described below. Hence it is impossible to know which features they present have a specific and which a generic value.

Key to the Species.

- a. Antero-lateral tooth of the keels, except at the posterior end of the body,
 large, acute, and projecting as far laterally as the pore-bearing tooth;
 lateral border of keels of second with four teeth *flagellatus*.

- a*¹. Antero-lateral tooth of keels smaller, not long and acute, and not projecting so far laterally as the second and third teeth; lateral border of keels of second segment with three teeth (? in *woodianus*.)
- b*. Antero-lateral tooth of keels, except at posterior end of the body, moderately large but truncate; very few tubercles on the keels. . . . *hirsutus*.
- b*¹. Antero-lateral tooth of keels a minute sharp denticle; keels more tubercular than the median area of the segments *woodianus*.

1. **Peridontodesmus flagellatus**, sp. n. (Tab. X. figg. 4-4 *g*.)

♀. *Colour* nearly uniformly testaceous or yellow-brown. *Head* beset with short hairs inferiorly; *antennae* similarly clothed distally. *First tergal plate* with large horizontal keels, its anterior border with a row of eight small setiferous tubercles increasing in size externally and passing into the teeth of the antero-lateral border of the keel, of which there are five, the posterior being the smallest; posterior border of the keel directed forwards and outwards; the median area of the plate only lightly convex and bearing three rows of tubercles in addition to those on the anterior border. The rest of the *segments* very similar in form to one another; each with three rows of tubercles, the posterior row being on the posterior border; a shallow transverse sulcus lying between the first and second rows, on all but the second, third, fourth, and nineteenth; on the keels there are only about four or five tubercles continuing the anterior and median rows; the median area of the segments lightly convex; the keels large, set high on the sides, nearly horizontal; from the second to about the sixth directed slightly forwards, but the forward inclination less and less marked towards the middle of the body, those of the mid-region being transverse; from the 16th to the 19th directed more and more backwards; the *keels* at the posterior end more squared or rhomboid than those at the anterior end, which are wider than long and narrowed externally, except on the second; in all cases the keels as long as the segment, with the anterior border straight or becoming lightly convex in the posterior half of the body; the anterior angle well marked, acute in front, squared in the mid-region, and obtuse posteriorly; the second with well-marked posterior angle; its lateral edge armed with four strong teeth, the first and fourth being respectively upon the anterior and posterior angles; its posterior border also with four teeth, whereof the internal is smaller and lobate or subtubercular; from the third to about the tenth the lateral and posterior teeth form a continuous curved series; on the poreless keels there are three strong lateral teeth and four posterior teeth, the latter becoming gradually smaller and more rounded and lobate internally; the second and third lateral teeth with a supplementary tooth on most of the segments; on the pore-bearing keels there are two lateral teeth in front and a large subdivided tooth on the posterior angle, which becomes more and more acute and produced from about the 16th to the 19th; three teeth on the posterior border of the 17th, two on the 18th, and one on the 19th, but the teeth on these keels all smaller than those of the segments preceding them, and the anterior with a supplementary denticle. *Pores* conspicuous, normal in number, situated above the edge and rather more than their own diameter internally to and in front of the angular notch dividing the large tooth into its two moieties.

♂. Like the ♀, but smaller and with the keels a little larger and more horizontal; and, at least in the specimens examined, there is no anterior supplementary tooth on the second and third teeth on the lateral border of the keels. For structure of the phallopods, reference may be made to the generic diagnosis and to the figures.

Length of ♀ 9 millim., width 2; length of ♂ 7 millim., width about 1.5.

Hab. GUATEMALA, Cholhuitz (*Stoll*).

2. **Peridontodesmus hirsutus**, sp. n. (Tab. X. figg. 5, 5 *a*.)

♀. *Colour* (in alcohol) dark blackish-green, fading when dry to pale olive-grey, without the yellowish or brownish tinge of *P. flagellatus*. Very similar to the latter, but larger, and differing in the following particulars: the keels are narrower and less lamellar, those of the second are only armed laterally with

three instead of four teeth, the anterior tooth being large and having a decidedly convex anterior border, the total number of teeth on the keel being six and a minute posterior internal tooth instead of seven and a small rounded tooth; the antero-lateral tooth is short and truncate at the apex instead of acute, and does not project so far laterally as the second and third teeth; as in *P. flagellatus*, there are three very distinct rows of tubercles on the median area of the terga and only a few upon the keels.

Total length, ♀, about 12 millim., width 2.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*).

3. *Peridontodesmus woodianus*.

Polydesmus (Scytonotus) woodianus, Humb. & Sauss. Rev. et Mag. Zool. 1869, p. 152.

Polydesmus woodianus, Humb. & Sauss. Miss. Sci. Mex., Myr. p. 52, t. 1. figg. 13, 13 a (1872).

Peridontodesmus woodianus, Attems, Denk. Akad. Wien, lxxviii. p. 359, t. 15. fig. 364 (copied) (1900).

The description of this species supplies very few particulars enabling me to compare it accurately with the two just described. In two characters mentioned by Humbert and Saussure it differs markedly from them, namely, in having the upper side of the keels more thickly tubercular than the median area of the segments and in having the lateral angles of the first tergal plate rounded, an epithet by no means applicable to the pointed and toothed angle of this plate in *P. flagellatus* and *P. hirsutus*. The full figure of the type of *P. woodianus* gives only a vague idea of the general appearance of the animal and cannot be trusted for details; the dentition, indeed, is not the same on the right and left keels of individual segments. More confidence may probably, however, be placed in the much enlarged figure of the dorsal side of one of the segments, which shows that the antero-lateral tooth is minute and sharp, and quite different from the corresponding tooth in the two new species here described. It is merely a minute denticle, and does not project so far laterally as the second tooth, which is itself surpassed by the large bifid pore-bearing tooth.

Length 12 millim., width 2.

Hab. MEXICO, Eastern Cordillera.

Fam. PLATYRACHIDÆ.

Large, very large, or medium-sized Polydesmoidea, with the caudal process not triangular or cylindrical, but broad, squared, oblong, or semicircular, and projecting well beyond the keels of the 19th segment, which are small. In all the Central-American species the antennæ are short and rather close together, and in all genera except *Aphelidesmus*, which is included with some doubt in this family, the phallopods are simple, and the accessory branch, when present, rises near the extremity of the organ as a protection or guard to the seminal stile.

Distribution. Oriental Region eastward from Tenasserim; South America, Central America, and with a few outlying forms in the Southern States of North America; absent from the Australian, Ethiopian, and Holarctic Regions.

The characters upon which this family rest are not very satisfactory. Nevertheless, the numerous genera that have been established are united by a complex of structural features which enables them to be distinguished at once from all other Polydesmoidea.

Subfam. *PLATYRACHINÆ*.

Typical members of the family with the pores opening upon the upper side of the keels, sometimes close to the lateral edge, sometimes remote from it, and not insunk in distinct depressions, but surrounded by a thick circular rim, giving them the appearance of a cannon's mouth. Lateral edge of keels never smooth and thickened as in most Polydesmoidea, but generally narrow and granular, like the rest of the upper side of the keel.

Distribution. Central America (Costa Rica); West Indies; northern part of South America; Oriental Region east of Tenasserim.

The Central-American representatives of this group known to me fall into two well-marked sections, one of which is represented by a single species, the other by a considerable number. For the former I adopt the name *Tiroidesmus* given by Cook to an allied form. For the latter I retain the old name *Platyrachus*, C. Koch, of which the type, *P. scaber*, Koch, came from Brazil, and resembles in general features the species here referred to that genus. It must be remembered, however, that the generic diagnosis here given of *Platyrachus* was not taken from the type-species, in which the secondary sexual characters of the male and other important features are unknown, but from the Central-American forms enumerated below. Of the latter, however, I have seen representatives of only six out of the ten species. In the case of the remaining four, the descriptions given by their describers are not sufficiently detailed to supply the information necessary to give assurance as to their agreement in all respects with the diagnosis of the genus *Platyrachus* given below, and it is possible that disagreement from it may be found to occur in one or more minor points. This, however, would by no means necessarily involve exclusion of such deviating species from the genus; it would only necessitate modification of the generic diagnosis to meet the discrepancies.

The two genera may be contrasted as follows:—

- | | |
|---|---------------------|
| <p><i>a.</i> Phallopods arcuate, incurved and crossing at the apex, which is strongly upcurled, the sternum of the sixth segment excavated to receive them; keels of mid-region of body quadrate, with anterior border projecting at right angles to long axis of body, and with convexly rectangular anterior angle; legs and antennæ very short</p> | <p>PLATYRACHUS.</p> |
| <p><i>b.</i> Phallopods subparallel, projecting straight forwards, not apically upcurled; sternum of sixth segment in ♂ not excavated; keels aliform, the anterolateral border forming a nearly continuous arch directed obliquely outwards and backwards, and uninterrupted by any marked anterior angle; legs and antennæ much longer</p> | <p>TIRODESMUS.</p> |

PLATYRACHUS.

Platyrachus, C. Koch, Syst. Myriap. s. 131. 1. iii. Bändchen zu (Panzer) Herrich-Schäffer, Krit. Revis. Insektenfaune Deutschl. 1847; Die Myriapoden, i. p. 47 (1863).

Polydesmus (Stenonia), Saussure, Mém. Soc. Phys. Genève, xv. p. 531 (1860).

Platyrrhacus, Attems, Brölemann, Carl (in part.).

Keels of mid-region of body not narrowed externally, quadrate, with anterior border projecting at right angles to the long axis of the body, with marked anterior angle and long lateral border parallel to the long axis of the body; upper surface of metazonites closely and finely granular; the rows of tubercles faint; the first tergal plate evenly convex, not sunken in the middle; the anterior and posterior borders scarcely elevated, the keels but little developed, not directed forwards, the widest point of the plate being about the middle; the pearl-like tubercles but little developed on this and the succeeding terga. *Antennæ* short, in ♀ second segment only a little longer than the first, its length less than twice its thickness. *Legs* also short; third segment only a little exceeding the width of the sternal area; sixth segment not so tapering and markedly wider at its distal end than the width of the claw. *Phallopods* arcuate, curving inwards and crossing at the distal end, which is markedly upcurled; sternum of sixth segment excavated, especially posteriorly, to receive them.

Type, *P. scaber*, C. Koch.

Distribution. Costa Rica and the northern countries of South America.

Analytical Key to the Central-American Species.

- a. Pores remote from the lateral edge of the keels.
 - a¹. Lateral edge of keel with about five large spiniform teeth; colour said to be as in *P. bilineatus* *mexicanus*.
 - b¹. Lateral edge of keel with rounded or sharp tuberculiform teeth.
 - a². Dorsal surface with two narrow pale stripes on a dark ground *bilineatus*.
 - b². Dorsal surface not so coloured; phallopod strongly bent at its distal end; seminal stile short, sharply bent forwards; auxiliary branch wide, laminate (except in *P. riparius*).
 - a³. Dorsal surface yellow, with a dark brown band extending on each side at base of keels *bivirgatus*.
 - b³. Dorsal surface altogether brown, or brown with the whole or part of the keels yellow.
 - a⁴. Auxiliary branch of phallopod sickle-shaped *riparius*.
 - b⁴. Auxiliary branch of phallopod laminate.
 - a⁵. First tergal plate with its circumference studded with tubercles *limonensis*.
 - b⁵. First tergal plate with at most a row of indistinct tubercles on its anterior and posterior borders.
 - a⁶. Only the outer half of the keels yellow; their lateral edge with five or six pointed tubercular teeth *fraternus*.
 - b⁶. The entire upper surface of the keels yellow; their lateral edge with very low and small, mostly elongated tubercles *tristani*.
 - b. Pores near the lateral edge of the keel, their distance from it from twice to less than once the diameter of the pore-area; phallopods less strongly curved distally than in species mentioned under b², with the seminal stile longer and the auxiliary branch sickle-shaped.
 - a⁷. Brown, with yellow keels; less convex.
 - a⁸. Keels somewhat strongly toothed like those of *P. mexicanus* *montivagus*.
 - b⁸. Keels with tubercular lateral border *propinquus*.
 - b⁷. Colour almost as in *P. bivirgatus*, yellow with a brown stripe on each side; strongly convex *stenopterus*.

1. *Platyrachus bilineatus*.

Polydesmus bilineatus, Lucas, Hist. Nat. des Crust., Arachn. et Myriap. p. 523 (1840)¹; Gervais, Ins. Apt. iv. p. 107².

Polydesmus (Stenonia) bilineatus, Saussure, Mém. Soc. Phys. Genève, xv. p. 532, t. 7. fig. 50 (1860)³.

? *Platyrhacus bilineatus*, Attems, Denk. Akad. Wien, lxxviii. p. 347 (1900)⁴.

Colour. Head, antennæ, first tergal plate, and dorsal area generally dark olive-brown, with two narrow whitish stripes, somewhat widely separated from each other, extending from the 2nd to the 18th segments; anterior and lateral edges of the keels, the tubercles along the posterior border of the segments and on the lateral margins of the keels also whitish; underside brown or yellow-brown.

Apart from colour, this species seems to resemble for the most part those grouped round *P. limonensis*. The keels are large, standing somewhat high on the sides, and horizontal; their anterior edges are convex, their posterior edges concave, both being serrulated; lateral margin with about five tuberculiform teeth; the posterior angle produced and acute in the hinder half of the body, but not spiniform. Pores remote from the edge. Dorsal area granular; a row of tubercles along the posterior edge and two less distinct rows in front. Caudal process rounded.

Length of ♂ (typical example) 63 millim., width 11.

Hab. MEXICO¹⁻³.

Saussure's description of this species was taken from the typical example in the Paris Museum. It is said to have come from Mexico. The example described by Attems⁴ as *P. bilineatus* came from Oliveria, in Peru, and probably represents a different species. It measures 80 millim. long and 13 broad.

2. *Platyrachus mexicanus*.

Polydesmus mexicanus, Lucas, Hist. Nat. des Crust., Arachn. et Myriap. p. 523 (1840)¹; Dict. Sci. Nat. d'Orbigny, Myriap. t. 1. fig. 3²; Gervais, Ins. Apt. iv. p. 107³.

Polydesmus (Stenonia) mexicanus, Saussure, Mém. Soc. Phys. Genève, xv. p. 534, t. 7. fig. 51 (1860)⁴.

?? *Platyrhacus mexicanus*, Attems, Denk. Akad. Wien, lxxviii. p. 348 (1900)⁵.

Colour obscure, with two pale longitudinal lines as in *P. bilineatus*, but believed by Saussure to be attributable to discoloration.

Large; keels horizontal, lamellar, very wide, shaped as in *P. bilineatus*, but narrowing a little externally in the median portion of the body; their anterior border less regularly arched, being more strongly arched proximally than distally and not denticulated; the posterior border less regularly concave; the external border not finely toothed as in *P. bilineatus*, but armed with four or five long spiniform teeth, of which the last is divided posteriorly and is a little incurved on segments 15 and 16 to form a kind of hook; keels of 17th less regularly toothed and more or less truncated posteriorly. Pores very large and far removed from the lateral edge of the keels. Dorsal surface obscurely granular; a row of tubercles traceable along their posterior border.

Length (minus head and segments 1 to 5) 75 millim., width 17. The total length was probably over 90 millim.

Hab. MEXICO¹⁻⁵.

This species appears to be very incompletely known. The examples that Attems identified and described under the name *P. mexicanus* differ in several respects from the type as described by Saussure, in size, colour, height of the keels, shape of their anterior border, distance of the pore from the lateral margin, tuberculation of

tergal surface, &c., and there appears to me to be very little doubt that he had in his hands examples of the species to which Carl subsequently gave the name *P. montivagus*.

3. *Platyrachus tristani*, sp. n. (Tab. X. figg. 6-6 b.)

♂. *Colour* black, with the entire keel yellow, so that the yellow area on each side of the upper surface is equal in width to the black area; head black; antennæ and legs brown, with their two basal segments and the ventral surface clearer yellow-brown.

Frontal area of *head* granular, with two large tubercles. *Dorsal surface* very distinctly granular, much more coarsely so than in *P. montivagus*, and in consequence much less shining; the rows of tubercles traceable only on the posterior segments. *First tergal plate* with its angle rectangular and blunt; the border in front of the angle very obscurely tuberculate. *Keels* better developed than in *P. montivagus*, a little higher on the side, and nearly horizontal, so that the dorsal surface is flatter. The lateral margins of all the keels only very slightly irregular, owing to their being studded with small shining tubercles—in no sense of the word describable as teeth. Anterior border of the keels lightly convex and forming an even curve with the convex anterior angle; the posterior border straight or, at the posterior end of the body, lightly concave; from about the 7th to the 17th segments the posterior angle is a little produced and spiniform, very feebly so on the anterior of these segments and not strongly so on those of the posterior half of the body; posterior angle of the 18th sharp, of the 19th rounded. *Pores* remote from the margin, as in *P. mexicanus*; lateral edge of some of the pore-bearing keels with a shallow indentation, which, however, never extends nearly so far as the pore; anterior border of keels from about the 13th to the 18th very finely serrulate, and the posterior border from about the 11th. *Second tergal plate* with its posterior angle more produced and more square than in *P. montivagus*. *Caudal process* semicircular. *Anal sternal plate* narrower than in *P. montivagus*, with the tubercles much larger and separated by a narrower space. *Sternal areas* of body slightly hollowed out, but neither longitudinally nor transversely sulcate; each furnished with four low tubercles in the posterior half of the body, but in the anterior half these are more pronounced, being especially well developed upon the 5th, 8th, and 9th; on the sternum of the 6th, which is excavated, the anterior tubercles are large and the posterior absent; and there is a very distinct pair at the base of the legs of the 7th segment. A small conical tooth on the sternum of the 4th. Rim of *cavity* of phallopods with a groove just below it, as in *P. montivagus*. *Phallopods* a little less strongly bowed in their proximal half than in that species, so that there is a narrower space between them; distally crossed; the upcurved portion sublaminar, blunt, with sinuous edges; the seminal stile very short and slender and turned forwards in a direction nearly at right angles to that of the sublaminar auxiliary portion.

Length of ♂ 94 millim., width 14.

Hab. COSTA RICA, La Palma (*Tristan*).

Closely allied to *P. limonensis*, Attems, and *P. fraternus*, Carl; but the descriptions given of the typical examples of these two species compel me to regard the example above described as representing a form distinct from both. As regards *P. limonensis*, Attems says that the circumference of the first tergal plate is studded with larger tubercles, that the keels of segments 2 to 4 are "nach rückwärts gezogen," that the colour is chestnut-brown, and that the basal segments of the legs of the sixth pair are furnished with a long conical process ("Zapfen"). This last is a very remarkable character, if it exists in reality. Can it be that Attems has mistaken the rather long vertical *sternal* process for a coxal outgrowth? Apart, however, from this, the other characters enumerated are sufficient to enforce the separation of *P. tristani* from *P. limonensis*.

With regard to *P. fraternus*, this species was separated by Carl from *P. limonensis* for

the same reason that I separate *P. tristani* from *P. limonensis*, although Carl accepted without question the truth of the statement regarding the presence of the coxal tooth on the legs of the sixth pair. My reasons for treating *P. tristani* as distinct from *P. fraternus* are that Carl says that the anal sternal plate in *P. fraternus* bears two small warts as in *P. bivirgatus*, whereas these warts are of large size in *P. tristani*, as they are in *P. limonensis*; that he describes the outer half of the keels only as yellow, instead of the entire keel; and, finally, that the statement that the lateral edges of the keels are furnished with from four to five "ziemlich spitze Häckerzähne" does not in the least express the character of the armature of the keels in *P. tristani*, which, as has been said above, are in no sense sharp or tooth-like.

The phallopods seem to be of practically the same structure in the three species enumerated above.

4. *Platyrachus limonensis*.

Platyrhacus limonensis, Attems, Denk. Akad. Wien, lxxviii. p. 344, t. 14. fig. 319 (1900)¹.

Hab. COSTA RICA, Port Limon¹.

The typical male example of this species measures 116 millim. long and 18 millim. wide. The enumeration of its essential characters under the heading of *P. tristani* makes a repetition of the description given by Attems superfluous.

5. *Platyrachus fraternus*.

Platyrhacus fraternus, Carl, Rev. Suisse Zool. x. p. 655, t. 11. fig. 71 (1902)¹; Brölemann, Ann. Soc. Ent. France, lxxiv. p. 342 (1905)².

Hab. COSTA RICA¹, La Palma 1600 metres, Caché, Atlantic slope 1000–1100 metres, San José, Port Limon (*Biolley*²), Cariblanco 600 metres (*Lankester*²).

Specimens measured by Carl were from 90–100 millim. long and from 16–19 millim. wide. Brölemann, however, points out that his examples from Cariblanco are smaller than those from La Palma, while adults from Caché do not exceed 60 millim. in length. For the distinctive features of this species, see above under the heading *P. tristani*.

6. *Platyrachus bivirgatus*.

? *Polydesmus* (*Odontodesmus*) *python*, Peters, Monatsb. Akad. Berlin, 1864, p. 543¹.

Platyrhacus bivirgatus, Carl, Rev. Suisse Zool. x. p. 652, t. 11. fig. 65 (1902)².

Closely allied to *P. limonensis*, *P. fraternus*, and *P. tristani*, but totally different in colour. The greater part of the upper surface is yellow with a large brown patch on each side of the tergal area, where it passes into the keel; the patch forms, with the brown area of the sides of the prozonites, a continuous brown band extending from the 1st to the 18th tergal plates; each patch is a little narrower than the yellow area of the keel and about half the width of the median yellow area of the back; the caudal process of the anal tergal plate is yellow, and there is a yellow patch on the summit of the head; the ventral surface of the body is also paler than in the others.

The tubercles of the *anal sternal plate* in the one specimen I have examined are considerably smaller than

those of *P. tristani* and agree with Carl's description of them. The armature of the lateral borders of the keels is as in *P. tristani* and not as in *P. fraternus*. The dorsal surface shows distinct traces of the polygonal areas so noticeable in such a species as *P. clathratus*, Gerv., from Bogota, and the granulation is less distinct than in *P. tristani*. The *phallopod*, judging from Carl's figure, although very like that of *P. limonensis*, *P. fraternus*, and *P. tristani*, has the sublaminar distal portion less expanded.

Length, ♀, 90–100 millim., width 17–20.

„ ♂, 90 „ „ 17

Hab. COSTA RICA¹, San José (*Biolley*²), La Palma 1600 metres (*Biolley, Tristan*), Carrillo (*Underwood*).

It is highly probable that this form, as Brölemann has suggested, will prove to be the same as the earlier, but insufficiently described *Platyrachus python*, Peters, which also came from Costa Rica (*Hoffmann*). The single female upon which the species was based measured 100 millim. long and 21 millim. wide. The colour appears to be the same as in *P. bivirgatus*, but Peters says that the dorsal surface is smooth and without conspicuous granulation. As I have elsewhere pointed out, however, old and large examples of a species of this group are commonly much smoother than smaller and younger individuals. Hence the differences mentioned may merely be a matter of age.

7. *Platyrachus riparius*.

Platyrhacus riparius, Carl, Rev. Suisse Zool. x. p. 641, t. 12. fig. 83 (1902)¹.

Colour dark brown above, with the borders of the keels paler; ventral surface and legs pale brown.

Female with *dorsal surface* more strongly vaulted and keels more sloped than in the male, which is flatter.

Thickly granular above, more coarsely on the posterior than on the median segments, the former also showing more distinctly the three rows of small tubercles. Sometimes vestiges of polygonal areas observable. No tubercles on the head. *Keels* wide, except those of the anterior three and posterior four segments, projecting at right angles to the long axis of the body; their anterior border straight or lightly convex, unarmed; anterior angle blunt; lateral border nearly smooth, lightly sculptured or armed with from two to five low blunt tubercular teeth; posterior border from the 5th to the 16th segments nearly straight, serrulate; posterior angle from the 7th to the 16th segments bearing a short, blunt, small, somewhat inwardly-directed, sometimes spiniform tooth. *Pores* far removed from the lateral border. *Caudal process* quadrate, with parallel sides. *Sternal areas* unarmed. *Phallopod* stout, especially at the base, ending in two branches, the seminal stile shorter than the outer auxiliary branch, which is sickle-shaped.

Length 55 to 60 millim., width 11.

Hab. COSTA RICA¹, Rio Général, Pacific slope (*Biolley*),

Although this species has the pores remote from the edge of the keels, in the form of the phallopod it more nearly resembles *P. montivagus*.

8. *Platyrachus montivagus*. (Tab. X. figg. 7–7 b.)

? *Platyrhacus mexicanus*, Attems, Denk. Akad. Wien, lxxviii. p. 348 (1900)¹ (? *P. mexicanus*, Lucas).

Platyrhacus montivagus, Carl, Rev. Suisse Zool. x. p. 662, t. 12. figg. 84–88 (1902)²; Brölemann, Ann. Soc. Ent. France, lxxiv. p. 342 (1905)³.

I have described below at some length the specimens I refer to this species, namely, a series obtained by

Rogers in Costa Rica and a few from La Palma collected by J. Tristan, because certain differences they present from Carl's description of *P. montivagus* suggest that they represent a different species, unless his diagnosis and figures are inaccurate in certain particulars, as I assume to be the case.

♀. *Colour* chocolate-brown, with the external half of the keels and the caudal process yellow; antennæ and legs rather paler brown, the ventral surface and the two basal segments of the legs yellowish-brown.

Body very gradually attenuated from about the 15th segment forward. *Dorsal surface* coriaceous, subgranular, the three rows of tubercles only just detectable; back convex; keels of moderate size, and inclined downwards and slightly outwards. *First tergal plate* slightly wider than the head, its lateral angle rectangular; the edge just in front of the angle very weakly tuberculate; a row of indistinct tubercles along the anterior edge of the plate. *Keels* of 2nd, 3rd, and 4th directed forwards and downwards, nearly parallel-sided, the lateral border convex and armed with five small tuberculiform teeth. On the rest of the segments the keels have their anterior border lightly convex and the posterior lightly concave, the convexity and concavity increasing towards the posterior end of the body; from about the 11th and 12th, backwards, the anterior border is serrulate, and the posterior border also from about the 7th; the lateral border is armed with about five teeth, which are sometimes large and spiniform, sometimes smaller and more tuberculiform; and near the middle of the lateral margin there is a shallower or deeper angular notch, near the apex of which the *pore* is situated, its distance from the notch being from once to nearly twice its own diameter according to the depth of the notch; on the keel of the 19th the pore is near the middle of its upper surface. The upper surface of the keels is more granular than the median area of the segments; the anterior angles of the keels are convex, the posterior angles become gradually more and more acute and spiniform posteriorly: those of the 14th very slightly surpass the level of the posterior edge of the tergal area; those of the 18th and 19th are apically rounded. *Caudal process* semicircularly rounded, scarcely irregular marginally; *sternal plate* granular, broad, with two widely separated smallish tubercles. *Sternal areas* of the body granular, somewhat deeply sulcate transversely, the sulcus extending right across the middle line; the area in front of it lightly sulcate longitudinally and the area behind deeply sulcate vertically, so that the posterior sternal area is bicoxiform; sternum of 4th bitubercular, of 5th, 6th, 7th, and 8th quadritubercular, the tubercles becoming gradually weaker.

♂. Smaller than the ♀, but less convex and with keels better developed. *Sternal area* of third with a median tuberculiform triangular tooth; sternum of sixth excavated to receive the tips of the phallopods, its posterior pair of tubercles suppressed. Margin of *cavity* of phallopods defined behind by a deep groove. *Phallopods* arcuate, crossing apically, the distal half bent inwards and upwards; the auxiliary branch curved and apically pointed; the seminal stile much shorter, straight, but pointing in the same direction obliquely outwards and downwards.

Length, ♀, from about 70–83 millim., width 11–12.

„ ♂, „ „ 60–70 „ „ 8–10.

Hab. COSTA RICA² (*Rogers*), Carrillo (*Underwood*), La Palma 1600 metres³ (*Tristan and Biolley*), Volcan de Turrialba 2000 metres.

Carl states that the sterna of *P. montivagus* are unarmed; and Brölemann appears to have detected no discrepancy between the specimens he referred to this species and those described by Carl. The examples I have seen, however, have well-developed spiniform or subspiniform tubercles on some of the anterior sterna. Moreover, neither of these authors mentions any peculiarity in the sulcation of the sterna, such as mentioned above; and, if Carl's figures be correct, the lateral borders of the keels of the 2nd segment are less convex and the anterior angle much more square, and the posterior angles of the 11th and 14th considerably more produced and spiniform in Carl's specimens than in those that I have seen.

In the dentition of the lateral borders of the keels these specimens and *P. montivagus*

show considerable resemblance to *P. mexicanus*, Lucas, as figured by Saussure; but in the latter the pore is far removed from the margin. It appears to me to be almost certain that Attems described examples of this species as *P. mexicanus*. These specimens are in the Berlin Museum, but have no locality attached. I cannot find in his description of them a single reliable character by which they can be distinguished from the specimens I have described above as *P. montivagus*. On the contrary, they differ apparently in many points from the typical and only known example of *P. mexicanus* (cf. *supra*, p. 140).

9. *Platyrachus propinquus*.

Platyrhacus propinquus, Carl, Rev. Suisse Zool. x. p. 665, t. 12. figg. 80-82 (1902)¹.

This species is described as very nearly related to *P. montivagus*, which it closely resembles in colour, in the structure of the legs, sternal plates, caudal process, and sternum of anal segment, and other points; but the yellow of the keels is not sharply defined from the brown of the rest of the upper surface; the *first tergal plate* is markedly wider, with the angle more produced; it is evenly convex above and has a lightly concave posterior border; the lateral borders of all the keels are much less strongly toothed, with the pores small and about twice their diameter from the lateral border. Finally, the phallopod is thinner, and when seen in profile shows a much greater space between the seminal stile and the terminal auxiliary branch, which is also more curved.

Length, ♀, 76 millim., width 13-14.

„ ♂, 65-73 „ „ 10-13.

Hab. COSTA RICA, Las Delicias, Santa Clara, 300 metres (*Biolley*¹).

10. *Platyrachus stenopterus*. (Tab. X. figg. 8-8 c.)

Platyrhacus stenopterus, Brölemann, Ann. Soc. Ent. France, lxxiv. p. 343 (1905)¹.

As in the case of *P. montivagus*, I find that the examples I identify as *P. stenopterus* differ, according to Brölemann's description, from the type of that species in having some of the anterior sterna armed with spiniform or subspiniform tubercles. He also says that the third segment of the leg is shorter than the width of the sterna in the middle of the body, which is not the case in my specimens. His description, however, was based upon a single female example, apparently defective in colour and of small size. Except, however, in the particulars mentioned, my examples agree so well with his detailed description of the type that I cannot but conclude they belong to the same species. The male was not previously known. For these reasons, and making allowance for the possibility of my determination being erroneous, I have described my specimens at some length.

Colour very nearly the same as in *P. bivirgatus*, but the brown band on the sides of the upper surface broader, each about as broad as the median pale area, or only a little narrower, and at least twice the width of the pale area on the external half of the keels; a yellow patch on the crown of the head; no vertical yellow stripe on the labrum; caudal process yellow; legs, antennæ, and sternal areas yellow or yellowish-brown. *Body* nearly as stout at the posterior end as in the middle; the posterior end more truncated than is usually the case. *Dorsal surface* strongly convex; keels small, their upper surface sloping, arising about the middle of the side; their anterior edge from the 11th backwards lightly convex, strongly convex only on the 17th or 18th segment. *Posterior border* lightly concave on the 4th and becoming more and more strongly concave to about the 17th, owing to the increase in the length of the posterior angle. Their border finely serrulate from about the 5th segment. Anterior angle of keels rectangular but rounded; posterior angle a little acute on the 5th, and becoming more and more spiniform back to the 17th, but the spiniform process only surpassing the level of the posterior border of the terga from about the 10th segment; lateral border armed with from about three to five small tuberculiform

but sharpish teeth, which, however, vary in size upon different segments, but are never so large as in *P. montivagus*; the pore-bearing keels show a shallow emargination or a toothless smooth area opposite the pore which is quite close to the lateral edge; the keels without pores generally exhibit a lateral notch, which is visible even on the 4th segment. The *dorsal surface* closely granular, with the three rows of tubercles just traceable on the middle of the body, and more distinct at its anterior and posterior ends, especially upon the lateral slope of the segments. Lateral border of the keels of the 2nd convex, tubercularly toothed, with the posterior angle more convex and less prominent than the anterior; *first tergal plate* with tubercles extending nearly round its circumference, slightly depressed behind its anterior border, which is evenly convex to the blunt lateral angle. *Head* without distinct frontal tubercles, such as are seen in *P. bivirgatus* and *P. tristani*. *Sternal area*, from the 4th to the 7th, with a distinct tooth-like tubercle at the base of each leg; from the 7th backwards these tubercles gradually die away; sterna of 5th and 8th longitudinally and transversely sulcate; those of the median and posterior areas markedly notched laterally and angularly excised posteriorly, the posterior notches being more or less coxiform; all the sterna granular and generally wrinkled. *Caudal process* short, widely rounded. *Anal sternal plate* wide, with rather large tubercles.

♂. Smaller than the ♀, but with the keels relatively larger and more strongly excised. No distinct tooth on the sternal area of the 4th; sternal area of 6th and also of 7th behind the phallopods also untoothed. *Phallopods* stout, crossed, gradually curved upwards at the end, the auxiliary branch sickle-shaped, attenuated and pointed; seminal stile relatively long and showing a distinct but not strongly pronounced sigmoid curvature.

Length, ♀, 75-80 millim., width 11-12.

„ ♂, 55-65 „ „ 7.5-8.

„ ♂ (type), 55 „ „ 12.

Hab. COSTA RICA (*Rogers*), Rancho Redondo 2000 metres (*Biolley* ¹).

TIRODESMUS*.

Tirodesmus, Cook, Brandtia, xii. (1896).

Keels, except at the anterior and posterior ends of the body, very large, laterally narrowed owing to the oblique backward inclination of the anterior border, the lateral border, where defined, only about half the length of the base of the keel, the anterior and lateral borders forming a continuous arch broken only by the teeth marking the commencement of the lateral edge; upper surface of metazonites studded with coarse comparatively widely spaced granules, amongst which the three rows of tubercles, especially the posterior, stand out like pearly pustules; both anterior and posterior borders of the first tergal plate raised and studded with coarse pearly tubercles; the plate markedly hollowed longitudinally in the middle and transversely behind the anterior border. *Antennæ* long, second to fourth segments much longer than their distal thickness, the second much longer than the first. *Legs* long and slender; third segment at least twice as long as the width of the sternum, sixth segment tapering to a point which is scarcely wider than the base of the long slender claw. *Phallopods* not arcuate and not upcurled apically, projecting straight forwards, distally spatulate, with the seminal stile directed forwards. *Sternum* of the sixth not excavated, as high behind as in front.

Type, *T. fimbriatus*, Peters.

Distribution. Central and South America.

1. *Tirodesmus biolleyi*. (Tab. X. figg. 9-9 b.)

Platyrhacus biolleyi, Carl, Rev. Suisse Zool. x. p. 658, t. 11. figg. 67, 68 (1902) ¹; Brölemann, Ann. Soc. Ent. France, lxxiv. p. 341 (1905) ².

Colour black or dark brown, with the extreme margin of the keels and the larger dorsal tubercles yellowish-white.

* Omitted from the 'Zoological Record.'

Dorsal area convex in the middle. *Keels* horizontal, with pore remote from the margin; anterior and posterior borders irregular or armed with tuberculiform teeth, not serrulate; lateral border usually with four or five larger subspiniform teeth and some smaller tubercles; two of the teeth are upon the posterior angle, which is acute but never actually spiniform. *First tergal plate* with keels well developed, projecting forwards and outwards, so that the widest point of the plate is well in advance of its middle; posterior border of the keel, as of all the rest except of the 18th and 19th, concave, at all events externally. *Caudal process* quadrate, with parallel sides and irregular tubercular convex posterior border. *Anal sternal plate* with large tubercles. *Sternal areas* rather narrow, their width about equal to the length of the second segment of the leg and less than half that of the third in the mid-region of the body; not distinctly tubercular but transversely and longitudinally hollowed.

♂. Like the ♀, but smaller, with keels relatively larger and higher, those at the posterior end being more strongly raised. Sternum of third segment with triangular tubercle, which is also present in ♀.

Length, ♀, 95 millim., width 16.

„ ♂, 87 „ „ 15.

Hab. COSTA RICA, La Palma¹ (*Tristan & Biolley*), Las Delicias (*Biolley*), Cariblanco (*Lankester*¹).

The coarseness of the granulation and the number and development of the lateral teeth on the keels are subject to considerable individual variation in this species.

I believe the specimens above described to be accurately identified. Nevertheless it must be pointed out that the shape of the keel of the tenth segment is, in all my examples, very different from that of the tenth segment of the type-specimen, as depicted by Carl. Since, however, this figure does not agree with the description as regards the position of the pore, which is much too near the sides of the body, I feel justified in assuming that it may be inaccurate in other respects and have its lateral border much too long and its anterior border insufficiently oblique. It gives very little idea of the peculiarity in the shape of the keels exhibited in my specimens, which must be specifically distinct from *T. biolleyi*, if the figure in question is correct.

Subfam. EURYURINÆ.

With the possible exception of *Aphelidesmus*, which appears to link the typical members of this subfamily with the Chelodesmidæ, the two genera here referred to the Euryurinæ form a natural group, differing from the Platyrachinæ mainly in the fact that the lateral margin of the keel is smooth, thickened, differentiated from the rest of the upper surface of the keel, and carries the pore, which does not present so markedly the cannon-mouth appearance so noticeable in the Platyrachinæ.

Distribution. Eastern area of Oriental Region; Southern States of North America; Central America and northern area of South America.

The three Central-American genera here admitted may be distinguished as follows:—

a. Dorsal surface of segments more or less strongly sculptured; phallopod simple, terminating in one or two accessory processes in addition to the seminal stile; caudal process squared or rounded.

b. Anal sternal plate with its posterior margin straight or concave, not produced between the setiferous tubercles

AMPLINUS.

- b*¹. Anal sternal plate semicircular; area between the setiferous tubercles convexly produced POLYLEPISCUS.
*a*¹. Dorsal surface of segments smooth; phallopod more complicated, subdivided, the seminal stile guarded by wide sheath-like accessory branches APHELIDESMUS.

AMPLINUS.

Polydesmus (Paradesmus), Saussure, Liun. Ent. xiii. p. 325 (1859) (in part.: Div. ii.); Mém. Soc. Phys. Genève, xv. p. 292 (1860) (in part.: Section i.).

Polydesmus (Pachyurus), Humbert & Saussure, Verh. zool.-bot. Ges. Wien, xix. p. 673 (1869) (in part.); Mém. Sci. Mex., Myr. p. 27 (1872).

Polylepis, Bollman, Bull. U.S. Nat. Mus. 46, pp. 160 & 197 (1893) (for *Pachyurus*, preoccupied).

Pachyurus (Amplinus), Attems, Denk. Akad. Wien, lxxviii. p. 281 (1900) (misprinted *Amphinus*).

Pachyurus, Brölemann & Carl (in part.).

Antennæ short, segments 2-6 not very unequal in length, subequal or gradually increasing to the sixth; area between them narrow and marked with a Λ -shaped sulcus, the upper limb of which is the downward continuation of the deep frontal sulcus, the two lower limbs passing into the antennal sockets, the area below the fork and above it on each side swollen, rounded, smooth, and shining. *First tergal plate* wider than the head and nearly or quite as wide as the second, produced laterally into angular cariniform laminæ. *Dorsal surface* of all the segments, with the occasional exception of the first or a few more of the anterior segments, sculptured, the sculpturing consisting of three definite rows of polygonal areas, sometimes themselves granular or tubercular, or of about four rows of rounded or elongate, large, smooth tubercles, often broken up by smaller ones. Lateral borders of the *keels* thickened. *Pores* lodged in depressions of the thickening, and usually looking outwards, sometimes more or less upwards; cylindrical area of segments quite smooth, lateral area granular. *Sterna* smooth, about as wide as long, transversely and longitudinally sulcate. *Anal tergal plate* ending in a broad subquadrate caudal process, with subparallel lateral borders, straight or lightly convex posterior border, as wide behind as in front, or approximately so. *Anal sternal plate* with posterior border wide, emarginate or nearly straight from side to side, when emarginate there is a distinct bluntly rounded setiferous prominence on each side. *Legs* with third segment slightly or markedly longer than sixth, which is much longer than the fifth, the latter a little longer than the fourth. *Phallopods* with distal segment moderately long, projecting forwards parallel to each other, and ending in two, rarely in three prongs, the inferior prong being the seminal stile.

Type, *A. kalonotus*, Attems.

Distribution. Central and northern parts of South America.

Under the name *Pachyurus*, Humbert and Saussure included originally *P. klugi*, Brandt, from Central America, *P. margaritaceus* and *P. squamatus*, Koch, and *P. granosus*, and pointed out that the latter from the Moluccas differed from the three others in having the first tergal shield only as wide as the head and much narrower than the second. These characters, as Attems has shown, hold good, so far as is known, as a distinguishing feature between the Oriental and American species. The first author who definitely fixed the type of *Polylepis*, which was so named by Bollman because *Pachyurus* was preoccupied, was Silvestri, who in 1896 [Ann. Mus. Genova, (2) xvi. p. 190] selected the Moluccan *P. granosus*, thus assigning the name *Polylepis* to the Oriental species with narrow first tergal plate. Overlooking this fact, I subsequently gave the name *Paradesmorhachis* to a species, *P. solomonis*, from the

Solomon Islands [Ann. & Mag. Nat. Hist. (6) xx. p. 445, 1897], which is probably identical generically with *P. granosus*, the type of *Polylepis*, from the Moluccas. Afterwards came Attems, who, in spite of its preoccupation, resuscitated *Pachyurus* and divided it into two subgenera, *Amplinus* for the American species and *Angustinus* for the Oriental species. Giving these names generic rank, we get the following result:—

Polylepis (= *Paradesmorhachis* = *Angustinus*) for the Oriental species with narrow first tergal plate. Type, *P. granosus*, Humb. & Saussure.

Amplinus, Attems, for the Central and South American species with broad first tergal plate. Type (by selection), *A. kalonotus*, Attems.

Key to the Central-American Species *.

- a.* Sculpturing of segments tessellated, consisting of three rows of low, smooth, polygonal areas.
- b.* A median yellow band extending from the first to the last segment; keels wholly yellow *palicaudatus*.
- b*¹. No median yellow dorsal band; keels at most with external half yellow.
- c.* Median area of terga of segments 1 to 6 smooth and inconspicuously sculptured *convexus*.
- c*¹. Median area of terga of at least segments 2 to 6 conspicuously sculptured.
- d.* Antennæ and legs yellow, as yellow as the margins of the keels . . . *flavicornis*.
- d*¹. Antennæ and legs brown, much darker than the margins of the keels.
- e.* Posterior angle of all the keels less produced, those of second to fourth segments nearly rectangular; the anterior tooth on these segments small; phallopod with auxiliary branch bigeniculate *nitidus*.
- e*¹. Posterior angle of all keels more produced, those of second to fourth segments acute; the anterior tooth on these segments stronger; phallopod with auxiliary branch simply curved *areatus*.
- a*¹. Sculpturing consisting of round, oval, or fusiform smooth tubercles, which on the posterior segments, at least, consist of about five irregular transverse rows.
- f.* Lateral edges of the keels distinctly toothed *armatus*.
- f*¹. Lateral edges of the keels not distinctly toothed.
- g.* Phallopod 3-pronged; keels smaller, more depressed, with edges not so strongly thickened *triramus*.
- g*¹. Phallopod 2-pronged; keels larger, more horizontal, with edges strongly thickened *klugi*.

1. *Amplinus nitidus*. (Tab. XI. fig. 3.)

Platyrrhachus nitidus, Brölemann, Mém. Soc. Zool. France, xiii. p. 97, t. 6. figg. 18–20 (1900)¹.

Pachyurus nitidus, Carl, Rev. Suisse Zool. x. p. 638 (1902)².

A jet-black, shining species, with black antennæ and dark brown legs, and with the external half of the keels clear yellow and sharply contrasted with the black of the rest of the dorsal surface. The sculpturing

* *A. erichsoni*, of which the distinctive features are unknown, has been omitted from this Table.

consists of three rows of polygonal areas and is weak on the middle of the 1st tergal plate. The phallopods are chiefly remarkable for having the auxiliary branch bent twice at right angles.

Length of ♂ (loosely articulated) 65, width 8.

„ „ (according to Brölemann) 57, width 8.

Hab. GUATEMALA ^{1 2} (*Rodriguez, Ultramar*).

Mr. Godman's collection contains a single male collected in Guatemala by Rodriguez. The figure of the phallopod (Tab. XI. fig. 3) is taken from this specimen.

2. *Amplinus palicaudatus*. (Tab. XI. figg. 1-1 e.)

Pachyurus palicaudatus, Attems, Mitt. Mus. Hamburg, xviii. p. 98, t. 1. fig. 8 (1901)¹; Carl, Rev. Suisse Zool. x. p. 638 (1902)².

A species distinguishable from all the Central-American forms hitherto described by its coloration: the keels are wholly yellow and there is a conspicuous yellow line down the centre of the back; the legs and antennæ are yellow. The sculpturing consists of three rows of polygonal areas and is obsolete on the middle of the 1st tergal plate. The phallopod has the auxiliary branch only a little curved, whereas the seminal stile is strongly arcuate at the base, showing a light sigmoid flexure, with its terminal portion lightly curved in the same direction as that of the other branch.

Length 50-60 millim., width 7.

Hab. MEXICO, La Joya, Chiapas ^{1 2} (type, *H. Kulow*); GUATEMALA (*Ultramar*), Quezaltenango (*Paganini*), Chalhuitz (*Stoll*).

The British Museum contains examples of both sexes of this species from Quezaltenango, presented by the Marquis G. Doria, and others from Chalhuitz, presented and collected by Dr. O. Stoll.

From the former have been taken figg. 1-1 b on Tab. XI., and from a male from Chalhuitz figg. 1 c-e, representing the phallopod. The terminal rami of this organ appear to be longer than indicated by Attems's figure of the type-specimen, and the examples I have seen may belong to another subspecies of *A. kalonotus*, possibly to a distinct species. But the rami in question differ so greatly in apparent length and curvature according to the aspect they are viewed from, that without examining the type of *A. kalonotus* it would, I think, be rash to attach systematic value to the differences mentioned.

3. *Amplinus convexus*.

Pachyurus convexus, Carl, Rev. Suisse Zool. x. p. 633, t. 11. fig. 57 (1902)¹.

A large species, brown in colour, with the keels apparently the same colour as the back, and the legs and antennæ yellow. Sculpturing consisting of three rows of polygonal areas; obsolete in the middle of the 1st tergal plate and also of the 2nd to the 6th; the areas on the sides of the back and on the upper surface of the keels carrying each a tubercle; dorsal area of 19th with a single posterior row of tubercles. *Keels* back to the 16th with posterior angle rectangular; lateral margin considerably thickened, especially on the pore-bearing keels, which have the lateral margin produced and sinuous in outline, those of the poreless keels straight. *Caudal process* with straight parallel lateral borders, rounded angles, and lightly convex posterior border. *Anal sternal plate* with two very small tubercles. *Phallopod* somewhat like that of *A. palicaudatus*, but with the auxiliary branch longer, more arcuate and sickle-like, and the seminal stile less arcuate.

Length, ♀, 80-85 millim., width 13.

„ ♂, 70-75 „ „ 11.

Hab. COSTA RICA¹ (*Biolley*).

This species is known to me only from Carl's figure and description. From the other species with polygonal sculpturing it differs in having the median area of segments 1 to 6 smooth and the posterior angle of the keels rectangular. It is also characterized by its large size, a feature in which it most resembles *A. areatus*, but has the terminal branches of the phallopod much more widely separated and the auxiliary branch more strongly arcuate.

4. **Amplinus areatus**, sp. n. (Tab. XI. figg. 4-4 f.)

Colour dark brown with posterior row of polygonal areas paler; external half of keels yellow; antennæ brown, much darker than yellow area of keels; legs with two basal segments yellow, the rest brown like the antennæ. Closely allied to *A. flavicornis*, but larger and with the legs and antennæ much darker tinted; the *keels* a little better developed, with the posterior angle a little more produced; the median area of the 1st tergal plate sculptured, though the sculpturing is weaker than at the sides and the antero-lateral notch on the keels of the 2nd and 3rd marked in front by a distinct but small tooth. *Phallopods* rather like those of *A. flavicornis*, but the terminal portion which carries the two branches narrower, with its flattened internal face less well-defined above and below and with its lower rim not produced into a definite crest; the terminal branches shorter and less curved distally.

Length, ♀, 70 millim., width 11.

Hab. N.W. GUATEMALA, La Tortuga, Retalhuleu (*Stoll*).

5. **Amplinus flavicornis**, sp. n. (Tab. XI. figg. 2-2 f.)

Colour brown with the margins of the keels yellow; antennæ and legs rather paler yellow than the keels. Summit of *head* smooth. Sculpturing of *dorsal area* consisting of three rows of smooth polygonal areas which at most show laterally a tubercle now and again on some of the segments. *First tergal plate* with sculpturing obsolete in the middle, laterally with four rows of areas which decrease in number and increase in distinctness on the keel, which is well developed, with very obtuse anterior angle and subacute but blunt posterior angle. The 2nd, 3rd, and 4th with convex anterior and lightly concave posterior border; the anterior angle obtuse, marked by a notch; the posterior subacute. In the succeeding segments the anterior margin of the keel is lightly convex and runs into the somewhat widely-rounded anterior angle, not serrulate; posterior border straight or lightly concave, finely serrulate from about the 5th; the posterior angles slightly produced but never sharp or spiniform, those of the 17th, 18th, and 19th more produced than the others; lateral border of the poreless keels nearly straight and moderately thickened; other pore-bearing keels considerably thickened and more sinuous in outline. Upper surface of the 19th with two rows of subtuberculiform areas. *Caudal process* smooth, mesially depressed, its posterior border lobulate. *Anal sternal plate* emarginate between the thickened tubercles. Lateral surface of segments granular. Underside of outer half of keels smooth.

♂. Similar to the ♀, but with the keels better developed. *Phallopods* rather slender, ending in two slender pointed terminal branches which are rather narrowly separated, both being curved distally towards the middle line; the superior border of the slightly hollowed area at the base of the fingers with a distinct upstanding crest; the hollowed area wide and well-defined.

Length, ♀, 58 millim., width 8.

„ ♂, 53 „ „ 7.

Hab. CENTRAL AMERICA (*Mus. Brit.*).

Related to *A. nitidus*, Bröl., but differing from it in having the legs and antennæ pale, instead of black or dark brown, and in the structure of the phallopod, in which

the auxiliary branch is slenderer at the base and simply curved inwards at the point, instead of curving sharply downwards and abruptly forwards.

6. *Amplinus klugii*. (Tab. XI. figg. 5-5 e.)

Polydesmus klugii, Brandt, Recueil Mém., Myriap. (1841)¹; Gervais, Ins. Apt. iv. p. 108².

Polydesmus (Paradesmus) klugii, Saussure, Mém. Soc. Phys. Genève, xv. p. 293 (1860)³.

Polydesmus (Pachyurus) klugii, Humbert & Saussure, Miss. Sci. Mex., Myr. p. 27 (1872)⁴.

Pachyurus klugii, Karsch, Arch. Naturg. 1881, p. 37⁵; Attems, SB. Akad. Wien, ciii. p. 47, t. 2. fig. 12 (1894)⁶; Denk. Akad. Wien, lxxviii. p. 284 (1900)⁷.

Polydesmus (Paradesmus) picteti, Saussure, Linn. Ent. xiii. p. 325 (1859)⁸.

Hab. MEXICO, Alvarado in Vera Cruz¹ (*Brandt*), Cordova, Orizaba, Panuco, Anahuac, and the entire eastern slope of the plateau (*Saussure*^{3 4}), Guanajuato (*Dugès, Mus. Brit.*), Jalapa (*Höge, Mus. Brit.*).

Although this species has been described at length by Saussure and Attems, it greatly needs revision from the point of view of geographical races as is suggested by the material that I have seen. But since the exact characters of the typical form from Alvarado are unknown, and the locality of the specimen to which Saussure gave the name *picteti* is unrecorded, it would be premature to attempt such a revision with the available material. The colour is typically black, with the margins of the keels, the antennæ, and the legs flavous. This is the colouring in an individual from Jalapa in the British Museum. On the other hand, the examples from Guanajuato are browner, with the edges of the keels, the antennæ, and the legs paler reddish brown as in the specimens to which Saussure gave the name *picteti*. The sculpturing consists of tubercles, rounded or elongate in shape, the fusiform or elongate prominences being disposed in the median area of the dorsal surface, the round ones along the anterior edge and on the upper side of the keels; the spaces between those on the keels are granular. The edges of the keels are at most slightly lobulate, not truly dentate. The sides of the caudal process are nearly straight and subparallel, the angles rounded, and the posterior border lightly convex and lobulate. The sternal plate is emarginate with rounded edges in the example from Jalapa, more markedly bitubercular in the specimens from Guanajuato. The phallopods are short, rugose, and end in two rather widely separated prongs, strongly curved downwards.

Length of ♀ (according to Saussure) 72 millim., width 11.

7. *Amplinus erichsoni*.

Polydesmus erichsonii, Brandt, Recueil Mém. Myriap. (1841)¹; Gervais, Ins. Apt. iv. p. 108 (1841)²; id. Voyage de Castelnau, p. 7 (1841)³.

Polydesmus (Paradesmus) erichsonii, Saussure, Mém. Soc. Phys. Genève, xv. p. 293 (1860)⁴.

Polydesmus (Euryurus) erichsonii, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 542⁵.

Pachyurus erichsoni, Attems, Denk. Akad. Wien, lxxviii. p. 288 (1900)⁶.

Hab. MEXICO¹⁻⁶ (*Deppe*).

This species, although the type was said by Peters to be in the Berlin Museum, does not appear to have been examined or described since the days of Brandt. Judging from the original description, *A. erichsoni* is very closely allied to *A. klugi*, and since the type-specimens of the two were obtained in Mexico by the same collector, it is not improbable that they belong in reality to the same species.

8. *Amplinus armatus*, sp. n. (Tab. XI. figg. 6-6 b.)

♀. *Colour* of dry specimen a uniform chocolate-brown, with the legs and antennæ flavous. Sculpturing of *dorsal area* of mid-region of body consisting of three rows of polygonal areas roughened with granules and each bearing a rounded tubercle. At the posterior end of the body the segments become more regularly covered with rounded and elongate tubercles showing no definite arrangement, the polygonal areas being obscured; dorsal area of the 19th segment uniformly covered. *First tergal plate* showing very definite areas, which are smooth in its middle third and granular at the sides; on the second and third the sculpturing consists of large smooth tubercles in the middle, arranged in three rows, and of granules and much smaller tubercles at the sides and on the keels. *Keels* large; those of the mid-region of the body with the anterior angle nearly rectangular and toothed; lateral border of all the keels, except those of the 1st and 19th segments, distinctly but irregularly toothed; the teeth smallest on the anterior and posterior keels; the anterior border lightly convex, the posterior lightly concave; the posterior angle acute and pointed; the marginal thickening well-developed, even on the 2nd and 3rd keels, which have somewhat strongly convex anterior border, correspondingly concave posterior border, obtuse anterior and acute posterior angle. *Caudal process* of anal segment squared with straight sides, subrectangular angles, and lightly convex, lobulated posterior border. *Anal sternal plate* emarginate, the tubercles on rounded prominences.

Length of ♀ 75 millim., width 12.

Hab. MEXICO (*Mus. Brit.*).

A single female specimen in the collection of the British Museum.

Nearly related to *A. klugi*, Brandt, but differing in having the anterior margins of the keels more squared and the lateral margins manifestly denticulated, those of the pore-bearing segments straight and less bulging, and the posterior angles of the second and third more acute. Male unknown.

9. *Amplinus triramus*, sp. n. (Tab. XI. figg. 7-7 h.)

Colour varying through all shades from dark chocolate-brown to testaceous; at most the thickened borders of the keels yellowish in dark specimens, but these almost always of very much the same tint as the rest of the dorsal surface; antennæ yellow, with terminal segments brownish; legs and ventral surface yellow. The whole of the *dorsal surface* of the metazonites covered with shining tubercles, which commonly stand up near the centre of irregularly granular areas defined by sulci and evidently representing the polygonal areas seen in the previously described species of this genus and in those of *Polylepiscus*. The tubercles vary in size and shape, being more elongate in the middle of the back and becoming more spherical upon the sides and on the upper surface of the keels. *First tergal plate* convex, covered with rounded tubercles and granules, with a series of elongate tubercles along the median portion of its posterior border; the lateral angles produced, but blunt, with a lightly emarginate anterior border.

BIOL. CENTR.-AMER., Diplop., December 1909.

X

The 2nd to the 4th tergal plates also covered with tubercles, arranged in three rows, interspersed with granules. On the succeeding segments the number of rows of tubercles increases from four to five or even six, but their linear arrangement is obscured. *Keels* rather small, sloping in the anterior part of the body, but becoming horizontal in the posterior part; anterior border lightly convex, anterior angle convex; lateral border of posterior segments almost straight with a shallow notch in front, of pore-bearing segments more convex; posterior angle nearly rectangular, very slightly produced, more spiniform, those of the 18th and 19th more produced than in the preceding segments, but blunt; posterior border very weakly serrulate. *Pore-area* moderately thickened, pores looking slightly upwards. Metazonite of 19th smooth in its anterior third, tubercular behind. *Caudal process* convex in front, flattened and depressed behind, with rounded posterior angles and lightly convex posterior border. *Anal sternal plate* manifestly bitubercular, the edge between the tubercles concave or straight. Lateral area granular up to the keels. *Phallopods* with seminal stile, showing sigmoid curvature, somewhat strongly arcuate at the base; auxiliary branch terminating in two branches, an inner shorter and nearly straight and an outer curving gradually inwards and upwards. No tubercles on *sternum* of 7th segment in ♂.

Length, ♀, up to about 70 millim., width 10.

„ ♂, „ 60 „ „ 8.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

Very like *A. klugi* and *A. armatus* in the character of its sculpturing, but differing from both in having the keels smaller, more depressed, and with less thickened edges. As in *A. klugi*, the lateral margins of the keels are not manifestly toothed. The male of *A. triramus* resembles the two species of the following genus, in which this sex has been described, in having the auxiliary branch of the phallopod biramous, and differs in this respect from all the other species of *Amplinus*.

POLYLEPISCUS, gen. nov.

Differs from *Amplinus* in having the anal sternal plate with its distal margin rounded, that is to say, the area between the setiferous tubercles is produced and convex, following the curvature of the sides, as in *Euryurus*; and from the latter in having the dorsal surface sculptured as in *Amplinus*. The known species also differ from those of the genus *Amplinus* in having the posterior angles of the keels, at least towards the end of the body, strongly elongate and spiniform.

Type, *P. stolli*.

Distribution. Guatemala.

Key to the Species.

- a. Size medium; dorsal area not granular or rugulose, the polygonal areas well defined, shining; pores on 19th segment completely lateral.
- b. Polygonal areas smooth, not tubercular, except obscurely so on the keels . . . *stolli*.
- b¹. Polygonal areas manifestly tubercular *furcifer*.
- a¹. Size large; dorsal area rugulose or granular, the polygonal areas obscured by the granulation; pores on 19th segment on the dorsal side of the keels.
- c. Keels of posterior half of body with anterior border basally produced, posterior border from 13th to 18th distinctly shouldered at base; 19th granular all over; keels yellow *actæon*.
- c¹. Keels of posterior half of body, e. g. of 16th, with anterior border less produced; posterior border strongly concave, not shouldered; 19th granular posteriorly *heterosculptus*.

1. *Polylepiscus stolli*, sp. n. (Tab. XII. figg. 3-3 d.)

♀. *Colour* fairly uniformly yellowish-brown, with legs, antennæ, and thickened margin of keels clearer (when living probably dark brown or black, with the antennæ, legs, and keel-margins yellow). *First tergal plate* smooth, very lightly sculptured quite at the sides, nearly as wide as the second; its anterior border nearly evenly convex; a very short lateral border, the posterior angle subrectangular, and the posterior border directed obliquely forwards and outwards externally. *Dorsal area* of 2nd, 3rd, and 4th almost smooth mesially, with polygonal subtubercular sculpturing upon the keels; from the 5th to the middle of the body the sculpturing becomes gradually more distinctly defined as three transverse rows of low smooth polygonal areas, which on the keels become more tubercular. In the posterior half of the body these rows become less regular, more broken up, so that as many as four rows of more irregularly shaped areas are traceable; on the upper side of the 18th the sculpturing consists mostly of longitudinally elongate tubercles; on the 19th the sculpturing is confined to the posterior half and consists of anastomosing longitudinal grooves. *Keels* nearly horizontal; the anterior angle widely rounded, less so on 2nd and 3rd, anterior border serrulate from about the 6th; posterior border concave, distinctly serrulate from the 5th; posterior angle acute and becoming gradually more and more produced and spiniform from before backwards; from about the 7th the spiniform process, which is very long, slender, and lightly incurved on the posterior segments, surpasses the posterior border of the median portion of the segment; lateral border fairly evenly and lightly convex on the poreless segments, except the 2nd, 3rd, and 4th, which are lightly emarginate, but on the pore-bearing segments there is a distinct notch-like emargination marking the position of the pore; margins of all the keels moderately thickened and uptilted posteriorly; the thickening more marked upon the pore-bearing segments. *Pores* completely lateral even upon the 18th and 19th segments; keels of the 18th strongly acute but hardly spiniform; keels of the 19th markedly angular, with apex blunt. *Caudal process* with lightly convex lateral borders, rather more strongly convex posterior border, and rounded angles. *Anal sternal plate* with its posterior border markedly convex between the two small tubercles. *Lateral area* of segments granular; lower side of keels smooth, at least externally. *Terminal segments of legs* bearing stout setæ, not short slender spines.

Length, ♀, 65 millim., width 10.

Hab. N.W. GUATEMALA, Chalhuitz (*Stoll*).

Although resembling *P. heterosculptus*, Carl, in its rounded anal sternal plate and strongly spiniform posterior angles to the keels, this species is quite distinct in having smaller keels with the anterior border more abruptly recurved, in the absence of the granulation from the dorsal area, the smoothness of the median area of the anterior segments, the lateral position of the pores upon the 18th and 19th keels, the more distinct serrulation on the anterior and posterior borders of the keels, the less squared caudal process, &c.

2. *Polylepiscus actæon*, sp. n. (Tab. XII. figg. 2-2 c.)

♀. *Colour* brown, the external half of the keels yellow, legs brown (head and segments 1-4 missing). The entire *dorsal surface* rugose, covered closely with low anastomosing granules and small tubercles, amongst which the three transverse rows of polygonal areas are easily detectable, except on the 17th to 19th segments, where they become obsolete and lost amongst the granulation; a few scattered larger tubercles, showing obscure arrangement in three transverse rows, visible here and there upon the lateral slope of the dorsal and the adjacent portion of the keels; upper side of the 19th granular and sulcate. *Keels* large, horizontal; anterior border of the 6th lightly convex, posterior border lightly concave. From the 6th backwards the anterior border becomes more and more convex and prominent at the base and the posterior border very gradually straighter and more in line with the posterior border of the tergal area, and at the base more and more thickened and shouldered, the shoulder-like thickening quite

visible on the 13th and increasing in size to the 18th, where it is very marked; the anterior angle forming a continuous curve with the anterior border, which is serrulate from about the 10th, posterior angle acute and becoming gradually more and more produced and spiniform to the 13th-16th, on which it is slightly hooked inwards. On the 17th the spiniform process is short; on the 18th and 19th it is absent, the posterior angle of their keels being blunt. Lateral border of the poreless segments straight; of the pore-bearing segments deeply notched just in front of the pore; pores becoming posteriorly gradually more and more visible from the dorsal side; on the 18th, and especially on the 19th, they are on the upper side, and on the 19th quite recall the position of the pores in some species of *Platyrrhacus*. Posterior border of the keels weakly serrulate. *Caudal process* wide, with parallel sides and sharply rectangular angles, the posterior border being transverse, straight, not lobulate, and without visible setæ. *Terminal segment of legs* bearing short slender spines.

Length (minus head and segments 1-5) 75 millim., width 15.

Hab. GUATEMALA (*Stoll*).

This species, both in size and general characters, is nearly allied to *P. heterosculptus* of Carl, but differs in having all the segments uniformly rugose and covered with granulation, the 19th granular throughout, the coarser tubercles much less numerous and less distinct, the greater part of the keels yellow, and the anterior border of the keels more prominent basally, more convex, and the posterior border less concave and with a basal shoulder-prominence, at least in the posterior part of the body. According to Carl, the median area of the back in *P. heterosculptus* is smooth, or at all events much smoother than the sides, so that the polygonal areas are distinctly exposed; the larger tubercles are very numerous and arranged in about five irregular rows, the polygonal areas being also more numerous; the 19th segment is only rugose behind; the dorsal area is said to be brown, without any mention of yellow on the keels; and, lastly, on the 16th segment the posterior border is evenly and somewhat strongly concave, and there appears to be no basal shoulder-prominence on the posterior border of any of the keels.

3. *Polylepiscus furcifer*, sp. n. (Tab. XII. figg. 1-1 h.)

Colour brown, with the greater part of the keels and the caudal process yellow; antennæ and legs brownish.

Dorsal surface showing distinct sculpturing, polygonal areas arranged mostly in three transverse rows, which on the posterior segments break up into more numerous less regularly arranged rows; the areas not covered with fine granulation as in *P. actæon*, but each of them, at least on the median segments of the body, bearing a central tubercle; these tubercles more distinct and more constant in occurrence upon the lateral slope of the dorsal area and upon the upper side of the keels, showing a strong tendency to complete obliteration in the middle of the dorsal surface; on the upper side of the keels the polygonal areas are for the most part lost in the strigose sculpturing; both tubercles and areas more numerous on the posterior segments; on the anterior segments the median area is nearly smooth, the lateral portion showing weakly defined polygonal areas and tubercles. *First tergal plate* nearly smooth, weakly sculptured laterally, its angles only a little produced. *Keels* of succeeding segments much like those of *P. stoll*i and *P. actæon*, the lateral margin being thickened and notched on the pore-bearing segments, and almost straight on the poreless segments; the posterior angle is acute and becomes gradually more and more produced and spiniform back to about the 16th; anterior border of keels produced slightly forwards; the posterior border slightly shouldered basally in the posterior half of the body, and distinctly serrulate, the serrulation extending even on to the spiniform processes. *Pores* almost wholly lateral, even on the 19th, where they are scarcely visible from the dorsal side; this segment markedly granular

and strigose in its posterior half. *Caudal process* of anal segment with convex posterior border and angles. *Legs* with terminal segment covered with spiniform setæ, not spines. *Phallopods* distally three-branched as in *P. heterosculptus*, the seminal style superior and internal, evenly curved downwards, arising apart from the others which spring from a common basis and curve inwards, the inferior of the two grooved below and less strongly curved than the superior, the former not apically hooked as in *P. heterosculptus*.

Length, ♀, 64 millim., width 11.

„ ♂, 59 „ „ 9.

Hab. ? GUATEMALA.

This species, the exact locality for which is unknown, is based upon specimens in the British Museum. It may be known from *P. heterosculptus* and *P. actæon* by its much smaller size and by the freedom of the polygonal areas from granulation, though the tubercles in number and distinctness seem to resemble those of *P. heterosculptus*. From both, again, it differs in having the pores, especially upon the 19th keels, lateral, and the caudal process rounded. The first tergal plate has its angles considerably less produced than in *P. heterosculptus*, and this plate in the latter has a very distinct anterior and posterior row of tubercles as well as others scattered on its surface. The phallopod is somewhat like that of *P. heterosculptus*; but the curvature of the two auxiliary prongs is different and the subcylindrical portion of the distal segment of this organ is shorter as compared with the terminal portion carrying the prongs. From *P. stolli* this new species may be at once distinguished by the presence of tubercles on the polygonal areas and by having the posterior angles of the keels, especially of the segments of the mid-region of the body, shorter and less markedly spiniform.

4. *Polylepiscus heterosculptus*.

Pachyurus heterosculptus, Carl, Rev. Suisse Zool. p. 635, t. 12. figg. 73-75 (1902) ¹.

The essential characters of the species, which is unknown to me, have been cited under the diagnoses of *P. actæon* and *P. furcifer* and need no recapitulation.

Length 80-90 millim., width 13-15.

Hab. GUATEMALA ¹.

APHELIDESMUS.

Euryurus, Humbert & Saussure, Miss. Sci. Mex., Myr. p. 151 (1872) (in part.); Attems, Denk.

Akad. Wien, lxxviii. p. 277 (1900) (nec *Euryurus*, Koch, as restricted by Humbert and Saussure).

Aphelidesmus, Brölemann, Ann. Soc. Ent. France, lxxvii. pp. 266, 322 (1898); Attems, Denk.

Akad. Wien, lxxviii. p. 435 (1900).

Differs principally from *Amplinus* and *Polylepiscus* in having the dorsal surface smooth, the first tergal plate much wider laterally, and the caudal process of the anal segment narrower, longitudinally oblong or with slightly converging sides; anal sternal plate rounded as in *Polylepiscus*; phallopods more complicated, the terminal segment showing much more distinct traces of division into femoral, tibial, and tarsal elements; the auxiliary branch wide, complicated in structure, and forming a sheath enveloping the long and flagelliform seminal style, which is inferior to it as in *Dirhabdophallus*.

Type, *A. hermaphroditus*, Bröl.

Distribution. Central America and the northern countries of South America (Colombia, Venezuela).

Brölemann gave no reasons for separating this genus from *Euryurus*, Koch, although one of the species he referred to it, namely *dealbatus*, Gerv., was placed in it by Peters and by Humbert and de Saussure; and, curiously enough, Attems appears to have overlooked the fact that the species he described under the name *Euryurus* seem to be generically inseparable from those that Brölemann referred to *Aphelidesmus*. The type of *Euryurus*, *E. erythropygus*, was unknown to these authors; but, although it is similar in general features to *Aphelidesmus*, the structure of the phallopod, as Carl has shown (Rev. Suisse Zool. xi. p. 562, 1903), and as is borne out by a specimen in the British Museum, is very different in the two. In *Euryurus* it is formed like that of *Amplinus* and *Platyrhacus*, the distal segment being undifferentiated into femoral, tibial, and tarsal segments, and ending in two simple slender branches, of which the inferior (aboral) is the seminal stile, and the other the auxiliary branch; the distal extremity of the phallopod is sharply bent downwards.

Of *Euryurus* two species, namely *E. erythropygus*, Brandt., and *E. australis*, Bollm., appear to be known. These have only been recorded from the southern parts of North America (Indiana, Tennessee, Carolina).

1. *Aphelidesmus glaphyros*.

Euryurus glaphyros, Attems, Denk. Akad. Wien, lxxviii. p. 279, t. 7. figg. 163, 164 (1900)¹;
Brölemann, Ann. Soc. Ent. France, lxxiv. p. 353 (1905)².

Colour banded brown and yellow, first tergal plate dark brown in front, yellow behind; posterior half of prozonites and anterior half of metazonites brown, anterior half of prozonites and posterior half of metazonites yellow; antennæ, legs, tail, and ventral surface yellow. *Antennæ* short. *First tergal plate* wide, somewhat wider than the following segments; transversely elliptical, with rounded lateral angles. *Dorsal surface* vaulted; keels following the slope of the back, small, with rounded anterior angle; posterior angle with a small sharp tooth. *Pores* ventral near the posterior end of the thickening. *Caudal process* long and wide; the lateral borders slightly converging, posterior border rounded, emarginate. *Sterna* small, quadrate, transversely and longitudinally sulcate. Length about 35 millim., width of ♂ 3, of ♀ 3.5.

Hab. COSTA RICA¹, Carrillo 600 metres, Cuesta del Tablazo 1500 metres (*Biolley*²), Cariblanco 600 metres (*Lankester*²).—? BAHAMAS, Great Island¹.

Fam. STRONGYLOSOMIDÆ.

Strongylosomatidæ, Cook, Ann. N. York Acad. Sci. ix. p. 5 (1895) (in part.).

Strongylosominæ, Attems, Denk. Akad. Wien, lxvii. p. 271 (1899).

Keels of the second segment projecting at a lower level than those of the third and succeeding segments, moderately wide and jutting forwards beneath the inferior angle of the narrow first plate; keels of the rest moderately well developed and with thickened margins carrying the pores or reduced to a very

narrow ledge. *Antennæ and legs* moderately long, or long and slender. *Caudal process* narrowed posteriorly with truncate apex or subcylindrical. *Phallopods* moderately large, the distal segments showing division into two or even three elements, sometimes simple, sometimes branched towards the end, the seminal stile in the latter case lying at all events usually on the upper (adoral) side of the appendage and the guard or sheath on the lower or aboral side.

Distribution. Tropical and temperate zones of both Eastern and Western Hemispheres; but not as yet recorded as indigenous in Central America.

ORTHOMORPHA.

Paradesmus, Section III., Saussure, Linn. Ent. xiii. p. 326 (1859); Humbert & Saussure, Verh. z.-b. Ges. Wien, xix. p. 670 (1869) (nom. præocc.).

Orthomorpha, Bollman, Bull. U.S. Nat. Mus. 46, p. 159 (1893); and of subsequent authors.

Antennæ slender. *First tergal plate* wider than the head, semielliptical, generally with rounded angles; metazonites smooth, from the fourth to about the 18th with a transverse sulcus. *Keels* moderately well developed, with thickened borders carrying the lateral pores; posterior angle acute or subacute. *Caudal process* with sides converging and apex truncate. *Anal sternal plate* triangular. *Sternal areas* unarmed. *Legs* slender. *Phallopod* with its distal segment elongate and differentiated into femoral, tibial, and tarsal elements; the seminal stile arising on the upper (adoral or preaxial) side and guarded by an auxiliary branch forming a sheath which may be complicated by accessory branches.

Type, *O. beaumonti*.

Distribution. Oriental and Ethiopian Regions, introduced by human agency into other Regions.

The name *Paradesmus*, Saussure, was originally applied to the following species:— Section I. *P. carolinensis*; Section II. *P. klugi*, *P. erichsoni*, *P. picteti*; Section III. *P. beaumonti* (Linn. Ent. xiii. pp. 325, 326, 1859). One of these must be its type, the addition of *P. coarctatus* to the list in 1860 (Mém. Soc. Phys. Genève, xv. p. 297) not in any way affecting the question. As a matter of fact this question was settled by Humbert and Saussure in 1869 (Verh. z.-b. Ges. Wien, xix. p. 670), who eliminated the members of Sections I. and II. respectively under the names *Euryurus* and *Pachyurus*, and restricted *Paradesmus* to Section III., making *P. beaumonti* its type-species. But since *Paradesmus* was preoccupied, Bollman proposed *Orthomorpha* to replace it. Therefore *P. beaumonti* is the type of *Orthomorpha* and not *P. coarctata* as Silvestri asserts [Ann. Mus. Genov. (2) xvi. p. 198, 1896]. The importance of this conclusion comes in in the following way:—*P. beaumonti* was described by Le Guillou, and its characters are not sufficiently well known to enable a satisfactory settlement of its exact position to be reached. It may, in fact, fall into the genus to which I subsequently gave the name *Prionopeltis* (see Attems, Denk. Akad. Wien, lxxvii. p. 359, 1899). If so, *Prionopeltis* will fall as a synonym of *Orthomorpha* and another name will have to be found for the host of species now by common consent assigned to *Orthomorpha*. But since *P. beaumonti* may be congeneric with the latter, it would be premature to disturb the existing nomenclature. I have therefore retained the name *Orthomorpha* for the following species.

1. *Orthomorpha gracilis*.

Fontaria gracilis, C. L. Koch, Syst. d. Myr. p. 142 (1847)¹.

Paradesmus gracilis, Latzel, Myr. Österr.-Ung. Mon. ii. p. 162, t. 6. fig. 70 (1884)².

Orthomorpha gracilis, Pocock, Ann. & Mag. Nat. Hist. (6) xv. p. 354 (1895)³; and of subsequent authors.

Colour dark chocolate-brown with yellow keels.

Length from about 16–20 millim., width about 2.

Hab. EUROPE, ASIA, &c.

This species, almost cosmopolitan in distribution owing to introduction by human agency, has been recorded by Brölemann from Guatemala (Mém. Soc. Zool. France, xiii. p. 97, 1900) and Costa Rica, San José (Ann. Soc. Ent. France, lxxiv. p. 341, 1905).

Closely allied to the foregoing, and almost equally widely distributed, is *Orthomorpha coarctata*, Saussure. Originally from the Eastern Hemisphere, this species has been recorded from various localities in the Neotropical Region (Cayenne, Paraguay, Chile, Jamaica), and by Brölemann from Cocos Island, which is under the protectorate of Costa Rica (Ann. Soc. Ent. France, lxxii. p. 139, 1903). Its size and coloration are the same as in *O. gracilis*; it differs, however, from that species in being rather more convex dorsally and in the shape of the phallopods. The tibial element of the appendage in *O. coarctata* is long and slender, and the seminal stile is protected by a simple sheath-like auxiliary branch. In *O. gracilis*, on the contrary, the tibial element is short and conical and the seminal stile is protected by a much more complicated auxiliary branch provided with accessory processes.

Fam. CHELODESMIDÆ.

Chelodesmidæ, Cook, Ann. N. York Acad. Sci. ix. p. 4 (1895).

Leptodesminæ, Attems, Denk. Akad. Wien, lxxvii. p. 369 (1900)¹.

Keels of the 2nd segment well developed, but on the same level as those of the 3rd and 1st, the latter as wide as those of the second or nearly so; keels of the rest large or small, with more or less well-marked thickened pore-area. *Antennæ and legs* elongate and slender. *Caudal process* subcylindrical or triangular, apically truncate. *Phallopods* simple or complicated.

Distribution. Central and South America; Mediterranean Region.

Subfam. CHELODESMINÆ.

Leptodesminæ (s. s.), Carl, Rev. Suisse Zool. xi. p. 544 (1903).

Phallopods with coxal calcar; generative processes of second leg in male short, blunt, and subconical, at least in Central-American genera.

Distribution. As above for Chelodesmidæ.

Key to the Central-American Genera.

- a.* Upper surface of metazonites with a deep transverse sulcus, behind which the integument is ornamented with two rows of smooth or tubercular areas; 5th segment of legs much longer than 4th and almost as long as 6th (at least in the type species) EUTYPORHACHIS.
- a*¹. Upper surface of metazonites with at most a shallow sulcus, the area behind it not differently sculptured from that in front of it.
- b.* Terminal segment of legs short, its proximal extremity supported beneath by a pad-like process from the penultimate segment.
- c.* Phallopod forming a simple twisted rod with at most very small accessory branches CYCLORHABDUS.
- c*¹. Phallopod short, stout, and complicated PHYLACTOPHALLUS.
- b*¹. Terminal segment of legs long, much longer than the penultimate and not supported beneath in either sex by a pad projecting forwards from the penultimate DIRHABDOPHALLUS.

DIRHABDOPHALLUS, gen. nov.

Body as wide anteriorly as in the middle. *Keels* high, horizontal, and moderately well developed. *Pores* normal in number and very commonly, at all events, carried upon tuberculiform excrescences projecting from the lateral edge. *Caudal process* conical with truncate apex. *Legs* with terminal segments long, much longer than the penultimate (5th) segment, which is only a little longer than the 4th segment. No arthrodial pad at the joint of the 5th and 6th segments beneath. *Phallopods* simple, consisting of two branches projecting straight forwards and not bent upwards at the tip; the inferior branch of the seminal stile sickle-shaped, with concavity looking inwards and geniculate at the base, the superior auxiliary branch wider and longer than the other, protecting it from above and forming a partial sheath over it.

Type, *D. montanus*.

Distribution. Central and South America.

Brölemann (Ann. Soc. Ent. France, lxxvii. p. 284, 1898) stated that the genus *Leptodesmus*, Saussure, was based upon *L. sallei*, Sauss., and added that I replaced the name with *Odontopeltis*, without giving reasons for the change. This paragraph contains three mistakes due to neglect to consult the original bibliographical sources of the names. In the first place, I proposed *Odontopeltis* as a substitute, not for *Leptodesmus*, but for *Rhacophorus*, C. Koch. In the second place, I gave as my reasons for the change the fact that *Rhacophorus* was preoccupied (Journ. Linn. Soc., Zool. xxiv. p. 509, 1893). In the third place—and this is a much more serious question,—*Leptodesmus* was *not* based upon *L. sallei* *, but upon five species described by Saussure as *granulosus*, *subterraneus*, *carneus*, *aztecus*, and *javanus* (Linn. Ent. xiii. pp. 323–324, 1859). *L. sallei*, therefore, which was not added to the group until its revision by Saussure in 1860 (Mém. Soc. Phys. Genève, xv. pp. 299–304), *cannot* be

* I am glad to be able to share with Brölemann the responsibility for this error, since in the paper above cited I stated that *L. sallei* “appears to be the type” of *Leptodesmus*.

its typical species; and Brölemann's selection of *L. sallei* as the type is null and void.

Of the five species originally referred to the genus, Saussure in 1860 eliminated *granulosus* by referring it to *Fontaria*, and *javanus* by referring it to *Odontodesmus* (Mém. Soc. Phys. Genève, xv. pp. 323, 328), thus leaving the choice of type between *subterraneus*, *carneus*, and *aztecus*. But the selection has been still further narrowed by the relegation of *aztecus* to the genus *Neoleptodesmus* by Carl in 1903. Of the two remaining species, I propose to select *carneus* as the type, a species which has been retained in *Leptodesmus* by both Attems and Carl, the latter of whom has given figures and descriptions of the secondary sexual characters of the male. Judging from these characters, which I have verified by an examination of the two examples in the British Museum, *L. carneus* appears to me to differ generically from all the allied forms below enumerated from Central America. It differs at least in characters analogous with and equivalent to those which form the basis of the generic distinctions drawn between such genera as *Acutangulus*, Attems, and *Neoleptodesmus*, Carl.

In addition to the species assigned to it below, *Dirhabdophallus* contains several others, such as *D. plataleus*, Karsch, *D. goudoti*, Gervais, and others from South America. Brölemann speaks of this section as the "*Plataleus*-group of *Leptodesmus*"; and since the genus *Leptodesmus*, in the wide sense admitted by this author, by Attems, and by Carl, contains heterogeneous elements, it appears to me expedient to give nominal generic recognition to the above-mentioned section, which contains a number of kindred forms with common characters readily capable of definition. They all apparently differ from the true *Leptodesmus*, as exemplified by the type-species, *L. carneus*, Sauss., in having the terminal segment of the leg long, the penultimate segment short, in the absence of an arthrodial pad beneath the joint of these segments, in the much simpler structure of the phallopods, the more conical caudal process, in having the keels of the anterior four segments less expanded and less depressed, in colour, and in size. *Leptodesmus carneus*, which has been described by Saussure, Attems, and Carl, is a very large Polydesmoid from Bahia. It is rosy-red in colour and reaches a length, according to Saussure, of over 80 mm. For its general characters reference may be made to the works of those authors just quoted. It must be added, however, that Carl's claim to have described Saussure's original examples must be dismissed, for Saussure expressly stated that the type of the species from which his description and figure were taken was an immature male with undeveloped phallopods, whereas Carl described an adult male and female, and there is no evidence obtainable from the text of the original description that Saussure had more than the one example in his hands at the time. The examples from Rio Janeiro that he and Humbert subsequently—that is to say, in 1872—assigned to this species were possibly

those that Carl examined in the Geneva Museum. In any case they are not the original and typical examples of the species and may prove to be specifically distinct from it.

Key to the Central-American Species.

- a.* Slender, keels small, their width less than half the width of the metazonite; auxiliary ramus of phallopod not abruptly expanded at the tip, its inner edge simple, no secondary crest passing in from it to protect the point of the seminal stile.
- b.* Principal branch of phallopod (seminal stile) stout, with sigmoid curvature; auxiliary branch (sheath) very wide; keels a little larger; no distinct yellow band crossing the posterior half of the metazonites *spatulatus.*
- b*¹. Principal branch of phallopod slender and evenly curved; auxiliary branch also comparatively slender; keels smaller; a pale or yellow band crossing the posterior half of the metazonites *ensiger.*
- a*¹. Broader, the keels much larger, nearly half the width of the metazonite; auxiliary ramus of phallopod abruptly expanded and spatulate at the tip, the inner edge double, giving rise to a secondary crest which passes inwards in front of the apex of the seminal stile.
- c.* Smaller, length about 30 mm.; sculpturing more definitely granular, with the three rows of tubercles on the metazonites clearly defined; posterior border of keels generally with a tooth or anguliform projection; no distinct notch in front of the pore-prominence *rodriguezii.*
- c*¹. Larger, length about 50 mm.; sculpturing coriaceous, coarser or finer; the rows of tubercles less obvious.
- d.* Lateral border of keels with a distinct notch in front of the pore-prominence; posterior border of pore-bearing keels generally decidedly angular, coarsely coriaceous *montanus.*
- d*¹. Lateral border of keels forming a continuous curve; posterior border also evenly curved, rarely only very feebly angular; finely coriaceous on median area of metazonites *granosus.*

1. **Dirhabdophallus montanus**, sp. n. (Tab. XII. figg. 4-4 *g*; XIII. fig. 2.)

Colour chocolate-brown, the external half of the keels yellowish white, sternal area and legs reddish yellow. *Keels* rather large and horizontal. 1st, 2nd, and 3rd segments slightly narrower than the 4th and 5th; 1st with evenly convex anterior border; posterior border of keels oblique, not emarginate; lateral angle rounded, not pointed. *Keels* of 2nd and 3rd suboblong, with minute antero-lateral tooth; keels of 4th larger, with lateral margin slightly irregular and more convex posterior border. Keels of pore-bearing segments with anterior angle widely convex, the posterior border in its external half running obliquely forwards and outwards up to the porous area, which is somewhat abruptly thickened and forms a tubercle-like excrescence; on the 12th and 13th the posterior border is markedly angled; on the 15th it is strongly notched just behind the pore-area; on the 17th the posterior angle is a little acute and projects backwards. On the poreless segments the anterior angles are widely rounded, the posterior border lightly convex, and the posterior angle mostly rectangular. The entire *dorsal surface* of the metazonites is roughened with irregular granulation, with three rows (the first indistinct) of larger, more definite granules

Phallopods of the same type as in *D. granosus*; the process forming the sheath for the scimitar-shaped, pointed branch (seminal stile) stoutish with downbent margins, the laminate apex with a pointed angular tip and defined by a distinct notch externally; the space between the bases of the two branches wide when seen from the side.

Length 45 millim., width about 7.

Hab. GUATEMALA, Volcan de Agua (*Stoll*).

2. *Dirhabdophallus granosus*. (Tab. XII. figg. 5-5 b.)

Leptodesmus plataleus granosus, Carl, Rev. Suisse Zool. x. p. 602, t. 10. fig. 27 (1902) ¹.

Colour as in *D. montanus*, to which this species is closely allied, but with the coriaceous sculpturing of the terga rather finer and the tubercles less coarse. The 1st tergal plate has its posterior border more sinuous, the posterior border of the lateral portion more concave and the posterior angle more acute; the anterior angle of the 2nd, 3rd, and 4th much more convex, not in any sense squared. The *keels* of the rest of the segments have their anterior margin less thickened, less convex; the lateral border with the pore-area much less prominent and not emphasised by a notch and tooth in front; the posterior border is more evenly convex, much less distinctly angled, and never shows a sign of a tooth; the posterior end of the body is more narrowed and the keels of the 17th and 18th more produced and acute. The *phallopod* also differs in that the lower ramus (seminal stile) is thinner and the upper ramus (the sheath) also thinner, its inner edge, viewed from below, being lightly convex proximally and lightly concave distally, not strongly convexo-concave, while the terminal expansion is more quadrate and less pointed. Seen from the side the proximal space between the rami is markedly narrower and the superior ramus not geniculate but evenly convex above proximally.

Length of ♂ 50 millim., width 7.

Hab. COSTA RICA ¹, La Uruca 1100 metres, San José (*Biolley*).

The above-given description is taken from two male examples from La Uruca collected by the late Paul Biolley and belonging to Mr. Godman's collection. I believe these to be identical specifically with those characterized by Carl, in spite of his remark that the keels are similar to those of the Venezuelan form described by Brölemann as *Leptodesmus plataleus flaviporus* (Ann. Soc. Ent. France, lxxvii. p. 328, t. 29. figg. 30-33). This is not true of my examples, in which the keels are manifestly narrower than in *D. flaviporus*. The form of the phallopods, however, is so similar in the specimens from La Uruca and San José that it indicates specific identity between them. There appears to me to be no valid reasons for regarding *D. granosus* as a subspecies of *D. plataleus*.

3. *Dirhabdophallus rodriguezii*.

Leptodesmus rodriguezii, Brölemann, Mém. Soc. Zool. France, xiii. p. 103, t. 6. figg. 43-46 (1900) ¹.

Closely resembling *D. montanus*, but much smaller, with the keels of the 1st tergal plate much more acute; and also with the anterior angles of the 2nd and 3rd much more rounded and the posterior more acute instead of having both subrectangular.

Length 31 millim., width 5.

Hab. GUATEMALA (*Rodriguez* ¹), Purula (*Stoll, ex Mus. Brit.*).

4. **Dirhabdophallus spatulatus**, sp. n. (Tab. XII. figg. 6-6 c.)

♀. Colour of dorsal surface of mature specimens black or very deep brown, the posterior angles of the keels flavous; antennæ testaceo-fuscous; legs flavous. Antennæ long and slender, segments 2-6 subequal in length. Body nearly parallel-sided, the keels of the 1st to 4th well developed and on the same level with each other and with those of the rest of the body; the rest of the keels separated, rather small, situated high above the middle of the sides, nearly horizontal, the anterior angle evenly rounded, the posterior rectangular, produced posteriorly only in the last five segments; the pores conspicuous, situated in an ovate excavation of the keel just in front of the posterior angle and looking upwards and outwards, the area around the pore forming a swollen prominence; the rest of the margin not thickened. The dorsal surface very finely but distinctly rugulose, with indications of transverse rows of granules, the transverse sulcus shallow, but visible; lateral surface lightly wrinkled. Sterna wide, with straight anterior border and emarginate posterior border. Anal tergal plate much narrowed, its apex truncate; sternal plate triangular, with a setiferous tubercle on each side of the posterior angle.

Legs long and slender.

Length 37 millim., width 4.8.

♂. Slenderer than ♀, the keels horizontal and rising near the summit of the sides. The phallopods terminating in two processes, the upper of which is very wide, spatulate, and hollowed below, while the lower, lying in the hollow of the upper, is much shorter than it, pointed, and lightly curled.

Length 33 millim., width 3.8.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (H. H. Smith).

5. **Dirhabdophallus ensiger**, sp. n. (Tab. XII. fig. 7; XIII. fig. 1.)

Closely allied to the preceding (*D. spatulatus*).

Differing in colour, in that the posterior half of the keel-bearing portion of the segments is ochraceous, which gives the dorsal surface a yellower aspect; antennæ entirely testaceous. Keels much less developed.

Phallopods of the same form, but much slenderer.

♀. Length 33 millim., width 4; ♂, length 29 millim., width 3.3.

Hab. MEXICO, Omilteme and Xautipa in Guerrero (H. H. Smith).

The following species is of doubtful generic position, though probably belonging to *Dirhabdophallus*, and possibly synonymous with *D. granosus*:—

Dirhabdophallus (?) hoffmanni.

Rhacophorus hoffmanni, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 537¹.

Colour dark olive-brown, with the ends of the keels yellow. Edge of the keels rounded; pores opening upwards and borne upon an excrescence projecting from their lateral edge; posterior angle of keels conspicuous only at the hinder end of the body.

Length 52 millim., width a little more than 6.

Hab. COSTA RICA (Hoffmann¹).

Under the name *Leptodesmus carinovatus*, Attems (Mt. Mus. Hamburg, xviii. pt. 2, p. 85, 1901) records a form from Port Limon, Costa Rica, which is in all probability specifically distinct from the true *L. carinovatus*, from Manaos on the Amazons (Denk. Akad. Wien, lxxvii. p. 376, t. 6. figg. 127, 128, and t. 7. fig. 154, 1899). The true *L. carinovatus* appears to belong to the genus *Dirhabdophallus*, but differs from all the Central-American species of that genus that I have seen in the structural details of its phallopods, the terminal rami being very short, the auxiliary branch very wide

and oval, and the seminal stile slender and but little curved. The segment that bears them, moreover, seems, from Attems's figures, to be rotated in such a way that when viewed from the outside the seminal stile is completely concealed by lying on the inner side of the sheath or auxiliary ramus. The length is 53 mm., much the same, that is to say, as in *D. granosus*. The dorsal surface, moreover, is granular, with three rows of tubercles, and the pore-area is prominent as in the other Central-American species. Attems unfortunately furnishes no particulars about the example or examples from Port Limon he determined as *L. carinovatus*. He does not say that there were males amongst them; and until information on this head is forthcoming suspension of judgment must be exercised as to the correctness of his determination of the specimens. It is, in my opinion, highly improbable that specific identity exists between examples from Manaos and those from Costa Rica. But whether the specimens from Port Limon are specifically distinct, as is indeed probable, from *D. granosus*, Carl, and *D. hoffmanni*, Peters, both from Costa Rica, there are no data to show.

For these reasons I have omitted *D. carinovatus* from the table of Central-American species given above.

PHYLACTOPHALLUS, gen. nov.

Head sulcate above; *antennæ* elongate and slightly incrassate to the 6th segment, the segments from the second to the sixth subequal in length. *Body* narrow, wider in front than behind, but even in front barely wider than the head; 1st tergal plate as wide as the 2nd; anterior keels moderately well developed, high and nearly horizontal, becoming gradually smaller in the middle and posterior portion of the body; the metazonites with a distinct but not deep transverse sulcus beginning on the 4th or 5th segments. *Pores* normal. *Caudal process* triangular, truncate, and *anal sternal plate* triangular. *Legs* with sixth segment very short, shorter than fifth, which sends forwards a process beneath its proximal end. *Phallopods* stout, apically blunt, and hooked, with a minute superior spiniform process and an external laminate sclerite.

Type, *P. stenomerus*.

Distribution. Central America (Costa Rica).

1. *Phylactophallus stenomerus*, sp. n. (Tab. XIII. figg. 3-3 h.)

Colour blackish, with the keels, the posterior border of the terga, the legs, and antennæ pale. *Head* sulcate above, rugulose. *Antennæ* moderately long, a little incrassate, the second and third segments subequal and slightly longer than the fourth, fifth, and sixth, which progressively decrease in length, the second as long as the sixth and seventh together. *Body* narrow, parallel-sided, rugulose above. The 1st tergal plate narrower than the head, nearly semicircular, convex above, its antero-lateral border evenly rounded forwards from the angles of the keels, which are a little acute; the posterior border mesially emarginate. *Dorsal surface* of the rest of the segments convex above, the keels not much above the middle of the sides and all small; the anterior and lateral borders of the majority forming a very obtusely rounded angle; the lateral margin evenly thickened, especially on the pore-bearing segments; the pores looking laterally; posterior angles of the keels acute, subspiniform, and a little produced backwards, becoming more and more spiniform and produced on the posterior segments. Keels of 2nd and 3rd segments directed a little forwards, especially those of the 2nd, in which the anterior angle is squared; anterior angles of 3rd, 4th, 5th, 6th, and 7th, &c. becoming gradually more and more convex; a minute antero-lateral tooth traceable on some of the anterior keels. The dorsal surface coriaceous, with a distinct sinuous sulcus on the 5th to the 15th metazonites. *Caudal process* conical, truncated;

anal sternal plate subtriangular, but not sharply pointed. *Sterna* moderately broad. Lateral surface coriaceous. A crest above the legs of the posterior pair on all the segments in the anterior half of the body. *Legs* moderately long; the anterior shorter and thicker than the posterior; the terminal segment of the legs of segments 1 to 8 very short, only about half as long as the penultimate segment, which is prolonged inferiorly beneath its proximal end as an arthrodistal pad; terminal segment a little longer than the penultimate in the segments from the 9th to the end; the second segment of all the legs thickened and conically elevated above, the thickening gradually becoming smaller towards the end of the posterior half; third segment always rather short, thickened and convex above on the anterior legs, incrassate on the posterior legs; fourth segment shorter than fifth, the two together longer than the third or sixth segments. *Seminal processes* of coxæ of second leg short and rounded; two small tuberculiform excrescences on the anterior border of the sternum of the third segment. *Socket of phallopods* large and wide, its border elevated behind, and widely separating the coxæ of the posterior legs of the seventh segment. *Phallopods* with coxal segments large and coarsely hairy in front; distal segment with femoral piece also coarsely hairy, but the hairs shorter; this segment directed forwards, stout and short, with its terminal portion bent upwards at a right angle, and inclining a little outwards, and near the middle of its outer side there arises a large subquadrate lamina projecting outwards and downwards; the tip of the organ is hooked backwards and bluntly emarginate towards a short subcylindrical process (? the seminal stile) which arises from the upper side of the segment.

Length, ♂, 23 millim., width about 2.

Hab. COSTA RICA, Irazu (*Rogers*).

It is possible that the genus *Rhachidomorpha* may have to come into this section of the Polydesmoidea, and not into the Rhachidesminæ, where it is placed in this enumeration. The doubts that envelop the systematic position of the genus have arisen from our ignorance of the male-characters of the Mexican specimens described by Saussure as *Rhachidesmus tarasca*, the typical species of the genus, and from the fact that Attems has described as *R. tarasca* a specimen from Espirito Santo in Brazil, which unquestionably belongs to the section Leptodesminæ. In this example the phallopod has a distinct calcar and terminates in three branches—a superior arising from the femoral portion, and two, one above the other, from the terminal or tibial portion, the upper of these bearing the seminal duct, and the lower or aboral being an auxiliary branch. But whether or not the true *R. tarasca* possesses this type of phallopod, it differs from all the known Central-American species of Chelodesminæ in its strongly elevated subspiniform keels.

For further particulars concerning this species, see below, under the heading *Rhachidomorpha*, p. 174.

CYCLORHABDUS.

Cyclorhabdus, Brölemann, Ann. Soc. Ent. France, lxxvii. p. 279 (1898); Mém. Soc. Zool. France, xiii. p. 98 (1900).

Allied to *Dirhabdophallus*, but differing in that the distal segment of the phallopod consists in the main of a single long, curled, and more or less twisted sclerite, without or with only very short accessory branches; in having the terminal segment of the legs short and supported proximally beneath by a forwardly directed process from the penultimate segment.

Type, *C. annulus*, Bröl.

Distribution. Venezuela and Guatemala.

1. *Cyclorhabdus contortus*.

Cyclorhabdus contortus, Brölemann, Mém. Soc. Zool. France, xiii. p. 98, t. 6. figg. 21–25 (1900)¹;
Bull. Soc. Zool. France, xxix. p. 189 (1904)².

Leptodesmus contortus, Carl, Rev. Suisse Zool. x. p. 607, t. 10. figg. 28–31 (1902)³.

Colour greyish-brown with the swollen area of the keels pale yellow and a pale round spot in the middle of the dorsal area of the segment; antennæ and legs pale ochre. *Dorsal surface* of the segments coriaceous; area beneath the keels granular. *Head* smooth. *Antennæ* tolerably long and slender. *First dorsal plate* as wide as the head, with angles rounded and feebly concave posteriorly. *Keels* of 2nd, 3rd, and 4th segments subrectangular, a little depressed anteriorly; a minute tooth on the anterior angle of the 2nd. Upon the following segments the keels are reduced to a slender rounded ledge, which, however, is much dilated upon the segments carrying the pores; pores small and opening laterally; groove between the two portions of the segment wide and longitudinally canaliculate. *Caudal process* of 20th segment conical, with round slightly down-bent tip. *Legs* moderately long, the two basal segments studded externally (above) with spiniform tubercles; the penultimate segment produced inferiorly and distally beneath the proximal end of the terminal segment, which is short. *Phallopods* with basal portion (femoral area) of distal segment short, subcylindrical, and internally hairy; distal portion with an external spiniform process near the base, the rest of the segment stout with its distal half bent strongly upwards and outwards, ending in two processes—a slender seminal stile and a broader, more rounded, subsidiary process. Sternum of the 5th with two short, wide, flattish processes between the legs of the first pair and also a tubercle at the base of the coxæ of those of the second pair.

Length, ♀, 25 millim., width 3.40.

„ ♂, 20 „ „ 2.20.

Hab. GUATEMALA^{1–3} (*Rodriguez*).

This genus and species are known to me only from the description and figures.

EUTYPORHACHIS, gen. nov.

Distinguishable in both sexes from *Dirhabdophallus* by the presence of a deep transverse sulcus on the dorsal area of the metazonites, the area behind the sulcus ornamented with two rows of flat tessellated or tubercular areas. Fifth segment of legs much longer than the fourth and only a little shorter than the sixth. *Phallopods* otherwise formed.

Type, *E. tessellatus*.

Distribution. Guatemala.

Forms related to the type-species of this genus have been referred by myself and Attems to *Odontopeltis* (*cf. supra*, p. 161). Now the name *Odontopeltis* was proposed as a substitute for *Rhacophorus*, Koch; therefore the type-species of *Odontopeltis* must be the same as that of *Rhacophorus*, a point which has not yet been settled, for it will be noticed that Silvestri in his analytical key to the genera of Polydesmidæ cited a type-species for all the genera save *Odontopeltis*.

Of the two forms referred by Koch to *Rhacophorus*, I select *R. conspersus*, Perty, as the type. The specific name *conspersus* was given to a Polydesmoid from Brazil measuring over 80 mm. in length, with wide keels in which the posterior angle from the fifth segment onwards is acutely produced and directed more and more backwards towards the posterior end of the body, the anterior border being lightly convex and the posterior lightly concave or straight and with the anterior angle armed externally with a strong, sharp, but short tooth, defined posteriorly by a conspicuous

notch which separates it from the thickened but not prominent porous area. The upper surface is granular and rugulose. Until this species has been rediscovered and the character of the male made known, the position of *Odontopeltis* will remain unsettled. It may be that none of the forms referred to *Odontopeltis* by Attems and myself are congeneric with *R. conspersus*. At all events, it appears to me to be practically certain that the one I have described below as *Eutyporhachis tessellatus* is generically distinct from it.

The two species here referred to the genus *Eutyporhachis* may be distinguished as follows:—

Posterior area of terga behind the transverse groove tessellated, the anterior shorter areas irregularly rounded, the posterior larger, longitudinally oblong, scarcely tubercular; the single subsidiary branch of phallopod not much expanded proximally, strongly bigeniculate	<i>tessellatus</i> .
Sculpturing of posterior area of terga behind the sulcus tubercular, the tubercles of the posterior row overlapping the edge of the segments; phallopod with two subsidiary branches, the larger forming a funnel-shaped expansion on the inner side of the seminal stile and not bigeniculate	<i>oltramarei</i> .

1. *Eutyporhachis tessellatus*, sp. n. (Tab. XIII. figg. 4-4 c.)

♂. *Colour* piceous above; the pore-bearing area of the keels sometimes paler; legs and antennæ yellowish brown. *Antennæ* long, not incrassate, the second segment only a little longer than the third, fourth, fifth, and sixth. *Head* smooth above, hairy below; frontal sulcus distinct. *Body* as wide anteriorly as in the middle, attenuated posteriorly; keels widely separated. *First tergal plate* smooth above, lightly convex; its anterior border not quite evenly curved, being straightish across the middle, laterally strongly convex, with well-developed posteriorly acutely pointed angle projecting backwards as far as the posterior border of the median area, with the intervening posterior border of the keel somewhat strongly concave. All the *keels* high on the sides, projecting horizontally, so that the back is nearly flat; their anterior border convex and becoming gradually more and more sloped backwards from the 2nd to the 19th segment, forming an even arch with the anterior half of the lateral border, so that from the 4th backwards no definite anterior angle is formed; the posterior angle acutely produced on all the keels and surpassing more or less the posterior edge of the median portion of the tergal area; those of the 2nd, 3rd, and 4th with posterior border more concave and angle more produced than are those of the median area of the body, where the posterior border is sometimes lightly convex or inclined forwards, then abruptly bent backwards, sometimes showing a few small teeth, which, however, are inconstant; from the 16th to the 19th, where the body is narrowed, the keels become gradually produced more and more backwards, those of the 18th forming strong spiniform processes, those of the 19th smaller spiniform processes; antero-lateral edge of the keel elevated, on the poreless segments, the elevated edge gradually passing into the thickening which pervades the posterior angle; but on the pore-bearing segment the pore-area is more abruptly and more strongly thickened, and is defined from the anterior portion of the lateral border by a distinct notch, except on segments 17 to 19. *Dorsal area* strongly sculptured, as in the genus *Polydesmus*; each metazonite marked with a deep, central, mesially angled transverse sulcus; the area in front of this smooth, but mesially sulcate, and furnished usually with two pairs of small setigerous granules; the area behind the sulcus divided up into two transverse rows of low polygonal areas which are posteriorly weakly tuberculiferous, the areas of the anterior row, usually six in number, shorter than those of the posterior row, which are usually eight in number and longitudinally suboblong; sometimes the areas of these two rows almost fuse, and externally they pass into a few similar but less well-defined areas upon the upper side of the keels; the 2nd and 3rd

segments are only very weakly tessellated in the way above described and the transverse sulcus begins on the 4th; 19th segment weakly tessellated. *Caudal process* of 20th conical, apically truncate; sternal plate triangular, the apex not spiniform. *Sternal areas* of segments wide, slightly wider in front than behind, posteriorly lightly emarginate; but upon the posterior segments more strongly so, the sternum of the 19th and in a lesser degree of the 18th being angularly excised behind. Sterna and legs hairy. Anterior sterna of ♂ without tubercles or processes. *Genital process* of second leg short and blunt. *Phallopods* moderately long, robust, ending in two branches—an external, slender, attenuated, pointed, and downcurved in its distal half (the seminal stile); and a larger internal, which is broad and bent sharply downwards proximally and then abruptly forwards and slightly outwards distally, the extremity being narrow and pointed. *Fossa of phallopods* wide, with strongly elevated thin posterior border. Coxæ of legs of 7th segment widely separated.

♀. Like the male, but a little larger and with the keels considerably less expanded (head and first three segments missing in only specimen available).

Length, ♂, 30 millim., width 3.5.

„ ♀, about 35 millim. (damaged), width 4.2.

Hab. GUATEMALA, Senahu in Alta Vera Paz (*Champion*).

2. *Eutyporhachis ultramarei*.

Leptodesmus ultramarei, Carl, Rev. Suisse Zool. x. p. 600, t. 10. fig. 34 (1902)¹.

Colour yellow or brownish yellow; sterna and appendages clear yellow. (Head and first tergal plate unknown.) *Keels* small, not much surpassing the posterior border of the median area of the segments, their anterior border forming a continuous arch with the anterior half of the lateral border. On the keels without pores the hinder angle is rectangular with the short posterior border of the keels. On the pore-bearing segment the pore-area forms an oval thickening, which projects a little beyond the border of the tergal area as a blunt anguliform process. *Dorsal surface* lightly vaulted, shining; the metazonites with central transverse groove; area in front of the groove smooth or at most lightly coriaceous; area behind it with two rows of tubercles, the first row consisting of six larger tubercles, the second row of eight smaller tubercles, which extend beyond the posterior edge of the tergal plate. Externally to the ends of the sulcus there is a small swelling. *Legs* long and thin, sparsely hairy. *Phallopods* moderately long; the distal segment divided into two unequal branches; the subsidiary branch is inferior, subcylindrical, and apically attenuated. The principal branch is longer and stronger and is itself divided distally into two, one of which (the seminal stile) is narrowed and slightly down-bent apically, while the other is expanded into a funnel-shaped lamina, the cavity of which looks outwards and upwards and guards the seminal stile on the inner side.

Length about 20 millim., width 1.8–2.

Hab. GUATEMALA (*Oltramare*¹).

Subfam. RHACHODESMINÆ.

*Rhachidesminæ**, Carl, Rev. Suisse Zool. xi. p. 553 (1903).

Phallopods without coxal calcar, usually excavated on the inner aspect of the femoral element. *Generative processes* of second leg in male long, slender, and projecting backwards.

Distribution. Central America.

* Although Carl employed the term *Rhachidesminæ* for this section, the genus *Rhachidesmus* does not appear amongst the genera included under it. He retains the preoccupied name *Rhachis*, for which Cook had substituted that of *Rhachodesmus*.

Key to the Central-American Genera.

- a.* All the pores absent, except a single pair upon the fifth segment DUOPORUS.
- a*¹. Pores retained upon other segments, normal in number or in excess of the normal.
- b.* Pores abnormal in number, present upon segments 8, 11, and 14 STRONGYLODESMUS.
- b*¹. Pores normal in number, absent upon segments 8, 11, and 14.
- c.* Distal segment of phallopod bent at a right angle to the coxa and bearing a distinct seminal fossa at the base on the inner side.
- d.* Seminal fossa of phallopod forming a circular or subcircular pit lined with hairs.
- e.* Keels elevated, spiniform, with acutely-pointed angles RHACHIDOMORPHA.
- e*¹. Keels broad, laminate, not spiniform.
- f.* Lateral edges of keels scarcely thickened, but markedly irregular in outline RHACHODESMUS.
- f*¹. Lateral edges of keels markedly thickened, with evenly rounded outline PARARHACHISTES.
- d*¹. Seminal fossa of phallopod not closed on its distal side, but opening into a wide channel traversing the inner surface of the segment.
- g.* Keels small, ending posteriorly in a sharp tooth; phallopod 3-pronged, the seminal stile narrow acuminate, not longer than the auxiliary branches ACUTANGULUS.
- g*¹. Keels large, not markedly spiniform; seminal stile of phallopod compressed, sublamine, and much longer than the auxiliary branches NEOLEPTODESMUS.
- c*¹. Distal segment of phallopod not bent at a right angle to the coxa, the two segments axially in the same straight line and protruding vertically from their socket; no distinct seminal fossa at the base of the distal segment.
- h.* Phallopods large; their sockets large and abutting against the basal segments of the legs of the seventh segment; the tracheal rods short; anal sternal plate distinctly triangular; keels large and overlapping ACERATOPHALLUS.
- h*¹. Phallopods very small with long and cylindrical tracheal rods; their sockets very small and remote from the basal segments of the legs of the seventh segment; anal sternal plate semi-oval.
- i.* Keels medium-sized, not overlapping; sternal areas not compressed and bituberculate behind; legs with sixth segment much longer than fifth PAMMICROPHALLUS.
- i*¹. Keels very large, wide, overlapping and depressed; sternal areas narrowed posteriorly, with their posterior border deeply angled and bidentate; legs with sixth segment only a little longer than fifth ZEUCTODESMUS.

DUOPORUS.

Duoporus, Cook, Pr. Ent. Soc. Wash. iv. p. 402 (1901).

Antennæ slender, clavate, the sixth segment the broadest and longest, its length a little exceeding that of the second. *Head* smooth, prominent; without sulcus. *First tergal plate* semielliptical, wider than the head, a little narrower than the second, its angles not produced. *Segments* not sulcate or sculptured, smooth, rather strongly convex. *Keels* moderately broad, inserted about the middle of the side, broader on the anterior than on the posterior segment; the posterior border concave and posterior angle acute, becoming sharply spiniform on the posterior segments; anterior angle rounded, with very minute notch; the margin entire, thin, and with very fine raised rim. *Pores* present only on segment 5; minute and lodged in a depression just inside the edge of the keel, which is not thickened. *Caudal process* subtriangular, with apex abruptly narrowed, truncated. *Anal sternal plate* nearly as long as broad, with rounded margin; tubercles obsolete. *Sterna* with a small conical spine at the base of each leg. *Phallopod* quite simple; distal segment unbranched, subfalcate, at right angles to the proximal, which is large, prominent, and subcylindrical. *Genital processes* of second leg of ♂ sharp, conical, and directed posteriorly.

Type and only known species, *D. barretti*, Cook.

Distribution. Mexico.

Cook makes no suggestion as to the systematic position of *Duoporus*. The only character mentioned in the diagnosis from which I can form an opinion on this point is the shape and position of the genital processes of the second leg in the male, which in being conical and sharp and projecting backwards from the posterior aspect of the coxæ resemble these same processes in *Rhachodesmus*, *Strongylodesmus*, and other genera referred by Carl to the Rhachodesminæ; but there is no evidence that the coxal spur is missing. In the presence of two pores only on the fifth segment, *Duoporus* differs from all known Central-American genera, except *Stenodesmus*, a genus in other respects totally distinct from it.

Since only one species of this aberrant genus is known, it is difficult to decide what characters are of generic and what of specific value. No doubt some of those mentioned in the generic diagnosis will prove to be merely of specific importance when other species have been discovered.

1. *Duoporus barretti*.

Duoporus barretti, Cook, Pr. Ent. Soc. Wash. iv. p. 404 (1901)¹.

Colour pale purplish (in alcohol).

Length 12–14 millim., width 1.9–2.

Hab. MEXICO, Cuernavaca in Morelos¹.

STRONGYLODESMUS.

Strongylodesmus, Saussure, Linn. Ent. xiii. p. 327 (1859); Mém. Soc. Phys. Genève, xv. p. 537 (1860); Saussure & Humbert, Miss. Sci. Mex., Myr. p. 55 (1872), and of all later authors.

Antennæ long and slender. *Second tergal plate* as wide as the following. *Keels* well developed, situated high on the sides, horizontal; lateral borders of the pore-bearing keels thickened, of the poreless keels hardly bordered. *Pores* upon segments 5, 7–19, near the edges of the keels, the latter with rounded angles, except those of the 17th to 19th segments, which are broad and spiniform. *Caudal process* of

anal segment triangularly conical and truncate; sternal plate triangular. *Legs* long and slender. *Sterna* wider than long. *Phallopods* with basal segment (coxa) without calcar; distal segment stout, subcylindrical, furnished apically with a slender hooked process (the seminal stile).

Type, *S. cyaneus*, Sauss.

Distribution. Mexico.

This well-marked genus differs from all others known from Central America in having pores upon the 8th, 11th, and 14th segments, as well as upon the 5th, 7th, 9th, 10th, 12th, 13th, 15th to 19th segments as in Polydesmoidea with normal pore-formula. In other respects *Strongylodesmus* most resembles *Rhachodesmus*.

1. *Strongylodesmus geddesi*, sp. n. (Tab. XIII. figg. 5-5 c.)

Colour (in alcohol) pale olive-green, with the keels tinted with yellow; antennæ green like the head and dorsal surface; legs markedly yellower than the body. *Head* rugulose, with frontal sulcus. *Antennæ* long, segments 2 to 6 subequal in length, distance between antennæ less than length of their second segment. *Upper surface* of the metazonites uniformly and closely covered with granules, with exception of the extreme edges and the lateral thickening of the keels. *Back* nearly flat, with high horizontal keels; an indistinct transverse row of small tubercles along the posterior border of the median area of the tergal plates. The *first tergal plate* wide with the keels well developed, the anterior angle rounded, posterior angle sharp and rectangular, anterior border of the plate straight from side to side, posterior border mesially lightly emarginate and elevated, posterior border of keels oblique and straight. On the *keels* from the 2nd to about the 16th the anterior and posterior borders are more or less convex, on the 2nd and 3rd the anterior border is strongly convex and the posterior border nearly straight; but upon the segments of the mid-region the posterior border is more convex than the anterior; the anterior angle of the keel is rounded, with a distinct but small antero-lateral tooth; the posterior angle is nearly square, but from about the 7th backwards its angle bears a small backwardly directed tooth; there is also an angulation of the lateral border just beneath the pores; posterior border of 16th to 19th directed more and more backwards, the 18th and 19th being triangularly spiniform and posteriorly uplifted. *Caudal process* of anal tergal plate curved, triangular, truncate; sternal plate wide, triangular, with setiferous tubercles far apart and some distance behind the extremity. *Sternal areas* wide, transversely oblong, hairy. *Lateral area* of metazonites granular, of prozonites smooth. *Legs* long; third segment a little longer than the first, both longer than fourth + fifth segments. *Phallopods* short and thick; thickly hairy externally and in the hollow internally; ending distally on the inner aspect in a somewhat bowl-shaped hollow, the proximal border of which is armed with two short spiniform teeth, the distal border being angled above and passing below into a large, wide, semicircularly curved inwardly directed, sickle-shaped ramus, the seminal stile, which lies in a horizontal plane when the phallopod projects forwards, the apices of the two normally crossing each other; behind the superior angle of the hollow there is a forwardly directed tuft of bristles, and between the two teeth of its posterior or proximal edge there is a backwardly directed triangular gutter running back towards the excavation of the femoral portion. *Seminal processes* long and slender. *Legs* of first pair short, but otherwise unmodified.

Length of ♂ 41 millim., width 5.

Hab. MEXICO (*Patrick Geddes, in Mus. Brit.*).

2. *Strongylodesmus cyaneus*.

Strongylodesmus cyaneus, Sauss. Linn. Ent. xiii. p. 327 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 537, t. 3. fig. 20 (1860)²; Sauss. & Humb. Miss. Sci. Mex., Myr. p. 55 (1872)³; Attems, Denk. Akad. Wien, lxxviii. p. 413 (1899)⁴; Carl, Rev. Suisse Zool. xi. p. 555 (1903)⁵.

Strongylodesmus viridis, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 547 (sec. Saussure & Humbert)⁶.

The descriptions of this species furnished by Saussure and Carl compel me to regard it as distinct from the form described above as *S. geddesi*. According to Carl's figures of the phallopod, the apical or distal hollow in *S. cyaneus* is much longer and narrower, has no spiniform teeth on its proximal margin, and the seminal stile instead of being semicircularly curved and directed straight inwards, is sharply geniculate at the base and projects decidedly downwards and inwards with a sinuous curvature. In general form the two species are much alike, but the anterior borders of the keels as considerably more convex than they are in *S. geddesi*, especially on the first tergal plate are the anterior borders of the keels produced and convex, thus giving rise to the median concavity he describes and figures. This does not exist in *S. geddesi*, where the anterior border forms from side to side a continuous curve, strongly pronounced laterally. Lastly, he makes no mention of any denticle on the antero-lateral border of the keels nor of a tooth upon the posterior angle, the margin of the keels forming, according to his figure, a continuous curve. Perhaps no great reliance should be placed upon the differences in colour; it must be borne in mind, however, that he describes *S. cyaneus* as green and represents the legs and keels as the same colour as the body. His animal is also larger, the length being 47 millim. and the width 7.

Hab. MEXICO, Orizaba¹⁻⁶.

RHACHIDOMORPHA.

Rhachidomorpha, Saussure, Mém. Soc. Phys. Genève, xv. p. 326 (1860); Saussure & Humbert, Miss. Sci. Mex., Myr. p. 37 (1872).

Rhachidomorpha, Attems, Denk. Akad. Wien, lxxvii. p. 410 (1899).

Microrhachis, Carl, Rev. Suisse Zool. xi. p. 556 (1903).

Distinguishable from all the Central-American genera by the shape of the *keels*, which are well developed, separated, high on the sides, elongate, spiniform, and tilted upwards so that the dorsal surface is flat or hollow, the degree to which the keels are tilted depending upon the sex and species, the tilting being greater in the male than in the female and greater in the typical species *tarasca* than in *adunca*. *Pores* normal. *Phallopods*, where known, much like those of *Rhachodesmus*; the basal segment without calcar; the proximal end of the distal segment with a roundish seminal fossa, the distal end with a seminal stile and a large bifid subsidiary branch.

Type, *R. tarasca*, Sauss.

Distribution. Mexico.

I have added *Microrhachis* to the synonymy of *Rhachidomorpha*, because I cannot find any evidence that satisfies me as to the existence of generic characters to distinguish the typical species of the two, namely *tarasca* and *adunca*. *Microrhachis* was based upon the male-characters of the latter; but since the male of the genuine *tarasca* does not appear to have been examined for the particular points presented by *adunca*, there is very little evidence, much less proof, of their generic distinctness. On the other hand, the two species are so much alike in general features, especially in the unusual shape and direction of the keels, that strong presumptive evidence is supplied of the resemblance extending to deeper-seated structures. Attems, however (Mt. Mus. Hamburg, xviii. pp. 85, 95, 1901), records these two species, namely *R. tarasca* and *R. adunca*, from Espirito Santo in Brazil; and, as the result of his examination of the specimens so identified, reduced *Rhachidomorpha* to a subgeneric synonym of *Leptodesmus*. This conclusion is opposed to that of Carl, who had the opportunity of examining the type of *R. adunca*, for which he wrongly retained the

name *uncinata*. This author showed that the phallopod of *R. adunca* has no coxal calcar, and thus differs from that organ as known in all the species modern authors have referred to *Leptodesmus*. There is no evidence, however, that Attems knew the male of the species he identified as *R. adunca*. The male was known to him in the case of the species he determined as *R. tarasca*. But all that I know of the distribution of species of Diplopods justifies the conclusion that the two species from Espirito Santo must be specifically different from the genuine *R. adunca* and *R. tarasca* from Mexico. If this be so, as is practically certain, they may also be generically different. At all events, it is proved that *R. adunca* does not belong to the genus *Leptodesmus*, and I do not think the evidence justifies the conclusion that *R. tarasca* is generically distinct from *R. adunca*. I have tentatively, therefore, kept them under the same generic heading, *Rhachidomorpha*, of which the type-species is *R. tarasca*, with *Microrhachis*, of which the type-species is *R. adunca*, as its synonym. Examination of the male-characters of *R. tarasca* alone can show whether this opinion is correct or whether *R. tarasca*, carrying with it the generic name *Rhachidomorpha*, belongs to the same category of species as *Leptodesmus* and differs generically from *R. adunca*. If this be so, the genus *Microrhachis* will have to be resuscitated in the section Rhachodesminæ.

The two known species may be distinguished as follows:—

- a. Keels very strongly elevated and corniform *tarasca*.
 b. Keels only moderately elevated *adunca*.

1. *Rhachidomorpha tarasca*.

Polydesmus (Rhachidomorpha) tarasca, Sauss. Mém. Soc. Phys. Genève, xv. p. 327, t. 4. fig. 24 (1860)¹.

♂. Colour? Body slender, elongate, and smooth. Antennæ very long and slender. First tergal plate with its anterior border semicircularly arched; its keels strongly aliform, elevated, with posterior border concave, ending in a sharp backwardly-directed spine. Keels of 2nd and 3rd segments directed slightly forwards at the base, then strongly recurved; those of the following segments in the form of narrow wings, strongly elevated, terminated by a sharp backwardly-directed spine; marginal thickening narrow; the pores not far from the extremity of their spiniform processes; a small spiniform tooth near the anterior end of the outer side of the keels. The keel-bearing portion of all the segments with an arched groove extending across from the base of one keel to that of the other. Caudal process of anal tergal plate conical.

Length 21 millim., width ?

Hab. MEXICO, Cordova¹.

2. *Rhachidomorpha adunca*.

Polydesmus (Rachidomorpha) uncinatus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 152 (1869)¹; Miss. Sci. Mex., Myr. p. 38, t. 1. fig. 14 (1872)² (*uncinatus* preoccupied).

Polydesmus (Rachidomorpha) aduncus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 158 (1872)³.

Rhachidomorpha aduncus, Attems, Denk. Akad. Wien, lxxvii. p. 410 (1899) ⁴.

Rhachis (Microrhachis) uncinatus, Carl, Rev. Suisse Zool. xi. p. 556, t. 16. fig. 15 (1903) ⁵.

♀. *Colour* cochineal-red, passing into white in dried specimens. *Body* slender, with the segments, which are smooth and shining, a little separated. *Antennæ* long. *Dorsal surface* flat between the keels, which are tilted upwards above the horizontal plane. *First tergal plate* with its anterior border nearly semicircularly arched, the posterior strongly sinuous, its keels directed backwards and sharp. The other *keels* aliform, becoming more and more pointed and produced posteriorly and terminated by a long spine; their anterior edge bordered and armed externally with a small tooth. *Pores* small, opening on the terminal spine. *Caudal process* of 20th conical.

♂. *Keels* much more elevated, segments more separated and the anterior tooth more pronounced than in the female. *Phallopods* with distal segment bent at right angles to the basal (coxa) and stout; its femoral and tibial areas not distinctly separable; from the base distad of the seminal fossa there arises a chitinous process bearing the seminal duct, to which the main part of the segment acts as a guard; this is divided into two pieces, an inner simple, shaped like a knife-blade, while the outer is expanded, more lobate, and itself subdivided.

Length, ♀, 20 millim., width 2.7.

„ ♂, 21 „ „ 2.8.

Hab. MEXICO, Monte Azul, Cerro de Azcamela, Sierra de Agua in the Eastern Cordillera ¹⁻³.

According to Humbert and Saussure, this species is difficult to distinguish from *R. tarasca*, but has the keels less divergent, less elevated, less corniform, more lamellar, more aliform, and with the anterior border more arched.

RHACHODESMUS.

Polydesmus (Rachis), Saussure, Linn. Ent. xiii. p. 326 (1859); Mém. Soc. Phys. Genève, xv. p. 329 (1860); Humbert & Saussure, Verh. z.-b. Ges. Wien, xix. p. 692 (1869); Miss. Sci. Mex., Myr. p. 54 (1872).

Rhachis, Attems, Denk. Akad. Wien, lxxvii. p. 415 (1899); Carl, Rev. Suisse Zool. xi. p. 554 (1903) (preoccupied).

Rhachodesmus, Cook, Ann. N. York Acad. Sci. ix. p. 4 (1895).

Antennæ long and slender. *Dorsal surface* flat or even slightly hollow. *Keels*, except those of the anterior segments, which are contiguous, somewhat widely separated from each other on each side, wide and lamelliform, with the lateral border not thickened, or scarcely so, but irregularly lobate or toothed, only to a slight extent thickened round the pores, which are normal in number and placed near the middle of the lateral border slightly above the edge. *Caudal process* of anal segment triangular, truncate. *Legs* very long. *Sterna* hairy. *Phallopods* with basal segment (coxa) without calcar: the second segment stout but short, swollen basally and furnished internally with a large subcircular seminal fossa which is lined with bristles.

Type, *R. viridis*.

Distribution. Mexico and California.

1. *Rhachodesmus viridis*.

Polydesmus (Rachis) viridis, Sauss. Linn. Ent. xiii. p. 326 (1859) ¹; Mém. Soc. Phys. Genève, xv. p. 330, t. 3. fig. 19 (1860) ²; Attems, Denk. Akad. Wien, lxxvii. p. 415 (1899) ³.

Colour blue or green, becoming more or less decolorized in alcohol, the keels, legs, and antennæ becoming

yellowish-white, with traces of the bluish tint on the cylindrical portion of the segments. *Head* finely rugose, naked and sulcate above, hairy below. *Antennæ* hairy, not incrassate. *First tergal plate* almost as wide as the second, with lightly concave anterior border, convex lateral border, and posterior border straight mesially, directed slightly forwards laterally, the angles rounded. *Body* elongate; *dorsal surface* rugulose from the 1st to the 18th segment, hollowed, the keels standing high on the sides and a little uptilted. *Keels* subquadrate, slightly wider basally than the median area; the lateral border excised in its posterior half, giving rise to a median lobe and a short posterior lateral subspiniform process; in the anterior half of the body there is also a small antero-lateral spiniform tooth; keels of 17th and 18th segments forming wide spiniform processes, those of the 19th very small. All the *legs* slender and richly hairy. In the male the *seminal processes* of the coxæ of the legs of the 2nd pair are elongate and smaller, but somewhat similar processes are present upon the coxæ of the 3rd pair. Base of the distal segment of the *phallopod* swollen, thickly hairy inferiorly (posteriorly), and defined from the distal portion by a deep notch, giving rise to a conical process, the distal portion straight, not bent downwards, with rounded antero-inferior angle and divided into four more or less distinct lamellæ, the two inner with serrate edges, behind the distal of the latter arises a short process tipped with four long bristles.

Length, ♂, from 50–60 millim., width from 6–7.

Hab. MEXICO, Orizaba¹⁻³.

PARARHACHISTES, gen. nov.

Head with deep frontal sulcus, smooth above and hairy below. *Antennæ* long and slender, not incrassate, the 4th and 5th segments serrate, only a little shorter than the 6th, which is subequal to the 2nd and 3rd. *Keels* well developed on all the segments, rising high on the sides, and horizontal or more or less elevated at the anterior end of the body; except at the anterior end not in contact, but separated much as in *Rhachodesmus* and *Strongyloidesmus*; rather longer antero-posteriorly than the median dorsal area of the segments; the lateral margin not noticeably excised, but markedly thickened, especially on the pore-bearing segments, which are of the normal number; a small antero-lateral tooth; the 17th to the 19th keels posteriorly produced, spiniform, but not sharp. *Caudal process* of anal segment triangular, truncated; *anal sternal plate* triangular with rounded apex. *Sterna* wider than long, hairy. *Legs* long, hairy, 6th segment shorter than 3rd and about as long as the 4th and 5th taken together. *Generative orifice* of ♀ very large, with two long, generally protruded vulval sclerites. *Phallopod* of male much like that of *Rhachodesmus*, but with a longish, slender, flagelliform process arising from the base of the distal segment instead of a conical process.

Type, *P. elevatus*.

Distribution. Mexico.

Allied to *Rhachodesmus*, Cook, but at least distinguishable by having the lateral margins of the keels considerably thickened, the thickening carrying the pore, with the edge evenly rounded and nearly straight, at most slightly sinuous and with a minute antero-external tooth.

The two known species of *Pararhachistes* may be distinguished as follows:—

- a. Keels of the anterior four segments strongly elevated and produced backwards far beyond the posterior border of the median area of the segments *elevatus*.
- a'. Keels of the anterior four segments moderately elevated and scarcely produced backwards beyond the posterior border of the median area of the segments . . . *vertebratus*.

1. **Pararhachistes elevatus**, sp. n. (Tab. XIII. figg. 7-7 *d*; XIV. figg. 1-1 *c*.)

Colour (in alcohol) pale olive-green; legs and antennæ yellower. *Body* slender, attenuated posteriorly. *Keels* of 1st, 2nd, 3rd, and 4th segments directed obliquely upwards and backwards almost as much as in *Rhachidomorpha tarasca*; those of the 5th less strongly elevated; the following keels horizontal, except those at the posterior end, which are slightly elevated. Anterior border of 1st *tergal plate* straight, lateral borders of keels also nearly straight and parallel, the anterior angle rectangularly rounded, the posterior portion of the keels produced considerably beyond the posterior border of the median portion. The 2nd, 3rd, 4th, and 5th segments wider measured across the anterior rounded angles of the keels than across the posterior angles; keels of 2nd and 3rd produced considerably backwards, of 4th less so, and of 5th still less. In all the anterior angle is more strongly convex and rounded than the posterior angle, which, however, is always bluntly rounded. The antero-lateral tooth becoming almost obsolete in the posterior half of the body; the anterior edge convex. Keels of the median segments much smaller than those of the anterior, and slightly smaller than those of the 16th and 17th segments. *Dorsal area* smooth; an obsolete transverse sulcus; upper side of keels swollen. *Pores* looking outwards. *Lateral surface* of segments smooth, only slightly wrinkled quite at the anterior end of the body. *Sterna* as wide behind as in front, except on the 15th segment. *Generative orifice* in ♀ with raised margin.

Phallopod in ♂ with moderately large coxal segment and spiniform tracheal rod; 2nd segment with its proximal portion hairy, especially externally, where the hairs form a longish tuft; the distal portion smooth, stout, bent downwards at the apex; hollow below owing to the presence of a large down-bent laminate outgrowth, the tip truncate with an outwardly-directed slender process, and another process directed forwards and downwards. *Fossa of phallopods* transversely elliptical, wider than the sternal area behind it, with evenly elevated margin. Sternal area of 5th, and especially of 6th, wide, hollowed. *Coxal segments* of 1st legs with conical processes directed forwards and downwards in addition to the two long, crossing seminal processes.

Length, ♀, 29 millim., width 3.

„ ♂, 25 „ „ 2.8.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

2. **Pararhachistes vertebratus**, sp. n. (Tab. XIII. figg. 6-6 *e*.)

♀. Closely resembling the preceding in size, colour, and form, but with the *keels* differently and much more normally shaped, those of the first four segments only slightly tilted and much less strongly produced posteriorly; the anterior angles of the others less rounded, more rectangular; the posterior angle also sharper. Margin of *genital orifice* much less elevated.

Length 30 millim., width about 3.

Hab. MEXICO, Amula in Guerrero 6000 feet (*H. H. Smith*).

ACUTANGULUS.

Acutangulus, Attems, Denk. Akad. Wien, lxxvii. p. 409 (1898); Carl, Rev. Suisse Zool. xi. pp. 555, 559 (1903).

Body slender, shaped as in *Strongylosoma*; all the *keels* very small, but with their posterior angle from the 4th backwards produced into a short but sharp spiniform process. Basal segment (coxa) of *phallopods* large, without calcar; second segment with conspicuous seminal fossa opening distally; when at rest the second segment bent at right angles to the basal and projecting forwards parallel to the ventral surface. *Sterna* of 5th and 6th segments in ♂ with a process at the base of each leg.

Type, *A. coccineus*, Humb. & Sauss.

Distribution. Mexico.

The two described species, both unknown to me, may be separated as follows:—

- a.* Length 18 millim. Phallopod slender, curved, swollen at the base, ending in three longish down-bent subequal processes *coccineus.*
a'. Length 14 millim. Phallopod stouter, straighter, ending in three short processes, of which only one is sharply bent downwards *neglectus.*

1. *Acutangulus coccineus.*

Polydesmus (Tropisoma) coccineus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 152 (1869)¹.

Polydesmus (Strongylosoma) coccineus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 50, t. 1. fig. 12 (1872)².

Acutangulus coccineus, Attems, Denk. Akad. Wien, lxvii. p. 409 (1899)³; Carl, Rev. Suisse Zool. xi. p. 560 (1903)⁴.

Colour red, whitish or pink when dried. *Body* smooth or lightly striolated, vermiform, of equal width throughout. *Head* shining, with frontal sulcus little marked. *First tergal plate* bordered, with straight posterior border, laterally pointed and triangular. *Keels* of 2nd and 3rd segments directed a little backwards; the remaining keels small, forming a narrow ledge, their posterior angle lightly prolonged and dentiform, tending to become effaced from about the 12th segment backwards; those of the 19th almost absent. *Pores* just above the lateral edge, near the posterior end of the keels. *Caudal process* of 20th segment triangularly truncated.

♂. A little smaller, but with *keels* better developed. *Phallopod* slender; distal segment lightly arched, expanded at the base, hairy along its lower edge, ending in three subequal, up-turned processes, a proximal slender and pointed (seminal stile) and two distal a little longer and more sickle-shaped.

Length 18 millim., width 2.

Hab. MEXICO, Orizaba (*Sumichrast*¹⁻⁴).

2. *Acutangulus neglectus.*

Polydesmus (Strongylosoma) coccineus, var., Sauss. & Humb. Miss. Sci. Mex., Myr. p. 51 (1872)¹.

Acutangulus neglectus, Carl, Rev. Suisse Zool. xi. p. 560, t. 16. fig. 16 (1903)².

Smaller than the preceding, but similar in form. and principally distinguishable by the structure of the *phallopods*, of which the distal segment is straighter, less swollen at the base, with the seminal fossa less circumscribed, more open distally, and with the three terminal branches much shorter; the seminal stile lies in the same direction as the main branch of the segment; the proximal of the two subsidiary branches is abruptly curved downwards, lamellate and constricted at the base (seen in profile), and the distal is short and somewhat tooth-like.

Length 13-14 millim., width ?

Hab. MEXICO, Orizaba (*Sumichrast*^{1 2}).

This species was based upon some small examples mentioned by Humbert and Saussure, and found by Carl amongst those described by the former authors as *Polydesmus (Strongylosoma) coccineus*.

NEOLEPTODESMUS.

Neoleptodesmus, Carl, Rev. Suisse Zool. xi. p. 557 (1903)¹.

Resembling *Leptodesmus* in form and general characters, but differing in the structure of the phallopods.

Antennæ long and slender. *First tergal plate* as wide as the others, with rounded side-angles and

nearly horizontal keels. *Keels* of segments horizontal, with rounded anterior angle and with posterior angle backwards to the 14th or 15th segment rounded, behind that point angular and lightly produced posteriorly. *Pores* normal in number, the area round them more or less distinctly thickened. *Dorsal area* flattish or vaulted, without transverse groove. *Caudal process* of anal segment conical; *anal sternal plate* triangular, with two small bristle-bearing tubercles. *Sternal areas* wider than long. *Phallopods* without coxal calcar; second segment long and strong, branched distally, bearing on the inner side a wide distally open seminal fossa.

Type, *N. sumichrasti*, Humb. & Sauss.

Distribution. Central America.

This genus, known to me only from figures and description, is nearly allied to *Acutangulus*, and the two may be found to intergrade through such forms as *N. vermiformis* and *N. orizabæ*, in which the structure of the phallopods is unknown.

The four species here referred to *Neoleptodesmus* seem to be separable by the following features:—

- a.* Body attenuated in front, the 1st segment being narrower than the 3rd *vermiformis.*
- a*¹. Body as wide in front as in the middle, the 1st segment as wide as the succeeding ones.
- b.* Pores not borne upon definite button-shaped or tuberculiform excrescences.
- c.* Keels very small and linear, with posterior angles rectangular *orizabæ.*
- c*¹. Keels comparatively large, with the anterior and posterior angles widely rounded; (phallopod nearly straight, its median branch but little expanded apically) *sumichrasti.*
- b*¹. Pores borne upon distinct tuberculiform excrescences; (phallopod arcuate, its median branch much expanded at the distal end) *aztecus.*

1. *Neoleptodesmus aztecus.*

Polydesmus (Leptodesmus) aztecus, Sauss. Linn. Ent. xiii. p. 324 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 301, t. 1. fig. 5 (1860)².

Polydesmus (Oxyurus) aztecus, Sauss. & Humb. Miss. Sci. Mex., Myr. p. 160 (1872)³.

Colour whitish. *Segments* smooth and shining. *Body* cylindrical, slender, and elongate, the keels of the mid-region of the body widely separated on each side. *First tergal plate* as wide as those of the rest of the body, with rounded angles and finely bordered. *Keels* of segments 2 to 4 sloping and directed slightly forwards; the following keels very short, almost as in *Strongylosoma*, rounded, bordered, and ending laterally in small prominences bearing the pores; on the 19th segment the keels are represented by small backwardly-directed tooth-like processes. *Caudal process* of anal segment slightly down-bent apically; *sternal plate* triangular.

♂. *Keels* larger, higher on the sides, and horizontal; the pore-area more markedly tuberculiform. *Phallopods* with distal segment lightly arcuate, the inferior edge convex and hairy, the upper concave and smooth, ending in three processes—a median large, apically laminate and compressed, with sinuously rounded edge, which carries the seminal duct, and a shorter one on each side, the inner of the two narrowed and pointed, with two small teeth above, the outer more bluntly rounded, but with a short angular process above.

Length, ♀, 30 millim., width 5.

„ „ ♂, 45 „ „ ?

Hab. MEXICO³, plateau of Puebla, Peak of Orizaba, and Volcan de Tuxtla^{1 2}.

The above-given characters have been taken from the descriptions published by Saussure and Carl. Saussure refers to a large male example discovered on the Volcan de Orizaba, and the discrepancy in size between the length of the male and female measured suggests that the dimensions of the male were taken from this example. The latter, however, was probably a representative of a species distinct from the females if the measurement is correctly printed.

2. *Neoleptodesmus sumichrasti*.

Polydesmus (Oxyurus) sumichrasti, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 151 (1869)¹;
Miss. Sci. Mex., Myr. p. 49, t. 1. fig. 8 (1872)².

Polydesmus (Oxyurus) intermedius, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 151 (1869)³;
Miss. Sci. Mex., Myr. p. 49, t. 1. fig. 10 (1872)⁴ (ex Carl).

Neoleptodesmus sumichrasti, Carl, Rev. Suisse Zool. xi. p. 558 (1903)⁵.

Colour whitish. Very nearly allied to *N. orizabæ*, but with the dorsal surface flatter. *Keels* tolerably wide, transverse, with rounded angles, the posterior angle not obliquely cut away nor hollowed behind the swelling carrying the pore, the thickening of the margin continued right round the edge, and not exhibiting any button-shaped excrescence such as is seen in *N. aztecus*; keels of 17th and 18th segments with posterior angle prolonged behind; those of the 19th simply spiniform. Keels of the 1st tergal plate very long antero-posteriorly, and rounded marginally. *Caudal process* of anal segment with edges less sinuous than in *N. orizabæ*. *Sides* of anterior segments rugulose, granular at the anterior end of the body. *Phallopods* very like those of *N. aztecus*, but with the distal segment much less arcuate, the median branch lightly concavo-convex, much less dilated than in *N. aztecus*, with the apex truncate and emarginate, the inner of the two subsidiary branches with straight subserrate upper edge, the outer simply pointed and not wide as in *N. aztecus*.

Length 30 millim., width 3.6.

Hab. MEXICO, Orizaba (*Sumichrast* 1-5).

3. *Neoleptodesmus orizabæ*.

Polydesmus (Oxyurus) orizabæ, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 151 (1859)¹;
Miss. Sci. Mex., Myr. p. 48, t. 1. figg. 11, 11 a (1872)².

♀. Closely resembling *N. aztecus*. *Colour* whitish. *Body* smooth, cylindrical, attenuated posteriorly. *Keels* very small and widely separated, arcuate in front and subangular behind; the caudal process of the anal segment with its sides very markedly sinuous.

Length 35 millim., width 8 (? misprint for 3).

Hab. MEXICO, Orizaba 1 2.

The generic position of this species is doubtful, the male characters being unknown. According to Humbert and Saussure the female may be distinguished from that of *N. aztecus* by the sinuous edges of the caudal process, by the posterior extremity of the body being more attenuated, the entire body thinner, the back flatter, the keels narrower, with the anterior segments more regularly vaulted owing to the keels being more sloping.

It may be noted that although these authors state that the body is narrower in this

species than in *N. aztecus*, the width is twice given as 8 millim. This figure is in all probability a misprint for 3, a measurement which, when compared with the length, is quite in accord with the statement as to the slenderness of the body.

4. *Neoleptodesmus vermiformis*.

Polydesmus (Strongylosoma) vermiformis, Sauss. Linn. Ent. xiii. p. 326 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 298, t. 1. fig. 4 (1860)².

Colour white (probably brown when alive). *Body* smooth, shining, cylindrical. *Keels* sloping, situated about the middle of the sides or even lower, very small, linear; area round pores swollen; pores looking laterally and placed in the posterior part of the swollen area. *First tergal plate* (judging by the figure) considerably narrower than the 3rd. The cylindrical portion of the segments not retracted within the keel-bearing portion, hence the keels are widely separated from each other on each side.

Length 40 millim., width about 7.

Hab. MEXICO, Eastern Cordillera^{1 2}.

The sexual characters of this species have not been examined. Its generic position, therefore, is unknown. It may prove to belong to *Acutangulus* or perhaps to *Dirhabdophallus*.

ACERATOPHALLUS.

Aceratophallus, Carl, Rev. Suisse Zool. x. p. 608 (1902); op. cit. xi. p. 554 (1903); Brölemann, Ann. Soc. Ent. France, lxxiv. p. 346 (1905).

Distinguishable from *Leptodesmus* by the structure of the *phallopods*, the basal segment (coxa) of which has no calcar, while the distal segment shows no trace of a division and is extended axially in the same straight line as the basal segment; hollowed and hairy basally on its inner surface, distally it ends in two branches somewhat widely separated from each other. The *seminal processes* of the ♂ are elongate and pointed. The *keels* overlap, are large, subaliform, longer than the area of the metazonite that bears them, both anterior and posterior borders being produced. The *anal sternal plate* is triangular, with the sides nearly straight, the tubercles not widely separated from each other and the margin between them pointed, compressed, and subcristate. The *sternal areas* are wider than long, as wide behind as in front, except on the last two leg-bearing segments, and show no signs of having the posterior border notched or bidentate. The sixth segment of the *leg* is shorter than the third, but much longer than the fifth.

Type, *A. unicolor*, Carl.

Distribution. Central America (Costa Rica).

The two species of this genus here admitted are separable as follows:—

- a.* Principal branch at apex of phallopod (seminal stile) strongly geniculate, with entire button-shaped apex; secondary branch apically pointed *unicolor*.
- a'*. Principal branch at apex of phallopod (seminal stile) evenly and lightly curved, with the tip deeply notched; secondary branch blunt at apex *lumellifer*.

1. *Aceratophallus unicolor*. (Tab. XIV. fig. 2.)

Aceratophallus unicolor, Carl, Rev. Suisse Zool. x. p. 609, t. 2. figg. 35, 36 (1902)¹; Brölemann, Ann. Soc. Ent. Fr. lxxiv. p. 345, t. 8. figg. 6, 7 (1905)².

♀. *Colour* nearly uniformly testaceous (? specimens recently moulted).

Head smooth above. *Antennæ* moderately long, fifth and sixth segments noticeably longer than the second, third, or fourth. *Body* flat, parallel-sided, rapidly attenuated from the 17th segment backwards. *Keels* large, broad and long, overlapping or almost overlapping each other, the anterior border produced forwards and convex, the posterior border straight or lightly concave, a little produced and with a slight basal shoulder; the lateral margins feebly and evenly thickened, those of the pore-bearing segments a little more so than the others; lateral border straight, with an anterior tooth; anterior angle rounded; posterior angle sharp, rectangular on the 4th to the 7th segments and becoming gradually more and more produced; that of the 17th and 18th very acute, subspiniform. The *first tergal plate* as wide as the second, with evenly convex anterior lateral border, with strongly sinuous posterior border and acute angle; anterior border of second and third convex; posterior border lightly concave; posterior angle a little acute on the second, less so on the third. *Dorsal surface* smooth in the middle, granular on the keels; no tubercles and no transverse sulcus. *Caudal process* of anal segment narrowed, with truncate apex; *anal sternal plate* with a median pointed process between the two setiferous tubercles. *Sterna* wider than long; posterior moieties of the last coxiform. *Legs* with third segment longer than the sixth, which is much longer than the fifth; the latter a little longer than the fourth.

Phallopods (according to Carl and Brölemann) comparatively long and strong, ending in two branches, the principal branch or seminal stile geniculate and terminating in a spoon-shaped or button-shaped dilatation; the other branch wide at the base and narrowed to a point apically. The main part of this distal segment excavated on the inner side, the excavation hairy; some long hairs also extend along the convex side of the segment up to the subsidiary branch and some tooth-like tubercles are visible near the base of the latter.

Length, ♂, 30–33 millim., width 5.5 (according to Carl).

„ „ 31 „ „ 4 („ Brölemann).

„ ♀, 37–39 „ „ 5 („ „).

„ „ 33 „ „ 6 (specimen above described).

Hab. COSTA RICA, San José^{1 2}, La Uruca (*Biolley*).

The female above described came from La Uruca and belongs to Mr. Godman's collection. I am unable to separate it from the examples recorded by Carl and Brölemann from San José; but, considering the difference of the locality, the determination must be regarded as doubtful.

2. *Aceratophallus lamellifer*.

Aceratophallus unicolor lamellifer, Brölemann, Ann. Soc. Ent. France, lxxiv. p. 346, t. 8. figg. 1–5 (1905)¹.

Although described as a variety of *A. unicolor*, this form appears to me to be worthy of specific distinction, on account of the marked differences, mentioned above in the analytical key, presented by the phallopods.

Brölemann was unable to detect any certain differences between the females.

Length, ♀, 31–34 millim., width 4.7–4.9.

„ ♂, 33–35 „ „ 4.8–5.

Hab. COSTA RICA, San José (*Biolley*¹).

PAMMICROPHALLUS, gen. nov.

Allied to *Aceratophallus*, but with the *keels* not longer than the metazonites, neither their anterior nor their posterior borders produced; hence the keels do not overlap each other in front and behind. *Anal sternal plate* semioval, with the setiferous tubercles widely separated and the border between them convex. *Phallopods* with coxal segment small, the tracheal rod very long and slender; joint between the coxa and the distal segment suture-like and apparently inflexible; the distal segment at most with

a very short auxiliary branch; fossa of phallopods very small, its width barely one-fourth the diameter of the prozonite, its posterior border remote from the coxæ of the ambulatory legs of the seventh segment.

Type, *P. ornatus*.

Distribution. Mexico.

The two forms here referred to *Pammicrophallus*, together with the single species belonging to the genus described below as *Zeuctodesmus*, exhibit the extreme stage in the degeneration of the phallopods exemplified by the Central-American species placed by Carl in the Rhachodesminæ. The first stage is the suppression of the coxal calcar shown in *Strongylodesmus*, *Rhachis*, and others, in which the phallopod is otherwise round, except for the presence of a pit or excavation on the inner side of the distal segment. The second stage is shown in the typical form of *Aceratophallus*, in which there is no definite pit on the phallopod, the two segments of which are axially in the same straight line, though the phallopods remain normal as to size; the final stage being reached in the two genera here described as new, in which the phallopods, though in some respects like those of *Aceratophallus*, are greatly reduced with respect to size, the socket that lodges them being comparatively diminished both in length and breadth.

The males of the two species referred to the genus *Pammicrophallus* may be readily distinguished as follows:—

- a.* Phallopod slender, ending distally in two slender processes, a longer and a shorter; the margin of the fossa raised in front as well as behind *ornatus*.
a'. Phallopod laterally bicarinate and expanded, its apex compressed and ending in a simple point; the margin of the fossa only raised behind *pictus*.

1. *Pammicrophallus ornatus*, sp. n. (Tab. XIV. figg. 3–3 *i.*)

♀. *Colour* (in alcohol) of fresh specimens variegated*, a median dorsal yellow spot usually visible, the keels yellow, sometimes clouded in front, between the keels and the pale spot dark brownish or bluish; head and antennæ generally darker than the legs.

Head smooth, with frontal sulcus. *Antennæ* short and hairy, moderately long, scarcely incrassate; second, third, and sixth segments subequal and a little longer than the fourth and fifth. *Body* moderately robust and wide, smooth and polished above. *Keels* well developed, but, except on the anterior segments, not overlapping; almost horizontal, slightly uptilted posteriorly; 1st tergal plate as wide as the 2nd, evenly convex above, its keels being depressed with widely rounded anterior and nearly rectangular posterior border; posterior angles of keels of 2nd and 3rd rounded, of 4th very slightly produced; from the 5th to the 19th gradually more and more produced, but blunt, not sharp, the posterior border lightly concave; anterior border nearly straight, inclined gradually more and more backwards towards the posterior end, but the backward inclination never strongly marked, the anterior angle always well emphasised, rather larger than the angle of a square, with a small external tooth which is present on all the keels from the 2nd backwards; margins of keels slightly thickened, but comparatively markedly so on the area around the pores. *Anal tergal plate* triangular, but apically truncate; *anal sternal plate* triangular, but with apex rounded. *Sternal plates* a little narrower behind than in front, their posterior border concave, transversely sulcate laterally. *Lateral surface* of segments nearly smooth; no distinct crest even on the anterior segments, above the base of the legs. *Legs* slender, in the mid-region of the body

* When dried or after many years' immersion the pattern fades away entirely or almost so.

the first segment less than half the length of the second, the latter about half the length of the third (femur), the sixth (tarsus) shorter than the third, but longer than the fourth and fifth taken together. *Generative orifice* moderately large with rim a little raised.

- ♂. Shorter than the ♀, but with the *keels* better developed and the *legs* thicker, the sterna and basal segments of the legs more hairy; tarsi of legs of anterior segments somewhat thickly padded below with short hairs. Coxæ of the third pair with a forwardly directed tuberculiform tooth. *Phallopods* very short, slender, and retracted within the fossa, attenuated and slightly hooked apically; posteriorly a little above the apex there arises a small tooth-like process which is sometimes represented by two smaller teeth. Orifice of fossa small, irregularly elliptical transversely; with the anterior and posterior margins considerably raised, well separated from the sternal plate, bearing the ambulatory legs of the seventh segment.

Length, ♀, about 25 millim., width about 4.2.

„ ♂, „ 18 „ „ „ 4.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

2. *Pammicrophallus pictus*, sp. n. (Tab. XIV. figg. 4-4 b.)

Resembling the preceding in *colour*, but with the antennæ darker. Closely allied to the preceding also in structure, but with the *keels* better developed and the margin less thickened, this difference being especially noticeable on those that bear pores.

- ♂. In general features resembling that of *A. ornatus*, but with the edge of the cavity of the phallopods strongly elevated behind, not elevated in front; the distal segment of the *phallopods* very wide, owing to the presence of a laminate crest on each side, the apex turned outwards and forwards, strongly compressed and ending in a point. No distinct processes on the coxæ of the third leg.

Length, ♀, about 23.5 millim., width about 4.5.

„ ♂, „ 22 „ „ „ 4.

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

ZEUCTODESMUS, gen. nov.

Antennæ long, scarcely incrassate, second, third, and sixth segments subequal, fourth and fifth only a little shorter. *Body* broad, somewhat resembling superficially that of the stout species of *Fontaria* or somewhat *Cryptodesmus*-like. *Keels* large and depressed, overlapping, and, except just at the posterior end, inclined slightly forwards, with the anterior border convex, the anterior angle widely rounded, the posterior border lightly concave and the posterior angle acute, becoming gradually smaller and more and more acute and spiniform from about the 16th to the 19th; lateral edges of the keels thin but slightly margined, the margin thickened a little round the pores, which are normal in number and close to the edge and only a little way in front of the posterior angle; the thickened margin continued round the anterior edge of the keels. The posterior borders of the terga from the summit to the tips of the keels sinuous. *Sternal areas* moderately wide and long, markedly narrower behind than in front, the posterior border of each from the 5th to the 19th with a deep mesial notch, giving rise to a pair of stout, blunt, posteriorly directed subspiniform processes; a somewhat similar but much smaller and less conspicuous process at the base of the anterior pair; antero-posteriorly the two larger posterior processes become gradually larger and are approximated quite at the hinder end. *Anal sternal plate* wide, with convex, scarcely angular border and with the two setiferous tubercles a little removed from the edge. *Anal tergal plate* gradually narrowed, with truncate apex. *Legs* moderately long, the third segment longer than the sixth, which only exceeds by a little the fifth.

♀. *Generative orifice* of average size, with raised margin.

- ♂. *Phallopods* minute, vertical, bisegmented, the basal segment (coxa) small, without spur and without seminal fossa; the distal segment apparently united to the coxa by an immovable joint and incapable of being flexed at right angles to it, terminating distally in two diverging branches, the subsidiary not

forming a sheath for the principal branch or seminal stile; tracheal rods very long, slender, and cylindrical. Socket or cavity of phallopods small, irregularly, transversely elliptical.

Type, *Z. cæruleus*.

Distribution. Mexico.

In the shape of the anal sternal plate, the small size and structure of its phallopods, and in the small size of the cavity into which they are partially at all events retractile, this new genus shows marked resemblance to the two species described above as *Pammicrophallus ornatus* and *P. pictus*. Generic differences between them subsist, however, in the large size of the keels, which are depressed and overlap throughout the length of the body, in the deeply angular and bitubercular posterior margins of the sternal areas, and in the comparative shortness of the sixth segment and the greater length of the fourth and fifth segments of the legs.

1. ***Zeuctodesmus cæruleus***, sp. n. (Tab. XIV. figg. 5–5j.)

Colour (in alcohol) a paler or darker Prussian-blue, with a yellow patch upon the upper side of the keels; head and antennæ blackish; labrum, legs, and sterna ferruginous, the legs sometimes greenish.

Head smooth. *Antennæ* shortly hairy. *Dorsal surface* smooth; lateral surface of segments granular. *Sterna* and *legs* thickly hairy. *Phallopods* with distal segment subcylindrical, terminating in two diverging branches, an outer and an inner—the inner longer and stouter, directed obliquely forwards; the outer thinner, more pointed, and projecting downwards; the segment somewhat sharply angled at the base of these two processes in front.

Length, ♀, 27 millim., width 7.5.

„ ♂, 25 „ „ 7.

Hab. MEXICO, Amula in Guerrero 6000 feet (*H. H. Smith*).

Subfam. *XYSTODESMINÆ*.

Xystodesmidæ, Cook, Ann. N. York Acad. Sci. ix. p. 5 (1895).

The only character known to me by which the genera referred by Cook to the family Xystodesmidæ can be distinguished from the genera constituting the Chelodesmidæ of that author is the presence of a spine projecting from the distal end of the second segment of the legs. It appears to me that no more than subfamily rank should be accorded to this character.

The Central-American genera have characteristically formed biramous *phallopods*. The principal or seminal branch lies in the same line as the long axis of the proximal portion of the femoro-tibial segment and is much longer than the auxiliary or accessory branch. It is generally more or less curved, is hairy in its proximal and smooth in its distal half, a longer sensory seta marking the origin of the smooth portion on the inner side. The auxiliary branch rises not far from the base of the main portion of the segment on its upper side and is directed forwards, or forwards and upwards. It varies in length and is not uncommonly spiniform. On the inner aspect of the proximal portion of the segment there is a deep groove, overhung below by bristles, which traverses the segment up to the concavity formed by the point of origin of the two branches. In the posterior or proximal end of this groove the distal extremity of the coxal calcar lies. The groove is the same as that found in the Rhachodesminæ, in which, however, the coxal calcar is absent.

The phallopod forcibly recalls that of some of the species of *Sphæriodesmus* and suggests kinship between the genera.

The name Xystodesminæ is derived from *Xystodesmus*, a generic term proposed by Cook for the Japanese species described by Peters as *Fontaria martensii*.

The two Central-American genera of the group may be readily distinguished as follows:—

- a.* Pores present only upon the fifth segment; the two branches of the phallopod enormously long as compared with the palmar * portion, which is only about half the length of the auxiliary branch STENODESMUS.
- a*¹. Pores normal in number; the two branches of the phallopod shorter, the auxiliary branch usually much shorter, never longer than the palmar portion of the segment RHYSODESMUS.

STENODESMUS.

Stenodesmus, Saussure, Linn. Ent. xiii. p. 327 (1859); Mém. Soc. Phys. Genève, xv. p. 539 (1860); and of subsequent authors.

Related to *Rhysodesmus* apparently in all essential features, even in the form of the phallopod, but with the pores absent from all the segments, with the exception of the fifth. According to Carl, the terminal segment of the phallopod has a single superior auxiliary branch, which is long and slender and projects parallel with the main or seminal branch, but falls considerably short of its apex; it rises close to its base. The main or seminal branch is long, lightly curved, and hooked at the tip.

Distribution. Mexico.

1. *Stenodesmus mexicanus*.

Stenodesmus mexicanus, Sauss. Linn. Ent. xiii. p. 327 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 539, t. 3. fig. 21 (1860)²; Carl, Rev. Suisse Zool. xi. p. 561, fig. 20 (1903)³.

Colour maroon-brown, with the edges of the keels, the legs, and the underside yellowish.

Head with frontal sulcus well marked. *First tergal plate* with its anterior border slightly elevated and defined by a shallow groove. *Dorsal surface* convex, the keels following approximately the slope of the median portion; sculpturing very distinct, consisting of longitudinal striæ and scattered granules, the latter disappearing upon the keels. *Keels* of segments 2 to 4 with their posterior border directed obliquely forwards; their posterior angles not spiniform; those from the 6th backwards with their posterior border emarginate and posterior angle spiniform, the spiniform process much in evidence on segments 8 to 13 and becoming gradually less marked on segments 14 to 18, rounded on segment 19; the anterior border on the 8th and following segments directed obliquely backwards; the anterior angle rounded; lateral border with linear thickening and very finely denticulated. *Caudal process* conical; *anal sternal plate* rounded, with median tubercle as well as the normal setiferous tubercles.

♂ rather smaller than the ♀, with the sculpturing coarser, the dorsal surface less convex, and the posterior tooth of the keels less acute and produced.

Length, ♀, 65 millim., width 12.

„ ♂, 40 „ „ 10.

Hab. MEXICO, Cordova¹⁻³.

* I have used the term “palmar portion” in this key and the key of species of *Rhysodesmus* for the proximal grooved portion of the distal segment of the phallopod, the length of this area being judged from the inner aspect of the segment.

RHYSODESMUS.

Fontaria, Humbert & Saussure, and of subsequent authors ; nec *Fontaria*, Gray, *sensu stricto*.
Rhysodesmus, Cook, Ann. N. York Acad. Sci. ix. p. 5 (1895).

Characters as above.

Type, *Fontaria limax*, Sauss.

Distribution. North and Central America ; ? China and Japan.

Setting aside the species here described for the first time, all those referred in the following pages to the genus *Rhysodesmus* were assigned by their describers to *Fontaria*. But this genus, as understood by Saussure and Humbert, Wood, Bollman, and others, has of late years been split up into the following genera or subgenera :—

Fontaria, Gray, in Griffith's Animal Kingdom, Insecta, 2, xv. p. 787, t. 135. fig. 1 (1832). Type, *virginiensis*, Drury, as interpreted by Gray.

Rhysodesmus, Cook, Ann. N. York Acad. Sci. ix. p. 5 (1895). Type, *Fontaria limax*, Sauss.

Pachydesmus, Cook, Ann. N. York Acad. Sci. ix. p. 5 (1895). Type, *Fontaria crassicutis*, Wood.

Eurymerodesmus, Brölemann, Mém. Soc. Zool. France, xiii. p. 101 (1900). Type, *Fontaria hispidipes*, Wood.

The type of the genus *Fontaria* is the species represented by the specimens in the British Museum identified by Gray with *Polydesmus virginiensis*, Drury (Ins. Exot. i. t. 43. fig. 8, 1770 ; Westwood's ed. i. p. 96, t. 43. fig. 8, 1837). These specimens differ from all the Central-American examples previously referred to *Fontaria* in having the distal segments of the phallopod strongly arcuate, curved through three-fourths of a circle, with the convexity inferior (or posterior), hairy all along its inner edge, with the apex strongly expanded and without an auxiliary branch ; the basal segment rises up into a high shelf-like projection behind the base of the distal segment. Moreover, the first segment of the legs, as well as the second, is spined ; and the sterna from the tenth backwards are spined, the spines becoming progressively stronger in the posterior half of the body. As specific characters may be mentioned the coarsely coriaceous sculpturing of the dorsal surface and the equality in length between the ultimate and penultimate segments of the legs.

Rhysodesmus has been characterized above. The phallopod has a longer or shorter, slender auxiliary branch rising from its upper (anterior) side, the principal branch being smooth and slender distally with a slightly bifid tip ; the basal segment of the legs is unspined.

Pachydesmus is essentially characterized by the structure of the phallopods, which have two auxiliary branches—one moderately short, curved, and pointed, the other long, as long as the main (or seminal) branch, and apically bifid. The type of the genus is *Fontaria crassicutis*, Wood (Proc. Acad. Nat. Sci. Philad. 1864, p. 7 ;

Tr. Amer. Phil. Soc. xii. p. 224, fig. 55, 1865; also Brölemann, Mém. Soc. Zool. Fr. xiii. p. 101, t. 7. figg. 28, 29, 1900), from the Mississippi. To this genus also belongs apparently the species described by Attems as *Fontaria laticollis*, from Illinois (Denk. Akad. Wien, lxxviii. p. 258, t. 13. fig. 312, 1900).

Another name that has been introduced, viz. *Eurymerodesmus*, was proposed by Brölemann for a subgenus of *Fontaria*; the type being the species he identified as *Fontaria hispidipes*, Wood (see Brölemann, Ann. Soc. Ent. Fr. lxxv. p. 67, and Mém. Soc. Zool. Fr. xiii. p. 101, t. 6. fig. 32, 1900). This species is very nearly allied to the type of *Fontaria* in the structure of its phallopods, but these organs have the coxæ unraised and the distal segments only lightly arcuate. Moreover, the first segment of the legs is unspined. The type of *Eurymerodesmus* is the species represented by the specimens regarded by Brölemann as *F. hispidipes*, which may or may not be specifically identical with Wood's examples.

In addition to the above-mentioned groups, one more genus, *Xystodesmus*, has been proposed by Cook for the Japanese species described by Peters as *Fontaria martensii*. This genus, however, does not here concern us; nor do other genera which will probably be erected when a comprehensive survey is made of all the species referred to *Fontaria* that have been described from the Chinese area and North America. It will suffice here to tabulate the characters of the four North and Central American genera above enumerated, in the event of one or more of them being discovered hereafter in Central America in addition to *Rhysodesmus*:—

- a. Phallopod without auxiliary branch; hairy to the apex.
- b. Phallopod strongly arcuate, its coxal segment forming a shelf-like lamina; legs with first segment spined [FONTARIA.]
- b¹. Phallopod lightly arcuate; first segment of legs unspined [EURYMERODESMUS.]
- a¹. Phallopod with one or two auxiliary branches; smooth distally.
- c. Phallopod with two auxiliary branches—one short, pointed, and curved, the other straight, as long as the main (seminal) branch, and bifid apically [PACHYDESMUS.]
- c¹. Phallopod with a single slender auxiliary branch rising on its upper (anterior) surface RHYSODESMUS.

The genus *Rhysodesmus* is the dominant Polydesmoid of Central America. Some species closely resemble superficially representatives of the genera akin to *Leptodesmus*, but there is very considerable variation in size and shape, owing to specific differences in the width and shape of the keels and the degree to which they overlap each other in front and behind. As a very general rule in the genus, the keels approximately follow the slope of the back, and when the segments are normally contracted overlap each other so that they form a continuous shelf-like projection, with uninterrupted edge, all along the body. These forms present a stout, compact, and slug-like

appearance, which suggested to Saussure the name "*limax*" for the typical species of the genus. Yet, despite the variation in these and other respects, the general type of phallopod remains constant in all the Central-American representatives; and the spine on the apex of the second segment of the leg is never wanting, though variable in size.

With the material at my disposal I have found it impossible to write a monograph of the members of this genus. This could only have been done if specimens of all the described species had been available for examination. The species themselves are not difficult to distinguish, as a rule, by eye, but the differences between them are in many cases extremely difficult to express intelligibly in writing; and I have found it practically impossible to enumerate succinctly the distinguishing features of both sexes of the species in a dichotomous analytical key.

The majority of those described by Saussure and Humbert I have been compelled to omit from the table, because many of the characters I have found useful for identification purposes are not mentioned in the descriptions published by those authors. Notably have they omitted in nearly all cases to describe the structure of the phallopods.

It is unfortunate that many species have been based upon specimens of a uniformly pallid hue, which had either been decolorised by drying or by the action of alcohol, or, having recently moulted, had not acquired their natural tints. For it does not seem likely that any of the species are normally testaceous when adult in a state of nature. The possibility of this being so, however, must be borne in mind. However that may be, when a number of species are mixed together it is generally not difficult to sort them out by colour alone; and if the colours had in all cases been known, the characters they present would have been of the greatest use in drawing up a table of distinguishing specific features. As a slight aid to the determination of the species I have endeavoured to draw up a supplementary table based upon the pattern where this has been preserved and has been recorded:—

- a.* Small, length about 20 mm.; keels with anterior border strongly raised, the area behind it depressed; lateral border of keels from about the 5th to the 15th wider anteriorly than posteriorly, so that the lateral border is inclined obliquely inwards and backwards; posterior border thick, a little uptilted and deeply notched at base; phallopod with main branch about as long as palmar area, somewhat sharply incurved distally; auxiliary branch very short, almost spiniform *pusillus.*
- a'*. Larger, length not less than about 27 mm.; keels not noticeably depressed behind the anterior border, which is not markedly raised as compared with the lateral border; lateral border not inclined obliquely inwards and backwards, the anterior angle of the keel not projecting more prominently than the posterior angle.

- b.* Sterna from 5th to 17th segments posteriorly markedly bidentate; pores far forwards; body robust; keels depressed, their posterior angles produced; prozonites pale, metazonites dark; interzonal groove as under section *b*¹ *tabascensis.*
- b*¹. Sterna not remarkably bidentate, the posterior border straight, lightly convex or lightly concave.
- c.* Ridge on anterior border of keels continued across the dorsum as a crest, forming the anterior rim of the interzonal groove, this groove being thus separated from the corresponding groove on the lateral surface of the segments; lateral portion of first tergal plate narrow and acuminate, dorsal surface granular, at least on the keels; body very or moderately broad; keels depressed with produced posterior angles; sterna wide anteriorly; pores anterior; prozonites pale; metazonites dark.
- d.* Body broad, about 12 mm. when the length is 47 mm.; posterior angle of keels very slightly produced; anal sternal plate almost semi-circular, with the setiferous tubercles widely separated; phallopod with principal branch slightly shorter than palmar portion of the segment, inclined inwards distally and upcurled at the point; auxiliary branch long, curved, somewhat blade-like, directed obliquely upwards basally and about half as long as the palmar portion *stolli.*
- d*¹. Narrower, about 9 mm. with a length of 44 mm.; posterior angle of keels more markedly produced; anal sternal plate triangular, the setiferous tubercles more narrowly spaced *championi.*
- c*¹. Ridge on anterior border of keels not continued across the dorsum and separated from the anterior border of the groove between the prozonite and metazonite which is continued entirely round the segment; lateral portion of first tergal plate broader, not markedly acuminate; upper surface of keels rarely closely granular, though often with scattered granules or small tubercles arranged in three rows; when closely granular or coriaceous, the posterior angle is convex (*e. g.* in *R. totanacus*).
- e.* Body nearly flat; keels high, wide, nearly horizontal; form not compact, but "*Leptodesmus*"-like; keels of second segment wider than median dorsal area of metazonite; anterior border of keels extended well beyond the convexity of the ridge when this is marked; antennæ and legs long, tarsi long and slender; sterna not wider in front than behind; prozonites and metazonites uniformly brown; keels yellow.
- f.* Larger, length about 48 mm.; anterior crest of keels with marked convex curve near base; phallopod with its principal branch a little longer than the palmar portion, its distal smooth extremity very broad at base, abruptly narrowed and curved inwards, then forwards and a little outwards, the extremity is thus hook-like and externally geniculate, but the apex is not upcurled; the auxiliary branch very long, a little shorter than the palmar portion and directed forwards nearly parallel with the main branch *godmani.*

- f*¹. Smaller, length about 33 mm.; anterior crest of keels almost straight; phallopod short, with its principal branch barely as long as the palmar portion, its distal portion gradually incurved and a little upcurled apically; auxiliary branch quite short and directed obliquely upwards. *salvini*.
- e*¹. Body more convex and compact, the keels being narrowed, more sloped and less widely extended, the anterior border never widely extended beyond the convex curve of the anterior crest; legs and antennæ shorter.
- g*. Posterior border of most of the keels very strongly convex at the base and inclining forwards and outwards at least from the 5th to the 10th segments, with the posterior angle obtuse; sterna strongly emarginate, wider in front than behind; phallopod with hairy portion of distal segment conical when viewed from below; the principal branch longer than the palmar portion, slightly sinuous both from the inferior and lateral aspects, a little upcurled apically; auxiliary branch half the length of the palmar portion, slender and directed nearly straight forwards *totanacus*.
- g*¹. Posterior border of keels nearly straight or convex throughout or at the base, but at most only a little inclined forwards, and then the posterior angle is directed slightly backwards and is not obtuse; sterna rarely markedly emarginate.
- h*. Distal segment of phallopod long, attenuated; the principal branch about as long as the palmar portion, but straight and not incurved at the extremity, although upcurled at the tip; auxiliary branch short, with slight upward inclination, about one-third the length of the palmar portion, its apex falling considerably short of the commencement of the smooth terminal portion of the principal branch; prozonites pale, metazonites brown; body compact, stout; keels sloping, with anterior ridge straight, posterior border lightly sinuous and the angle slightly produced; sterna not emarginate *attemsi*.
- h*¹. Principal branch of phallopod either abruptly or gradually incurved, arcuate or sinuous; auxiliary branch longer, its apex in no case much behind the point where on the principal branch the hairs cease and the smooth part begins; anterior crest on keels sinuous, the curvature often sigmoid; prozonites brown, at least posteriorly, and the same colour as the adjacent area of the metazonites, the latter being usually brown in front, sometimes brown all over (? in *R. montezumæ*).
- i*. Keels quite small, low, and sloping, with the posterior border strongly convex and defined by a pronounced basal notch; posterior angle obtuse, rounded, not pointed even on the 18th segment; lateral edge strongly thickened, with the pore lying far back; phallopod with the principal branch turned inwards, then forwards, sinuous in profile, and upturned apically, a little

- longer than the palmar aspect of the segment; auxiliary branch about half its length and rising obliquely upwards, then forwards *montezumæ*.
- i*¹. Keels with the posterior border lightly convex and the posterior angle squared or even a little produced, the angles rarely rounded and blunt (*smithi*, ♀), and then the posterior border is nearly straight with very shallow basal notch.
- k*. Principal branch of phallopod viewed from the side showing scarcely any upward curvature, when viewed from below the smooth portion is seen to bend somewhat abruptly inwards and then forwards; principal branch about as long as the palmar portion; auxiliary branch about half as long as the palmar portion, directed slightly upwards, then curved downwards and forwards, inter-ramal space semioval; generally conspicuously banded yellow and brown, posterior half of metazonite yellow: female robust; male moderately slender; posterior border of keels slightly convex, posterior angle squared or a little produced on median segments *inustus*.
- k*¹. Principal branch of phallopod when viewed from the side showing apical upward curvature, when viewed from below the inward bend not abrupt or subgeniculate, but evenly convex or obtusely angular.
- l*. When viewed from within the palmar portion of the distal segment of the phallopod is seen to be much longer than the auxiliary branch and only a little, if at all, shorter than the entire main branch, which is more abruptly incurved.
- m*. Principal branch strongly arcuate seen from the side; auxiliary branch very thin, about one-third the length of the palmar portion, which, if anything, exceeds the length of the main branch; colour as in *R. inustus*, but form more robust *flavocinctus*.
- m*¹. Principal branch lightly arcuate when seen from the side, and a little longer than the palmar portion; auxiliary branch stouter; proportions as in *R. inustus*, but the yellow on the posterior portion of the metazonites mostly restricted to a median patch *notostictus*.
- l*¹. When viewed from within the palmar area of the phallopod is seen to be short, much shorter, indeed, than the main branch and not much, if at all, longer than the auxiliary branch, the principal branch more evenly curved.
- n*. Auxiliary branch broad, blade-like, somewhat suddenly narrowed at the apex; principal branch long, evenly attenuated and curved; size larger, ♀ when contracted about 40 mm. in length; keels larger, anterior crest

- with its bend nearer to the base than to the obtusely convex anterior angle of the keel; lateral edge straighter, posterior angle squarer and sharper; posterior border more sinuous and more convex at the base; metazonites brown throughout, not or scarcely yellow posteriorly *arcuatus*.
- n*¹. Auxiliary branch narrow, gradually attenuated, principal branch more sinuous; smaller, contracted ♀ about 32 mm. in length; keels smaller; anterior crest straighter, its bend continuous with and close to the rounded anterior angle; lateral edge more convex, posterior angles blunter, posterior border less sinuous, less markedly convex internally at base; colour doubtful *smithi*.

In the following table an attempt has been made to separate and affiliate the species by colour. In the case of the species which I have had no opportunity of examining, the information as to their pattern has been taken from authors' descriptions.

The following species based upon pallid individuals have been excluded:—*simillimus*, *zapotecus*, *otomitus*, *consobrinus*, and *vicinus*.

- a*. Longitudinally banded; dorsal area yellow or reddish, with a longitudinal band on each side formed by a dark brown or blackish patch on each side of the metazonite of each segment and continuous with the corresponding patch before and behind; prozonites mostly pale above.
- b*. Prozonites with a narrow median dark longitudinal streak *acolhuus*.
- b*¹. Prozonites without a median streak *mystecus*.
- a*¹. Not longitudinally banded, when there is a lateral dark patch upon the metazonite it is restricted to its anterior part.
- b*. Transversely banded, with the posterior area of the metazonites blackish and the anterior area pale; the prozonites also pale; first tergal plate black; antennæ also blackish *zendalus*, ? also *smithi*.
- b*¹. Otherwise coloured; metazonites either pale with dark anterior streak and large dark spot on each side, or uniformly brown above or brown with pale narrow anterior and posterior rim; when distinctly transversely banded the posterior area is yellowish and the anterior area dark brown, the brown apparently invading, at least in most cases, the posterior area of the prozonite; at least the keels of the first tergal plate yellow.
- c*. Brown of the median area of the metazonites forming a distinct longitudinal band not much wider than the yellow of the keels and not encroaching upon them anteriorly; prozonites apparently pale; a median dark patch on the first tergal plate; antennæ pale *tapanecus*.
- c*¹. Brown area of metazonites, when present, broader, generally very much broader than the yellow of the keels and encroaching more or less upon their anterior portions; when, as in *R. godmani*, the yellow of the keels

is more in evidence the prozonites are posteriorly brown and almost as dark as the metazonites.

- d.* Metazonites pale, with a narrow dark transverse anterior streak expanding laterally into a conspicuous dark spot close to the anterior base of the keel; prozonites pale; first tergal plate with dark patch almost divided; head and antennæ dark *totanacus*.
- d*¹. When the pattern approaches that of *R. totanacus* the prozonites at least are brown.
- e.* Prozonites pale and sharply contrasted with the dark hue of the metazonites *attemsi, tabascensis, ? limax, ? stolli, ? championi*.
- e*¹. Prozonites dark and gradually shading into the dark hue of the metazonites.
- f.* Distinctly transversely banded, the posterior portion of the metazonites yellow from keel to keel, the dark patch on the first tergal plate bounded behind by yellow; anterior area of metazonites with a thickish transverse brown stripe expanding close to the base of the keel into a larger patch. *inustus, flavocinctus, nahuus*.
- f*¹. Not distinctly banded transversely, the metazonites either uniformly brown or a little paler behind, sometimes with a pale median patch, which, however, does not reach the yellow of the keels; dark patch on first tergal plate continued to its posterior border or only indistinctly and partially separated therefrom . . . *salvini, godmani, arcuatus, notostictus, ? toltecus, ? montezumæ, ? fraternus, ? violaceus, ? angelus*.

1. *Rhysodesmus montezumæ*. (Tab. XIV. figg. 6, 6 *a*; XV. fig. 8.)

Polydesmus (Fontaria) montezumæ, Sauss. Linn. Ent. xiii. p. 321 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 308, t. 2. fig. 9 (1860)².

Nec *Fontaria montezumæ*, Attems, Denk. Akad. Wien, lxxviii. p. 258 (1900)³.

Colour (in alcohol) a tolerably uniform pale olive-green, with the antennæ and the distal segments of the legs ochre-yellow.

Body slender and *Leptodesmus*-like, with keels small, not overlapping.

Head with frontal sulcus; *antenna* short; width of head equal to length of segments 1 to 5. *First tergal plate* with anterior border evenly convex; lateral angle rounded; posterior border laterally inclined forwards; keels of 2nd and 3rd with posterior border also directed obliquely forwards, with the posterior angle obtuse, and the anterior angle widely rounded. *Dorsal area* nearly smooth, only finely sculptured; the sulcus lineolate; three indistinct rows of granules. *Keels* small, markedly wider posteriorly than anteriorly; the anterior border very short, passing abruptly into the lateral border, the angle being very obtuse and rounded; the lateral margin considerably thickened; the posterior border produced, convex, separated by a distinct notch from the posterior border of the median portion; posterior angle rounded, never spiniform, surpassing the posterior border of the median portion only on segments 16 to 19. The keels even in the male rising low on the sides, but in this sex not following the slope of the back. *Pores* on the posterior half of the lateral surface, near its middle on the 5th keel, which has its posterior border inclined forwards slightly. *Caudal process* triangular, truncated; *anal sternal plate* subtriangular, an anguliform process between the setiferous tubercles. *Sternal areas* laterally notched; posterior border lightly emarginate; indistinctly longitudinally sulcate. *Legs* only moderately long, thickish, spine strong, terminal segment about twice as long as the penultimate. *Phallopods* when viewed from below with distinct sinuous curve distally, the points projecting straight forwards, not

crossing; when viewed from the side the principal (seminal) branch shows a slight upward curvature, separated from the auxiliary branch by a wide suboval space, the branch short, slender, inclined obliquely upwards, then forwards.

Length of ♂ 36 millim., width 7.5; length of antenna 6.5 millim.

Hab. MEXICO, temperate regions of the plateau at localities ranging from 1000 to 8000 feet in altitude—Mirador, Cordova, and the plateau of Anahuac round Puebla and Chalchicomula (*Saussure*^{1 2}), Peak of Orizaba (*Mus. Brit.*).

The specimen above described as *R. montezumæ* is one from the Volcan de Orizaba in the British Museum. Apart from its decolorization, it agrees very well with Saussure's figures and description of that species.

According to him, the normal colour is chocolate-brown, with the anterior border of the first tergal plate and at least the angle of the keels of the rest, and sometimes the posterior border of the median area of the segments, red or yellow; the lower side of the body is also yellowish or reddish, like the two dorsal segments of the legs. In size Saussure's specimens varied from 37 to 42 millim. in length and from 8 to 9 in width.

The specimen ticketed "North America" (Senckenberg Museum), and described by Attems as *Fontaria montezumæ*, differs from all the Central-American species of the genus *Rhysodesmus* that I have seen in having a small spine upon the basal segment of the legs. What this species may be I do not know; but it is certainly different in the character mentioned from the example I have identified as *R. montezumæ*. In all probability it did not come from Central America.

2. *Rhysodesmus totanacus*. (Tab. XIV. figg. 8, 8 a.)

Polydesmus (*Fontaria*) *totanacus*, Sauss. Linn. Ent. xiii. p. 321 (♂) (1859)¹; Mém. Soc. Phys. Genève, xv. p. 322, t. 2. fig. 14 (1860)².

♂. *Colour* (in alcohol) greyish-olive above, the keels a little paler, a large dark spot close to the base of each keel in front, the two connected by a dark stripe running transversely along the groove between the zonites; a corresponding recurved mark upon the first tergal plate; prozonites dorsally pale, laterally darker; head and antennæ brown, the antennæ distally infusate; sterna and legs pale. *Antennæ* about as long as the width of the first tergal plate, shorter than that of the second and succeeding segments back to the 17th; segments 2 to 5 equal to width of head. *First tergal plate* narrower than 2nd; its anterior border not quite evenly convex; its lateral third on each side obliquely cut away, the lateral angle subacute, posterior angle of 2nd and 3rd rounded; metazonite of 2nd not markedly shorter than the keel. *Keels* of 2nd, 3rd, and 4th lightly depressed, of the following segments becoming gradually more and more horizontal, though upraised posteriorly; those of the 18th the most nearly horizontal of the series. *Dorsal surface* convex, very lightly coriaceous, becoming more coarsely so towards the base of the keels, which are wrinkled above and subgranular; the groove well marked and striate, not continuous with the groove defining the anterior edge of the keels; this edge convex, the groove markedly sinuous, with the forward curvature some distance from the angle which is convex; the lateral margin of the keel nearly evenly thickened throughout its length; the *pores* situated well forwards—in front of the middle of the metazonites on the anterior and middle segments, in a line with the posterior border on the 18th; posterior angle of keels not produced; from the 4th to about the 9th obtuse, from the 11th to the 16th subrectangular, from the 17th to the 19th produced but rounded, those of the 19th well developed and projecting well beyond those of the 18th; posterior border of the keels markedly convex, strongly so close to the metazonite, and from the 4th to the 10th

directed obliquely forwards; from the 11th to the 16th becoming gradually more in line with the posterior border of the segments, and from the 17th directed obliquely backwards. *Anal sternal plate* triangular. *Sternal areas* wider in front than behind; rather deeply notched and sulcate laterally; not flat in front; posteriorly emarginate, almost bitubercular. *Legs* with spine strong; terminal segment moderately long, but barely twice as long as the penultimate. *Phallopod* with its smooth terminal portion inclined slightly inwards when viewed from below; lightly sinuous from its lateral aspect, with the tip turned upwards; the auxiliary branch directed obliquely forwards and upwards.

Length of ♂ about 40 millim., width 9; length of antennæ 7 millim.

Hab. MEXICO, the plateau of Anahuac and the mountains rising from the plateau (*Saussure*^{1 2}), Peak of Orizaba (*Mus. Brit.*).

I do not think there is any reason to doubt the correctness of my identification of the specimen in the British Museum which I have described as *R. totanacus*. It agrees very closely with Saussure's description and figure of that species, the colour especially being exactly the same.

3. *Rhysodesmus pusillus*, sp. n. (Tab. XIV. figg. 7, 7a; XV. fig. 9.)

♂. *Colour* (in specimen available) uniformly brown or testaceous. *First tergal plate* with anterior border nearly straight, transverse in the middle; at the sides obliquely cut away, not forming a continuous curve; posterior border laterally oblique, meeting the anterior in a blunt acute angle. *Dorsal surface* smooth, with a few granules laterally, convex. *Keels* rising about the middle of the side, depressed, with their anterior and lateral margins somewhat strongly raised, especially round the anterior angle, which is strongly rounded and salient (rather more prominent, that is to say, than the posterior angle), so that the lateral border is inclined slightly inwards from before backwards; the ridge defining the anterior border without any abrupt forward curvature, straight from the base of the keel to the curve of the anterior angle; posterior border of keel straight, inclined slightly forwards at the anterior extremity of the body, transverse in the central portion and backwards from about the 17th segment; somewhat thickened and uptilted and defined by a notch from the posterior border of the median portion of the segment; a wide groove passing in front of the keel defining the prozonite from the metazonite. *Pores* on anterior and median segments nearly in the middle of the lateral border. *Sterna* longer than wide; transversely sulcate, laterally notched and mesially depressed in their posterior half; posterior border straight or lightly emarginate. *Legs* thickened, terminal segment much longer than the penultimate and armed with a long stout claw; spine of second segment short on the anterior and median segments of the body. *Phallopod* with distal segment short, thickly hairy internally; the terminal ramus, when viewed from below, projecting straight forwards and sharply incurved at the tip; when viewed from the side the tip is seen to be slightly downcurved as well; accessory branch very short, slender, and hooked.

Length about 20 millim, width about 4.

Hab. MEXICO (*Mus. Brit.*).

In size this form shows resemblance to *R. vicinus*, Sauss.; but, on the evidence supplied by Saussure's description of that species, it is impossible to affiliate the two. According to that author, *R. vicinus* is very closely allied to *R. otomitus*, the figure of which gives a good idea of the form of *R. vicinus*. If that be so, *R. pusillus* differs essentially from *R. vicinus* in the form of its keels, for the figure of *R. otomitus* does not show the obtuseness of the posterior angle of the keels, the prominence of the anterior angle, the obliquity of the lateral margin, and the sloping character of the keels so noticeable in *R. pusillus*.

4. *Rhysodesmus stolli*, sp. n. (Tab. XV. figg. 3, 3 b.)

♂. *Colour* (? decolorised) olive-grey with the keels and caudal process yellower than the metazonites; the metazonites above brownish, especially in their posterior half; prozonites pale; first tergal plate with median brown central patch; antennæ yellow; legs yellow, with two basal segments darker and rather sharply contrasted in tint with the sternal areas, which are whitish grey. *Body* robust, attenuated anteriorly from the 5th segment and posteriorly from the 17th, with the keels normally overlapping and depressed, but well developed. *Antennæ* short, width of head equal to length of segments 2 to 5 inclusive; segments 2 to 6 subequal in length. *First tergal plate* with anterior border only very lightly convex mesially, obliquely cut away laterally, lateral angle bluntly acute, posterior border lightly sinuous. *Dorsal surface* of body nearly smooth, only finely coriaceous in the middle; but becoming much more coarsely so on the lateral slope and on the upper side of the keels, which do not quite follow the slope of the metazonites, with two to three rows of obsolete granules and coriaceous in the shallow depression just behind the anterior ridge, which is laterally continuous with the ridge or crest of the anterior border of the keels. Keels with anterior border convex, and rounded anterior angle; the lateral marginal thickening well developed; posterior border very lightly concave, slightly prominent at shoulder and notched at the base; with the posterior angle a little produced, but becoming gradually more so in the hinder half of the body; the posterior border inclined obliquely backwards from about the 15th; keels of 19th small, apically rounded, only surpassing by a little those of the 18th. *Pores* in the anterior half of the keel, except at the posterior end of the body, but never near the apex. *Caudal process* triangular with truncate apex; *anal sternal plate* semicircular, with setiferous tubercles wide apart. *Sternal areas* considerably wider in front than behind; mesially depressed, with mesially abbreviated transverse sulcus, which is deep only between the two legs on each side, its posterior border produced a little on each side beyond the coxal cavity, lightly emarginate but becoming more pronouncedly so and in some cases bitubercular in the posterior half of the body, especially on the 17th segment. The ridge between the two zonites curving backwards in front of the base of the keel to meet at an acute angle, the dorsal ridge passing inwards from the anterior edge of the keel. *Legs* short, with spine of second segment well developed, about as long as the claw; terminal segment short, shorter than the third and not much longer than the fourth segment. *Phallopods* shortish, nearly in contact, crossing at the tip of the seminal stile, which is pointed when viewed from below, triangularly expanded from the side and lightly upcurled; auxiliary branch directed obliquely forwards and upwards, turned forwards at the tip and rising from about the middle of the upper side of the organ.

Length (♂, ♀ undistended) about 47 millim., width 12; length of antennæ 7 millim.

Hab. N.W. GUATEMALA, Retalhuleu (*Stoll*).

5. *Rhysodesmus tabascensis*, sp. n. (Tab. XV. figg. 2, 2 a.)

♀. Closely allied to the preceding species in *colour* and structural characters, but with the anterior border of the *keels* more obliquely cut away externally, so that the anterior angle is more obtuse and less rounded and the posterior borders of the sternal areas are much more strongly bidentate.

Length about 42 millim., width 11.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*).

6. *Rhysodesmus championi*, sp. n.

♀. *Colour* as in *R. stolli*. *Antennæ* short, width of head about equal to segments 2 to 6 inclusive. Allied to the two preceding species (*R. stolli* and *R. tabascensis*), but thinner, the anterior ridge of the keels less convexly produced, though the nature of the curvature more resembles that of *R. stolli* than that of *R. tabascensis*; the posterior angles from the 5th segment backwards produced, more so than in either of these forms; the keels of the 19th far surpassing those of the 18th, and the *anal sternal plate* markedly more triangular, its sides being nearly straight and the area between

the tubercles angled. *Sternal plates* only lightly emarginate, more strongly so posteriorly, like those of *R. stolli*.

Length, ♀, 42 millim., width 9; length of antennæ 6 millim.

Hab. GUATEMALA, Zapote, Pacific slope (*Champion*).

7. *Rhysodesmus flavocinctus*, sp. n. (Tab. XV. figg. 6, 6 a.)

♂. *Colour*: transversely banded with brown and yellow, the anterior half of the dorsal area of the metazonites and the prozonites being dark brown, the posterior half of the metazonites yellow-brown and rather darker than the keels and caudal processes, which are pale yellow; first tergal plate brownish only in the middle; head brown above, paler below; antennæ brownish yellow; legs yellowish, a little darker than the sternal areas.

Antennæ short; head equal to segments 2-4 + half of 5 (♂) or to 2-5 + half of 6 (♀).

Body robust. *Keels* well developed, depressed, and almost following the slope of the dorsal area of the metazonites; those of the segments 1 to 4 much less narrowed laterally than in the three preceding species, the antero-lateral border of the 1st being evenly convex, the anterior angle of the 2nd and 3rd more rectangularly and less obtusely rounded; the anterior border of the succeeding keels more strongly produced, the greatest convexity of the crest being close to the anterior angle, which is rounded, the posterior angle scarcely produced; the posterior border very lightly convex or nearly straight, lateral border evenly thickened, not abruptly thickened in front of the pore as in *R. stolli*. *Pores* not so far forwards as in *R. stolli* and *R. tabascensis*, not in front of the middle of the keel, and lying well in the posterior half in the posterior portion of the body. Keels of 19th segment small, sometimes surpassed by those of the 18th. *Dorsal surface* smooth, with a few small tubercles near the base of the keels. *Anal sternal plate* with a small median dentiform process between the tubercles. *Sternal areas* and *legs* practically as in *R. stolli*. Ridge between the zonites continued right round, taking an abrupt bend in front of the base of the keel, but not quite continuous with the ridge along the anterior border of the keels.

Phallopods stout, with their distal extremity geniculate, turned obliquely inwards and forwards and upwards; the auxiliary branch rising just behind the middle of the upper (adoral) aspect of the organ and directed obliquely forwards and upwards with a sinuous curve.

Length, ♂, about 28 millim., width 7; length of antennæ 6 millim.

„ ♀, „ 31 „ „ 8; „ „ 5 „

Hab. MEXICO, Amula in Guerrero 6000 feet (*H. H. Smith*).

8. *Rhysodesmus godmani*, sp. n. (Tab. XV. figg. 4-4 d.)

Colour chocolate-brown; keels brown, except their anterior portion, which is clouded with brown; head brown; antennæ brown and darker than the legs, which, like the ventral surface, are pale yellowish; dorsal area of prozonites as dark as the adjoining area of the metazonite and darker than their ventral portion.

Head with frontal sulcus ending inferiorly in a distinct depression. *Antennæ* long, in male about equal to the width of the body across the keels, with segments 2+3+4 equalling width of head; in female rather shorter. *First tergal plate* with an anterior transverse depression, rather widely rounded lateral border, with the posterior angle slightly obtuse; posterior border sinuous, mesially emarginate, very lightly curved laterally. *Body* not compact, but like that of typical members of the Chelodesminæ. *Keels* separated, large, and nearly horizontal; their anterior border rather strongly curved at the base; anterior angle widely convex; posterior border nearly straight, but shouldered at the base and defined by a distinct notch; their posterior angle rectangular, becoming gradually more and more acute (but never sharp or spiniform) from the 15th to the 18th; those of the 19th blunt; a few tubercles on their upper side. *Metazonites* very finely striolate, separated in front from the prozonite by a decided groove, bordered in front by the ridge which passes in front of the keel without any marked alteration of direction: thus the metazonites and prozonites do not form a continuous surface. *Anal sternal plate* with an angular process between the setiferous tubercles. *Sterna* moderately high, not flat in front;

their posterior border lightly convex or straight, only mesially notched on the 17th and 18th segments.

Legs longish and slender, the terminal segment much longer than the penultimate.

Phallopods long, their distal end, viewed from below, forming a strong sigmoid curvature turning abruptly inwards, then forwards and outwards, the extremity not bent upwards; the auxiliary branch rising rather far back and projecting more forwards and closer to the main branch than is usual.

Length, ♀, 47 millim., width 9; length of antennæ 9 millim.

„ ♂, 36 „ „ 7; „ „ 8 „

Hab. MEXICO, Omilteme and Amula in Guerrero 6000–8000 feet (*H. H. Smith*).

9. *Rhysodesmus salvini*, sp. n. (Tab. XV. figg. 5, 5 a.)

Allied to *R. godmani* in all general structural features, with the legs and antennæ long, the keels high and nearly horizontal; a marked groove between the prozonites and metazonites, but differing principally in the following characters:—Size much smaller; colour darker brown. The anterior borders of the *keels* are straight and not markedly produced and convex at the base; the tubercles are more in evidence upon the dorsal surface. *Phallopods* very different from those of *R. godmani*; short, thick, slightly incurved and upcurved apically, with the auxiliary process short, rising near the middle of the upper surface and projecting obliquely upwards, then forwards at the tip.

Length, ♀, 32 millim., width 6; length of antennæ 6.5 millim.

„ ♂, 30 „ „ 5.5; „ „ 6 „

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

10. *Rhysodesmus attemsi*, sp. n. (Tab. XV. figg. 7–7 b.)

Colour (in alcohol) deep brown or rich reddish-brown above, with the keels yellow and the prozonites testaceous; head brown, paler below, with the antennæ yellowish-brown; legs and sternal areas uniformly yellowish.

Antennæ shortish, segments 2–5 in ♀, and 2–4 + half of 5 in ♂, equal to width of head. *Body* convex above; keels following slope of the back in female, more raised in male; smooth, with a few faintly defined tubercles laterally. *First tergal plate* longer than in *R. flavocinctus*, the antero-lateral border oblique, the angle much less rounded, subacute, the marginal thickening not curved. Dorsal surface without transverse depression between the metazonites and prozonites; the ridge not continuous with the ridge of the anterior border of the keel, but, owing to its strong backward bend in front of the keel, almost in the same transverse line with it. Anterior margin of *keels* nearly straight, turned slightly forwards in female and more strongly so in the male where it passes into the convex anterior angle; posterior border of keels lightly sinuous, a little convex and produced at the base, a little concave externally, becoming gradually more and more produced from about the 15th to the 18th, the 17th and the 18th being subspiniform, and the 19th dentiform and rounded. *Pores* not in front of the middle of the sides, on the 5th about in the middle, becoming gradually nearer the point of the keel posteriorly. *Caudal process* truncated triangular; *anal sternal plate* with median dentiform tubercle between the setiferous tubercles, which are close to it. *Sterna* much broader in front than behind, with posterior border slightly or, at the posterior end, more strongly sinuous, mesially depressed; anterior area a little raised or sloping gradually away. *Legs* with spines weak in the anterior, strong in the posterior half of the body; terminal segment longer than in *R. flavocinctus*, but shorter than the sum of the two preceding segments, although almost as long at the posterior end of the body.

Phallopods when viewed from below acuminate, lightly inclined inwards distally; when viewed from the side the main branch is straight and upbent only quite at the tip; the auxiliary branch is short and slightly inclined upwards and forwards, curved at the tip.

Length, ♀, 35 millim., width 9; length of antennæ 6 millim.

„ ♂, 28 „ „ 7; „ „ 6 „

Hab. MEXICO, Amula and Omilteme in Guerrero 6000–8000 feet (*H. H. Smith*).

11. *Rhysodesmus smithi*, sp. n. (Tab. XV. figg. 12, 12 a.)

♀. *Colour* doubtful, probably with the metazonites and prozonites brown, the keels certainly mostly yellow; first tergal plate apparently all brown, except the keels; head brown; antennæ yellowish-brown, darker apically; legs pale yellowish.

Antennæ short; width of head about equal to length of segments 2-5.

First tergal plate nearly semilunar in shape, the lateral portion of the anterior border only slightly oblique; lateral portions of posterior border also only slightly oblique. *Body* smooth, shining, convex, with scarcely if any trace of tubercles on the keels. *Keels* small and depressed, not or hardly overlapping when the segments are contracted; ridge of the anterior border produced, if at all, at the anterior angle, which on the segments in the middle of the body is rectangularly rounded; lateral margin lightly rounded; posterior border nearly straight, scarcely produced, inclined backwards from about the 15th segment; posterior angle blunt, nearly rectangular, only a little produced on the 17th and 18th segments; marginal thickening somewhat lozenge-shaped on the pore-bearing segments; *pores* on the fifth in the middle of the margin, behind the middle on the other segments. *Interzonal groove* complete, shallow dorsally. *Sterna* scarcely wider in front, mesially depressed behind, laterally notched. *Legs* with distal segments considerably longer than penultimate.

♂. Smaller and narrower, but with *keels* relatively much larger, their posterior angle square and subacute.

Phallopods as figured, and as described in analytical key (*antea*, p. 194).

Length, ♀, 30 millim., width 6+; length of antennæ 5 millim.

„ ♂, 25 „ „ 5 ; „ „ 5 „

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

12. *Rhysodesmus arcuatus*, sp. n. (Tab. XV. figg. 13-13 e.)

♀. *Colour* deep blackish-brown; keels externally yellow, at least with a large yellow spot around and extending inwards from the pore, the anterior angle and extreme posterior edge of the keels brownish; anterior keels yellower than the posterior; caudal process yellow; head dark brown; antennæ brown; legs yellowish-brown, with terminal segments clear yellow; sterna and lateral surface brownish.

Antennæ moderately long; width of head about equal to segments 2+3+4+half of 5 or over.

First tergal plate with its anterior border only lightly convex in the middle line, generally lightly produced where it passes into the obliquely sloping nearly straight lateral portion; lateral angle moderately wide, rounded; posterior border mesially nearly straight, laterally also nearly straight but oblique. *Body* broad and compact, the keels overlapping. *Keels* moderately large, scarcely following the slope of the dorsal surface, which is often somewhat wrinkled and bears distinct scattered tubercles on the keels; anterior border of keels convex, the ridge defining it curved forwards in such a way that its most prominent point is about halfway along the keel; anterior angle obtusely rounded and forming an even curve with the lateral edge; posterior border a little produced, lightly sinuous or lightly convex, inclined slightly forwards in the anterior half of the body, beginning to incline backwards from about the 15th segment; posterior angle mostly nearly rectangular, acute on segments 15 to 19; the marginal thickening, which is tolerably large, even, and not abruptly expanded round the pore, sometimes a little produced posteriorly. *Pores* lying near the middle of the lateral margin, looking slightly upwards. *Interzonal sulcus* continued right round the segments. *Sterna* mesially depressed, laterally notched, wider in front than behind. *Legs* with distal segment moderately long and slender, longer than the penultimate.

♂. Flatter; the *keels* approaching the horizontal. *Phallopods* as shown in figure and as described in analytical key to species.

Length, ♀, 38 millim., width 10; length of antennæ 7 millim.

„ ♂, 35 „ „ 8.5; „ „ 7.5 „

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

13. **Rhysodesmus notostictus**, sp. n. (Tab. XV. figg. 10, 10 a.)

♂. *Colour* of dorsal surface, including prozonites, mostly brown, with the keels largely yellow, and generally more or less distinct traces of a yellow spot on the middle of the posterior area of the metazonites; anterior margin of the first tergal plate and the keels yellow; head brown, paler below; antennæ pale, apically brownish; legs yellow.

Antennæ shortish, width of head equal to length of segments 2+3+4+half of 5.

First tergal plate with anterior border nearly evenly but lightly convex. *Body* lightly convex. *Keels* approaching the horizontal, fairly large, overlapping, bearing a few tubercles above; anterior border with its crest produced forwards nearer to the body than to the anterior angle; the anterior angle widely and obtusely rounded, lateral border lightly convex, posterior border also very lightly convex; posterior angle rectangular, sometimes sharp and a little produced; marginal thickening rather narrow and evenly thickened. *Pores* in the middle of the border, except at the posterior end of the body. *Interzonal groove* conspicuous and complete. *Sterna* hardly wider in front than behind. *Legs* with distal segment only a little longer than the penultimate.

Phallopods as in figure and description given in analytical key.

♀. More convex than male and with smaller keels.

Length, ♂, 28 millim., width 5.5; length of antennæ 6.5 millim.

„ ♀, 25 „ „ 5.5; „ „ 5.5 „

„ ♀, 33 „ „ 8; „ „ 6.5 „

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

Three males and three females. Two of the latter, although with the full complement of segments, are much smaller than the third. The larger females also have the posterior border of the keels more sinuous and the posterior angle slightly produced. I am not sure that the females belong to the same species as the males (type), nor that they are themselves conspecific.

14. **Rhysodesmus inustus**, sp. n. (Tab. XV. figg. 11, 11 a.)

♀. *Colour* brown above, both on prozonite and metazonite, but with the keels yellow and a stripe of the same colour extending across the posterior half of the metazonite and sometimes invading its anterior portion; first tergal plate with its anterior border pale and the brown patch subdivided behind; head reddish-brown, paler below; antennæ darker than the legs, which are pale yellowish.

Antennæ short; width of head almost equal to length of segments 2-6.

First tergal plate shortish, gradually and nearly evenly narrowed laterally, or its angle wide and rounded.

Dorsal surface finely striolate, with a few tubercles laterally. *Keels* depressed, of moderate size; crest of anterior edge with its greatest convexity close to the anterior angle, which is somewhat prominent and rectangularly rounded; posterior border very slightly produced towards the base, slightly sinuous, the posterior angles for the most part rectangular, but a little produced owing to a slight elongation of the marginal thickening; lateral border lightly convex; thickening nearly parallel-sided. *Pores* submedian, except at the posterior end. *Interzonal groove* nearly obsolete dorsally except for its anterior edge. *Sterna* wide in front; posterior edge emarginate. *Legs* with terminal segment shortish, only a little longer than the penultimate.

♂ (*type*). Smaller, narrower, flatter; *keels* with posterior angle more rounded; *antennæ* longer, width of head equal to segments 2-5. *Phallopods* as in figure and description in analytical key on p. 193.

Length, ♀, 33 millim., width 8; length of antennæ 5.5 millim.

„ ♂, 28 „ „ 7.5; „ „ 6 „

Hab. MEXICO, Omilteme in Guerrero 8000 feet (*H. H. Smith*).

The following species are unknown to me, except from their figures and descriptions :—

15. *Rhysodesmus acolhuus*.

Polydesmus (Fontaria) acolhuus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 150 (1869)¹; Miss. Sci. Mex., Myr. p. 33, t. 2. fig. 2 (1872)².

Colour: the dorsal surface yellowish and traversed by two blackish olive-green lateral bands composed of a large patch on each metazonite, and represented on the first tergal plate by two converging patches; a median narrow stripe of the same colour on the middle of the prozonites; sides and lower surface blackish-green; head blackish, with a tricuspidate frontal patch and pale labrum; antennæ testaceous, dark apically.

♀. *Body* moderately vaulted. *Keels* almost following the slope of the back, lightly raised at the extremity; keels of segments 1–4 or 5 with their posterior border directed obliquely forwards; those of the ten following segments quite transverse, the posterior border straight and in the same line as that of the median area of the segments; posterior border on the following segments directed obliquely backwards; keels from the 2nd to the 15th very round, the posterior angle rounded but squarer than the anterior; from the 16th to the 19th the posterior angles become progressively more angular; marginal thickening tolerably wide and thick; *pores* superior and median. *Caudal process* longer than wide. *Dorsal surface* a little striolated, rugulose or subsquamous at the base of the keels; the keels coriaceous.

♂. Smaller and much flatter than the ♀, with the keels horizontal.

Length, ♀, 50 millim., width 9.5.

„ ♂, 44 „ „ 8.

Hab. MEXICO, Valley of Moyoapan and the Sierra de Agua, near Orizaba, in the Eastern Cordillera^{1 2}.

16. *Rhysodesmus angelus*. (Tab. XV. fig. 14.)

Polydesmus (Fontaria) angelus, Karsch, Arch. f. Naturg. xlvii. p. 39, t. 3. fig. 13 (1881)¹.

Fontaria tepaneca, Attems, Denk. Akad. Wien, lxxviii. p. 259, t. 13. fig. 313 (1890)² (? *Fontaria tepaneca*, Sauss.).

Colour (when not decolorized) castaneous with yellow keels.

Body vaulted, smooth and shining, rugulose. The *keels* following the slope of the back, their anterior angles rounded, posterior angles of segments 2–4 also rounded, those of 5–13 almost rectangular, and those of 16–18 forming a wide short tooth; those of 19 forming a rounded lobe. *Sterna* smooth, not hairy, with cross-shaped sulcus.

Phallopod cylindrical and straight, distally narrowed (? when seen from below); when seen from the side, the principal branch is very stout, longer than the palmar portion of the organ, with both its upper and lower edge markedly sinuous; its apex is distinctly upcurled and somewhat strongly bifid; the interramal space is wide and rounded; and the auxiliary branch, which is rather less than half the length of the palmar portion, is slender, projects obliquely forwards and upwards, with lightly convex upper border and nearly straight lower border, the entire branch being only very slightly curved.

Length, ♀, 50 millim., width 9.5.

„ ♂, 42 „ „ 8.5.

Hab. MEXICO, Puebla^{1 2} (*Hamburg Museum*).

So far as I can ascertain from the text of Attems's monograph, the only examples he has seen of the species he described as *Fontaria tepaneca*, Sauss., were those in the Hamburg Museum which Karsch described as *Fontaria angelus*. I am unable to say certainly whether his determination of these specimens as conspecific with those that

Saussure named *tepanecus* is correct or not. The description is too inadequate to supply data for such a conclusion, since it applies to many of the Central-American species of this genus. It may be noted, however, that Attems does not draw attention to the sexual differences pointed out by Saussure. Moreover, the measurements he gives suggest that the co-types of *R. angelus* are narrower than the type (σ) of *R. tepanecus* from Cordova and than the females from Moyoapan and Santa Cruz, near Orizaba, which Saussure and Humbert subsequently identified as that species. The male of *R. angelus*, for example, is 42 mm. long and 8.5 wide; while the male of *R. tepanecus* was 40 mm. long and 10 mm. wide. This fact, coupled with the inadequacy of the description of *R. angelus*, and with the circumstance that *R. tepanecus* was not recorded from Puebla, induces me to keep the two species distinct provisionally, lest *R. angelus* be wrongly lost sight of as a synonym and until the phallopod of *R. tepanecus* be described and compared with that of *R. angelus*, the structure of which has been partially made known by Attems. In being straight and gradually attenuated, this phallopod seems to resemble that of *R. attemsi*, but certainly differs in the greater thickness of the principal branch and the sinuous curvature of its edges when seen from the side. In these latter respects it somewhat calls to mind the phallopod of *R. pusillus*, but unmistakably differs, according to Attems's description, in having the principal branch straight and not inclined distally.

Attems has also recorded as *R. tepanecus* a species represented by specimens in the Hamburg Museum from La Joya, Mexico, and from Soconusco, Chiapas (Mt. Mus. Hamb. xviii. p. 85, 1901). Since neither of these localities is mentioned in his monograph of 1900 under the heading *Fontaria tepaneca*, it is impossible to say whether the specimens are specifically identical with *R. angelus* or not.

17. *Rhysodesmus consobrinus*.

Polydesmus (Fontaria) consobrinus, Sauss. Linn. Ent. xiii. p. 322 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 317, t. 2. fig. 13 (1860)²; Sauss. & Humb. Miss. Sci. Mex., Myr. p. 37 (1872)³.

Colour unknown; greyish or whitish.

♀. Like that of *R. otomitus*, but the *dorsal surface* slightly more convex and the *keels* a little more sloping, with the marginal thickening more linear, those which bear the pores being scarcely swollen. *Pores* small, not lodged in small pits, opening behind the middle of the lateral border, even on the 7th segment; and the spine on the *legs* stronger.

♂. *Dorsal surface* less convex, lateral border of the *keels* straighter, their posterior angles less obtuse, rectangular on the segments in the anterior half of the body and not obtuse as in the ♀. In the median and posterior segments the keels are horizontal, with their posterior angles acute and triangularly prolonged, the posterior border forming a distinct angle and not an even curve with that of the median area of the segments; posterior angle of segments 16 to 19 very sharp.

Length 31 millim., width about 7.

Hab. MEXICO, the colder parts of the plateau (Anahuac, Volcan de Orizaba, &c.)¹⁻³.

Said to be easily distinguishable from *R. fraternus* by its less convex shape, the female of *R. consobrinus* being even flatter than the male of *R. fraternus*.

18. *Rhysodesmus fraternus*.

Polydesmus (Fontaria) fraternus, Sauss. Linn. Ent. xiii. p. 323 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 310, t. 3. fig. 16 (1860)².

? *Fontaria fraterna*, Attems, Denk. Akad. Wien, lxxviii. p. 260 (1900)³.

Colour chocolate-brown, with the postero-lateral portion of the keels, the anterior border of the first tergal plate, the legs, and antennæ flesh-coloured. *Body* robust and compact; the *keels* squarely truncated, with the lateral margins scarcely swollen. *Pores* smaller than in *R. montezumæ*, to which this species is said to be closely allied, and situated more forwards; also the keels of the 17th to the 19th are subacute and less rounded than in *R. montezumæ*; and the anal valves are striated as in *R. fraternus*.

♂. With *keels* sensibly more elevated, and approaching the horizontal in the posterior half of the body; *behind* the 6th and 7th segments projecting a little at the base posteriorly, and having the posterior angle somewhat acute. The *pores* more forward as in *R. montezumæ*.

Length, ♀, 37 millim., width 9.

„ ♂, 35 „ „ 9.

Hab. MEXICO³, in the villages of the eastern slope of the Cordillera^{1 2}.

This species is said to be closely related to *R. montezumæ*, of which it has the appearance, the shape, and the colours; but differs in being stouter and in the other characters mentioned in the diagnosis.

I cannot decide whether Attems correctly determined as *R. fraternus* the female specimen in the Hamburg Museum, ticketed Mexico, which he assigned to that species.

19. *Rhysodesmus limax*. (Tab. XV. figg. 1, 1 a.)

Polydesmus (Fontaria) limax, Sauss. Linn. Ent. xiii. p. 312 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 312, t. 2. fig. 10 (1860)².

Colour chocolaté-brown, the keels often paler. *Body* large, broad and compact. *Dorsal surface* evenly convex; anterior end elliptically narrowed. *First tergal plate* with lateral angles narrowed; posterior border of segments 2 to 4 lightly concave in the middle area, the posterior border of their keels oblique and a little sinuous, the anterior border rounded. *Keels* of the other segments depressed, almost following the slope of the dorsum; anterior border and angle of the keels forming an almost semicircular curvature, the border prominent; the posterior border sinuous, with a convex prominence at the base, then directed obliquely forwards, with the posterior angle somewhat produced, so that the entire border presents a sinuous ~-shaped curve; as far back as the 10th or 11th segments the keels are directed slightly obliquely forwards; only from the 12th are they directed obliquely backwards; marginal thickening very flattened, small, shining, posteriorly spiniform on the segments behind the 8th; posterior angle of keels of 18th and 19th sometimes deprived of spiniform process. *Pores* superior, in the anterior half of the marginal thickening as far back as the 16th segment. *Dorsal area* of segments 1 to 3 smooth, with only insignificant striæ, that of the rest with somewhat squamiform sculpturing, which becomes coarser upon the keels, the scales becoming as it were spiniferous. In addition the keels commonly show traces of three rows of small smooth tubercles; 18th and 19th segments almost smooth. In large individuals the sculpturing becomes almost effaced upon the middle of the back.

♂. With dorsal surface less vaulted.
Length 50–80 millim., width 17–20.

Hab. MEXICO, Cordova, San Andres Tuxtla^{1 2}.

In the British Museum there is a single male specimen, probably referable to this species and purchased under the name "*P. limax*." It is 75 mm. long and 22 wide.

The keels are very large but distinctly depressed, almost following the slope of the dorsum, with the posterior angles dentiform. The dorsal surface is rugose, tubercular laterally. The sterna are deeply emarginate, being bilobate or bidentate posteriorly; they are also much wider in front than behind. The terminal segments of the legs are quite short. The phallopods are elongate and distally gradually incurved; seen from the side the principal branch projects straight forwards and curls upwards at the tip and is about as long as the palmar area of the organ; the inter-ramal space is oval; the auxiliary branch is short, not half the length of the palmar portion, and is fairly evenly curved and subspiniform. This example is labelled "Mexico," without further particulars as to locality.

20. *Rhysodesmus mystecus*.

Polydesmus (Fontaria) mystecus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 150 (1869)¹; Miss. Sci. Mex., Myr. p. 32, t. 2. figg. 3-3 c (1872)².

♀. *Colour* (in alcohol) testaceous with a pair of brownish-red longitudinal dorsal bands extending laterally near the base of the keels over the metazonites and prozonites; first tergal plate with a somewhat A-shaped mark; head blackish above, testaceous below; antennæ and legs testaceous, last segment of the former brown.

Very like *R. acolhuus*, a little more vaulted, the *keels* less rounded, squarer, the posterior angles rectangular, and the marginal thickening narrower, the pores opening almost laterally. The *body* much less attenuated posteriorly, remaining wide to the end, with the keels of the three penultimate segments much less prolonged; those of the 19th forming only small triangular teeth, whereas in *R. acolhuus* they form longer and wider lobes. The *caudal process* is, moreover, very different, being convex, conical, wider than long, and more pointed, with concave lateral borders.

♂. Much less vaulted, with the keels horizontal, wide and short, showing an oblique backward inclination from the 7th segment, the posterior end narrower.

Length, ♀, 43 millim., width 9.

„ ♂, 36 „ „ 8.3.

Hab. MEXICO, mid-region of the Eastern Cordillera^{1 2}.

21. *Rhysodesmus nahuus*.

Polydesmus (Fontaria) nahuus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 150 (1869)¹; Miss. Sci. Mex., Myr. p. 36, t. 1. figg. 6-6 b (1872)².

Colour (in alcohol) greyish, the prozonites reddish-brown; a brown spot on each side of the metazonites placed anteriorly and at the base of the keels. *Dorsal surface* coriaceous, with some granules upon the keels. *Body* anteriorly attenuated. *Keels* continuous and depressed, following the slope of the back; those of segments 2-4 transverse with parallel borders; those of the 5th with a small basal prominence behind, the following with a similar prominence, but with the posterior border concave; from the 7th or 8th segment the concavity becomes more and more pronounced, making the posterior angle produced and subspiniform, the anterior angle rounded; the subspiniform process disappearing about the 15th or 16th segment. *Keels* of the 18th triangular, of the 19th small, rounded. *Pores* small, on the upper side of the middle of the marginal thickenings. *Caudal process* conical.

♂. *Keels* lightly raised posteriorly.

Length 30 millim., width 6.

Hab. MEXICO. Eastern Cordillera^{1 2},

According to the describers, this species is distinguishable from all the Mexican forms known at that time by the subspiniform posterior angles of the keels and the emargination of their posterior borders.

22. *Rhysodesmus otomitus*.

Polydesmus (Fontaria) otomitus, Sauss. Linn. Ent. xiii. p. 322 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 315, t. 2. fig. 12 (1860)²; Sauss. & Humb. Miss. Sci. Mex., Myr. p. 37 (1872)³.

♀. *Colour* ?; whitish when dry. Very like the male of *R. fraternus*, but relatively a little less convex. Posterior border of *keels* scarcely concave as far back as the 16th, marginal thickenings which bear the pores thickened and lozenge-shaped. *Pores* large, in the middle of the lateral border, even at the posterior extremity of the body.

♂. Differs from the ♀ by having the posterior angle of the keels more produced and the keels more elongated.

Length, ♀, 24 millim., width 6.

Hab. MEXICO, the plateau and temperate regions (Cordova)^{1 2}.

This species was based upon immature individuals. The measurements given therefore are deceptive for the adult. It is said to differ from *R. fraternus* by having the pores lodged in small pits, in being less convex, and in having the keels of the male otherwise elevated. To what extent these characters would apply to adults is unknown.

23. *Rhysodesmus simillimus*.

Polydesmus (Fontaria) simillimus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 150 (1869)¹; Miss. Sci. Mex., Myr. p. 31, t. 1. figg. 5-5 b (1872)².

♂. *Colour* wholly pale when dry. *Body* tolerably flat. *Keels* continuous when the body is contracted. *Dorsal surface* smooth but coriaceous. *Keels* scarcely elevated, with narrow marginal thickening and very small pores; behind the 7th segment the keels are directed slightly obliquely backwards, with the anterior angle rounded, the posterior border lightly concave, with the posterior angle sharp; from the 4th to the 16th segment a small tooth-like "shoulder" process is seen at the base of the posterior border of each keel; the keels from the 15th to the 19th are large and triangularly prolonged. Posterior extremity of the *body* much narrowed.

Length of ♂ (contracted) 25 millim., width 5.4.

Hab. MEXICO, Eastern Cordillera (Santa Cruz, near Orizaba)^{1 2}.

Said to resemble closely *R. consobrinus*, *otomitus*, and *zapotecus*, but to differ from the first two in the presence of the small tooth upon the base of the posterior border of the keels, and from *R. zapotecus* in having a distinct notch at the base of the keels of the 17th and 18th segments, and the keels of the 19th larger and more triangular.

24. *Rhysodesmus tepanecus*.

Polydesmus (Fontaria) tepanecus, Sauss. Linn. Ent. xiii. p. 321 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 319, t. 3. fig. 17 (1860)²; Humb. & Sauss. Miss. Sci. Mex., Myr. p. 30, t. 1. figg. 4-4 b (1872)³.

Colour: a broad median dark brown band extending along the metazonites, the patch on each segment narrowly bordered in front and behind by yellow and not extending laterally on to the keels, which are

yellow, the yellow patch on each keel nearly as wide as the median brown area; first tergal plate with only a median patch; prozonites apparently pale like the lateral and inferior portions of the segments; head pale; antennæ pale, with apical segment infuscate; legs pale. *Body* stout, compact; *dorsal surface* vaulted, the *keels* following the slope of the median area; their anterior angles rectangularly rounded; the posterior angles not spiniform or directed posteriorly; posterior border directed a little forwards on the 4th to the 8th segments, slightly convex from the 8th to the 14th, lightly inclined backwards on the 15th and 16th, and strongly oblique on the two following; keels of the 18th triangular posteriorly. *Pores* opening in the middle of the lateral border. *Dorsal surface* vaguely striolate and coriaceous, the keels with two often indistinct rows of granules.

♂. With all the keels more elevated as in other species, those of the 15th to the 17th directed more obliquely posteriorly.

Length, ♀ (contracted), 43 millim., width 10.

„ ♂ (distended), 55 „ „ 9.

Hab. MEXICO, mid-region of the Eastern Cordillera (Cordova [♂, type], Moyoapan, Santa Cruz, near Orizaba [♀]).

25. *Rhysodesmus toltecus*.

Polydesmus (Fontaria) toltecus, Sauss. Linn. Ent. xiii. p. 322 (1859) (♀)¹; Mém. Soc. Phys. Genève, xv. p. 325, t. 4. figg. 22, 23 (1860)².

Polydesmus (Fontaria) mayus, Sauss. Linn. Ent. xiii. p. 322 (1859) (♂)³.

Polydesmus (Leptodesmus) granulatus, Sauss. Linn. Ent. xiii. p. 323 (1859) (♂)⁴.

Colour brown, with the end of the keels pale; altogether porcelain-white when dry. Form as in *R. totanacus*, but with the body more vaulted; *keels* not quite continuing the slope of the back, shaped almost as in *R. totanacus*, but the lateral borders a little thicker and the posterior angle showing a tendency to form a small projection. All the segments except those quite at the anterior and posterior ends of the body marked with three irregular transverse rows of rounded polished tubercles.

♂. Much flatter than the female; the keels horizontal, uptilted externally, so that they appear to be separated by a gutter from the median convex area of the segments.

Length, ♀, 36 millim., width about 8.

„ ♂, 33 „ „ „ 7.

Hab. MEXICO, the eastern slope of the Cordillera and the edge of the plateau (Cordova, ? Peak of Orizaba, 3000 metres)¹⁻⁴.

Distinguishable from all the species known to me by the distinctness of the three rows of tubercles on the dorsal area of the segments.

26. *Rhysodesmus violaceus*. (Tab. XV. fig. 15.)

Fontaria violacea, Brölemann, Mém. Soc. Zool. France, xiii. p. 101, t. 6. figg. 33-36 (1900)¹.

Colour violet-brown, with whitish keels, the pale colour sometimes extending along the posterior border of the median area of some of the segments. *Body* robust, a little attenuated anteriorly. *Dorsal surface* nearly smooth, becoming coriaceous upon the keels. *First tergal plate* with anterior and posterior borders nearly straight in the middle, abruptly cut away laterally; the lateral angle acute, with blunt point; posterior angles of the keels almost rectangular, entirely so in segments 5 to 14; behind the 15th becoming more acute. *Sterna* unarmed. *Phallopod* with principal branch lightly curved upwards (? inwards), stout and short, considerably shorter than the palmar portion; auxiliary branch stout, rather long, straightish, somewhat abruptly hooked at the apex.

Length, ♀, about 45 millim., width 10.

„ ♂, „ „ „ 9.3.

Hab. GUATEMALA (*Rodriguez*¹).

This species differs from all those known to me in the structure of the phallopods. In some particulars it seems to resemble *R. stollii*, but certainly differs from it in the shape of the auxiliary branch of the phallopod.

Brölemann (*loc. cit.* p. 102) also records, but does not name, a second species from Guatemala, which somewhat approaches apparently *R. zendalus*, Sauss., in colour, but has the keels entirely pale. The ♀ measures 48 mm. long and 10 wide.

27. *Rhysodesmus vicinus*.

Polydesmus (Fontaria) vicinus, Sauss. Linn. Ent. xiii. p. 322 (1859)¹; Mém. Soc. Phys. Genève, xv. p. 318 (1860)².

♂. *Colour* ? white. Very nearly allied to *R. otomitus*, but much smaller, more vermiform, with the posterior angle of the keels a little elevated triangularly; a shallow groove running obliquely from the anterior angle of the keel to its posterior border; posterior angle of the 19th rounded.

♀ with the body more vermiform and the keels smaller.

Length 17 millim., width 4.

Hab. MEXICO, cold regions, the plateau of Anahuac, also Oaxaca in the tropical regions^{1 2}.

28. *Rhysodesmus zapotecus*.

Polydesmus (Fontaria) zapotecus, Sauss. Mém. Soc. Phys. Genève, xv. p. 314, t. 2. fig. 11 (1860)¹; Humb. & Sauss. Miss. Sci. Mex., Myr. p. 37 (1872)².

Colour uniformly brown. *Dorsal surface* very little convex, but the *keels* following its slope, wide, their anterior borders prominent, the posterior concave, excised, with a small basal prominence; anterior angle rounded, posterior with a tolerably sharp tooth beginning on the 7th, 8th, or 9th segments; marginal thickening even, pores superior, in the middle of the thickening on the 5th and 7th and thereafter becoming more and more posteriorly placed.

♂. More flattened, the dentiform lobes of the posterior angles more pronounced.

Length, ♀, 29 millim., width 5.

Hab. MEXICO, San Andres Tuxtla &c.^{1 2}.

This species is said to be characterized by the length of the spines on the legs, the slenderness of the body, the dentiform process of the posterior angle of the keels, and the emargination of the posterior border of the keels.

29. *Rhysodesmus zendalus*.

Polydesmus (Fontaria) zendalus, Humb. & Sauss. Rev. et Mag. Zool. (2) xxi. p. 150 (1869)¹; Miss. Sci. Mex., Myr. p. 34, t. 2. figg. 1, 1 a (1872)².

♀. *Colour*. Body testaceous, but the dorsal surface barred transversely with olive-black across the posterior half of the metazonites and on the keels; head pale, darker on the front; antennæ and legs brown.

Compared with *R. fraternus*, *acolhuus*, and *mystecus*: back arched, keels moderate, not markedly wide, a little elevated, and squared; the posterior border of keels 2 to 5 slightly oblique forwards; that of

the following transverse, but a little prominent at the base; showing an oblique backward direction, which gradually becomes more pronounced from the 14th to the 18th. *Caudal process* conical, as in *R. mystecus*.

♂. Less arched, the keels wider and horizontal, coriaceous and sparsely granular above.
Length, ♀, 37 millim., width 8.
,, ♂, 32 ,, ,, 6.

Hab. MEXICO, Eastern Cordillera^{1 2}.

CORRIGENDUM.—Page 113, *l* of the table of the families and subfamilies of the Group POLYDESMOIDEA, for
“no hair-lined depression” read “usually a hair-lined depression” &c.

INDEX.

[Names in small capitals refer to Families, &c.; those in roman type to the chief reference to each species included in the work; those in italics to species incidentally mentioned, synonyms, &c.]

	Page		Page		Page
ACERATOPHALLUS	182	ANARTIOSTIGMA	1	<i>Chelodesmince</i>	113
<i>Aceratophallus</i>	171, 183, 184	<i>Anartiostigmata</i>	1	CHILOGNATHA	41
— <i>lamellifer</i>	183	<i>Andrognathus</i>	49	CHILOPODA	1
— <i>lamellifer</i>	182	<i>Angustinus</i>	149	CHOMATOBIUS	40
— <i>unicolor</i>	182	<i>Anoplodesmus</i>	110	— <i>brasilianus</i>	40
— <i>unicolor</i>	183	APHELIDESMUS	157	— <i>mexicanus</i>	40
— — <i>lamellifer</i>	183	<i>Aphelidesmus</i> .. 137, 147, 148, 158		CHOMATOPHILUS	39
ACUTANGULUS	178	— <i>glaphyros</i>	158	— <i>smithi</i>	39
<i>Acutangulus</i> 162, 171, 180, 182		— <i>hermaphroditus</i>	157	CHORDEUMOIDEA	51
— <i>coccineus</i>	179	<i>Archispirostreptus</i>	91, 92, 93	<i>Chordeumoidea</i>	41
— <i>coccineus</i>	178	— <i>camerani</i>	92	<i>Cladostreptus</i>	92
— <i>neglectus</i>	179	— <i>gigas</i>	91	— <i>sebastianus</i>	92
<i>Alipes</i>	13	<i>Arthronomalus toltecus</i>	37	CLEIDOGONA	52
<i>Alloporus</i>	91, 92, 93	ARTIOSTIGMA	3	— <i>godmani</i>	52
— <i>dissimilis</i>	91	<i>Artiostigmata</i>	3	— <i>godmani</i>	53
<i>Amphinus</i>	148	<i>Brachycybe</i>	43, 44	— <i>mexicana</i>	53
AMPLINUS	148	— <i>californica</i>	44	— <i>stolli</i>	52
<i>Amplinus</i>	147, 148,	— <i>lecontei</i>	44	COLOBODESMUS	128
	149, 154, 157, 158	— <i>rosea</i>	44	<i>Colobodesmus</i>	119, 129
— <i>areatus</i>	151	<i>Branchiostoma celebense</i>	26	— <i>biolleyi</i>	129
— <i>areatus</i>	149	— <i>celer</i>	27	COLOBOGNATHA	41
— <i>armatus</i>	153	— <i>ceylonicum</i>	26	CORMOCEPHALUS	24
— <i>armatus</i>	149, 154	— <i>gymnopus</i>	26	— <i>aurantiipes</i>	24
— <i>convexus</i>	150	— <i>inmarginatum</i>	26	<i>Craspedosoma mexicanum</i>	53
— <i>convexus</i>	149	— <i>indicum</i>	26	CRASPEDOSOMIDÆ	51
— <i>erichsoni</i>	152	— <i>longipes</i>	27	<i>Cryptodesmus</i> .. 131, 134, 135, 185	
— <i>erichsoni</i>	149, 153	— <i>subspinosum</i>	26	— <i>olfersii</i>	134
— <i>flavicornis</i>	151	<i>Cambala</i>	104, 105	CRYPTOPIDÆ	28
— <i>flavicornis</i>	149	— <i>annulata</i>	105	<i>Cryptopinæ</i>	28
— <i>kalonotus</i>	148, 149, 150	<i>Cambalide</i>	105	<i>Cryptops</i>	15, 28, 34
— <i>klugi</i>	152	<i>Cambalomorpha</i>	104	<i>Cryptotrichus</i>	52
— <i>klugi</i>	149, 153, 154	<i>Cambalopsis</i>	104	— <i>caesio-annulatus</i>	52
— <i>nitidus</i>	149	<i>Cermatia linceci</i>	1	CRYPTURODESMUS	116
— <i>nitidus</i>	151	<i>Cermatobiidæ</i>	3	<i>Crypturodesmus</i>	115, 117
— <i>palicaudatus</i>	150	CHELODESMIDÆ	160	— <i>targionii</i>	117
— <i>palicaudatus</i>	149	<i>Chelodesmidæ</i>	113	— <i>verrucosus</i>	116
— <i>picteti</i>	152	CHELODESMINÆ	160	CYCLODESMINÆ	118
— <i>triramus</i>	153			<i>Cyclodesminæ</i>	112, 117
— <i>triramus</i>	149, 154			CYCLODESMUS	118

- | | Page | | Page | | Page |
|-------------------------------|---------------------------------|--|-------------------------|------------------------------|---------------|
| <i>Cyclodesmus</i> | 117, 127, 129 | <i>Dirhabdophallus</i> (?) <i>hoffmanni</i> .. | 165 | <i>Fontaria nahua</i> | 206 |
| — <i>aztecus</i> | 119 | — <i>hoffmanni</i> | 166 | — <i>otomita</i> | 207 |
| — <i>aztecus</i> | 127, 129 | — <i>montanus</i> | 163 | — <i>simillima</i> | 207 |
| CYCLORHABDUS | 167 | — <i>montanus</i> | 161, 164 | — <i>tepaneca</i> | 203, 204, 207 |
| <i>Cyclorhabdus</i> | 161 | — <i>plataleus</i> | 162, 164 | — <i>tolteca</i> | 208 |
| — <i>annulus</i> | 167 | — — <i>flaviporus</i> | 164 | — <i>totanaca</i> | 196 |
| — <i>contortus</i> | 168 | — <i>rodriguezii</i> | 164 | — <i>vicina</i> | 209 |
| CYCLOTHYRPHORUS | 83 | — <i>rodriguezii</i> | 163 | — <i>violacea</i> | 208 |
| <i>Cyclothyrophorus</i> | 89 | — <i>spatulatus</i> | 165 | — <i>virginiensis</i> | 188 |
| — <i>heteropygus</i> | 85 | — <i>spatulatus</i> | 163 | — <i>zapoteca</i> | 209 |
| — <i>heteropygus</i> | 84 | <i>Dolistenus</i> | 44 | — <i>zendala</i> | 209 |
| — <i>nietanus</i> | 84 | DUOPORUS | 172 | | |
| — <i>nietanus</i> | 85, 86 | <i>Duoporus</i> | 171 | <i>Geophilidae</i> | 35 |
| — <i>salvini</i> | 84 | — <i>barretti</i> | 172 | GEOPHILOMORPHA | 35 |
| — <i>salvini</i> | 83, 85 | | | GEOPHILUS | 35 |
| — <i>vulvanus</i> | 86 | EPINANNOLENE | 106 | — <i>aztecus</i> | 36 |
| — <i>vulvanus</i> | 84 | <i>Epinannolene</i> | 104, 105, 107 | — <i>aztecus</i> | 35 |
| <i>Cyliocyrtus</i> | 114, 115 | — <i>bicornis</i> | 107 | — <i>bilineatus</i> | 40 |
| — <i>asper</i> | 115 | — <i>pittieri</i> | 107 | — <i>brevilabiatum</i> | 40 |
| CYLIONUS | 127 | <i>Epistreptus</i> | 91, 92 | — <i>carpophagus</i> | 35 |
| <i>Cylionus</i> | 117, 119, 129 | — <i>oscenus</i> | 91 | — <i>godmani</i> | 37 |
| — <i>constrictus</i> | 127 | <i>Eucorybas</i> | 13 | — <i>godmani</i> | 36, 38 |
| — <i>constrictus</i> | 128, 129 | <i>Eupolydesmus</i> | 110 | — <i>lineatus</i> | 40 |
| — <i>gracilis</i> | 128 | <i>Eurhinocricus</i> | 68, 73 | — <i>mexicanus</i> | 40 |
| — <i>gracilis</i> | 127, 129 | — <i>biolleyi</i> | 72 | — <i>salvini</i> | 38 |
| CYPHODESMUS | 118 | <i>Eurymerodesmus</i> | 188, 189 | — <i>salvini</i> | 36 |
| <i>Cyphodesmus</i> | 117 | <i>Eurytropis</i> | 110 | — <i>stolli</i> | 38 |
| — <i>mexicanus</i> | 118 | EURYURINÆ | 147 | — <i>stolli</i> | 36 |
| CYRTODESMINÆ | 115 | <i>Euryurinae</i> | 113 | — <i>toltecus</i> | 37 |
| <i>Cyrtodesminæ</i> | 112, 114 | <i>Euryurus</i> | 154, 157, 158, 159 | — <i>toltecus</i> | 36, 38 |
| <i>Cyrtodesmus</i> | 114, 115, 133 | — <i>australis</i> | 158 | <i>Glomeridesmus</i> | 119 |
| — <i>asper</i> | 115 | — <i>dealbatus</i> | 158 | — <i>mexicanus</i> | 125, 126 |
| — <i>granosus</i> | 115, 116 | — <i>erichsonii</i> | 153 | <i>Glyphiulus</i> | 104 |
| — <i>velutinus</i> | 115 | — <i>erythropygus</i> | 158 | <i>Gymnostreptus</i> | 92, 93 |
| | | — <i>glaphyros</i> | 158 | — <i>perfidus</i> | 92 |
| <i>Decaporodesmidæ</i> | 130 | EUTYPORHACHIS | 168 | <i>Hercodesmus</i> | 130 |
| DECAPORODESMUS | 133 | <i>Eutyporhachis</i> | 161, 169 | <i>Himantarium</i> | 39 |
| <i>Decaporodesmus</i> | 131 | — <i>oltramarei</i> | 170 | | |
| — <i>motzoronginis</i> | 134 | — <i>oltramarei</i> | 169 | IULOIDEA | 53 |
| <i>Detodesmus</i> | 114 | — <i>tessellatus</i> | 169 | <i>Iuloidea</i> | 41 |
| — <i>aurantiacus</i> | 114 | — <i>tessellatus</i> | 168 | <i>Iulomorpha</i> | 104, 105 |
| <i>Diaporus</i> | 91, 93 | <i>Fontaria</i> .. | 110, 162, 185, 188, 189 | — <i>chilensis</i> | 104, 105 |
| — <i>americanus</i> | 91 | — <i>acolhua</i> | 203 | — <i>kinbergi</i> | 105 |
| <i>Diopsiulus</i> | 108 | — <i>angelus</i> | 203 | <i>Iulus</i> | 53, 58 |
| — <i>bellus</i> | 108 | — <i>consobrina</i> | 204 | | |
| DIPLOPODA | 41 | — <i>crassicutis</i> | 188 | <i>Julus aztecus</i> | 64, 68 |
| DIRHABDOPHALLUS | 161 | — <i>fraterna</i> | 205 | — <i>bioculatus</i> | 109 |
| <i>Dirhabdophallus</i> | 157, 162,
165, 167, 168, 182 | — <i>gracilis</i> | 160 | — <i>chichimecus</i> | 69 |
| — <i>carinovatus</i> | 166 | — <i>hispidipes</i> | 188, 189 | — <i>filicornis</i> | 58 |
| — <i>ensiger</i> | 165 | — <i>laticollis</i> | 189 | — <i>fraternus</i> | 101 |
| — <i>ensiger</i> | 163 | — <i>limax</i> | 188, 205 | — <i>mexicanus</i> | 81 |
| — <i>flaviporus</i> | 164 | — <i>martensii</i> | 186, 189 | — <i>montezumæ</i> | 99 |
| — <i>goudoti</i> | 162 | — <i>maya</i> | 208 | — <i>mystecus</i> | 81 |
| — <i>granosus</i> | 164 | — <i>montezumæ</i> | 195, 196 | — <i>nietanus</i> | 84 |
| — <i>granosus</i> | 163, 165, 166 | — <i>mysteca</i> | 206 | — <i>olivaceus</i> | 66 |

	Page		Page		Page
<i>Julus otomitus</i>	100	<i>Lithobius vulcani</i>	4, 9	<i>Oncodesmus granosus</i>	116
— <i>rasilis</i>	58	LOPHODESMUS	131	ONISCODESMIDÆ	113
— <i>tarascus</i>	57	<i>Lophodesmus</i> 111, 130, 133, 134		<i>Oniscodesmidæ</i>	112
— <i>tepanecus</i>	80	— <i>celatus</i>	133	ONISCODESMINÆ	114
— <i>toltecus</i>	68	— <i>celatus</i>	132	<i>Oniscodesminæ</i>	112
— <i>totanacus</i>	69	— <i>laminatus</i>	132	<i>Oniscodesmus</i> 114, 115, 116, 118	
— <i>tzendalus</i>	82	— <i>laminatus</i>	133	— <i>mexicanus</i>	118
— <i>zapotecus</i>	69	— <i>perparvus</i>	133	— <i>oniscinus</i>	114
<i>Katantodesmus</i>	116	— <i>perparvus</i>	132	<i>Opisthomega spinicauda</i>	28
<i>Leptodesminæ</i>	160	— <i>pusillus</i>	131, 133	ORPHNÆUS	40
<i>Leptodesmus</i>	161, 162, 174, 175, 179, 182, 189, 191, 195	<i>Mecistocephalus</i>	35	— <i>brasiliensis</i>	40
— <i>aztecus</i>	161, 162, 180	<i>Microrhachis</i>	174, 175	— <i>brevilabiatus</i>	40
— <i>carinovatus</i>	165, 166	— <i>uncinatus</i>	176	— <i>lividus</i>	40
— <i>carneus</i>	161, 162	<i>Nannolene</i>	104, 105, 106	ORTHOMORPHA	159
— <i>contortus</i>	168	— <i>burkei</i>	106	— <i>beaumonti</i>	159
— <i>granulosus</i>	161, 162, 208	NANNOLENIDÆ	104	— <i>coarctata</i>	159, 160
— <i>javanus</i>	161, 162	<i>Nannolenidæ</i>	90, 105	— <i>gracilis</i>	160
— <i>oltramareii</i>	170	NEOLEPTODESMUS	179	ORTHOPORUS	93
— <i>platuleus granosus</i>	164	<i>Neoleptodesmus</i> 162, 171, 180		<i>Orthoporus</i> 91, 92, 102, 103, 106	
— <i>rodriguezii</i>	164	— <i>aztecus</i>	180	— <i>ampussis</i>	102
— <i>sallei</i>	161, 162	— <i>aztecus</i>	181, 182	— <i>amulensis</i>	98
— <i>subterraneus</i>	161, 162	— <i>orizabæ</i>	181	— <i>amulensis</i>	94, 95
LIGIODESMUS	114	— <i>orizabæ</i>	180	— <i>chiriquensis</i>	97
<i>Ligiodesmus</i>	115, 116	— <i>sumichrasti</i>	181	— <i>chiriquensis</i>	94, 100, 103
— <i>pusillus</i>	114	— <i>sumichrasti</i>	180	— <i>confragosus</i>	101
<i>Lignydesmus</i>	114	— <i>vermiformis</i>	182	— <i>confragosus</i>	94, 102
— <i>rubriceps</i>	114	— <i>vermiformis</i>	180	— <i>cordovanus</i>	98
LITHOBIIDÆ	3	NEWPORTIA	32	— <i>cordovanus</i> 94, 95, 99, 100	
LITHOBIOMORPHA	3	<i>Newportia</i>	30, 35	— <i>diaporoides</i>	91
LITHOBIUS	3	— <i>azteca</i>	32	— <i>festæ</i>	102
— <i>aztecus</i>	10	— <i>azteca</i>	33	— <i>festæ</i>	103
— <i>aztecus</i>	3, 11, 12	— <i>balzani</i>	35	— <i>fraternus</i>	101
— <i>decodontus</i>	9	— <i>dentata</i>	32	— <i>montezumæ</i>	99
— <i>decodontus</i>	3	— <i>longitarsis</i>	30, 32	— <i>montezumæ</i>	95, 100, 101
— <i>forficatus</i>	9, 12	— <i>mexicana</i>	30	— <i>omalopyge</i>	103
— <i>godmani</i>	6	— <i>monticola</i>	32	— <i>omalopyge</i>	95
— <i>godmani</i>	4, 8, 9, 11	— <i>pusilla</i>	32, 35	— <i>otomitus</i>	100
— <i>humberti</i>	5	— <i>rogersi</i>	34	— <i>otomitus</i>	99, 101
— <i>humberti</i>	4, 7, 9	— <i>rogersi</i>	32	— <i>palmensis</i>	96
— <i>macroceros</i>	4	— <i>spinipes</i>	33	— <i>palmensis</i> 94, 95, 103, 104	
— <i>macroceros</i>	3	— <i>spinipes</i>	32, 35	— <i>rodriguezii</i>	103
— <i>mexicanus</i>	12	NEWPORTIIDÆ	29	— <i>rodriguezii</i>	95
— <i>mystecus</i>	10	NOTIPHILIDES	40	— —, subsp. <i>coriaceus</i> 103	
— <i>mystecus</i>	11	— <i>maximiliani</i>	40	— <i>striatulus</i>	99
— <i>pontifex</i>	5	<i>Notiphilus maximiliani</i>	40	— <i>striatulus</i>	94, 98, 102
— <i>pontifex</i>	4, 6, 7, 9, 12	<i>Octoglena</i>	42	— <i>teapensis</i>	97
— <i>salvini</i>	7	<i>Odontodesmus</i>	162	— <i>teapensis</i> 94, 95, 100, 102	
— <i>salvini</i>	4, 8, 9, 11	— <i>python</i>	142	— <i>typotopyge</i>	95
— <i>saussurei</i>	12	<i>Odontopeltis</i>	161, 168, 169	— <i>typotopyge</i>	94, 96, 97, 100, 103
— <i>stolli</i>	9	<i>Oligodesmus</i>	133	<i>Orya xanti</i>	40
— <i>stolli</i>	3	<i>Omodesmus</i>	115	OTOCRYPTOPS	29
— <i>toltecus</i>	11	ONCODESMUS	115	<i>Otocryptops</i>	28
— <i>vulcani</i>	8	<i>Oncodesmus</i>	114	— <i>ferrugineus</i>	29
				— <i>gracilis</i>	29
				— <i>melanostoma</i>	29

	Page		Page		Page
<i>Otocryptops rubiginosus</i>	28	<i>Paraiulus filicornis</i>	58	<i>Platydesmus mesomelas</i> ..	43, 44, 47
— <i>æurpinosus</i>	29	— <i>obtectus</i>	54	— <i>mexicanus</i>	48
<i>Otostigmus</i>	25	— <i>olmecus</i>	57	— <i>mexicanus</i>	43, 45, 49
— <i>appendiculatus</i>	25	— <i>olmecus</i>	54, 55, 58	— <i>moreleti</i>	48
— <i>brasiliensis</i>	25	— <i>pennsylvanicus</i>	54	— <i>moreleti</i>	44
— <i>inermis</i>	25	— <i>rasilis</i>	58	— <i>perpictus</i>	47
— <i>kervillei</i>	25	— <i>stylifer</i>	57	— <i>perpictus</i>	42, 44, 49
— <i>limbatus</i>	25	— <i>stylifer</i>	54, 55, 56, 58	— <i>polydesmoides</i>	48
— <i>occidentalis</i>	25	— <i>tarascus</i>	57	— <i>polydesmoides</i>	42, 43, 44
— <i>scabricauda</i>	25	— <i>tarascus</i>	58	— <i>triangulifer</i>	45
— <i>spiculiferus</i>	25	<i>Parajulus</i>	54	— <i>triangulifer</i>	46, 47, 48, 49
— <i>sulcatus</i>	25	— <i>olmecus</i>	54, 57	— <i>typhlus</i>	44
OXYPYGE	73	— <i>tarascus</i>	57	PLATYRACHIDÆ	137
<i>Oxypyge</i>	89	PARARHACHISTES	177	<i>Platyrachidæ</i>	113
— <i>varicolor</i>	73	<i>Pararhachistes</i>	171	PLATYRACHINÆ	138
<i>Oxyurus aztecus</i>	180	— <i>elevatus</i>	178	<i>Platyrachinæ</i>	113
— <i>intermedius</i>	181	— <i>elevatus</i>	177	PLATYRACHUS	138
— <i>orizabæ</i>	181	— <i>vertebratus</i>	178	<i>Platyrachus</i>	110, 156, 158
— <i>sumichrasti</i>	181	— <i>vertebratus</i>	177	— <i>bilineatus</i>	140
<i>Pachydesmus</i>	188, 189	PAROTOSTIGMUS	25	— <i>bilineatus</i>	139
<i>Pachymerium</i>	35	— <i>denticulatus</i>	25	— <i>bivirgatus</i>	142
<i>Pachyurus</i>	148, 149, 159	— <i>denticulatus</i>	26	— <i>bivirgatus</i> ..	139, 143, 145, 146
— <i>convexus</i>	150	— <i>limbatus</i>	26	— <i>clathratus</i>	143
— <i>erichsoni</i>	153	PERIDONTODESMIDÆ	134	— <i>fraternus</i>	142
— <i>granosus</i>	148	<i>Peridontodesmidæ</i>	112	— <i>fraternus</i>	139, 141, 143
— <i>heterosculptus</i>	157	PERIDONTODESMUS	135	— <i>limonensis</i>	142
— <i>klugii</i>	148, 152	<i>Peridontodesmus</i>	111, 134	— <i>limonensis</i> ..	139, 140, 141, 143
— <i>margaritaceus</i>	148	— <i>flagellatus</i>	136	— <i>mexicanus</i>	140
— <i>nitidus</i>	149	— <i>flagellatus</i>	135, 137	— <i>mexicanus</i> ..	139, 141, 143, 145
— <i>palicaudatus</i>	150	— <i>hirsutus</i>	136	— <i>montivagus</i>	143
— <i>squamatus</i>	148	— <i>hirsutus</i>	137	— <i>montivagus</i>	139, 141,
PAMMICROPHALLUS	183	— <i>woodianus</i>	137		144, 145, 146
<i>Pammicrophallus</i>	171, 184	— <i>woodianus</i>	135, 136	— <i>propinquus</i>	145
— <i>ornatus</i>	184	PHYLACTOPHALLUS	166	— <i>propinquus</i>	139
— <i>ornatus</i>	185, 186	<i>Phylactophallus</i>	161	— <i>python</i>	143
— <i>pictus</i>	185	— <i>stenomerus</i>	166	— <i>riparius</i>	143
— <i>pictus</i>	184, 186	<i>Physiostreptidæ</i>	105	— <i>riparius</i>	139
<i>Paracryptops</i>	28	<i>Physiostreptus</i>	104, 105, 107	— <i>scaber</i>	138, 139
<i>Paradesmorhachis</i>	148, 149	— <i>ortonedæ</i>	105	— <i>stenopterus</i>	145
— <i>solomonis</i>	148	<i>Piestodesmus</i>	42, 43	— <i>stenopterus</i>	139
<i>Paradesmus</i>	148, 159	— <i>moreleti</i>	42, 43, 48	— <i>tristani</i>	141
— <i>beaumonti</i>	159	PLATYDESMIDÆ	42	— <i>tristani</i>	139, 142, 143, 146
— <i>carolinensis</i>	159	PLATYDESMUS	42	<i>Platyrrhachus nitidus</i>	149
— <i>coarctatus</i>	159	<i>Platydesmus</i>	43, 44, 49	<i>Plutyrrhacus</i>	138
— <i>erichsonii</i>	152, 153, 159	— <i>analis</i>	46	— <i>bilneatus</i>	140
— <i>gracilis</i>	160	— <i>analis</i>	45	— <i>biolleyi</i>	146
— <i>klugii</i>	152, 159	— <i>guatemalensis</i>	49	— <i>bivirgatus</i>	142
— <i>picteti</i>	152, 159	— <i>guatemalensis</i>	43, 44	— <i>fraternus</i>	142
PARAIULIDÆ	53	— <i>hirudo</i>	46	— <i>limonensis</i>	142
PARAIULUS	54	— <i>hirudo</i>	43, 45, 47	— <i>mexicanus</i>	140, 143
<i>Paraiulus</i>	53, 58	— <i>lecontei</i>	43	— <i>montivagus</i>	143
— <i>amulensis</i>	55	— <i>lineatus</i>	46	— <i>propinquus</i>	145
— <i>amulensis</i>	56, 57, 58	— <i>lineatus</i>	45, 48	— <i>riparius</i>	143
— <i>aztecus</i>	56	— <i>marmoreus</i>	47	— <i>stenopterus</i>	145
— <i>aztecus</i>	55, 57, 58	— <i>marmoreus</i>	43, 44, 48	<i>Plusioporus</i>	91, 92, 93, 102
		— <i>mesomelas</i>	46	— <i>festæ</i>	102

	Page		Page		Page
<i>Plusioporus salvadorii</i>	91	<i>Polylepiscus stolli</i>	154, 156, 157	<i>Rhinocricus chichimecus</i>	69
<i>Plutoniinae</i>	28	<i>Polyzonium</i>	42	— <i>chichimecus</i>	70
<i>Plutonium</i>	28	<i>Prionopeltis</i>	110, 159	— <i>costaricensis</i>	71
<i>Polycricus</i>	35	<i>Pseudoiulus</i>	54, 58	— <i>costaricensis</i>	72
— <i>toitecus</i>	37	<i>Pseudojulus</i>	54	— <i>dugesi</i>	71
POLYDESMOIDEA	109	— <i>obtectus</i>	54	— <i>dugesi</i>	68
<i>Polydesmoidea</i>	41, 210	<i>Pseudonannolene</i> .	104, 105, 106, 107	— <i>ferrugineus</i>	70
<i>Polydesmus</i>	138, 148, 169, 176	<i>Pseudonannolenidæ</i>	105	— <i>hagedussii</i>	70
— <i>acolhuus</i>	203	<i>Psochodesmus</i>	130, 131	— <i>hagedussii</i>	68, 71
— <i>aduncus</i>	175	— <i>crescentis</i>	131	— <i>marci</i>	66
— <i>angelus</i>	203	<i>Ptyoiulus</i>	54	— <i>marci</i>	60
— <i>aztecus</i>	180	— <i>pennsylvanicus</i>	54	— <i>nodosicollis</i>	72
— <i>bilineatus</i>	140	PYRGODESMIDÆ	130	— <i>obesus</i>	71
— <i>coccineus</i>	179	<i>Pyrgodesmidæ</i>	112	— <i>ocraceus</i>	72
— <i>consobrinus</i>	204	<i>Pyrgodesminæ</i>	130	— <i>olivaceus</i>	66
— <i>erichsonii</i>	152, 153	<i>Pyrgodesmus</i>	130, 134	— <i>olivaceus</i>	60
— <i>fraternus</i>	205	<i>Rachidomorpha adunca</i>	175	— <i>omiltemæ</i>	67
— <i>granosus</i>	116	— <i>uncinata</i>	175	— <i>omiltemæ</i>	59, 73
— <i>granulosus</i>	208	<i>Ruchis</i>	176	— <i>parcus</i>	59
— <i>intermedius</i>	181	<i>Rhachidesminæ</i>	113, 170	— <i>rixi</i>	64
— <i>klugii</i>	152	<i>Rhachidesmus</i>	170	— <i>rixi</i>	60
— <i>limax</i>	205	— <i>tarasca</i>	167	— <i>rogersi</i>	61
— <i>mayus</i>	208	RHACHIDOMORPHA	174	— <i>rogersi</i>	60, 62
— <i>mexicanus</i>	140	<i>Rhachidomorpha</i>	167, 171, 175	— <i>rubicundus</i>	71
— <i>montezumæ</i>	195	— <i>adunca</i>	175	— <i>salleanus</i>	64
— <i>mystecus</i>	206	— <i>adunca</i>	174, 176	— <i>salleanus</i>	61, 65, 66
— <i>nahuus</i>	206	— <i>tarasca</i>	175	— <i>scobinatus</i>	65
— <i>orizabæ</i>	181	— <i>tarasca</i>	174, 176, 178	— <i>scobinatus</i>	60
— <i>otomitus</i>	207	— <i>uncinata</i>	175	— <i>smithi</i>	62
— <i>picteti</i>	152	<i>Rhachis</i>	170, 176, 184	— <i>smithi</i>	61, 69, 73
— <i>python</i>	142	— <i>uncinatus</i>	176	— <i>sp.</i>	83
— <i>simillimus</i>	207	— <i>viridis</i>	176	— <i>sp.</i>	83
— <i>sumichrasti</i>	181	RHACHODESMINÆ	170	— <i>stolli</i>	62
— <i>tarasca</i>	175	RHACHODESMUS	176	— <i>stolli</i>	61
— <i>tepanecus</i>	207	<i>Rhachodesmus</i>	170, 171,	— <i>toltecus</i>	68
— <i>toltecus</i>	208		172, 173, 174, 177	— <i>totanacus</i>	69
— <i>totanacus</i>	196	— <i>viridis</i>	176	— <i>tristani</i>	63
— <i>uncinatus</i>	175	<i>Rhacophorus</i>	161, 168	— <i>tristani</i>	60, 64, 71
— <i>vermiformis</i>	182	— <i>conspersus</i>	168, 169	— <i>zapotecus</i>	69
— <i>vicinus</i>	209	— <i>hoffmanni</i>	165	RHYSIDA	26
— <i>virginiensis</i>	188	RHINOCRICUS	59	— <i>celeris</i>	27
— <i>viridis</i>	176	<i>Rhinocricus</i> ..	67, 68, 72, 73, 83, 89	— <i>celeris</i>	26
— <i>woodianus</i>	137	— <i>angusticollis</i>	70	— <i>ceylonica</i>	27
— <i>zapotecus</i>	209	— <i>aposematus</i>	63	— <i>gymnopus</i>	27
— <i>zendalus</i>	209	— <i>aposematus</i>	60, 64, 71	— <i>immarginata</i>	26
<i>Polylepis</i>	148, 149	— <i>atoyacus</i>	65	— <i>immarginata</i>	27
— <i>granosus</i>	148, 149	— <i>atoyacus</i>	61	— <i>longipes</i>	27
POLYLEPISCUS	154	— <i>aurocinctus</i>	62	— <i>longipes</i>	26
<i>Polylepiscus</i>	148, 153, 157	— <i>aurocinctus</i>	61, 69, 73	RHYSODESMUS	188
— <i>actæon</i>	155	— <i>aztecus</i>	68	<i>Rhysodesmus</i>	187, 189, 196
— <i>actæon</i>	154, 156, 157	— <i>aztecus</i>	64, 69	— <i>acolhuus</i>	203
— <i>furcifer</i>	156	— <i>biolleyi</i>	72	— <i>acolhuus</i>	194, 206, 209
— <i>furcifer</i>	154, 157	— <i>biolleyi</i>	68, 73	— <i>angelus</i>	203
— <i>heterosculptus</i>	157	— <i>brevicollis</i>	69	— <i>angelus</i>	195, 204
— <i>heterosculptus</i> ..	154, 155, 156	— <i>brevicollis</i>	70	— <i>arcuatus</i>	201
— <i>stolli</i>	155			— <i>arcuatus</i>	194, 195

	Page		Page		Page
<i>Rhysodesmus attemsi</i>	200	<i>Scaphiostreptus fuscipes</i>	92	<i>Scolopendridæ stollii</i>	31
— <i>attemsi</i>	192, 195, 204	— <i>omalopyge</i>	103	— <i>stollii</i>	30
— <i>championi</i>	198	— <i>rodriguezii</i>	103	SCOLOPENDRINÆ	13
— <i>championi</i>	191, 195	— <i>tynotopyge</i>	95	SCOLOPENDROMORPHA	13
— <i>consobrinus</i>	204	— — <i>palmensis</i>	96	<i>Scolopendropsis</i>	28
— <i>consobrinus</i>	194, 207	<i>Schizotarsia</i>	1	SCOLOPOCRYPTOPIDÆ	28
— <i>flavocinctus</i>	199	SCOLOPENDRA	13	<i>Scolopocryptops</i>	28
— <i>flavocinctus</i>	193, 195, 200	<i>Scolopendra</i>	22, 23	— <i>melanostoma</i>	29
— <i>fraternus</i>	205	— <i>azteca</i>	21, 22, 24	— <i>mexicana</i>	30
— <i>fraternus</i> ..	195, 204, 207, 209	— <i>brandtiana</i>	14	— <i>miersii</i>	28
— <i>godmani</i>	199	— <i>castaneiceps</i>	18, 19	SCUTIGERA	1
— <i>godmani</i> ..	191, 194, 195, 200	— <i>chichimeca</i>	15, 16	— <i>coleoprata</i>	2
— <i>inustus</i>	202	— <i>copeana</i>	19	— <i>forceps</i>	2
— <i>inustus</i>	193, 195	— <i>copeana</i>	14, 20, 21	— <i>linceci</i>	1
— <i>limax</i>	205	— —, subsp. <i>gaumeri</i>	20	— <i>linceci</i>	2
— <i>limax</i>	190, 195	— <i>ferruginea</i>	29	— <i>mexicana</i>	1
— <i>montezumæ</i>	195	— <i>gigas</i>	14	— <i>nigro-vittata</i>	2
— <i>montezumæ</i> ..	192, 193, 196, 205	— <i>gigas</i>	13	— <i>occidentalis</i>	1
— <i>mystecus</i>	206	— <i>heros</i>	18	— <i>rugosa</i>	3
— <i>mystecus</i>	194, 209, 210	— <i>heros</i>	14, 19, 20, 21, 24	SCUTIGERIDÆ	1
— <i>nahuus</i>	206	— <i>inæquidens</i>	17	SCUTIGEROMORPHA	1
— <i>nahuus</i>	195	— <i>maya</i>	21, 22	<i>Scytonotus woodiamus</i>	137
— <i>notostictus</i>	202	— <i>morsitans</i>	14	<i>Siphonocybe</i>	50
— <i>notostictus</i>	193, 195	— <i>morsitans</i>	13	— <i>hartii</i>	50
— <i>otomitus</i>	207	— <i>mysteca</i>	18, 21	SIPHONOPHORA	50
— <i>otomitus</i> ..	194, 197, 204, 209	— <i>nicaraguensis</i>	24	<i>Siphonophora</i>	49
— <i>pusillus</i>	197	— <i>occidentalis</i>	24	— <i>brevicornis</i>	50
— <i>pusillus</i>	190, 204	— <i>olmeca</i>	16, 17	— <i>brevicornis</i>	51
— <i>salvini</i>	200	— <i>otomita</i>	21, 22	— <i>cornuta</i>	50
— <i>salvini</i>	192, 195	— <i>pachygnatha</i>	23	— <i>cornuta</i>	51
— <i>simillimus</i>	207	— <i>pachygnatha</i>	14	— <i>globiceps</i>	51
— <i>simillimus</i> ..	194	— <i>pachypus</i>	19, 20, 22, 24	— <i>globiceps</i>	50
— <i>smithi</i>	201	— <i>parva</i>	21, 23	— <i>mexicana</i>	51
— <i>smithi</i>	193, 194	— <i>polymorpha</i>	18, 20	SIPHONOPHORIDÆ	49
— <i>stollii</i>	198	— <i>pomacea</i>	15	<i>Siphonotus</i>	42
— <i>stollii</i>	191, 195, 199, 209	— <i>pomacea</i>	13, 16, 17	SPHÆRIODESMIDÆ	117
— <i>tabascensis</i>	198	— <i>punctiventris</i>	17	<i>Sphæriodesmidæ</i>	112
— <i>tabascensis</i> ..	191, 195, 199	— <i>punctiventris</i>	13	SPHÆRIODESMINÆ	119
— <i>tapanecus</i>	207	— <i>pygmæa</i>	15	<i>Sphæriodesminæ</i>	112, 117
— <i>tapanecus</i> ..	194, 204	— <i>pygmæa</i>	13	SPHÆRIODESMUS	119
— <i>toltecus</i>	208	— <i>subspinipes</i>	14	<i>Sphæriodesmus</i>	111, 117,
— <i>toltecus</i>	195	— <i>subspinipes</i>	13	127, 128, 129, 186	
— <i>totanacus</i>	196	— <i>sumichrasti</i>	20	— <i>angustus</i>	123
— <i>totanacus</i>	191, 192,	— <i>sumichrasti</i>	13, 21	— <i>angustus</i>	120, 121
195, 197, 208		— <i>tenuitarsis</i>	18	— <i>coriaceus</i>	125
— <i>vicinus</i>	209	— <i>tenuitarsis</i>	14	— <i>coriaceus</i>	120, 122
— <i>vicinus</i>	194, 197	— <i>tolteca</i>	21, 22, 23	— <i>digitatus</i>	124
— <i>violaceus</i>	208	— <i>viridis</i>	21	— <i>digitatus</i>	120
— <i>violaceus</i>	195	— <i>viridis</i>	14, 17, 22, 23, 24	— <i>gracilis</i>	128, 129
— <i>zapotecus</i>	209	— <i>woodii</i>	17	— <i>medius</i>	126
— <i>zapotecus</i> ..	194, 207	SCOLOPENDRIDÆ	13	— <i>medius</i>	122
— <i>zendalus</i>	209	SCOLOPENDRIDES	30	— <i>mexicanus</i>	125
— <i>zendalus</i>	194	— <i>brevipes</i>	30	— <i>mexicanus</i>	122, 126
<i>Scaphiostreptus</i>	92, 93	— <i>ernsti</i>	30	— <i>neglectus</i>	126
— <i>confragosus</i>	101	— <i>mexicanus</i>	30	— <i>neglectus</i>	121
		— <i>mexicanus</i>	31	— <i>oniscus</i>	122

	Page		Page		Page
<i>Sphaeriodesmus oniscus</i>	120, 121, 125	<i>Spirobolus mystecus</i>	81	<i>Stiodesmidæ</i>	130
— <i>prehensor</i>	123	— <i>mystecus</i>	74, 75, 79, 80, 82, 83	STRONGYLODESMUS	172
— <i>prehensor</i>	120, 121, 129	— <i>nahuus</i>	88	<i>Strongyloidesmus</i>	171, 173, 177, 184
— <i>robustus</i>	122	— <i>nietanus</i>	83, 84, 85, 86	— <i>cyaneus</i>	173
— <i>robustus</i>	120, 121, 123, 125, 129	— <i>olivaceus</i>	66	— <i>cyaneus</i>	174
— <i>saussurei</i>	126	— <i>parcus</i>	59	— <i>geddesi</i>	173
— <i>saussurei</i>	122	— <i>platyops</i>	76	— <i>geddesi</i>	174
— <i>stilifer</i>	124	— <i>platyops</i>	74	— <i>viridis</i>	173
— <i>stilifer</i>	120, 121	— <i>reptans</i>	83	<i>Strongylosoma</i>	178, 180
SPIROBOLELLUS	86	— <i>reptans</i>	79	— <i>coccineum</i>	179
<i>Spirobolellus</i>	89	— <i>stolli</i>	77	— <i>vermiforme</i>	182
— <i>atriculus</i>	88	— <i>stolli</i>	74, 75, 78	<i>Strongylosomatidæ</i>	158
— <i>atriculus</i>	87	— <i>tapanecus</i>	80	STRONGYLOSOMIDÆ	158
— <i>chrysodirus</i>	86	— <i>tapanecus</i>	74, 75, 79, 81, 82	<i>Strongylosomidæ</i>	113
— <i>nahuus</i>	88	— <i>toltecus</i>	68	<i>Strongylosominæ</i>	158
— <i>richardsoni</i>	87	— <i>tzendalus</i>	82	<i>Stylodesmidæ</i>	130
— <i>richardsoni</i>	86, 88	— <i>tzendalus</i>	77, 78	<i>Stylodesmus</i>	130
— <i>tylopus</i>	87	— <i>vulvanus</i>	83, 86	<i>Sulciferus</i>	110
— <i>tylopus</i>	88	SPIROSTREPTIDÆ	90	THEATOPS	28
SPIROBOLIDÆ	59	SPIROSTREPTOIDEA	90	— <i>spinicauda</i>	28
SPIROBOLOIDEA	59	<i>Spirostreptoidea</i>	41	TIRODESMUS	146
<i>Spiroboloidea</i>	41	<i>Spirostreptus</i>	91, 93, 105	<i>Tiodesmus</i>	138
SPIROBOLUS	74	— <i>ampussis</i>	102	— <i>biolleyi</i>	146
<i>Spirobolus</i>	59, 76, 83, 89	— <i>confragosus</i>	101	— <i>biolleyi</i>	147
— <i>amulensis</i>	79	— <i>fraternus</i>	98, 101	— <i>fimbriatus</i>	146
— <i>amulensis</i>	75	— <i>montezumæ</i>	99	<i>Trachelodesmus</i>	134
— <i>angusticollis</i>	70	— <i>omalopyge</i>	103	<i>Trachyiulus</i>	104
— <i>aztecus</i>	64	— <i>otomitus</i>	98, 99, 100	<i>Trigoniulus</i>	76
— <i>brevicollis</i>	69	— <i>rodriguezii</i>	103	<i>Trigonostylus</i>	117
— <i>bungii</i>	74	— —, var. <i>coriaceus</i>	103	<i>Tropisoma coccineum</i>	179
— <i>chichimecus</i>	69	— <i>typotopyge</i>	95		
— <i>dugesii</i>	71	— — <i>palmensis</i>	96	<i>Unguipalpi</i>	3
— <i>eximius</i>	82	<i>Stemmatoiulus</i>	109	<i>Urodesmus</i>	130, 134
— <i>eximius</i>	75, 78	— <i>bioculatus</i>	109	<i>Urotropis</i>	91, 92
— <i>ferrugineus</i>	70	STEMMIULIDÆ	108	— <i>carinatus</i>	91, 92
— <i>fossulifer</i>	78	STEMMIULOIDEA	108		
— <i>fossulifer</i>	75, 77, 79	STEMMIULUS	109	<i>Xystodesmidæ</i>	186
— <i>godmani</i>	78	<i>Stemmiulus</i>	108	XYSTODESMINÆ	186
— <i>godmani</i>	74, 75, 76, 77	— <i>bioculatus</i>	109	<i>Xystodesminæ</i>	113
— <i>hagedussii</i>	70	— <i>ceylonicus</i>	108	<i>Xystodesmus</i>	186, 189
— <i>heteropygus</i>	83, 85	— <i>compressus</i>	108		
— <i>hoplomerus</i>	76	STENODESMUS	187	ZEUCTODESMUS	185
— <i>hoplomerus</i>	74	<i>Stenodesmus</i>	172	<i>Zeuctodesmus</i>	171, 184
— <i>mexicanus</i>	81	— <i>mexicanus</i>	187	— <i>cæruleus</i>	186
— <i>mexicanus</i>	76	<i>Stenonia</i>	138		
— <i>monticola</i>	80	— <i>bilineata</i>	140		
— <i>monticola</i>	74, 79	— <i>mexicana</i>	140		

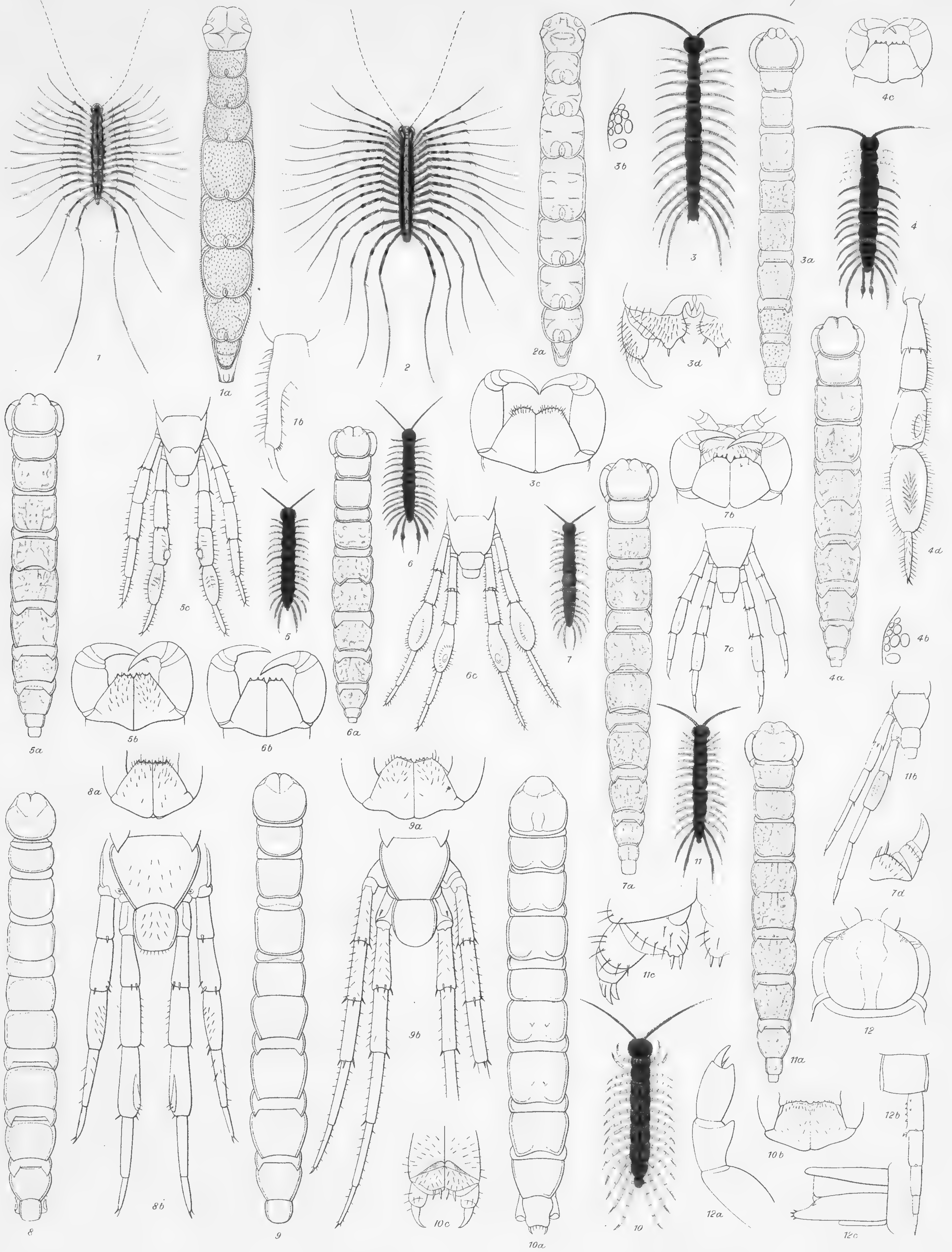
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CHILOPODA.

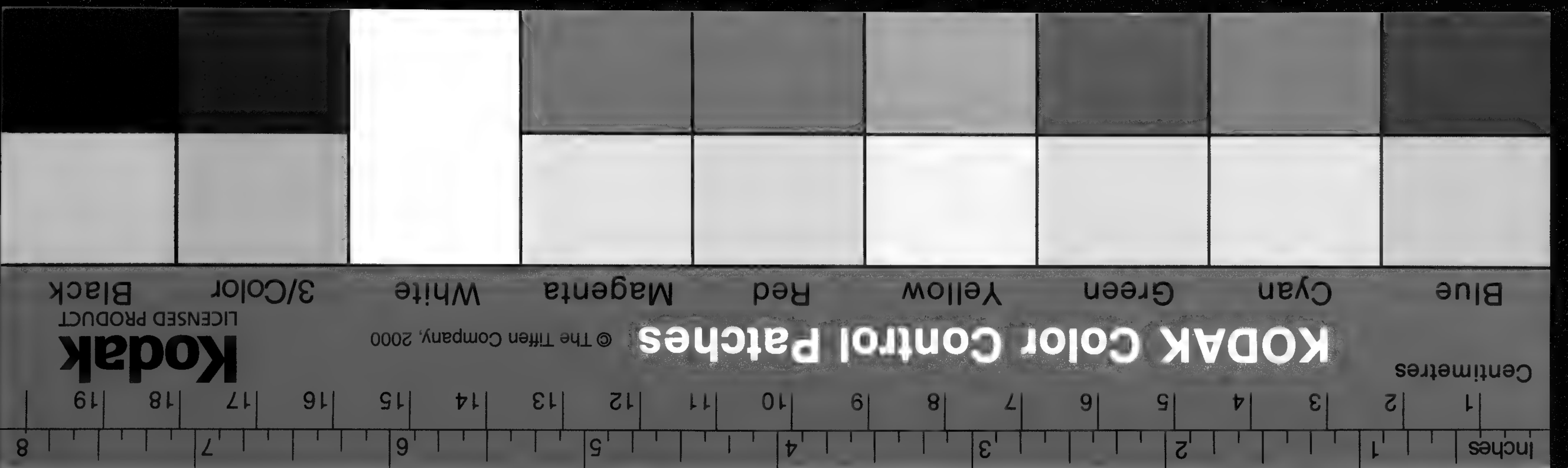
PLATE I.

Fig. 1. *Scutigera linceci*, Wood, nat. size.

- | | | | |
|-------|---------------------------------------|----------------------------------|--|
| 1 a. | „ | „ | upperside of body and head. |
| 1 b. | „ | „ | generative forceps of ♀. |
| 2. | „ | <i>nigro-vittata</i> , Mein., | nat. size. |
| 2 a. | „ | „ | upperside of body and head. (In this figure the borders of the terga should be a little more convex and sinuate, and the stoma-saddles a trifle longer.) |
| 3. | <i>Lithobius macroceros</i> , sp. n., | nat. size. | ♀. |
| 3 a. | „ | „ | upperside of body and head. |
| 3 b. | „ | „ | eyes. |
| 3 c. | „ | „ | maxillipedes. |
| 3 d. | „ | „ | generative forceps of ♀. |
| 4. | „ | <i>pontifex</i> , sp. n., | nat. size. ♂. |
| 4 a. | „ | „ | upperside of body and head. |
| 4 b. | „ | „ | eyes. |
| 4 c. | „ | „ | maxillipedes. |
| 4 d. | „ | „ | anal leg from above. |
| 5. | „ | <i>humberti</i> , sp. n., | nat. size. |
| 5 a. | „ | „ | upperside of body and head. |
| 5 b. | „ | „ | maxillipedes. |
| 5 c. | „ | „ | legs of fourteenth and fifteenth pairs. |
| 6. | „ | <i>godmani</i> , sp. n., | nat. size. ♂. |
| 6 a. | „ | „ | upperside of body and head. |
| 6 b. | „ | „ | maxillipedes. |
| 6 c. | „ | „ | legs of fourteenth and fifteenth pairs. |
| 7. | „ | <i>salvini</i> , sp. n., | nat. size. ♂. |
| 7 a. | „ | „ | upperside of body and head. |
| 7 b. | „ | „ | maxillipedes. |
| 7 c. | „ | „ | legs of fourteenth and fifteenth pairs. |
| 7 d. | „ | „ | left half of generative forceps of ♀. |
| 8. | „ | <i>vulcani</i> , sp. n. : | upperside of body and head. |
| 8 a. | „ | „ | maxillipedes. |
| 8 b. | „ | „ | legs of fourteenth and fifteenth pairs. |
| 9. | „ | <i>decodontus</i> , sp. n. : | upperside of body and head. |
| 9 a. | „ | „ | maxillipedes. |
| 9 b. | „ | „ | legs of fourteenth and fifteenth pairs. |
| 10. | „ | <i>stolli</i> , sp. n., | nat. size. ♀. |
| 10 a. | „ | „ | upperside of body and head. |
| 10 b. | „ | „ | maxillipedes. |
| 10 c. | „ | „ | generative forceps of ♀. |
| 11. | „ | <i>aztecus</i> , Humb. & Sauss., | nat. size. |
| 11 a. | „ | „ | upperside of body and head. |
| 11 b. | „ | „ | legs of fourteenth and fifteenth pairs. |
| 11 c. | „ | „ | generative forceps of ♀. |
| 12. | <i>Scolopendra heros</i> , Girard : | head-plate. | |
| 12 a. | „ | „ | left maxillary palp. |
| 12 b. | „ | „ | anal tergite and leg. |
| 12 c. | „ | „ | anal somite from the side. |



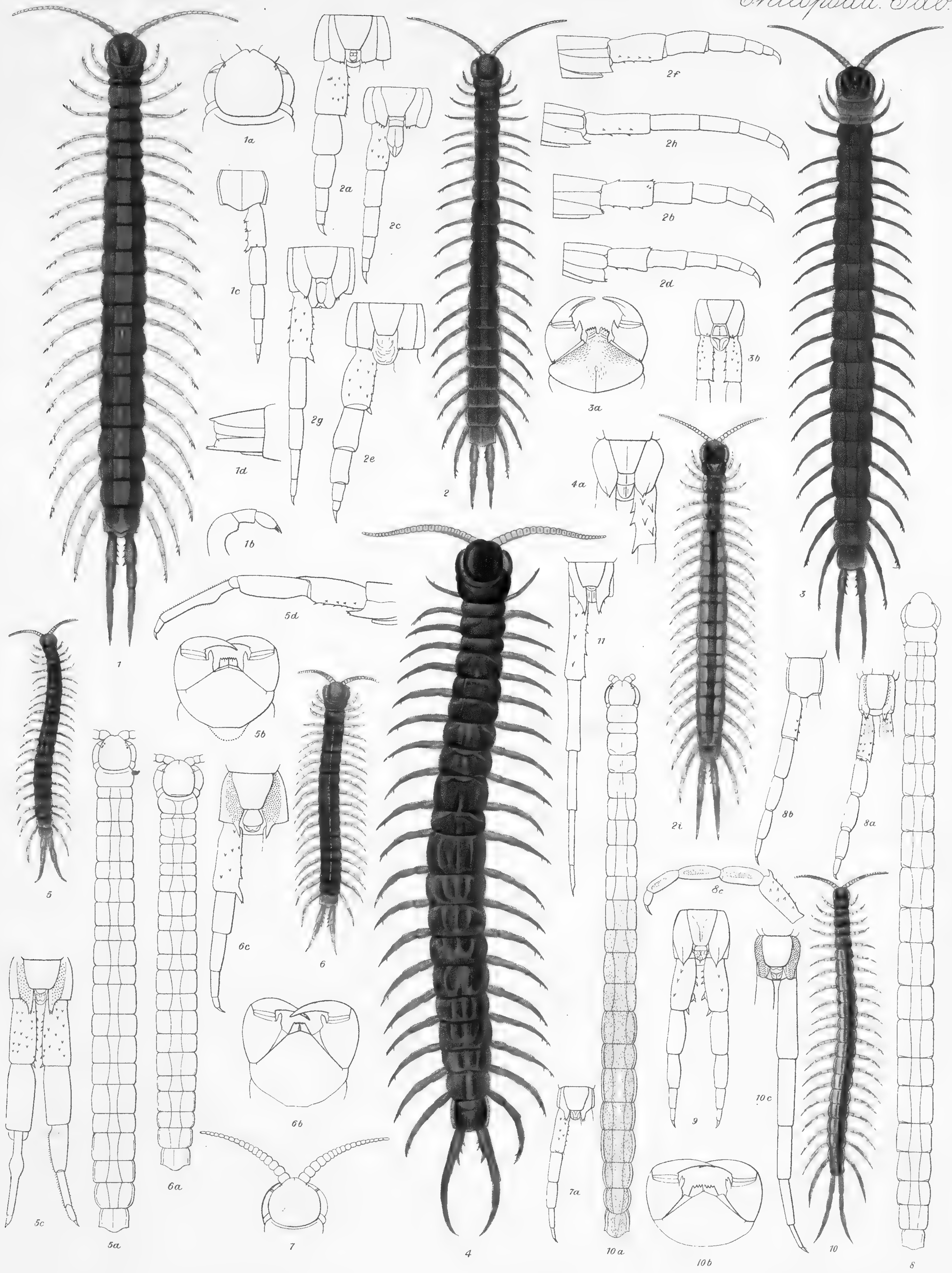
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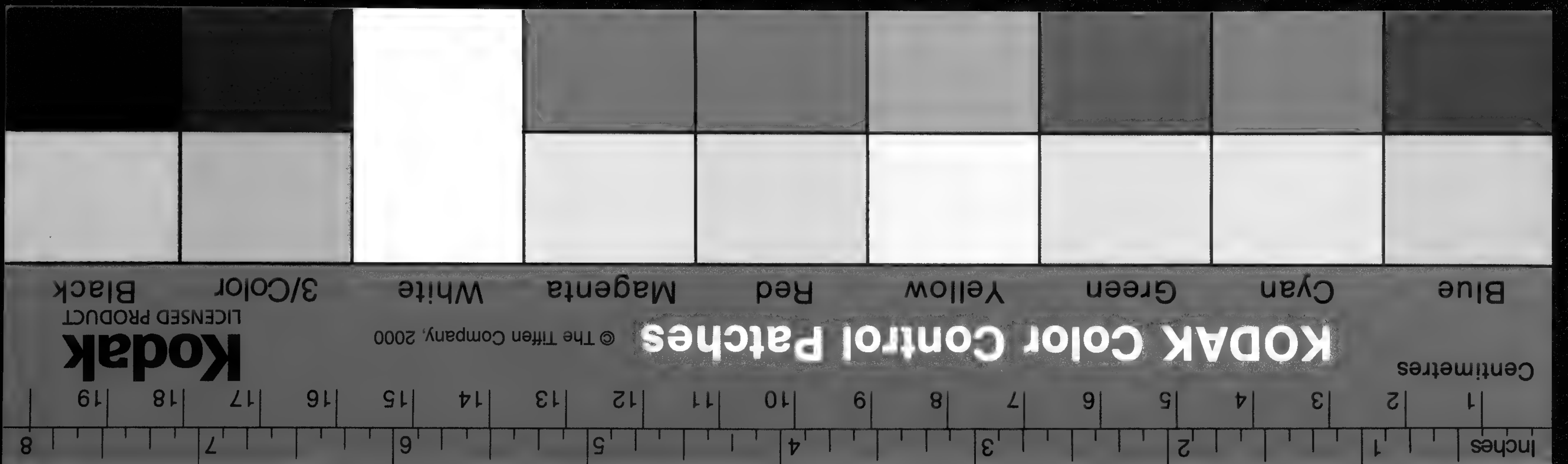
CHILOPODA.

PLATE II.

- Fig. 1. *Scolopendra copeana*, Wood, nat. size. Specimen from Chihuahua (Mexico).
- 1 a. " " head-plate.
 1 b. " " maxillary palp.
 1 c. " " anal tergite and leg.
 1 d. " " anal somite from the side.
2. " *viridis*, Say, nat. size. Specimen from San Andres Tuxtla, belonging to the subspecies *azteca*, Sauss.
- 2 a. " " anal somite from below.
 2 b. " " anal somite from the side.
 2 c, 2 d. " " anal somite of specimen from San Diego (Texas).
 2 e, 2 f. " " anal somite of a second specimen.
 2 g, 2 h. " " anal somite of a third specimen.
 2 i. " " Specimen from the United States without special locality, showing coloration of the type.
3. " *pachygnatha*, sp. n., nat. size.
- 3 a. " " maxillipedes.
 3 b. " " anal somite from below.
4. " *sumichrasti*, Sauss. Specimen from British Honduras, reduced.
- 4 a. " " anal somite from below.
5. " *tenuitarsis*, sp. n., nat. size.
- 5 a. " " body and head magnified.
 5 b. " " maxillipedes.
 5 c. " " anal somite from below.
 5 d. " " abnormal anal leg.
6. " *punctiventris*, Newp. Specimen from Omilteme. Nat. size.
- 6 a. " " body and head enlarged.
 6 b. " " maxillipedes.
 6 c. " " anal somite from below.
7. " *pomacea*, C. Koch : head.
- 7 a. " " anal somite from below.
8. " *pygmæa*, sp. n. : body and head, much enlarged.
- 8 a. " " anal somite from above.
 8 b. " " anal somite from below.
 8 c. " " anal leg, inner surface.
9. " *subspinipes*, Leach : lower view of anal somite of specimen from Mexico.
10. *Parotostigmus denticulatus*, gen. et sp. n., nat. size.
- 10 a. " " body and head, enlarged.
 10 b. " " maxillipedes.
 10 c. " " anal somite from below.
11. *Rhysida longipes* (Newp.) : anal somite from below.



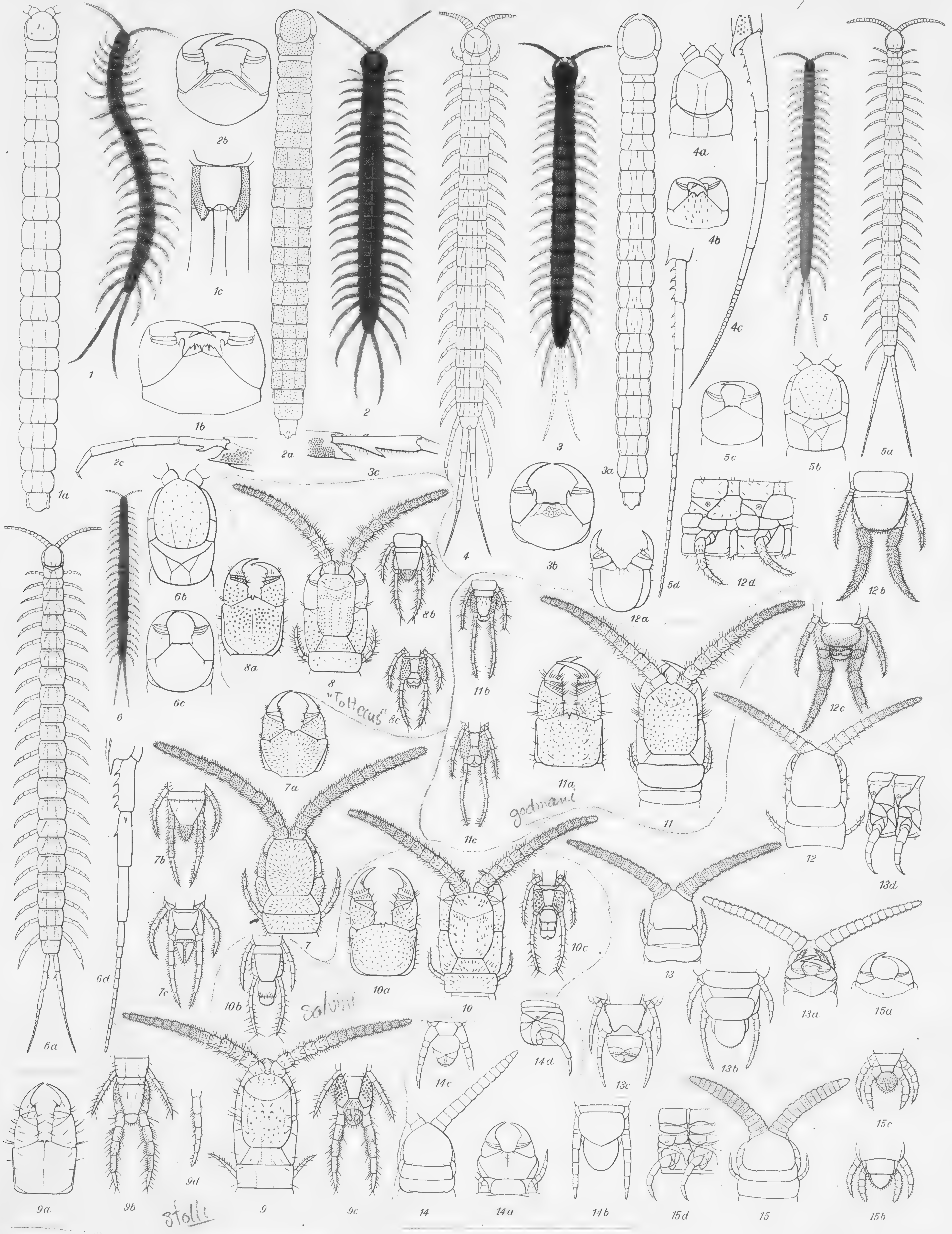
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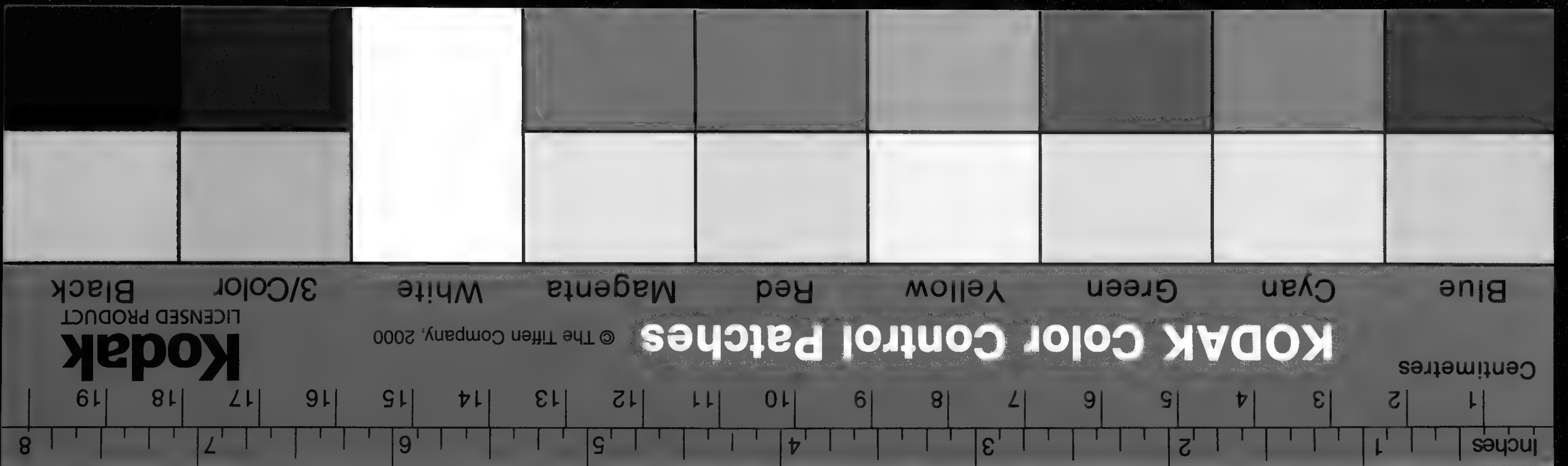
CHILOPODA.

PLATE III.

- Fig. 1. *Rhysida immarginata*, Porat, nat. size (specimen from Belize): 1 *a*, enlarged view of dorsal surface; 1 *b*, maxillipedes; 1 *c*, anal somite from below.
2. *Otocryptops ferrugineus* (Linn.), nat. size: 2 *a*, dorsal surface enlarged; 2 *b*, maxillipedes; 2 *c*, anal somite from the side.
3. *Otocryptops melanostoma* (Newp.), nat. size (specimen from Guatemala): 3 *a*, dorsal surface; 3 *b*, maxillipedes; 3 *c*, anal somite from the side.
4. *Scolopendrides stolli*, sp. n., outline view of dorsal surface: 4 *a*, enlarged view of head and first tergite; 4 *b*, ditto of maxillipedes; 4 *c*, ditto of external view of anal leg and pleura.
5. *Newportia spinipes*, sp. n., nat. size: 5 *a*, dorsal surface enlarged; 5 *b*, head and first tergite; 5 *c*, maxillipedes; 5 *d*, lateral view of anal leg and apex of pleura.
6. *Newportia rogersi*, sp. n., nat. size: 6 *a*, dorsal surface enlarged; 6 *b*, head and first tergite; 6 *c*, maxillipedes; 6 *d*, lateral view of anal leg and apex of pleura.
7. *Geophilus aztecus*, Humb. & Sauss., anterior end from above: 7 *a*, maxillipedes; 7 *b*, posterior end from above; 7 *c*, posterior end from below.
8. *Geophilus toltecus*, Humb. & Sauss., anterior end from above: 8 *a*, maxillipedes; 8 *b*, posterior end from above; 8 *c*, posterior end from below.
9. *Geophilus stolli*, sp. n., anterior end from above: 9 *a*, maxillipedes; 9 *b*, posterior end from above, ♂; 9 *c*, posterior end from below, ♂; 9 *d*, anal leg from above, ♀.
10. *Geophilus salvini*, sp. n., anterior end from above: 10 *a*, maxillipedes; 10 *b*, posterior end from above, ♀; 10 *c*, posterior end from below, ♀.
11. *Geophilus godmani*, sp. n., anterior end from above: 11 *a*, maxillipedes; 11 *b*, posterior end from above, ♀; 11 *c*, posterior end from below, ♀.
12. *Chomatophilus smithi*, gen. et sp. n., anterior end from above: 12 *a*, maxillipedes; 12 *b*, posterior end from above; 12 *c*, posterior end from below; 12 *d*, lateral view of two median segments.
13. *Chomatobius mexicanus*, Humb. & Sauss., anterior end from above: 13 *a*, anterior end from below; 13 *b*, posterior end from above; 13 *c*, posterior end from below; 13 *d*, lateral view of two median segments. (Figures taken from an example obtained by Mr. W. Taylor at San Diego, Texas.)
14. *Orphnæus brevilabiatus* (Newp.), anterior end from above: 14 *a*, maxillipedes; 14 *b*, posterior end from above; 14 *c*, posterior end from below; 14 *d*, lateral view of a median segment. (Specimen from Tampico, Tamaulipas.)
15. *Notiphilides maximiliani*, Humb. & Sauss., anterior end from above: 15 *a*, maxillipedes; 15 *b*, posterior end from above; 15 *c*, posterior end from below; 15 *d*, lateral view of two median segments. (Specimen from Teapa, Tabasco.)



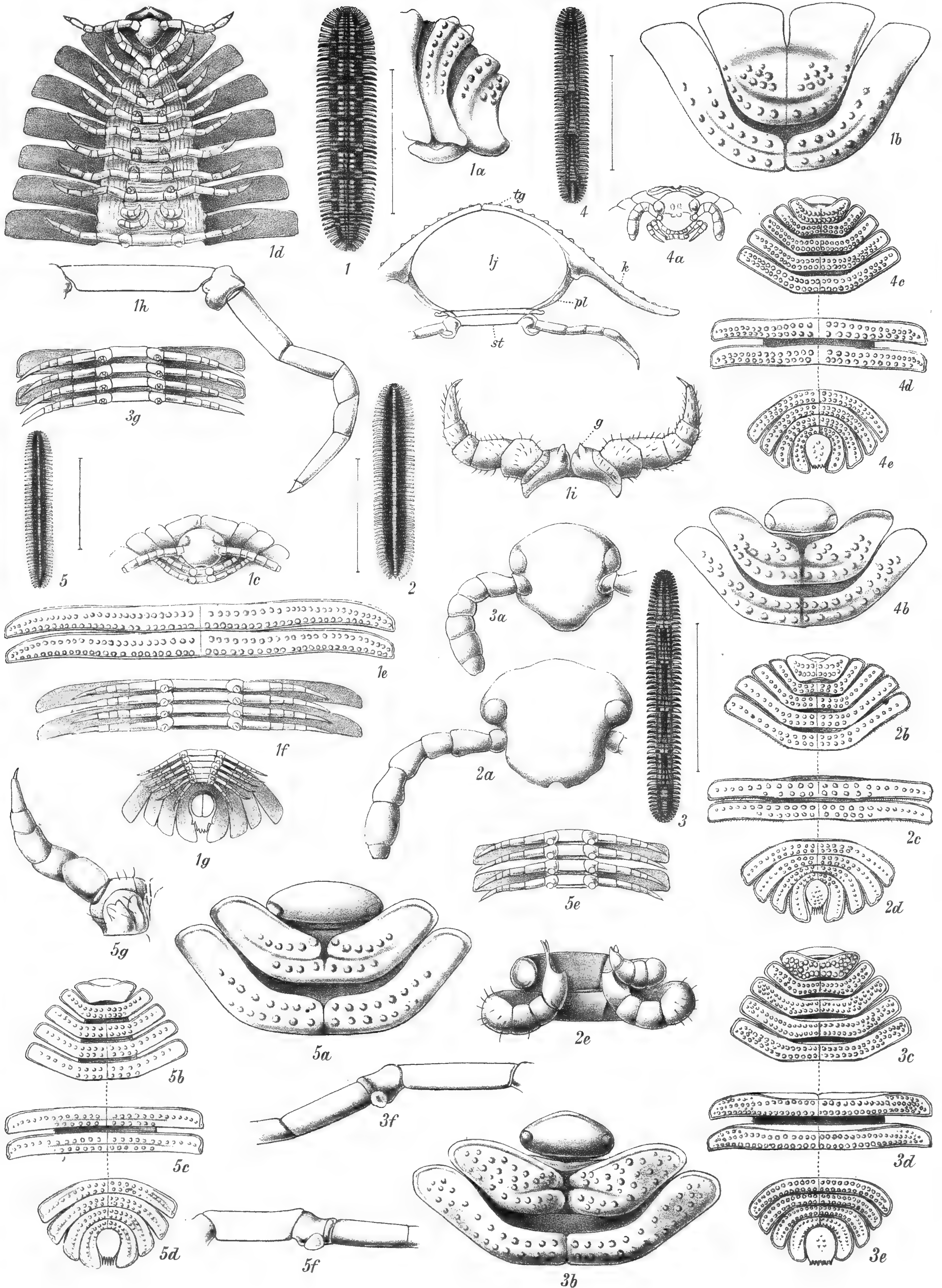
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DIPLOPODA.

PLATE IV.

- Fig. 1. *Platydesmus perpictus*, sp. n., $\times 1\frac{1}{2}$: 1 *a*, lateral view of first and second segments; 1 *b*, dorsal view of first and second segments; 1 *c*, ventral view of head and first three segments; 1 *d*, ventral view of first eight segments of male, showing eight pairs of legs in front of copulatory organs (partially diagrammatic); 1 *e*, dorsal view of two segments of the mid-region of the body; 1 *f*, ventral view of four segments in the mid-region of the body (same scale as 1 *c*); 1 *g*, posterior extremity of body (same scale as 1 *c* and 1 *f*); 1 *h*, sternum and leg of segment in mid-region of body; 1 *i*, legs of second pair in male (*g.*, genital papilla); 1 *j*, transverse section of segment (*tg.*, tergum; *k.*, keel; *pl.*, pleural membrane; *st.*, sternum).
2. *Platydesmus hirudo*, sp. n., $\times 1\frac{1}{2}$: 2 *a*, anterior view of head; 2 *b*, anterior extremity of body; 2 *c*, two segments of mid-region; 2 *d*, posterior extremity; 2 *e*, copulatory organs of male with anterior leg of right side removed (partially diagrammatic).
3. *Platydesmus analis*, sp. n., $\times 1\frac{1}{2}$: 3 *a*, anterior view of head; 3 *b*, dorsal view of head and first two segments; 3 *c*, anterior extremity of body from above; 3 *d*, two segments of the mid-region from above; 3 *e*, posterior extremity; 3 *f*, sternum and basal segments of leg of mid-region of body; 3 *g*, ventral view of four segments of mid-region.
4. *Platydesmus triangulifer*, sp. n., $\times 1\frac{1}{2}$: 4 *a*, head and first three segments from below; 4 *b*, head and first two segments from above; 4 *c*, anterior extremity from above; 4 *d*, two segments of mid-region from above; 4 *e*, posterior extremity from above.
5. *Platydesmus lineatus*, sp. n., $\times 1\frac{1}{2}$: 5 *a*, head and first two segments from above; 5 *b*, anterior extremity from above; 5 *c*, two segments of mid-region from above; 5 *d*, posterior extremity; 5 *e*, four segments of mid-region from below; 5 *f*, sternum and basal segments of leg from mid-region; 5 *g*, second leg of female.

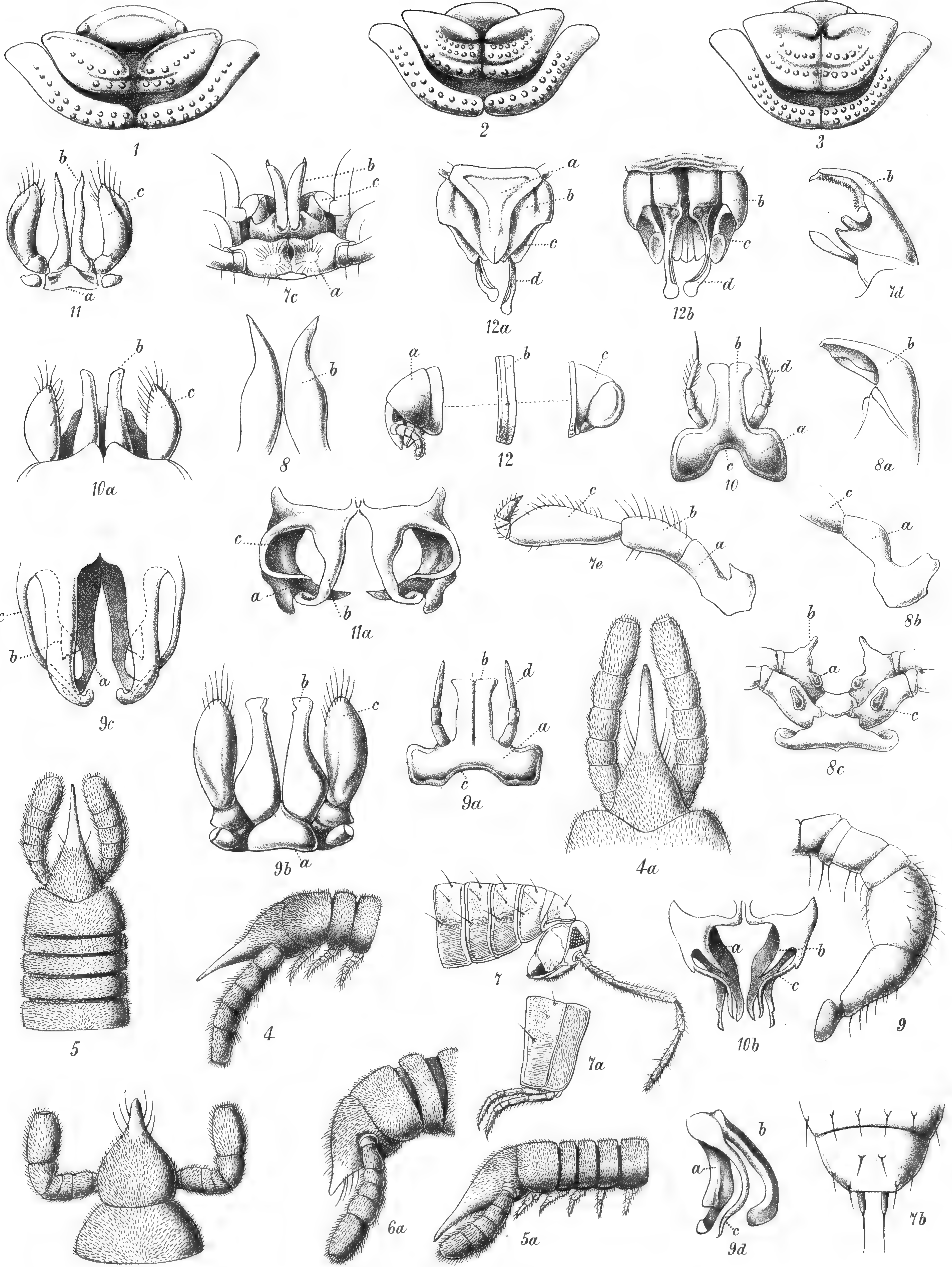


1, 1 a-j PLATYDESMUS PERPICTUS. 3, 3 a-g PLATYDESMUS ANALIS
 2, 2 a-e " " 4, 4 a-e " TRIANGULIFER.
 5, 5 a-g PLATYDESMUS LINEATUS.

DIPLOPODA.

PLATE V.

- Fig. 1. *Platydesmus hirudo*, sp. n., head and first two segments from above.
2. *Platydesmus mesomelas*, sp. n., head and first two segments from above.
3. *Platydesmus marmoreus*, sp. n., head and first two segments from above.
4. *Siphonophora cornuta*, sp. n., lateral view of anterior end of body; 4 *a*, head, antennæ, and fore part of first tergal plate from above.
5. *Siphonophora brevicornis*, sp. n., anterior extremity from above; 5 *a*, ditto from the side.
6. *Siphonophora globiceps*, sp. n., head and first tergal plate from above; 6 *a*, anterior extremity from the side.
7. *Cleidogona godmani*, sp. n., anterior extremity from the side; 7 *a*, one of the segments from the mid-region of the body; 7 *b*, last two tergal plates; 7 *c*, ventral view of sixth and seventh segments, showing the basal segment of seventh leg (*a*), the phallopod (*b*), and the proximal end of the ninth leg (*c*), *in situ*; 7 *d*, left phallopod from the outer side (*b*, terminal recurved portion); 7 *e*, right leg of ninth pair (♂) from behind (*a* and *b*, the two divisions of the long basal segment; *c*, second segment).
8. *Cleidogona stolli*, sp. n., external portion of phallopods from below, compare with fig. 7 *c* (*b*); 8 *a*, lateral view of left phallopod, to compare with 7 *d*; 8 *b*, first segment (*a*) and part of second segment (*c*) of ninth leg (♂) from behind, to compare with 7 *e*; 8 *c*, sternal plates and coxæ of tenth and eleventh legs, showing extruded coxal pouches (*a*) and processes (*b*).
9. *Paraiulus amulensis*, sp. n., ♂, left leg of first pair from behind; 9 *a*, appendages &c. of second pair (*a*, sterno-coxal plate with median processes (*b*), emargination (*c*) for penis, and palpiform appendage (*d*); the vertical deep-lying portion of sternal plate omitted); 9 *b*, anterior appendages of seventh segment from the front (*a*, sternal plate; *b*, internal, *c*, external branches with proximal sclerites); 9 *c*, phallopods from behind (*a*, anterior; *b*, posterior; and *c*, external branches); 9 *d*, phallopod of left side, external view (lettering as in 9 *c*).
10. *Paraiulus aztecus*, sp. n., ♂, sternal plate and appendages of second pair from below (lettering &c. as in 9 *a*); 10 *a*, anterior appendages of seventh segment, partially protruded (lettering as in 9 *b*); 10 *b*, phallopods, posterior view (lettering as in 9 *c*).
11. *Paraiulus stylifer*, sp. n., ♂, anterior appendages of seventh segment from the front (lettering as in 9 *b*); 11 *a*, phallopods, posterior view (lettering as in 9 *c*).
12. *Rhinocricus rogersi*, sp. n. (*a*, head and anterior two tergal plates from the side; *b*, segment of mid-region of body; *c*, anal segment): 12 *a*, appendages of seventh segment of ♂, anterior aspect (*a*, median plate; *b*, anterior plate; *c*, posterior plate of first pair; *d*, phallopod); 12 *b*, the same from behind (lettering as in 12 *a*).



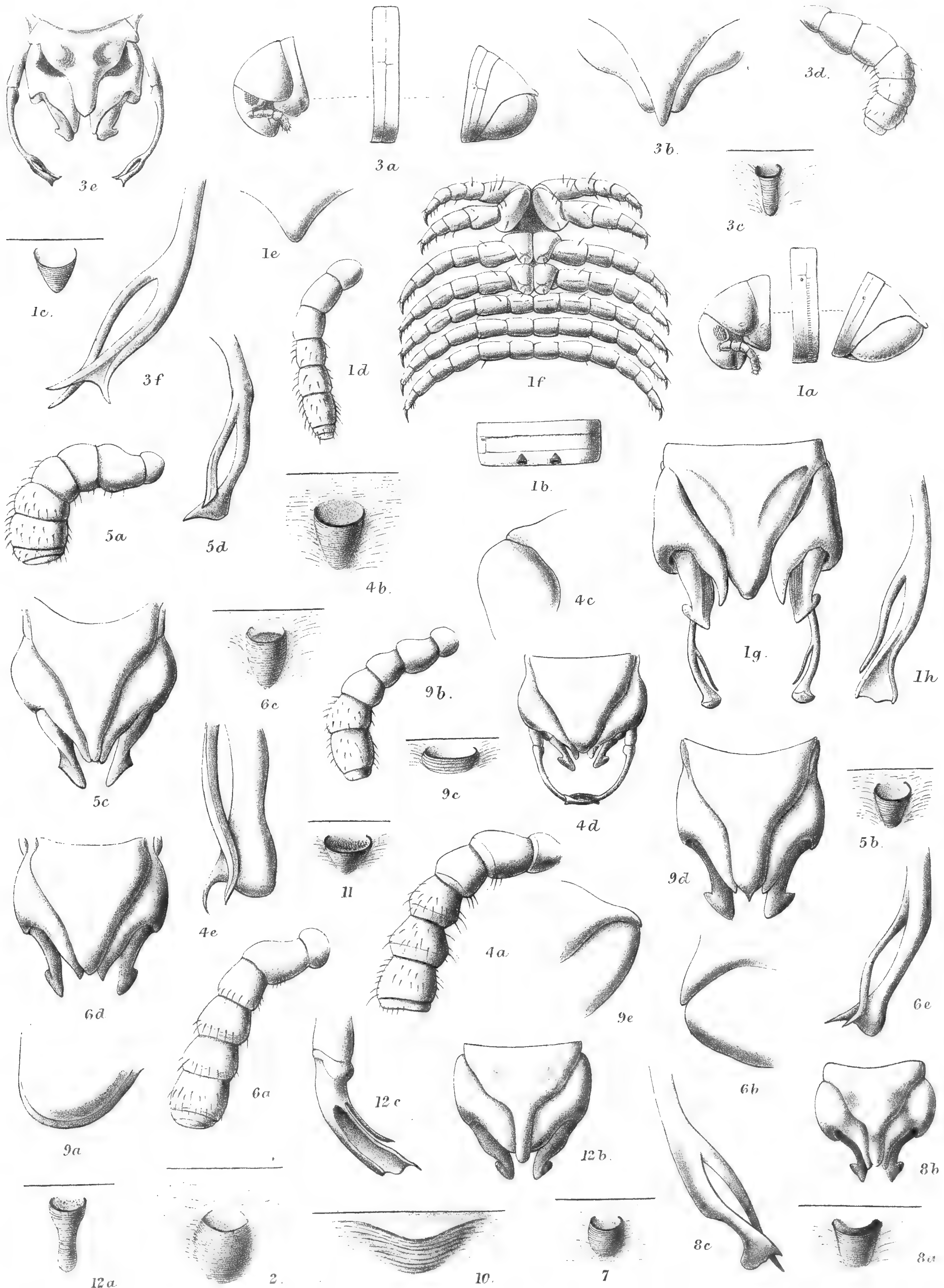
1 PLATYDESMUS HIRUDO. 5,5a SIPHONOPHORA BREVICORNIS. 9,9 a-d PARAIULUS AMULENSIS.
 2 " MESOMELAS. 6,6a " GLOBICEPS. 10,10 a,b " AZTECUS.
 3 " MARMOREUS. 7,7 a-e CLEIDOGONA GODMANI. 11,11 a " STYLIFER.
 4,4 a SIPHONOPHORA CORNUTA. 8,8 a-c " STOLLI. 12,12 a,b RHINOCRICUS ROGERSI.

DIPLOPODA.

PLATE VI.

(The line drawn in front of the figures of the scobina represents the anterior border of the tergal plate.)

- Fig. 1. *Rhinocricus aurocinctus*, sp. n.: 1 *a*, lateral view of anterior extremity, of a tergal plate of the middle of the body, and of the posterior extremity; 1 *b*, dorsal view of one of the terga, the posterior edge uppermost, to show the form and position of the scobinæ; 1 *c*, scobina; 1 *d*, antenna of male; 1 *e*, dorsal view of extremity of anal tergal plate; 1 *f*, anterior seven pairs of legs of the male; 1 *g*, anterior aspect of the copulatory apparatus, the phallopods protruding inferiorly; 1 *h*, extremity of phallopod.
2. *Rhinocricus stolli*, sp. n., scobina.
3. *Rhinocricus smithi*, sp. n.: 3 *a*, lateral view of anterior extremity, of a tergal plate of the middle of the body, and of the posterior extremity; 3 *b*, dorsal view of the extremity of anal segment from above; 3 *c*, scobina; 3 *d*, antenna of male; 3 *e*, anterior aspect of copulatory apparatus, with phallopods shown at the side; 3 *f*, extremity of phallopod.
4. *Rhinocricus aposematus*, sp. n.: 4 *a*, antenna of male; 4 *b*, scobina; 4 *c*, upper portion of anal segment seen from the side; 4 *d*, anterior aspect of copulatory apparatus; 4 *e*, extremity of phallopod.
5. *Rhinocricus tristani*, sp. n.: 5 *a*, antenna of male; 5 *b*, scobina; 5 *c*, anterior aspect of copulatory apparatus; 5 *d*, extremity of phallopod.
6. *Rhinocricus rixi*, sp. n.: 6 *a*, antenna of male; 6 *b*, upper portion of anal segment; 6 *c*, scobina; 6 *d*, anterior aspect of copulatory apparatus; 6 *e*, extremity of phallopod.
7. *Rhinocricus salleanus*, sp. n., scobina.
8. *Rhinocricus atoyacus*, sp. n.: 8 *a*, scobina; 8 *b*, anterior aspect of copulatory apparatus; 8 *c*, extremity of phallopod.
9. *Rhinocricus scobinatus*, sp. n.: 9 *a*, inferior portion of first tergal plate; 9 *b*, antenna of male; 9 *c*, scobina; 9 *d*, anterior aspect of copulatory apparatus; 9 *e*, upper portion of anal segment.
10. *Rhinocricus olivaceus* (Newp.), scobina.
11. *Rhinocricus marci*, sp. n., scobina.
12. *Rhinocricus omiltemæ*, sp. n.: 12 *a*, scobina; 12 *b*, anterior aspect of copulatory apparatus; 12 *c*, phallopod.



1a-h. RHINOCRICUS AUROCINCTUS.	5a-d. RHINOCRICUS TRISTANI.	9a-e. RHINOCRICUS SCOBINATUS.
2. " STOLLI.	6a-e. " RIXI.	10. " OLIVACEUS.
3a-f. " SMITHI.	7. " SALLEANUS.	11. " MARCI.
4a-e. " APOSEMATUS.	8a-c. " ATOYACUS.	12a-c. " OMILTEMÆ

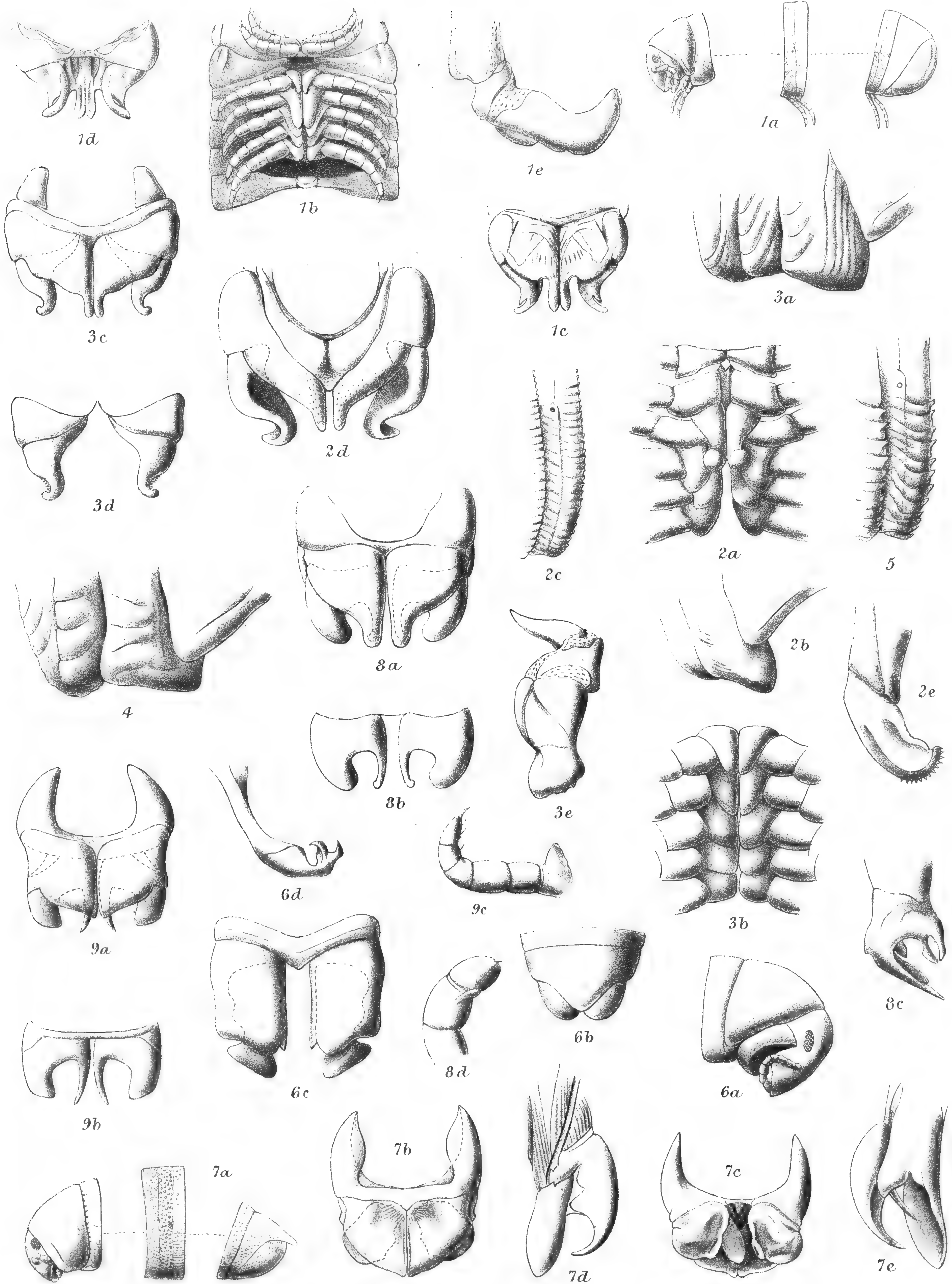
R.I.P. & A.T.H. del.

J. Green lith. et imp.

DIPLOPODA.

PLATE VII.

- Fig. 1. *Spirobolus godmani*, sp. n.: 1 *a*, lateral view of anterior extremity, of a tergal plate of the middle of the body, and of the posterior extremity; 1 *b*, lower surface of anterior end of body of male showing the legs of the anterior seven pairs; 1 *c*, anterior aspect of copulatory apparatus; 1 *d*, posterior aspect of the copulatory apparatus; 1 *e*, anterior aspect of extremity of right phallopod.
2. *Spirobolus fossulifer*, sp. n.: 2 *a*, basal segments of the legs of the anterior six pairs; 2 *b*, infero-lateral portions of the anterior three tergal plates; 2 *c*, infero-lateral portion of eighth tergal plate from the end of the body to show the striæ and serrulation; 2 *d*, anterior aspect of copulatory apparatus; 2 *e*, distal extremity of right phallopod.
3. *Spirobolus stolli*, sp. n. (♂ from Pachuta): 3 *a*, infero-lateral portions of anterior four tergal plates showing the shape of the postero-lateral angles of the second and third plates; 3 *b*, basal segments of the legs from the third to the seventh pairs; 3 *c*, anterior aspect of copulatory apparatus; 3 *d*, posterior aspect of the same with the anterior portion removed; 3 *e*, right phallopod from behind.
4. *Spirobolus stolli* (?) (♀ from Costa Cuca): infero-lateral portions of anterior four tergal plates for comparison with fig. 3 *a*.
5. *Spirobolus hoplomerus*, sp. n.: infero-lateral portion of eighth tergal plate from the end of the body to show the strong crests and spine-armature.
6. *Cyclothyrophorus salvini*, gen. et sp. n.: 6 *a*, lateral view of head and first two tergal plates to show the extent of the exposure of the mandible; 6 *b*, dorsal aspect of anal segment to show the convexity of the valves; 6 *c*, anterior aspect of the copulatory apparatus; 6 *d*, right phallopod.
7. *Spirobolellus richardsoni*, sp. n.: 7 *a*, lateral view of anterior extremity of a tergal plate of the middle of the body and of the posterior extremity; 7 *b*, anterior aspect of copulatory apparatus; 7 *c*, posterior aspect of the same; 7 *d*, anterior aspect of left phallopod; 7 *e*, posterior aspect of the same.
8. *Spirobolellus tylopus*, sp. n.: 8 *a*, anterior aspect of copulatory apparatus; 8 *b*, posterior view of posterior laminæ of coleopods; 8 *c*, phallopod; 8 *d*, extremity of third leg of male showing swollen tarsus, minute claw, and membranous sensory papilla on protarsus.
9. *Spirobolellus atriculus*, sp. n.: 9 *a*, anterior aspect of copulatory apparatus; 9 *b*, posterior aspect of posterior laminæ of coleopods; 9 *c*, third leg of male to compare with fig. 8 *d*.



1a-e SPIROBOLUS GODMANI.
 2a-e " FOSSULIFER.
 3a-e " STOLLII.
 R.I.P. & A.T.H. del.

4 SPIROBOLUS STOLLII?
 5 " HOPLOMERUS.
 6a-d CYCLOTHYROPHORUS SALVINI.

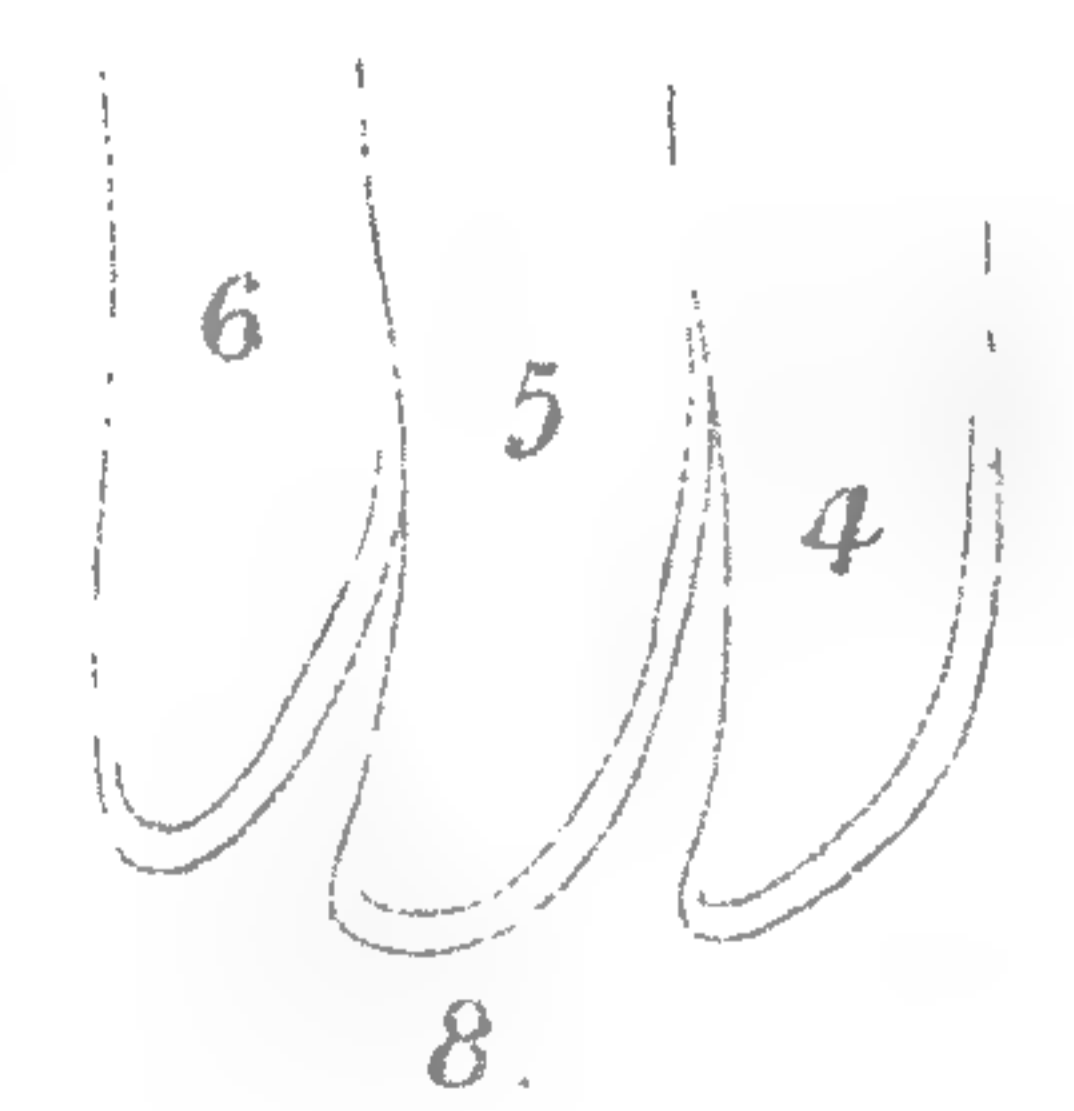
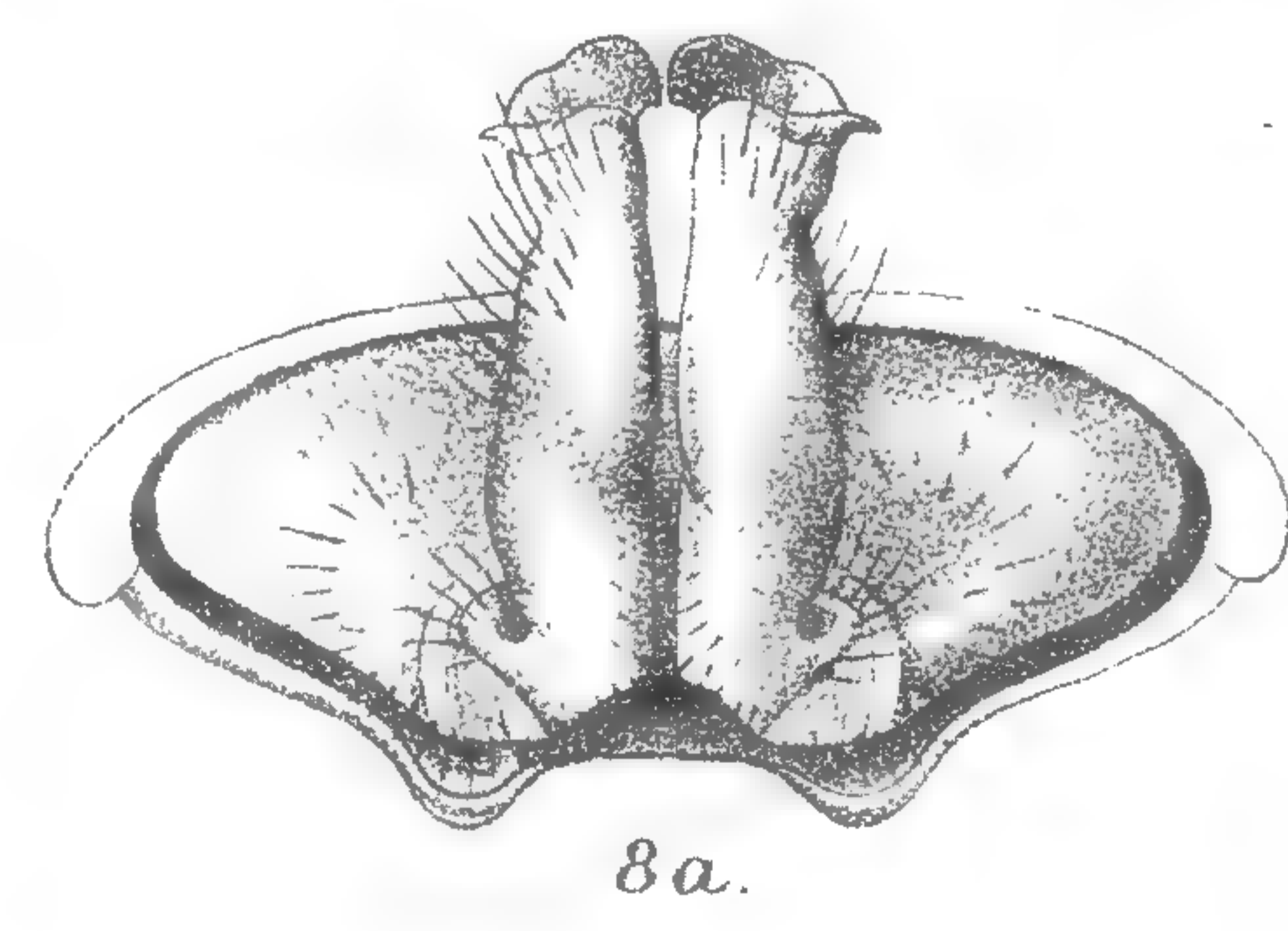
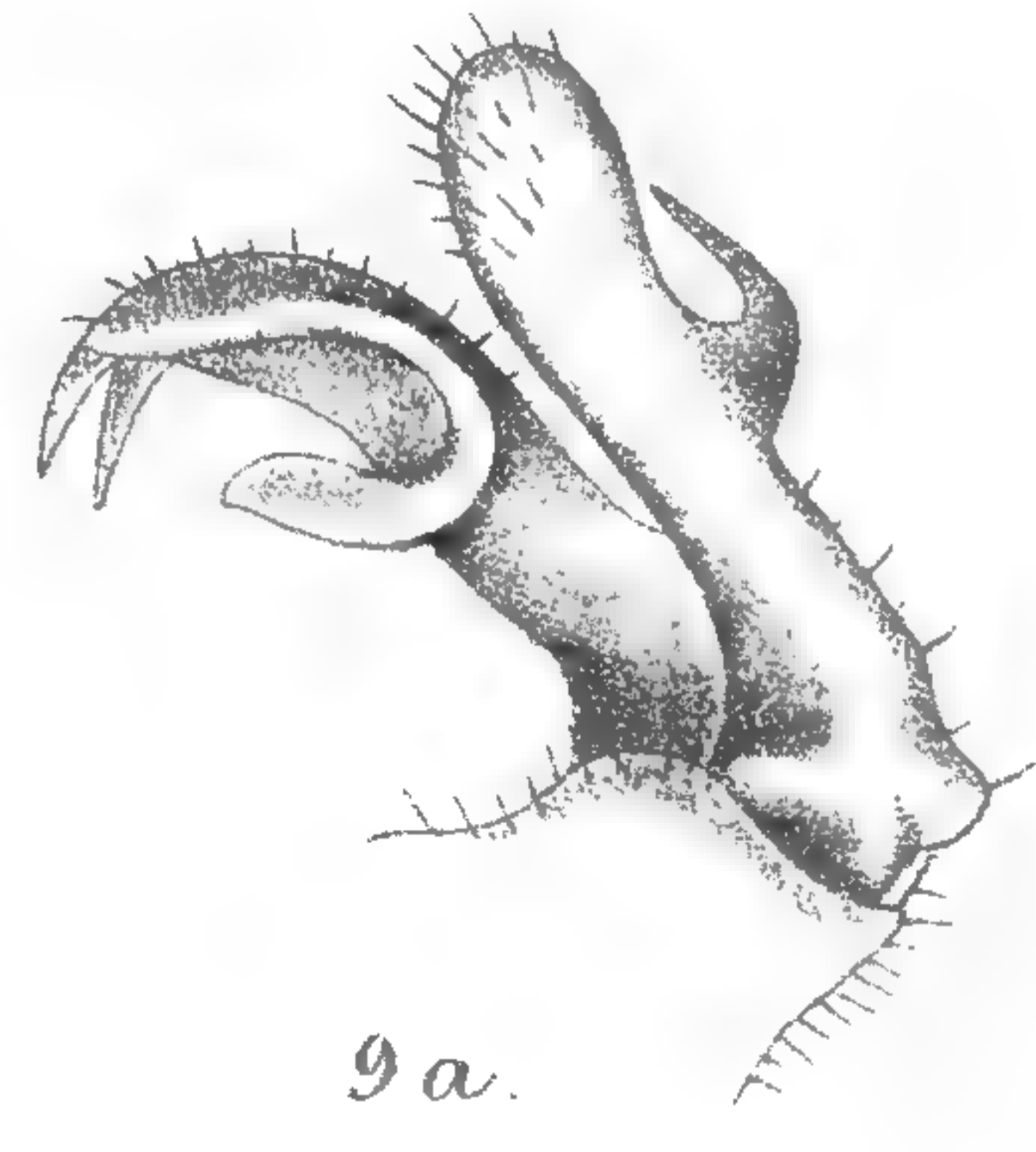
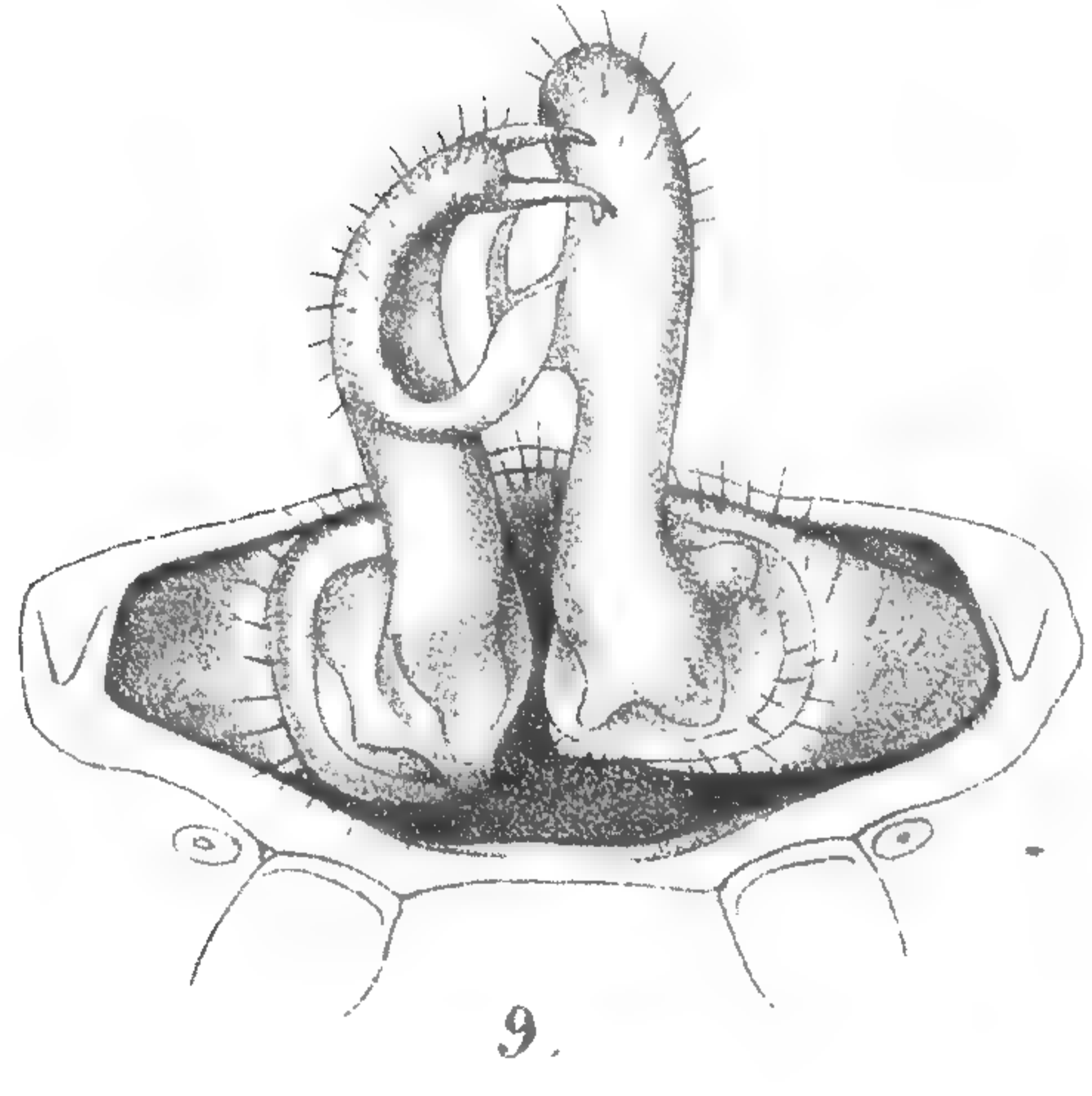
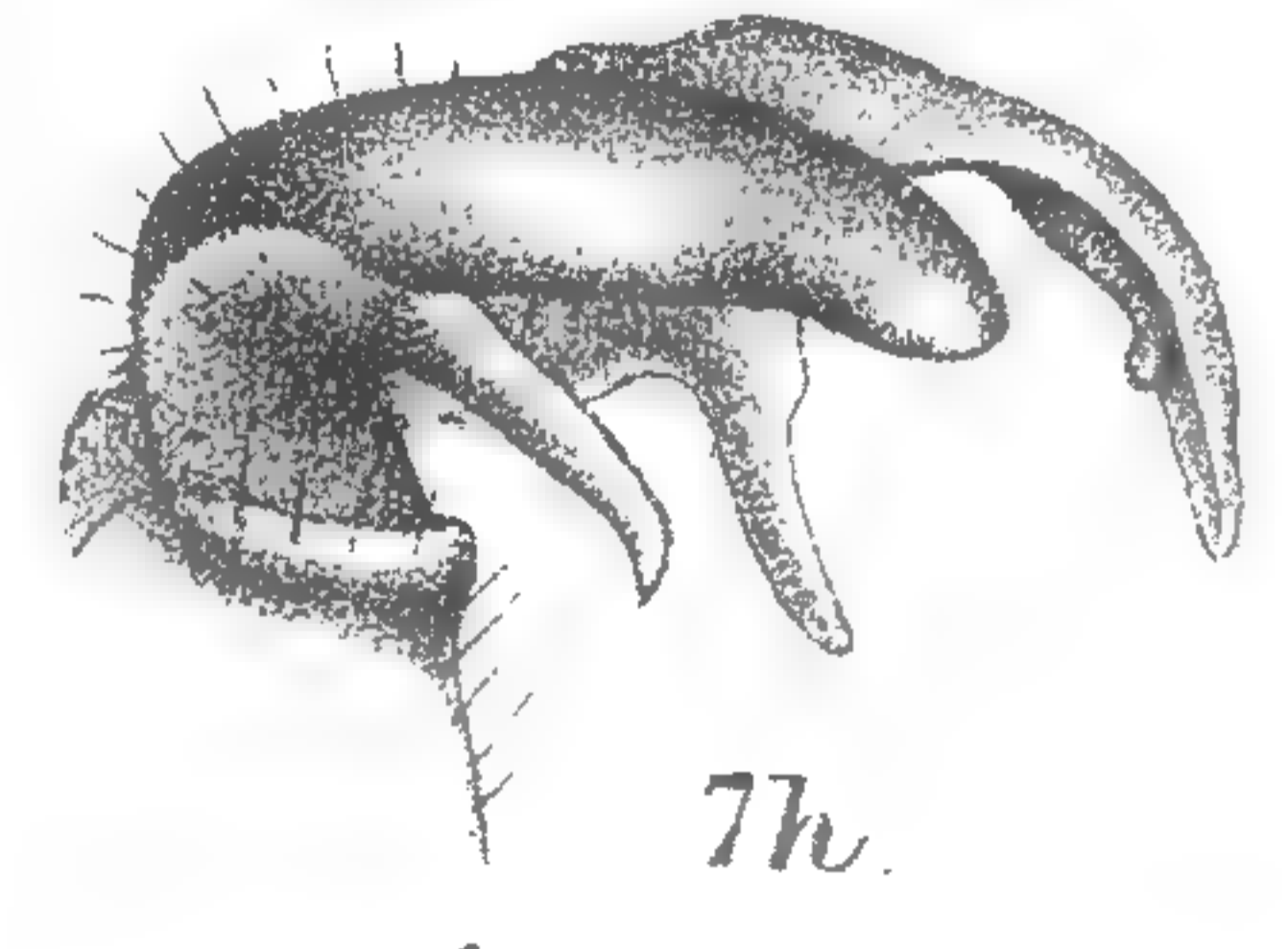
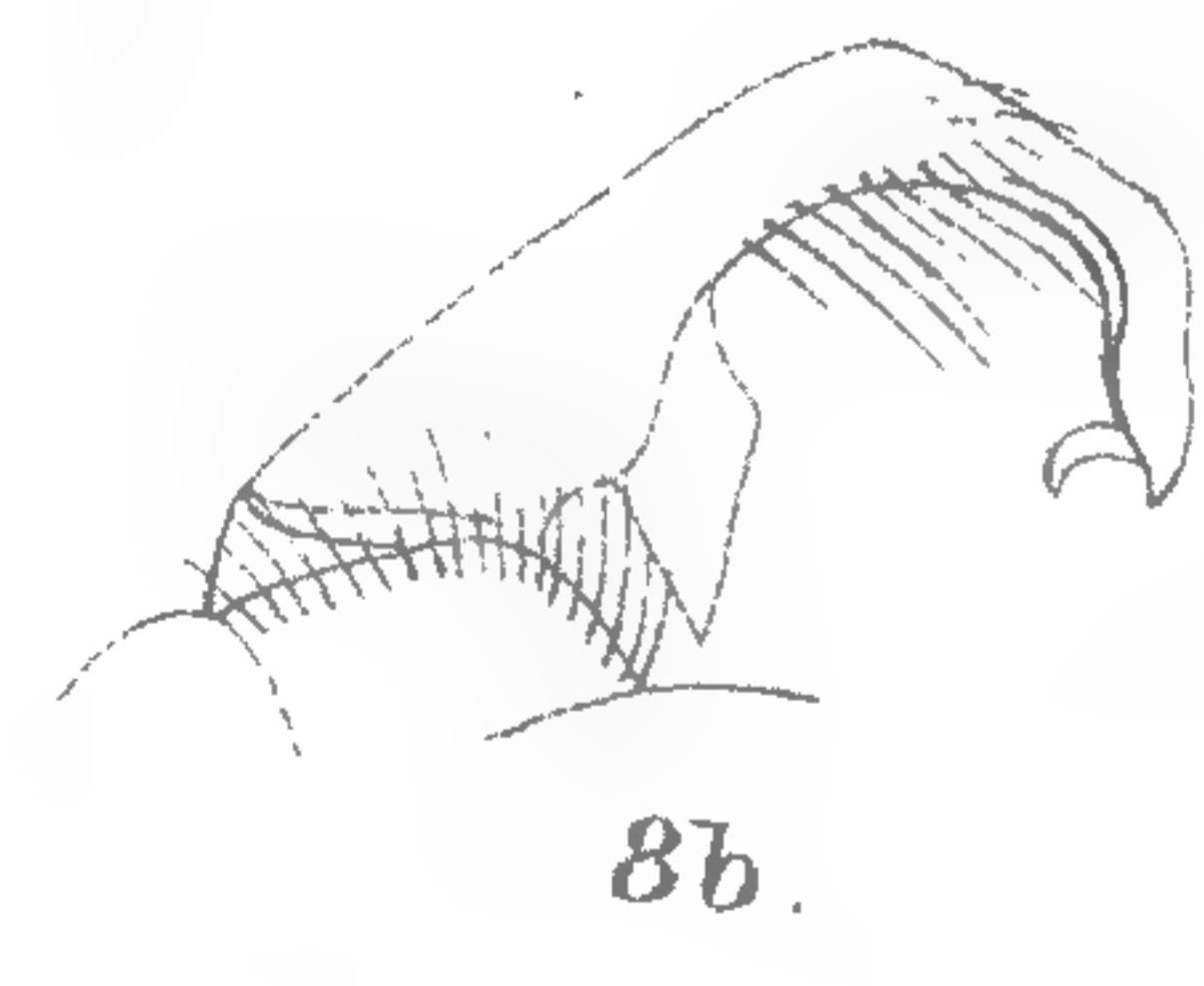
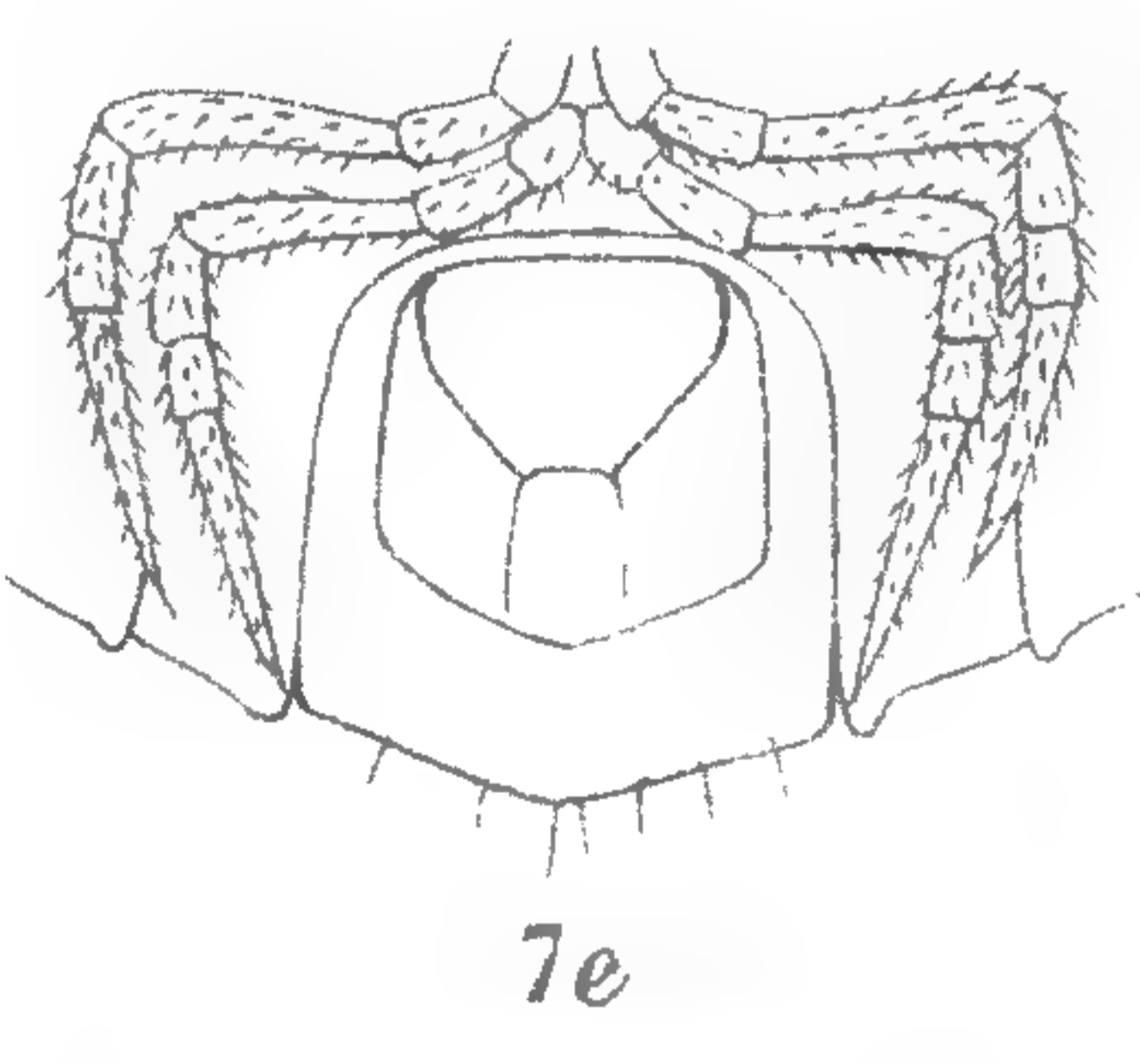
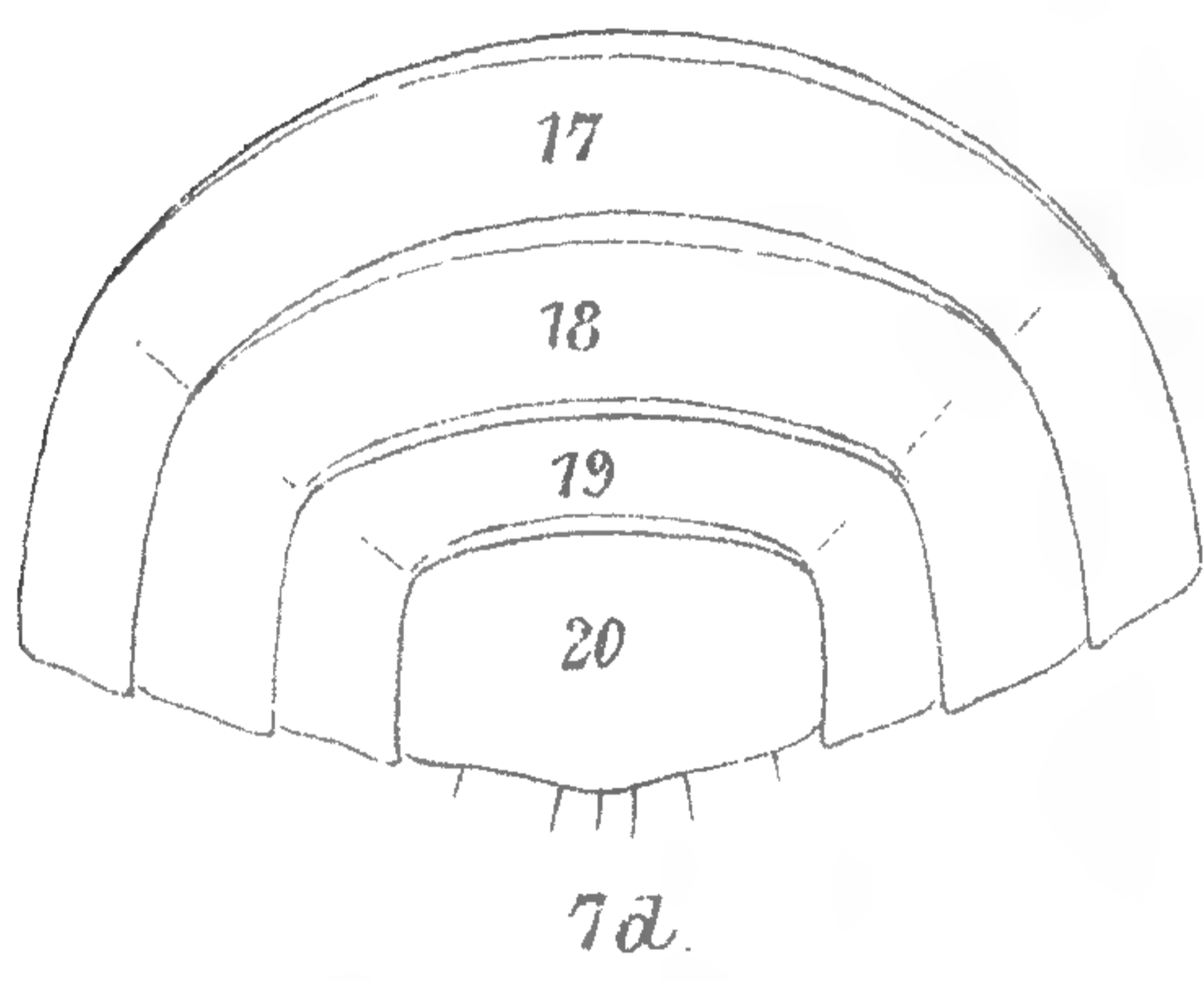
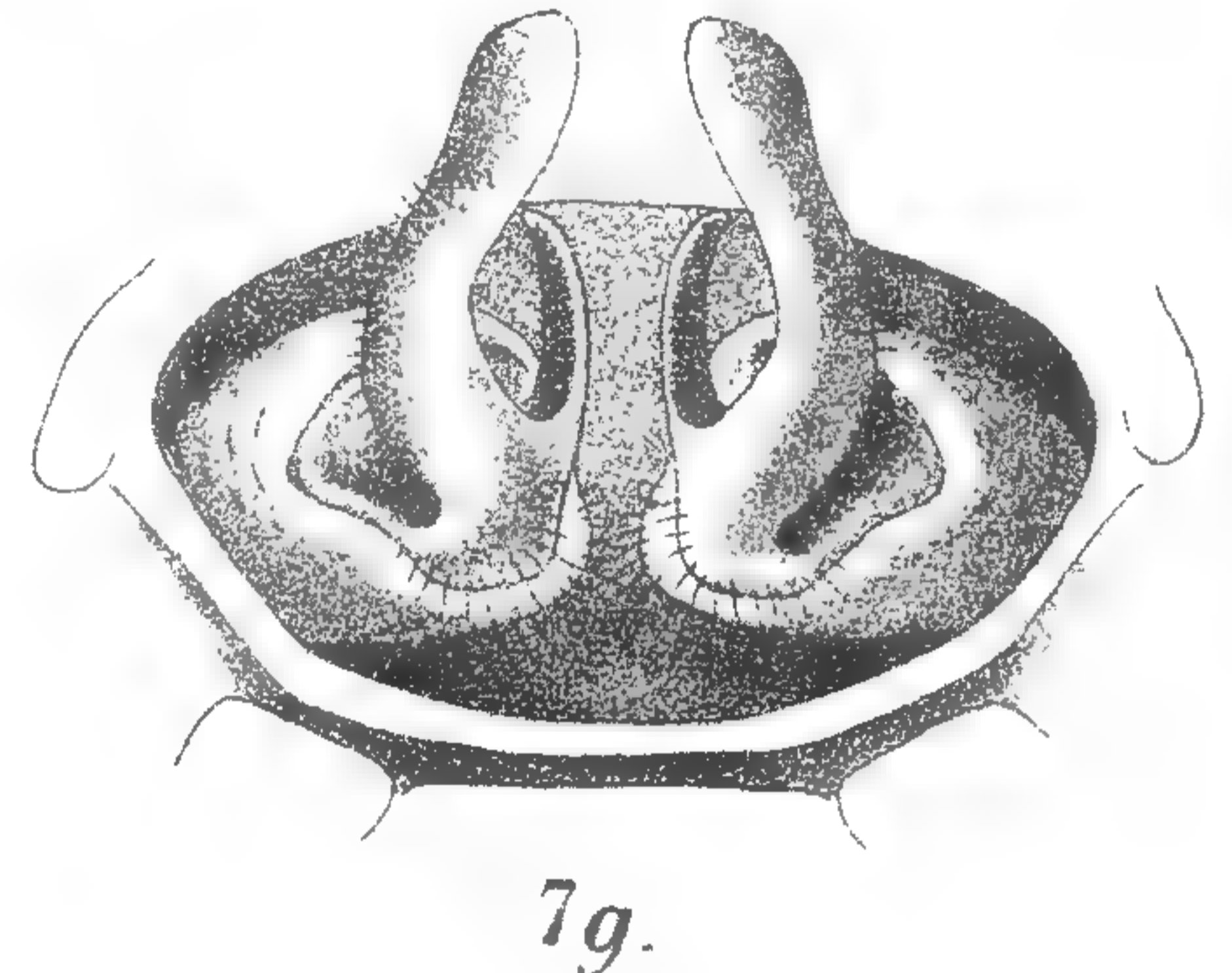
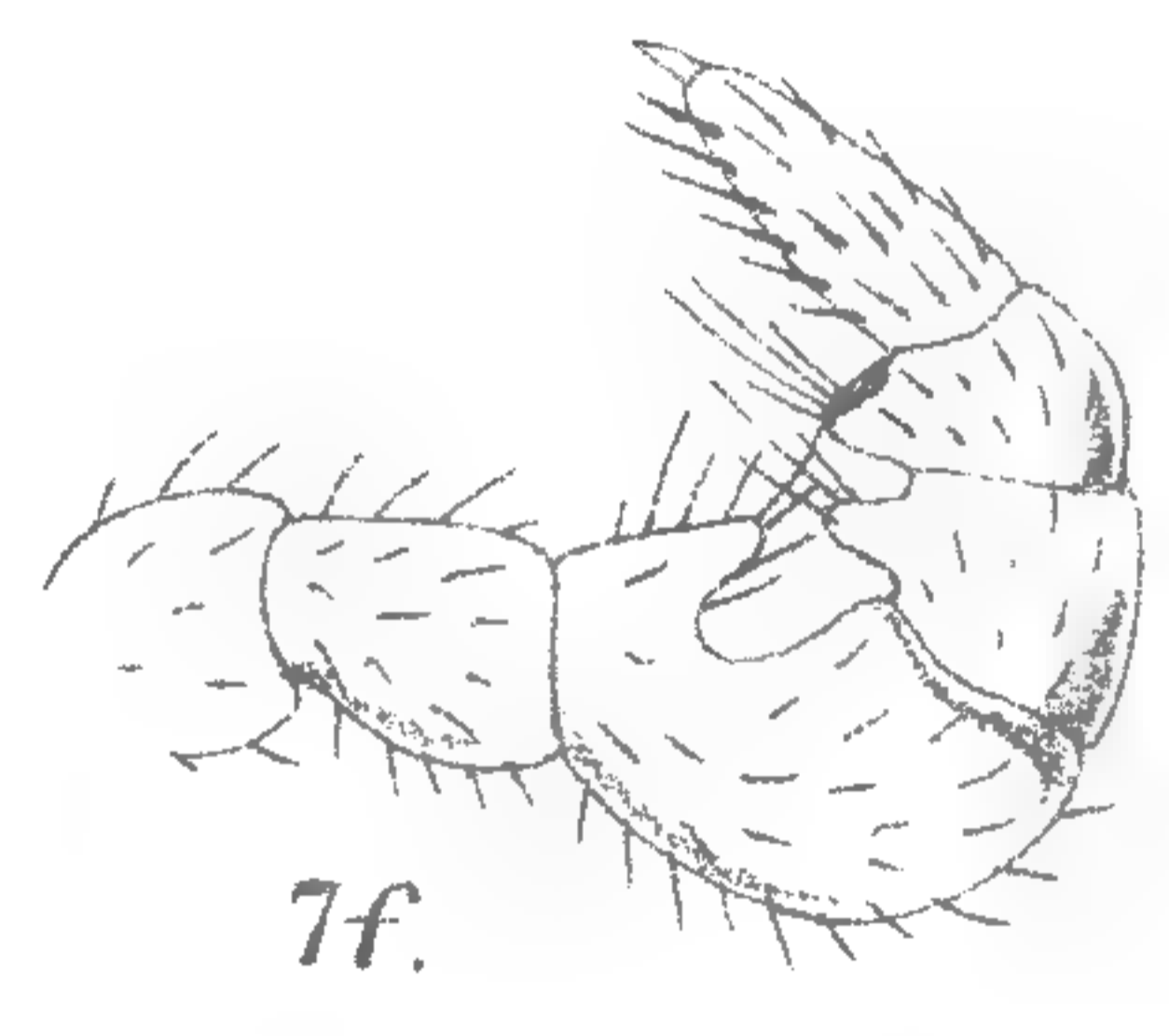
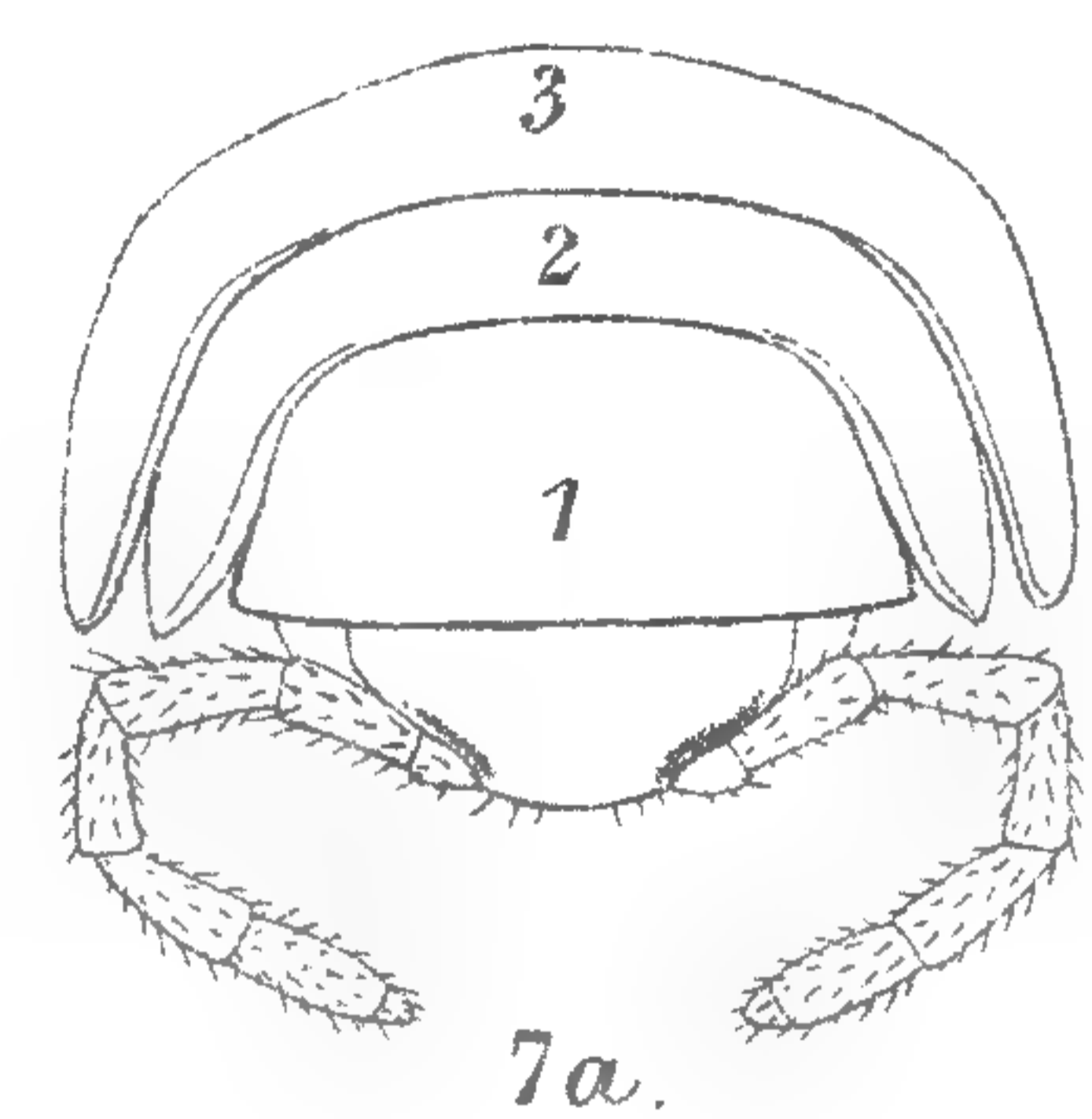
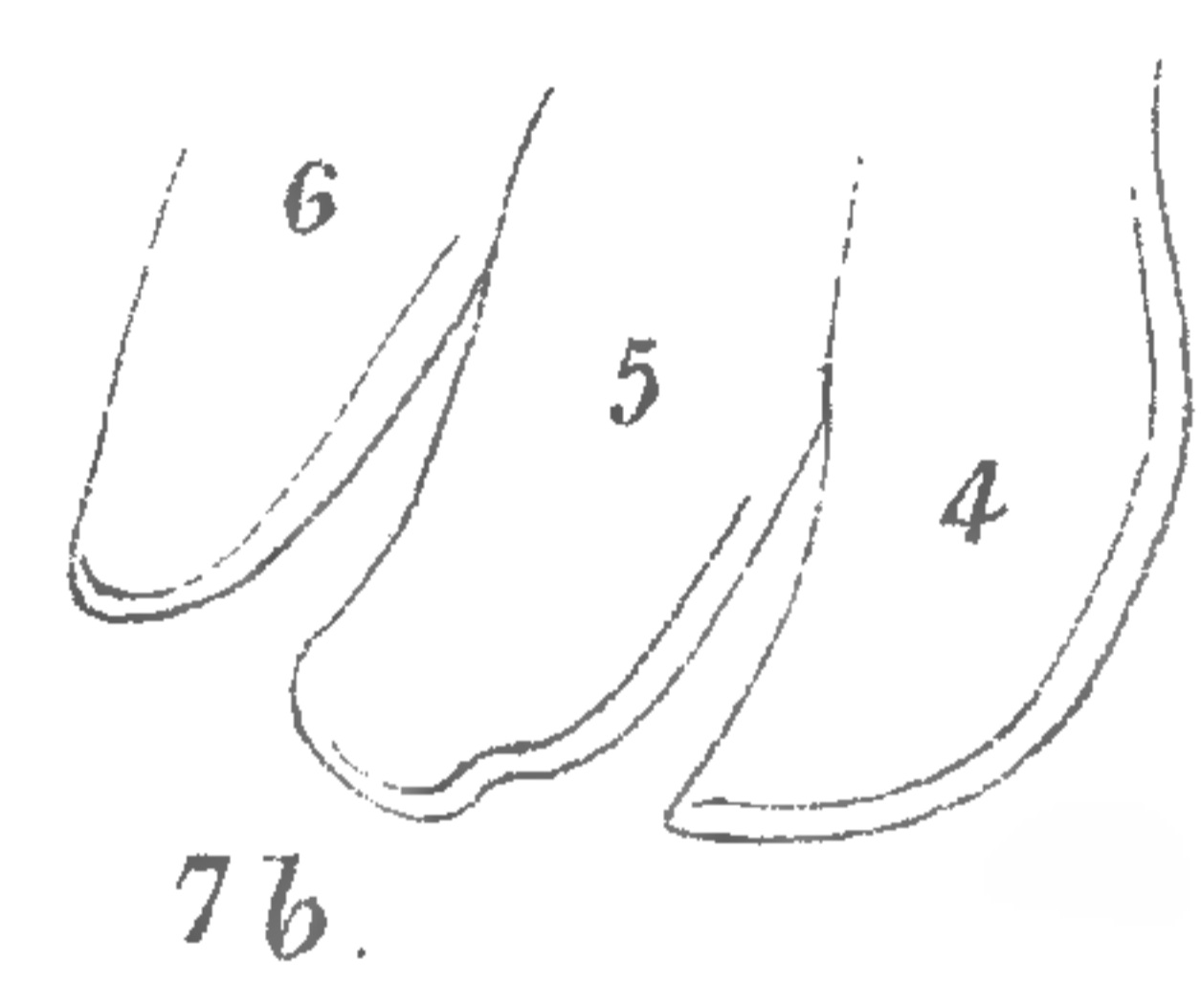
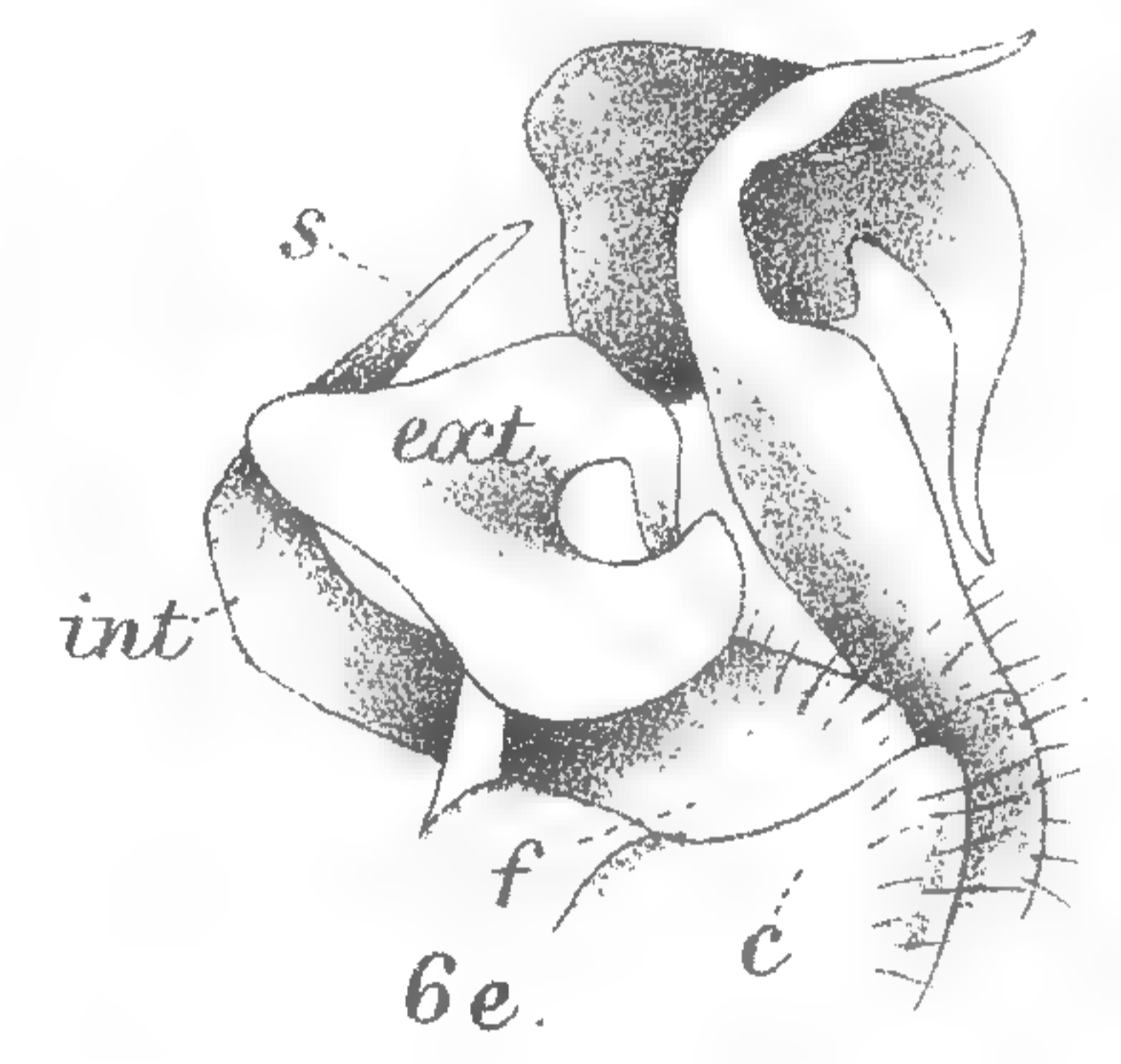
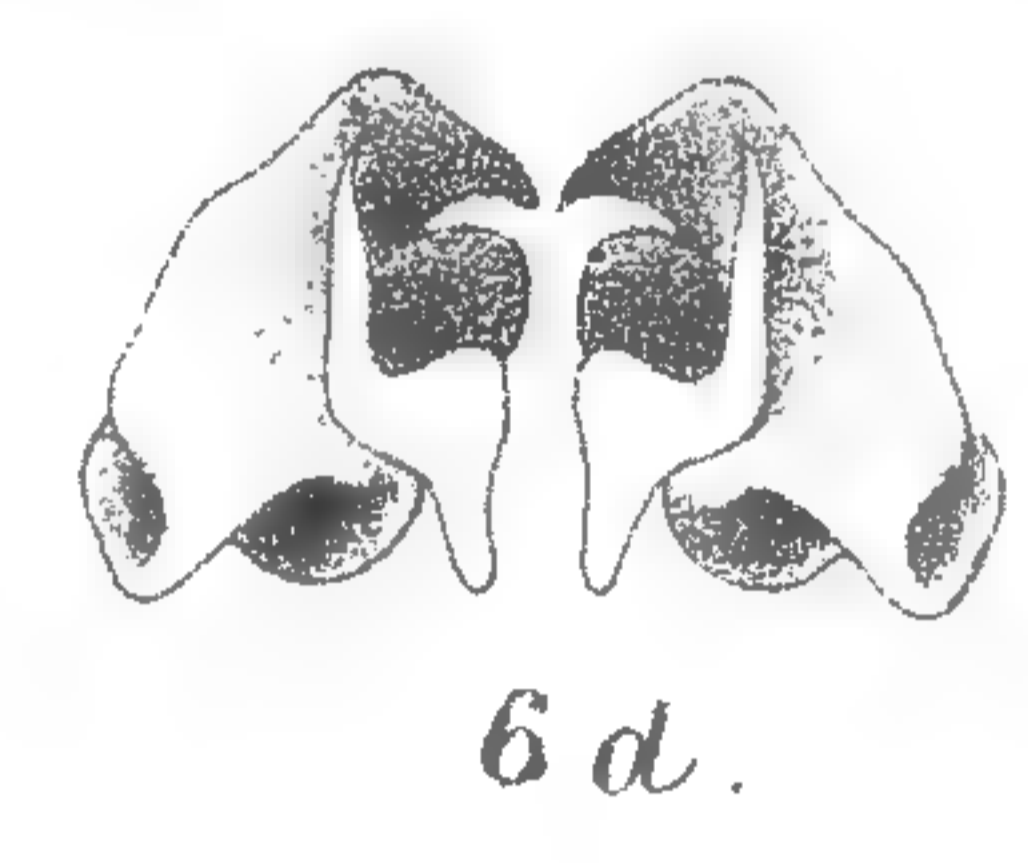
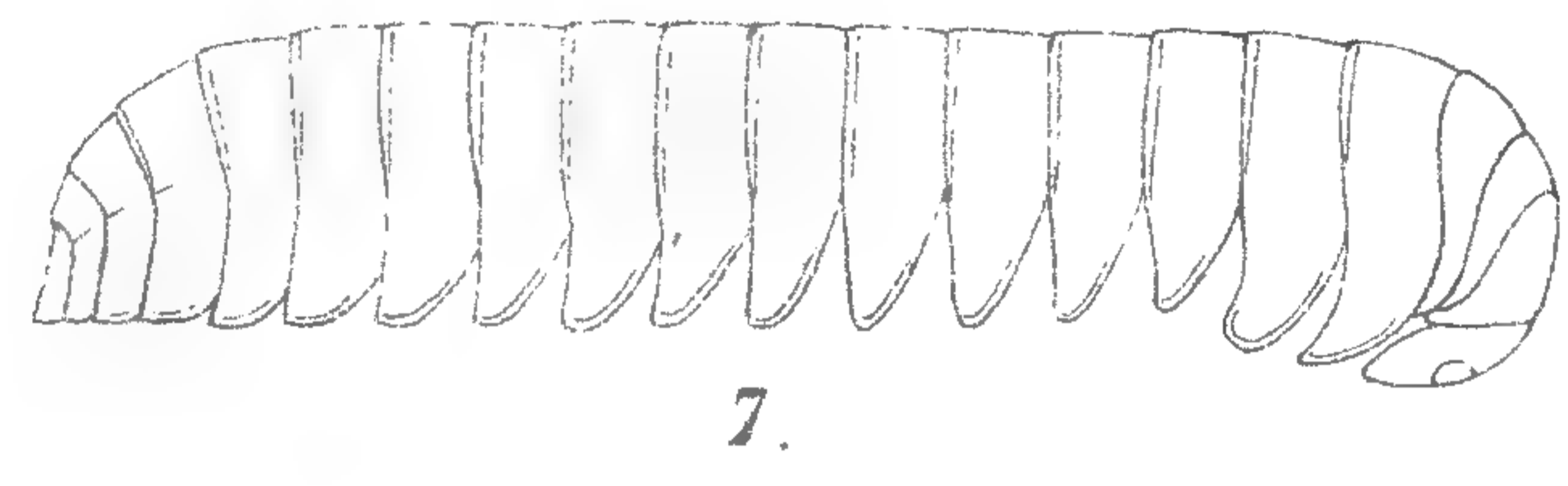
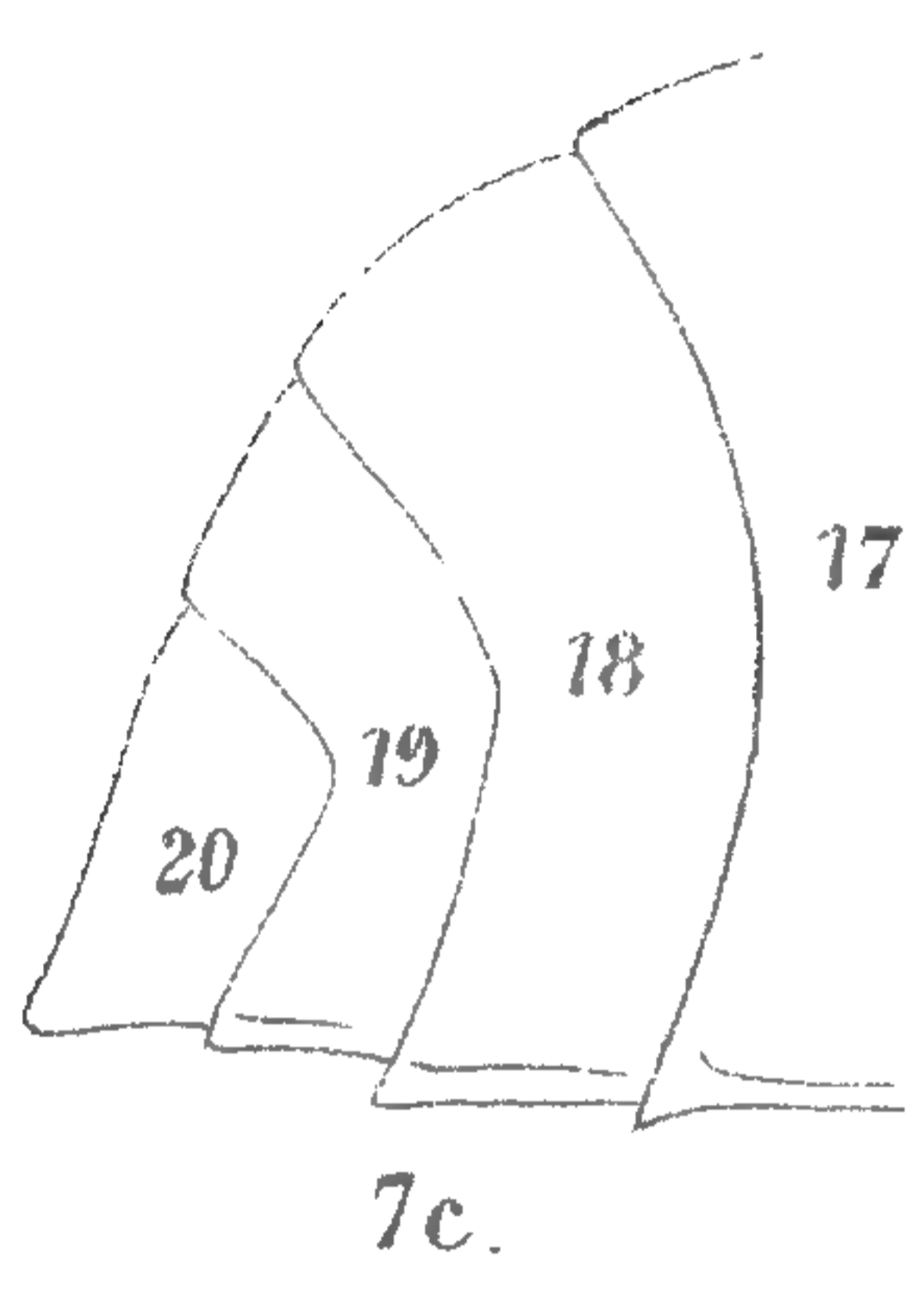
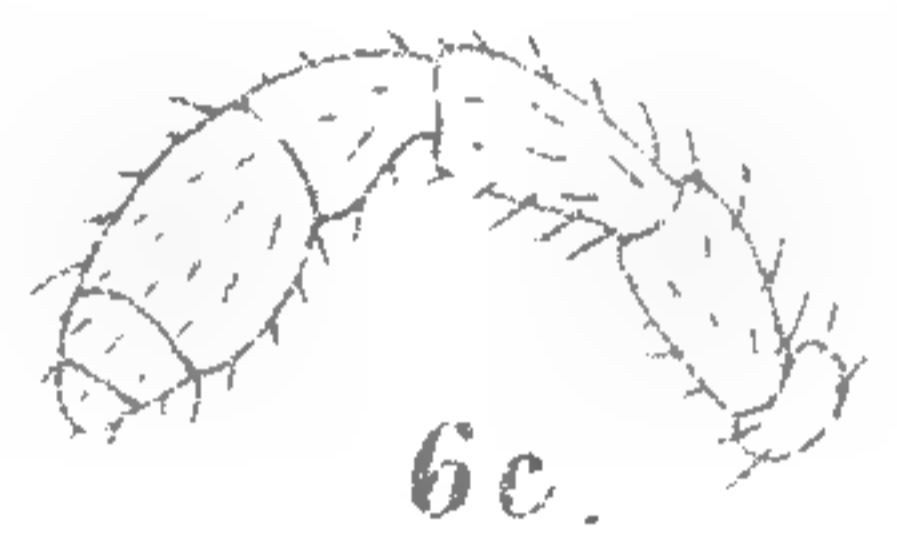
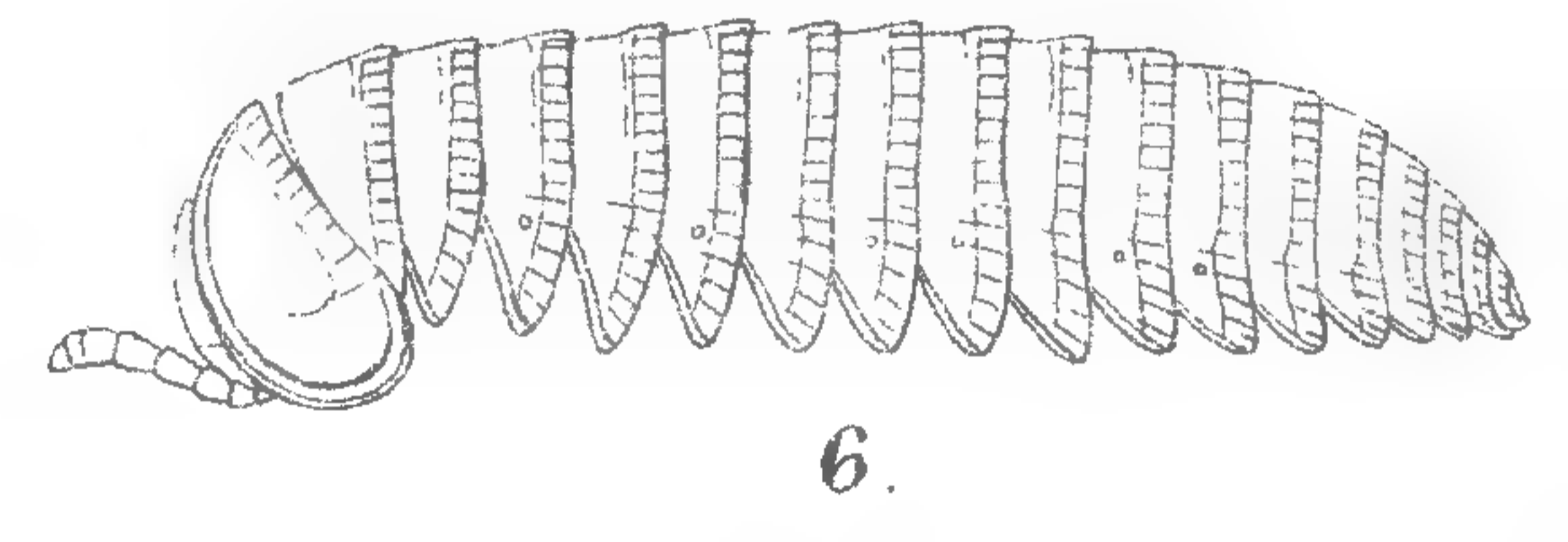
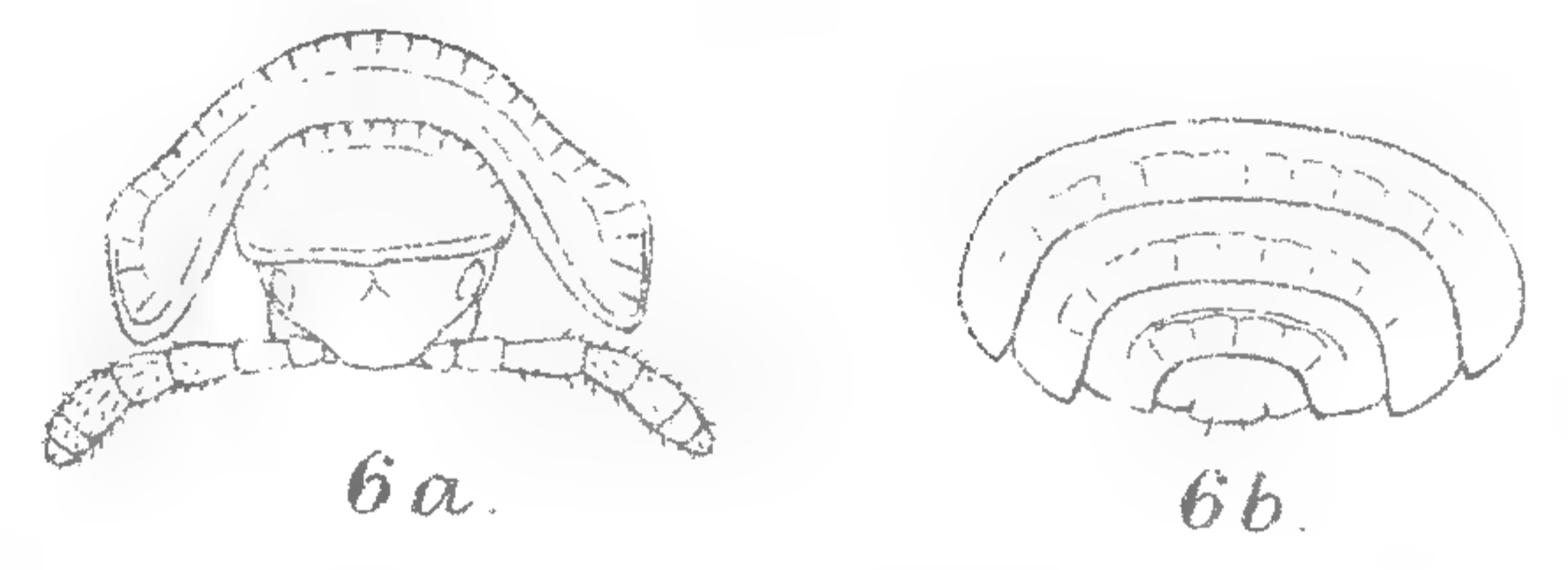
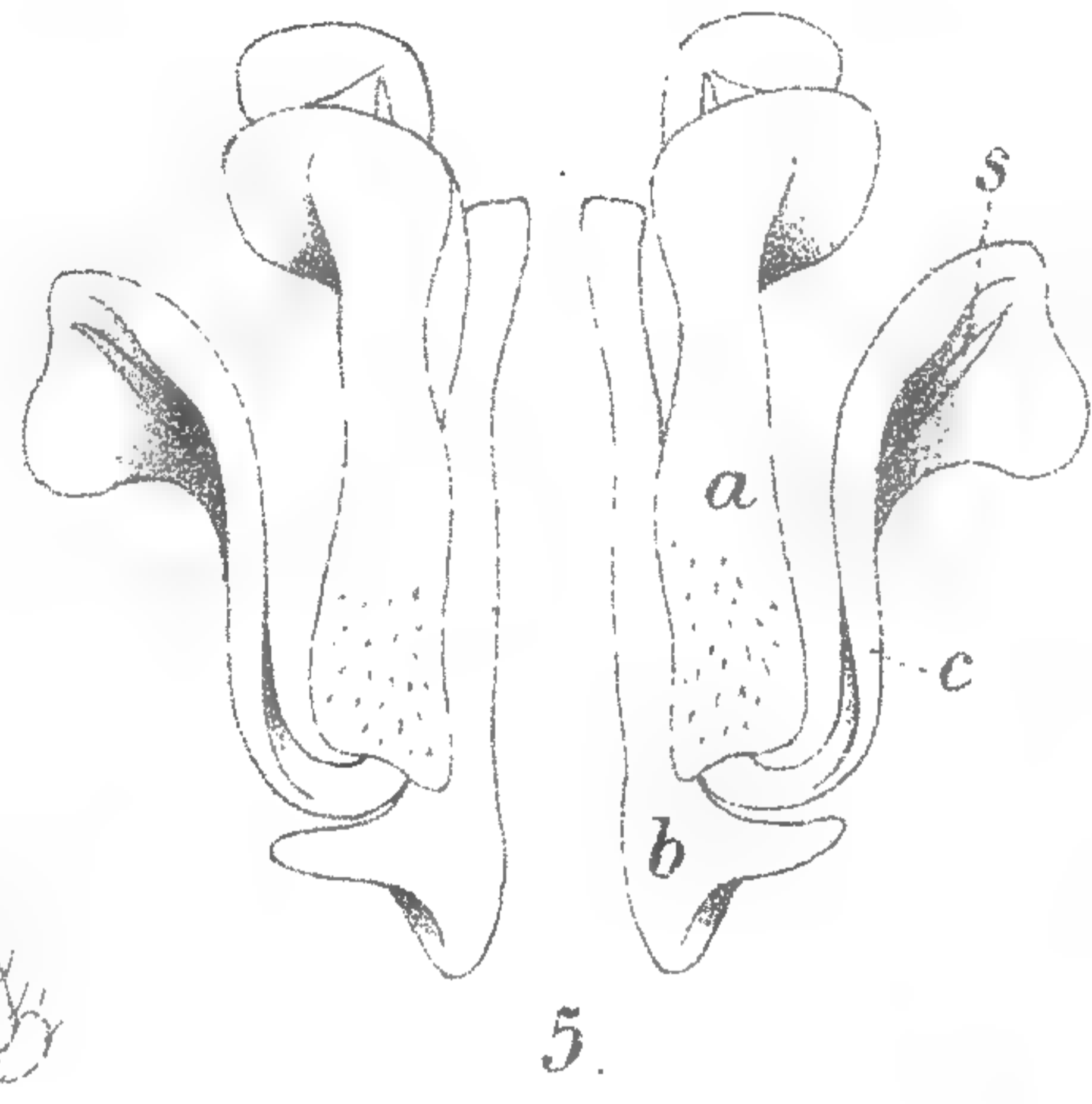
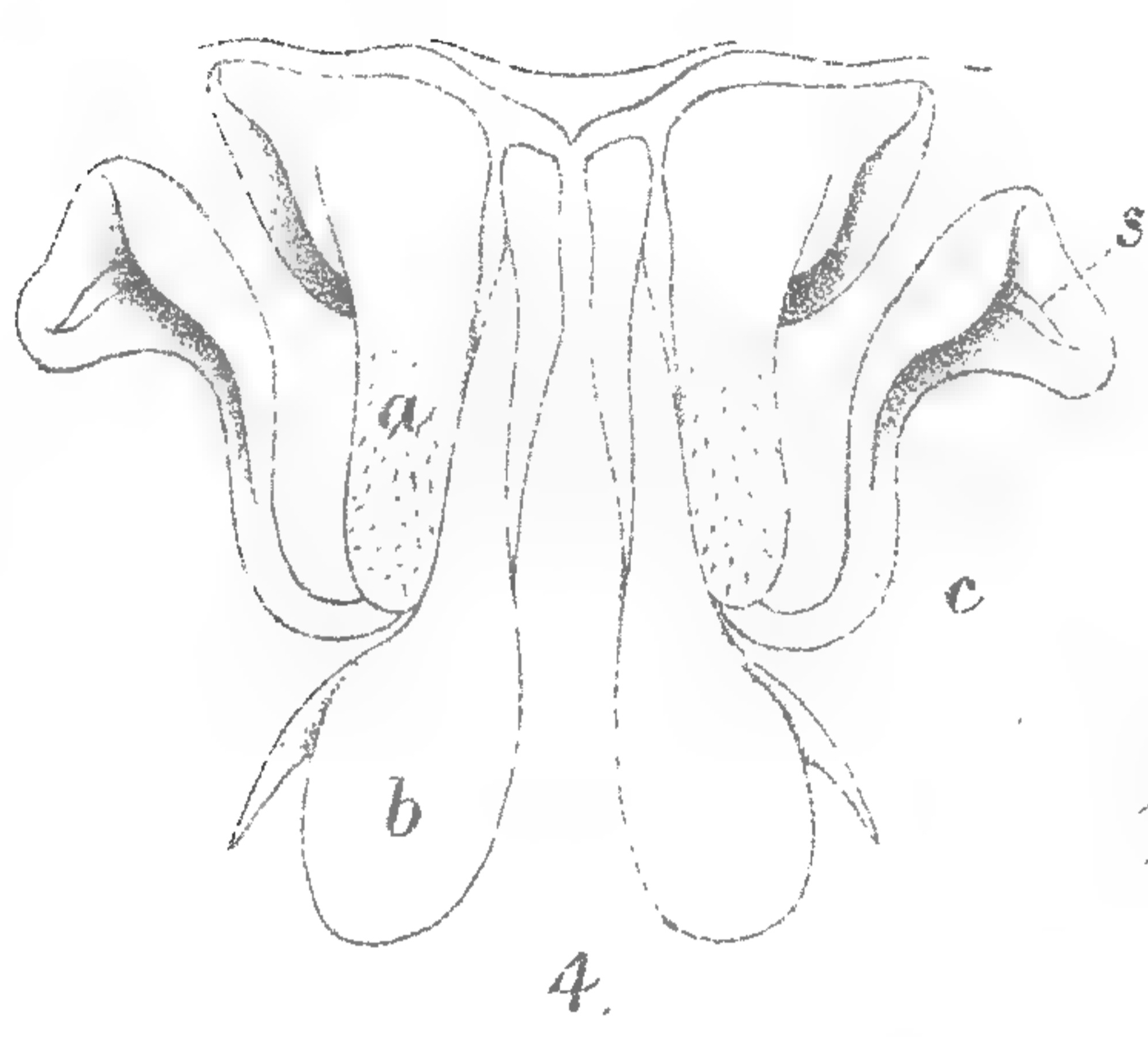
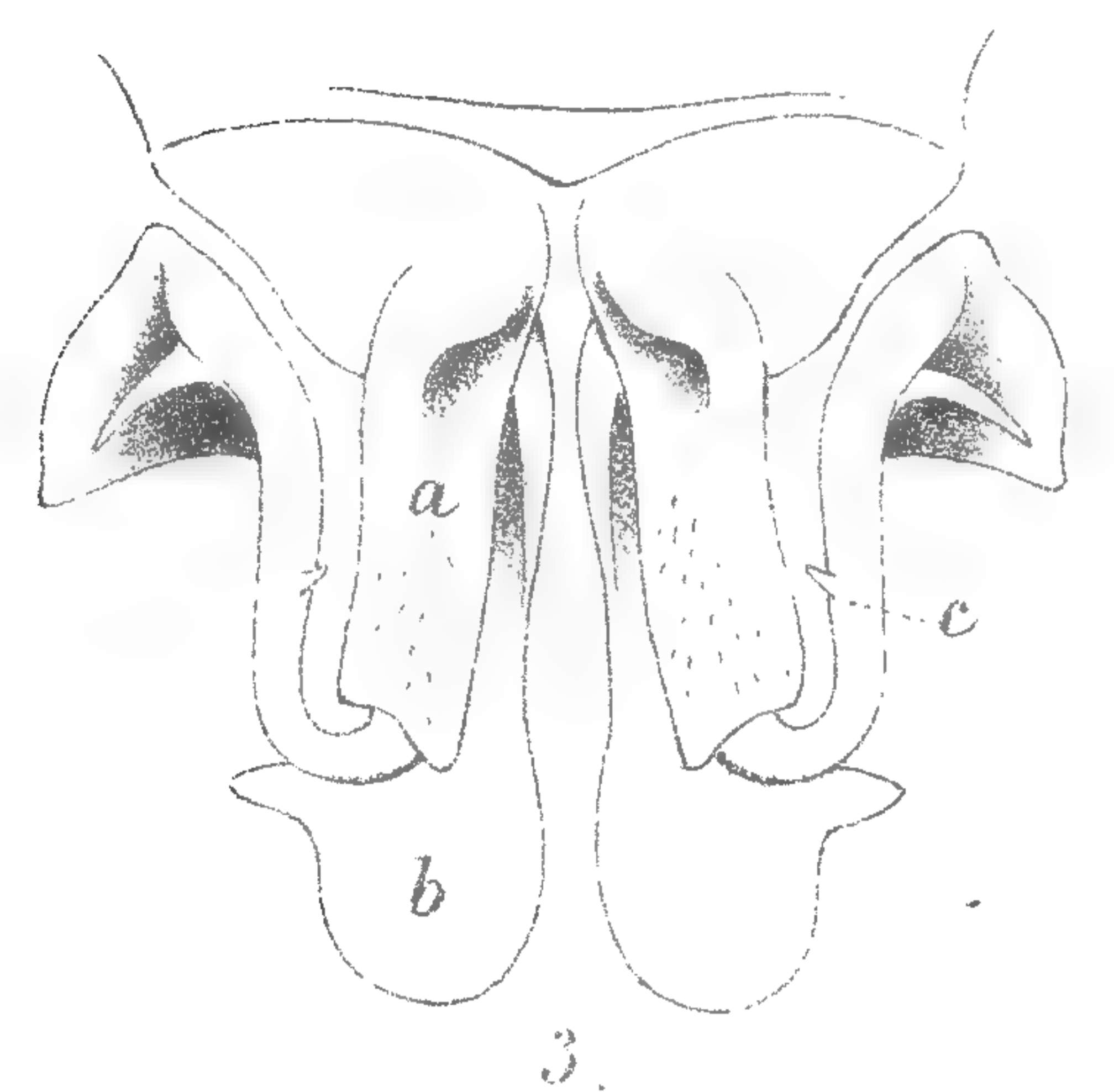
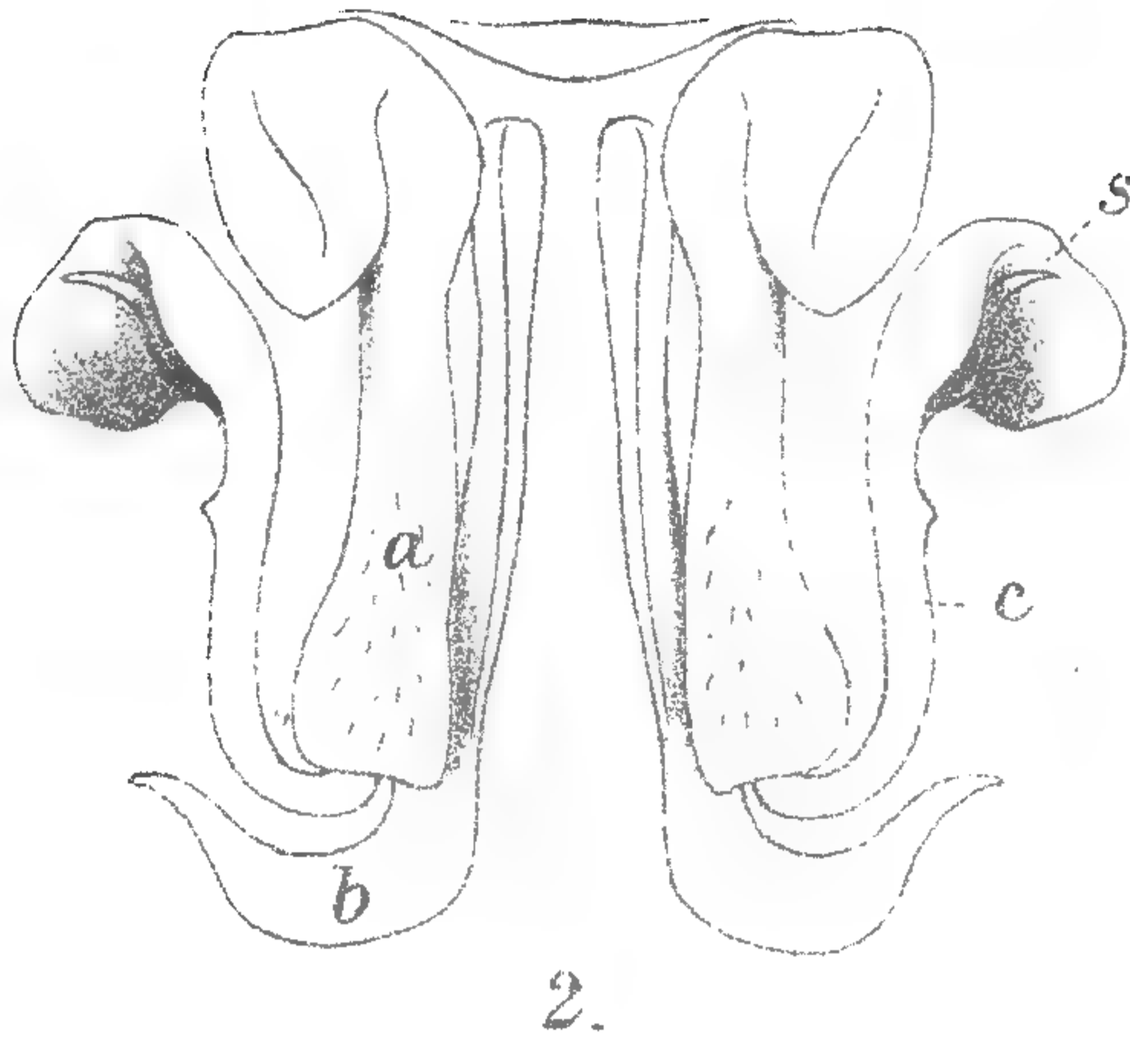
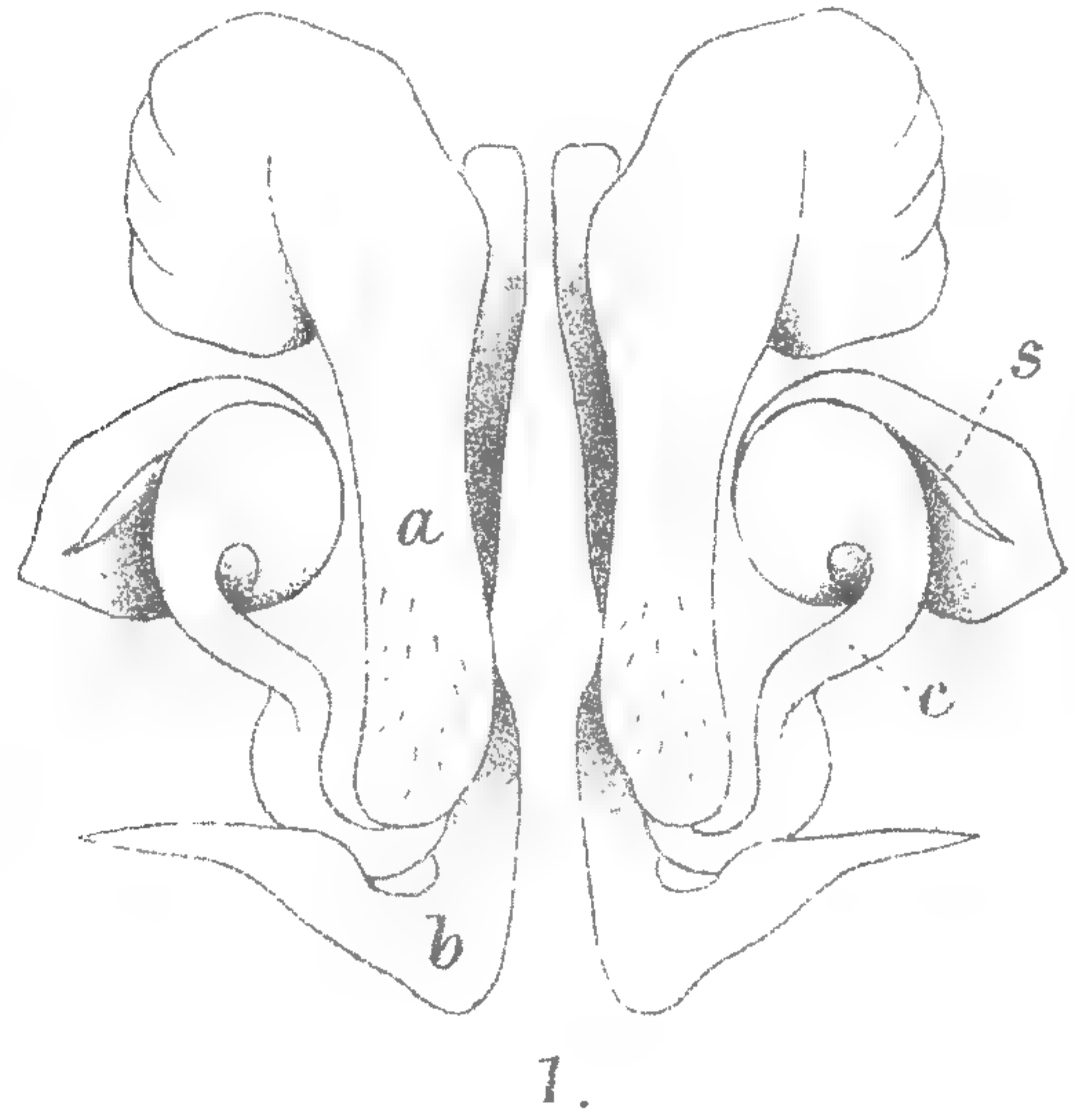
7a-e SPIROBOLELLUS RICHARDSONI.
 8a-d " TYLOPUS.
 9a-c " ATRICULUS.

J. Green lith. et imp.

DIPLOPODA.

PLATE VIII.

- Fig. 1. Anterior aspect of copulatory apparatus of *Orthoporus striatulus*: *a*, anterior lamina of coleopod; *b*, extremity of posterior lamina; *c*, phallopod with funnel-shaped end guarding seminal stile *s*.
2. Ditto of *Orthoporus chiriquensis*.
 3. „ „ *cordovanus*.
 4. „ „ *teapensis*.
 5. „ „ *amulensis*.
 6. *Ligiodesmus pusillus*, gen. et sp. n., lateral view: 6 *a*, head and first two tergal plates from the front; 6 *b*, posterior extremity from behind; 6 *c*, antenna; 6 *d*, phallopods from below; 6 *e*, phallopods viewed from the right side—*c*, coxal segment, *f*, femoral segment, *ext.*, external laminate branch, *int.*, internal branch ending in seminal stile *s*.
 7. *Sphæriodesmus robustus*, sp. n., lateral view: 7 *a*, head, antennæ, and first three tergal plates (1, 2, 3) viewed from the front; 7 *b*, lateral portions (keels) of the fourth, fifth, and sixth tergal plates (4, 5, 6); 7 *c*, lateral view of the last four tergal plates; 7 *d*, posterior view of the same (17, 18, 19, 20); 7 *e*, posterior end of the body viewed from below; 7 *f*, leg of first pair of male; 7 *g*, phallopods viewed *in situ* from below; 7 *h*, phallopods from the side.
 8. *Sphæriodesmus oniscus*, sp. n., lateral view of keels of fourth, fifth, and sixth (4, 5, 6) segments: 8 *a*, phallopods *in situ* from below; 8 *b*, external view of phallopod.
 9. *Sphæriodesmus prehensor*, sp. n., phallopods *in situ* from below; 9 *a*, lateral view of phallopods.

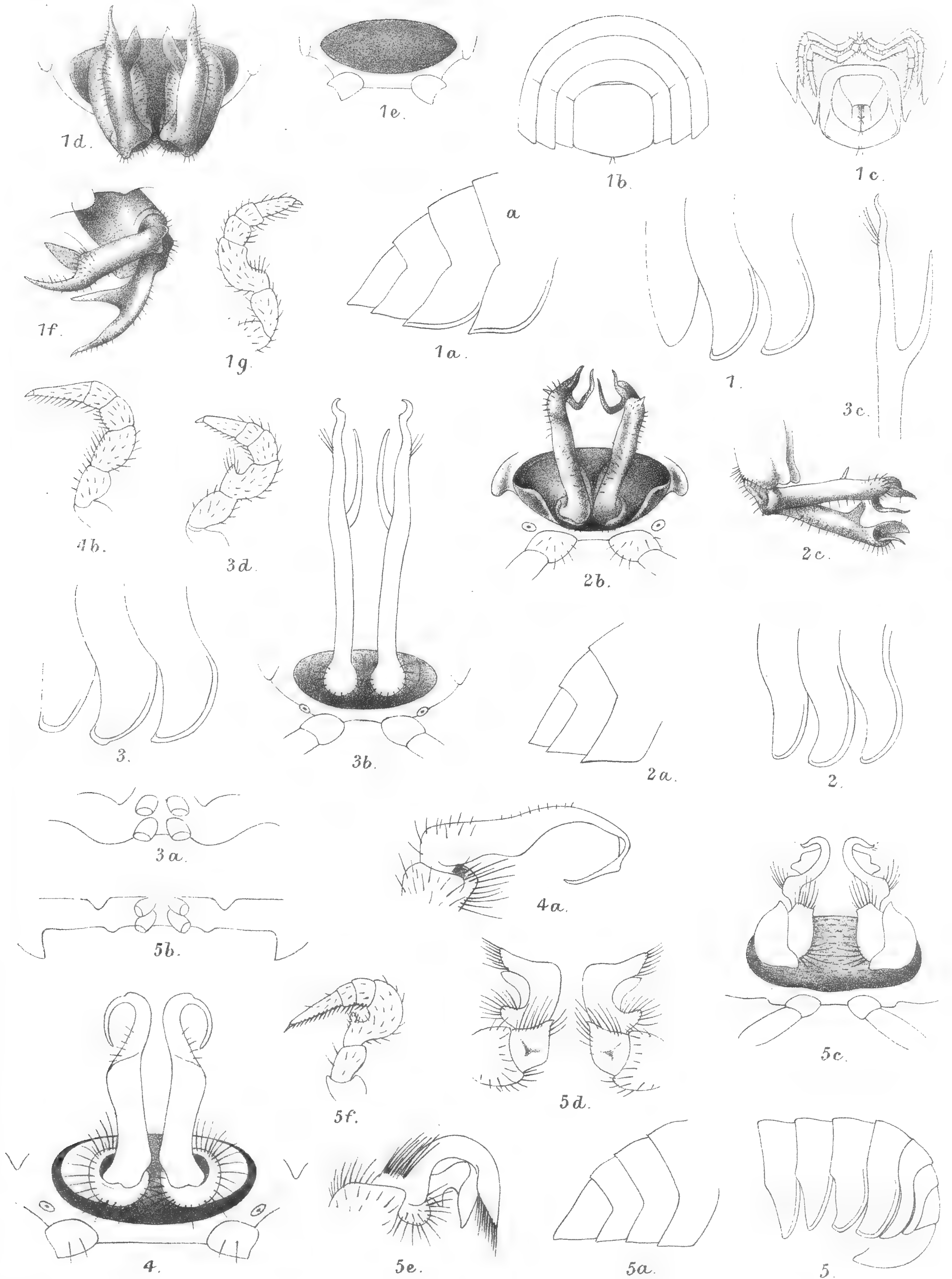


1 ORTHOPORUS STRIATULUS. 4 ORTHOPORUS TEAPENSIS. 7h SPHERIODESMUS ROBUSTUS.
 2 " CHIRIQUENSIS. 5 " AMULENSIS. 8-8b. " ONISCUS.
 3 " CORDOVANUS. 6-6e LIGIODESMUS PUSILLUS. 9-9a. " PREHENSOR.

DIPLOPODA.

PLATE IX.

- Fig. 1. *Sphæriodesmus angustus*, sp. n., keels of fourth, fifth, and sixth tergal plates: 1 *a*, lateral view of posterior extremity; 1 *b*, posterior view of the same; 1 *c*, inferior view of last three segments; 1 *d*, phallopods viewed *in situ* from below; 1 *e*, socket of phallopods; 1 *f*, lateral view of phallopods; 1 *g*, first leg of male.
2. *Sphæriodesmus stilifer*, sp. n., keels of fourth, fifth, and sixth tergal plates: 2 *a*, lateral view of posterior extremity; 2 *b*, phallopods viewed *in situ* from below; 2 *c*, lateral view of phallopods.
3. *Sphæriodesmus digitatus*, sp. n., keels of fourth, fifth, and sixth tergal plates: 3 *a*, inferior view of eleventh segment, showing the sinuous shape of the posterior border characteristic of *Sphæriodesmus*; 3 *b*, phallopods viewed *in situ* from below; 3 *c*, lateral view of extremity of phallopod; 3 *d*, first leg of male.
4. *Sphæriodesmus coriaceus*, sp. n., phallopods viewed *in situ* from below: 4 *a*, internal aspect of phallopod; 4 *b*, first leg of male (represented too short and thick).
5. *Cylionus constrictus*, sp. n., lateral view of anterior extremity: 5 *a*, lateral view of posterior extremity; 5 *b*, inferior view of eleventh segment, to show the straightness of the posterior border (to compare with 3 *a*); 5 *c*, phallopods viewed *in situ* from below; 5 *d*, inferior aspect of phallopods seen more obliquely; 5 *e*, lateral view of external aspect of phallopod; 5 *f*, first leg of male.

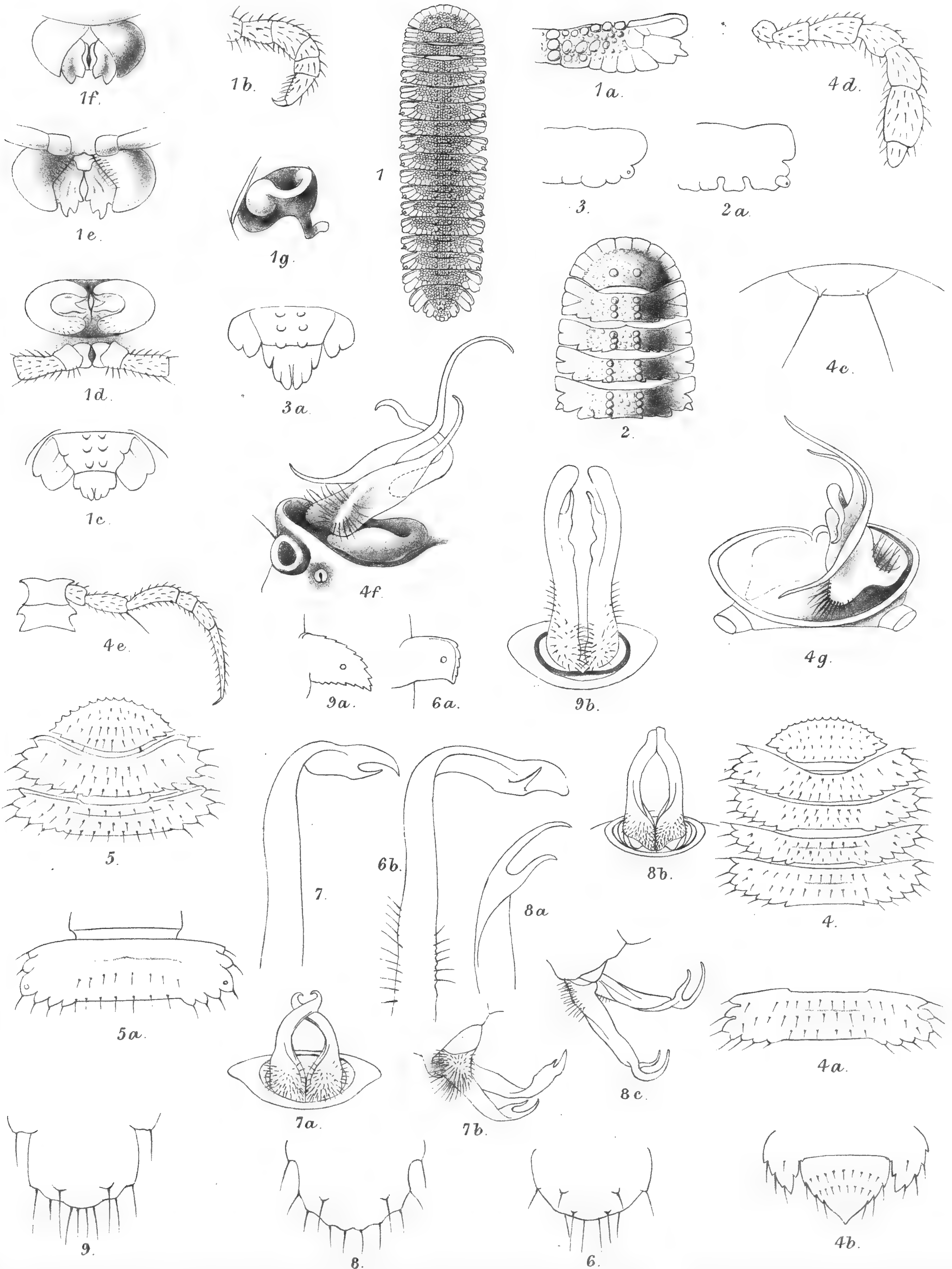


1.1g SPHÆRIODESMUS ANGUSTUS. 3.3d SPHÆRIODESMUS DIGITATUS. 4.4b SPHÆRIODESMUS CORIACEUS.
 2.2c " " STILIFER. 5.5f CYLIONUS CONSTRICTUS.

DIPLOPODA.

PLATE X.

- Fig. 1. *Lophodesmus laminatus*, sp. n., ♂ : dorsal aspect, enlarged.
- | | | | |
|---|----|----|---|
| 1 a. | ,, | ,, | right half of the fifth tergal plate, to show shape of keel. |
| 1 b. | ,, | ,, | leg of fourth segment. |
| 1 c. | ,, | ,, | dorsal aspect of 19th and 20th segments. |
| 1 d. | ,, | ,, | ventral view of seventh segment, showing the phallopods
<i>in situ</i> and the sternum and basal segments of the legs. |
| 1 e. | ,, | ,, | posterior aspect of phallopods and of basal segments of
the legs. |
| 1 f. | ,, | ,, | anterior aspect of phallopods. |
| 1 g. | ,, | ,, | enlarged view of internal portion of right phallopod
from below. |
| 2. <i>Lophodesmus celatus</i> , sp. n. : dorsal aspect of anterior end of body. | | | |
| 2 a. | ,, | ,, | dorsal aspect of keel of 13th segment. |
| 3. <i>Lophodesmus perparvus</i> , sp. n. : dorsal aspect of keel of 13th segment. | | | |
| 3 a. | ,, | ,, | dorsal aspect of 19th and 20th segments. |
| 4. <i>Peridontodesmus flagellatus</i> , sp. n. : dorsal aspect of anterior extremity of body. | | | |
| 4 a. | ,, | ,, | ditto 13th segment. |
| 4 b. | ,, | ,, | ditto 19th and 20th segments. |
| 4 c. | ,, | ,, | ditto anal sternal plate. |
| 4 d. | ,, | ,, | ditto antenna. |
| 4 e. | ,, | ,, | ditto sternum and leg of ninth segment, ♀. |
| 4 f. | ,, | ,, | ditto lateral aspect of left phallopod from the
outer side <i>in situ</i> . |
| 4 g. | ,, | ,, | ditto inferior aspect of the same; with the
right phallopod removed. |
| 5. <i>Peridontodesmus hirsutus</i> , sp. n. : dorsal aspect of first three segments. | | | |
| 5 a. | ,, | ,, | ditto 13th segment. |
| 6. <i>Platyrachus tristani</i> , sp. n. : caudal process. | | | |
| 6 a. | ,, | ,, | right keel of tenth segment. |
| 6 b. | ,, | ,, | distal end of phallopod from the outer side. |
| 7. <i>Platyrachus montivagus</i> , Carl : distal extremity of phallopod from the outer side. | | | |
| 7 a. | ,, | ,, | phallopods <i>in situ</i> from below. |
| 7 b. | ,, | ,, | ,, the side. |
| 8. <i>Platyrachus stenopterus</i> , Bröl. : caudal process. | | | |
| 8 a. | ,, | ,, | distal extremity of phallopod from the inner side. |
| 8 b. | ,, | ,, | phallopod <i>in situ</i> from below. |
| 8 c. | ,, | ,, | ,, the side. |
| 9. <i>Tirodesmus biolleyi</i> , Carl : caudal process. | | | |
| 9 a. | ,, | ,, | right keel of tenth segment. |
| 9 b. | ,, | ,, | phallopods <i>in situ</i> from below. |

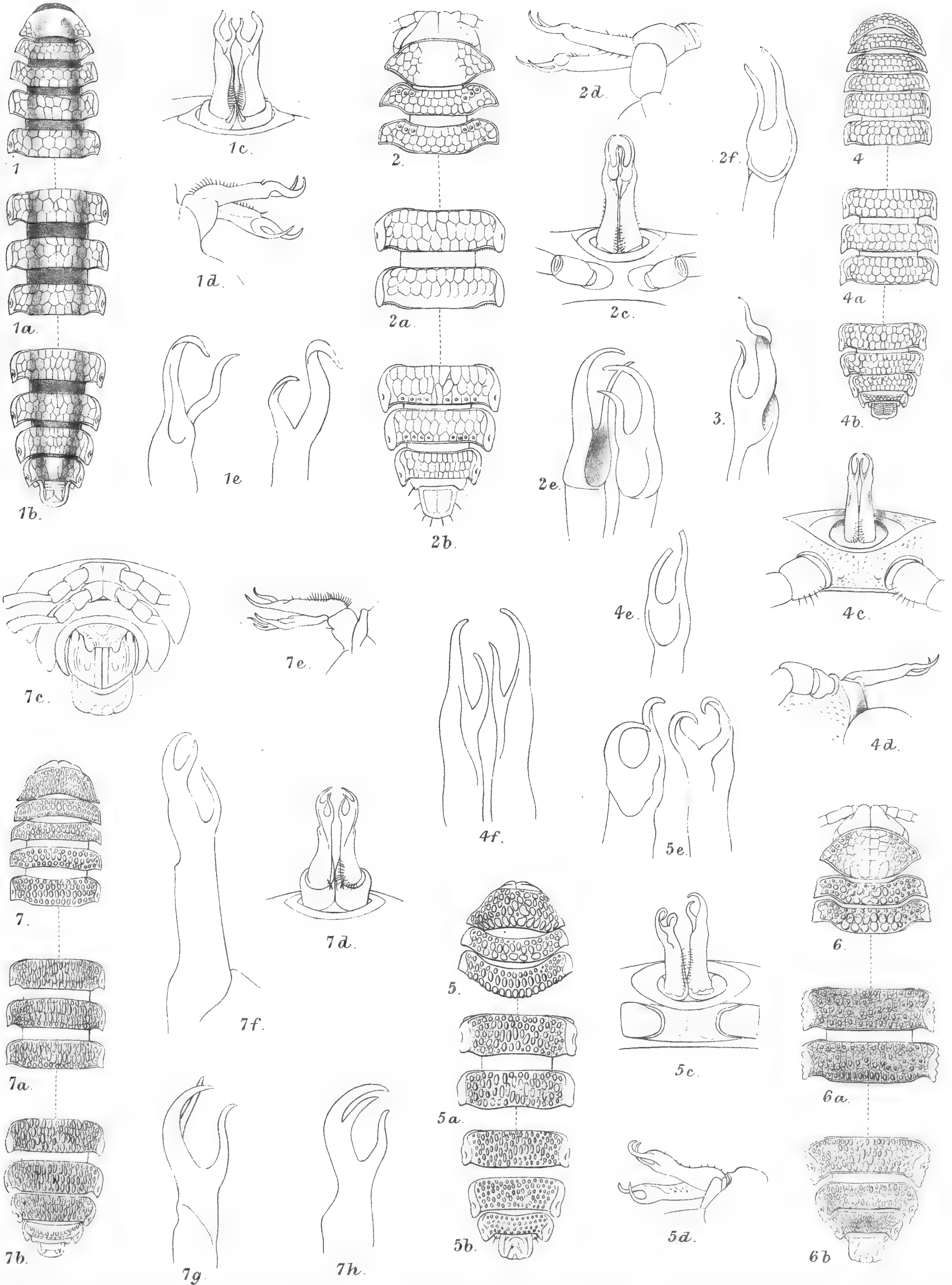


1-1g LOPHODESMUS LAMINATUS. 4-4g PERIDONTODESMUS FLAGELLATUS. 7-7b PLATYRACHUS MONTIVAGUS.
 2-2a " " CELATUS. 5-5a " " HIRSUTUS. 8-8c " " STENOPTERUS.
 3-3a " " PERPARVUS. 6-6b PLATYRACHUS TRISTANI. 9-9b TIRODESMUS BIOLLEYI.
 A.T.H. & R.I.P. del. J.Green lith. et imp.

DIPLOPODA.

PLATE XI.

- Fig. 1. *Amplinus palicaudatus*, Attems: anterior extremity.
- | | | | |
|------|---|---|---|
| 1 a. | „ | „ | three median segments. |
| 1 b. | „ | „ | posterior extremity. |
| 1 c. | „ | „ | phallopods from below. |
| 1 d. | „ | „ | phallopods from the side. |
| 1 e. | „ | „ | extremity of the two phallopods seen obliquely, showing alteration in shape of branches according to the point of view. |
2. *Amplinus flavicornis*, sp. n.: anterior extremity.
- | | | | |
|------|---|---|--|
| 2 a. | „ | „ | two median segments. |
| 2 b. | „ | „ | posterior extremity. |
| 2 c. | „ | „ | phallopods from below, |
| 2 d. | „ | „ | phallopods from the side. |
| 2 e. | „ | „ | extremity of phallopod from below. |
| 2 f. | „ | „ | extremity of left phallopod from the inner side. |
3. *Amplinus nitidus*, Bröl.: extremity of left phallopod from the inner side.
4. *Amplinus areatus*, sp. n.: anterior extremity.
- | | | | |
|------|---|---|--|
| 4 a. | „ | „ | three median segments. |
| 4 b. | „ | „ | posterior extremity. |
| 4 c. | „ | „ | phallopods from below. |
| 4 d. | „ | „ | left phallopod from the outer side. |
| 4 e. | „ | „ | extremity of left phallopod from the inner side. |
| 4 f. | „ | „ | extremity of phallopods from below. |
5. *Amplinus klugi*, Brandt: anterior extremity.
- | | | | |
|------|---|---|---|
| 5 a. | „ | „ | terga of tenth and eleventh segments. |
| 5 b. | „ | „ | posterior extremity. |
| 5 c. | „ | „ | phallopods from below. |
| 5 d. | „ | „ | phallopods from the side. |
| 5 e. | „ | „ | inner surface of left phallopod from two different aspects. |
- (Figures taken from specimen from Jalapa in the British Museum, identified as *A. klugi*, Br.)
6. *Amplinus armatus*, sp. n.: anterior extremity.
- | | | | |
|------|---|---|---------------------------------------|
| 6 a. | „ | „ | terga of tenth and eleventh segments. |
| 6 b. | „ | „ | posterior extremity. |
7. *Amplinus triramus*, sp. n.: anterior extremity.
- | | | | |
|------|---|---|---|
| 7 a. | „ | „ | terga of ninth, tenth, and eleventh segments. |
| 7 b. | „ | „ | posterior extremity. |
| 7 c. | „ | „ | 18th, 19th, and 20th segments from below. |
| 7 d. | „ | „ | phallopods from below. |
| 7 e. | „ | „ | phallopods from the side. |
| 7 f. | „ | „ | right phallopod shown slightly obliquely from the inner side. |
| 7 g. | „ | „ | extremity of right phallopod from below. |
| 7 h. | „ | „ | extremity of right phallopod from the outer side. |



1-1e AMPLINUS PALICAUDATUS.
2-2f " FLAVICORNIS.

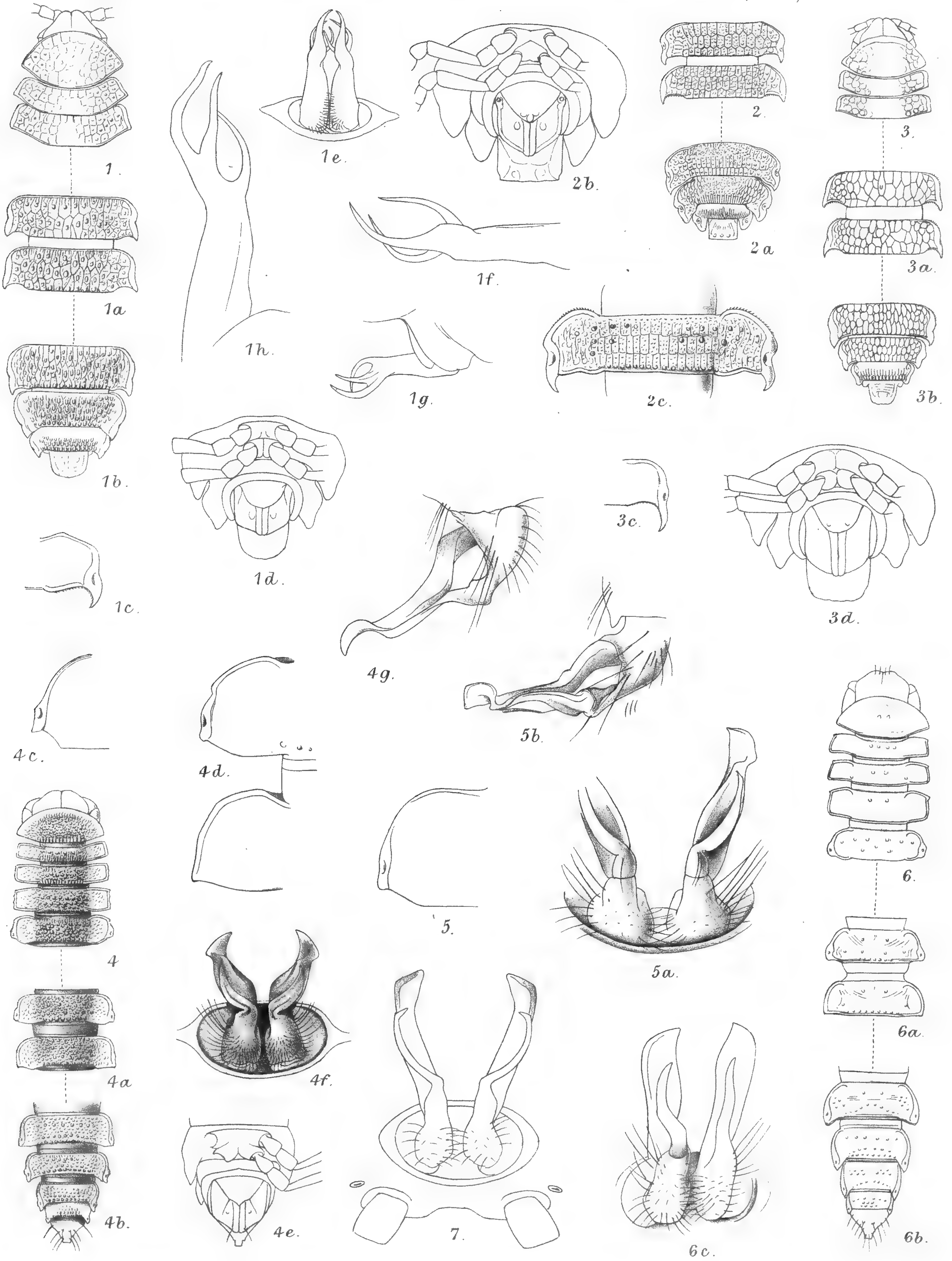
3. AMPLINUS NITIDUS.
4-4f " AREATUS.
5-5e " KLUGII.

6-6b AMPLINUS ARMATUS.
7-7h TRIRAMUS.

DIPLOPODA.

PLATE XII.

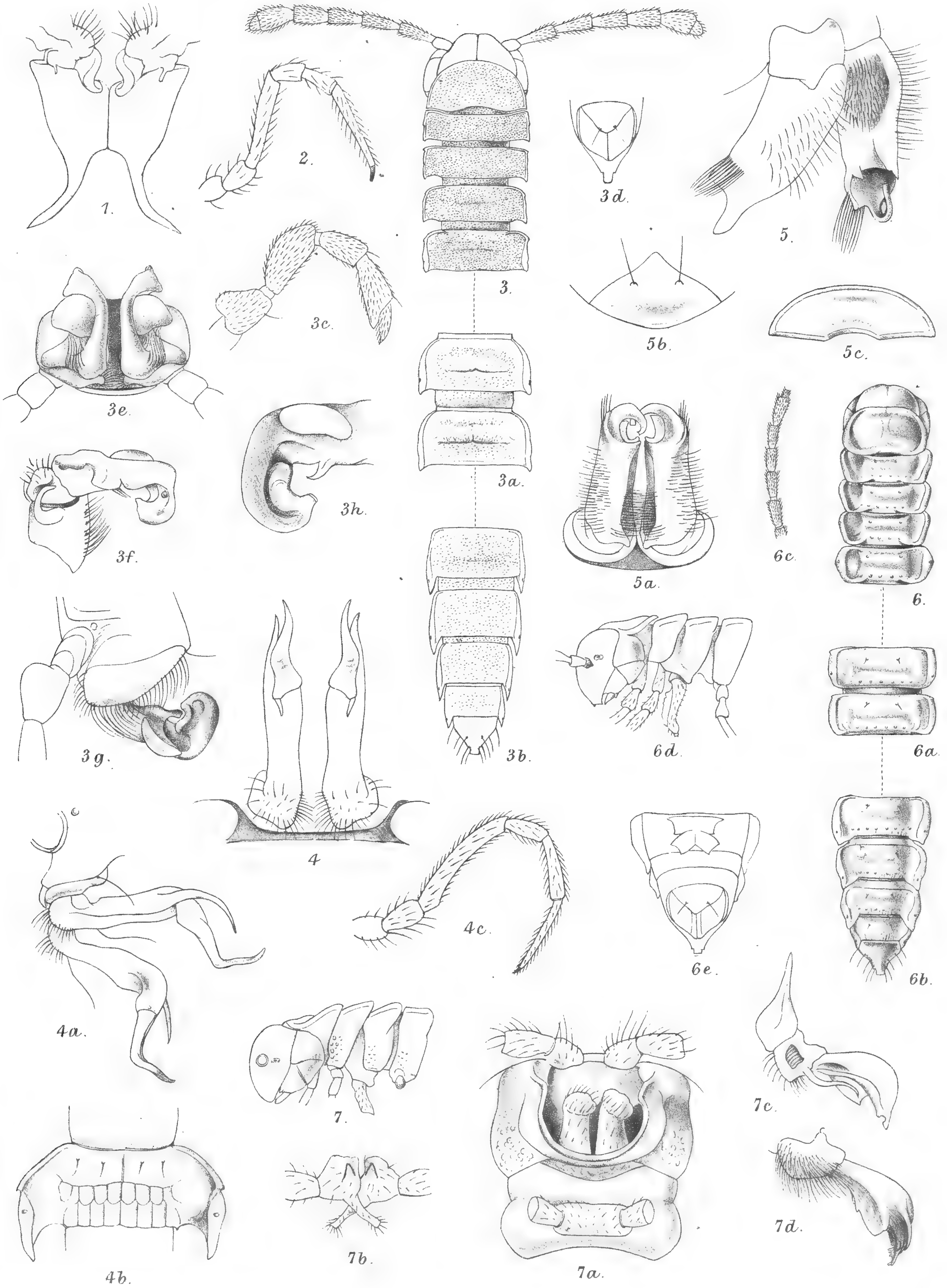
- Fig. 1. *Polylepiscus furcifer*, sp. n. : anterior extremity.
- 1 a. " " terga of 10th and 11th segments.
 - 1 b. " " posterior extremity.
 - 1 c. " " keel of 16th segment.
 - 1 d. " " 18th, 19th, and 20th segments from below.
 - 1 e. " " phallopods from below.
 - 1 f. " " extremity of right phallopod from below.
 - 1 g. " " left phallopod from the side.
 - 1 h. " " ditto (much enlarged).
2. *Polylepiscus actæon*, sp. n. : 10th and 11th terga.
- 2 a. " " posterior extremity.
 - 2 b. " " 18th, 19th, and 20th segments from below.
 - 2 c. " " tergum of 16th segment.
3. *Polylepiscus stolli*, sp. n. : anterior extremity.
- 3 a. " " terga of 11th and 12th segments.
 - 3 b. " " posterior extremity.
 - 3 c. " " keel of 16th segment.
 - 3 d. " " 18th, 19th, and 20th segments from below.
4. *Dirhabdophallus montanus*, sp. n. : anterior extremity.
- 4 a. " " terga of 10th and 11th segments.
 - 4 b. " " posterior extremity.
 - 4 c. " " keel of 13th segment.
 - 4 d. " " keels of 10th and 11th segments.
 - 4 e. " " 18th, 19th, and 20th segments from below.
 - 4 f. " " phallopods from below.
 - 4 g. " " left phallopod from the outside.
5. *Dirhabdophallus granosus*, Carl : keel of 13th segment.
- 5 a. " " phallopods from below.
 - 5 b. " " left phallopod from the outside.
6. *Dirhabdophallus spatulatus*, sp. n. : anterior extremity.
- 6 a. " " terga of 10th and 11th segments.
 - 6 b. " " posterior extremity.
 - 6 c. " " phallopods from below, the two seen from slightly different aspects.
7. *Dirhabdophallus ensiger*, sp. n. : phallopods and sternal area of 7th segment from below.



1-1h POLYLEPISCUS FURCIFER.
2-2c " ACTÆON.

3-3d POLYLEPISCUS STOLLI.
4-4g DIRHABDOPHALLUS MONTANUS. 7
5-5b " GRANOSUS.

6-6c DIRHABDOPHALLUS SPATULATUS.
" ENSIGER.

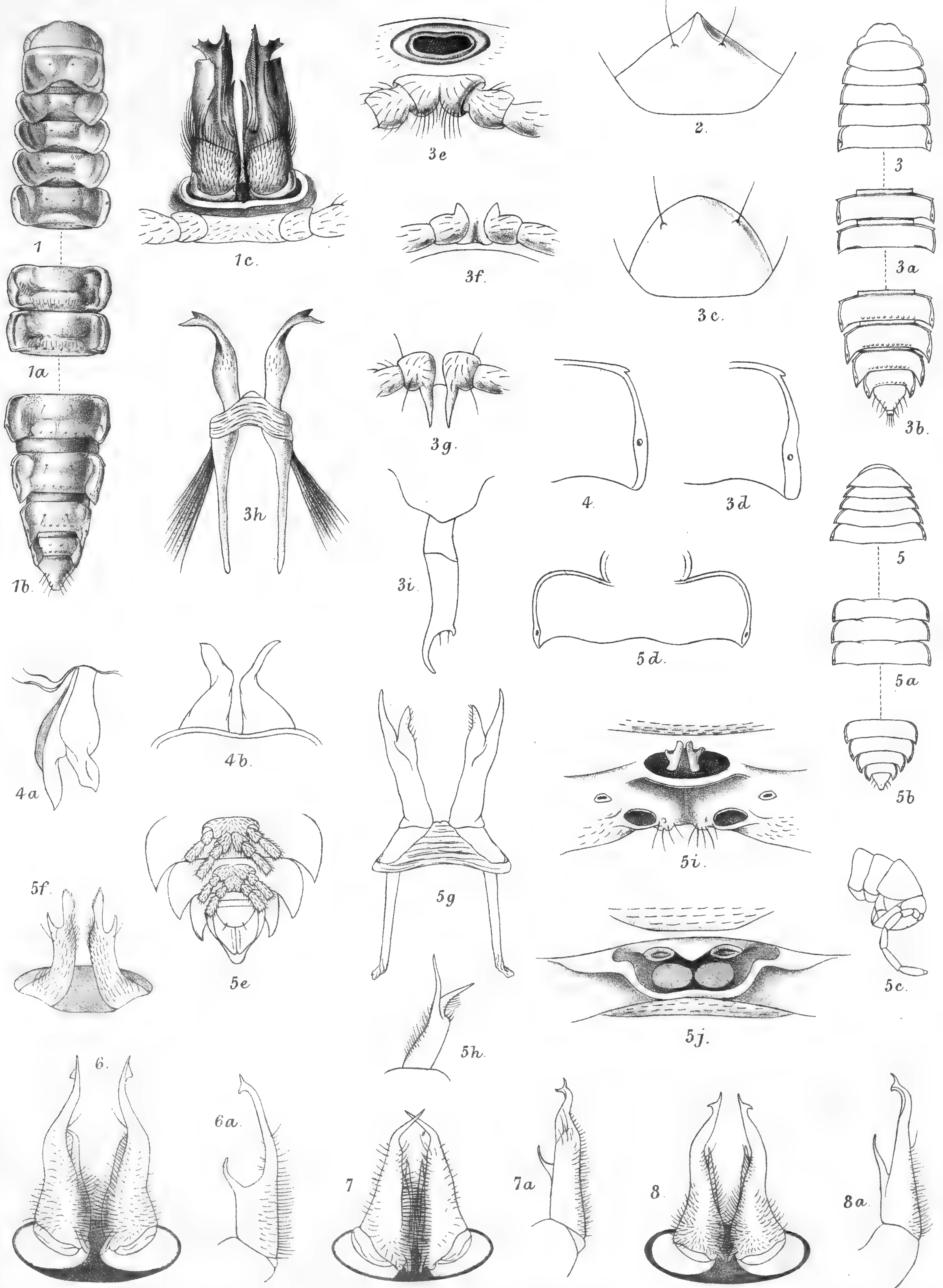


1 DIRHABDOPHALLUS ENSIGER. 3_3h PHYLACTOPHALLUS STENOMERUS. 6_6e PARARHACHISTES VERTEBRATUS.
 2 " MONTANUS. 4_4c EUTYPORHACHIS TESSELLATUS. 7_7d " ELEVATUS.
 5_5c STRONGYLODESMUS GEDDESI.

DIPLOPODA.

PLATE XIV.

- Fig. 1. *Pararhachistes elevatus*, sp. n., ♀ : anterior extremity.
- 1 *a.* " " terga of 10th and 11th segments.
1 *b.* " " posterior extremity.
1 *c.* " " ♂ : phallopods from below.
2. *Aceratophallus unicolor*, Carl : anal sternal plate.
3. *Pammicrophallus ornatus*, gen. et sp. n., ♀ : anterior extremity:
- 3 *a.* " " terga of 10th and 11th segments.
3 *b.* " " posterior extremity.
3 *c.* " " anal sternal plate.
3 *d.* " " keel of 9th segment of male.
3 *e.* " " lower view of part of 7th segment of male, showing
 socket of phallopods and sternal area.
3 *f.* " " sternum and basal segments of legs of 4th segment
 of male.
3 *g.* " " basal segments of legs of 2nd pair, showing genital
 processes.
3 *h.* " " phallopods extracted, showing long tracheal rods &c.
3 *i.* " " lateral view of left phallopod extruded, its anterior
 surface to the left.
4. *Pammicrophallus pictus*, sp. n. : keel of 9th segment of male.
- 4 *a.* " " lateral view of the phallopods, their anterior aspect to the
 right.
4 *b.* " " posterior aspect of phallopods, the two seen from slightly
 different positions.
5. *Zeuctodesmus cæruleus*, gen. et sp. n. : anterior extremity.
- 5 *a.* " " terga of 10th, 11th, and 12th segments.
5 *b.* " " posterior extremity.
5 *c.* " " lateral view of head and first three segments.
5 *d.* " " dorsal view of 9th segment (♀).
5 *e.* " " posterior end from below.
5 *f.* " " phallopods, partially extruded, from the front.
5 *g.* " " phallopods, extruded, showing the long tracheal rods
 &c., viewed from the front.
5 *h.* " " lateral view of extruded phallopod, its anterior surface
 to the right.
5 *i.* " " lower view of part of 7th segment of ♂, the legs
 removed, showing the small phallopods partially
 retracted.
5 *j.* " " inferior view of genital orifice of ♀, the legs
 removed.
6. *Rhysodesmus montezumæ*, Sauss. : phallopods from below.
- 6 *a.* " " right phallopod from the outside.
7. *Rhysodesmus pusillus*, sp. n. : phallopods from below.
- 7 *a.* " " right phallopod from the outside.
8. *Rhysodesmus totanacus*, Sauss. : phallopods from below.
- 8 *a.* " " right phallopod from the outside.



1.1c PARARHACHISTES ELEVATUS. 4.4b PAMMICROPHALLUS PICTUS. 6,6a RHYSODESMUS MONTEZUMÆ.
 2. ACERATOPHALLUS UNICOLOR. 5.5j ZEUCTODESMUS CÆRULEUS. 7,7a. " PUSILLUS.
 3.3i PAMMICROPHALLUS ORNATUS. 8,8a. " TOTANACUS.

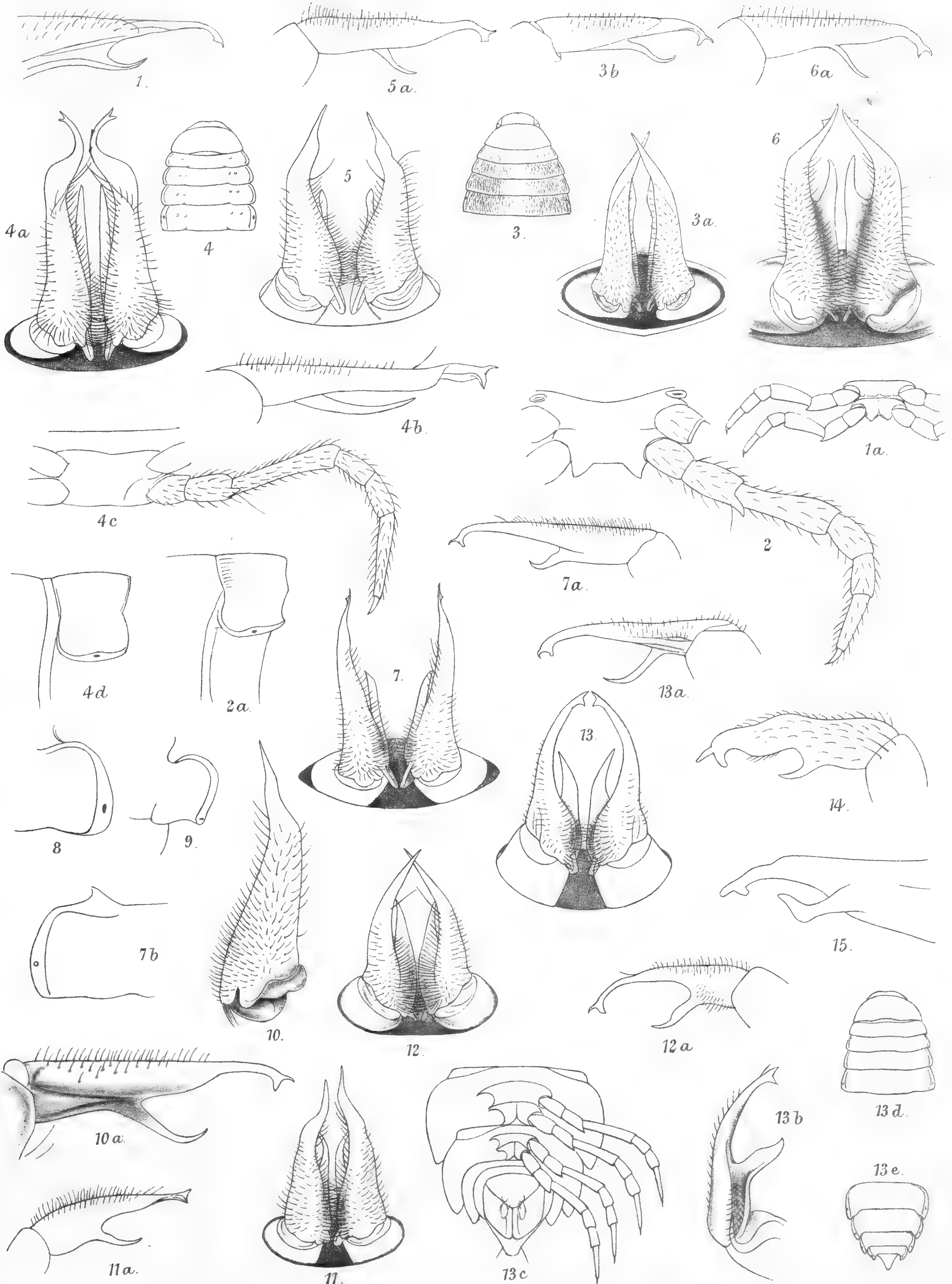
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DIPLOPODA.

PLATE XV.

- Fig. 1. *Rhysodesmus limax*, Sauss. : extremity of phallopod from inner side.
1 a. " " sternum and legs of 11th segment of ♂. (These two figures taken from specimen in the British Museum identified by me as *R. limax*.)
2. *Rhysodesmus tabascensis*, sp. n., ♀ : sternum and leg of 9th segment.
2 a. " " lateral view of keel and interzonal area of 9th segment.
3. *Rhysodesmus stoll*i, sp. n. : anterior extremity.
3 a. " " phallopods from below.
3 b. " " left phallopod from outside.
4. *Rhysodesmus godmani*, sp. n., ♂ : anterior extremity.
4 a. " " phallopods from below.
4 b. " " left phallopod from outside.
4 c. " " sternum and leg of 9th segment.
4 d. " " lateral view of keel and interzonal area of 9th segment.
5. *Rhysodesmus salvini*, sp. n. : phallopods from below.
5 a. " " left phallopod from outside.
6. *Rhysodesmus flavocinctus*, sp. n. : phallopods from below.
6 a. " " left phallopod from outside.
7. *Rhysodesmus attemsi*, sp. n. : phallopods from below.
7 a. " " right phallopod from outside.
7 b. " " keel of 9th segment.
8. *Rhysodesmus montezumæ*, Sauss., ♂ : keel of 9th segment.
9. *Rhysodesmus pusillus*, sp. n. : keel of 8th segment.
10. *Rhysodesmus notostictus*, sp. n. : left phallopod from below.
10 a. " " left phallopod from outside.
11. *Rhysodesmus inustus*, sp. n. : phallopods from below.
11 a. " " left phallopod from the outside.
12. *Rhysodesmus smithi*, sp. n. : phallopods from below.
12 a. " " right phallopod from outside.
13. *Rhysodesmus arcuatus*, sp. n. : phallopods from below.
13 a. " " right phallopod from outside.
13 b. " " right phallopod from inner side and from a slightly different position, to show coxal calcar and groove.
13 c. " " posterior end of body from below.
13 d. " " anterior extremity.
13 e. " " posterior extremity.
14. *Rhysodesmus angelus*, Karsch : right phallopod from outside (after Attems).
15. *Rhysodesmus violaceus*, Bröl. : extremity of phallopod (after Brölemann).



1, 1a	RHYSODESMUS LIMAX.	6, 6a	RHYSODESMUS FLAVOCINCTUS.	11, 11a	RHYSODESMUS INUSTUS.
2, 2a	" TABASCENSIS	7-7b.	" ATTEMSI.	12, 12a	" SMITHI.
3-3b	" STOLLI.	8.	" MONTEZUMÆ.	13, 13e	" ARCUATUS.
4-4d	" GODMANI.	9.	" PUSILLUS.	14.	" ANGELUS.
5, 5a	" SALVINI.	10, 10a.	" NOTOSTICTUS.	15.	" VIOLACEUS.

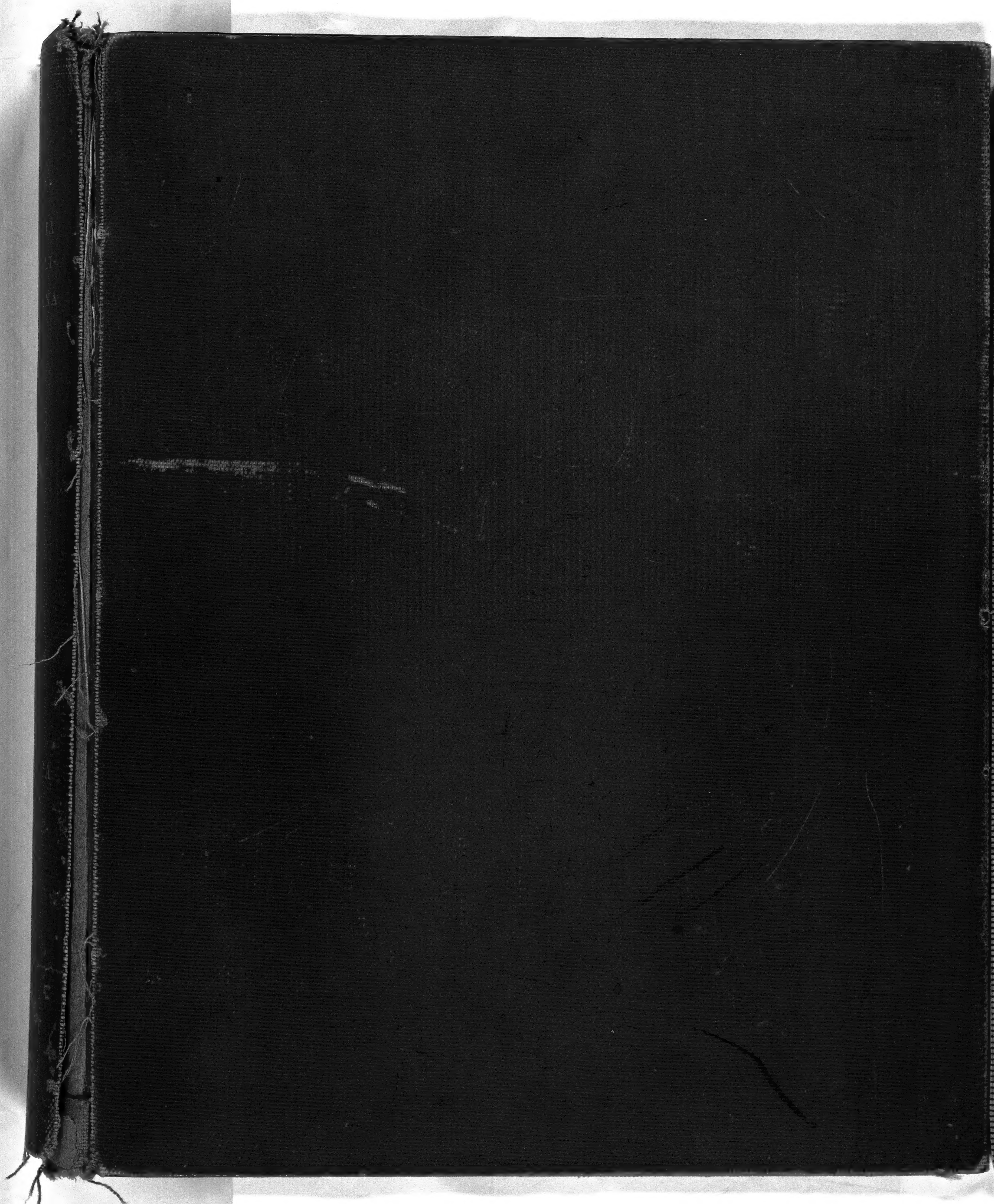
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