

The illustrations of Saussure are crude and in some respects misleading. The illustration of *P. dollfusi* (see above), which is perhaps not distinct from the present species, gives a better idea of the latter.

***Pseudarmadillo dollfusi* Richardson, 1905**

Figure 191

*Pseudarmadillo dollfusi* RICHARDSON, 1905, p. 657 (orig. descr.), Figs. 700, 701a-g.—BOONE, 1934, p. 575.

This is perhaps a synonym of *P. carinulatus*. So far as I am aware, the chief character distinguishing it is that it has the inner lamella of the coxopodite notch of segment I emarginate ("bifurcate," according to Richardson), instead of rounded at the tip.

LOCALITY.—Three specimens were obtained at Mangrove Cay, Andros Island, Bahamas. Types in the Museum of Comparative Zoology, Cambridge, Mass. (Richardson). The American Museum of Natural History has nine specimens from Andros Island (several of them from Mangrove Cay, the type locality).

***Pseudarmadillo welchi* Boone, 1934**

Figure 192

*Pseudarmadillo welchi* BOONE, 1934, p. 577 (orig. descr.), Figs. 5, 8d, 8e, 8f.

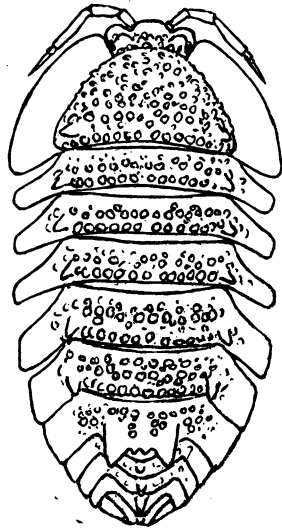


Fig. 192. *Pseudarmadillo welchi* Boone.

This is a form intermediate between *P. carinulatus* and *P. gillianus* (see below) and requires no description here as it apparently differs

from the latter form only in having conical or more or less pyramidal tubercles in place of the long spines of *gillianus*. Of these tubercles the two on the rear border of segment VII are the largest and project considerably beyond the rear border of the segment; between them there may be one or two minute tubercles or none at all. The tubercles replacing the lateral spines on the first six segments vary much in size in different individuals and some individuals are not very conspicuously enlarged.

In the widely flaring lateral borders and ends of the body segments which bend outward much more than in the specimens of *P. carinulatus* and its doubtfully distinct ally *dollfusi* which I have seen; in its size (ranging up to 11 or 12 mm. in length); and in its mottled coloration of brown and whitish irregularly variegated (especially on the epimeral parts) with large whitish areas of different extent and arrangement in different individuals, *gillianus* and *welchi* are alike, and I must consider the validity of the latter species as requiring more confirmation.

DISTRIBUTION.—Miss Boone reports *P. welchi* from a number of localities in Cuba from Camaguey to Piñar del Rio Provinces inclusive. The American Museum of Natural History contains the type (Cat. No. 6623) from Marti, Camaguey Province, and a number of other specimens. Variations in the development of the tuberculation are considerable, but do not seem to be correlated with size, age or locality.

#### *Pseudarmadillo gillianus* Richardson, 1902

##### Figure 193

*Pseudarmadillo gillianus* RICHARDSON, 1902b, p. 509 (orig. descr.), Figs. 1-4; 1905, p. 655 (descr.), Figs. 696-699 (original figures reproduced).—BOONE, 1934, pp. 577, 580, Fig. 6.

In this species, the row of large tubercles on each side of the thorax becomes a row of large spines, and the pair of tubercles on the rear border of thoracic segment VII, also the median tubercle on abdominal segment 5, are developed into long, tapering spines. The inner lamella of the notch in segment I is "bifurcate." Other differences which, from the figures, might be assumed to exist between this species and *dollfusi* (which perhaps = *carinulatus*) are probably due to the relaxed condition of the intersegmental muscles in the specimen from which the figure of *gillianus* was drawn, and from the fact that the head is more upturned.

LOCALITY.—Nueva Gerona, Isle of Pines, Cuba. Type in U. S. National Museum (Richardson). Boone, 1934, reports it from several localities in Cuba from Camaguey to Piñar del Rio Provinces inclusive.

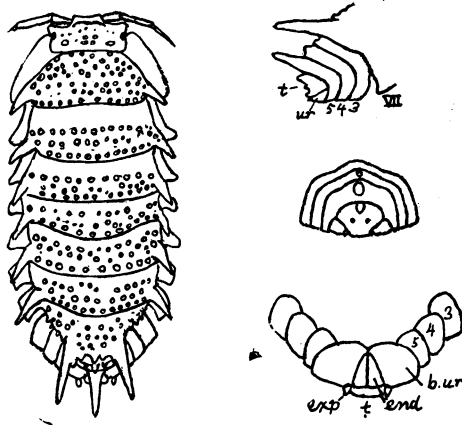


Fig. 193. *Pseudarmadillo gillianus* Richardson. Adapted from Richardson, 1902b.

***Pseudarmadillo buscki* Boone, 1924**

Figure 194

*Pseudarmadillo buscki* BOONE, 1934, p. 582 (orig. descr.), Fig. 7.

This remarkable species, though a typical *Pseudarmadillo* in all its fundamental structures and details, and conforming to the description given above under that genus, has perhaps the most extraordinary development of spines of any isopod.

In general form the body conforms to that of *P. gillianus*, but the small tubercles present on the dorsal surface of that species are practically wanting, the surface being merely granular. The large lateral spines present in *gillianus* have in *buscki* an even greater development, being larger and longer, and more or less flattened from side to side, the rear margin having a tendency to be slightly dentate. The head bears a pair of large, upwardly extending, flattened, leaf-like diverging processes. The spines borne by *gillianus* on the seventh thoracic segment are here represented by a pair of large acute leaf-like appendages joined at the base but diverging and extending nearly horizontally backward over the abdomen. They have the margins somewhat dentate and, on the lower aspect, a midrib bearing a row of tubercles. On the thoracic segments there is a transverse row of a few acute tubercles or small erect spines close to the rear margin; of these the pair each side of the median line are the largest of them, except that on segment VI there is a single median spine instead of a pair. Abdominal segments 4 and 5 and the

telson bear a median triangular erect plate, that on the telson being the largest.

The antennae resemble those of the other species of the genus. The eyes are small and composed of few ocelli. The coxopodite ridge of segment I is similar to that of *carinulatus* and ends in a small process whose tip is not expanded or emarginate. Segment 2 has a tooth-like coxopodite process.

Color yellowish white, with little trace of darker pigmentation.

Length of type (a female) about 10.2 mm.

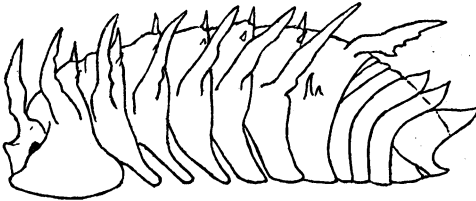


Fig. 194. *Pseudarmadillo buscki* Boone.

LOCALITY.—The type above described and a much smaller fragmentary specimen were obtained at Caenito, Cuba. Type in the American Museum of Natural History (Cat. No. 6615). We may surmise that with more material available, considerable individual variation in the development of the dorsal spines and processes would be found to occur.

#### DELATORREIA BOONE, 1934

This genus is characterized by the remarkable projection of the rear margin of the seventh thoracic segment which is broadly extended out in a roof-like manner over, but not in contact with, the abdomen. At its rear end this extension is curved downward and rendered slightly two-lobed as seen in a dorsal view by a median notch or emargination.

In other respects, including the coxopodite sulcus along the whole length of the margin of the first thoracic segment on the underside, and in the tooth-like coxopodite process of the second segment and the characters of the abdominal segments, telson, uropoda, etc., the genus does not appear to differ from *Pseudarmadillo*.

#### *Delatorreia hoplites* Boone, 1934

Figure 195

*Delatorreia hoplites* BOONE, 1934, p. 586 (orig. descr.), Figs. 8a, 8b, 8c, 9.

The characters given under the genus sufficiently differentiate this species from other known forms. The upper surface of the head and the back are covered with small tubercles which, on the back, form, on most of the segments, two or more distinct, transverse rows.

Eyes with few (seven, according to Miss Boone) well-developed ocelli. Antennae with a flagellum of two articles, the first very short. Abdominal segments 4 and 5, the telson with a median oblong tubercle.

The type specimen exhibits hardly any pigmentation.

Length of type (a female) about 10 mm.

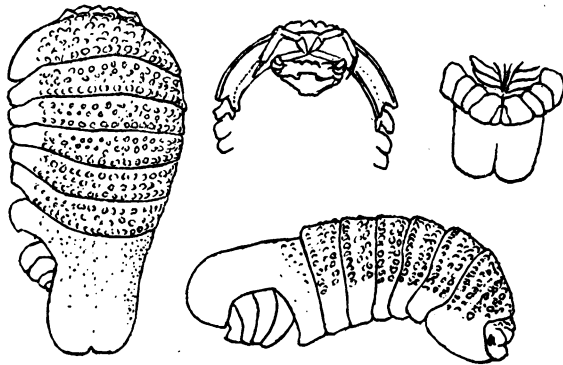


Fig. 195. *Delatorreia hoplites* Boone.

LOCALITIES.—The type (Cat. No. 6607 in the American Museum of Natural History) and a smaller specimen, were obtained at Finca de Soma, Sierra de Cubitas, Camaguey, Cuba. Miss Boone records a larger example (size not stated) from the Sierra de Najaza, Camaguey Province, Cuba.

CUBARIS BRANDT, 1833

(= *Armadillo* auct. plur.)

Budde-Lund's (1885) diagnosis of this genus, as translated by Richardson, 1905, is as follows:

"First pair of antennae very small, inconspicuous, composed of three articles. Second pair of antennae short, generally not longer than one-third the length of the body; flagellum composed of two articles.

"Eyes composite, small or moderately large. Clypeus very short, with the anterior margin entire, lobate at the sides. Epistome flat,

forming a continuously straight frontal marginal line. The vertical marginal line reaches the frontal line.

"First thoracic segment with the epimera posteriorly cleft, often also the second; rarely entire. Terminal abdominal segment tetragonal, wider at the base than at the apex, more or less contracted in the middle.

"Outer branch of all the pleopoda furnished with tracheae. Uropoda short, not extending beyond the terminal abdominal segment. Basal article or peduncle large, wide, entire, tetragonal, obliquely produced; outer branch very small, rather slender, inserted at the middle of the inner lateral margin of the basal article; inner branch small, rather slender or rather compressed."

The members of this genus are among the most perfectly adapted of all isopods for rolling the body up into the form of a ball for protection. They can readily be distinguished from the other American genera having this character, by their telson and uropoda. The telson is widely truncated at the rear end, forming a considerable part of the outline of the body; it is also wide at the superior or basal end, but usually more or less constricted in width in the middle portion. The broad, flattened basal segments of the uropoda fill in the space between the sides of the distal part of the telson and the fifth abdominal segment, also taking part in forming the posterior outline of the body. The inner branches of the uropoda are small and short, inserted well toward the basal ends, and visible only in a ventral view of the body. The external branches are mere rudiments, often very minute, inserted on the inner (median) margin of the basal segment, or sometimes on its external (dorsal) aspect near that margin.

On the first segment, in the American species, there is usually a sulcus or groove on the inferior aspect of the margin which separates off an internal ridge (the coxopodite ridge) that runs parallel to and inside of the actual margin for a part, or sometimes for the whole, length of the latter.<sup>1</sup> The second segment commonly has a small coxopodite process.

With a few exceptions, possibly all accidental importations through human agency, the American species of *Cubaris* may be placed in a single subgenus which includes also a number of African species, for

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<sup>1</sup> The reader should bear in mind that the sulcus here referred to is on the inferior or ventral aspect of the lateral border of the first segment, usually extending forward from a more or less well-developed notch or cleft at the posterior lateral angle. It must not be confounded with another groove on the margin of the segment, formed by the abrupt upturning of the margin, present in some species.

resemblance between certain American and African species is very striking, although they are not identical.<sup>1</sup>

Budde-Lund adopted the name *Diploexochus* Brandt for this subgenus and has been followed by a few other writers, notably Arcangeli and Barnard, the latter having given the group generic rank (1932).<sup>2</sup> But as none of these numerous American and African species have the peculiarities of the epimera on which Brandt's *Diploexochus* was based, it seems better to restrict his name to his type species *echinatus* and to consider the others as a different group. Verhoeff has recently (1928, p. 113) proposed the name *Venezillo* for it, with *Cubaris clausa* (Budde-Lund) as the type. Although he gives no diagnosis and does not discuss the limits of the group, which is evidently a very large one, *C. clausa* is a typical example of it and the name *Venezillo* appears to be available for use.

Pending a more complete study of the numerous species of *Cubaris* and for greater convenience in dealing with the American members of it in the present work, I have arranged them in five groups based on the development of the sulcus and coxopodite ridge on the first thoracic segment, as this is the most convenient single character for the purpose. Of these five groups, I, II, and probably III, including the great majority of the American species, belong in the subgenus *Venezillo*, with the possible exception of a few species.

The species of *Cubaris* have comparatively weak limbs and rather poor powers of locomotion. The result is that most of the species are very local in their distribution, unless they happen to have been more widely disseminated by some external factor, such as accidental introduction on plants brought for cultivation. Specimens from widely separated places, or from different islands (unless they are situated quite close together) will usually prove to be of different species.

#### Table of American Species of *Cubaris*

GROUP I.—Coxopodite sulcus on lower side of margin of first thoracic segment narrow or moderately narrow and distinct on the whole or nearly the whole length of the margin. Members of subgenus *Venezillo*.

<sup>1</sup> This similarity extends in a conspicuous manner to the arrangement of the tubercles with which the dorsal surface of some of the species are ornamented, and to other seemingly superficial characters. As an example of this, compare the American species *C. phylax* and *C. mineri*, here described and figured, with such African species as *C. jomposiensis* (Collinge), 1920, and *C. regulus* Van Name, 1920. I am inclined to attribute this largely to convergence, or more probably an inherited tendency derived from some ancestral form, to develop a certain pattern of tuberculation, rather than as evidence of recent immigration of African species to South America.

<sup>2</sup> Barnard, 1932, employs the genus *Cubaris* in a very restricted sense with *C. murina* as the type, corresponding to the subgenus *Cubaris* (of the genus *Armadillo*) employed by Budde-Lund, 1909.

a.—Upper surface practically smooth, or with only weakly developed rugae on the lateral regions of the back:

<i>watsoni</i>	Jamaica
<i>colomboi</i>	Cuba
<i>zigzag</i>	St. Vincent
<i>boliviana</i>	Bolivia
<i>booneae</i>	Jamaica
<i>hendersoni</i>	Haiti
<i>aguayoi</i>	Cuba
<i>congenera</i>	Brazil
<i>venusta</i>	Venezuela and Trinidad
<i>silvarum</i>	St. Vincent
<i>sanchezi</i>	Cuba

b.—Upper surface moderately rugose or tuberculated, especially on the lateral regions of the back:

<i>clausa</i>	Venezuela
<i>walkeri</i>	Mexico
<i>multipunctata</i>	Venezuela
<i>rubropunctata</i>	Venezuela
<i>pumila</i>	Venezuela
<i>viticola</i>	Grenada

c.—Upper surface with large tubercles:

<i>scaberrima</i>	Venezuela
<i>perlata</i>	St. Vincent or Grenada
<i>phylax</i>	Santo Domingo

GROUP II.—Coxopodite sulcus on lower side of first thoracic segment reduced in length and developed only on about one-half (or less) of the length of the margin (in *C. ramsdeni* and *wheeleri* almost entirely suppressed). Members of subgenus *Venezillo*.

a.—Upper surface practically smooth or with only weakly developed rugae on the lateral regions of the back:

<i>moneaguensis</i>	Jamaica
<i>oaxacana</i>	Mexico
<i>grenadensis</i>	Granada, Venezuela, Colombia, Cuba
<i>nigrorufa</i>	Venezuela



<i>similis</i>	South America(?)
<i>pisum</i>	Florida
<i>gigas</i>	Nicaragua, Colombia
<i>dumorum</i>	Mustique Island
<i>dugesi</i>	Mexico
<i>beebei</i>	Galapagos

b.—Upper surface more or less conspicuously rugose or tuberculated:

<i>truncorum</i>	Venezuela
<i>vincentis</i>	St. Vincent (also Colombia?)
<i>culebrae</i>	Culebra
<i>jamaicensis</i>	Jamaica
<i>verrucosa</i>	Ecuador
<i>galapagoensis</i>	Galapagos
<i>tuberosa</i>	Haiti

c.—Coxopodite sulcus and ridge reduced to a small cleft or a minute notch at rear lateral angle of segment:

<i>ramsdeni</i>	Cuba
<i>wheeleri</i>	Culebra

GROUP III.—Coxopodite ridge distinct on posterior half or lower side of first thoracic segment but considerably removed from the lateral margin. Upper surface of body strongly tuberculated or spiny. (These are somewhat doubtful members of the subgenus *Venezillo*.)

<i>brevispinis</i>	Colombia
<i>mineri</i>	British Guiana
<i>longispinis</i>	Panama

GROUP IV.—Coxopodite ridge and sulcus of the first thoracic segment almost suppressed, the ridge represented only by a slight prominence or jog in the outline of the ventral aspect of the segment, far removed from the lateral margin. (Subgenus *Cubaris*, see Barnard, 1932, pp. 376, 377.)

<i>murina</i>	widely distributed
<i>cinerea</i>	Brazil
<i>brunnea</i>	British Guiana
<i>flavobrunnea</i>	Darien
<i>cinchonae</i>	Jamaica

GROUP V.—No coxopodite ridge or sulcus. These two species were doubtfully assigned by Budde-Lund (1904) to a group to which he later (1909) gave the name *Bethalus*, and which with these exceptions included only Old World species.

<i>tenuipunctata</i>	Mustique Island
<i>depressa</i>	St. Vincent

Doubtful species, insufficiently described to place in one of the above groups:

<i>affinis</i>	California
<i>californica</i>	California
<i>cacahuamilpensis</i>	Mexico
<i>granaria</i>	Chile

#### GROUP I

Coxopodite sulcus and ridge of thoracic segment I narrow or moderately narrow, and distinct on the whole length, or by far the greater part of the whole length of the lateral margin of the segment. *C. viticola*, though included here on account of the length of the coxopodite ridge, is peculiar in the distant removal of that ridge from the margin and in the elongate, scarcely constricted telson, and might be regarded as constituting a group by itself.

*a.*—Upper surface practically smooth, or with only weakly developed rugae on the dorso-lateral regions.

#### ***Cubaris watsoni*, new species**

Figures 196, 197

Body highly arched, broadly rounded in front and especially behind, where the ends of the abdominal segments extend obliquely outward, increasing the width.

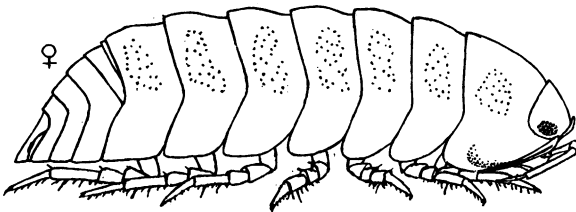


Fig. 196. *Cubaris watsoni*, new species.

Body surface smooth except for minute close granulation visible on magnification, and slight unevenness in the lateral regions of the back, a vestige of the tuberculation

present in many related species. Exposed part of the thoracic segments slightly but not abruptly elevated above the part fitting under the segment next in front. Legs moderately long but slender and with weak spines.

Front outline of head gently curved when seen from above. Upper border of epistome arched and forming a narrow, thin projecting border which is strongly up-turned but not closely appressed to the forehead. Eyes rather small, with about seventeen ocelli; antennae small and slender, the terminal article of the flagellum nearly twice as long as the proximal one.

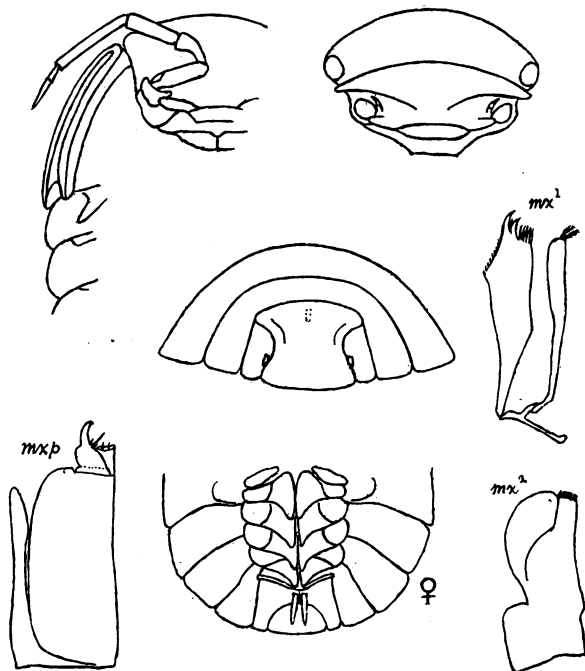


Fig. 197. *Cubaris watsoni*, new species.

First segment of the thorax with the lateral border quite abruptly but not very widely turned outward and very slightly upward it becomes narrower and merges with the side of the segment a considerable distance in front of the rear angle of the segment. The inferior aspect of the border has a rather narrow sulcus of U-shaped cross section on its whole length, but this is very shallow on the anterior half; on the posterior half it is also shallow and becomes gradually deeper and slightly wider and ends in a notch or cleft, whose inner side is shorter than the outer, which forms the rear angle of the segment. The second segment bears a narrow rather acute coxopodite process; none is developed on the third or succeeding segments. Telson not greatly wider than long; the wide upper part is short, and the rear end, which is cut

off in the arc of a very large circle, is over four-fifths the width of the upper part. The exposed part of the basal joint of the uropoda is long and narrow and bears the slightly elongated outer branch in a notch about the middle of the inner border of the exposed portion. The inner branches are narrow and fail by a considerable distance to reach the end of the telson.

Color of the alcoholic specimens are mostly yellowish, or whitish, only a little blackish pigment being present on the upper parts, thinly and unevenly distributed, chiefly on the median and epimeral parts of the segments and near their posterior borders, giving the back a cross-barred appearance.

Length of largest specimen about 15 mm.

LOCALITIES.—Mandeville, Jamaica. Three female specimens (including the type, Cat. No. 6514) in the American Museum of Natural History collected by Mr. F. E. Watson, for whom the species is named, at an altitude of about 2350 feet, and several from Port Antonio, Jamaica. There is also a small and poorly preserved specimen in the same museum from Chinchona, Jamaica, that appears to be of this species.

**Cubaris colomboi** Arcangeli, 1929

Figure 198

*Cubaris colomboi* ARCANGELI, 1929, p. 132, Fig. 1.

The main characters of this species, which is described in detail by Arcangeli, are shown by the figures here reproduced. It has a highly

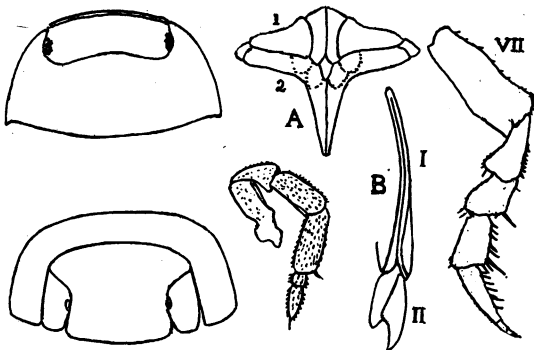


Fig. 198. *Cubaris colomboi* Arcangeli. Adapted from Arcangeli, 1929. A, first and second pleopoda of male seen from below; B, lower aspect of margin of first and second thoracic segments.

arched body with nearly vertically descending sides and practically smooth surface, except for a minute squamation. Eyes rather large, with twelve ocelli.

First thoracic segment with a narrow raised margin extending nearly to the rear angle and a very narrow shallow coxopodite sulcus throughout its length ending in a notch at the rear, which divides the margin into two lobes of which the "superior" is described as more widely rounded, the "inferior" as more acute. The second segment has a somewhat acute coxopodite process.

In the male the legs of the seventh pair bear a setose, truncated lobe at the inner distal angle of the basipodite, and above this on the rostral side, a subacute tooth.

Inner branches of uropoda reaching halfway along the under surface of the telson; their terminal bristles reaching or exceeding the rear margin of the telson.

Color.—Gray above, with yellowish markings. Ends of the epimera, the uropoda, base of the telson, and most of under parts yellowish.

Length, 6 mm.; width, about 3 mm.

LOCALITY.—Santiago de Las Vegas, Cuba. 13 specimens collected by Professor Silvestri in 1928.

Arcangeli assigns this species "provisionally" to Budde-Lund's subgenus *Diploexochus*.

### *Cubaris zigzag* (Dollfus), 1896

Figure 199

*Armadillo zigzag* DOLLFUS, 1896, p. 394 (orig. descr.), Figs. 7a-7d.—BUDDE-LUND, 1904, p. 107.

*Cubaris zigzag* RICHARDSON, 1901, p. 572; 1905, p. 649 (orig. descr. quoted), Fig. 692 (after Dollfus).

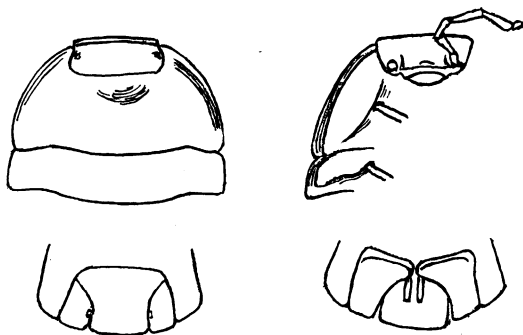


Fig. 199. *Cubaris zigzag* (Dollfus). Adapted from Dollfus, 1896.

The following is Dollfus' description:

"Body convex, smooth.

"Cephalon.—Prosepistoma plain, fore edge nearly straight. Eyes small; about twelve ocelli. Antennae short; first segment with a slightly perceptible antero-median tubercle, edges hardly raised, coxopodite distinct on the entire length of the edge (underside), not divergent. Coxopodite of the second segment narrowly quadrangular.

"Pleon, Telson.—Pleotelson as wide as long; sides feebly curved; apex with rounded angles, half as wide as the basis.

"Uropoda.—Basis oblique, endopodite reaching to one-half the length of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis (upperside).

"Color.—Yellowish, with a double median and crinkled lateral lines of dark brown; uropoda pale.

"Dimensions.—4 by 1.75 mm."

LOCALITY.—"St. Vincent, forest, damp ground under rubbish, 1000 feet, one example." Type in British Museum (Dollfus).

**Cubaris boliviana** (Dollfus), 1897

Figure 200

*Armadillo bolivianus* DOLLFUS, 1897a, p. 1 (orig. descr.), Figs. 1–1d.

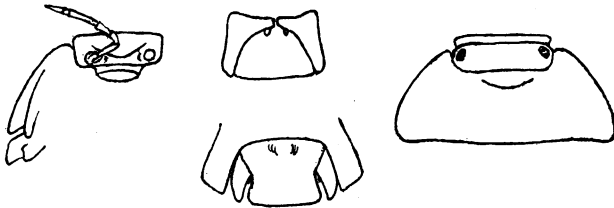


Fig. 200. *Cubaris boliviana* (Dollfus). Adapted from Dollfus, 1897a. NOTE.—The figure does not agree with the description in respect to the length of the coxopodite ridge of segment I.

No other information than that given in the above reference is available about this species:

"Corps assez convexe, presque lisse, finement ponctué.

"Cephalon.—Prosépistome dépassant sensiblement le front, convexe sans depression médiane. Yeux moyens. Antennes courtes, fouet à premier article trois fois plus court que le second.

"Pereion.—Premier segment à duplication coxale bien marquée, le coxopodite est divergent postérieurement et se distingue sur toute la longueur du bord du segment par un sillon qui va en s'atténuant antérieurement; deuxième segment à coxopodite court et très-divergent.

“Pleon, Telson.—Le pleotelson est à peu près aussi long que large, les côtes sont incurvés et le bord postérieur presque aussi large que la base; il est convexe, muni près de la base de deux petits mamelons carenés. Uropodes à base étroitement allongée; exopodite très-petit, visible seulement sur la face dorsale; endopodite minuscule.

“Couleur.—Gris, linéolé de blanchâtre, côtés blanchâtres.

“Dimension.—Long. 8 millimètres, larg. 3 1/2 millimètres.”

LOCALITIES.—“Mission de S. Francisco, Haut Pilcomayo (Bolivie).  
—Mission de Aguairenda, Chaco Bolivien.—Caiza, Chaco Bolivien.”

**Cubaris booneae, new species**

Figure 201

Closely related to *C. silvarum* (Dollfus), 1896, but readily distinguished from it by having the front outline of the head as seen from above gently convex instead of nearly straight; the ocelli fewer; the constricted part of the telson nearer to the base than to the end; and the sulcus on the inferior edge of the border of the first segment longer, wider, and of comparatively uniform width throughout its length except near the rear end.

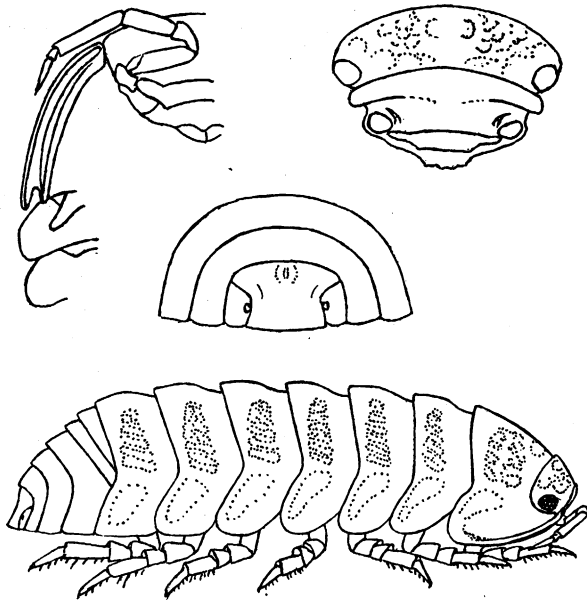


Fig. 201. *Cubaris booneae*, new species.

Body surface rather smooth except for minute setose granulation visible only on magnification, and slightly raised confluent tuberculations on the lateral parts of the back and on the head.

Front of head gently convex with a narrow, rather strongly upturned border, which is slightly wider toward the lateral ends. Ocelli about sixteen.

First segment of thorax with the lateral border rather narrow and abruptly turned outward at about a right angle, though not separated off by an actual furrow on the upper surface; below there is a fairly wide sulcus the whole length of the lateral margin of the segment. This has a shallow, inverted U-shaped cross-section and ends in a cleft with very slightly divergent sides (the inner slightly the shorter) at the rear end. The projecting lateral border diminishes and merges into the lateral face of the segment before the rear angle (which is rounded off) is reached. Second segment with a short, obliquely directed tooth-like coxopodite process; the third segment merely has a thickening of the anterior border with a slight prominence, but no actual process. Legs of moderate length, not very stout.

Telson considerably wider than long, its narrowest part rather nearer the base than the end, which is somewhat less than three-fourths as wide as the base. The inner branches of the uropoda are short, reaching hardly two-thirds of the distance to the end of the telson; the external branches are minute and scale-like and borne in a minute depression on the external (dorsal) surface of the basal segment close to, and somewhat indenting, the inner margin of the basal segment, which has on the middle line of the dorsal surface near the basal edge a small oval pit or impression, the lateral edges of which may be slightly raised.

Color grayish brown with the usual small, light-colored markings on the lateral regions of the back and less well-defined light spots on the median region and on the epimera of each thoracic segment. Largest specimen (a female) would measure about 10 mm. long if straightened out.

**LOCALITIES.**—Type locality, Palm Beach, Montego Bay, Jamaica. Six specimens (4 females, 2 males) in the American Museum of Natural History, collected by Mr. J. A. Grossbeck, March 11, 1911. Largest female (Cat. No. 6520) is the type. There is also a specimen from Moneague, Jamaica.

Named for Miss Lee Boone, describer of many American isopods.

***Cubaris hendersoni* Boone, 1934**

Figure 202

*Cubaris hendersoni* BOONE, 1934, p. 595 (orig. descr.), Fig. 13.

Through the kindness of the authorities of the U. S. National Museum, I had the opportunity of examining one of the three original specimens of this species.

The body is highly arched, elliptical in a dorsal view and rather narrowly rounded off at the ends, especially behind. The epimera are not flared or bent outward. Body surface very smooth, even on the dorsal lateral regions, but minutely scabrous-punctate under high magnification.

The rear (always exposed) part of each thoracic segment is convex



and raised somewhat above the flat part that slides under the segment next in front, but is not marked off from the latter by any abrupt shoulder.

Eyes rather small, about 18 ocelli are present but only about 10 of them are pigmented. Upper border of epistome turned up and appressed to the forehead, though actually separated from it by a deep but narrow groove. This border is convex (almost obtuse angled in the middle) when seen from in front. Antennae missing in this specimen.

The first thoracic segment has the lateral border much thickened but not bent or flared outward. The thickened border is separated from the main part of the segment by a deep cleft-like groove extending in horizontally and reaching from close to the front end to near the rear

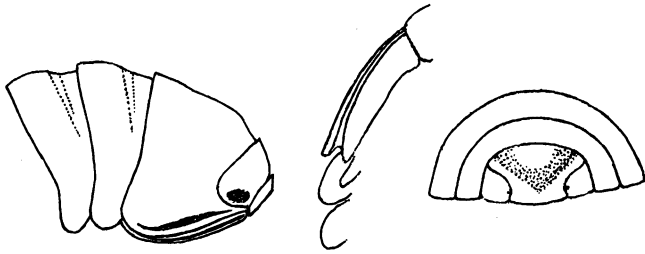


Fig. 202. *Cubaris hendersoni* Boone.

end of the border. This groove is widest and deepest in the middle part of its length. The rear angle of the segment forms a trifle less than a right angle and is somewhat rounded off, and (when seen from below) is cleft into a small notch from which a narrow, sharply defined coxopodite sulcus of quite even width extends forward the whole length of the lateral margin of the segment, but the sulcus lies rather on the outer-ventral than directly on the ventral aspect of the thickened margin of the segment, so that it is visible throughout its length in either a direct ventral or direct lateral view of the segment. The two sides of the notch at the rear angle do not appear to differ greatly in size or form, the inner being a little more extended and straighter than the outer, but the tightly rolled-up condition of the specimen prevented a satisfactory examination of this character or of the coxopodite process of the second segment, which appears to be rather small, or of the legs.

Thoracic segments II, III, and IV have the epimera much rounded off, the remaining three are successively more squarely truncated. The

abdominal segment and the telson and uropoda are squarely truncated at the ends so as to give the rear part of the body an even, continuous outline.

The telson is small and very short and quite wide, having the end a little more than half as wide as the base, and a very moderate constriction in the middle part; its dorsal surface has a large, somewhat tumid area on the median dorsal part, bounded by a very slight V-shaped depression. The exposed parts of the basal joints of the uropoda are very wide and short and fill in the spaces each side of the rear part of the telson very completely. The inner branches are fairly large and stout and outwardly curved and reach over halfway along the exposed part of the underside of the telson, the outer are represented by minute, scarcely discernible rudiments inserted close to the inner margin of the basal joint.

LOCALITY.—Tomazeau, Haiti, collected by Bartsch and Henderson, 1917. Three specimens, including the type, in the U. S. National Museum.

**Cubaris aguayoi** Boone, 1934

Figure 203

*Cubaris aguayoi* BOONE, 1934, p. 593 (orig. descr.), Fig. 12.

This is a species having the body quite broadly rounded before and behind when seen from above. The abdominal epimera slope outward

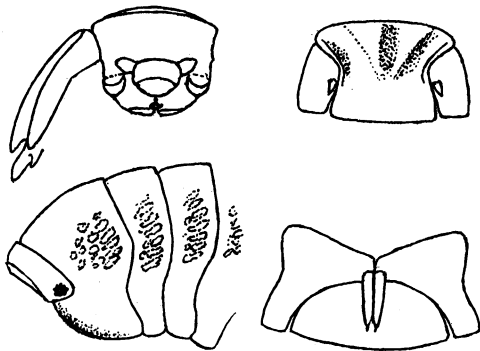


Fig. 203. *Cubaris aguayoi* Boone.

to a much greater extent than those of the thorax, which are nearly vertical. Body surface fairly even, granular on magnification, with groups of very low confluent tubercles on the dorso-lateral regions.

Front outline of head very gently curved with a very narrow, up-turned, almost appressed border which widens only at the lateral corners. Eyes fairly large and convex, with a dozen or more well-developed ocelli. Antennae missing.

The first thoracic segment is characteristic in the moderately wide, outwardly and a little upwardly rolled, lateral border which extends almost its whole length, forming a shallow trough of U-shaped cross section, deepest toward the front end but widest about the middle of the length of the segment. On the lower surface of the margin there is a narrow but well-marked coxopodite sulcus extending the whole length of the segment, widening very gradually and ending in a narrow cleft whose sides are nearly equal in length (the outer slightly longer) and which are not flared or bent apart. The coxopodite process of the second segment is small, flattened, tooth-like, and not very acute. The proportions of the telson and exposed parts of the uropoda are shown in the accompanying figures. The rear or dorsal surface of the telson presents a rather large median raised triangular area (the apex pointing downward) which is divided into two by a distinct, rather narrow median furrow. Between the sides of the raised triangle and the somewhat thickened and raised lateral borders of the telson there are wide shallow depressions.

The type specimen (alcoholic) is yellowish and exhibits little sign of pigment.

Length of type about 11 mm.

LOCALITY.—The type (Cat. No. 6606 in the American Museum of Natural History) and a paratype are from Camoa, Cuba.

**Cubaris congenera** (Budde-Lund), 1904

*Armadillo congener* BUDDE-LUND, 1904, p. 108 (orig. descr.).

The description in full is as follows:

“Oblonge ovalis, convexus, minutissime et densissime squamatus.

“Oculi mediocres; ocelli numero c. 18.

“Antennae breviores, tertiam corporis partem longitudine vix explentes; scapi articuli 2. et 4. aequales; flagelli articulus prior altero triplo vel quadruplo brevior.

“Epistoma margine superiore frontem paululum superante, linea marginalis verticalis utrinque ante oculos ad marginem epistomatis continue producta; area lateralis infraocularis nulla fere. Clypeus brevis, subperpendicularis, lobis lateralibus brevibus rotundatis.

“Trunci segmentum 1. epimeris crassis, margine laterali per totam

longitudinem sulco angustiore sed profundo instructo; post subaequaliter fisso; lacinia interior angustior sed paululo longior quam lacinia exterior; margo posterior segmenti utrinque vix conspicue incurvus. Segmentum 2. epimeris profunde fissis; lacinia interior subovalis; paulum retroducta, multo brevior et angustior quam lacinia exterior; pronotum decima parte dorsi vix longius. Trunci segmentorum 5.-6.-7. epimera duplicatura inferiore leviori sublunari. Caudae segmenta 3.-4.-5. epimeris longioribus, subrectangulis, processu inferiore inflexo nullo; epimera segmenti 5. subconvergentia. Pleopus primo paris in femina area operculari mediocri instructus.

"Telsum paulo latius quam longius, in medio satis coarctatum.

"Uropodum scapus vix longior quam latior; expoditum minutissimum, fere punctiforme, lateri interiori scapi procul ab apice insertum, brevissime ovale.

"Color brunneus, flavomaculatus.

"Long. 4-5 mm. Lat. 2.5 mm."

LOCALITY.—"Rio Nabilecche in the interior of Brazil." Type in the Genoa Museum (Budde-Lund).

***Cubaris venusta* (Budde-Lund), 1893**

Figure 204

*Armadillo venustus* BUDDE-LUND, 1893, pp. 114 (orig. descr.), 118.—DOLLFUS, 1893a, pp. 340, 344, Pl. IX, figs. 3a-3e.—BUDDE-LUND, 1904, p. 104, Pl. IX, figs. 30, 31.—ARCANGELI, 1932, p. 124; 1929, p. 93.

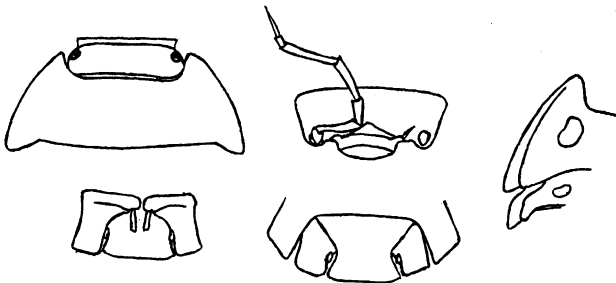


Fig. 204. *Cubaris venusta* (Budde-Lund). Adapted from Dollfus, 1893a.

The following statements are taken from Budde-Lund's original description:

"Trunci tuberculositates ordinariae parvae, subdeletae; tota superficies minutissime reticulate transverse striata. Antennae cor-

pore dimidio vix breviores; flagelli articulus prior altero circiter triplo brevior. Oculi mediocres; ocelli circiter 20, ocelli seriei interioris minores. . . . Epistoma margine superiore frontem paulisper, maxime in lateribus superante, leviter curvato, angulis late rotundatis.

"Trunci segmentum primum epimeris crassioribus, ante paulum revolutis, margine laterali ad longitudinem manifesto, ante angustius sulcato, post aequaliter fisso; segmentum secundum epimeris bipartitis, pars interior exteriore multo angustior et paulo brevior, oblique retroducta, ad apicem paulum angustata.

"Color albidus vel pallide flavus, maculis, praesertim in capite et in cauda et in lateribus trunci creberrimis, fuscis. Pedes et antennarum basis albida, articulus quintus et plerumque articulus quartus et etiam tertius obscuriores, subnigri.

"Long. 7-7.5 mm. Lat. 3.5 mm."

DISTRIBUTION.—Recorded from several localities in Venezuela: from La Moka, Las Adjuntas, and St. Esteban by Budde-Lund, 1893, and from La Guaira and Caracas by Dollfus, also from Port of Spain, Trinidad, by Budde-Lund, 1904 (specimen in the Gottingen Museum).

Budde-Lund, 1904, accepts Dollfus' record and figures as referring to this species without any comment or expression of uncertainty.

### **Cubaris silvarum** (Dollfus), 1896

Figure 205

*Armadillo silvarum* DOLLFUS, 1896, p. 393 (orig. descr.), Figs. 6a-6d.—BUDDE-LUND, 1904, p. 107.

*Cubaris silvarum* RICHARDSON, 1901, p. 571; 1905, p. 643 (orig. descr. quoted), Fig. 685 (after Dollfus); 1912, p. 194.—VAN NAME, 1924, p. 205.—BOONE, 1934, p. 593.

The following is the original description:

"Body convex, slightly tuberculated on the pereion.

"Cephalon.—Prosepistoma plain. Eyes large; about 20 ocelli.

"Pereion.—First segment with a blunt, hardly perceptible antero-median tubercle; lateral edge forming a narrow raised border; coxopodite distinct on the entire length of the edge, and divergent on the half hind part, coxopodite of the second segment forming a tooth-like, divergent processus.

"Pleon, Telson.—Pleotelson wider than long, with a small double longitudinal ridge near the basis; sides curved near the apex; apex one-fourth narrower than the basis.

"Uropoda.—Endopodite extending to one-half the length of the

pleotelson; exopodite minute, placed near the middle of the internal edge of the basis.

"Color.—Dark gray or brown, with three longitudinal light lines, and a wide spot on the sides of each segment; antennae and uropoda pale.

"Dimensions.—16 by 7 mm."

DISTRIBUTION.—St. Vincent, W. I., "pretty common under rubbish, forest below 2000 feet. Forest, dry hillside near Chateaubelais (lee-ward), under stones 1000 feet; Cumberland Valley, damp ground, 1000 feet." Type in the British Museum (Dollfus).

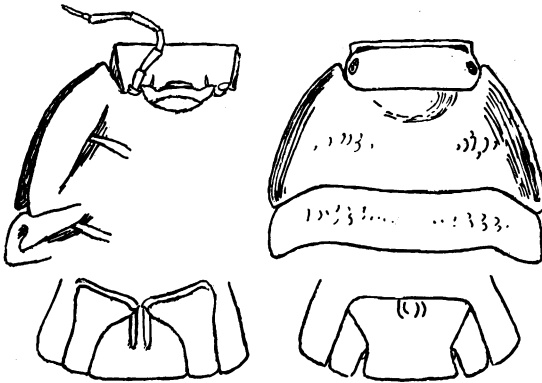


Fig. 205. *Cubaris silvarum* (Dollfus). Adapted from Dollfus, 1896.

The American Museum of Natural History has two specimens from Holmes Cay, Berry Island, Bahamas, received in exchange from the U. S. National Museum labeled "*Cubaris gigas?*" which are of this species or one very closely allied to it. They correspond well with Dollfus' description and figures, though the front margin of the head is a little curved and the telson, while of about the same general proportions as in his figure, has the upper or anterior border more curved and the constricted point slightly above the middle instead of a little below it.

***Cubaris sanchezi* Boone, 1934**

Figure 206

*Cubaris sanchezi* BOONE, 1934, p. 592 (orig. descr.), Fig. 11c.

This species, briefly described from a single specimen and illustrated only by a photograph of the ventral aspect, seems to be extremely close

to *C. silvarum*, Dollfus. The surface is smooth, except for minute granulation and patches of "unequal, coarsely irregular tubercles" appearing as minute ridges "on the dorso-lateral regions."

The head has the frontal margin "relatively straight" and produced into a very narrow border. The head is "marked by a pair of diagonal depressions, each of which extends from behind the eye to the middle of the frontal margin, creating the impression of infra-ocular lobes." Eyes with 13 ocelli. Flagellum of antennae with the distal article two and one-half times the length of the basal one.

The coxopodite of segment I closely resembles that of *C. silvarum* as figured by Dollfus, extending the whole length of the margin, but appears to be a little more divergent in the posterior half in the present species. This segment has the "lateral margin thickened." The coxopodite of segment II is, according to the respective figures, more acute than in *silvarum* and has the "outer free margin conspicuously arcuate."



Fig. 206. *Cubaris sanchezi* Boone.

The telson is described by Boone as "two-thirds as long as wide, the anterior and posterior margins are parallel, the anterior being only slightly the longer; the sides are roundly rather deeply constricted." The endopodites of the uropoda are longer ("five-sixths the length of the telson") in *C. sanchezi*. The exopodite is minute and inserted on the inner margin of the basal joint at its point of angulation.

Color.—Grayish with yellowish blotches on the tuberculated areas.

Length, 11 mm.; width, 5 mm.

LOCALITY.—The type and only specimen was collected at Alamedres River, "La Chorrera," Vedado, Havana, Cuba, and is in the United States National Museum (Boone).

b.—Upper surface moderately rugose or tuberculated.

**Cubaris clausa** (Budde-Lund), 1885

Figure 207

*Armadillo clausus* BUDDE-LUND, 1885, p. 23 (orig. descr.); 1893, pp. 112, 118.—  
DOLLFUS, 1893a, pp. 340, 344.—BUDDE-LUND, 1904, p. 107, Pl. IX, figs. 25–29.—  
ARCANGELI, 1932, p. 124.; 1934 p. 93.

*Armadillo (Venezillo) clausus* VERHOEFF, 1928, p. 113, Fig. 17.

*Diploezochus clausus* BARNARD, 1932, p. 323.

*Venezillo clausus* VERHOEFF, 1933, p. 102.

As the few details shown in the figures of Budde-Lund are hardly of a character to assist in recognizing the species, his description (1885) is here quoted in full:

“Ovalis vel oblonge ovalis, valde convexus, dense et reticulate punctatus. Trunci tuberculositates ordinariae manifestae, sed minores.

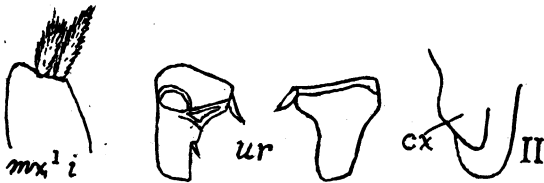


Fig. 207. *Cubaris clausa* Budde-Lund. Details, adapted from Verhoeff, 1928 (right-hand figure), and Budde-Lund, 1904 (remaining figures).

“Antennae exteriores tertia corpore parte vix longiores; flagelli articulus prior altero duplo brevior. Oculi majores; ocelli parvi, circiter 30, dense congregati. Clypeus lobis sat magnis, oblique triangularibus. Epistoma margine superiore frontem multo superante, leviter curvato, medio vix impresso.

“Trunci annulus primus epimeri margine laterali minus crasso, subaltecincto, ante levius post profundius sulcato et aequaliter fisso. Epimera annuli secundi bipartita, interiore parte latiore sed brevior. Margo posterior annulorum utrinque leviter sinuatus. Annulus primus ceteris annulis multo major et longior.

“Caudae annulus analis paulo latior quam longior, medio leviter coarctato, post rotundate truncato. Annuli 3–4–5 ut in *Arm. officinali* sed minus manifesto processu epimeri infra inflexo. Articulus basalis pedum analium paulo longior quam latior; ramus exterior minutissimus, procul ab apice insertus; ramus interior brevissimus.

“Color subuniformis, griseus.

“Long. 17 mm. Lat. 8 mm. Alt. 4.5 mm.”



Verhoeff (1928, p. 113, and 1933, p. 102) identifies with Budde-Lund's species some specimens from Maracay, Venezuela, and makes it the type of a subgenus or genus *Venezillo* (see remarks under genus *Cubaris*) giving the figure here reproduced in outline, and additional details regarding its characters, among others that the margin of the head and first thoracic segment together form a wide horizontally projecting border which makes almost a semicircle around the head and first segment. This border is as wide as the eye is long, the latter having five rows of ocelli. The first segment has the lateral margin turned out forming a broad "shovel" hollowed out above. The sulcus on the underside grows gradually narrower and does not reach the anterior end of the margin. The inner (coxal) process of epimeron II is separated from the epimeron itself by a wide cleft that is "continued forward as a groove." The endopodites of the uropods are very short (one-third the length of the exposed part of the telson).

TYPE LOCALITY.—Caracas, Venezuela. Types in Petrograd Museum (Budde-Lund). In 1893, Budde-Lund mentions specimens in the Berlin Museum, and gives La Moka as an additional locality; Dollfus records specimens from La Guaira and Corozal; and Verhoeff, specimens from Maracay. All these places are in Venezuela.

*Cubaris walkeri* Pearse, 1911

Figure 208

*Cubaris walkeri* PEARSE, 1911, p. 108 (orig. descr.), Figs. 1a-1f.

Pearse's description and figures are here reproduced:

"*Cubaris walkeri*, new species.—Body convex, minutely granulate; thoracic segments each with an elongated swollen mass of blended tubercles on each side 1 mm. from the middle line. Head more than twice as wide as long; anterior margin straight, strongly reflexed; eyes rather large, sixteen ocelli. Antennae with flagellum shorter than last joint of peduncle; first joint of flagellum less than a third as long as second. First segment of body separated by grooves from the lateral margins which are somewhat reflexed; lateral margins of other thoracic segments narrow, strongly flexed posteriorly; first coxopodite free along whole outer margin, divergent at posterior end; second coxopodite free along outer end and anterior margins, divergent at outer edge. Pleotelson strongly constricted in the middle, about as wide as long, width at distal end one-fourth less than at proximal end; a low tubercle near proximal margin in median line. Uropoda with basal segment a little

longer than wide; inner branch robust, spatulate, more than half as long as pleotelson, attached on the posterior inner margin of basal segment; outer branch small, conical, inserted more on the dorsal than ventral surface of the basal segment at the middle of its inner margin. Color of alcoholic specimens slaty; a series of longitudinal median white blotches along the segments from the head to the pleotelson; lateral margins of first, third, fourth, and all abdominal segments more or less white. Dimensions; 11 by 5.5 millimeters."

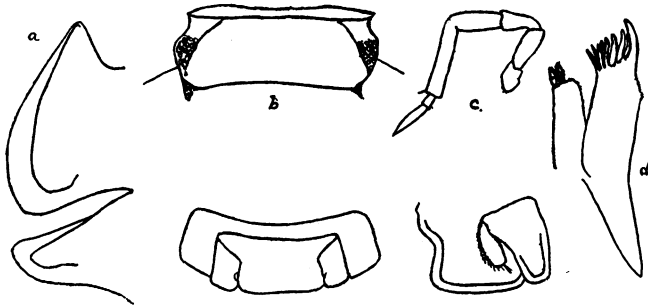


Fig. 208. *Cubaris walkeri* Pearse. Adapted from Pearse, 1911.

LOCALITY.—Cuatotolapam, Vera Cruz, Mexico, under leaves and stones at low elevation. Type in University of Michigan Museum (Pearse).

### *Cubaris multipunctata* (Budde-Lund), 1885

#### Figure 209

*Armadillo multipunctatus* BUDDE-LUND, 1885, p. 282 (orig. descr.); 1893, p. 112.—DOLLFUS, 1893a, pp. 340, 344, Pl. IX, figs. 5a-5e.—BUDDE-LUND, 1904, p. 108.

Described by Budde-Lund as follows:

"Oblongae ovalis, valde convexus; tota superficies punctata; tubercula ordinaria sublaevia, nitida.

"Antennae exteriores tertiam corporis partem paulum superantes; flagellum breve; flagelli articulus prior altero duplo vel magis brevior.

"Oculi minores, ocelli circiter 17.

"Clypeus lobis sat magnis, latis oblique semicirculis. Epistoma planum, margine superiore transverse profundius sulcato, frontem vix superante.

"Trunci annulus primus margine laterali crasso, ante paulum revo-

luto, profunde et late ad longitudinem sulcato, post subaequaliter fisso, parte inferiore quam exterior paulisper majore. Margo posterior annuli primi transversus, annulorum 2-3 utrinque levissime sinuatus. Epimera annulis secundi profunde fissa, parte inferiore quam exterior minore et angustiore.

“Caudae epimera annulorum 3-4-5 infra processu parvo inflexo minus manifesto. Annulus analis duplo latior quam longior, post medium coarctatus, ut basis longior, apex brevissimus fiat; post recte truncatus. Articulus basalis pedum analium satis latior quam longior, subtriangulus; ramus exterior minutissimus, vix conspicuus, punctiformis, lateri interiori articuli basalis procul ab apice insertus; ramus interior brevissimus, haud multo longior quam latior.

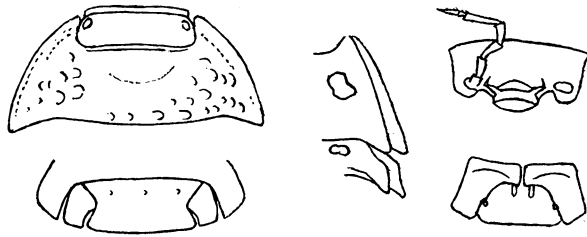


Fig. 209. *Cubaris multipunctata* (Budde-Lund). Adapted from Dollfus, 1893a.

“Color griseus vel e pallido griseus, subtus albidus.

“Long. 8.5 mm. Lat. 4 mm. Alt. 2.5 mm.”

LOCALITY.—Caracas, Venezuela. One specimen found with examples of *C. clausa* from Caracas in Berlin Museum (Budde-Lund, 1885).

See remarks under *C. rubropunctata*, which is perhaps not distinct from this species.

#### ***Cubaris rubropunctata* (Budde-Lund), 1893**

*Armadillo rubropunctatus* BUDE-LUND, 1893, pp. 113 (orig. descr.), 118.—DOLLFUS, 1893a, p. 344 (considered probable synonym of *C. multipunctata*).—BUDE-LUND, 1904, p. 107.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Budde-Lund's description, here given in full, is as follows:

“Subovalis, valde convexus; trunci tuberculositates laterales ordinariae magnae; caput fortiter rugose tuberculatum; in medio trunci segmentorum ad marginem posteriorem granula plerumque novena in series duas disposita, in segmento primo ante etiam tria granula,

duo anteriora juxtaposita majora, omnia subconfluentia; cetera superficies reticulate punctata.

"Antennae tertia corporis parte vix longiores; flagelli articulus prior altero triplo brevior.

"Oculi mediocres, a margine laterali capitis satis distantes; ocelli circiter 16.

"Clypeus lobis mediocribus, late rotundatis. Epistoma margine superiore curvato, ante leviter transverse sulcato, frontem multo superante.

"Trunci segmentum primum epimeris crassis, revolutis, margine laterali ad longitudinem late et satis profunde sulcato, post inaequaliter fisso; lacinia interior major; segmentum secundum epimeris bipartitis; pars interior exteriore multo angustior sed vix brevior, oblique retracta, subrectangula. Margo posterior segmenti primi subtransversus.

"Caudae segmentum anale duplo fere latius quam longius, in medio leviter coarctatum, post subrecte vel levissime curvate truncatum, supra in medio transverse curvate impressum. Epimera segmentorum 3-4-5 infra in basi paulum inflexa. Articulus basalis uropodum oblique subtriangulus, ejusdem fere longitudinis et latitudinis; ramus exterior minutissimus procul ab apice insertus; rami interiores brevissimi.

"Color.—Pallide flavus, punctis et maculis fuscis vel rufis creberrimis ornatus.

"Long. 15 mm. Lat. 7.5 mm."

LOCALITY.—Las Trincheras, Venezuela. One specimen obtained by sifting (Budde-Lund).

This species has not been figured and there are only a few statements in the description to prevent the acceptance of Dollfus' conjecture that it is identical with *C. multipunctata* (Budde-Lund), 1885. The first paragraph of the description of the present species indicates however a rougher, more conspicuously tuberculated surface; the descriptions of the epistome do not agree, nor do those of the telson and uropoda correspond very satisfactorily. Perhaps the strongest argument against uniting the species is the fact that Budde-Lund keeps them separate in his later work (1904), although he can hardly have been unaware of Dollfus' doubts of their distinctness.

#### *Cubaris pumila* (Budde-Lund), 1893

*Armadillo pumilus* BUDDE-LUND, 1893, pp. 115 (orig. descr.), 118.—DOLLFUS, 1893a, p. 344.—BUDDE-LUND, 1904, p. 107.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Nothing additional to Budde-Lund's original record and description is known about this species.

"Oblong ovalis, convexus; trunci tuberculositates ordinariae magnae, tota superficies dense squamate punctata.

"Antennae tertia corporis parte vix longiores; flagelli articulus prior altero plus duplo brevior.

"Oculi minores; ocelli circiter 15, mediocres nonnulli minores.

"Clypeus lobis mediocribus, late rotundatis. Epistoma margine superiore frontem paulum, maxime in lateribus, superante, leviter curvato.

"Trunci segmentum primum epimeris crassioribus, paulum revolutis, in margine laterali ad longitudinem levius infra sulcatis, post inaequaliter fissis: lacinia exterior paulo major; segmentum secundum epimeris bipartitis; pars interior parva, oblique retroducta, dentiformis. Margo posterior segmenti primi utrinque leviter sinuatus, angulis posterioribus late rotundatis.

"Caudae segmentum anale paulo latius quam longius, in medio satis coarctatum, post subtransversum. Epimera segmentorum 3-4-5 infra in basi processu minuto, inflexo. Articulus basalis uropodum valde obliquus, longior quam latior; ramus exterior minutissimus, procul ab apice insertus; rami interiores breves.

"Subunicolor, e griseo brunneus.

"Long. 8 mm. Lat. 3.5 mm."

LOCALITIES.—Budde-Lund records two specimens from Caracas obtained by sifting leaf mould, and two from Las Trincheras, Venezuela.

### *Cubaris viticola* (Dollfus), 1896

Figure 210

*Armadillo viticola* DOLLFUS, 1896, p. 396 (orig. descr.), Figs. 9a-9d.—BUDDE-LUND, 1904, p. 114.

*Cubaris viticola* RICHARDSON, 1901, p. 571; 1905, p. 642 (orig. descr. quoted), Fig. 684 (after Dollfus).

The following is Dollfus' description in full:

"Body very convex in the middle, rather depressed on the sides, covered with transverse lines of granulations.

"Cephalon.—Prosepistoma plain, fore edge slightly arched in the middle. Eyes moderate; ocelli 12. Antennae short; first joint of the flagellum three times shorter than the second.

"Pereion.—First segment with four large antero-median granulations; lateral edges hardly raised; coxopodite distant from the edge,

crested and ended by a tooth-like diverging processus. Second segment with a narrow coxopodite.

“Pleon, Telson.—Lateral parts of the pleon narrow; pleotelson longer than wide; sides slightly curved; apex one-half narrower than the basis, with rounded angles.

“Uropoda.—Basis very oblique; endopodite reaching to one-half the length of the pleotelson; exopodite a little larger than in the former species (probably Dollfus refers to *C. perlata*), visible on upper and under sides.

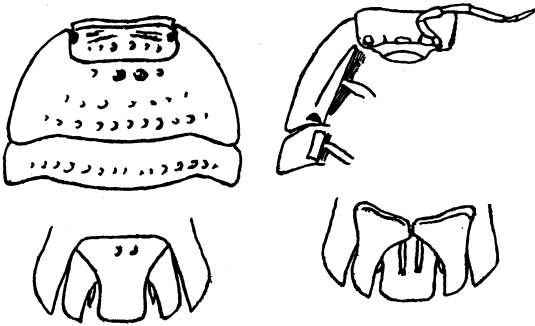


Fig. 210. *Cubaris viticola* (Dollfus). Adapted from Dollfus, 1896.

“Color.—Yellowish, veined and striped with brown.

“Dimensions.—9 by 4 millim.”

LOCALITIES.—“Grenada; Balthazar (windward), second-growth woods, beaten from vines and brush, 250 feet; Chantilly (windward), hillside, edge of forest, beaten from vines and brush, 400 feet.” Type in British Museum (Dollfus).

c.—Upper surface with large tubercles.

***Cubaris scaberrima* (Dollfus), 1893**

Figure 211

*Armadillo scaberrimus* DOLLFUS, 1893a, pp. 340 (orig. descr.), 344, Pl. IX, figs. 4a-4e.—BUDDE-LUND, 1904, p. 107.

Described by Dollfus as follows:

“Corps étroit, très convexe, couvert de grosses granulations perli-formes et subconiques, disposées sur tout le corps, si ce n’est sur les côtés, qui sont lisses.

“Cephalon.—Prosépistome dépassant faiblement le front. Yeux

formés d'un petit nombre d'ocelles. Antennes ne dépassant pas le deuxième segment pereiial; premier article du fouet trois fois plus court que le second.

"Pereion.—Relief antérieur du somite du premier segment bien accentué; bord latéral relevé, à marge assez épaisse; duplicature (coxopodite) du premier segment bien distincte tout le long du bord latéral.

"Pleon, Telson.—Pleotelson à côtés incurvés et présentant deux fortes granulations. Uropodes à endopodite court et épais, à exopodite rudimentaire, situé un peu au-dessus de la moitié du côté interne de la base.



Fig. 211. *Cubaris scaberrima* (Dollfus). Adapted from Dollfus, 1893a.

"Couleur.—Blanchâtre, plus ou moins marquée de gris.

"Dimensions.—3 1/2 × 1 1/2 mill. (exemplaires jeunes?)."

LOCALITY.—La Guaira, Venezuela.

### *Cubaris perlata* (Dollfus), 1896

#### Figure 212

*Armadillo perlatus* DOLLFUS, 1896, p. 395 (orig. descr.), Figs. 8a-8d.—BUDDELUND, 1904, p. 115.

*Cubaris perlata* RICHARDSON, 1901, p. 571 (*perlatus*); 1905, p. 644 (orig. descr. quoted), Fig. 686 (after Dollfus).—VAN NAME, 1924, p. 205.

Not *C. perlata* Pearse, 1917, p. 7 (= *C. tuberosa*).

The original description is as follows:

"Body convex, covered with large, pearly granulations.

"Cephalon.—Prosepiostoma with a shield-like convexity which does not reach quite to the front edge. Eyes very small; ocelli 3. Antennae short; first joint of the flagellum three times as short as the second.

"Pereion.—First segment with two rounded antero-median granulations; lateral edges raised; coxopodite distinct on the entire length of the edge but not divergent. Second segment with a large and very distinct coxopodite.

"Pleon, Telson.—Pleotelson nearly as wide as long, with two large, rounded granulations near the basis; sides curved, apex a little narrower than the basis.

"Uropoda.—Endopodite reaching to two-thirds the length of the pleotelson; exopodite unperceivable.

"Color.—Light gray, granulations whitish.

"Dimensions.—4.5 by 1.5 mm."

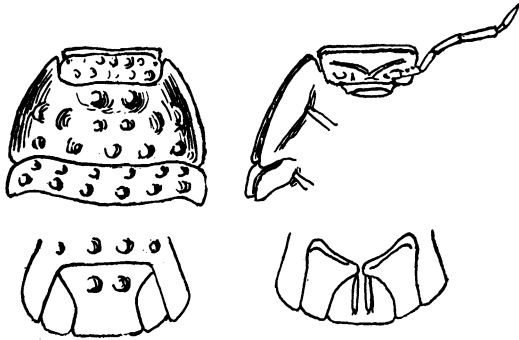


Fig. 212. *Cubaris perlata* (Dollfus). Adapted from Dollfus, 1896.

LOCALITIES.—“(St. Vincent?) Dry forest, leeward, under a log,” 800 feet altitude (one example). Type in British Museum (Dollfus).

This is one of the species of which Dollfus (p. 388) says that there was no record as to whether they were taken at St. Vincent or at Grenada.

### *Cubaris phylax*, new species

#### Figure 213

Body highly arched, its outline, when seen from above, oblong, broadly rounded in front and still more so behind, where the abdominal epimera are sloped outward to a considerable extent. The dorsal surface is ornamented with large, obtusely conical tubercles, mostly arranged with much regularity. On most of the thoracic segments, these conical tubercles form two transverse rows with about a dozen in each row and several additional tubercles on the lateral or epimeral part of the segment not definitely belonging to either row; on the first segment, there are four more or less definite rows; on the head, three; the abdominal segments bear tubercles as described below. The exposed part of the segments, that bears the tubercles, is abruptly raised above the anterior part that slips under the segment next in front. The thoracic epimera, except those of the first segment, descend nearly vertically.

The front outline of the head is only slightly convex; the epistome forms an up-turned, rather closely appressed border across the front of the head. Eyes fairly large, very convex, with sixteen ocelli which, however, are not all well pigmented. Antennae rather short and not very stout; their flagellum nearly equals the last



joint of the peduncle, and has its proximal article very short, less than one-fourth the length of the terminal one.

The lateral margin of the first segment of the thorax is curved outward, though not very abruptly, forming a fairly wide horizontally extending border, on the under surface of which the coxopodite sulcus is developed along the entire length. The sulcus is shallow and ends behind in a small notch whose inner plate is longer

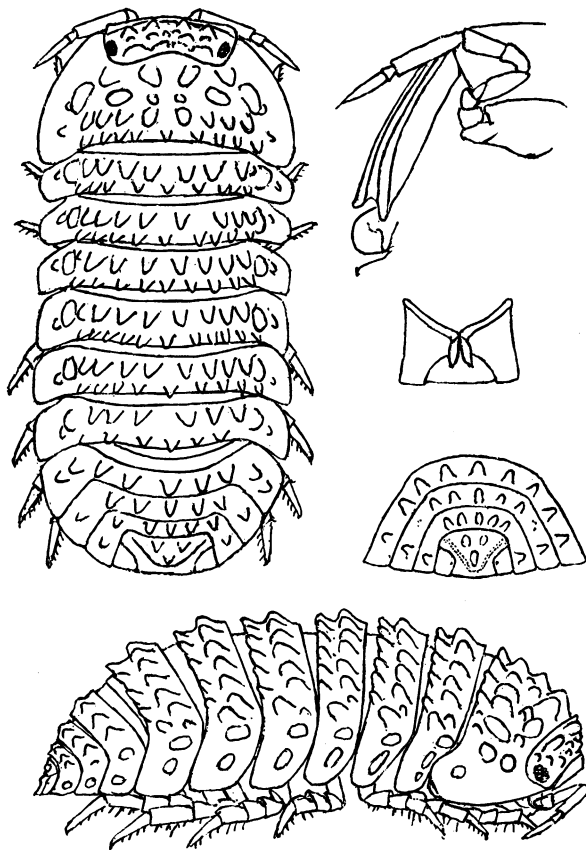


Fig. 213. *Cubaris phylax*, new species.

and much more narrowly rounded off than the outer one. The latter forms the rear lateral corner of the segment and is considerably extended back. Segment II has a narrow, backwardly directed coxopodite process, rather acute at the tip.

The abdominal segments one and two are smooth; three, four, and five each have a single row of large tubercles extending down on the epimera; the telson has a large tumid area of triangular outline occupying much of its dorsal surface and bearing three tubercles, a pair above and a median one below. The telson is only

moderately broad, its upper part about one and one-fourth times its total length, and is somewhat constricted in the middle. The exposed parts of the basal segments of the uropoda are a little longer than wide and bear the extremely minute and rudimentary exopodite close to the inner margin. The endopodites, visible only from below, are rather broad and short, and hardly reach halfway to the end of the exposed part of the lower surface of the telson.

Anterior part of thorax (segments I-V inclusive) and head, dark gray above; segments VI, VII, and the abdomen yellowish (unpigmented); under parts, legs and antennae, also yellowish (unpigmented).

The only specimen (a male) would not measure much over 7 mm. long if it could be straightened out.

LOCALITY.—Cape Macao, east end of Santo Domingo, April or May, 1913, F. N. DuBory, collector. Type and only specimen in the American Museum of Natural History (Cat. No. 6525).

## GROUP II

Coxopodite sulcus and ridge on lower side of thoracic segment I is distinct on only about half, or less than half, of the length of the margin (in *C. wheeleri* almost entirely suppressed).

a.—Upper surface practically smooth, or with only weakly developed rugae on the lateral regions of the back.

### *Cubaris moneaguensis*, new species

#### Figure 214

This species and *C. watsoni* described above are very close allies and closely resemble each other in form, size, and general appearance. With very few exceptions

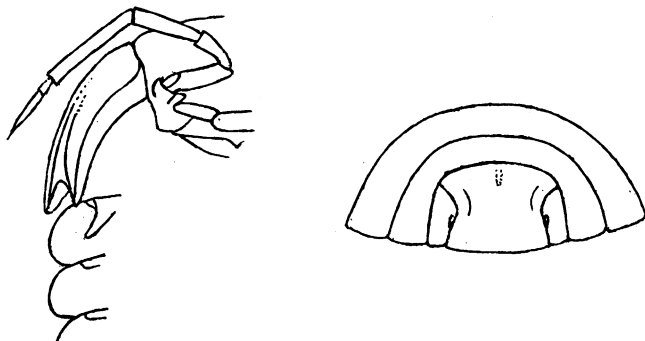


Fig. 214. *Cubaris moneaguensis*, new species.

the statements in the description of *C. watsoni* would apply exactly as well to this species.

The present one is most easily distinguished from *watsoni* by having the inferior margin of the lateral border of the first thoracic segment broader, especially toward the front, and the sulcus becomes shallower and practically fades out altogether a little in front of the middle of the length of the border, instead of being distinctly clear to the anterior end of the margin. Seen from above the margin of the first segment is turned or rolled outward slightly more than in *watsoni* and the antennae are proportionately a little longer and slenderer.

There is also a difference in the telson which is wider in the present species, less constricted in the middle portion, and nearly as wide at the end as in the upper part. The exposed portion of the basal joint of the uropoda is even narrower and more elongate than in *watsoni*.

The specimens are also like *C. watsoni* in being very lightly pigmented, though the color is grayer and is more evenly distributed, and the lower parts, limbs, and light markings of the upper parts are whitish with only a pale tinge of yellow.

Largest specimen, a female, about 15 mm. long.

LOCALITY.—Moneague, Jamaica. Eight specimens, including the type (Cat. No. 6528) collected in December, 1911, are in the American Museum of Natural History.

This is evidently also a near ally of the insufficiently described species *C. gigas* Miers from Nicaragua, but it appears to differ in having the anterior outline of the head less straight in a dorsal view, and the exposed parts of the uropoda narrower.

### *Cubaris oaxacana*, new species

Figure 215

Closely allied to *C. grenadensis* (Budde-Lund) and *C. gigas* Miers but readily distinguished from them by the sharply rounded lateral ends of the anterior thoracic segments. Body wide and highly arched, broadly rounded in front and especially

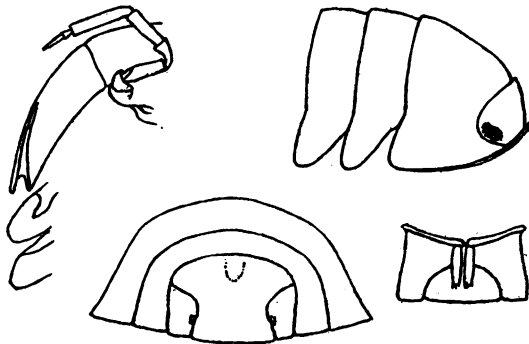


Fig. 215. *Cubaris oaxacana*, new species.

behind, where the epimera slope outward a little so as to increase the width. Surface extremely smooth; glossy when dry though minutely punctate on magnification; even on the lateral regions of the back it is scarcely roughened.

Front outline of head convex when seen from above, upper margin of epistome rather prominent, only slightly arched when seen from in front and only slightly turned up, though more so in the middle than at the sides. Antennae extremely short; the flagellum also proportionally short. Ocelli eighteen in a large specimen.

First segment of the thorax with the lateral border only narrowly rolled outward; on the inferior aspect of the margin there is a sulcus that is fairly wide and deep at the rear end, but becomes both narrower and shallower and fades out a little anterior to the middle of the length of the margin. At the rear end it ends in a cleft whose sides are nearly equal. The posterior angle of the segment as seen in a lateral view is but little produced backward and forms an angle but little less than a right angle with the apex rather sharply rounded off. The second segment has a small, stout tooth-like coxopodite process, the third merely has the anterior margin thickened. All the thoracic segments have the posterior angles a little extended backward. Segments II, III, and IV have the lateral ends quite narrow and sharply rounded off, segments V and VI have them successively more truncate, while in VII the ends are broadly truncate, as is the case in the abdominal segments.

Upper part of the telson at least one-third wider than the length; it is considerably constricted in the middle and its width at the ends is not equal to its length.

Light gray with narrow yellowish (unpigmented) borders and small yellowish markings on the dorso-lateral parts of the thoracic segments.

Length of largest specimen, a female, about 14 mm.

LOCALITY.—San Geronimo, Oaxaca, Mexico. Four specimens collected by Dr. A. Petrunkevitch, July 27, 1909, are in the American Museum of Natural History. The largest, described above, is the type (Cat. No. 6517); the others are considerably smaller.

### *Cubaris grenadensis* (Budde-Lund), 1893

Figure 216

*Armadillo grenadensis* BUDDE-LUND, 1893, pp. 115 (orig. descr.), 118.—DOLLFUS, 1893a, p. 344; 1896, p. 392 (new descr.), Figs. 5a-5d.—BUDDE-LUND, 1904, p. 110.—ARCANGELI, 1932, p. 124; 1934, p. 93.

*Cubaris grenadensis* RICHARDSON, 1901, p. 571; 1905, p. 651 (Dollfus' descr. quoted), Fig. 694 (after Dollfus); 1912c, p. 31.—VAN NAME, 1924, p. 205.—ARCANGELI, 1929, p. 130 (descr.); 1930a, p. 11.—BOONE, 1934, p. 591.

The following statements are from the original description:

"Subovalis, convexus; trunci tuberculositates subdeletae; cetera superficies minutissime et densissime reticulate punctata.

"Antennae tertia corporis parte paulo longiores; flagelli articulus prior altero duplo vel magis brevior.

"Oculi mediocres, a margine laterali capitis satis distantes; ocelli circiter 15. . .

“Epistoma margine superiore leviter curvato, frontem aliquantum superante, in medio levissime, vix memorabiliter reflexo.

“Trunci segmentum primum epimeris crassioribus, ante revolutis, margine laterali per posteriorem partem sulcato et post subaequaliter fisso; segmentum secundum epimeris bipartitis; pars interior exteriore multo minor et brevior et praesertim angustior, oblique retroducta, subdentiformis. . . .

“Caudae segmentum anale multo latius quam longius, in medio coarctatum, post levissime curvate truncatum, supra ad basin stria media brevi impressu, utrinque leviter excavatum. Articulus basalis

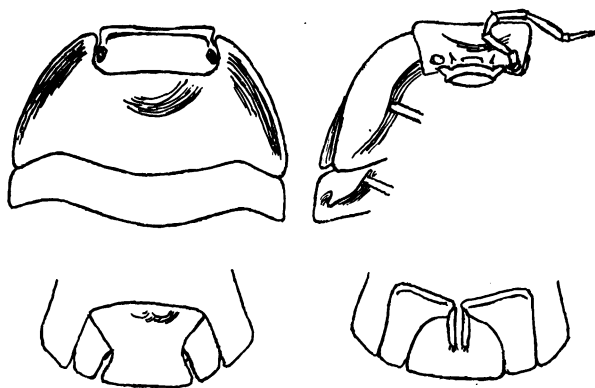


Fig. 216. *Cubaris grenadensis* (Budde-Lund). Adapted from Dollfus, 1896.

uropodum aliquanto longior quam latior; ramus exterior minutissimus, punctiformis, procul ab apice insertus. . . .

“Color cinereus vel e griseo brunneus subunicolor, tuberculositates trunci pallidiores.

“Long. 7–8 mm. Lat. 3.5–4 mm.”

Dollfus' (1896) description is as follows:

“Body much convex, nearly smooth.

“Cephalon.—Prosepistoma slightly convex, fore edge feebly arched in the middle. Eyes rather large; ocelli about 16. Antennae short; first joint of the flagellum three times shorter than the second.

“Pereion.—First segment with a blunt antero-median tubercle; lateral edges raised; coxopodite distinct and divergent on the half hind part of the edge (underside). Coxopodite of the second segment forming a tooth-like processus.

"Pleon, Telson.—Pleotelson as wide as long, with a blunt double tubercle near its basis; sides curved; apex nearly as wide as the basis; endopodite reaching to two-thirds the length of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis.

"Color.—Dark gray, with a light median line and light lineolae on the sides; antennae whitish.

"Dimensions.—14 by 6 mm."

Arcangeli, 1929, p. 130, gives a more detailed description of two females, collected in Cuba, which he refers to this species. This description corresponds well with the earlier ones.

DISTRIBUTION.—Budde-Lund's types (two specimens) were from Grenada, West Indies (vicinity of Georgetown); Dollfus, 1893, lists it from Venezuela, on what authority I do not know; and in his article of 1896 gives its distribution as follows: "Bequia Island (June), ravine, damp ground, under rotting leaves; Grenada; Balthazar (windward), 250 feet, cocoa orchard, under rotting leaves." Richardson (1912) records it without description from Calamar, Magdalena River, Colombia. Arcangeli reports it from Santiago de Las Vegas, Cuba.

Whether this species actually has such a wide distribution does not seem certain, as there are a number of closely allied species in this group, the distinctions between which are not easily made clear without careful illustrations. No illustrations of this species have been published except the rather crude ones of Dollfus, or reproductions of them. It will be observed that Dollfus' statement that the telson is "as wide as long" is by no means in agreement with that of Budde-Lund. However, his figure shows it much wider than long, and his statement apparently must be understood as referring to the width in the middle portion.

Arcangeli, 1929, p. 131, refers this form provisionally to Budde-Lund's subgenus *Diploexochus*.

### *Cubaris nigrorufa* (Dollfus), 1893

Figure 217

*Armadillo nigrorufus* DOLLFUS, 1893a, pp. 340 (orig. descr.), 344, Pl. ix, figs. 1a-1e.—BUDDE-LUND, 1904, p. 107.

Described by Dollfus as follows:

"Corps peu large, très convexe, ponctué, sétacé et obtusément tuberculé sur les premiers somites.

"Cephalon.—Prosépipistome dépassant à peine le front. Yeux assez grands, formés d'environ 16 ocelles. Antennes moyennes, atteignant

l'extrémité du deuxième segment pereial; premier article du fouet trois à quatre fois plus court que le second.

"Pereion.—Relief antérieur du premier somite bien accentué, bord latéral relevé; la duplicature (coxopodite) du premier segment n'est distincte que sur les deux tiers postérieurs du bord latéral.

"Pleon, Telson.—Pleotelson aussi long que large, à côtés incurvés et à sommet près de deux fois moins large que la base. Uropodes à endopodite très petit; exopodite rudimentaire, situé vers les deux tiers du côté interne de la base.

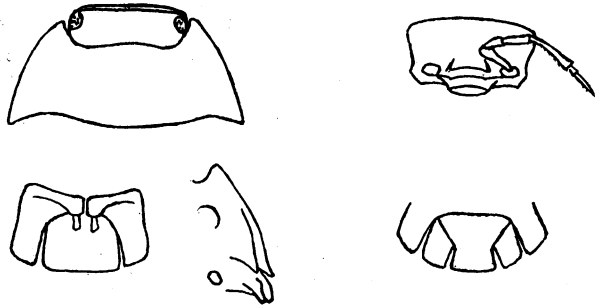


Fig. 217. *Cubaris nigrorufa* (Dollfus). Adapted from Dollfus, 1893a.

"Couleur.—Rousse, tachée et marbrée de noirâtre.

"Dimensions.—5 × 2 mill."

LOCALITY.—Colonie Tovar, Venezuela. 3 specimens.

***Cubaris similis* (Budde-Lund), 1885**

*Armadillo similis* BUDDE-LUND, 1885, p. 24 (org. descr.); 1904, p. 107.

Known only from the following description of Budde-Lund (1885):

"Statura et habitu omino praecedentis (*Arm. clausus*), at minor et forsitan subtilius punctatus.

"Antennae ut in *Arm. clauso*.

"Oculi mediocres; ocelli majores, circiter 20.

"Clypeus lobis magnis, oblique triangularibus. Epistoma margine superiore frontem multo superante, paulo repando.

"Trunci annulus primus epimeri margine laterali minus crasso, subaltecincto, subpellucide, e medio post versus sulcato et subaequaliter fisso; parte interiore epimeri paulo minore. Epimera annuli secundi bipartita, interiore parte multo brevior et angustior.

"Caudae annuli ut in praecedente.

"Articulus basalis pedum analium multo longior quam latior, ad

apicem haud angustatus; ramus exterior punctiformis, longe ab apice et a margine interiore articuli basalis insertus; ramus interior mediocris, annulo ultimo paulo brevior.

“Long. 13–14 mm. Lat. 6.5 mm. Alt. 3.5 mm.

“Patria.—America meridionalis? Exempla duo sine significatione patriae in Museo Petropolitano asservata vidi.”

**Cubaris pisum** (Budde-Lund), 1885

*Armadillo pisum* BUDDE-LUND, 1885, p. 32 (orig. descr.).—DOLLFUS, 1896*d*, p. 48.—BUDDE-LUND, 1904, p. 110.

*Cubaris pisum* RICHARDSON, 1901, p. 572; 1905, p. 653 (orig. descr. quoted and translated).—VAN NAME, 1924, p. 205.

“Ovalis, valde convexus, laevis, glaber, subnitidus.

“Antennae exteriores dimidio corporis paulo breviores, graciles; flagelli articulus prior altero triplo brevior.

“Oculi mediocres; ocelli circiter 15.

“Clypeus lobis brevibus, late rotundatis; epistoma margine superiore curvato, frontem vix superante; frons et vertex laevia.

“Trunci annulus primus margine laterali altecincto, post minus profundo et subaequaliter fisso, parte interiore paulo minore: epimera annuli secundi fissa, parte interiore minima. Margo posterior annulorum leviter utrinque sinuatus.

“Caudae annulus analis paulo latior quam longior, medio vix coarctato, post recte truncatus, supra convexus. Articulus basalis pedum analium paulo longior quam latior, ad apicem paulisper angustatus ramus exterior minutissimus, punctiformis, apici proprius insertus; ramus interior brevis.

“Color brunneus vel rufobrunneus, uniformis.

“Long. 4.5–5.5 mm. Lat. 2.5–3 mm.

“Patria.—Plurima exempla e Florida a cl. Uljanin transmissa vidi.” (Budde-Lund, 1885, p. 32).

Nothing appears to be known about this species except what Budde-Lund's description tells us. The conjecture is made by Dollfus (1896, see above) that *C. dugesi* (Dollfus) is a variety of the present species, but of this there does not seem to be any probability; the descriptions of the telson and uropoda do not correspond sufficiently well, and the localities are widely separated.

**Cubaris gigas** Miers, 1877

Figures 218, 219

*Armadillo gigas* BUDDE-LUND, 1879; p. 7; 1885, p. 40; 1904, p. 108.

*Cubaris gigas* MIERS, 1877*a*, p. 66 (orig. descr.), Pl. LXVIII, figs. 1–1c.—RICH-



ARDSON, 1901, p. 572; 1905, p. 648 (Miers' descr. quoted), Fig. 691 (after Miers).—PEARSE, 1915, p. 544 (see remarks below).—ARCANGELI, 1930a, p. 2.

Described by Miers as follows:

"Convex oblong-oval, nearly smooth, surface only very minutely granulated, and with only obscure indications of larger tubercles on each side of the middle line. Head transverse, with the anterior margin straight, reflexed at a right angle (as seen in a lateral view) with the upper surface of the head, and (as seen in a dorsal view) also forming a right angle with the lateral margins; antero-lateral lobes wanting. First segment of the body very concave on the sides with the lateral margins

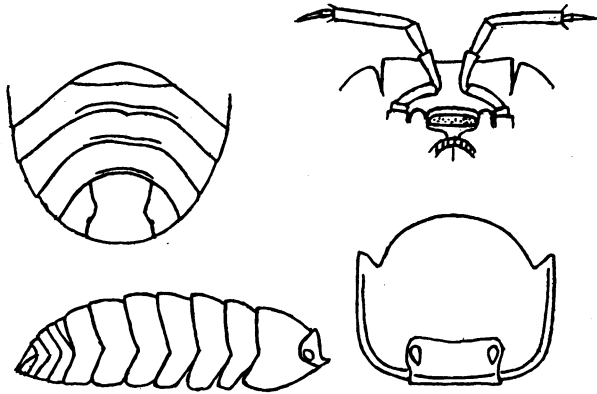


Fig. 218. *Cubaris gigas* Miers. Adapted and enlarged from Miers' (1877) figures.

strongly reflexed; all the segments distinctly flexed backward on the sides, with the posterior margins angular excavate; terminal segment of the tail about as broad as long, with the sides excavated; upper surface flat, with a shallow depression on each side and a small median pit near the base. Antennae with the flagellum much shorter than the last joint of the peduncle, with the first joint the shortest. Basal joint of the uropoda (viewed from above) oblong, terminal (apparent lateral) joint quite minute. Color light grey. Length, 10 1/2 lines."

LOCALITY.—San Juan, Nicaragua. Type in British Museum (Miers).

Pearse, 1915, reports it from Fundacion, Santa Marta, Colombia, under stones (nine examples). I have examined his specimens and agree that they correspond closely with Miers' description and figures, the

chief discrepancies being that the front outline of the head is gently convex, not straight (one must look at it very obliquely to make it appear anywhere near a straight line); that the abdomen appears to be somewhat wider than indicated in Miers' figure, and that they are all of small or only moderate size (the largest between 10 and 11 mm. long). Miers' description, however, is incomplete in respect to many important characters, and the identification therefore can be accepted only provisionally. The following notes were made on Pearse's specimens which were kindly loaned to me by the University of Michigan

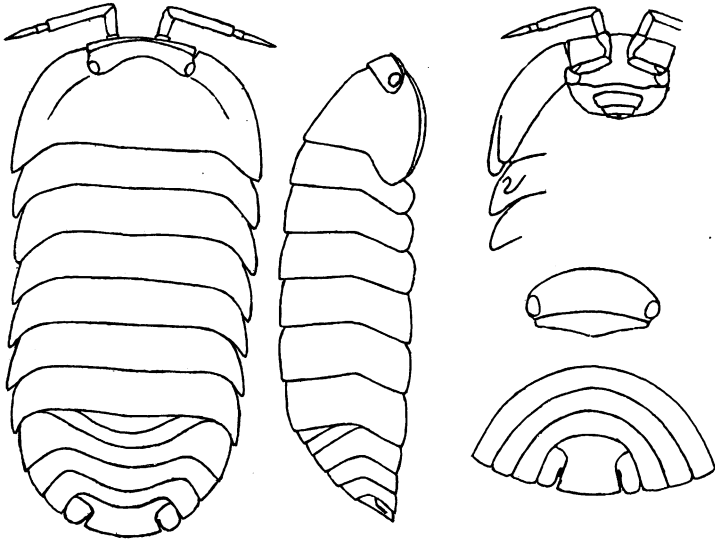


Fig. 219. *Cubaris gigas*(?) specimens of Pearse from Fundacion, Colombia.

Museum. Through an exchange, two of these specimens are now in the collection of the American Museum of Natural History.

Body wide and highly arched; oblong in outline and broadly rounded before and behind in a dorsal view. Surface very smooth and even, showing a slight and very minute granulation only on high magnification. The exposed parts of the segments are slightly but not abruptly raised above the parts that slip under the segments next in front.

Head wide; the upper edge of the epistome forms a border that projects much more at the lateral ends than in the middle and is gently convex in both front and dorsal views. Antennae rather slender; eyes with twenty or more ocelli. The epimera of the thoracic and ab-

dominal segments slope outward to some extent, thus increasing the wide appearance of the body, but they do not curve or flare outward much, except in the case of the first thoracic segment, whose lateral borders are curved outward and upward so as to form a wide shallow trough along most of the length of the segment, though it disappears before the rear angles are reached. These angles are strongly produced backward and are rounded off. The above described border turns sufficiently to allow a little of the under surface of the margin to be seen along most of the length of the segment in a side view of the latter.

Seen from below the first thoracic segment presents, at the rear end, a small notch whose inner side is considerably shorter than the outer. This notch is continued forward as a shallow, constantly narrowing groove which disappears before the middle of the length of the segment is reached. The second thoracic segment bears a rather narrow somewhat curved exopodite process flattened and rounded at the tip. No process on the third or following segments. Telson about one-eighth wider than long. The inner branches of the uropoda (visible only from below) fall far short of reaching the end of the telson; their outer branches, though small, are elongate and pointed.

Pearse makes the following statements regarding their color:

“The color of this species is rather striking. There is a salmon-colored band along each side of the body, extending through all the thoracic epimera; dorsum with the usual lateral markings; distal half of uropoda salmon-colored.”

Specimens in the U. S. National Museum from the Bahamas doubtfully identified as *C. gigas* by Richardson are not this species.

### ***Cubaris dumorum* (Dollfus), 1896**

Figure 220

*Armadillo dumorum* DOLLFUS, 1896, p. 391 (orig. descr.), Figs. 3a–3d.—BUDDENLUND, 1904, p. 110.

*Cubaris dumorum* RICHARDSON, 1901, p. 572; 1905, p. 650 (orig. descr. quoted), Fig. 693 (after Dollfus).—VAN NAME, 1924, p. 205.

Briefly described by Dollfus as follows:

“Body very convex, nearly smooth.

“Cephalon.—Prosepistoma nearly plain fore edge straight. Eyes large; about 20 ocelli. Antennae very short; first joint of flagellum twice as short as the second.

“Pereion.—First segment with a blunt antero-median tubercle; lateral edges raised on the fore part; coxopodite separated by a cleft

extending to the third part of the segment (underside). Second segment with a square coxopodite, distinct on its total length (underside).

“Pleon, Telson.—Pleotelson quite as long as wide; sides curved; apex one-third narrower than the basis.

“Uropoda.—Basis wide, oblique; endopodite extending to one-third the length of the pleotelson; exopodite very small, placed near the internal edge of the basis (upperside).

“Color.—Dark gray or brown, with light dots and lineolae on both sides of the median line (pereion).

“Dimensions.—8 by 3.5 millim.”

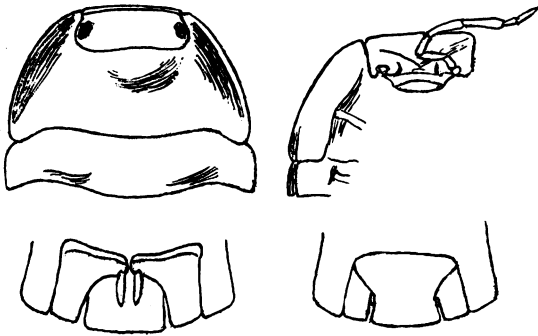


Fig. 220. *Cubaris dumorum* (Dollfus). Adapted from Dollfus, 1896.

LOCALITY.—“Mustique Island, found by beating brush.” Type in British Museum (Dollfus).

***Cubaris dugesi* (Dollfus), 1896**

Figure 221

*Armadillo dugesi* DOLLFUS, 1896*d*, p. 47, Figs. 1*a*–1*d*.—BUDDE-LUND, 1904, p. 110.—VERHOEFF, 1933, p. 98 (*dugezi*).

*Cubaris dugesi* RICHARDSON, 1905, p. 652 (Dollfus’ descr. quoted and translated), Fig. 695 (after Dollfus).—VAN NAME, 1924, p. 205.

Dollfus’ description is as follows:

“Corps étroit, convexe, lisse, très finement ponctué-sétacé.

“Cephalon.—Prosépistome dépassant un peu le front, surtout des deux côtés, face plane; yeux petits, environ 14 ocelles; fouet des antennes à premier article deux fois plus court que le second.

“Pereion.—Bord latéral du premier segment relevé sur toute sa longueur; mamelon antéro-médian à peine visible; coxopodites dis-

tincts seulement sur le tiers postérieur du côté du segment, mais atteignant à extrémité de celui-ci. Deuxième segment à coxopodite très distinct.

“Pleon, Telson.—Pleotelson aussi long que large, avec un petit relief suivi d’une impression, situé près de la base; incurvation latéral bien indiquée, le sommet égal en largeur environ les  $3/4$  de la base. Uropodes à article basilaire peu oblique; endopodites très petits; exopodites minuscules, situés vers le  $2/3$  du côté interne de la base (face supérieur).

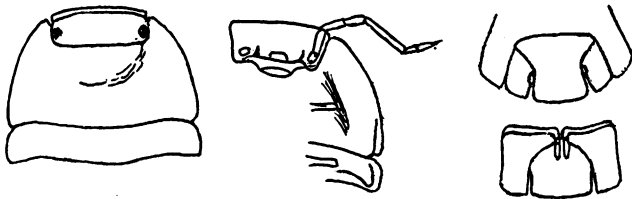


Fig. 221. *Cubaris dugesi* (Dollfus). Adapted from Dollfus, 1896d.

“Couleur.—Gris foncé uniforme.

“Dimensions.—Longueur 8 millimètres; largeur  $3\frac{1}{2}$  millimètres.”

LOCALITIES.—Corritos (Silao) and Morelia, Mexico.

Dollfus (p. 48) says of this species that it is near to *A. pisum* Budde-Lund, 1885, from Florida (see above), and may perhaps be only a variety of it.

#### ***Cubaris beebei* Van Name, 1924**

Figure 222

*Cubaris beebei* VAN NAME, 1924, p. 203 (orig. descr.), Figs. 28–30.

The following extracts from the description are given here to supplement the original figures reproduced:

Back highly arched, its surface without any coarse tuberculation, though very slightly uneven in the lateral regions of the back, but under considerable magnification it exhibits evenly, though not very thickly distributed, scabrous punctations. The exposed part of each thoracic segment is somewhat elevated, though not abruptly so, above the part overlapped by the segment next in front.

Upper margin of epistome only very gently arched and turned up to form a very narrow but distinct projecting border clear across the

front of the head. This border is separated from the forehead by a very narrow impressed groove or furrow. The front outline of the head and first body segment, when seen from above, forms a broadly rounded curve. Eyes rather small, with about twelve ocelli.

Lateral border of first thoracic segment turned up rather widely in front, the reflected part diminishing to nothing as the rounded rear angle of the segment is approached, so as to form between itself and the surface of the main part of the segment a narrow shallow groove. Posterior lateral corner of the first segment with a small cleft, but this is not extended forward as an appreciable sulcus on the inferior aspect of the mar-

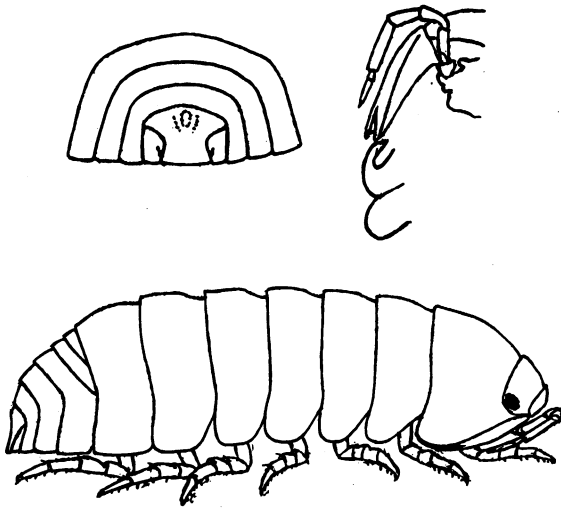


Fig. 222. *Cubaris beebei* Van Name. From Van Name, 1924, *Zoologica*, V, p. 203.

gin except for an insignificant distance. The epimeron of the second segment bears on its inner aspect a small coxopodite process ending in a flattened rounded tip. No process on third segment.

Telson broader than long by nearly one-fourth, and considerably constricted in the middle; the truncated rear end is about two-thirds the width of the upper part. On the middle line near the upper end there is an elongate depression or shallow pit with a slight elevation on either side. Basal segments of uropoda a little longer than wide. Their inner branches, visible only from below, are very short and rather wide; the outer branches are reduced to very small rudiments borne close to the inner margin of the basal joint, some distance from the end.

Color gray-brown above with the usual light markings; legs and under parts not pigmented.

Length of largest specimens (perhaps not fully grown) about 5 to 6 mm.

LOCALITIES.—Galapagos Islands; the type and four other specimens obtained on Eden Island under stones, and three others on South Seymour Island collected by sifting dead leaves. These are both small islets close to Indefatigable Island. Type in the American Museum of Natural History (Cat. No. 4836).

b.—Upper surface more or less conspicuously rugose or tuberculated.

**Cubaris truncorum** (Budde-Lund), 1893

Figure 223

*Armadillo truncorum*, BUDDE-LUND, 1893, pp. 116 (orig. descr.), 118.—DOLLFUS, 1893a, p. 340, Pl. IX, figs. 2-2c.—BUDDE-LUND, 1904, p. 104, Pl. IX, fig. 34.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Budde-Lund's description is as follows:

"Subovalis, convexus; tuberculositates trunci ordinariae majores; caput rugose tuberculatum; trunci segmenta in medio ad margine pos-

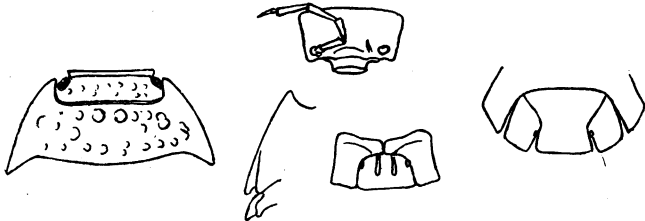


Fig. 223. *Cubaris truncorum* (Budde-Lund). Adapted from Dollfus, 1893a.

teriolem obscure et delete granulata, segmentum primum ante tuberculis duobus confluentibus subtumidum; cetera superficies minutissime et densissime squamate punctata.

"Antennae tertia corporis parte paulo longiores; flagelli articulus prior minutus, altero fere quadruplo brevior.

"Oculi mediocres, marginem lateralem capitis attingentes; ocelli circiter 16.

"Clypeus lobis mediocribus, subacute triangulis. Epistoma margine superiore in medio paulisper, in lateribus aliquantum superante.

"Trunci segmentum primum epimeris tenuibus, paulum revolutis,

marginē laterali non sulcato, post inaequaliter fisso: lacinia interior exteriore satis minor; segmentum secundum epimeris bipartitis; pars interior minuta, dentiformis, acuta, oblique retroducta. Margo posterior utrinque fortius sinuatus.

"Caudae segmentum anale paulo longius quam latius, in medio coarctatum, post recte truncatum, ad basin supra utrinque leviter impressum. Articulus basalis uropodum multo longior quam latior, subtrapezoidalis, ramus exterior minutissimus, punctiformis, procul ab apice insertus: rami interiores mediocres. Epimera segmentorum 3-4-5 subrectangula, basi quam apice paulo angustiore infra in basipaulisper inflexa.

"Color e rufo brunneus, maculis fuscis, creberrimis, presertim in quattuor series longitudinales condensatis, in capite et media cauda obscurior. Articulus basalis uropodum cum basi segmenti analis semper pallidus, apice segmenti nigro.

"Long. 6-7 mm. Lat. 3-3.5 mm."

LOCALITIES.—Budde-Lund records it from several places in the vicinity of Caracas, Venezuela, the specimens being mostly obtained by sifting; several were found on the bark of a bombax tree. Dollfus reports it from Corozaal, Caracas, and St. Esteban, Venezuela, the last one of the places also named by Budde-Lund.

In his revision of the genus *Armadillo* (*Cubaris*), Budde-Lund (1904) does not refer to Dollfus' record or figures of this species.

#### ***Cubaris vincentis* (Budde-Lund), 1904**

Figure 224

*Armadillo cinctus* DOLLFUS, 1896, p. 392 (orig. descr.), Figs. 4a-4d.

*Armadillo vincentis* BUDDE-LUND, 1904, p. 110.

*Cubaris cincta* RICHARDSON, 1901, p. 572 (*cinctus*); 1905, p. 647 (orig. descr. quoted), Fig. 690 (after Dollfus).—PEARSE, 1915, p. 543 (see note below).

*Cubaris vincentis* VAN NAME, 1924, p. 205.—BOONE, 1934, p. 591.

The description of Dollfus (no other has been published) is as follows:

"Body moderately convex, rather wide, depressed on the fore and hind parts of the segments, with a transverse range of tubercles on each segment.

"Cephalon.—Prosepistoma nearly plain, fore edge straight. Eyes middling; ocelli about 16. Antennae; first joint of the flagellum twice as short as the second.

"Pereion—First segment with a double antero-median tubercle;



lateral edges raised; coxopodite distinct and divergent on the third hind part of the edge (underside). Coxopodite of the second segment forming a narrow quadrangular processus.

“Pleon, Telson.—Pleotelson as long as wide, with a triangular tubercle near its basis; sides curved; apex one-fourth narrower than the basis.

“Uropoda.—Basis nearly straight; endopodite very small, extending hardly to one-sixth the length of the pleotelson; exopodite minute, placed above the middle of the internal edge of the basis (upper side).

“Color.—Dark, gray, with small lighter lineolae on both sides of the median line (pereion) and three light dots on the pleotelson.

“Dimensions.—7.5 by 3.25 millim.”

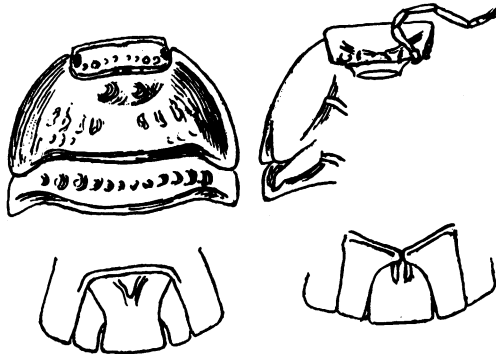


Fig. 224. *Cubaris vincentis* (Budde-Lund), 1904. Adapted from Dollfus' (1896) figure of *Armadillo cinctus*.

LOCALITIES.—Type locality “Near Layon (leeward side) on rotten wood, dry forest, 500 feet” (Dollfus). Type in British Museum (Dollfus). Layon is probably on St. Vincent, W. I. Pearse, 1915, reports “a small specimen, probably referable to this species” from near the Cincinnati Coffee Plantation, Santa Marta, Colombia (elevation 4500 ft.). This specimen is probably in the University of Michigan Museum.

Budde-Lund, 1904, p. 110, changed the name of this species to *vincentis*, the name *cinctus* having previously been employed by him for a species from the Greek Islands.

#### ***Cubaris culebrae*, new species**

Figure 225

Body highly arched; rather coarsely granular and scabrous under magnification, and ornamented with numerous small, well defined, rounded or slightly oval

tubercles arranged in transverse rows with considerable regularity. In a dorsal view the front of the head is gently curved while the sides of the first thoracic segment are more straight, converging toward the front, where they curve in to meet the head; the rear end of the body appears quite broad owing to the epimeral ends of the abdominal segments 3 to 5 bending considerably outward. Integument firm and articulation of the segments compact. The exposed tubercle-bearing parts of the thoracic segments are noticeably but not abruptly raised above the parts fitting under the segment next in front.

Head with small low tubercles; the superior margin of the epistome forms a distinctly projecting border clear across the front of the head, though it is more up-

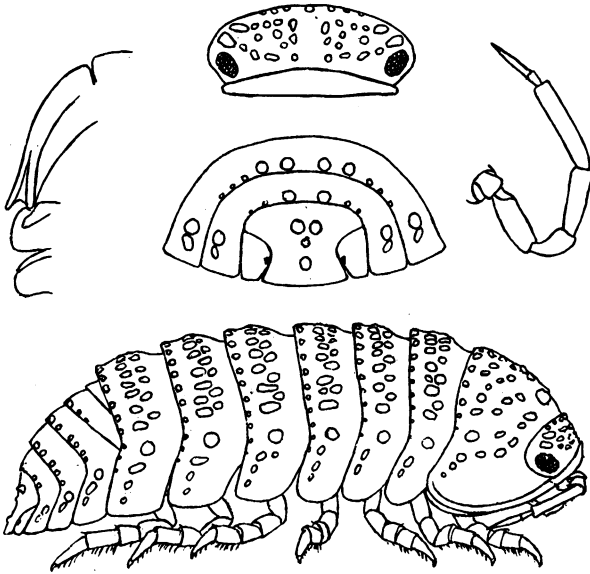


Fig. 225. *Cubaris culebrae*, new species.

turned and appressed in the middle than at the sides. Eyes well developed, with about twenty ocelli. Terminal article of flagellum of antennae more than twice the length of the proximal one.

First thoracic segment with numerous tubercles, of which a pair on the anterior median region are the largest. Its lateral borders are sharply rolled outward, rather broadly in front, and edged by a thickened margin. The posterior lateral angles are somewhat extended back and rounded off, and are cleft by a small notch to receive the second segment when the body rolls up. This notch is extended forward as a sharply defined, constantly narrowing sulcus for about one-third the length of the margin. In a lateral view the inferior margin of the segment is gently curved: the sulcus on its inferior aspect described above is slightly visible owing to a slight obliquity in its position.

The thoracic segments have their epimeral ends nearly vertical; the more anterior ones have the ends rounded off; those farther back are more truncated. They have a row of small tubercles along the posterior border and two more or less irregular transverse rows of larger ones in front of these on the lateral regions of the back, also a few on the epimera. Abdominal segments two to five inclusive have only the row along the posterior edge and a few on the epimera and telson. The end of the telson is truncated in the arc of a very large circle, and is scarcely two-thirds the width of the upper part. Outer branch of the uropoda minute and scale-like, the inner branches quite short.

Color grayish brown above, the margins of the segments usually unpigmented, as are numerous irregular spots which often correspond more or less in size and position with the tubercles, though usually larger than the latter and frequently confluent.

Length of largest specimen (a female) about 12 mm.; most of the others are much smaller.

LOCALITIES.—Type locality, Culebra Island, West Indies (east of Puerto Rico); nine specimens in the American Museum of Natural History, of which the largest male (Cat. No. 6513) is the type. Collected by Prof. W. M. Wheeler, March 4, 1906. There are also in the same museum two specimens collected by Dr. F. E. Lutz, Feb. 18, 1914, on Desecheo Island west of Puerto Rico, and five from St. John, Virgin Islands, March 9, 1925, also collected by Dr. Lutz.

***Cubaris jamaicensis* Richardson, 1912**

Figure 226

*Cubaris jamaicensis* RICHARDSON, 1912, p. 193 (orig. descr.), Figs. 2, 3.

Of this species its describer states that it is "closer to *Cubaris silvarum* (Dollfus) than to any other described species. It differs from that form in not having the coxopodites of the first thoracic segment distinct on the entire length of the edge, in having the coxopodite of the second segment smaller and more distant from the lateral margin, and in having the tubercles of the body more distinct and differently arranged."

The following characters were determined from the specimens in the American Museum mentioned below, which seem to belong to Richardson's species.

Body quite highly arched and showing under magnification a scabrous granulation and fairly prominent tubercles distributed as in Richardson's description and figures. On the first thoracic segment there is a pair of large low tubercles in the anterior median region; those in the groups on the lateral regions of the back are of more or less

irregular elongate form and are often somewhat confluent. The abdomen is smooth except for one pair of tubercles near the upper margin of the telson and a slight median elevation below them. The exposed and tubercle-bearing part of the segments is noticeably raised above the part fitting under the segments next in front. The epimeral ends of the abdominal segments 3 to 5 are bent or flared outward to a noticeable extent.

Front outline of head fairly convex when seen from above; the upper margin of the epistome is not very wide, but is slightly upturned so that there is a distinct groove between it and the forehead. Eyes convex; fifteen or more well-developed ocelli.

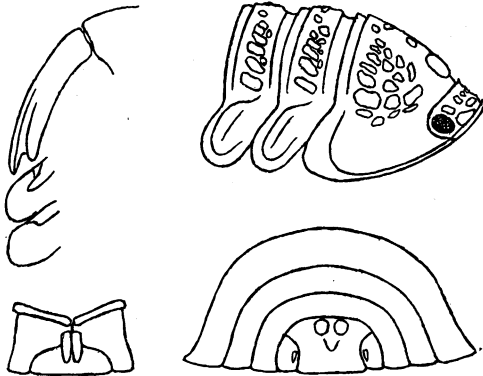


Fig. 226. *Cubaris jamaicensis* Richardson. From specimens in the American Museum of Natural History.

The first thoracic segment has the lateral border turned outward so that there is a noticeable concavity of the face of the segment just above it; this concavity is terminated behind by a distinct curved line a little way in front of the rear angle of the segment. A distinct sulcus of U-shaped cross section, and not very wide, marks off the coxopodite on the lower aspect of the margin of the segment. It ends behind in a small notch the inner side of which is considerably the shorter, and it fades out, more by becoming shallower than by becoming narrower, about the middle of the length of the segment. The second thoracic segment has a small, obliquely directed, rather acute coxopodite process; the third has none, though its anterior border is somewhat thickened.

Color brown above with the usual light (unpigmented) markings.

Neither of these two specimens is as large as the dimensions given by Richardson (9.5 by 5.0 mm.).

LOCALITIES.—Mandeville, Jamaica (type locality), 30 specimens collected by Dr. Thomas Barbour. Types in Museum of Comparative Zoölogy, Cambridge, Mass. Cotypes in U. S. Nat. Mus. (Richardson). The American Museum of Natural History contains specimens from two other localities in Jamaica: Moneague and Montego Bay, one from each place.

**Cubaris verrucosa** (Budde-Lund), 1904

*Armadillo verrucosus* BUDDE-LUND, 1904, p. 104 (orig. descr.).

The original description is here quoted in full:

“Ovalis vel breviter ovalis, convexus.

“Caput rugis vel tuberculis asperum; trunci segmentis tuberculis in posteriore elevatiore parte segmentorum irregulariter transverse biseriatas, ad latera majoribus, positas; caudae segmentis serie transverse verrucularum vel tuberculorum saepe deletiorum munita; telsum tuberculis duobus in basi positas majoribus. Altra superficies dense et minutissime squamata.

“Oculi majores, globosi, ocelli numero c. 16.

“Antennae breves, tertiam corporis partem longitudine vix aequantes; scapi articuli 2. et 4. subaeque longi; flagelli articulus 1. quadruplo brevior quam articulus 2.

“Epistoma margine superiore frontem nonnihil maxime in lateribus superante. Clypeus perpendicularis, lobis lateralibus parvis, rotundatis, subsemicircularis.

“Trunci segmentum 1. epimeris leviter altecinctis, margine laterali post mediam sulcato et post profunde subaequaliter fissis; lacinia interior rotundata, lacinia exterior rotundata truncata, interiore paulo brevior. Epimera segmenti 2. bipartita; lamina interior angusta, retroducta; pronotum perbreve, vigesima parte dorsi vix longius. Margo posterior omnium segmentorum, maxime segmenta 1. et 2., utrinque leviter incurvus. Epimera segmentorum 5.–6.–7. subtus duplicatura anteriore.

“Caudae segmenta 3.–4.–5. epimeris paulum revolutis, subrectangularis, nullo processu inferiore instructis. Pleopodes primi paris in femina perparvi, transversis, trachea parva area operculari vix conspicua instructi.

“Telsum tertia parte vel plus latius quam longius, post leviter co-

aretatum; basis multo longior quam apex, margine postico subtransverso.

"Uropodum scapus nonnihil longior quam latior; latus exterius subrectum, latus interius leviter incurvum. Exopoditum minutissimum, punctiforme, lateri interiore scapi procul ab apice insertum. Endopoditum minutissimum, vix duplo latius quam longius.

"Unicolor, griseus, maculis parvis albidis in capite et trunci segmentis ad latera ornatus; pedes pallidi, antennae griseae saepe rufescentes.

"Long. 5-6 mm. Lat. 2.5-3.2 mm."

LOCALITY.—Guayaquil, Ecuador, taken from under the bark of trees. Specimens in the Hamburg Museum (Budde-Lund).

#### **Cubaris galapagoensis** Miers, 1877

Figure 227

*Armadillo galapagoensis* BUDDE-LUND, 1879, p. 7 (*galapagoensis*); 1885, p. 40; 1904, p. 108.

*Cubaris galapagoensis* MIERS, 1877, p. 74 (orig. descr.), Pl. XII, figs. 2-2c.—VAN NAME, 1924, p. 201 (new descr.), Figs. 23-27.

The following characters are taken from the description in Van Name, 1924, pp. 201-203:

Body hard and compactly articulated; its surface minutely granulated under magnification and raised into rounded and elongate tubercles arranged with some regularity.

Eyes small, with about fifteen ocelli.

Upper edge of epistome gently arched when seen in an anterior view, and forming a narrow projecting border clear across the head.

Thoracic segments having their exposed part noticeably but not very abruptly raised above the part fitting under the segment next in front, and the rear border forming a somewhat prominent ridge. The first segment has the lateral border curved as seen in a side view, and its anterior two-thirds rolled outward to form a prominent but not very thick projecting margin. No distinctly defined groove marks this off from the lateral face of the segment. The rear lateral angles have a small nearly equal-sided cleft to receive the second segment when the body rolls up; this is not continued forward into a perceptible sulcus on the underside of the rolled-out margin except for a short distance. The second segment bears a small, short, rather bluntly pointed coxopodite process. The third segment merely has the anterior border of the epimeron thickened, but bears no process.

The abdomen has the lateral ends of segments 3, 4, and 5 broadly truncated and slightly flared outward, and each bears one oval tubercle on each side near the lateral end. Outer branches of the uropoda reduced to small rudiments, each borne on a small tubercle close to the inner margin of the outer face of the basal joint some distance from the rear margin.

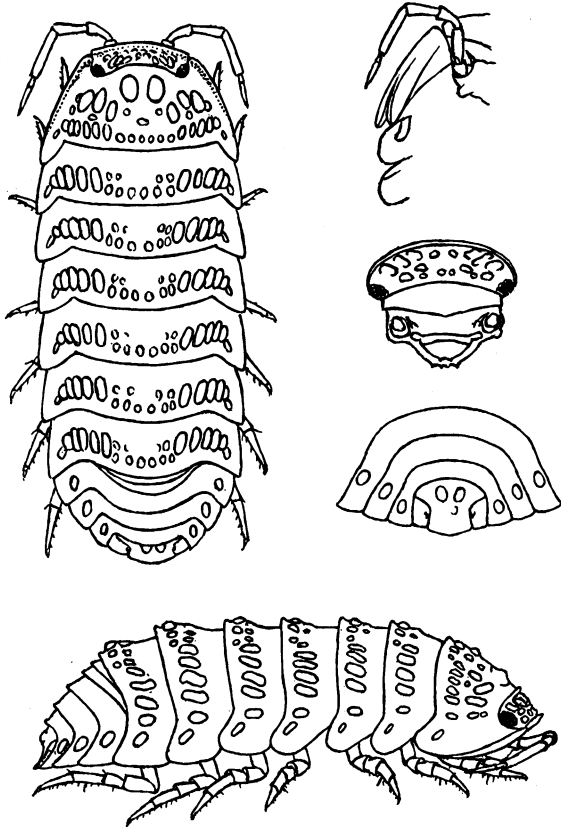


Fig. 227. *Cubaris galapagoensis* Miers. From specimens in the American Museum of Natural History. Adapted from Van Name, 1924.

Color rather dark gray with the margins of the segments and the tubercles light grayish or brownish white (unpigmented).

Length, 11 mm. (Miers, type).

LOCALITY.—Charles Island, Galapagos. Type in the British Museum (Miers). Eden Island, Galapagos, found under a stone (Van Name, 1924, specimen in the American Museum of Natural History).

Though the Eden Island specimen is smaller (only 6 mm. long) and is from a different island it agrees so well with Miers' description and figures that I cannot consider it distinct. The chief discrepancy is that Miers figures the lateral ends of the anterior thoracic segments as broader and more truncated, possibly an error on the part of his artist. Eden Island is a small islet close to Indefatigable Island, the next one north of Charles Island.

**Cubaris tuberosa** (Budde-Lund), 1904

Figure 228

*Armadillo tuberosus* BUDDÉ-LUND, 1904, p. 109 (orig. descr.), Pl. x, figs. 1-4.

*Cubaris perlata* PEARSE, 1917, p. 7 (not Dollfus).

*Reductoniscus tuberosus* KESSELYAK, 1930, pp. 61-64.

"Caput rugose tuberculatum. Trunci segmentum primum seriebus transversis tribus vel quattuor tuberculorum ornamentum; series prima tubercula quattuor majora, series secunda duo parva, series tertia multa, c. 12, mediocria, series marginalis postica c. 7 minor continet; omnia

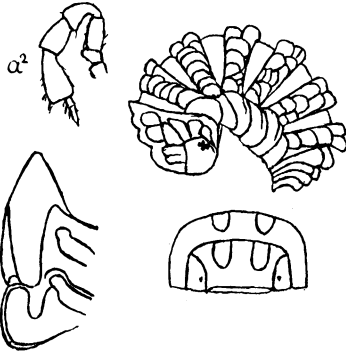


Fig. 228. *Cubaris tuberosa* (Budde-Lund). Adapted from Budde-Lund, 1904.

segmenta sequentia seriem transversam tuberculorum et post in medio tubercula quaterna habent. Caudae segmenta 3. et 4. tuberculis quaternis mediis, segmenta 5. et 6. tuberculis binis instructa.

"Oculi medioeres; ocelli numero c. 15.

"Antennae breviores, scapi articulus 4. paulo longior sed multo crassior quam 3., articulo 2. subaequalis flagelli articulus 1. plus duplo brevior quam 2.

"Epistoma supra subtriangulare prominens, marginem frontalem paulum superans, infra carinula brevis; clypeus lobis lateralibus parvis, rotundatis.



“Trunci segmentum 1. margine laterali post sulcato et subaequaliter fisso; segmentum 2. epimeris fassis; lacinia interior parva, dentiformis.

“Telsonum multo, fere duplo, latius quam longius, lateribus leviter incurvis.

“Uropodium exopoditum minutum, endopoditum breve.

“Unicolor, pallido albus.

“Long. 3.5 mm. Lat. 1.8 mm.” (Budde-Lund, 1904.)

LOCALITIES.—Port au Prince, Haiti. One specimen (type) in Hamburg Museum (Budde-Lund). Through the kindness of Prof. E. P. Creaser I have been able to examine eleven specimens collected by Prof. Pearse on St. Thomas Island and assigned by him (1917, p. 7) to *C. perlata* (Dollfus), but they belong, or are closely allied, to the present species.

Budde-Lund's figures and description fail to bring out the unusual extent to which the ends of the abdominal segments and the rear end of the telson are bent or flared outward, and they somewhat exaggerate the width of the antennal segments, which, however, are exceptionally wide. In spite of the large size of the tubercles, they are more or less irregular in size and arrangement on the lateral parts of the back, as Budde-Lund's figure indicates. From the most lateral tubercles, which are large and oblong in outline, a curved ridge extends down near the posterior border of the epimeron. The cleft at the posterior angle of the first thoracic segment is quite small, but is continued forward as a diminishing groove for half the length, or somewhat more, of the border of the first segment.

The species is evidently a very small one; none of the specimens much exceed the type in size.

The remarks made under *C. mineri*, regarding resemblance to certain Old World species, apply also in the case of this form, which in my opinion belongs, as most of the West Indian species do, to the *Venezillo* group, though Kesselyak, 1930, separated it, on the basis of Budde-Lund's description and figure, and placed it in a genus, *Reductoniscus*, which he established in that article for a form of unknown natural habitat that he found in the palm house of the botanical garden at Dahlem, near Berlin.

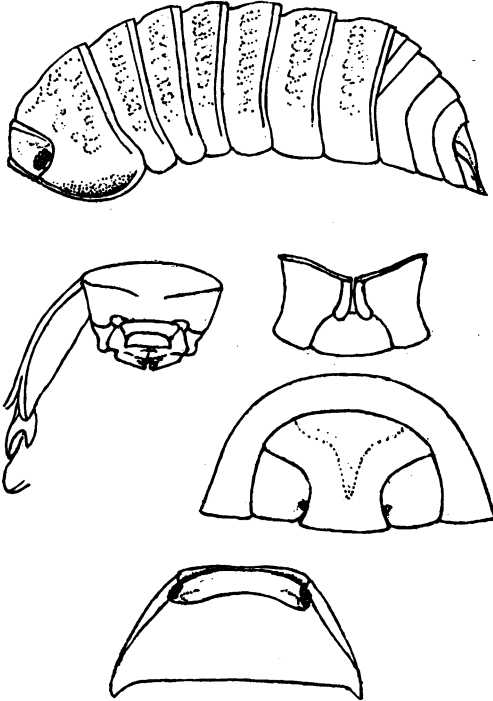
c.—In the two following species, although in other characters they show close relationship to most of the members of this group, the reduction of the coxopodite ridge and sulcus has proceeded toward complete disappearance, no indications remaining except the cleft at the rear angle of the first segment.

**Cubaris ramsdeni**, Boone, 1934

## Figure 229

*Cubaris ramsdeni* BOONE, 1934, p. 589 (orig. descr.), Fig. 10.

A rather smooth species, rather sparsely scabrous-punctate under high magnification, with faintly indicated rugosity on the dorso-lateral regions. The segments have some degree of individual convexity and have the exposed part elevated (though not abruptly) more than the

Fig. 229. *Cubaris ramsdeni* Boone.

part that slips under the segment next in front, and have the rear margin with a smooth border marked off by a distinct line. The body is highly convex, oblong in a dorsal view with broadly rounded ends, especially behind, where the epimeral parts of the segments slope outward considerably.

The head has an upturned margin across the front which is nearly straight in a dorsal view, except near the ends, and is narrower and more appressed in the middle where it is pushed back so that when seen at a

certain angle the median outline recedes a little, but even there the up-turned border is separated from the forehead by a distinct furrow which becomes much wider toward the sides. The eyes have about fifteen ocelli. The antennae are broken off in all the specimens but, from the basal joints remaining, appear to have been rather slender.

The first thoracic segment has the lateral margin with a thickened border extending from the front to near the rear angle, separated from the vertical side of the segment by a rather well-marked groove wide and merging into the somewhat concaved side of the segment in front but narrow and fading out toward the rear. The coxopodite sulcus is greatly reduced and represented only by a small V-shaped cleft at the rear angle. The inner side of the V is the longest. The second segment has a moderately large, somewhat flattened and curved coxopodite process.

The telson has the upper or basal part wide (about one and one-third times the length); the posterior extension narrow with strongly incurved sides. The median basal part of its dorsal surface is somewhat tumid, the raised area extending down toward the end as a narrow ridge tapering to a point. The exopodites are very small, short-conical and inserted on the dorsal side of the basal joint close to the inner margin. The endopodites, visible only from below, are very short and broad and curved strongly outward.

The type would measure, if it could be fully straightened out, between 8 and 9 mm. long. Its colors have faded out.

LOCALITIES.—“El Ocuja1,” Guantanamo, Cuba (Boone). The type (Cat. No. 6603) and three paratypes are in the American Museum of Natural History.

#### ***Cubaris wheeleri*, new species**

Figures 230, 231

Superficially somewhat like *Cubaris murina* Brandt in appearance. Body stout and highly arched and evenly and broadly rounded behind (slightly less so in the male than in the female) with the head wide and nearly transverse in front when seen from above. General surface of the body of smooth appearance though minute, evenly but not very closely distributed, slightly setose granules are visible with a hand lens. Only slight and poorly defined indications of the tuberculation usually present in species of this group on the lateral regions of the back are present in this species. These are too slight to detract much from the general smooth appearance of the dorsal surface.

Upper edge of epistome forming a projecting border clear across the front of the head, but this is turned up and appressed to the forehead in the middle so that it appears much narrower there than at the sides. The upper margin of the forehead has also a slightly raised border. Eyes large with fifteen to eighteen well-developed ocelli.

First segment of thorax with the lateral border gently curved, when seen in a lateral view, and rolled or turned outward to form a rather narrow projecting border, which diminishes and merges with the side of the segment a little before the rear angle is reached. The side of the segment is somewhat concave above the border, which however is not marked off from the rest of the segment by any distinct line or furrow. There is no sulcus on the lower aspect of the margin, though the rear angle of the segment which is extended backward and slightly truncated has a very small short V-shaped cleft. The second segment has a small short blunt coxopodite process. The third segment has none.

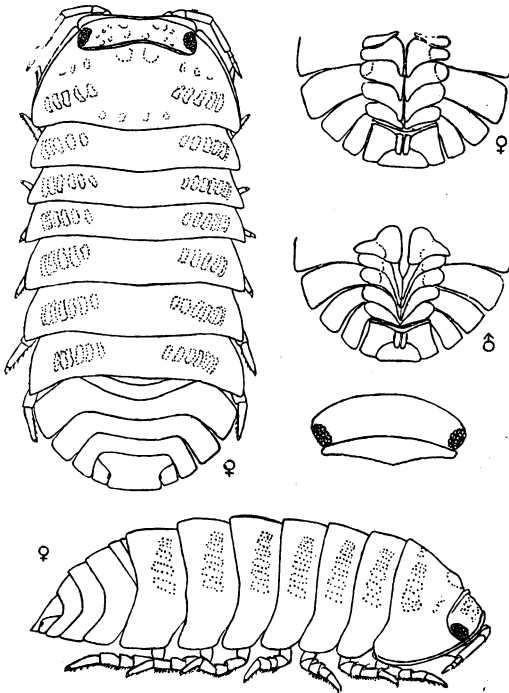


Fig. 230. *Cubaris wheeleri*, new species.

The lateral ends of the abdominal segments three to five are somewhat divergent but do not bend or flare outward perceptibly. The telson is wide with a rather short posterior extension which is a little more than half as wide as the upper part, and the exposed parts of the basal joints of the uropoda are of proportionally short, wide outline. The minute outer branch is borne in a notch on the inner border; it is elongate and less reduced than in many of the genus. The inner branches, visible only from below, are rather short and wide.

Color usually quite dark grayish brown with the usual small, light-colored, yellowish (unpigmented) markings on the lateral regions of the back. In addition, the exposed parts of the uropoda, the epimera of the abdominal segments, the basal

part of the telson and usually the whole of the fifth abdominal segment are yellowish (unpigmented). Lower parts and legs unpigmented.

The largest specimen is a male and if straightened out would measure about 9 mm. long.

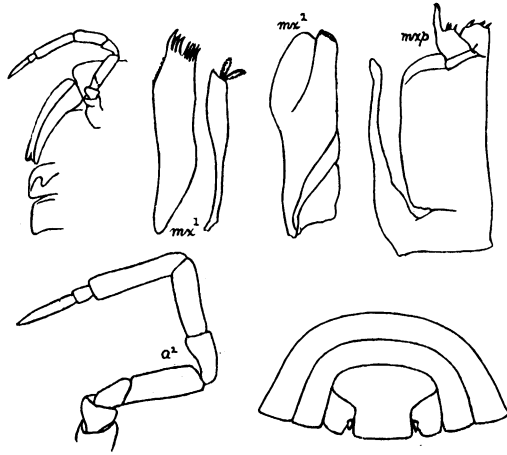


Fig. 231. *Cubaris wheeleri*, new species.

LOCALITY.—Culebra Island east of Puerto Rico. About 30 specimens, including the type (Cat. No. 6518), in the American Museum of Natural History collected by Prof. W. M. Wheeler, for whom the species is named, March 9, 1906.

### GROUP III

Composed of several species having the coxopodite ridge of thoracic segment I distinct on the posterior half of the segment only, but the ridge is far removed from the margin throughout its length. These species are all strongly tuberculate or spiny.

#### *Cubaris brevispinis* Pearse, 1915

Figure 232

*Cubaris brevispinis* PEARSE, 1915, p. 543 (orig. descr.), Fig. 5.

The following statements are taken from Pearse's description:

"Head wider than long; front straight; anterolateral angles rounded. Eyes small, rounded, with sixteen facets.

"First thoracic segment with lateral parts large and laminar; anterior and posterior angles rounded; dorsal surface of epimera con-

cave. All thoracic epimera produced and flattened, rectangular with rounded angles. Coxopodites distinct on first and second segments, tapering with rounded tips.

"Uropoda rather slender; outer rami small, reaching halfway to posterior margin; inner rami minute, only reaching a little beyond the median constriction in the sixth abdominal somite.

"Color brown with a narrow horn-colored margin along the lateral and posterior borders of all free somites and with some irregular white spots.

"Length, 9; width, 4.3 mm."

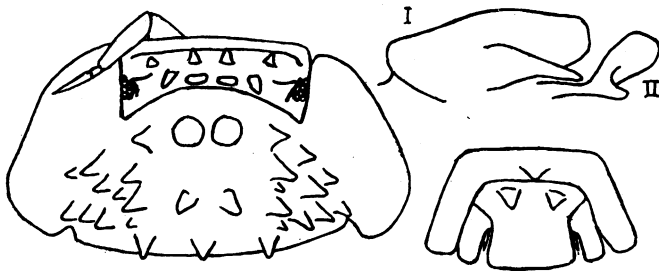


Fig. 232. *Cubaris brevispinis* Pearse. Adapted from Pearse, 1915.

LOCALITIES.—Santa Marta, Colombia, at Fundacion and La Rosa (places of comparatively low altitude) and "below the Cincinnati Coffee Plantation (altitude 4500 feet)." Type (in the University of Michigan Museum) collected above Minca (elevation 2200 feet). Specimens also in the U. S. National Museum.

"The usual haunt of this little isopod was beneath the scales of a tree with extremely rough bark. Only two specimens were found under some stones in a dry creek bed." (Pearse, 1915, p. 544.)

#### *Cubaris mineri*, new species

##### Figure 233

Body broadly oblong in a dorsal view, parallel-sided, broadly rounded in front and behind, and highly arched. The epimeral ends of both the thoracic and abdominal segments bend or flare strongly outward, much increasing the width of the body relative to its length and bulk.

The dorsal surface is ornamented with large regularly arranged tubercles. These are of conical form with the tip rounded off; on the segments of the thorax (except the first, on which they are more numerous) they form two rows, an anterior row of eight and a posterior row, very close to the posterior margin of each segment, of nine (seven only on segment VII). In addition there is a larger oblong tubercle at the

junction of the main and epimeral parts of the segment on each side. From this large tubercle a fairly well-defined curved ridge or keel extends down toward the lateral end of the segment. The abdominal segments are smooth except for a horizontal row of four conical tubercles on each of segments three, four, and five, and a pair on the telson. These tubercles, though large, prominent, and of regular form, do not

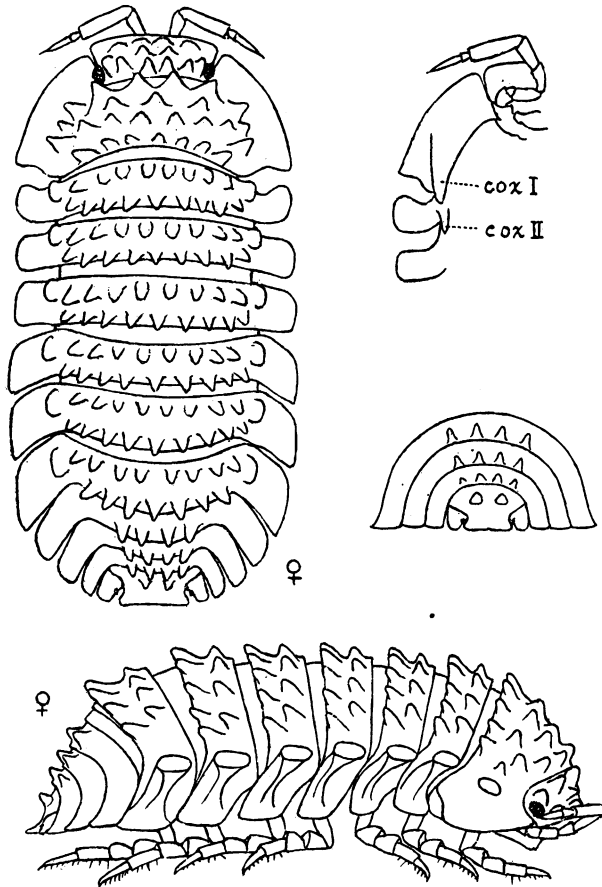


Fig. 233. *Cubaris mineri*, new species.

develop into anything that can properly be called a spine as they do in *Diploexochus echinatus* Brandt. The body surface, including that of the tubercles, is granular.

Front outline of head gently and evenly curved when seen from above. The upper border of the epistome forms a wide, rather thin, horizontally projecting border; this is nearly straight when seen from in front. There is a row of six large tubercles along the posterior or upper margin of the head, and a pair of smaller ones below

them, also a row of four above the projecting margin of the epistome. Eyes with about fourteen ocelli. Antennae rather small and short with a flagellum fully three-fourths the length of the last joint of the peduncle. The first article is about one-third the length of the terminal one, which bears only a short terminal spine.

The epimera of thoracic segments II, III, IV, V, and to a less extent the other segments, are shorter antero-posteriorly than the main part of the segment, so that the body outline is not continuous but interrupted by clefts between the epimera of successive segments. On the thorax the part of the segments bearing the tubercles is considerably and abruptly raised above the part slipping under the segment next in front.

The first thoracic segment has the lateral part curved out horizontally to form a wide, rather thin lateral border. Seen from below, this border exhibits an oblique coxopodite ridge which is produced behind into the inner plate of a notch for receiving the second segment when the body is rolled up. The outer plate of the notch, formed by the postero-lateral angle of the segment, is truncated in an emarginate manner so as to form a shallow notch instead of a rounded or more or less acute apex as in most members of the genus. The second thoracic segment bears a well-developed posteriorly directed, tooth-like coxopodite process. There is none on the succeeding segments. The legs are rather weak and slender with poorly developed spines.

The telson is very much wider than long and has the lower or terminal part strongly bent out horizontally. The truncated rear end, though much narrower than the upper part, nevertheless appears to exceed the length of the segment in its width. The middle part of the telson is constricted in width and bears a pair of tubercles, as stated above. The basal joints of the uropoda are short and wide, and round at the rear end; the internal branches, visible only from below, are very short; the external branch is minute, resembling a pointed scale, and is inserted on, or almost on, the notched inner margin of the basal joint.

The alcoholic specimens are yellowish with some brownish pigment on the upper parts.

This appears to be a small species. The largest of the three specimens, a female, would measure little over 6 mm. in length, if it could be completely straightened out.

LOCALITY.—Kamakusa, British Guiana. Three specimens collected by Mr. Herbert Lang, the type (a female, Cat. No. 6515) in January, 1923, and two smaller ones, one a male, on October 25, 1922.

Named for Dr. Roy W. Miner, of the American Museum of Natural History, through whose aid and encouragement the publication of this work has been made possible.

#### *Cubaris longispinis* Richardson, 1912

Figure 234

*Cubaris longispinis* RICHARDSON, 1912a p. 477, (orig. descr.), Figs. 1, 2.—ARCANGELI, 1930a, p. 2.

A species resembling *Diploexochus echinatus* Brandt in many char-



acters, though with longer spines, and lacking the peculiar division of the thoracic epimera.

The following characters are among those given by Richardson:

"Color brown, mottled with yellow. Head wider than long; front slightly excavate in the middle, the antero-lateral angles produced and rounded; eyes small, round, composite, situated close to the lateral margin, halfway between the anterior and posterior margins. Second antennae with a flagellum composed of two articles, the second of which is twice as long as the first.

"First segment of the thorax with the lateral parts large and expanded, the antero-lateral angles extending forward as far as the antero-lateral angles of the head, the post-lateral angles being rounded; dorsal surface of the lateral parts concave, with the margins produced laterally.

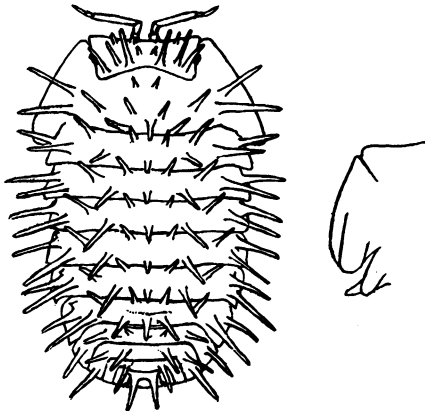


Fig. 234. *Cubaris longispinis* Richardson. Adapted from Richardson, 1912a.

The lateral parts of the second, third and fourth segments are drawn out laterally in narrow acutely ending processes; those of the fifth and sixth segments are wider and produced downward; those of the seventh are the width of the segment with only the posterior angle acutely produced. The coxopodites of the second segment are present on the underside, some distance from the edge, and are rounded plates.

"Sixth or terminal segment (of abdomen) constricted about the middle and truncate posteriorly; peduncle of the uropoda occupying the space between the sixth segment and the lateral parts of the fifth; outer branch minute and placed at the inner post-lateral angle of the

peduncle; inner branch short and not quite reaching the extremity of the sixth abdominal segment (seen from the underside)."

LOCALITY.—Porto Bello, Republic of Panama. Two specimens, including the type, in the U. S. National Museum (Richardson). They were collected by Mr. E. A. Schwarz, who found the species abundant on bushes and under rubbish on the ground.

#### GROUP IV

Species having the coxopodite ridge of the first segment reduced to a slight prominence or jog in the outline in the rear part of the inner surface of the lateral part of the segment well removed from the posterior lateral angle and the lateral margin of the segment. They do not appear to be closely allied to the other American species and may all be of Old World origin.

#### *Cubaris murina* Brandt, 1833

Figures 235, 236

*Armadillo borellii* DOLLFUS, 1894, p. 1 (descr.), Figs. 1-5.—BUDDE-LUND, 1904, p. 120.

*Armadillo conglobator* BUDDE-LUND, 1879, p. 7.

*Armadillo cubensis* SAUSSURE, 1857, p. 307 (diagnosis); 1858, p. 481 (descr.), Pl. v, figs. 42, 42a (outlines of body).

*Armadillo murinus* MILNE-EDWARDS, 1840, III, p. 179 (descr.).—BUDDE-LUND, 1879, p. 7; 1885, p. 27 (new descr.; synonyms).—DE BORRE, 1886, p. cxiii.—DOLLFUS, 1896d, p. 47; 1897, p. 205.—BUDDE-LUND, 1904, p. 119, Pl. x, figs. 20-22 (details).—ARCANGELI, 1927, p. 224.

*Cubaris affinis* MIERS, 1877a, p. 666 (descr.), Pl. LXVII, figs. 4-4b. (Not *C. affinis* (Dana), 1854.)

*Cubaris cubensis* MIERS, 1877, p. 74; 1877a, p. 666.

*Cubaris murina* BRANDT, 1833, p. 190 (orig. descr.).—GERSTAECKER, 1873, p. 527.—STUXBERG, 1875, p. 44 (*C. murinus*).—RICHARDSON, 1901, p. 571 (*C. murinus*); 1905, p. 645 (new descr.), Figs. 687-689.—RATHBUN, 1912, p. 460.—VAN NAME, 1925, p. 466.—MOREIRA, 1927, p. 194.—ARCANGELI, 1929, p. 129.—BARNARD, 1932, p. 379, Fig. 77.—MOREIRA, 1932, p. 432.—BOONE, 1934, p. 597.

See also *Cubaris brunnea* and *C. flavorbrunnea* (probably synonyms) and *C. cinera*.

Brandt's original description is as follows:

"Cingulum dorsi primum margine posteriore leviter fissum, margine inferiore esulcatum.

"Corpus oblongum sat convexum subdilatatum. Dorsum e nigricante griseum. Appendices caudales dilate flavo brunneae. Patria: Brasilia."

As in the case of many other supposedly well-known species, the

descriptions and illustrations thus far published leave much to be desired. It may be recognized by the reduction of the coxopodite ridge to a slight projection near the rear end of the segment, well removed from the margin, and the conspicuous manner in which the epimeral ends of the segments, especially those of the first dorsal and the abdominal ones, bend or flare outward, though there is no distinct groove or furrow marking off the border of the first dorsal segment. The dorsal surface appears smooth (minutely granular on magnification) in spite of the presence of slightly raised confluent tubercles on the lateral regions of the back.

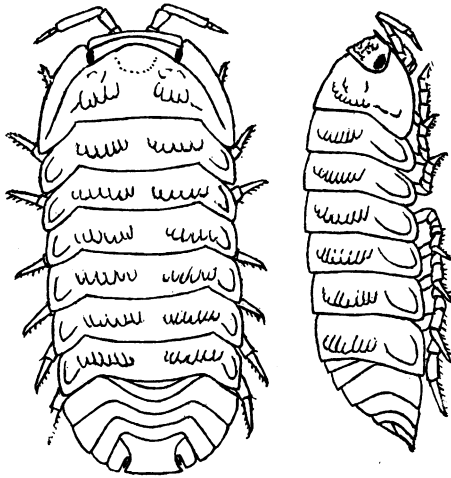


Fig. 235. *Cubaris murina* Brandt. Drawn from specimens from Havana, Cuba.

Color of upper parts varying from light or dark gray to brownish or brown, with small yellowish markings on the tuberculated areas. Exposed parts of basal segments of uropoda and terminal part of telson yellow or yellowish. Usual length not over 10 or 12 mm.

DISTRIBUTION.—Widespread in the tropical and subtropical regions of the Old and New Worlds, especially in the vicinity of towns and cities. Type locality "Brazil." Numerous American localities on record: Rio de Janeiro and points in Matto Grosso, Brazil; Rio Apa, Paraguay; Cayenne, various points in Cuba, Puerto Rico, Haiti, Dominica, St. Thomas, and Jamaica; Guanajuato, Mexico (de Borre); Colombia. Also Oahu, Hawaii. Type in Berlin Museum (Budde-Lund).

This species, though originally described from Brazil, is apparently

of East Indian origin, its introduction into America probably being due to human agencies, but if so, it must have occurred at an early period in the European settlement of South America.

Dollfus' (1894) description and figures of *Armadillo borellii*, from Rio Apa, northern Paraguay, agree extremely well with this species except

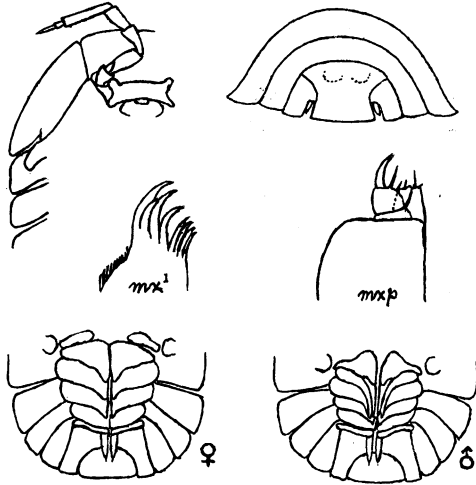


Fig. 236. *Cubaris murina* Brandt. Drawn from specimens from Havana, Cuba.

that the front margin of the head is figured somewhat too straight, and there seems to be no reason for not regarding *borellii* as a synonym, as Budde-Lund considered probable.

#### *Cubaris cinerea* Brandt, 1833

*Armadillo cinereus* MILNE-EDWARDS, 1840, III, p. 179.—BUDDE-LUND, 1885, p. 29 (says closely allied to *murina*. Type examined); 1904, p. 120 (says it is a good species).

*Cubaris cinerea* BRANDT, 1833, p. 190 (orig. descr.).—STUXBERG, 1875, p. 44 (*C. cinereus*).

Regarded as synonym of *C. murina* by Gerstaecker (1873, p. 527).

Brandt's (1833) original description is as follows:

"Cingulum dorsi primum margine posteriore leviter fissum, margine inferiore esulcatum. Corpus oblongum sat convexum. Dorsum cinereum, haud dilatatum. Ultimi caudae cinguli apex dilati flavicante brunneus. Patria: Brasilia."

DISTRIBUTION.—Brazil. Type in Berlin Museum (Budde-Lund).

Budde-Lund considered this species distinct from *C. murina* though he states that the type and only specimen is dried up and in poor condition. If the species are not distinct the name *cinerea* has page precedence over *murina* and *brunnea*. Budde-Lund (1885) thus describes the type:

“Statura et habitu omnino praecedentis (*murina*), at paulo minor. Clypeus lobus parvis rotundatis. Caudae annulus analis vix latior quam longior; ramus exterior minutissimus, procul ab apice insertus. Color cinereus; caudae annulus analis majore parte cum articulo basali pedum analium flavicante brunneus.”

This species, of course, has nothing to do with “*Oniscus cinereus* Zenker” from Dresden, Germany, briefly diagnosed and obscurely figured by Panzer, 1799, which is also alluded to as “*Armadillo (Oniscus) cinereus*” by Koch, 1847, and which is probably a synonym of *Armadillidium vulgare*.

#### **Cubaris brunnea** Brandt, 1833

*Cubaris brunnea* BRANDT, 1833, p. 190 (orig. descr.).—STUXBERG, 1875, p. 44 (*C. brunneus*).

*Armadillo brunneus* MILNE-EDWARDS, 1840, III, p. 179.—BUDDE-LUND, 1885, p. 28 (made doubtful syn. of *murina*); 1904, p. 120 (regarded as possibly a distinct species).

Other authors (RICHARDSON 1901, p. 571; 1905, p. 645.—VAN NAME, 1925, p. 466) have treated it as a syn. of *C. murina*.

Brandt's (1833) description is as follows:

“Cingulum dorsi primum margine posteriore leviter fissum, margine inferiore esulcatum. Corpus oblongum, subdilatatum. Dorsum brunneum. Patria: Demerary.”

The reasons for regarding this as distinct from *C. murina* do not seem at all convincing. The name *brunnea* does not have page precedence over either *murina* or *cinerea*, in case the species are identical.

#### **Cubaris flavobrunnea** (Dollfus), 1896

Figure 237

*Armadillo flavobrunneus* DOLLFUS, 1896b, p. 1 (*flavo-brunneus*, orig. descr.), Figs. 1-3.—BUDDE-LUND, 1904, p. 120.

*Cubaris flavobrunnea* VAN NAME, 1926, p. 2 (*flavobrunneus*); ARCANGELI, 1930a, p. 2.

It hardly seems necessary to quote Dollfus' description of this species as it corresponds closely with *C. murina* and very probably is,

as Budde-Lund suggests, a synonym of that species, although Dollfus' figures show the coxopodite process of the second segment more slender, the front of the head straighter, and the telson proportionately longer



Fig. 237. *Cubaris flavobrunnea* (Dollfus). Adapted from Dollfus, 1896.

than they actually are in *C. murina*. He gives the color as amber, irregularly marked with brown and the size as 10 by 4 mm.

LOCALITY (of the only specimen).—Punta de Sabana, Darien.

#### *Cubaris cinchonae*, new species

##### Figure 238

Body highly arched, and slightly narrowed in front and behind. Front outline of head convex as seen from above. Upper surface of head and thorax ornamented with rather large round or elliptical tubercles which are quite prominent on the head and anterior segments, but less so on the posterior part of the body, where they become smaller and less well defined in their outline. There is a pair of large elliptical tubercles on the anterior median region of the first thoracic segment, as well as other quite large ones on its sides. On the remaining segments the tubercles form for the most part only a single transverse row, composed of about four round ones in the median portion of the segment, and about six elliptical ones on the more lateral portions, while there are two vertically elongate elliptical ones on the epimera. The tubercle-bearing part of the segments is raised above the part that slips under the segment next in front, between these parts the surface of the segment is lower.

Upper border of epistome forming a narrow upturned border considerably but not evenly arched in an anterior view, and appressed against the forehead in the median region, though its margin is distinct all the way across the head. Antennae quite long; the flagellum is nearly equal to the last segment of the peduncle in length; its terminal article is at least three times as long as the proximal one. Eyes large, with at least sixteen well-developed ocelli.

Posterior lateral angles of the first thoracic segment much extended back and fairly acute; lateral margin of the segment evenly curved in a lateral view and but little turned or rolled out to form a border, nevertheless the surface of the segment is quite noticeably concave in the region above the anterior half of the lateral margin. When seen from below there is no trace of a sulcus or a coxopodite ridge except a slight jog in the outline quite a little removed from the posterior lateral angle of the segment. The second segment has only the merest vestige of a coxopodite process. The condition is much as in *Cubaris murina* Brandt, but on both the segments the coxopodites are much more vestigial.

The remaining thoracic segments have the posterior lateral angles less extended back, especially toward the rear of the body, where they are more truncated than in front, though the corners are in all cases a little rounded off.

Abdomen without tubercles except a pair of large elliptical ones on the upper part of the telson. Telson wide in its upper portion. Its posterior truncated end is about five-eighths the width of the upper portion. It is but little constricted in the middle. Exposed portions of the basal segments of the uropoda short; the minute external branch is borne in a notch in the inner margin; the internal branches, visible only from below, are quite wide and long, reaching to within a short distance of the end of the telson.

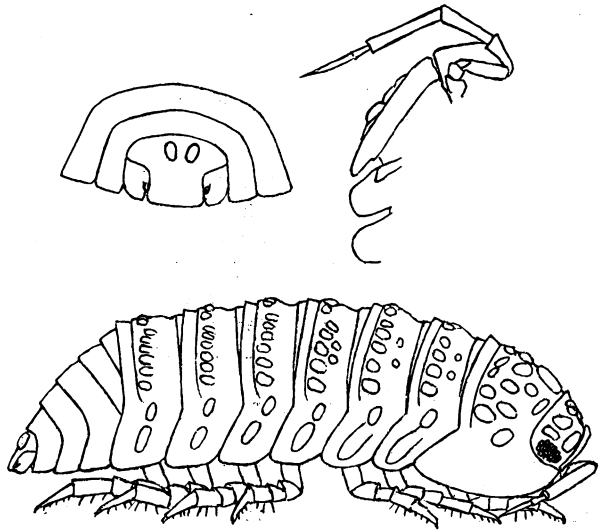


Fig. 238. *Cubaris cinchonae*, new species.

Variiegated with blackish brown and yellow on the upper parts; the usual small markings on the lateral regions of the back, the free margins of the segments and other less regularly defined areas and spots on the back are yellow (unpigmented), as are the lower parts and limbs; the telson and other abdominal segments and the epimera of the thoracic segments remaining largely blackish brown.

Length of largest specimen, a female, about 4 mm.

LOCALITY.—Botanical Gardens, Cinchona; Jamaica. Specimens in the American Museum of Natural History (type, Cat. No. 1814).

This species appears to be related to *Cubaris murina* Brandt and

may be of Old World origin, as that species undoubtedly is. It might easily have been brought to the Botanical Gardens on plants, but I have not been able to identify it with any described species. Among American forms it is nearest to *C. tenuipunctata* (Dollfus) from Mustique Island, West Indies, which is smoother, with a more elongate telson, and perhaps also is an introduced species.

#### GROUP V

Species in which the coxopodite ridge and sulcus have practically or entirely disappeared.

#### *Cubaris tenuipunctata* (Dollfus), 1896

Figure 239

*Armadillo tenuipunctatus* DOLLFUS, 1896, p. 389 (orig. descr.), Figs. 1a-1d.—  
 BUDDE-LUND, 1904, p. 132.—ARCANGELI, 1934, pp. 90, 91.

*Cubaris tenuipunctata* RICHARDSON, 1901, p. 571; (*tenuipunctatus*) 1905, p. 640  
 (orig. descr. quoted), Fig. 682 (after Dollfus).—BARNARD, 1932, p. 323.

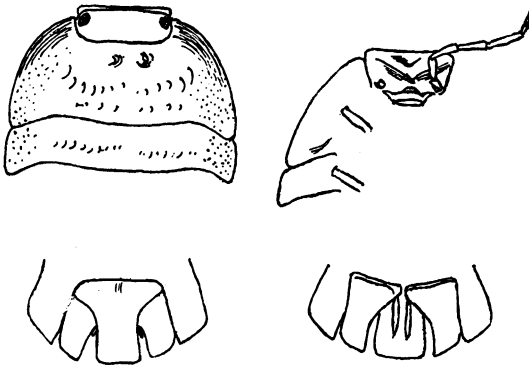


Fig. 239. *Cubaris tenuipunctata* (Dollfus). Adapted from Dollfus, 1896.

Dollfus' description is as follows:

"Body rather wide, moderately convex, slightly tuberculated on the pereon.

"Cephalon.—Prosepistoma with a shield-like convexity, a little depressed in the middle. Eyes middling; ocelli about 18. Antennae short; first joint of flagellum twice as short as the second.

"Pereion.—First segment with two antero-median rounded tubercles; lateral edges slightly raised; coxopodite hardly perceptible as a very small processus below the leg. Second segment without a distinct coxopodite.



“Pleon, Telson.—Pleotelson longer than wide, smooth, with a minute longitudinal wrinkle near the basis; sides feebly curved, the apex being half as wide as the basis.

“Uropoda.—Basis nearly straight; endopodite extending to half the length of the pleotelson; exopodite very small, placed near the middle of the internal edge of the basis (upper side).

“Color.—Gray, with irregular light markings, the sides are light and minutely punctuated with black.

“Dimensions.—10 by 4.5 mm.”

LOCALITY.—“Mustique Island, June, beaten from bush.” Type in British Museum (Dollfus).

***Cubaris depressa*** (Dollfus), 1896

Figure 240

*Armadillo depressus* DOLLFUS, 1896, p. 390 (orig. descr.), Figs. 2a-2d.—BUDDELUND, 1904, p. 132.—ARCANGELI, 1934, pp. 90, 91.

*Cubaris depressa* RICHARDSON, 1901, p. 571 (*depressus*); 1905, p. 641 (orig. descr. quoted), Fig. 683 (after Dollfus).—BARNARD, 1932, p. 323.

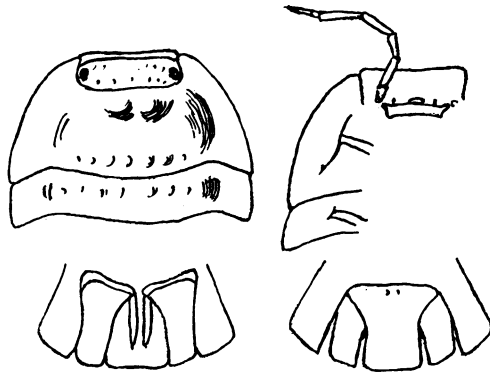


Fig. 240. *Cubaris depressa* (Dollfus). Adapted from Dollfus, 1896.

Briefly described by Dollfus as follows:

“Body wide, rather depressed, granulated on cephalon and pereion.

“Cephalon.—Prosepistoma nearly plain, fore edge a little arched in the middle. Eyes middling; ocelli about 16. Antennae: first joint of flagellum three times shorter than the second.

“Pereion.—First segment with a wide double antero-median tubercle; lateral edges not raised; coxopodite hardly perceptible, as a feeble ridge. Second segment without a distinct coxopodite.

“Pleon, Telson.—Sides of the pleon depressed: processus of the fifth segment widening at the apex. Pleotelson longer than wide, smooth: sides feebly curved; endopodite extending two-thirds of the length of the pleotelson; exopodite very small, placed near the internal edge of the basis (upper side).

“Color.—Dark gray, with a narrow light longitudinal line in the middle of the pereion, and light lineolae on both sides.

“Dimensions.—9 by 4.5 millim.”

LOCALITY.—“St. Vincent, Chateaubelais, August. One example.” Type in British Museum (Dollfus).

There is nothing in Dollfus' illustration to indicate the location of the “feeble ridge” that represents the coxopodite of the first segment.

#### DOUBTFUL SPECIES

Owing to the insufficiency of the descriptions it has not been possible to place the following species in the above groups.

#### *Cubaris affinis* (Dana), 1854

*Spherillo affinis* DANA, 1854, p. 176 (orig. descr.).—STIMPSON, 1857, p. 505.

*Armadillo affinis* BUDE-LUND, 1879, p. 7; 1885, p. 39; 1904, p. 115.—ARCANGELI, 1932, p. 124.

*Cubaris affinis* RICHARDSON, 1899, p. 865; 1905, p. 654 (orig. descr.).—PRATT, 1935, p. 443.

Not *Cubaris affinis* MIERS, 1877a (syn. of *C. murina* Brandt).

Dana's description is as follows:

“Corpus superficiei laeve et innotatum. Antennae subtilissime scabriculae, articulis duobus ultimis conjunctis (6to 7moque) 5to parce brevioribus. Segmentum abdominis ultimum paulo transversum, medio constrictum. Styli caudales lati, latitudine basali non longiores, angulo interno-posteriore late excavato, lateribus antico postico et externo fere rectis et inter sese rectangulatis, angulo interno-anteriore rotundato, ramo posteriore minute, parce exserto. Long. 4 1/2 lin.”

Collected in California by Dr. John L. Leconte.

Budde-Lund, 1885, p. 40, suggests that *A. californicus* Budde-Lund may be identical with this very insufficiently described species, which apparently is a *Cubaris*.

#### *Cubaris californica* (Budde-Lund), 1885

*Armadillo californicus* BUDE-LUND, 1885, p. 40; 1904, p. 115.—ARCANGELI, 1932, p. 124.

*Armadillo speciosus* STUXBERG, 1875, p. 62 (orig. descr.).

*Cubaris californica* RICHARDSON, 1899, p. 865; 1900a, p. 305; 1905, p. 653 (orig. descr. quoted and translated).

Not *Armadillo speciosus* DANA, 1853, from New Zealand.

Stuxberg described this species as follows:

“*Armadillo ovalis, valde convexus, laevis, subnitidus.*

“*Antennae exteriores articulo secundo triplo longiore quam primo, quinto recto, cylindrico, longissimo, flagelli articulis inaequalibus, interiore quadruplo brevior quam exterior.*

“*Trunci segmenta quattuor priora margine postico utrinque leviter, posteriora tria levissime sinuata. Epimera mediocria, angulis anticis oblique truncatis, angulis posticis primi segmenti subrectis, rotundate-rectangulis, margine sulcatis, secundi, tertii, quarti, quinti minus minusque late rotundatis, sexti et septimi subrectis, rotundatis.*

“*Caudae segmentum ultimum latitudine minima longitudinem assequente. Color dorsi griseus, linea mediana serieque macularum majorum laterali et epimeris segmentorum trunci pallidioribus. Caput creberrime pallide punctulatum. Cauda grisea, segmento tertio bipunctato. Longitudo 5.5 mm., latitudo 3 mm.*”

LOCALITIES.—San Francisco and San Pedro, California.

Budde-Lund, 1885, who changed Stuxberg's name on account of its being preoccupied, suggests the probability of this species being identical with *C. affinis* (Dana), 1854. The descriptions, however, are insufficient to decide this.

#### ***Cubaris cacahuamilpensis* (Bilimek), 1867**

*Armadillo cacahuamilpensis* BILIMEK, 1867, p. 907 (orig. descr.).—STUXBERG, 1875, pp. 46, 62.—BUDDE-LUND, 1879, p. 7; 1885, p. 40 (says possibly a *Pseudarmadillo*).—PACKARD, 1894, p. 732.

*Cubaris cacahuamilpensis* MIERS, 1877a, p. 666.

*Sphaeroniscus cacahuamilpensis* RICHARDSON, 1905, p. 663 (orig. descr. quoted and translated).

This animal is known only from Bilimek's description which is partly in Latin and partly in German. The translation of the latter portion given here is taken from Richardson, 1905, pp. 663, 664.

“*Griseo-fuscescens, subtiliter transverse verrucosus; capite transversim dilatato, margine anteriore erecto: primo thoracis segment latissimo, lobo laterali denti simillimo; abdominis segmento ultimo in medietate valde coarctato; pedibus spuriiis angustis, duplo longioribus. Long. 9 mm.; lat. 3 1/2 mm.*”

“*Grayish brown and covered with delicate little transverse rugae.*

Head very broad, three times as broad as it is long, anterior border turned up broadly, but diminishing in breadth on the sides under the eyes and especially behind. Antenna five-jointed, with a three-jointed flagellum; eyes composed of fourteen ocelli. First thoracic segment strongly arched, broadest in the middle, and edged by a delicate border; a toothlike lobe is formed on the sides anteriorly, in front of which there is found a concave depression; on the back there is a flat transverse depression. Second segment about one-third narrower; the anterior portion is depressed transversely by the overlying anterior segment; the epimeron, which becomes narrower on the sides, is rounded and turned straight downward. Segments 3 to 7 similar, with the exception that the epimera on the side appears to be more bluntly cut off. First abdominal segment quite narrow; it does not reach to the outer edge; second to fourth continue to decrease in breadth and have a horseshoe-shaped appearance; the fifth is bordered with two lateral lobes and is as long as it is broad at the base; it is strongly constricted in the middle and somewhat enlarged toward the outer border. The legs are five-jointed, fourth and fifth joint abundantly covered with spines on the inside. The uropoda are thin, twice as long as they are broad; color of feet and antennae whitish in the dead animal."

LOCALITY.—Under stones in cave at Cacahuamilpa, Mexico.

This description, though detailed, is not clear in regard to several points, and leaves us in doubt as to the generic position of the animal. The statements regarding the telson and adjacent parts indicate that it cannot be a *Sphaeroniscus*.

#### *Cubaris granaria* (Nicolet), 1849

*Armadillo granarius* NICOLET, 1849, p. 275 (orig. descr.).—BUDE-LUND, 1885, p. 39 (listed as insufficiently described); 1904, p. 115.

*Armadillo granurus* STUXBERG, 1875, p. 44.

Nicolet's brief original description, our only information of this species, is as follows:

"*A. flavescens*; corpore capiteque fortiter granariis; fronte rotundata; antennis externis crassis; articulo ultimo minimo."

"Body much granulated or roughened, forehead wide and rounded; antennae stout with the first article of the terminal flagellum long and cylindrical and the last small, conical and acute. Length 4 lines." (Translated from the original description.)

LOCALITY.—Chile, in damp places.

## DIPLOEXOCHUS BRANDT, 1833

This group was established by Brandt (1833, p. 192) as a subgenus of *Cubaris*, the type and only species included being *D. echinatus* from Brazil. It was given generic rank by Milne-Edwards, 1840. The distinguishing character of the group was made the division of the epimera of the segments into two lamellae, one of which (conspicuous chiefly in a ventral view of the body) extends directly downward, while the other bends and extends out horizontally. The truncated ends of these horizontal lamellae determine the general outline of the body as seen in a dorsal or ventral view. There are, however, wide clefts or gaps between successive epimera, hence the outline of the body is not a continuous one.

In most other respects, although the dorsal surface is spinous to an unusual degree, *D. echinatus* conforms to the characters typical of *Cubaris*. The type species is the only one known to me, taking this group in the sense in which Brandt employed it. The much broader use of the name adopted by Budde-Lund and a few later writers, but not employed in the present work, has been discussed above (see under the genus *Cubaris*).

**Diploexochus echinatus** Brandt, 1833

Figures 241, 242, 243

*Armadillo echinatus* BUDDE-LUND, 1879, p. 7; 1885, p. 26 (descr.); 1904, p. 104, Pl. IX, figs. 35-37.

*Cubaris echinatus* PEARSE, 1917, p. 3.—VAN NAME, 1920, p. 99.

*Cubaris gaigei* PEARSE, 1917, p. 2 (descr.), Fig. 1.—VAN NAME, 1925, p. 466.

*Diploexochus echinatus* BRANDT, 1833, p. 192 (orig. descr.), Pl. IV, figs. 20-21.—MILNE-EDWARDS, 1840, p. 180.—BUDDE-LUND, 1909, p. 54.—RICHARDSON, 1912a, p. 479.—ARCANGELI, 1934, p. 93.

*Oniscus echinatus* given as a synonym by Brandt (1833, p. 192) was probably only the name on the label of the type and had never been published previously.

Upper surface of head and body with large, regularly arranged tapering spines or high acute tubercles which vary considerably in development in different individuals. Under magnification, the surface also shows minute, evenly scattered, setose granulations.

The body itself is rather narrow and the back only moderately arched for a member of this group, but great lateral extensions of the epimera give it a wide outline, broadly rounded at the ends, when seen from above, and the numerous spines and large tubercles increase the apparent height of the back and bulk of the body.

Front margin of head only very little curved when seen from above.

The upper margin of the epistome forms a prominently projecting border clear across the front of the head and is slightly and unevenly arched in a front view. Eyes fairly large; ocelli about eighteen. Antennae rather small and slender.

First thoracic segment with the lateral edges expanded into wide, thin, horizontally extending lamellae. No groove or furrow on the upper surface at their junction with the main part of the segment. Their rear posterior corners are angular. Examined from below, there is a long curved ridge, faint toward the anterior end of the segment

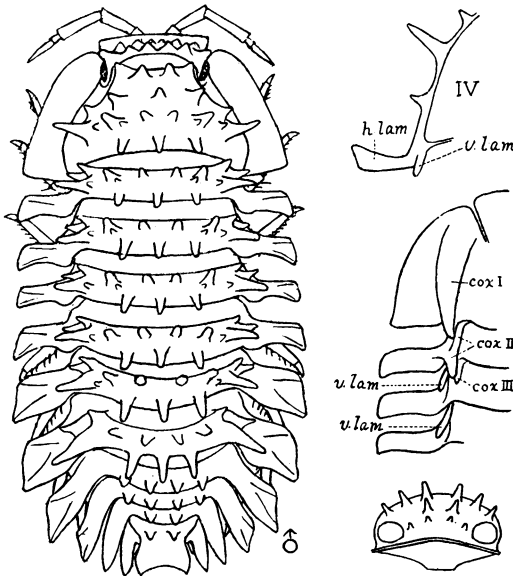


Fig. 241. *Diploexochus echinatus* Brandt. From specimens from British Guiana.

where it is rather near the outer margin, and more distinct toward the rear, where its curvature brings it much farther from the edge and where it extends farther back than the posterior lateral angle of the segment into a coxopodite process. The second segment also has a small but well-developed coxopodite process. On the third segment there is one also but it is so short and minute and situated so close to the base of the epimeron that unless the body is completely straightened out, as is by no means always the case in museum specimens, it is completely concealed by that of the second segment and is extremely likely to be over-

looked. These coxopodite processes are all more or less flattened from side to side, so as to appear narrow when seen directly from below. They are rounded at the tip.

Except the first, which has the tubercles or spines in four more or less distinct rows, the thoracic segments each have two transverse rows of spines, and well down on each side of the body, an additional one that does not seem to belong to either row. From this spine a rather poorly defined curved ridge extends downward and outward upon the surface of the laterally extending lamella of the epimeron. The part of each

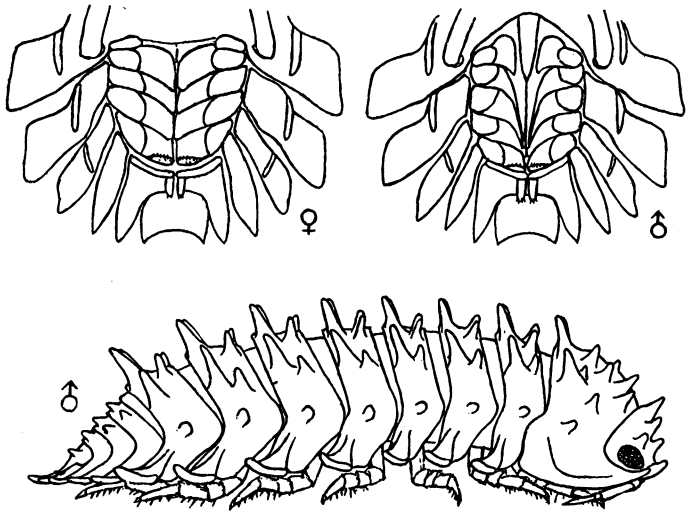


Fig. 242. *Diploezochus echinatus* Brandt. From specimens from British Guiana.

segment that bears the spines is very abruptly raised above the part which fits under the segment next in front.

The remarkable division of the epimera into two lamellae has already been described as a generic character. The vertical lamellae of the epimera extend but little below the level of origin of the horizontal lamellae; they are best developed on the last four or five thoracic segments but are noticeable on the third and fourth abdominal segments also. The telson is peculiar in being truncated at the end in a concave curve. Segments 3 and 4 of the abdomen each have a transverse row of four short spines or high pointed tubercles, segment 5 and the telson each have a pair of them.

The limbs are of moderate length but rather slender in proportion to the apparent bulk of the animal, and not very spinous.

Color (in alcohol) dark brown above with the ends of the spines and of the lateral lamellae of the epimera yellowish; the under parts and limbs yellowish.

The largest specimens in the American Museum are about 9 mm. long, but the species becomes considerably larger.

DISTRIBUTION.—Type locality, Brazil (Brandt). Budde-Lund (1904) records it from Port of Spain, Trinidad, and it appears to be rather common and widely distributed in British Guiana, as Pearse records it (as *C. gaigei*) from Dunoon "on the ground under leaves

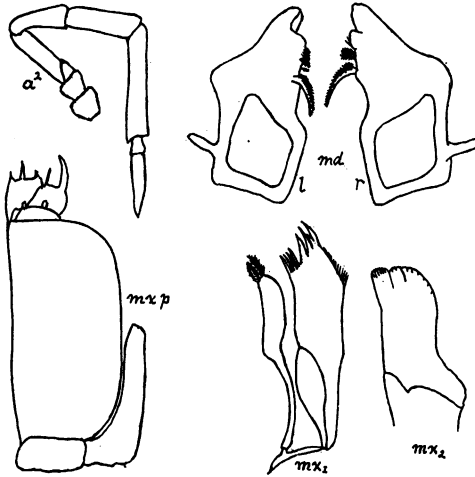


Fig. 243. *Diploexochus echinatus* Brandt. From specimens from British Guiana.

among tree clumps, and the American Museum has specimens from Tumatumari and Kamakusa in that country. One from Kamakusa was taken from the roots of an epiphyte fifteen feet from the ground.

#### ACANTHONISCUS KINAHAN, 1859

A genus consisting only of the following peculiar form. It is apparently related to *Cubaris* but, in addition to its remarkable spines, it differs notably in the form of the telson, which is expanded into a rounded terminal portion bearing at its end two small projections separated by a notch. The long and narrow exopodites of the uropoda also distinguish it from *Cubaris*. Unfortunately, no information regarding the existence



of coxopodite ridges or processes is given in the descriptions or figures, though it seems not unlikely that such structures are present.

***Acanthoniscus spiniger* Kinahan, 1859**

Figure 244

*Acanthoniscus spiniger* WHITE, 1847, p. 99 (*nomen nudum*).—GOSSE, 1851, p. 65 (see below).—KINAHAN, 1859, p. 197, Pl. XIX, fig. 4 (descr.).—BUDE-LUND, 1879, p. 5; 1885, p. 241.—STEBBING, 1893, p. 432.—RICHARDSON, 1901, p. 569; 1905, p. 637 (orig. descr. repeated), Fig. 681 (after Kinahan); 1909, p. 432 (new descr.), Figs. 1-7.—BUDE-LUND, 1910, p. 11.—ARCANGELI, 1927*a*, p. 135.

(*Oniscus spiniger*. See RICHARDSON, 1909, p. 431.)

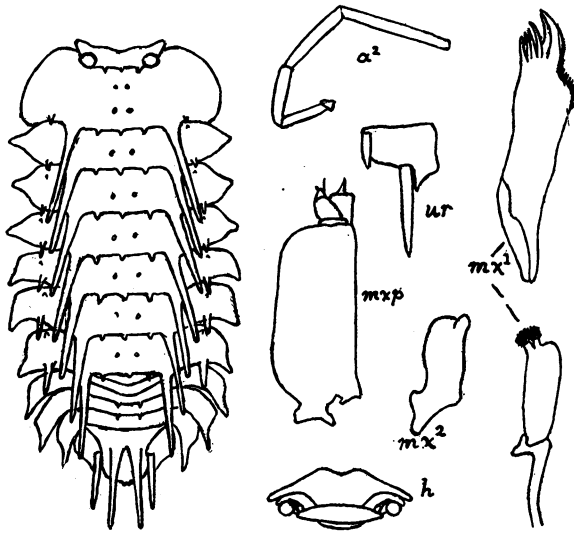


Fig. 244. *Acanthoniscus spiniger* Kinahan. Adapted from Richardson, 1909.

Richardson's description deals mainly with features clearly apparent from the figures that accompany it which are reproduced here, so that only the following quotations from it will be given:

"Body oblong ovate, capable of rolling up into a ball. Color, in alcohol, dark brown with irregular spots of light brown. . . .

"The peduncle of the uropoda resembles in form the lateral parts of the third, fourth and fifth thoracic segments; the inner posterior angle is acutely produced, the outer angle being rounded. The inner branch is inconspicuous in a dorsal view, being concealed beneath the abdomen; it is attached at the inner antero-lateral angle of the peduncle and does

not quite reach the tip of the abdomen. The outer branch is produced in a long spine, extending half its length beyond the inner posterior angle of the peduncle; in a dorsal view it is inserted on the inner lateral margin at the anterior angle."

DISTRIBUTION.—Jamaica, said by Gosse, 1851, p. 65, to be common under stones in the Bluefield Mountains, which are in the western part of the island. Kinahan described it from a single specimen in the British Museum; no other specimens appear to have reached any museum until one collected in Jamaica by Mr. H. G. Hubbard, probably in 1877, was received by the U. S. National Museum in 1908. This was the basis of Richardson's description.

Richardson adds to her description a few notes on Kinahan's type specimen with which she had her specimen compared.

#### ETHELUM BUDDE-LUND, 1899

This genus was established by Budde-Lund to contain several American species described by Dollfus and included by him in the Old World genus *Mesarmadillo*. They are, however, very close to the African genus *Eubelum*, which they resemble in having a series of four or more plumose tufts on the tip of the inner branch of the first maxilla instead of but two as in the majority of Oniscoidea. I cannot, however, regard this character of fundamental importance, and believe that in most other characters *Eubelum* and its allies resemble *Cubaris* too much to require their separation as a family (Eubelidae) as most authors, following Budde-Lund, have done. The rank of a subfamily (Eubelinae) seems to be the most that is warranted.

*Ethelum*, which contains the American members of this group, differs from *Eubelum* in the absence of a coxopodite sulcus along the under side of the margin of the first thoracic segment, this being reduced to a cleft at the rear angle. The rank of a subgenus of *Eubelum* may perhaps be sufficient for it. The telson is wide at the proximal end, with a tapering median posterior extension which may be pointed or rounded-truncate at the end. This at once distinguishes it from *Cubaris*, though as in that genus the flagellum of the antennae also has two articles, and the general form and appearance is similar.

#### *Ethelum americanum* (Dollfus), 1896

Figures 245, 246

*Ethelum americanum* BUDDE-LUND, 1899, p. 90 (new descr.), Pl. III, figs. 10-12.—RICHARDSON, 1905, p. 589 (descr. after Dollfus), Figs. 649 (after Budde-Lund), 650 (after Dollfus).—PEARSE, 1917, p. 1.—VAN NAME, 1925, p. 484 (new descr.), Figs. 27-36.

*Mesarmadillo americanus* DOLLFUS, 1896, p. 397 (orig. descr.), Figs. 11a–11d.—  
RICHARDSON, 1901, p. 573.

See also remarks under *Ethelum reflexum*.

“Body convex, rather narrow, smooth.

“Cephalon.—Prosepistoma with a small shield-like convexity; the prosepistoma is continuous with the forehead in the middle and separated from it on both sides by a transverse, incomplete, preocular cut. Eyes moderate; ocelli about 12; antennae short; flagellum small, first joint three times shorter than the second.

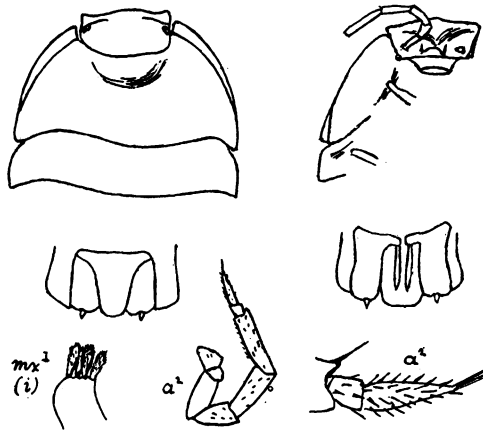


Fig. 245. *Ethelum americanum* (Dollfus). Upper four figures adapted from Dollfus, 1896, lower three from Budde-Lund, 1904.

“Pereion.—First segment with the antero-median tubercle hardly perceivable; coxopodites distinct on the entire length of the edge of the segment (upper side), forming a thick border, slightly crossed by the posterior angle of the segment. Coxopodite of the second segment hardly visible as a very small dentiform process before the legs.

“Pleon, Telson.—Pleotelson flat with curved sides and rounded apex. Uropoda; basis with a large oblong processus, extending between the lateral part of the fifth segment of the pleon and the pleotelson; endopodite reaching to two-thirds the length of the pleotelson; exopodite minute, placed at the top of the basal processes.

“Color brownish, with small light lineolae on the pereion; flagellum white; uropoda reddish.

“Dimensions.—6 by 2 1/4 mm.” (Dollfus, 1896.)

DISTRIBUTION.—St. Vincent, W. I. (type locality), from near the sea to 500 feet above sea level, under stones, leaves, rubbish, etc. (Dollfus); Dunoon, British Guiana, among bromeliad roots, vines, etc., on trees (Pearse); Kartabo, British Guiana, under dead wood at edge of jungle (Van Name, specimens in the American Museum of Natural History). Type in British Museum (Dollfus).

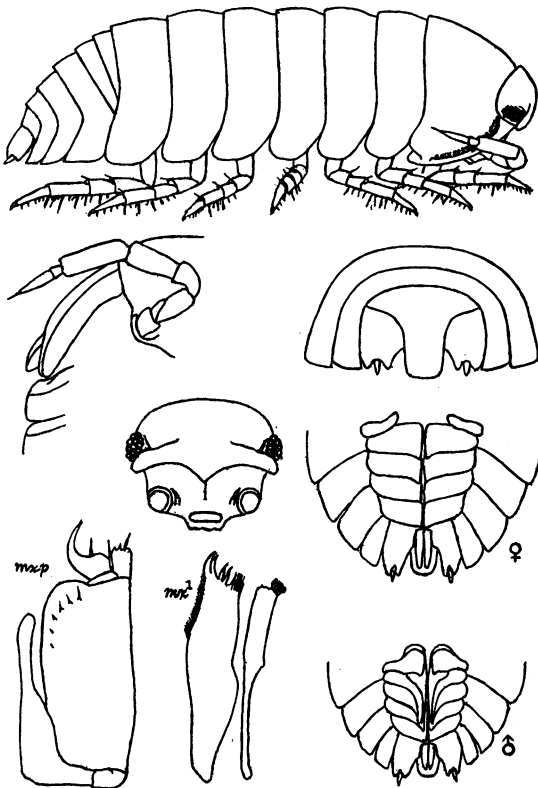


Fig. 246. *Ethelum americanum* (Dollfus). From Van Name, 1926, specimens from British Guiana.

I follow Pearse in identifying the British Guiana specimens with Dollfus' species from St. Vincent, though there are several small discrepancies. I found no coxopodite process on the second segment, only a thickening of the anterior edge (this corresponds to Dollfus' figure); there were five instead of four plumose tufts on the inner branch of the

first maxilla (verified on both right and left sides of the specimen studied), and the uropoda differ somewhat in shape and have longer branches. Not having St. Vincent specimens for comparison, I do not know how much weight to give to these differences. Possibly they may be of specific value.

The Kartabo specimens are described at length in Van Name, 1925. I would describe the surface as smooth, though Pearse states that his examples from Dunoon were slightly granular.

**Ethelum reflexum** (Dollfus), 1896

Figure 247

*Ethelum reflexum* BUDE-LUND, 1899, p. 91 (descr. after Dollfus).—RICHARDSON, 1905, p. 590 (descr. after Dollfus), Fig. 651 (after Dollfus).

*Mesarmadillo reflexus* DOLLFUS, 1896, p. 398 (orig. descr.), Fig. 12a-12d.—RICHARDSON, 1901, p. 573.

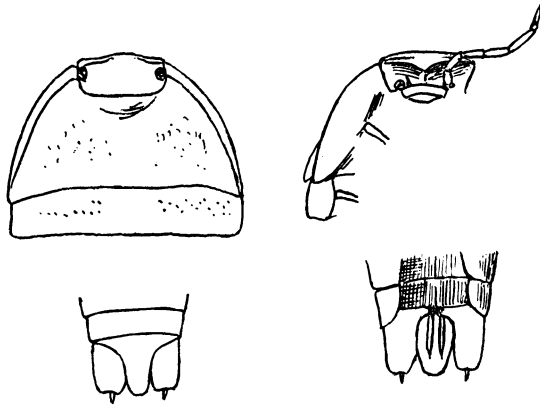


Fig. 247. *Ethelum reflexum* (Dollfus). Adapted from Dollfus, 1896.

A small species (5 mm. long) with the body surface slightly granulated, extremely closely related to, if really distinct from, *E. americanum*, but according to Dollfus' figures with a slightly narrower and more tapering telson. Dollfus appears to have had but one specimen, and the special peculiarity of the species, that the epimeral ends of the abdominal segments 3 to 5 curl inward under the body, might be explainable if this specimen were a dried up and more or less shrunken one of *E. americanum*. It does not seem like a normal character in a member of this group. For details see Dollfus' description, quoted in full in Richardson, 1905, p. 590.

DISTRIBUTION.—Only record, "Open swampy land under rubbish

S. end of the Island (St. Vincent).” Dollfus, 1896. Type in the British Museum (Dollfus).

This seems to be one of certain specimens of which Dollfus (1896, p. 398) had no record whether they were found in St. Vincent or in Grenada, W. I.

***Ethelum modestum* (Dollfus), 1896**

Figure 248

*Ethelum modestum* BUDDÉ-LUND, 1899, p. 91 (descr. after Dollfus).—RICHARDSON, 1905, p. 588 (descr. after Dollfus), Fig. 648 (after Dollfus).

*Mesarmadillo modestus* DOLLFUS, 1896, p. 397 (orig. descr.), Figs. 10a-10d.—RICHARDSON, 1901, p. 573.

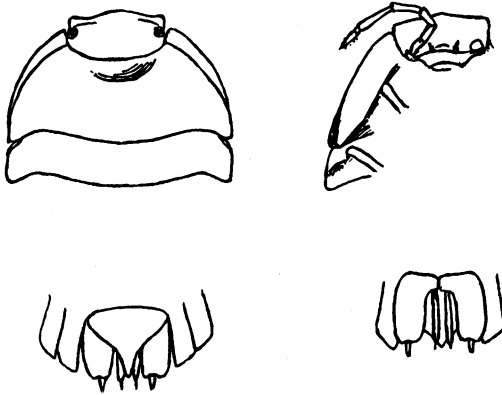


Fig. 248. *Ethelum modestum* (Dollfus). Adapted from Dollfus, 1896.

This is a small (6 mm. long), smooth species closely related to *E. americanum* but at once distinguishable from it by the narrow, pointed telson and long inner branches of the uropoda. The ocelli number sixteen. In most other particulars Dollfus' description does not differ greatly from that of *americanum*. His description is quoted in full by Richardson, 1905, p. 588.

DISTRIBUTION.—Only record, St. Vincent, W. I., low ground S. E. of the island, under rubbish. Type in the British Museum (Dollfus).

***Ethelum*, species**

Kraepelin, 1901, p. 201, records a new species of *Ethelum* determined as such by Budde-Lund, but which he neither names nor describes, that was brought to Hamburg with orchids from San Francisco, Brazil.

Superfamily **Hypotracheata** Verhoeff

Tracheae present in the exopodites of the pleopoda. They open by numerous apertures in the middle of the under lamellae of the pleopoda. The uropoda form a pair of closely fitting opercula covering the pleopoda. Telson wide. Epimera of thoracic segments I to VII marked off from the tergites (main portions) of the segments by deep furrows. All species capable of rolling up into a ball.

A small group of aberrant forms highly specialized for terrestrial life, yet showing characters in the structure of the head approaching some of the aquatic Isopoda (as *Idothea* of the suborder Valvifera) and more primitive in that respect than the other Oniscoidea.

**Tylidae**

See under genus *Tylos*, which is coextensive with the family.

## TYLOS LATREILLE, 1829

The members of this group are littoral but completely terrestrial species found on the seacoasts of warm and warm-temperate regions, and all are so nearly alike that they are best dealt with by giving one general description and indicating under each species the characters by which it is distinguished.

Body highly arched, oblong oval in a dorsal view, and capable of being rolled up into a ball. Its surface is granulated, very scantily pigmented, and bears scattered short stiff upright hairs.

Head not deeply set back into the thorax, the eyes rather small, rounded, and widely separated. No frontal line distinguishable. First antennae very rudimentary, of one or two segments; second antennae fairly long, with a flagellum of four articles. The second antennae arise quite near together; between them the frontal lamina forms a vertically placed and very prominent triangular shield which is the most anterior part of the head and is separated from the clypeus below it by a deep but narrow cleft. Clypeus with a very prominent rounded upper border, its lateral processes only very slightly developed.

Epimeral of the thoracic segments (except I) separated from the main or tergal part by a distinct suture. Those of segments II, III, and IV are very small. Legs stout with short stiff spines. Segment I with a coxopodite sulcus along the lower aspect of the margin. On the fore part of the margin the sulcus becomes more antero-lateral in position.

Epimeral ends of abdominal segments 3, 4, and 5 squarely truncated and forming with the transversely oblong telson a continuous outline

bounding the rear end of the body. Uropoda entirely on the ventral surface and visible only from below. Their large basal joints are flat and plate-like, semicircular in outline, hinged externally and meeting closely in the median line with their straight free edges. With large inwardly extending horizontal plates borne on the inner side of the abdominal epimera 3, 4, and 5, they form a quite closely fitting operculum or cover protecting much of the ventral surface of the abdomen and pleopoda and doubtless of important service in conserving moisture. The external branches of the uropoda are small and arise from the inner median angle of the plate-like basal segments.

**Tylos latreillei** Adouin and Savigny, 1826

Figures 249, 250

*Tylos latreillei* ADOUIN AND SAVIGNY, 1826, 'Descript. Egypt.,' p. 285 (orig. descr.), Pl. XIII, fig. 1.—DOLLFUS, 1890, p. 70, Figs. 4-4a.—RICHARDSON, 1902, (*T. latreillei*), p. 300 (descr.).—VERRILL, 1902, p. 844.—RICHARDSON, 1905, (*T. latreillei*), p. 586, Figs. 646, 647.—BUDE-LUND, 1908, p. 76 (descr.), Pl. III, figs. 1-13.—PEARSE, 1915, p. 541.—VAN NAME, 1924 (*T. latreillei*), p. 189 (in part, not the figures).—ARCANGELI, 1925, p. 53.—JACKSON, 1928a, p. 574, Figs. 6.—ARCANGELI, 1930, pp. 88, 89.

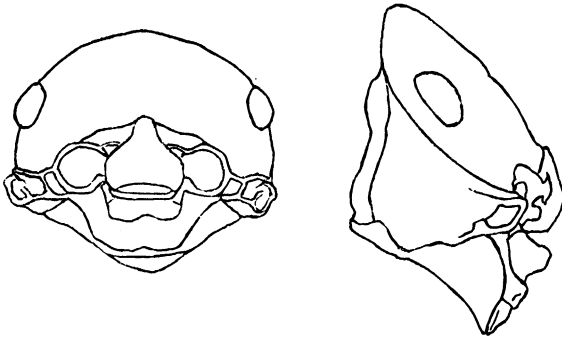


Fig. 249. *Tylos latreillei* Audouin and Savigny. Head. Adapted from Jackson, 1928.

Inwardly extending plates of fifth segment of the abdomen curved, rather narrow, more or less tapered and rounded off at the ends, and usually failing to meet on the median line of the lower aspect of abdomen, but there is some individual variation in their width and degree of approximation. Rear outline of telson slightly concave or emarginate.

DISTRIBUTION.—This is a well known species of the countries about the Mediterranean, frequenting especially the vicinity of the seashore. Richardson records it from Bermuda (see remarks under *T. niveus*)



and Florida (Miami), and Pearse (1915) from Santa Marta, Colombia. The American Museum has specimens from Puerto Rico (Punta Carolina, San Juan), and from Puerto Castilla, east coast of Honduras, which I have compared with specimens from Adria, Italy, received from Prof. Verhoeff, without finding characters that appeared to furnish any reliable basis for a conclusion that they represented different species. The examination of larger series of specimens from these various localities might lead to a different result if the opinion expressed by Budde-Lund

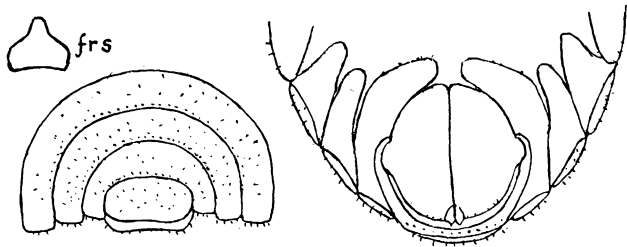


Fig. 250. *Tylos latreillei* Audouin and Savigny. Drawn from specimen from Puerto Rico, W. I. (*fr s*, frontal shield).

(1908, p. 75), that this genus is composed of a number of closely allied species of limited geographical distribution, applies to *T. latreillei*. I now feel sure that the specimens from the Galapagos Island that I assigned to this species (Van Name, 1924, p. 189) are distinct. They are described below as *T. insularis*, new species.

***Tylos punctatus* Holmes and Gay, 1909**

Figures 251, 252, 253

*Tylos punctatus* HOLMES AND GAY, 1909, p. 376 (orig. descr.), Figs. 3, 4.—STAFFORD, 1913, p. 182 (descr.), Fig. 6.—JOHNSON AND SNOOK, 1927, p. 292, Fig. 249.

The original description is as follows:

“Oblong, covered with scattered short spines or acute granulations. Eyes nearly round. First antennae single jointed, scale-like. Second antennae less than one-fifth the length of the body, not reaching the middle of the first thoracic segment; a hook-like process on the second joint of the peduncle; third joint nearly as long as the two preceding; flagellum slightly longer than the last joint of the peduncle, the third joint nearly as long as the two preceding; fourth joint short, conical, and furnished with numerous setae at its distal end. Lateral lobes of the head with two triangular projections in front of the eyes.

“Thoracic segments subequal, the epimera in all produced backward and rounded at the posterior angle. Legs very spiny, the terminal part of the claw marked off by an apparent suture from the longer basal

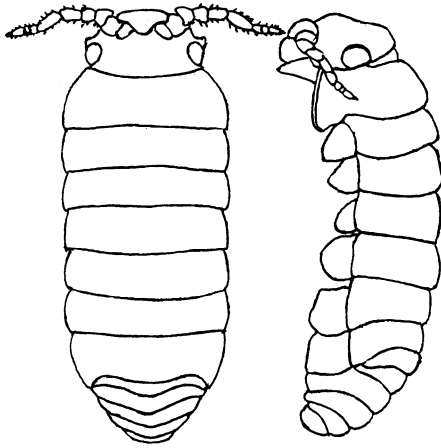


Fig. 251. *Tylos punctatus*, Holmes and Gay. Adapted from Stafford, 1913.

portion; first pair of legs with an acute lobe near the distal end of the anterior margin of the second joint; fourth joint produced and rounded in front.

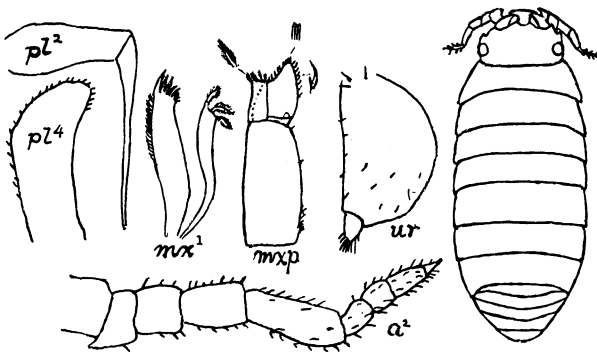


Fig. 252. *Tylos punctatus* Holmes and Gay. Adapted from Holmes and Gay, 1919.

“Third abdominal segment and to a less extent the fourth produced backward at the outer posterior angle; lateral process of fifth segment small. Last segment truncated and four or five times as broad as long.

Uropods nearly semicircular in outline, armed with a few scattered spines, the small terminal joint furnished with a few spines and several setae.

"Length, 10 mm.



Fig. 253. *Tylos punctatus* Holmes and Gay. Opercular region and frontal shield. From a cotype in the U. S. National Museum.

"LOCALITY.—San Diego, California, in sand near the beach."

Type in the U. S. National Museum.

A cotype of this species was kindly loaned me for examination by the above institution. It is very close to *T. latreillei*, if actually distinct. Judging by this single specimen and the few examples of *latreillei* available for comparison, the present species differs in having a slightly wider frontal shield with a narrower apical extension, the telson scarcely at all emarginate, the horizontal plates of abdominal segment 5 more strongly curved inward, and a little wider, yet with rounded ends that do not reach the median line. The specimen has numerous large impressed punctae on the head above and on the frontal shield, and on the telson, but whether these are a specific character I do not know.

#### *Tylos insularis*, new species

Figures 254, 255

*Tylos latreilli* (part) VAN NAME, 1924, p. 189 (descr.), Figs. 6–10.—ARCANGELI, 1930, pp. 88, 89.

Differs from *T. latreillei* in having the epistome less prominently raised above the surface of the forehead, the telson somewhat wider and without any concavity in the outline of its lower border, and the inwardly extending plates of the fifth segment of the abdomen much broader and more truncate at the ends (being thus intermediate between *T. latreillei* and *T. niveus*), though they do not come together or reach to the median line of the abdomen. The anterior half of the operculum is more triangular, with straighter sides than in *latreillei*. For further particulars, see Van Name, 1924, the description and figures there given applying entirely to this form.

DISTRIBUTION.—(Type locality) Tower Island, Galapagos, under dead wood and slabs of lava. Type in the American Museum of Natural History, New York (Cat. No. 4824).

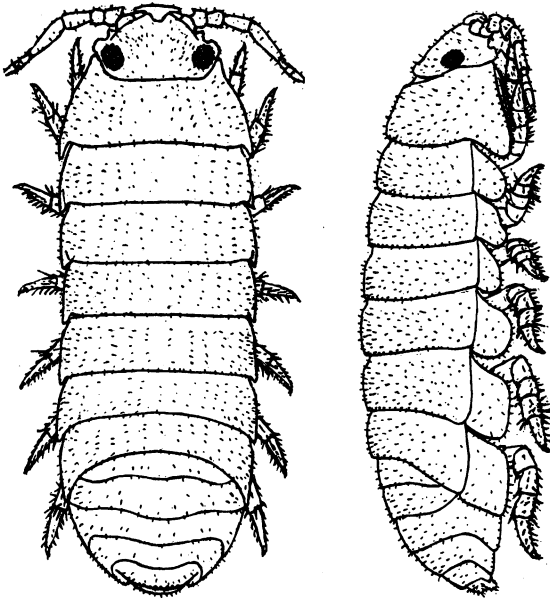


Fig. 254. *Tylos insularis*, new species.

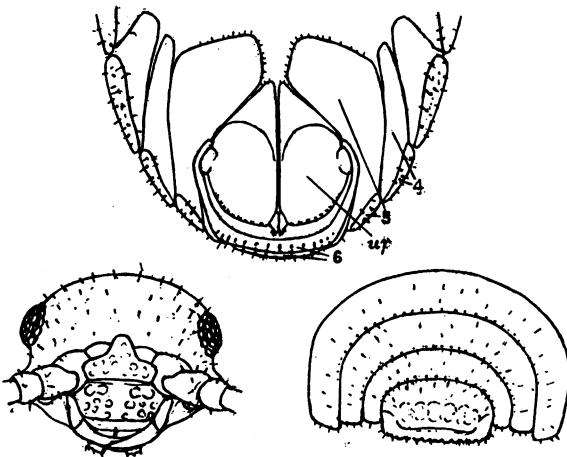


Fig. 255. *Tylos insularis*, new species.

This new species is established for the specimens of *Tylos* described and figured in the above article (Van Name, 1924) and there included in *T. latreillei*, to which they are so closely allied that I could not then make up my mind to separate them, although certain minor differences were recorded and illustrated.

***Tylos niveus* Budde-Lund, 1885**

Figure 256

*Tylos niveus* BUDDE-LUND, 1885, p. 278 (orig. descr.).—RICHARDSON, 1901, p. 561; 1902, p. 301 (in part); 1905, p. 585 (in part; descr. after Budde-Lund), Fig. 645 (after Dollfus, 1890, see below).—BUDDE-LUND, 1908, p. 76, Pl. III, figs. 31–33.—WAHRBERG, 1922, pp. 12, 19, Fig. 3 (No. 14), Fig. 5 (Nos. 7–9).—BOONE, 1934, p. 597 (new descr.), Figs. 11a, 11b, 14.

*Tylos latreilli* VAN NAME, 1924, p. 189, in part (specimens from Key Largo, Fla., only).

Other references appear to apply to some other species (perhaps *T. latreillei*) except in so far as they refer to Budde-Lund's original specimens.—DOLLFUS, 1890, p. 70 (descr.), Pl. I, figs. 5–5a (fig. 5a very misleading).—RICHARDSON, 1902 (part), p. 301.—VERRILL, 1902, p. 844.

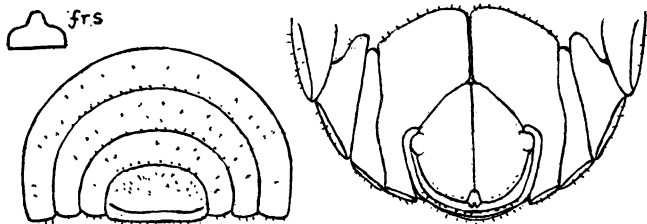


Fig. 256. *Tylos niveus* Budde-Lund. Specimens from Key Largo, Florida.

Most easily distinguished from *T. latreillei* by the large size and square outline of the ends of the internally projecting plates of the fifth segment of the abdomen, which meet along the median line of the lower aspect of the abdomen for a considerable distance. Rear outline of telson transverse, not perceptibly concave.

DISTRIBUTION.—Florida and Cuba; other records incorrect or unreliable. Budde-Lund's type locality was Key West, Florida. Dollfus' (1890) record from Bermuda needs confirmation. The American Museum of Natural History has specimens from Key Largo, Fla. (incorrectly referred to as *T. latreillei* in Van Name, 1924), and the U. S. National Museum has several, one of which I have examined, from La Puntilla, Vedado, Cuba. Boone, 1933, reports it from Cojimer, Cuba. The type is in the Cambridge, Massachusetts, Museum (Budde-

Lund). Budde-Lund's conjecture (1908, p. 77), expressed without seeing the material, that Richardson's specimens of *T. latreillei* from Bermuda were really *niveus* may be dismissed as unjustified. I have examined some of these specimens and I would include them in *latreillei*.

Some of the past errors, including my own, regarding this species, were due to a very misleading figure published by Dollfus and reproduced by Richardson, 1905.

### *Tylos spinulosus* Dana, 1853

Figure 257

*Tylos spinulosus* MIERS, 1877a, p. 675.—BUDDE-LUND, 1879, p. 9; 1885, p. 279.—STEBBING, 1893, p. 424.—BUDDE-LUND, 1908, p. 78.—CHILTON, 1901, p. 121; 1910, p. 288.—VAN NAME, 1924, p. 192.

*Tylos spinulosus* DANA, 1853, p. 717 (orig. descr.), Pl. XLVIII, figs. 1a-1c.

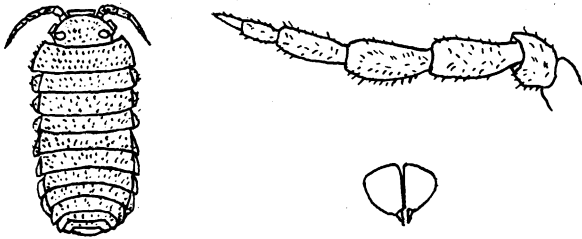


Fig.-257. *Tylos spinulosus* Dana. Adapted from Dana, 1853.

Dana's description is as follows:

"Body and antennae spinulose, spinules very short and often sub-clavate. Head below either eye having a prominent process which is truncate at extremity. Antennae reaching barely to second segment of thorax, second joint having a salient angle on anterior side near base, flagellum three-jointed, the first joint but little shorter than the preceding joint, and twice as long as the following.

"Plate 47, fig. 1a, body, enlarged four diameters, the head thrown outward; b, part of antenna, enlarged twenty-four diameter; c, caudal lamellae.

"Nassau Bay, Fuegia.

"Length, four lines; breadth, half the length. The so-called spinules are not acute, and might perhaps be more properly called setules. The processes on the head below the eyes are not in view, unless the head is placed out horizontally, as it would be carried by the animal when walking. The epistome is spinulose like the back. The caudal lamellae

have a small joint at the extremity, as described by Krauss in his South African species (Südaf. Crust., p. 63, pl. 4, figs. 5, 6); and as he suggests, there are differences between the specimens and the figures of Savigny's species, in this and other respects, which may require the institution of a new genus. The animal rolls up into a ball, like the Spheromae."

Nothing is known about this animal except from Dana's description and figures here reproduced. As pointed out by Budde-Lund, 1908, Dana's figure of the antenna does not agree with the description or with the characters of the genus *Tylos*, and his conjecture that the figure is incorrect seems plausible, as the animal seems to belong to that genus from its other characters. Chilton, 1910, says it is probably allied to a New Zealand species, *T. neozelanicus*.

This species may, however, be represented in the American Museum of Natural History by eight surprisingly large specimens (Cat. N. 7120) of *Tylos*, labeled "Tofo, Chile," perhaps an error for Toto, near Valparaiso.

Aside from their extraordinary size (the largest is fully 27 mm. long) they differ from *latreillei* in having the epistome semicircular in outline with no median upward extension. It is very widely set off from the forehead, which has two large low circular bosses or flattened tubercles. The rear border of the telson is slightly convex, not emarginate, and is narrowly but conspicuously flared or bent outward. The ventral plates of the fifth abdominal segment have their inwardly projecting ends tapering to a rounded tip, which usually fails to reach the median line.

#### *Tylos*, species

De Borre, 1886, p. cxiii, mentions a *Tylos* from Peru, saying "L'exemplaire conservé dessiché n'est pas malheureusement propre à pouvoir être décrit." Budde-Lund, 1908, p. 79, remarks that it is probably different from any described species.

## FRESH-WATER ISOPODA

The fresh-water Isopoda are not numerous in species and do not form a natural group, but a mixed assemblage of members of several different suborders (Chelifera, Flabellifera, Valvifera, Asellota and Epicaridea), and most of them belong to families, and in many cases also to genera, whose other members are marine. The Asellidae, however, are a fresh-water family.

In this work, 48 species are dealt with as members of the American fresh-water fauna. No attempt has been made to include all marine forms that may sometimes ascend estuaries and streams into brackish or only slightly saline water, as parasites on fishes or shrimps, or of their own accord.

For more details regarding the characters of the suborders and families to which these aquatic forms belong, see the works of Richardson (1905, 'A monograph of the isopods of North America,' Bull. U. S. Nat. Mus., No. 54) and Sars (1899, 'An account of the Crustacea of Norway,' II, Isopoda).

### SUBORDER OR ORDER CHELIFERA

(Syn. Tanaidacea or Tanaioidea)

Head fused with the first or with both the first and second segments of the thorax, to form a carapace with a branchial cavity on each side. This character is not found in other Isopoda. The remaining segments (five or six in number) of the thorax are distinct, with slightly developed epimera. The first pair of thoracic legs chelate. Uropoda terminal with one or two slender segmented branches.

In many recent classifications, this group is separated from the Isopoda and is regarded as a group of equal rank, instead of as one of its primary divisions. It is composed mainly of marine species.

### Tanaidae

In this family the body is not conspicuously attenuated behind, the mandibles have no palp and the first antennae never have more than one flagellum, which is often absent or rudimentary in the female.

TANAIS AUDOUIN AND MILNE-EDWARDS, 1829

"Eyes present and well developed. Abdomen composed of five or six segments. Only three pairs of pleopoda present, all fully developed. Uropoda simple, single branched. Incubatory pouch formed of two lamellae issuing from the base of the fifth pair of legs. Mandibles strong with the molar expansion well developed." (Richardson, 1905, p. 7.)



**Tanais fluviatilis** Giambiagi, 1923

Figures 258, 259

*Tanais fluviatilis* GIAMBIAGI, 1923, p. 248 (orig. descr.), 3 text-figs.

Most of the characters given in Giambiagi's description are so clearly apparent from the illustrations that it does not seem necessary to quote it here.

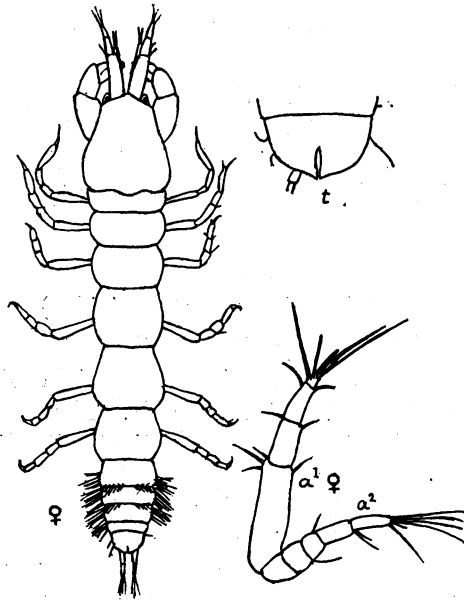


Fig. 258. *Tanais fluviatilis* Giambiagi. Adapted from Giambiagi, 1923.

The first pair of legs are stout and chelate, the second, third, and fourth have a sharp, nearly straight dactylus, while in the last three pairs the dactylus is strongly curved. The uropoda are composed of a single branch with four joints, the two basal joints are short.

The males have the chelae of peculiar form and longer antennae, as shown in the detailed figure.

Length of type specimen, a female not fully adult, 3.2 mm. (Dimensions of adults not given.)

This species inhabits minute tubes built of agglutinated sand attached to shells of mollusks (*Anodontites*) and stones.

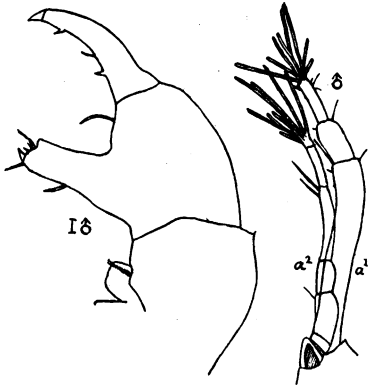


Fig. 259. *Tanais fluviatilis* Giambiagi. Adapted from Giambiagi, 1923.

LOCALITIES.—Type locality, Rio Santiago, Province of Buenos Aires, Argentina. Type in Museo Nacional de Historia Natural, Buenos Aires. Other specimens in the same museum from Conchillas, Department of Colonia (Republica Oriental), Argentina.

**NOTOTANAIS RICHARDSON, 1907**

First antennae with three segments in the male and five in the female; second antennae with five in both sexes. Head of male wide at the base and prolonged into a narrow forward portion. It is fused with the first thoracic segment. Abdomen with six well-defined segments. Uropoda with two branches each of two segments. (See Richardson, 1907, *Isopodes. Exp. Antarct. Franc. (1903–1905), Crustacés*, p. 1.)

The species described below fits fairly well into the definition of this marine sub-antarctic genus, in spite of the differences, both geographical and ecological, in its habitat. *N. dimorphus*, described under the name *Paratanais dimorphus* by Beddard, 1886, 'Rept. Voy. "Challenger,"' *Zool.*, XVII, p. 130, seems to be its nearest ally.

**Nototanais beebei** Van Nane, 1925

Figure 260

*Nototanais beebei* VAN NAME, 1925, p. 469, Figs. 1, 2.

**Description of male:**

"Body elongate; the average width is contained six or seven times in the length. Back flattened, the segments being only slightly

arched from side to side. All the segments are free and separately movable except the first thoracic segment, which is immovably united with the head. The specimens do not vary greatly in size; the largest do not much exceed 2 mm. in length. The alcoholic specimens are of the usual yellowish color.

“Head very elongate (over one-quarter of the total body length), its posterior end wide and rounded, and deeply set back into the first thoracic segment; its sides converge gradually toward the rather

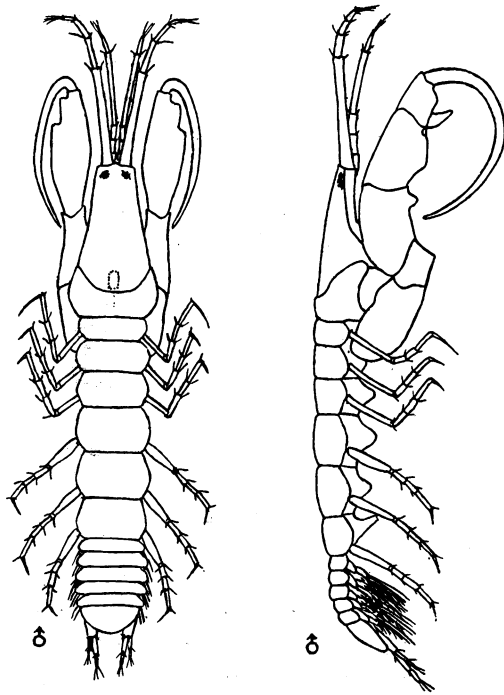


Fig. 260. *Nototanais beebei* Van Name. From Van Name, 1925, *Zoologica*, VI, p. 469.

narrow front end, which is truncate and has a slight median projection. Eyes represented by two pigmented areas on the upper surface at the extreme front end of the head. First antennae stout, of five segments, the basal one being very long, the terminal one minute; second antennae smaller and shorter, also of five segments, the three first short, the fourth very long; the second segment bearing a spine or scale on the median side at its distal end. The upper surface of the head is fairly smooth and

even except for an oval depression on the median line near the posterior border.

"The first thoracic segment is the widest part of the body and bears the enormous chelae which terminate in a long recurved scythe-like dactylus. The lower border of these chelae presents several teeth or projections, notably a long, triangular downwardly and distally directed one near the end of the propodus. Their superior border is evenly curved.

"In strong contrast to their flattened dorsal surfaces, the thoracic segments (especially toward the posterior end of the body) have their median ventral region produced downward into a keel-like projection. On the seventh segment this is long and more or less terete, and has an obliquely forward and downward direction. Except the first, the thoracic segments are of nearly uniform width, though varying greatly in length, the fifth, sixth and seventh being the longest; the abdominal segments are equally wide but all very short except the telson, which is broadly rounded behind. The thoracic legs are long, weak and slender; the first pair behind the chelae have the terminal claw much longer than the others, and the last three legs are somewhat stouter than those in front. The pleopoda are developed on all the five first segments of the abdomen. They are short, and bear an abundance of long swimming hairs. The uropoda each consist of a short basal segment which reaches a little beyond the telson and two terete branches, the inner of which is longer and stouter, though so far as I could demonstrate, they both consist of two segments.

"No female specimens obtained. The female may be expected to have smaller and simpler chelae and but three segments in the first antennae." (Van Name, 1925, p. 470.)

LOCALITY.—Five specimens, including the type, were collected at Kartabo, British Guiana, by William Beebe and preserved in the American Museum of Natural History. They were taken from the stomach of a catfish, *Pimelodus clarias* (Black).

#### SUBORDER FLABELLIFERA OR CYMOTHOIDEA

First pair of legs without chelae. Uropoda usually broad and inserted laterally on the telson, forming with it a large horizontally expanded fan-like swimming fin.

#### Cirolanidae

Body of compact form and more or less ovate or elliptical in a dorsal view, the back usually well arched. Eyes commonly small and

widely separated. Both pairs of antennae with many articles, the peduncle and flagellum being well differentiated. The two terminal articles of the palp of the maxillipeds are setose but not provided with hooks on the margins. The mandibles are wide throughout their length, with a more or less trifid cutting part and an elongate triangular molar portion.

The members of this family are mostly active predaceous forms with a hard cuticle, which often attach themselves to fishes as temporary external parasites. Most of them are small.

**CIROLANA LEACH, 1818**

First antennae without a right angle bend at the junction of their first and second segments. Peduncle of second antennae with five or six segments. Second segment (from the base) of the maxillipeds with one or more hooks on the inner margin. First pleopoda resembling the second pair in having only the outer branch hard and rigid, and the inner branch somewhat membranaceous.

***Cirolana cubensis* Hay, 1903**

Figure 261

*Cirolana cubensis* HAY, 1903, p. 430 (orig. descr.), Fig. 1.—RICHARDSON, 1905, p. 114 (new descr.), Figs. 98 (after Hay) and 99.—EIGENMANN, 1909, pp. 201 (descr.), 202.—RATHBUN, 1912, p. 460.—BRIAN, 1923, p. 116.—CHAPPUIS, 1927, p. 70.

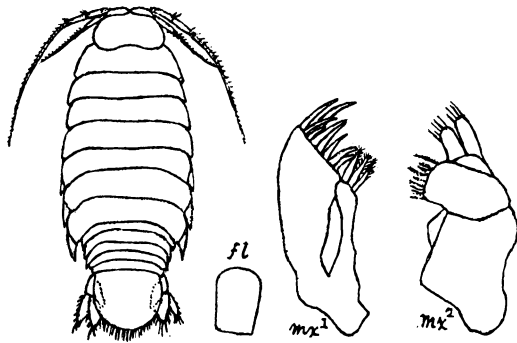


Fig. 261. *Cirolana cubensis* Hay. Adapted from Hay, 1903.

Richardson's description is here quoted in part:

"Body ovate; a little more than twice as long as wide; 3 mm.:7 mm.

"Head twice as wide as long—1 mm.:2 mm.—with the anterior margin rounded and produced in a median point. The eyes are absent. The first pair of antennae have the peduncle composed of only two

articles, both long and narrow; the second is a little longer than the first. The flagellum is composed of fourteen articles, and extends to the posterior margin of the second thoracic segment. The second pair of antennae have the first three articles short and subequal; the fourth and fifth articles are subequal in length, and each is as long as the first three articles taken together. The flagellum is composed of thirty articles, and extends to the middle of the fifth thoracic segment. The maxillipeds are composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina is short and broad, with the anterior extremity rounded. . . .

“The first segment of the abdomen is entirely covered by the seventh thoracic segment, with the exception of the post-lateral angles. The terminal segment is rounded posteriorly and has the posterior margin smooth. The uropoda do not extend beyond the extremity of the abdomen. The inner branch is twice as wide as the outer branch and is posteriorly pointed. The inner branch is obliquely truncate. The margins are smooth and furnished with hairs, as is the terminal abdominal segment. The inner angle of the peduncle of the uropoda is produced. The first pair of legs are somewhat prehensile. All the others are ambulatory.”

LOCALITY.—Cavern at San Isidro, Cuba. About 25 specimens obtained by Dr. C. H. Eigenmann in 1902. Type in U. S. Nat. Museum. Eigenmann (1909, p. 202) gives information regarding its habits, abundance, and voracity.

### **Cirolana browni**, new species

Figures 262, 263, 264

MALE.—Body stout, strongly convex, broadest at the fourth and fifth segments. Abdomen somewhat narrower than the thorax, the branches of the uropoda large and broad. Head only moderately wide, the curvature of its anterior outline seen from above is broken only by the merest suggestion of a rostral process, though the frontal lamina, as described below, extends still farther forward.

Body surface fairly even except for a system of tubercles unusually well developed for this genus. There is a pair of rather large but low tubercles on the upper median part of the head and a curved row of four across the middle of the first thoracic segment. Close to the posterior margin of this and of the remaining thoracic segments, and also the second to fifth abdominal segments, there is a row of tubercles, usually about twelve to fourteen on each segment. They are quite prominent in the case of the rows on the posterior segments of the thorax and on the fourth and fifth abdominal segments, but the tubercles of each row diminish toward the sides of the body, both in size and height. The telson has large though low tubercles near the anterior corners and smaller ones irregularly scattered. On the posterior part of the body there is more or less pubescence to which mud adheres.

Anterior surface of head very steeply inclined. Eyes of somewhat square outline with about thirty-two to thirty-five ocelli. The eyes are separated by nearly three times their diameter. A horizontal line or suture crosses the head between the eyes. The first pair of antennae arise quite close together at the extreme anterior part of the head; only a very narrow wedge-shaped downward extension of the minute rostrum separates their rather broad, somewhat inflated bases. Their basal segment consists of two segments immovably united, the proximal one broad and rounded and the second elongate, tapering and rather stout. Together the two parts

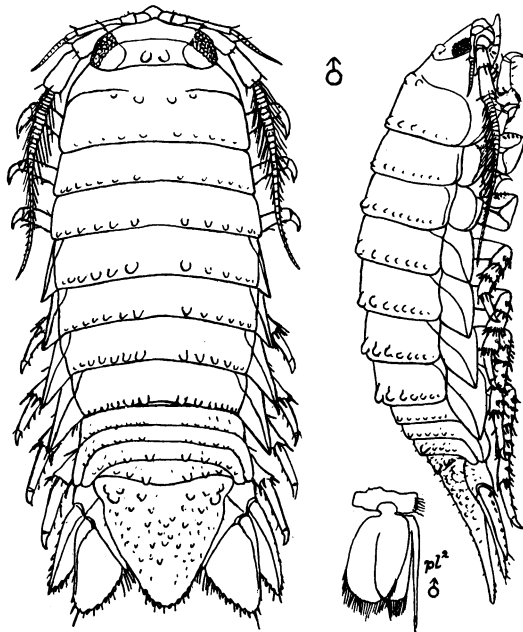


Fig. 262. *Cirolana browni*, new species, male.

fail to equal the next segment, which is slender and cylindrical. The flagellum consists of about eleven articles, the first one the longest. The second antennae extend horizontally outward and have five segments in the peduncle, the first two very short, the third, fourth, and fifth successively longer. The flagellum consists of about thirty to thirty-four articles, those of the proximal half short and bearing long hairs. When well drawn back the first pair reach to the middle of the first thoracic segment, the second pair to the end of the fourth segment.

The most characteristic feature of the head is the unusually large frontal lamina. Seen from below, this is of pentagonal form somewhat rounded off in front, extending forward between the bases of the second antennae, which it separates, as a spade-like process reaching farther forward than any other part of the head. The lower surface

of the frontal lamina and of the short wide clypeus and the labrum lying posterior to it give the head a nearly horizontal under surface; the upper side of the projecting part of the frontal lamina slopes up between the bases of the second antennae and nearly joins the lower end of the narrow wedge-shaped rostral plate that separates the bases of the first antennae.

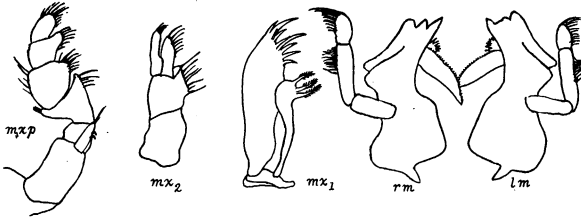


Fig. 263. *Cirolana browni*, new species. Mouth parts. Drawn from a male specimen.

It can be observed in the figures of the mouth parts that the two mandibles are not alike at the tip. The tip of the left overlaps that of the right and the middle one of the three teeth on the right mandible is replaced by a nearly straight edge on the left.

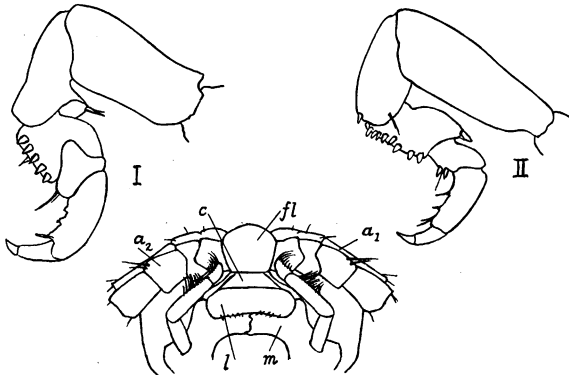


Fig. 264. *Cirolana browni* new species.

*a*, antenna; *c*, clypeus; *fl*, frontal lamina; *l*, labrum; *m*, mandibles.

All thoracic segments but the first have movable epimera, the surface of each being crossed by an oblique ridge, somewhat curved, which runs toward the produced posterior angle. The first three pairs of limbs, which are prehensile, diminish successively in length and stoutness, the last four pairs are ambulatory in character and increase in length toward the rear.

Only the third and fourth abdominal segments have their lateral ends extended



and bent backward. The telson has nearly the outline of an equilateral triangle with the tip rounded off. The inner branch is broader and slightly longer than the outer. The styloid process of the second pleopod is long, narrow, and straight, tapering to a needle-like point at the tip, and exceeds the foliate parts of the appendage in length.

Color (in alcohol) yellowish, with more or less blackish pigment on the upper parts, though this is almost wanting on the uropoda and terminal parts of the telson.

Length of largest male, 11.1 mm.; width, 4 mm.

FEMALE.—Very similar to the male but with the dorsal surface considerably smoother, noticeable tubercles being almost entirely confined to the posterior parts of the body, and the pubescence is less developed, the greater part of the upper surface being smooth and glossy. First thoracic leg very stout as in male; the second antennae are slenderer and less hairy though nearly as long as in the males.

Length of the two female specimens (which have well-developed marsupial plates), 9 to 10 mm.

LOCALITY.—Danny's River three miles below Rodas, Santa Clara Province, Cuba. Eight specimens (6 males, 2 females) collected by Dr. Barnum Brown. All specimens in the American Museum of Natural History. A large male (Cat. No. 6519) has been designated as type.

This is a near relative of *C. parva* Hansen, 1890, a West Indian marine species, but is remarkable for the spade-like extension of the frontal lamina and the development of the tuberculation. The locality indicates that it inhabits entirely fresh water.

#### CONILERA LEACH

Resembling *Cirolana* in most characters but having both branches (instead of only the outer branch) of the first pleopoda hard, forming an operculum to protect the other pleopoda.

#### *Conilera stygia* (Packard), 1900

*Conilera stygia* PACKARD, 1900, p. 228 (orig. descr.).—RICHARDSON, 1905, p. 120.—CHAPPUIS, 1927, p. 72.

“It is totally eyeless, and adds another to the blind fauna of our caves and wells. Hitherto the genus has been represented by but a single species, inhabiting the British coast. Compared with Bate and Westwood's figure of *C. cylindracea*, the body is longer, the antennae much longer, reaching to the middle of the first thoracic segment, those of the second pair nearly to the middle of the seventh thoracic segment. Only the first three pairs of legs are short with a very thick hand; the four hinder pairs of legs are long, slender. The two last divisions of the pleopoda are unequal, the outer division very narrow, but a little more than half as long as the broad inner division or endopodite. Length of body, 25 mm.; breadth, 5 mm.

"This form is like most, if not all, other blind or eyeless arthropods in having a longer body, antennae, and legs in compensation for the loss of eyes."

LOCALITY.—Monterey, Mexico. Found in wells.

NOTE.—There is a brief allusion, without description, to what is evidently this same species, in some article by Packard of earlier date than 1900, in which it is incorrectly mentioned as an "asellid crustacean." I have not been able to locate the reference.

**Cirolanides BENEDICT, 1886**

Distinguished from *Cirolana* by having only the first pair of legs prehensile and by the absence of eyes. The following is the only species known.

***Cirolanides texensis* Benedict, 1896**

Figure 265

*Cirolanides texensis* BENEDICT, 1896, p. 616 (orig. descr.).—EIGENMANN, 1900, pp. 228 (*texanus*), 229.—RICHARDSON, 1900a, p. 217.—ULRICH, 1902, p. 88 (descr.), Pl. xv (misprinted *Cirolanides*).—RICHARDSON, 1905, p. 120 (descr.), Fig. 103.—EIGENMANN, 1909, p. 201.—WARD AND WHIPPLE, 1918, p. 841, Fig. 1304.—BRIAN, 1923, p. 116.—CHAPPUIS, 1927, p. 71.

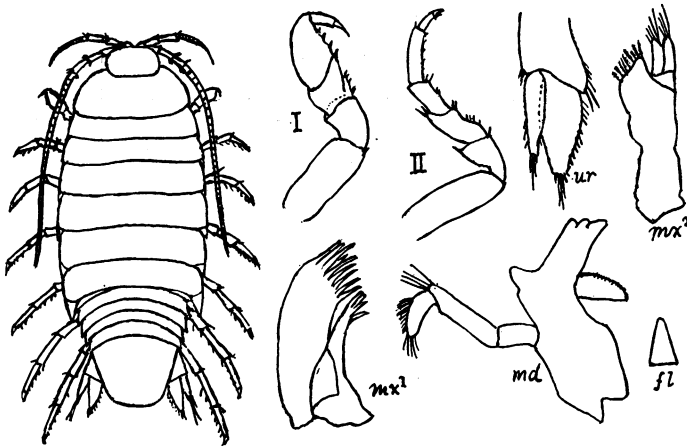


Fig. 265. *Cirolanides texensis* Benedict. Adapted from Richardson, 1905 (published by courtesy of Dr. Benedict).

As the details of this species are well shown in the figures here reproduced, it does not seem necessary to quote the somewhat lengthy descriptions given by the above authors, but attention may be called to the following characters:

Eyes entirely wanting. Flagella of first and second antennae with about fifteen and thirty articles, respectively. Body surface very smooth and hard; unpigmented. Only the first thoracic segment has the posterior corner rounded off; the second has it approximately rectangular and the succeeding ones have it acutely produced to an increasing degree. The abdominal segments also all have the rear angles acutely produced. Only the first pair of legs are prehensile.

Length of largest specimens recorded, 17 mm.

LOCALITY.—From an artesian well at San Marcos, Texas, where it occurs in rather small numbers.

Ulrich, 1902, p. 83, says, "During my stay of three days, I secured several specimens. It can readily be seen in the receiving basin of the well when thrown out." The American Museum of Natural History has four specimens from the same locality. Type in U. S. National Museum.

### Excorallanidae

The genus *Excorallana* Leach, through superficially resembling *Cirolana*, has been separated as a distinct family on account of the peculiar modification of the mandibles. These have the molar part and movable lacinia wanting, and are developed into a pair of large and powerful hooks, whose ends overlap across the median line when they are in their normal closed position. The compound eyes are often very large, covering much of the surface of the head.

#### EXCORALLANA LEACH

See under the family Excorallanidae.

#### *Excorallana berbicensis* Boone, 1918

Figure 266

*Excorallana berbicensis* BOONE, 1918 (orig. descr.), p. 594. Pl. XCH, fig. 1.—VAN NAME, 1925, p. 471 (descr.), Figs. 3-8.—NIERSTRASZ, 1931, p. 163.

The original description of this species was evidently based on females only. The discovery of the male shows that it is closely related to the marine tropical American species, *E. tricornis* (Hansen), 1890, from which, however, it may be at once distinguished by the absence of incisions on the sides of the tapering part of the telson. In the female, the upper surface of the head is smooth, but in the male the head bears an anterior median process or prominent tubercle, and a pair of somewhat smaller ones between the eyes as in *E. tricornis*, and the surface of the head within the triangle thus formed is depressed or concave.

"Body rather elongate, more so in the female, where the greatest width is contained over three times in the length, than in the male, where it is contained about two and three-quarters times. . . . Articula-

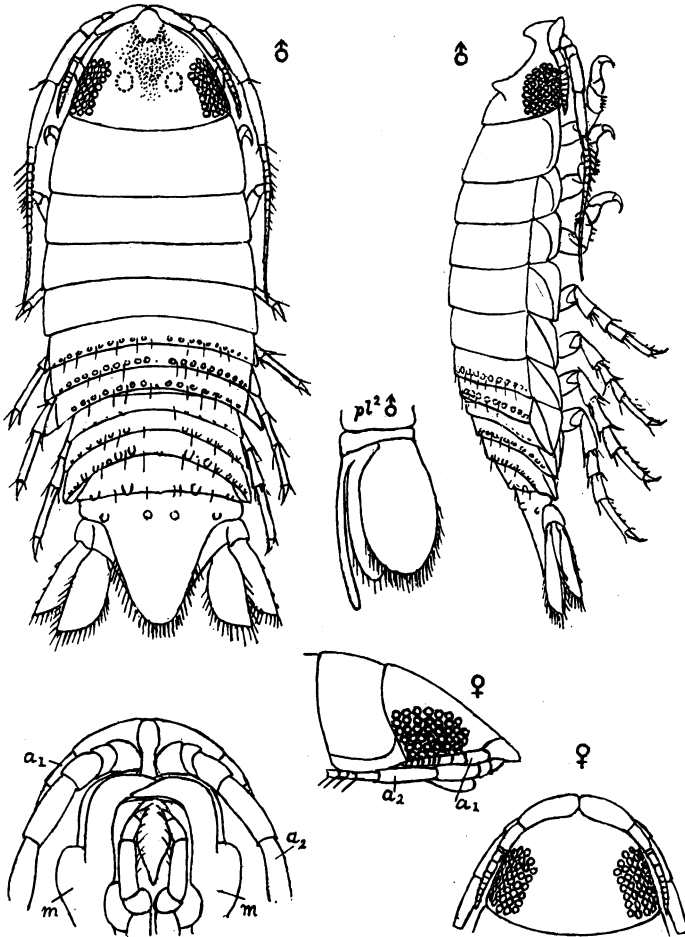


Fig. 266. *Excorallana berbicensis* Boone. From Van Name, 1925, *Zoologica*, VI, p. 472.

tion firm; body surface for the most part hard and smooth, except for a minute irregular pitting visible only on considerable magnification. The last two or three thoracic and the third and fourth abdominal segments bear a row of small tubercles near the posterior edge, also a few short

backwardly directed hairs. The fifth abdominal segment bears four tubercles along the posterior border; the telson has two pairs of small ones on the anterior part (two near the middle and two near the bases of the uropoda). These tubercles, which are all small, are more conspicuous in the male specimen, though present in both sexes. Legs of the first three pairs stout and provided with prehensile claws. The merus of the first pair bears on its lower outer aspect a row of five blunt tubercles. On the succeeding pair there are four of these tubercles (the middle one of the row being wanting); on the third pair there are but three. This is the condition in both the male and female specimens. The fourth to seventh legs are elongate, slender, and not prehensile.

"The head is narrow and rounded in front except for a small median process. The eyes are large with about eight horizontal rows of ocelli, with eight ocelli in the longest rows. The first antennae meet at the median line and form the extreme front outline of the head; they have ten articles in the flagellum, the first being very short and the second (in the female specimen, also the third) article being somewhat elongated. They reach, when drawn back, a little way beyond the rear border of the head. The second antennae have the three basal joints short and the fourth and fifth long, the flagellum has eighteen to twenty articles of which the first is more elongated than the succeeding ones; they reach, when well drawn back, along the fourth thoracic segment to about its middle. They are a little slenderer in the female than in the male." (Van Name, 1925, pp. 471, 473.)

Length of largest specimen, 13 mm.

LOCALITIES.—Rivers of British Guiana. The type specimens were from the Rio Berbice, and are preserved in the U. S. National Museum (Boone). Two additional specimens, including a male, from Kartabo, collected by William Beebe (see Van Name, 1925) are in the American Museum of Natural History. These were taken, one from the gills, the other from the pectoral fin of specimens of the fish *Lycengraulis grossideus* (Cuvier).

### Cymothoidae

Both antennae reduced, usually of comparatively few segments and not well differentiated into peduncle and flagellum. Maxillipeds with a palp of the two articles, terminal article furnished with hooks. Mandibles with palps. All seven pairs of legs (in *Artystone* only six pairs) end in large, hooked claws.

Mostly parasites, externally or in the mouth or gill cavities of fishes. They are usually of rather large size (for isopods) and more decidedly

parasitic than the *Cirolanidae*, the females, at least, often remaining permanently attached to their hosts and often becoming more or less asymmetrical, though without undergoing any structural modification.

There is great individual variation, and variation with age and sex in the members of this family. Not only many of its species, but some of the numerous genera that have been distinguished, are based on very unimportant and unreliable characters and will hardly stand the test of impartial investigation.

#### NEROCILA LEACH

"Body relaxed, very often flattened. Head posteriorly produced in three lobes, not at all immersed. First pair of antennae almost contiguous at the base.

"First segment of thorax with the anterior margin deeply trisinate. Posterior angles of the segments from the second to the last increasing gradually in length, the first of these often but little produced, the posterior ones almost always produced and often abruptly longer than the first ones. The anterior epimera almost always extend to or beyond the posterior angle of the segment; the posterior epimera are produced and acute, but do not reach the posterior angle of the segment.

"Abdomen free, rarely covered at the base or the sides. Legs rather long." (Richardson, 1905, p. 219.)

#### *Nerocila fluviatilis* Schioedte and Meinert, 1881

##### Figure 267

?*Nerocila falklandica* CUNNINGHAM, 1871, Trans. Linn. Soc. London, XXVII, p. 500 (descr.), Pl. LIX, fig. 2.

*Nerocila fluviatilis* RICHARDSON, 1904, p. 23.

*Nerocila fluviatilis* SCHIOEDTE AND MEINERT, 1881, p. 66 (descr.), Pl. v, figs. 6-9; 1884, p. 414.

This is one of a group of species of the genus *Nerocila* distinguished largely by very unsatisfactory characters, as they are subject to great variation with the age and development of the individual. The eyes are fairly well developed even in old specimens, the second antennae have eleven joints, the first antennae presumably eight, as usual in the genus, though this is not stated. The color is yellowish with black markings which form three longitudinal dark stripes on the back. Length of largest specimen (female) 24 mm.

For such other details as cannot be made out from the illustrations here given, the reader is referred to the work of Schioedte and Meinert, whose description is of much too great length to be quoted here, especi-

ally since the fresh-water habitat of this species seems to require investigation.

It was described from the La Plata River at Montevideo, parasitic on the fins of fishes, therefore from salt water. On the other hand, the statement that one poor specimen came from a catfish does not necessarily indicate its occurrence in fresh water. If it is identical with Cunningham's insufficiently described and crudely figured *N. falklandica* from Falkland Sound, that is further evidence that it is marine. Location of the type not stated. Specimens in Copenhagen and Cambridge, Massachusetts, Museums (Schioedte and Meinert).

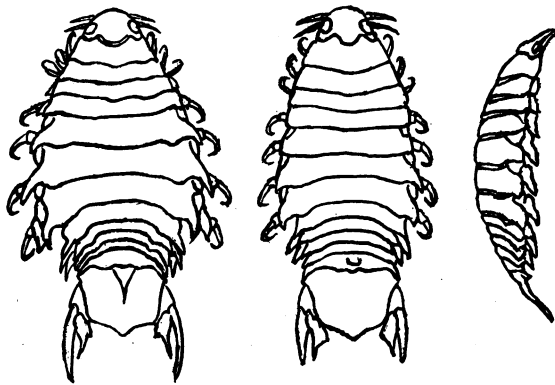


Fig. 267. *Nerocila fluviatilis* Schioedte and Meinert. Adapted from Schioedte and Meinert.

Schioedte and Meinert in a later installment of their work (1884, p. 414) report two specimens in the Vienna Museum that were collected by Natterer at "Inisanga, Brazil," which appears to be a misprint for Irisanga, a place which does not appear on any map available, but which, from the records of Natterer's journeys, evidently is in the interior of the northern part of the State of São Paulo. This, however, fails to explain why the species had received the name *fluviatilis* previous to existence of these specimens being known to the authors who named it. It seems possible that there may be some mistake as to the locality, if these specimens are correctly referred to the marine form.

BRAGA SCHIOEDTE AND MEINERT, 1883

This genus, related to, if really distinct from, the well-known marine genus *Anilocra*, is distinguished, according to Schioedte and Meinert,

principally by the arched forehead, the small epimera and the short abdomen. The claws of the seventh pair of legs are weak and small compared with those of the preceding pair.

The genus is composed of a few very insufficiently known, mainly marine species. As in related groups, the males differ considerably from the females, being smaller, narrower-bodied, and of more active habits.

***Braga cichlae* Schioedte and Meinert, 1883**

Figure 268

*Braga cichlae* SCHIOEDTE AND MEINERT, 1881, p. 94 (orig. descr.), Pl. VII, figs. 10, 11.—RICHARDSON, 1911, p. 96.—MONOD, 1931, p. 363.—SCHOUTEN, 1932, p. 105 (*sichlae*).

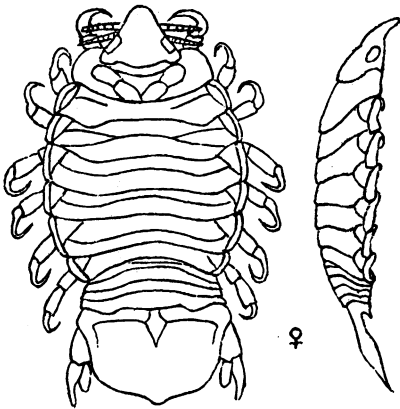


Fig. 268. *Braga cichlae* Schioedte and Meinert. Adapted from Schioedte and Meinert.

An insufficiently known species described from a single specimen (a virgin female) 17 mm. long, from the tongue of a cichlid fish (and therefore probably a fresh-water form), taken at José Apu, Brazil, a place I have failed to locate. In view of the clearness with which the figures show the main characters of the specimen, it does not seem necessary to quote here the lengthy description given by Schioedte and Meinert. The first antennae are stated to have eight segments, the second antennae nine.

***Braga patagonica* Schioedte and Meinert, 1884**

Figure 269

*Braga patagonica* SCHIOEDTE AND MEINERT, 1884, p. 419 (orig. descr.), Pl. XVIII, figs. 17, 18.—RICHARDSON, 1911, p. 96.—MONOD, 1931, p. 363, 364, Figs. 1-3.—SCHOUTEN, 1932, p. 105, Figs. 1, 2 (after Monod).



Described from a single dried female specimen from salt water on the Patagonian coast near the Rio Negro.

Monod, 1931, assigns to this species a pair of specimens from fresh water, from the vicinity of Asuncion, Paraguay. He gives no description, but states that the female closely agrees with the description of

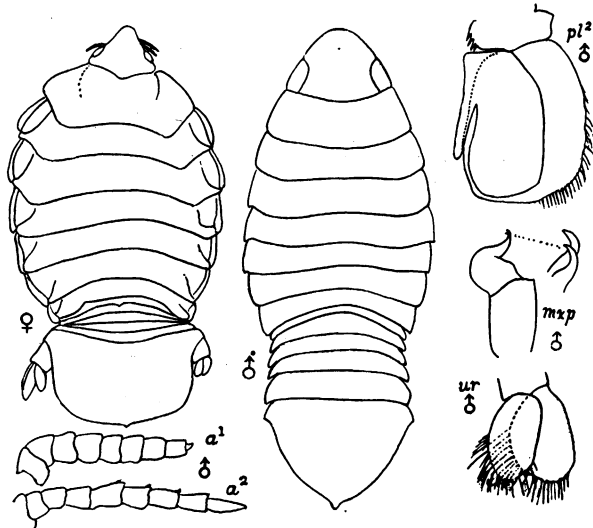


Fig. 269. *Braga patagonica* Schioedte and Meinert. Adapted from Monod, 1931.

this species given by Schioedte and Meinert. His female specimen was 35 mm. long; the male about 6 mm. long. Monod's figures are here reproduced in outline.

### *Braga fluviatilis* Richardson, 1911

Figure 270

*Braga fluviatilis* RICHARDSON, 1911, p. 94 (orig. descr.), Figs. 1, 2.—NIERSTRASZ, 1931, p. 127.—MONOD, 1931, pp. 363, 364.—SCHOUTEN, 1932, p. 106.

This must be regarded as a doubtful species, as it was described from a single immature male found in the mouth of a large catfish (native name "armado"), taken in fresh water in the Parana River or one of its tributaries, March 10, 1910, near San Ignacio. But little information is contained in the description that cannot be equally well made out from the figures given and here reproduced in outline. The

first and second antennae have seven and nine articles, respectively. The legs are all prehensile, and without a keel on the basis. The

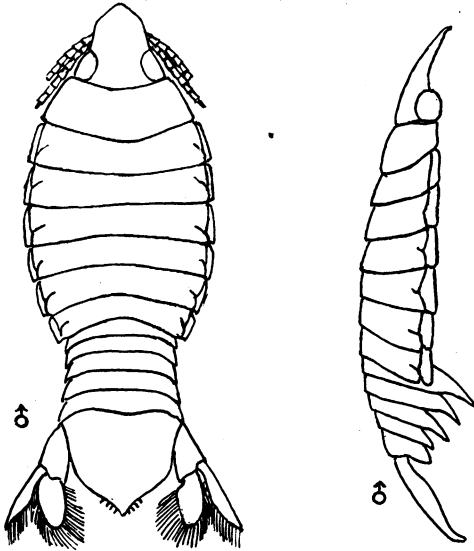


Fig. 270. *Braga fluviatilis* Richardson. Adapted from Richardson.

uropoda are not margined with hairs. Surface smooth, color yellow with dark brown markings.

Length, 10 mm.

#### TELOTHA SCHIOEDTE AND MEINERT, 1884

Established by Schioedte and Meinert, 1884, for the following two South American fresh-water species, which are but doubtfully distinct from each other. They have the body wider and the thoracic region of more rounded outline as seen from above, but there hardly appear to be any sufficient grounds for separating them from the well-known marine genus *Cymothoa*, the type of the family. *Telotha* is distinguished from *Artystone*, a genus of quite similar appearance, by having all seven pairs of legs prehensile and terminating in hooked claws.

#### *Telotha henselii* (von Martens), 1869

Figure 271

*Cymothoa henselii* VON MARTENS, 1869, p. 33 (orig. descr.), Pl. II, fig. 6.

*Telotha henselii* SCHIOEDTE AND MEINERT, 1884, p. 287 (descr.), Pl. X, figs. 11, 12.—WEBER, 1892, p. 538.—RICHARDSON, 1904, p. 23.—NIERSTRASZ, 1915, p. 95.—VAN NAME, 1925, p. 478 (descr.), Figs. 19–23.—NIERSTRASZ, 1931, p. 137.

The following statements are as quoted from Van Name, 1935:

"The body is quite broadly oval, rather highly arched in old specimens, but flatter in young ones. The head is wider than long and of

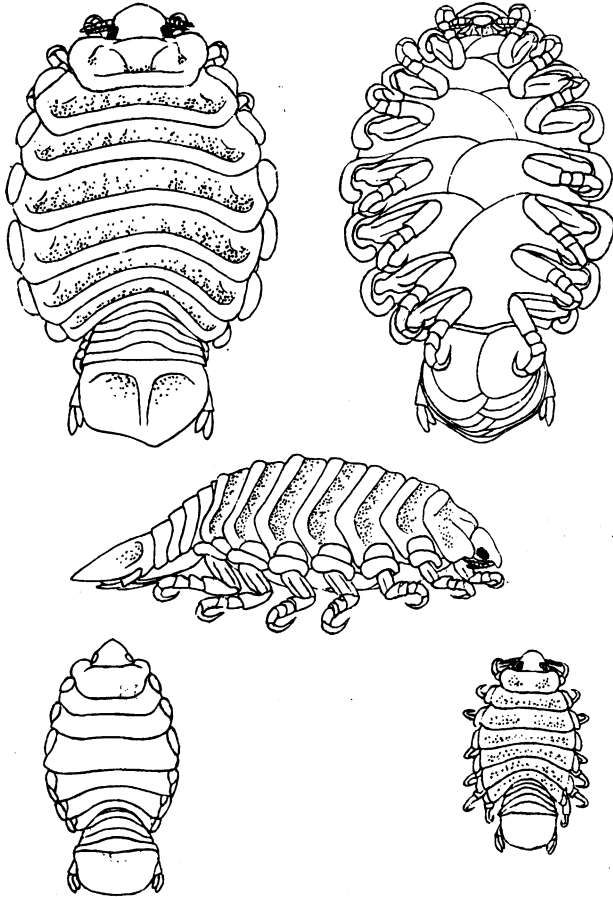


Fig. 271. *Telotha henselii* (von Martens). Three upper figures, a female 16 mm. long. Lower left figure, female 26 mm. long. Lower right figure, young individual 6.6 mm. long. From Van Name, 1925, *Zoologica*, VI, p. 479.

triangular outline, rounded in front; its anterior margin is considerably bent downward. The eyes are oblong and fairly well pigmented; the first antennae, which arise a little distance apart, are stout, but little compressed in cross section, and have only eight segments (according

to Schioedte and Meinert they have nine). The second antennae usually exceed the first pair a little in length, they are much slenderer and have nine segments. The head is not deeply set back into the thorax.

"The thoracic segments have the posterior border thickened and very prominent, in front of this the surface of the segment is more or less irregularly roughened and sculptured. The epimera are large and thick, especially in the middle region of the body, and are surmounted by large convex bosses on the lateral ends of the main portion of the segments.

"The legs are strong and of moderate length; their length increases toward the rear of the body. The dactyli are large and strongly hooked. The propodus of all the legs is curved, increasing the hook-like prehensile character of the limb; in the case of the three anterior legs that joint is somewhat flattened, though not much widened. The thighs are not compressed; their external aspect (the inferior aspect when the legs are drawn together under the body) is flattened or even slightly concaved. There is never more than a very slightly prominent ridge or keel.

"The abdomen is rather narrow in front, moderately immersed in the thorax, and widens behind. The telson is very broad and has the posterior margin normally very gently curved, but in the individual shown in figs. 19 to 21, it is unevenly worn off, as are also some of the pleopoda, evidently by pressure and friction from some part of the host. The telson has the anterior margin thickened and the dorsal surface more or less arched or convex; in the older specimens there is a poorly defined median ridge or keel each side of which the surface is minutely pitted and roughened. The uropoda and their branches are small and short; in adults they do not reach much beyond the end of the telson."

Length of largest specimen, 26 mm. Length of specimen (a female with marsupium) on which the above description is chiefly based, 16 mm. (No description of adult male available.)

LOCALITIES.—Types (preserved in Berlin Museum) taken from the gills of a cichlid fish (*Geophagus* sp.) taken at Porto Alegre, Rio Grande del Sul, Brazil (von Martens, Schioedte, and Meinert). The latter authors also mention specimens from "somewhere in Brazil," and Richardson, 1904, gives the locality "Rio in Brazil."

Specimens of various ages, apparently referable to this species, were collected at Kartabo, British Guiana, from a giant catfish (*Brachyplatystoma* sp.) and another catfish, *Pimelodus clarias* (Bloch), by William Beebe, and are preserved in the American Museum of Natural History, New York.

The illustrations and description here given are from the above British Guiana specimens. See also remarks under *Telotha lunaris*, below, and under the genus *Livoneca* regarding what is possibly a larval form of this species.

***Telotha lunaris*** Schioedte and Meinert, 1884

Figure 272

*Telotha lunaris* SCHIOEDTE AND MEINERT, 1884, p. 289 (orig. descr.), Pl. x, figs. 13, 14, fig. 15 (larva from marsupium).—NIERSTRASZ, 1915, p. 95; 1931, p. 137.

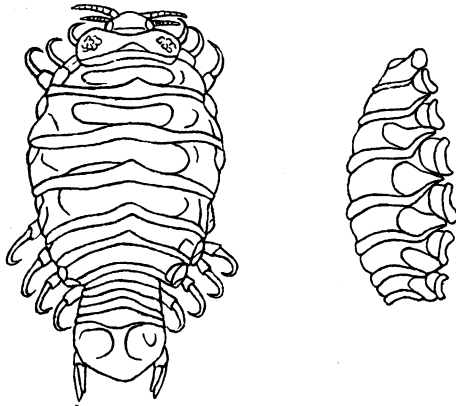


Fig. 272. *Telotha lunaris* Schioedte and Meinert. Adapted from Schioedte and Meinert, 1884.

This species was described and figured from a single specimen, a female 28 mm. long, from the gill cavities of the fish *Stemachius brazilensis* Reinhardt, taken in the Rio del Velhas, Brazil.

Considering the very great variability in this group, individually and with age and state of the reproductive functions, the validity of this species, which is evidently closely allied to *T. henselii* just described, cannot be regarded as very well established, though the smoother body and narrower abdomen, less deeply set back into the thorax, and the sinuous curve (usually forming an obtuse angle at the median line) of the impressed transverse line on the segments may be characters of specific value. The first antennae are stated to have eight segments, the second, nine.

**LIVONECA LEACH**

“Body suboval, more or less twisted.

“Head most always deeply immersed. First pair of antennae widely separated at the base, rather compressed.

“Anterior margin of the first thoracic segment widely sinuated in the middle, more or less sinuated or incised at the antero-lateral angles.

“Abdomen very little immersed, continuous with thorax, not narrower than thorax.” (Richardson, 1905, p. 256.)

In Van Name, 1925, p. 478, Fig. 18, a larval isopod 2.4 mm. long taken in British Guiana on a giant catfish (*Brachyplatystoma*) is described briefly and figured, and the suggestion is made that it might be the young of a species (*L. guianensis*) of this genus. It seems more probable that it is the young of *Telotha henselii*, which infests that fish.

***Livoneca symmetrica* Van Name, 1925**

Figures 273, 274

*Livoneca symmetrica* VAN NAME, 1925, p. 473 (orig. descr.), Figs. 1-14.

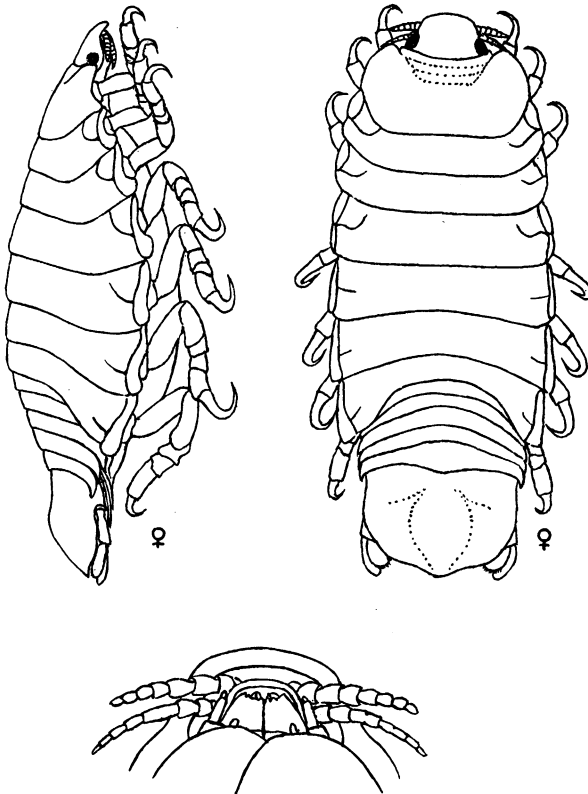


Fig. 273. *Livoneca symmetrica* Van Name, female. From Van Name, 1925, Zoologica, VI, p. 474.

Description of adult female (no specimens of adult male):

“The body surface is very slightly rough, pale yellowish in color, and bears minute scattered spots of blackish pigment.

“The head in a dorsal view is gently rounded in front and behind, with straight sides converging toward the front. It is scarcely at all set back into the thorax, though the first segment of the latter is produced forward a little way into a small lobe of rounded-triangular shape at each of the forward corners. The eyes are rounded-oblong in outline,

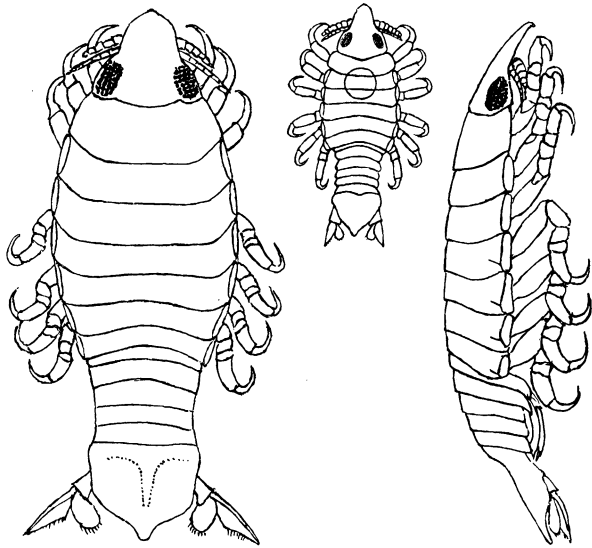


Fig. 274. *Livoneca symmetrica* Van Name. Young individuals 3.6 mm. and 8.5 mm. long, respectively, the small one from the marsupium of a female. From Van Name, 1925, *Zoologica*, VI, p. 475.

of fair size, and well pigmented. The front of the head is somewhat bent down over the bases of the antennae. The antennae of the two sides arise well apart. The first pair is the stoutest, and is eight-jointed. The second pair is more slender and a little longer and is nine-jointed. The form of the thoracic segments and their epimera are sufficiently shown in the figures here given. The legs are fairly long, but the thighs are not expanded or provided with a keel. The dactyli are strongly hooked and increase in length from the first to the sixth pair; those of the seventh pair are smaller even than those of the first. The abdomen is wide and slightly diminishes in width toward the rear. It is deeply

set into the thorax, and the lateral ends of all its segments except the first (which, however, is of the full width) are bent backward and pointed. The telson is wide and strongly arched and has the posterior outline slightly produced, forming an obtuse median angle. The uropoda reach to or slightly beyond its end; the outer branch is slightly falcate, the inner is shorter and oval. Both are rounded at the end." (Van Name, 1925, pp. 473, 474.)

Length of adult females, 17 mm. to 20.6 mm. (Larval stages described, Van Name, 1925, pp. 474-476, Figs. 12-14.)

LOCALITY.—Kartabo, British Guiana, parasitic on various river fishes. Type from gills of *Myloplus rubripennis*, others from *Sarasalmo strombeus*, *Hemidorus carinatus* ("from the scales"), *Cichla ocellaris*, and *Brachyplatystoma* species. The above specimens, including the type, are in the American Museum of Natural History.

**Livoneca guianensis** Van Name, 1925

Figure 275

*Livoneca guianensis* VAN NAME, 1925, p. 476 (orig. descr.), Figs. 15-17 (18).

Description of female (no male specimens):

"The body surface is smooth and highly polished, of the usual yellow color without pigment except a very few blackish dots distributed chiefly along the median dorsal line and near the rear borders of the segments.

"The upper surface of the head is convex and the anterior tip is considerably bent down. The eyes are small, rounded and situated on the sides of the head; they are well pigmented. The first antennae arise well apart. They are very short and stout, with eight joints, of which the second is considerably the longest, but not swollen. The joints are not compressed. The second antennae are slender and have but seven joints which are somewhat compressed. The first two are wide but very short, the others are so elongate that this pair of antennae slightly exceeds the first pair in length.

"The first segment of the thorax is wide and moderately long; the second and third (the latter the widest of all, as above stated) are short; the succeeding ones are all rather long. They have rather narrow but thick epimera, which except in the case of the seventh, fail by a greater or less interval to reach all the way along the lateral end of the segment. The legs are only moderately stout, but considerably compressed laterally, so that they appear much stouter in a side view. The



dactyli are sharp and hooked, and vary comparatively little in length; those of the first pair are, however, the longest, although the last pair of legs exceeds the others in total length.

"The abdominal segments have the lateral ends obliquely truncated and the posterior corners rounded off. The telson is about as wide as

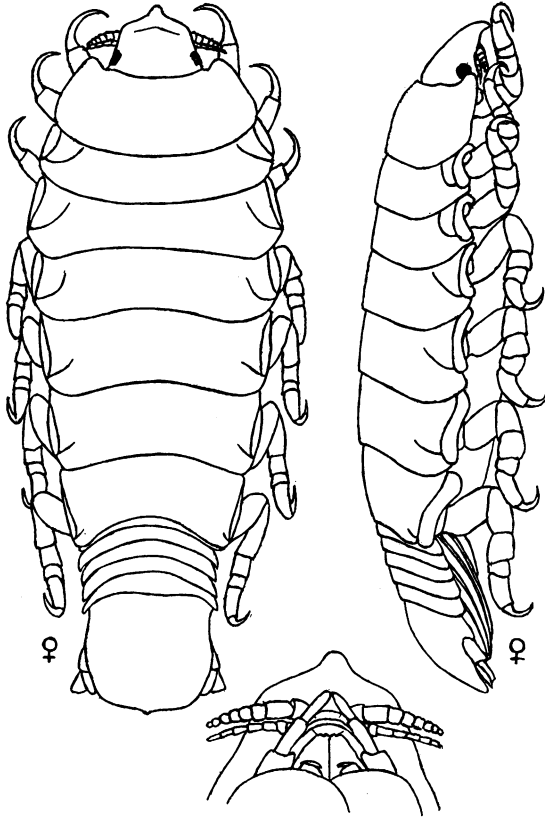


Fig. 275. *Livoneca guianensis* Van Name, female. From Van Name, 1925, *Zoologica*, VI, p. 477.

the rest of the abdomen and about as long as it is wide. It narrows but little toward the rear end, which is rounded off, but bent down so as to appear almost truncated in a dorsal view of the animal." . . . (From Van Name, 1925, pp. 476, 477.)

Length of largest specimen, 26 mm.

LOCALITY.—Three specimens, including the type, were obtained at Kartabo, British Guiana, and are in the American Museum of Natural History. Host of the type not recorded. The others were from the gills of the river fishes, *Leporinus fasciatus* (Bloch) and *Pimelodus clarias* (Bloch). See remarks on young under genus *Livoneca*.

***Livoneca lazzari* (Pearse), 1921**

Figure 276

*Aegathoa lazzari* PEARSE, 1920, p. 39 (*nomen nudum*); 1921, p. 461 (orig. descr.), Fig. 2.—MONOD, 1922, p. 406.

Described by Pearse as follows:

“Head wider than long, and narrower posteriorly. Eyes large ellipsoidal; with about 48 facets; almost covering postero-lateral

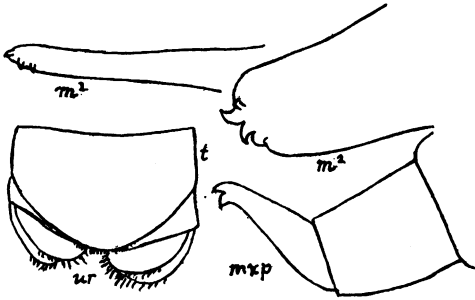


Fig. 276. *Livoneca lazzari* (Pearse), details. Adapted from Pearse, 1921.

angles. First antennae with seven segments, second antennae with eight segments. Maxillipeds bearing a two-segmented palp, which is armed at the tip with two hooks. First maxilla slender, armed at tip with three pairs of hooks; second maxilla robust armed at tip with two pairs of hooks. First segment of thorax longest, 0.5 mm. The following segments progressively shorter. The epimera of all segments except the first separated on the lateral margins. Abdomen somewhat narrower than the thorax; length 1.8 mm., segments as long as those of the thorax. Sixth or terminal segment broadly rounded and obtusely pointed posteriorly. Uropoda extending beyond tip of terminal segment. Both rami of uropoda rounded posteriorly. Posterior margins of the uropoda and the terminal abdominal segment are pringed with hairs. All the legs are prehensile and end in long curved dactyli. They are without spines.”

3.7 mm. long; 1.3 mm. wide.

LOCALITY.—Lake Valencia, Venezuela, the type parasitic on the fish *Astyanax bimaculatus* (Linnaeus); also parasitic on the fish *Gephyrocharax valenciae* Eigenmann. Type in University of Michigan Museum, paratype in U. S. National Museum.

This description is apparently from immature specimens, probably of the genus *Livoneca*. For a discussion of the reasons for rejecting the genus *Aegathoa* see the above article of Monod.

ASOTANA SCHIOEDTE AND MEINERT, 1881

“Frons profunde bisinuata.

“Corpus compactum, crassum vel crassiusculum, post compressum. Frons producta, procumbens, fornicata, profunde bisinuata. Oculi manifesti, minuti, aequati, latera capitis non attingentes. Antennae primi paris rectae, breves, subteretes, scapo obscure definito; 8-articulatae. Antennae secundi paris breves, teretes; 9-articulatae. Margo anticus annuli primi trunci profunde sinuatus. Anguli postici annulorum trunci vix vel non prominuli. Epimera prior involuta, posteriora subpendula, angustiuscula vel angusta, angulum annuli fere explentia.

“Pedes breviusculi, subtenuis, longitudine subaequales, paris ultimi ceteris manifesto longiores. Ungulae parium sex priorum longae vel longiusculae; paris septimi breviusculae, ceteris multo breviores atque tenuiores. Cauda ad basin obtecta. Latera annulorum quinque priorum integra, angustata. Annulus analis sublingulatus, fornicatus, in medio inflatus. Pedes anales brevissimi, remis perbrevis; remus interior quam exterior manifesto longior.” (Schioedte and Meinert, 1881, pp. 154–155.)

The following is the type and only species.

*Asotana formosa* Schioedte and Meinert, 1881

Figure 277

*Asotana formosa* SCHIOEDTE AND MEINERT, 1881, p. 155, Pl. x, figs. 10–12.—WEBER, 1892, p. 538.—RICHARDSON, 1904, p. 23.—NIERSTRASZ, 1931, p. 130.

The deeply three-lobed anterior outline of the head and the bosses and keel on the telson and other characters brought out in the generic diagnosis given above will doubtless suffice for the recognition of any adult specimen of this species.

LOCALITY.—River Iça, southern Peru. Type and only specimen in Cambridge, Massachusetts, Museum (Schioedte and Meinert).

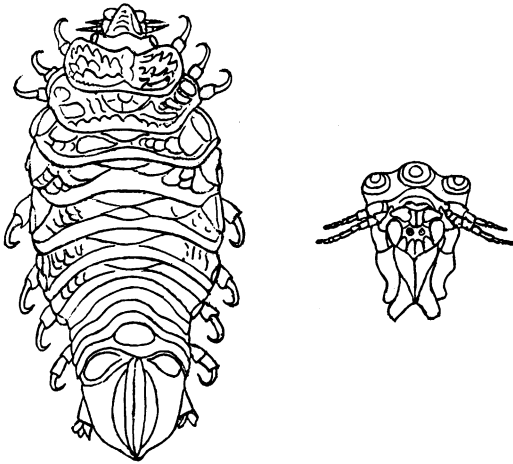


Fig. 277. *Asotana formosa* Schioedte and Meinert. Dorsal view and lower side of head. Adapted from Schioedte and Meinert, 1881.

#### ARTYSTONE SCHIOEDTE, 1866

This is one of the few satisfactorily differentiated genera of this family. It is similar to *Telotha* in most characters, but has the seventh pair of legs ambulatory in character, instead of prehensile, these being rather long, comparatively straight and ending in a small claw which is not hooked. The following is the type and only species. The male is not known.

#### *Artystone trysibia* Schioedte, 1866

##### Figure 278

*Artystone trysibia* SCHIOEDTE, 1866, p. 206 (orig. descr.), Pl. XI, figs. 4a-4i.—SCHIOEDTE AND MEINERT, 1884, p. 402, Pl. XVIII, figs. 1-4.—RICHARDSON, 1904, p. 23.

Much resembling *Telotha henselii* except for the difference in the seventh pair of legs which is a generic character. Aside from this, it differs in the following characters.

The first antennae are much smaller and shorter than the second, though both have about eight or nine articles. The head and abdomen are rather deeply immersed in the thorax and the abdomen is less narrowed anteriorly; the rear borders of the thoracic segments are more sinuous and the telson is longer and narrower, obtusely triangular be-

hind and its lateral borders have a tendency to become unrolled, accentuating its narrow appearance.

Color yellowish (unpigmented except the eyes).

Size of largest specimen, 30 mm. long, about 16 mm. wide.

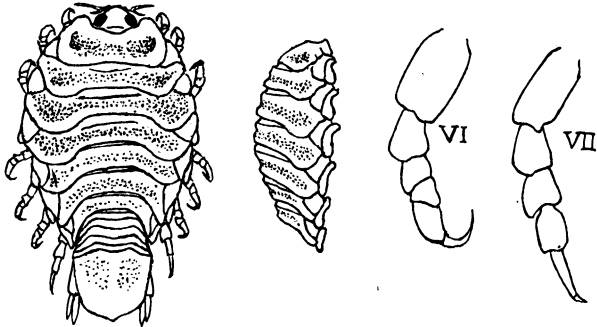


Fig. 278. *Artystone trysibia* Schioedte and Meinert. Female 25 mm. long, in the American Museum of Natural History.

LOCALITIES.—Schioedte (1866) described this species from a specimen taken from a fish in the La Plata River, which might indicate a salt-water habitat. Schioedte and Meinert, 1884, describe and figure a second specimen from “somewhere in Brazil.” Richardson, 1904, lists it as a fresh-water form. The American Museum of Natural History has two large specimens (30 mm. and 25 mm. long, respectively) from Avapupu, Rio Roraima, collected by Mr. G. H. H. Tate in December, 1927, and hence unquestionably from fresh water.

### Sphaeromidae

Body compact, highly arched and in some cases capable of being rolled up into a ball, as in many land isopods. Head broad, both antennae of rather numerous articles well differentiated into peduncle and flagellum.

Abdomen of only two distinct segments, the anterior composed of segments 1–5 united, the other, the telson (segment 6), is very large and broad, and bears the uropoda laterally inserted. The inner branch of the uropoda is immovable; the outer (which is sometimes wanting) is movably articulated.

#### SPHAEROMA LATREILLE

“Body contractile, able to roll into a complete ball. Abdomen

composed of two segments, the first of which is formed by the fusion of several coalesced segments. The terminal segment is rounded, entire.

"The branches of the uropoda are similar, both being salient. The outer branch of the uropoda is denticulate along the exterior margin; the inner branch is immovable and fixed to the side of the abdomen; the outer branch is movable, and capable of folding under the inner branch.

"The second, third, and fourth articles of the palp of the maxillipeds not produced into lobes, but furnished with exceedingly long hairs.

"Legs ambulatory in structure." (Richardson, 1905, p. 280.)

This genus contains certain species that bore in submerged wood, and are in some places destructive to piles of wharves and other structures. Most of them inhabit salt or at least strongly brackish water, and therefore do not come under consideration in the present work.

#### **Sphaeroma terebrans** Bate, 1866

Figure 279

*Sphaeroma destructor* RICHARDSON, 1897, p. 105 (new descr.); 1901, p. 534; 1904, p. 24; 1905, p. 282 (descr.), Figs. 294-296.—VAN NAME, 1920, p. 63 (descr.), Figs. 16-19.—ATWOOD AND JOHNSON, 1924, p. 26.—Pratt, 1935, p. 436.

*Sphaeroma terebrans* BATE, 1866, Ann. Mag. Nat. Hist., (3) XVII, p. 28, Pl. I, fig. 5.—RICHARDSON, 1905, p. 282 (*tenebrans*).—NIERSTRASZ, 1931, p. 192. (See Stebbing, 1904, Spolia Zeyland., II, part 5, p. 16, and Van Name, 1920, p. 64.)

"The body is stout, short, and highly arched; in its general outline and in its power of rolling into a ball superficially resembling some of the terrestrial isopods. The dorsal surface is granular, on the posterior half of the body, the granules are coarse and the larger ones bear tufts of minute hairs to which mud adheres. The thoracic segments, especially the fourth and fifth, have on the dorsal part a well-marked transverse ridge, and more or less well-developed paired tubercles are present on the last one or two of the thoracic and on the abdominal segments, of which there are but two in the genus. The posterior end of the abdomen is broad and obtuse; its posterior lateral margins are conspicuously bent upward.

"The first and second antennae have flagella with 8 or 9 and 12 or 13 articles, respectively.

"The first legs have a short spine on the inner distal end of the propodus. It is present in both sexes but is wanting on the other legs. All the legs, however, including the first, have a short rounded extension of the posterior aspect of the propodus, which overlaps the base of the dactylus.

“The number of teeth on the outside edge of the external branch of the uropoda has been used as a distinguishing character in the species of this group. The Congo specimens indicate that it is not reliable for such a purpose. They have from three to five well-formed teeth in addi-

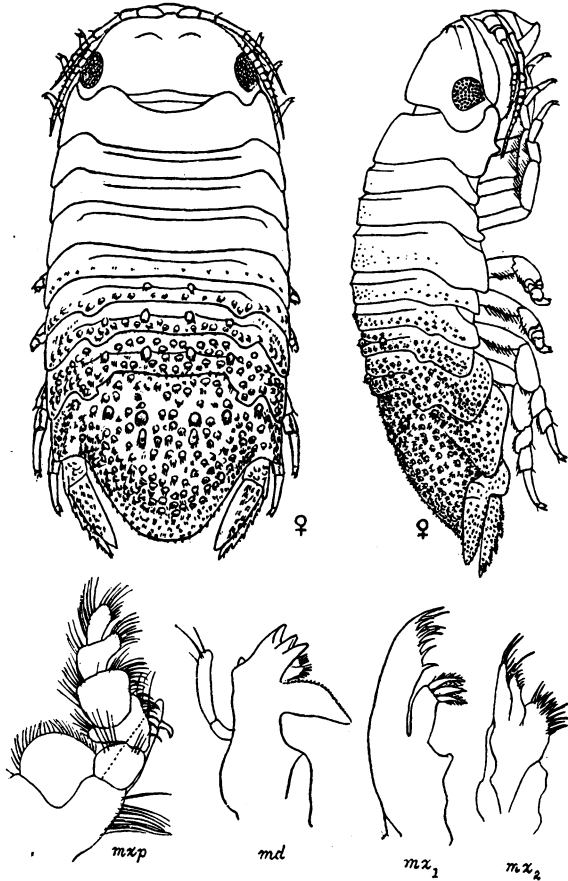


Fig. 279. *Sphaeroma terebrans* Bate. Female, and mouth parts.

tion to the apical point. The proximal tooth is often so reduced as to make it doubtful whether it should be counted or not, or it may be poorly developed or wanting on one side only.

“The drawings here reproduced are from a female. The males are, however, closely similar in general form, size, and appearance, but, as a rule, have the tubercles of the dorsal surface a little more prominent.

Often there are fairly well-developed tubercles on the sixth as well as seventh thoracic segment and one or two pairs of small tubercles posterior to the central pair on the last abdominal segment. The males also have the postero-lateral borders of that segment more broadly and conspicuously turned up than the females. This gives the posterior end of the body a slightly narrower outline as seen from above.

"The largest individuals measure 9.5 mm. to 10 mm. long to the tip of the abdomen. Their color varies from yellowish to a fairly dark brown or greenish brown, the color being due to minute, irregularly branching pigment-spots." (Van Name, 1920, p. 64.)

DISTRIBUTION.—Found boring in decaying wood, dead mangrove roots, etc., in warm and tropical regions of both the Old and New World, and is often destructive to piles of wharves, bridges, and other wooden structures in both salt and fresh water. Bate described it from Brazil from salt water; Richardson described it (as *S. destructor*) from entirely fresh water at Palatka, Florida.

#### EXOSPHAEROMA STEBBING

Differs (according to Richardson, 1905, p. 287) from *Sphaeroma* in having the second, third, and fourth articles of the palp of the maxillipeds produced into lobes and the outer branch of the uropoda not denticulate on the outer margin.

#### *Exosphaeroma dugesi* (Dollfus), 1893

Figure 280

*Exosphaeroma dugesi* RICHARDSON, 1905, p. 295 (descr.), Figs. 313, 314.—BRUES, 1924, p. 415.

*Sphaeroma dugesi* DOLLFUS, 1893, p. 115 (orig. descr.), Figs. 1, 2.—RICHARDSON, 1904, p. 24.

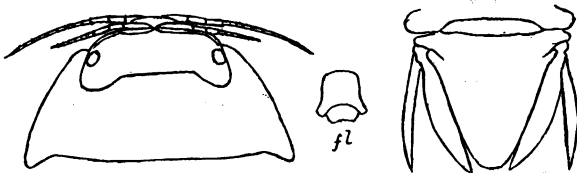


Fig. 280. *Exosphaeroma dugesi* (Dollfus). *fl*, frontal lamina and clypeus. Adapted from Dollfus, 1893, and Richardson, 1905.

The following extracts are quoted from Richardson's description: "Body ovate, twice as long as wide, 6 mm.: 12 mm.

"Head twice as wide as long, 2 mm.: 4 mm., with a frontal border



arising between the eyes and produced in a small median point. Eyes small, round, composite, and situated in the post-lateral angles of the head. . . . The flagellum (of the first antennae) is composed of eight articles. . . . The flagellum (of the second antennae) is composed of twelve articles. . . . The frontal lamina is large and conspicuous, and has the anterior division wide and long, with the post-lateral or ventral angles drawn out, giving it somewhat of a horse-shoe shape. The clypeus is transversely oblong, and fits into the concavity of the posterior part of the frontal lamina; its posterior margin is fringed with cilia. . . ."

LOCALITY.—Warm springs of Aguas Calientes. State of Aguas Calientes, Mexico.

***Exosphaeroma thermophilum* (Richardson), 1897**

Figure 281

*Exosphaeroma thermophilum* RICHARDSON, 1905, p. 294 (descr.), Figs. 311, 312.—COCKERELL, 1912, p. 49.—GIAMBIAGI, 1922, p. 236.—BRUES, 1924, p. 415.

*Sphaeroma thermophilum* RICHARDSON, 1897a, p. 465 (orig. descr.); 1900a, p. 223; 1904, p. 24.

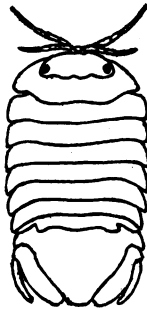


Fig. 281. *Exosphaeroma thermophilum* (Richardson). Adapted from Richardson, 1905.

This species, according to the original description of Richardson, can be readily distinguished from *E. dugesi*, to which it is closely related, by the absence of hairs on the body and by the uropoda, whose form is clearly shown in the figure.

LOCALITY.—A warm spring at Socorro, New Mexico.

***Exosphaeroma oregonensis* (Dana), 1853**

Figure 282

*Sphaeroma oregonensis* DANA, 1852–1855, p. 778 (orig. descr.), Pl. LII, fig. 4; 1856, p. 177.—RICHARDSON, 1904a, p. 214.

*Exosphaeroma oregonensis* RICHARDSON, 1905, p. 296 (descr.), Figs. 315, 316.

This well-known and widely distributed species of the northern North Pacific has been reported as found in fresh water at Popoff Island, Alaska (Richardson, 1904a, p. 214, *Sphaeroma o.*); 1905, p. 296, but is

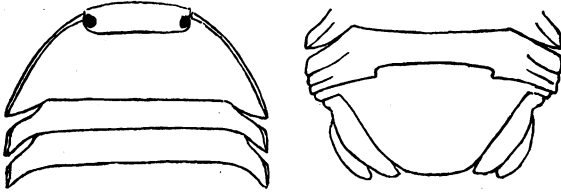


Fig. 282. *Exosphaeroma oregonensis* (Dana). Adapted from Dana, 1855.

normally a species of salt or strongly brackish water and does not appear to require description in this work.

#### ***Exosphaeroma rhombfrontalis* Giambiagi, 1922**

Giambiagi (1922, pp. 239-241, Pl. III) describes and figures under this name a marine species from Argentina which inhabits waters that are at times of greatly diminished salinity, but the species apparently has no claim to be considered a fresh-water form.

#### **SUBORDER VALVIFERA OR IDOTHEOIDEA**

This group is not represented in America, so far as I am aware, by any true fresh-water species. In it the uropoda are valve-like and attached under the abdomen to the lateral edges of the large terminal segment of the body which is composed of several united abdominal segments. The uropoda close like a pair of doors over the pleopoda 1 to 5, which are modified for respiratory purposes.

#### **Idotheidae**

See Richardson, 1905, pp. 346, 347, 368, 404, for diagnoses of the family and of the following genera.

#### ***Pentidotea lacustris* (Thomson), 1879**

A fresh-water form from New Zealand with which Miers, 1881a, (p. 39, Pl. I, figs. 11, 12) doubtfully identifies specimens from "Port Henry, Straits of Magellan." It is uncertain whether the New Zealand fresh-water and the South American forms are really specifically identical. They appear to be at least distinct varieties (see Chilton, 1909, p. 659, and 1916, Jour. Zool. Res., I, p. 156), and Miers gives no data to show that the South American specimens were from fresh water.

For original description see Thomson, 1879, Trans. Proc. New Zealand Inst., XI, p. 251 (*Idotea lacustris*).

**Cleantis linearis** Dana, 1849

*Cleantis linearis* DANA, 1849, Amer. Jour. Sci., (2) VIII, p. 427 (orig. descr.); 1852-1855, p. 708 (descr.), Pl. XLVI, figs. 9a-9i.

Recorded by Richardson (1904, p. 23) as a fresh-water species, on what grounds I do not know. Dana described it from the coast of Patagonia.

**Mesidotea entomon** (Linnaeus), 1767

Figure 283

*Oniscus entomon* LINNAEUS, 1767, 'Syst. Nat.', 12th Ed., p. 1060.

*Mesidotea entomon* RICHARDSON, 1905, p. 348, Figs. 374-376.—BOONE, 1920, pp. 19, 21.

*Mesidothea entomon* JOHANSEN, 1920, pp. 145, 147; 1922, p. 17.

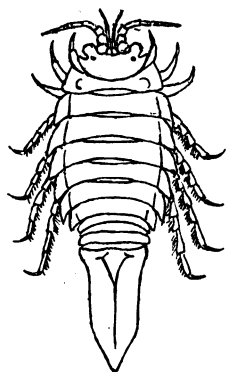


Fig. 283. *Mesidotea entomon* (Linnaeus). Adapted from Gerstaecker, 1881, in Bronn, 'Klass. u. Ordn. d. Thier-Reichs,' V.

This is a marine species attaining a length of 75 mm., found in the sand and gravel of sea beaches and in water to fifteen fathoms in depth in the circumpolar regions, south on the American coasts to Labrador and Pacific Grove, California. For description see Richardson, 1905, p. 348.

Johansen (1922) reports it as ascending into brackish and fresh water in arctic Alaska, and expresses the belief that it may live in certain lakes there in a landlocked condition. These lakes, however, are strongly saline in their deeper parts. Boone, 1920, p. 21, reports egg-bearing specimens found in water "quite fresh" in the outlet of a lake at Konganevik, Camden Bay, Alaska.

It has also been reported from fresh-water lakes in Sweden by Loven.

According to Packard (1871, p. 752; 1872, p. 19; 1879, p. 19), "a species representing this has been detected by Dr. Stimpson at the bottom of Lake Michigan." I know of no description of such a species.

#### SUBORDER ASELLOTA

Legs of the first pair not cheliform. Uropoda terminal, biramous. Pleopoda exclusively branchial, one pair in the female being generally transformed into a single operculum covering the succeeding pairs. Epimera very small or obsolete. All the segments of the abdomen fused together, although occasionally one or two short segments are partially visible anterior to the terminal segment.

#### Asellidae

Body depressed; segments of thorax with the lateral part expanded in the form of lamellae. Eyes small or sometimes wanting, widely separated. Both antennae with flagella of many articles. The abdominal segments, except sometimes the first two, which are very short, are fused into a single large, broad, flattened terminal segment. First and second pairs of pleopoda small (the second wanting in the female), the third pair large and forming an operculum for the succeeding pairs. Mostly fresh-water forms, many inhabiting subterranean waters.

In using the descriptions and figures of members of this family it should be remembered that in it the outline and appearance of the body varies very greatly with the state of contraction of the intersegmental muscles, owing to the very loose articulation of the segments. Further investigation as to the constancy of the characters on which some of the American species of this group are based seems to be needed. The length of the antennae and of the uropoda and their branches and the number of articles in the antennal flagella are subject to great variation individually and with age. (See statements under *A. incisus*, also the note under *Conilera stygia* Packard.)

#### ASELLUS GEOFFROY ST.-HILLAIRE, 1764

Mandibles with a palp. Last six pairs of legs with the dactylus provided with one claw. Eyes present.

#### *Asellus communis* Say, 1818

Figures 1, 284, 285

*Asellus communis* SAY, 1818, p. 427 (orig. descr.).—MILNE-EDWARDS, 1840, p. 147.—DE KAY, 1844, p. 49.—SMITH, 1874, p. 657, Pl. I, fig. 4.—FORBES, 1876, pp. 8, 10, Figs. 17, 18.—O. P. HAY, 1882, p. 241.—BOVALLIUS, 1886, p. 12.—UNDERWOOD, 1886, p. 358.—HERRICK, 1887, p. 40.—PACKARD, 1888, pp. 30, 31, etc.—STEBBING,

1893, p. 377.—RICHARDSON, 1900a, p. 297; 1901, p. 551; 1905, p. 420, Figs. 472, 473.—PAULMIER, 1905, p. 178, Fig. 50.—RATHBUN, 1905, p. 43.—NORTON, 1909, p. 250.—BANTA, 1910, pp. 246, etc.—FOWLER, 1912, p. 239 (descr.), Pl. LXXII.—STAFFORD, 1912, p. 118 (descr.), Figs. 65, 66.—HUNTSMAN, 1913, p. 274.—SHELFORD, 1913, pp. 90, etc., Fig. 55.—PRATT, 1916, p. 377, Fig. 602.—NEEDHAM AND LLOYD, 1916, p. 191.—KUNKEL, 1918, p. 231 (descr.), Fig. 74.—WARD AND WHIPPLE, 1918, p. 841, Fig. 1305.—RACOVITZA, 1920, p. 79 (descr.), Figs. 52-73.—JOHANSEN, 1920, pp. 146-148 (notes on habits).—RACOVITZA, 1923, p. 112; 1925, pp. 576, 597, 620, Figs. 195, 197-199.—JOHANSEN, 1925, p. 138; 1926, p. 26; 1929, p. 105.—ALLEE, 1929, p. 14.—STAMMER, p. 130 (see below).—MILLER, 1933, p. 102.—PRATT, 1935, p. 439, Fig. 604.

*Asellus militaris* O. P. HAY, 1878, p. 90.

*Asellus vulgaris* GOULD, 1841, p. 337.

See also remarks under *Asellus intermedius*.

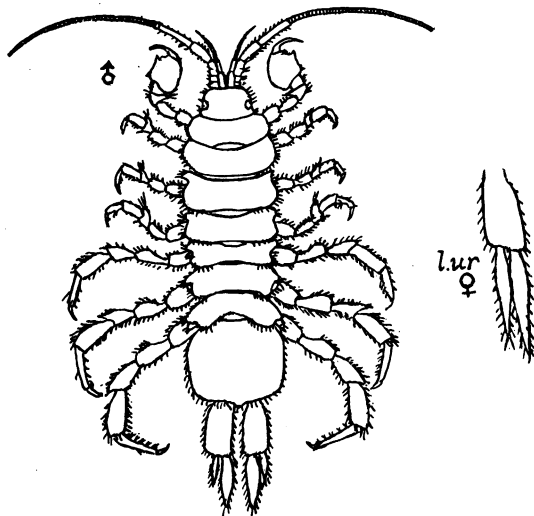


Fig. 284. *Asellus communis* Say. Large figure after Harger (in Smith, 1874).

"Body oblong-ovate, about three times as long as wide; thorax and abdomen of equal width. Head narrower in front than behind and with anterior margin excavate. Eyes small, round, compound, situated laterally, half way between front and hind margins.

"First antennae extending to the middle of last joint of second pair; second joint longer than third which, in turn, is longer than the first; flagellum made up of about fourteen joints. Second antennae more than half as long as body; fifth joint of peduncle one and two-thirds as long as fourth joint, which equals the length of the first three joints together; flagellum much longer than peduncle.

“Mandibles with triarticulate palp. Maxillipeds with five-jointed palp.

“First pair of legs subchelate; carpus very minute; propodus oblong, with hind margin bearing several stout spines at junction with palm; dactyl nearly as long as propodus and deeply serrated; succeeding legs with numerous spines; merus prolonged on anterior margin and armed with a group of long spines. Coxal plates very small.

“Abdomen composed of two short segments which are visible only on the mid-dorsal line and a large terminal one which is nearly as long as it is wide and has the postero-lateral angles rounded and the posterior margin produced in a broad triangular process between the uropods. Uropods as long as last segment of abdomen; rami styliform, inner ramus as long as peduncle, outer one about two-thirds as long.

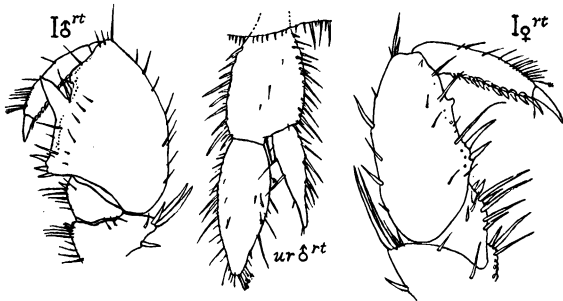


Fig. 285. *Asellus communis* Say. Details adapted from Racovitza, 1920. Specimens from Washington, D. C.

“Length 15 mm.” (Kunkel, 1918, pp. 231, 232.)

Epimera are present on all the thoracic segments, and are situated at the anterior lateral corners of the anterior segments, but farther back along the lateral margin in the posterior segments. In segments V, VI, and VII, they occupy a notch or emargination in the posterior part of the border.

To this description, it should be added that the chelae of the first legs are much wider in the male than in the female and that the females also have the legs slenderer and the uropoda narrower than in the male, both the basal joint and the two branches of the uropoda being narrower and the latter more nearly of the same length, though the inner branch is always longer. Immature individuals have the legs, chelae and uropoda more slender than those of adults.

Color brown or dusky, more or less spotted or mottled with small yellowish markings, noticeable only on magnification. Packard, 1888, p. 33, proposes the name var. *pallida* for two white specimens from the subterranean waters of "Lost River" (perhaps in Mammoth Cave).

DISTRIBUTION.—This is by far the most abundant and widely distributed fresh-water isopod in the eastern half of the United States, also in southern Canada (Ontario, Quebec, and Nova Scotia), occurring both in ponds and running streams, especially where there are water plants, and throughout much of its extensive range it is the only fresh-water isopod. More observations regarding the northern, southern, and western limits of its range are still to be desired. Type locality: vicinity of Philadelphia.

This species was carefully described and the details of the appendages figured by Racovitza, 1920, but unfortunately his studies seem to have been based on three specimens only, from the Potomac River at Washington, D. C.

Stammer, 1932, makes this the type of a subgenus, *Conasellus*, to which he also assigns *A. intermedius*, *A. brevicauda* and *A. hoppinae*.

#### ***Asellus intermedius* Forbes, 1876**

Figure 286

*Asellus intermedius* FORBES, 1876, p. 10 (orig. descr.), Figs. 12–16.—UNDERWOOD, 1886, p. 358.—PACKARD, 1888, p. 33.—RICHARDSON, 1900a, p. 297; 1905, p. 422 (descr.), Figs. 474–476.—NORTON, 1909, p. 250.—PEARSE, 1913, p. 3.—JOHANSEN, 1920, p. 148 (see below).—STAMMER, 1932, p. 130.—MILLER, 1933, p. 102.

Sides of head entire, with a small lobe on either side near the base. Eyes small, composite. Flagellum of the first antennae composed of nine articles, that of the second antennae of about fifty articles.

"The first segment of the thorax has the lateral margins entire, with the anterior angle not developed and the epimeral lobe large and conspicuous and placed antero-laterally. The second, third, and fourth segments have the lateral margins entire, with the antero-lateral angles well developed, and the epimera small and almost inconspicuous and placed antero-laterally. The fifth segment has the anterior part of the lateral margin produced in a well-defined lobe, with the epimeron large and conspicuous and placed about the middle of the lateral margin, just below the anterior lobe. The sixth and seventh segments have the posterior part of the lateral margin excavate, the anterior part projecting in a large lobe, and the epimera large and conspicuous and posteriorly situated just below the middle of the lateral margin. . . .

“The first pair of legs are subchelate, and have the propodus armed on the inferior margin with a triangular process about the middle, and below this a strong conspicuous spine. The inferior margin of the dactylus is furnished with a row of numerous short spines. All the other pairs of legs are ambulatory.” (Richardson, 1905, pp. 422, 423.)

Length, 7 mm.

DISTRIBUTION.—“Found in the hill country of southern Illinois under stones in small streams.” Type (in the Harvard Museum) re-described by Richardson, who adds (1905, p. 423):

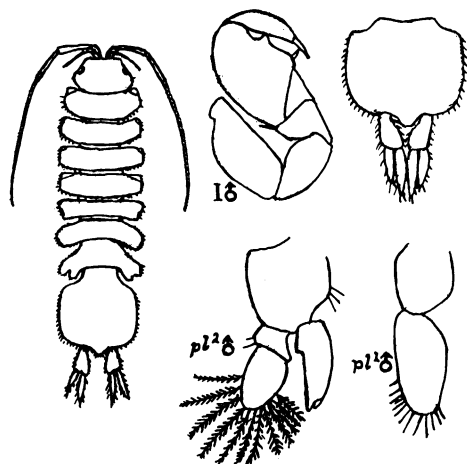


Fig. 286. *Asellus intermedius* Forbes. Adapted from Forbes, 1876 and Richardson, 1905.

“Specimens collected in the Potomac River near Washington of the same or perhaps a closely related species differ only in their larger size, being 4 mm. : 11 mm. ; in having three more articles in the flagellum of the first antennae, the flagellum of the second antennae having also a larger number of articles, sixty-three altogether, and in having the uropoda equal to two-thirds the length of the terminal segment.”

Norton, 1909, reports it from localities in Maine (Brunswick, Portland, and vicinity). Pearse, 1913, reports it from Omaha, Nebraska, and Alma, Michigan. It is assigned to the subgenus *Conasellus* by Stammer, 1932. According to a statement made by Johansen, 1920, at the end of p. 148, it would seem that this species was regarded by Huntsman and by Johansen himself as not distinct from *A. communis*, a possibility which has also occurred to the present writer.



**Asellus aquaticus** (Linnaeus), 1761

## Figure 287

*Asellus aquaticus* PARKER AND HASWELL, 1897, 'Treatise on Zoology,' I, p. 545, Fig. 432.—SARS, 1899, p. 97 (descr.), Pl. XXXIX.—RICHARDSON, 1905, p. 428 (descr.), Fig. 486.—RACOVITZA, 1919-1925, see remarks below.—JOHANSEN, 1920, p. 147.—NIERSTRASZ AND SCHUURMAN STECKHOVEN, 1930, p. 99, Fig. 46.—BIRSTEIN, 1933, p. 474.

*Asellus groenlandicus* KROYER, 1838, p. 318.—HANSEN, 1888, p. 190.

*Oniscus aquaticus* LINNÆUS, 1761, 'Fauna Svecica,' 2nd Ed., p. 500 (orgi. descr.).—FABRICIUS, 1780, 'Fauna groenlandica,' p. 251.

Described thus by Sars, 1899, p. 97:

"Body oblong oval, in male slightly widening behind, in female with the greatest width about in the middle and equalling half the

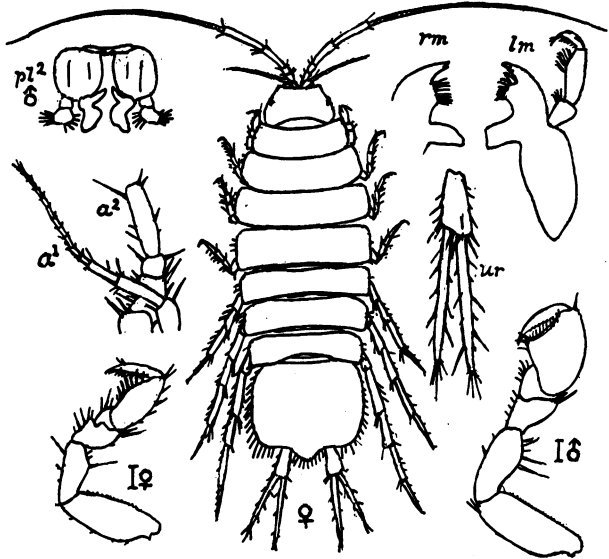


Fig. 287. *Asellus aquaticus* (Linnaeus). Adapted from Sars, 1899.

length, not including the caudal segment. Cephalon broader than it is long, with a slightly setous prominence on each side near the base, frontal edge straight. Segments of mesosome of nearly uniform size, lateral parts transversely truncated at the tip, and clothed with stiff hairs. Caudal segment about half the length of the mesosome, rounded quadrangular in form and fringed all round with stiff hairs; terminal edge bisinuate, with an obtuse median prominence. Eyes consisting

each of only 4 visual elements, ocular pigment not confluent. Superior antennae about the length of the peduncle of the inferior ones, flagellum composed of 10–12 articulations. Inferior antennae not quite as long as the body, flagellum more than twice the length of the peduncle. Legs densely clothed with spiniform bristles; 1st pair rather short with the propodus in female oblong oval, in male subtriangular, inner edge forming an obtuse prominence, armed with 3 strong spines. Uropoda with the rami more than twice as long as the basal part, and edged with scattered spiniform bristles. Colour very dark, fuscous, spotted with white. Length of adult female 8 mm., of male 12 mm."

According to Richardson, 1905, who described Greenland specimens, epimera are present on all the thoracic segments. On the first they are conspicuous and situated on the anterior lateral corners, on the second and third they are similarly situated but very small. In the fifth and succeeding segments, they become larger and are situated farther back, near or at the posterior corners. It appears to have slender limbs and uropoda than *communis*.

For descriptions and figures of many details of this species, especially of the appendages, the reader may be referred to Racovitza's (1919–1925) 'Notes sur les Isopodes,' many of which deal largely with this species.

DISTRIBUTION.—This is the common species of *Asellus* throughout most of the more northern parts of the Old World, but its distribution is probably not so wide as was formerly supposed, as other allied forms have been confused with it. (See Racovitza, 1919–1925, No. 2, p. 36.) It is apparently entitled to a place in the American list only because it occurs in Greenland, where it has been recorded by several authors, but *A. tomalensis* of northwestern America may perhaps be a very close ally.

Packard's (1897) record from Labrador, quoted by Richardson, 1905, refers to a land isopod (see Johansen, 1926, p. 140). The "*Asellus aquaticus*" from the Rideau River, Ontario, mentioned in a note in the Ottawa Naturalist, 1907, p. 102, was doubtless nothing but the common *A. communis* Say (see Johansen, 1920, p. 148).

#### ***Asellus tomalensis* Harford, 1877**

Figure 288

*Asellus tomalensis* HARFORD, 1877, p. 54 (orig. descr.).—RICHARDSON, 1899, p. 856 (1899, Ann. Mag. Nat. Hist., (7) IV, p. 322); 1900a, p. 297.—HAY, 1902, p. 422.—RICHARDSON, 1904, p. 668 (new descr.), Figs. 15–17; 1904a, p. 224 (descr.), Figs. 110–112.—HOLMES, 1904, p. 321 (descr.), Pl. xxxvii, figs. 39–42.—RICHARDSON,

1905, p. 431 (descr.), Figs. 487-489.—HOUSE, 1911, p. 132.—JOHANSEN, 1922, p. 156.—FEE, 1927, p. 20 (descr.).—JOHANSEN, 1929, p. 105.—STAMMER, 1932, p. 130.—MILLER, 1933, p. 102.

Harford (1877) described this species very briefly and insufficiently from a single mutilated specimen taken at Tomales Bay, California, but evidently in fresh water. Holmes, 1904, redescribed it at some length and figured the type. Two of his figures are here reproduced. Richardson 1904, 1905, gave a new description and several figures, yet our in-

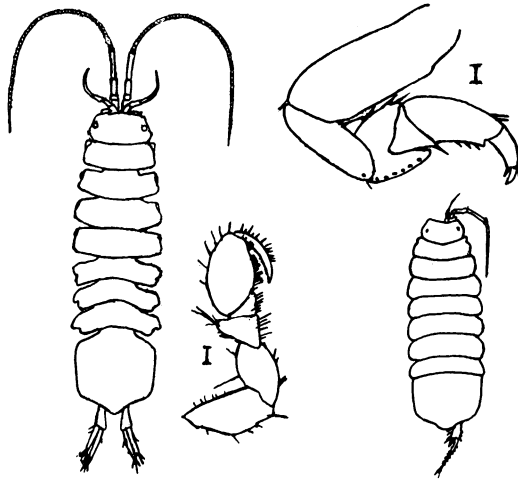


Fig. 288. *Asellus tomalensis* Harford. Two right-hand figures from original type (Holmes, 1904). Two left-hand figures after Richardson, 1905.

formation regarding it remains very insufficient for determining its diagnostic characters and relationships. According to Holmes, it may readily be distinguished from *communis* by the fact that in a dorsal view the thoracic epimera are concealed by the main portion of the somites in *tomalensis* but visible in *communis*. It appears probable that its relationship is closer with *aquaticus* than with *communis* and other American forms. Richardson gives the number of articles in the flagella of the first and second antennae as approximately ten and fifty-five, respectively. Length of Holmes type, about 7.5 mm.

DISTRIBUTION.—In fresh-water streams and lakes in the coastal region from northern California (Tomales Bay, the type locality), to British Columbia (Vancouver, Nanaimo and Ischachat). Holmes

records it from a well in Humboldt County, California; Richardson (1904, p. 668) described and assigned to this species specimens from a lake near Seattle, Washington. The identity of Richardson's specimens was questioned by Holmes (1904, p. 323), but seems to have been settled satisfactorily by a comparison with the type (see Richardson, 1904, p. 668), which is in the Academy of Natural Sciences, San Francisco.

House, 1911, lists it from Indiana, doubtless incorrectly.

***Asellus attenuatus* Richardson, 1900**

Figure 289

*Asellus attenuatus* RICHARDSON, 1900a, p. 297 (characters in key); 1901, p. 552 (descr.), Figs. 26-28.—HAY, 1902, p. 422.—RICHARDSON, 1905, p. 426 (descr.), Figs. 482-485.—FOWLER, 1912, p. 521.—STAMMER, 1932, p. 130.—MILLER, 1933, p. 102.

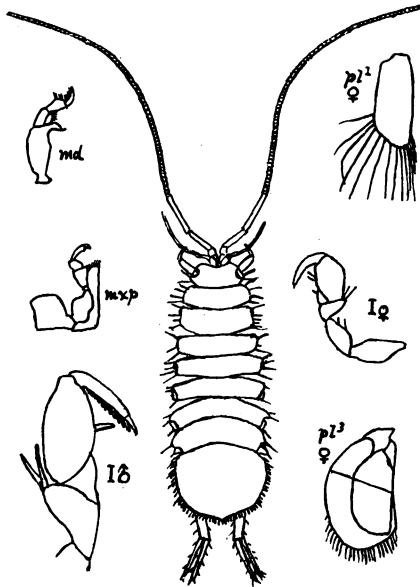


Fig. 289. *Asellus attenuatus* Richardson. Adapted from Richardson, 1905.

“Distinguished from *A. communis* by the very narrow cylindrical branches of the uropoda, and the narrow oval propodus of the first pair of legs which lacks prominent acute teeth on the palmar margin but is armed in the male with one stout spine. First antennae with a flagellum of thirteen articles, that of the second antennae with very numerous (over sixty) articles according to Richardson's figures. The second antennae are as long as the body.

"Epimera are present on all the thoracic segments and are situated at the anterior angles in the first four; the fifth has the posterior two-thirds emarginate, the epimeron conspicuous in the emargination; the sixth and seventh posteriorly emarginate, with the epimeron conspicuous." (Richardson, 1905, p. 427.)

Color reddish brown mottled with white. All the free margins of the body fringed with hairs; the lateral margins of the segments armed with spines. Dimensions not given.

LOCALITY.—Washington Ditch, Dismal Swamp, Virginia, many specimens collected. Type in U. S. National Museum (Richardson).

***Asellus brevicauda* Forbes, 1876**

Figure 290

*Asellus brevicauda* FORBES, 1876, p. 8 (orig. descr.), Figs. 8–11.—UNDERWOOD, 1886, p. 358.—PACKARD, 1888, p. 34.—RICHARDSON, 1900a, p. 297; 1905, p. 423. (descr.), Figs. 477–479.—STAMMER, 1932, p. 130 (see below).—MILLER, 1933, p. 102.

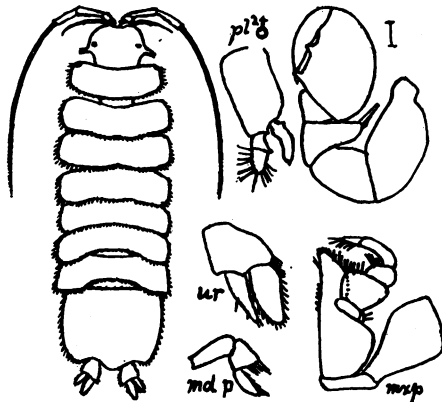


Fig. 290. *Asellus brevicauda* Forbes. Adapted from Forbes, 1876, and Richardson, 1905.

Anterior margin of head excavate and its antero-lateral angles somewhat truncate; its lateral margins near the rear produced into a small lobe on each side. First antennae with a flagellum of eleven to thirteen articles. The second antennae have a flagellum with from sixty to ninety articles (the higher number in the male).

Lateral margins of thoracic segments straight and entire or nearly so. Epimera distinguishable on the first segment only.

First legs of male with the palmar margin of the propodus straight,

with one strong tooth at its base and another at its middle. In the female the propodus is narrower and the palmar margin somewhat concave; the tooth at the middle is smaller but distinct. Many additional details are given in the original description.

DISTRIBUTION.—“Abundant in the hill country of southern Illinois, under stones in small streams.” (Forbes). Richardson, 1905, mentions Jackson and Union Counties in Illinois, and a small creek emptying into Redfoot Lake, Tennessee.

This species is assigned to the subgenus *Conasellus* by Stammer, 1932.

***Asellus hoppinae* Faxon, 1888**

Figure 291

*Asellus hoppinae* PACKARD, 1894, p. 731.

*Asellus hoppinae* FAXON, in GARMAN, 1889, p. 237 (orig. descr.), Pl. II, fig. 2.—HAY, 1902, p. 422.—RICHARDSON, 1905, pp. 420, 425, Figs. 480, 481.—STAMMER, 1932, p. 130 (see below).—MILLER, 1933, p. 102.

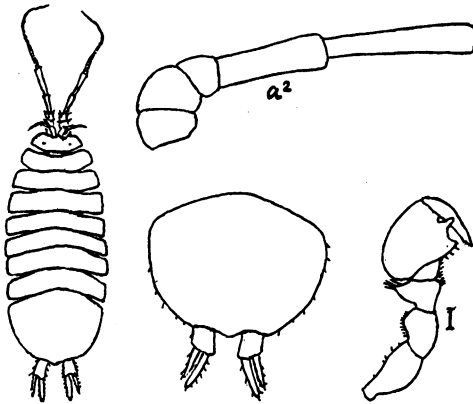


Fig. 291. *Asellus hoppinae* Faxon. Adapted from Faxon 1889, and Richardson, 1905.

Epimera not evident on any of the segments of the thorax. Head with the lateral margins not produced into lobes. First pair of antennae with a flagellum of about seven articles; they extend almost to the end of the fourth article of the peduncle of the second antennae. Second pair of antennae extending to the posterior margin of the seventh thoracic segment, their flagellum with about forty articles. First pair of legs subchelate, the propodus with two triangular processes on the clasping margin. Inner branch of uropoda twice as long as the basal segment, the outer branch about three-fourths its length.

DISTRIBUTION.—Subterranean waters in southwestern Missouri. Type locality: Day's Cave (Missouri). The American Museum of Natural History has one from Pine Run Cave, Stone County, Missouri.

This species is assigned to the subgenus *Conasellus* by Stammer, 1932.

***Asellus incisus*, new species**

Figure 292

Lateral parts of head expanded and flattened. The lateral margins, which converge toward the front, have a sharply defined narrow notch or cleft extending in at right angles toward the eyes, which are placed some distance in from the margin. Anterior border of head with an emargination or sinuous outline. Eyes somewhat

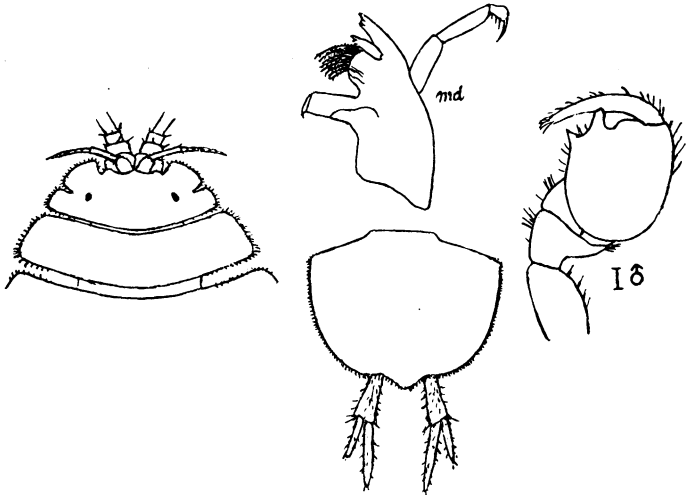


Fig. 292. *Asellus incisus*, new species.

irregularly oval, rather small but well pigmented and conspicuous. Flagellum of first antennae with about eight articles. Second antennae very long, almost as long as the body and with over seventy articles in the flagellum in the type.

The epimera are coalesced with their segments. There is a great variation in the length of the uropoda as a whole and in their branches. In the type, their basal segment projects beyond the telson for more than one-fourth of the length of the latter. The external branch much exceeds in length the exposed part of the basal segment and the inner branch is less than two-thirds the length of the outer. The other specimens, perhaps because not fully adult, have the uropoda much shorter, partly because the branches are proportionately shorter, but chiefly because the basal segment extends less beyond the end of the telson (in some young examples it projects but very little), and in many cases there is much less difference in the length of the two branches, though the inner is always longer and stouter.

Color very light yellowish brown, more or less unevenly mottled or marbled.

Length of the largest specimen (type), 15.5 mm. The remaining specimens obtained are all much smaller and more or less immature, ranging from 9 mm. to less than 4 mm. in length.

LOCALITY.—Spring in Marvel’s Cave, Stone County, Missouri. 18 specimens including the type (Cat. No. 6527), in the American Museum of Natural History.

This species apparently is well distinguished from our other species of *Asellus* by having a notch or cleft in the lateral margin of the head as in most species of *Mancasellus*, but having a well-developed mandibular palp, it cannot be placed in that genus.

**Asellus species**

*Asellus* sp. undet. PACKARD, 1888, p. 151, Pl. IV, fig. 4; 1894, p. 731.

The rather small and crude figure of this species, drawn from a single specimen obtained in Gill’s Branch, near Lancaster, Garrard County, Kentucky, would represent *A. hoppinae* fairly well except that the antennae and uropoda are somewhat longer, and the latter slenderer. No eyes appear in the figure but from Packard’s few statements (he remarks on its resemblance to *A. hoppinae*, 1894, p. 731) we may judge that it is not a blind species.

**CAECIDOTEA PACKARD, 1871**

This group is composed of blind species inhabiting subterranean waters in various parts of the United States. It is poorly distinguished from *Asellus*, the loss of the eyes and a more elongate terminal body segment being the chief differences, and as its species have without doubt arisen independently from different members of *Asellus*, its recognition as distinct from that genus has been objected to by several authorities, notably by Miller, 1930.

It is retained in the present work as a matter of convenience, without implying a single phylogenetic origin for its members. Type *C. stygia* Packard, 1871.

The following key to the species is given by Creaser, 1932, pp. 5, 6.

- 1a.—Eyes present but reduced. Japan.....*C. kawamurai* Tattersall, 1921.
- 1b.—Eyes absent.
  - 2a.—Outer terminal ramus of uropod at least half as long as peduncle.
    - 3a.—Length of telson and abdomen more than one-third as long as length of head and thorax. Tennessee and Georgia.....  
.....*C. nickajackensis* Packard, 1881.



- 3b.—Length of telson and abdomen one-fourth as long as length of head and thorax. Japan..... *C. akiyoshiensis* Ueno, 1927.
- 2b.—Outer terminal ramus of uropod distinctly less than one-half as long as peduncle.
- 4a.—Uropods not as long as body. Second antenna shorter than body.
- 5a.—Propodus of first walking leg of male with two tubercles along margin opposed to dactylus. Alabama.....  
..... *C. alabamensis* Stafford, 1911.
- 5b.—Propodus of first walking leg of male with three tubercles along margin opposed to dactylus. Kansas.....  
..... *C. tridentata* Hungerford, 1922.
- 5c.—Propodus of first walking leg of male with five tubercles along margin opposed to dactylus. Virginia, Kentucky, Indiana, and Illinois.....  
..... *C. stygia* Packard, 1871.
- 5d.—Propodus of first walking leg of male with about four long spines on inner margin. Dactylus with eleven spines on margin opposed to propodus. Tennessee.....  
..... *C. richardsonae* Hay, 1901.
- 4b.—Uropods as long as body. Second antenna twice as long as body. Missouri.....  
..... *C. antricola* Creaser.

*C. smithii* Ulrich is not included on the ground of being insufficiently known.

### Caecidotea stygia Packard, 1871

#### Figure 293

*Asellus stygius* FORBES, 1876, p. 11 (descr.), Figs. 19, 20.—UNDERWOOD, 1886, p. 359.—PRATT, 1935, p. 439 (*stygia*).

*Caecidotea microcephala* COPE, 1872, p. 411, Figs. 109, 110; 1872*a*, pp. 163, 174.—SMITH, 1873, p. 244.

*Caecidotea stygia* PACKARD, 1871, p. 752 (orig. descr.), Figs. 132, 133; 1872, p. 19, Figs. 132, 133; 1873, p. 95.—SMITH, 1874, p. 661.—PACKARD, 1879, p. 19, Figs. 132, 133.—HUBBARD, 1880, pp. 36, 79, 80, Fig. 10.—PACKARD, 1888, pp. 10, 12, etc., 29 (descr.), Pl. III, figs. 1–8, Pl. IV, figs. 1, 2.—STEBBING, 1893, p. 377.—PACKARD, 1894, pp. 729, 742.—RICHARDSON, 1900*a*, p. 297; 1901, p. 553.—HAY, 1902, pp. 423, 424 (*stygius*), 427, 428, Figs. 4, 5*a*, 5*g*.—RICHARDSON, 1905, p. 434 (descr.), Figs. 490–492.—BANTA, 1910, pp. 246, etc.—FOWLER, 1912, p. 522.—PRATT, 1916, p. 377.—RACOVITZA, 1920, p. 99; 1923, p. 107; pp. 580, 620 (*Caecidothea*), Figs. 196, 200, 201.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

*Cecidotea stygia* PACKARD AND COPE, 1881, p. 879.—PACKARD, 1885, p. 85; 1885*a*, p. 99.

This, the type species of the genus, is widely distributed in underground waters, and if the various authors who have referred specimens to it are all correct, it is very variable. According to Hay (1902) rudi-

ments of eyes may be found in some individuals. The number of joints in the first antennae is given as from ten to seventeen. The second have from seventy or less to eighty-five articles in the flagellum. In the female, they are about two-thirds the length of the body, in the male, somewhat longer. According to Richardson, epimera are present on all the thoracic segments and have on the first three segments the form of "small and narrow plates placed just below the anterolateral angles. On the fourth segment, they occupy the middle of the lateral margin. On the last three, they are posteriorly placed." According to the same author, the propodus of the first leg has two large and three small

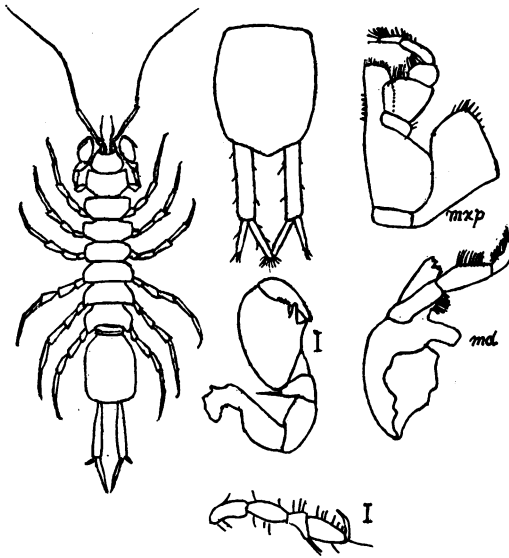


Fig. 293. *Caecidotea stygia* Packard. Adapted from Hay, 1902 (left figure), and Richardson, 1905 (details).

narrow teeth on the palmar surface of the chela. But Packard's original illustration, perhaps representing a female, shows no teeth but a row of six slender spines there. The uropoda vary greatly in development, individually and with age. In normal adult specimens, their basal segments are very long and narrow, about equaling the telson in length, the inner branch is likewise very long, while the outer is short.

Color practically white.

Length, up to 16 mm.

DISTRIBUTION.—This is given in detail by Packard, 1888, p. 32,

and comprises pools and streams in various caves in Kentucky, including Mammoth (the type locality), White's, Diamond, Salt, Wyandotte, and Walnut Spring Caves. Also, in Indiana, Bradford, and Carter Caves; wells in Illinois, and wells in Annville, Lebanon County, Pennsylvania, and springs and wells in limestone rocks in Cumberland and York Counties, Pennsylvania. Richardson adds Grahams Spring, Lexington, Virginia.

A "variety" which, however, he does not name, with but eight to nine joints in the first antennae, shorter head and body, and shorter abdomen, is recorded by Packard, 1888, p. 32, from Long Cave, near Glasgow Junction, Kentucky.

**Caecidotea alabamensis** Stafford, 1911

Figure 294

*Caecidotea alabamensis* STAFFORD, 1911, p. 572 (orig. descr.), Figs. 189, 190.—HUNGERFORD, 1922, pp. 175, 176.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

According to Miss Stafford, this species is most closely related to *C. stygia*. "But it differs from *C. stygia* in having the propodus of the first leg armed with two large triangular processes only, and three spines, whereas *C. stygia* has two large and three small triangular processes and no spines. The uropoda of this Isopod, *C. alabamensis*, are somewhat longer than the terminal abdominal segment. The outer branch of the uropoda is half as long as the inner branch whereas in *C. stygia* the outer is two-thirds as long as the inner.

"In *C. stygia* the first two articles of the first antennae are subequal in length but in *C. alabamensis* the second is longer than the first. In the former the flagellum of the first antennae has twelve articles, in the latter it has but ten articles. In *C. stygia* only five articles are given for the peduncle of the second antennae, whereas this isopod appears to have six, four small articles instead of three, although this may be merely a difference in observation. The flagellum of the second antennae of *C. alabamensis* has about eighty-five articles; that of *C. stygia* has but seventy. The terminal abdominal segment of *C. stygia* is less elongated than that of *C. alabamensis*, one and one-half times as long as wide in the former, once and two-thirds as long as wide in the latter. In *C. stygia* the median terminal lobe is less prominent than in *C. alabamensis*."

Length about 9 mm.; width about 1.5 mm.

LOCALITY.—A well in Auburn, Alabama, in the east central part of the state.

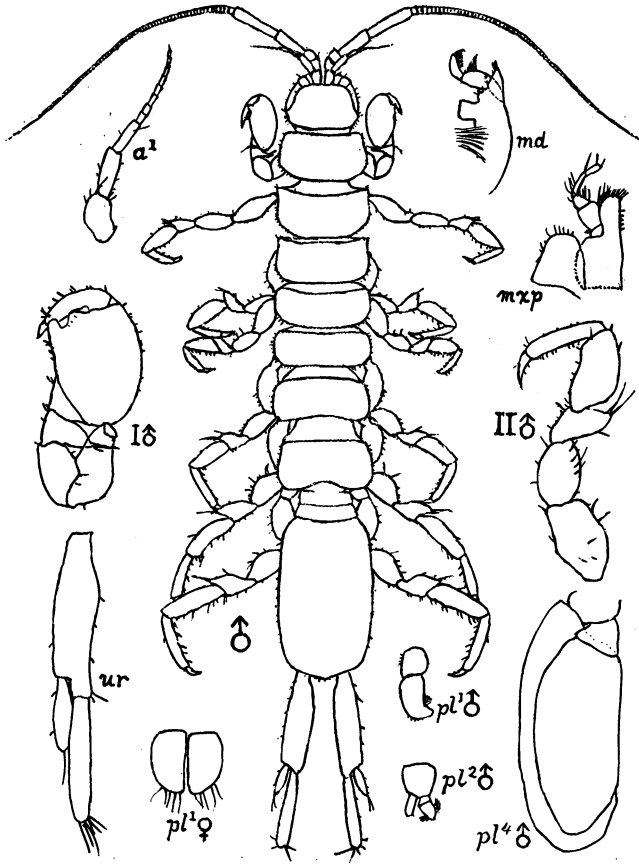


Fig. 294. *Caecidotea alabamensis* Stafford. Adapted from Stafford, 1911.

***Caecidotea nickajackensis* Packard, 1881**

Figure 295

*Caecidotea nickajackensis* PACKARD, 1881 (in Packard and Cope), p. 879 (orig. descr.), Pl. VII, fig. 3; 1888, p. 33 (descr.), Pl. III, figs. 9, 9a.—UNDERWOOD 1886, p. 359.—RICHARDSON, 1900a, p. 297.—HAY, 1902, pp. 426–429 (descr.), Figs. 1, 3, 5, 5b, 5d, 5e.—RICHARDSON, 1905, p. 436 (descr.), Figs. 493, 494.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

*Caecidotea troglodytes* HAY, 1902, p. 427 (see remarks below).

*Cecidotea nickajackensis* PACKARD AND COPE, 1881, p. 879.

The following statements are from Packard's description (1888, p. 33):

“Body longer, narrower and slenderer than in *C. stygia*. The first antennae are sometimes very long and reach to the end of the third joint of the second antennae, and are purplish white. . . . The second antennae . . . extend backward as far as the base of the abdomen. The legs are much longer and slenderer than in *C. stygia* and the caudal appendages are moderately long in one and short in another; in one individual the outer branch is much shorter and smaller than in the others; and in most it is as long as the basal joint. On the whole, the caudal appendages are no longer than the telson.”

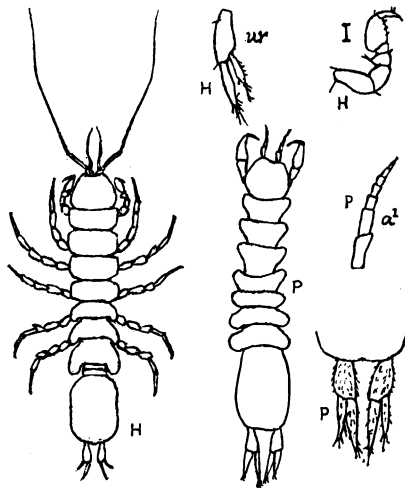


Fig. 295. *Caecidotea nickajackensis* Packard. Adapted from Packard, 1888 (P), and Hay, 1920 (H).

LOCALITIES.—Type locality, Nickajack Cave at Shellmound, Tennessee, near Chattanooga. (Packard's types have been lost, according to Hay.) Also, Metcalf, Georgia, in the extreme southern part of the state, 300 miles from Nickajack Cave. According to Hay, 1902, p. 427, these Georgia specimens may possibly represent a distinct species closely allied to Packard's Nickajack Cave form for which he proposes the name *Caecidotea troglodytes*. His figures of them are here reproduced in outline.

Richardson (1905) does not recognize them as distinct. The following details taken from Richardson's descriptions are apparently based on the Metcalf, Georgia, specimens:

The flagellum of the first antennae is composed of nine articles, that of the second antennae of fifty-three articles. Small epimera are present on all the thoracic segments, situated on the anterior part of the lateral margin in the first three segments, farther back in the fourth and posteriorly situated in the last three. Propodus of the first legs armed in the inferior margin with a triangular process near the distal end, and a long spine at the proximal extremity.

**Caecidotea richardsonae** Hay, 1902

Figure 296

*Caecidotea richardsonae* HAY, 1901, p. 180 (orig. descr.); 1902, p. 424 (descr.), Figs. 2, 5c, 5f.—RICHARDSON, 1905, p. 437 (descr.), Fig. 495.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 6.—MILLER, 1933, p. 102.

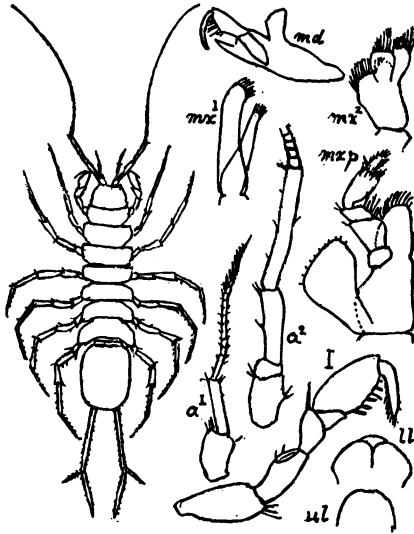


Fig. 296. *Caecidotea richardsonae* Hay. Adapted from Hay, 1902.

Distinguishable from *nickajackensis*, according to Hay, 1902, by the slenderer, frailer body, whiter coloration, longer legs, and much longer uropoda (more like those of *stygia*). The body is more parallel-sided, and narrower than in *nickajackensis*, but the telson is proportionately shorter and has sides of slightly convex outline. The first antennae have eleven articles in the flagellum, the second pair, which are as long as the body, have about eighty-six articles in the flagellum.

The propodus of the first pair of legs is thus described by Hay

(1902, p. 425): "The hand is broad, inflated and convex; the dactyl is strong and has an acuminate, somewhat sinuous tip and is provided, especially along its opposable margin, with stiff bristles. It shuts against the hand between two rows of strong spike-like teeth." Richardson (1905, p. 438) says: "The propodus is armed on the inferior margin with about four spines. The dactylus is armed with a row of about eleven spines along the inferior margin."

Length about 13.6 mm.

DISTRIBUTION.—A few examples, including the type, were found in the stream in Nickajack Cave at Shellmound near Chattanooga, Tennessee, by Hay in 1901, who failed to find there any specimens agreeing with Packard's *C. nickajackensis* previously described from that cave.

***Caecidotea smithii* Ulrich, 1902**

Figures 297, 298

*Caecidotaea smithii* EIGENMANN, 1900, p. 229 (*nomen nudum*, also Science, XII, p. 301).

*Caecidotea smithii* ULRICH, 1902, p. 93 (orig. descr.), Pl. xvi, figs. 10-18.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 6.

*Caecidotea smithsii* RICHARDSON, 1905, p. 438 (descr.), Fig. 496.—MILLER, 1933, p. 102.

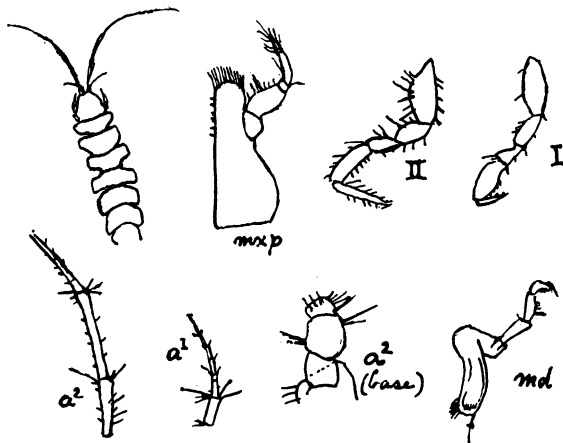


Fig. 297. *Caecidotea smithii* Ulrich. Adapted from Ulrich, 1902.

"Body of loosely jointed segments. Head as in *C. stygia* Pack. No trace of eyes. Inner antennae short, not more than half as long as basal portion of outer antennae. Flagellum of inner antennae consists of five segments, the second 1/4 of first, remaining ones longer. Last

segment of flagellum with a spine more than twice length of segment, beside which there is an olfactory club  $2/3$  as long. Another somewhat shorter olfactory club on penultimate segment. Last segment of the basal portion of the inner antennae provided with three spines, as in *C. stygia*. Outer antennae probably as long as body. Basal portion of 5 segments, the first three short and thick, the fourth and fifth much longer and more slender. The flagellum consists of at least 40 segments. Mouth parts essentially as those of *C. stygia*. Legs long and slender, first pair subchelate, remaining ones with a weak claw. Inferior margin of the body segments beset with short spines.

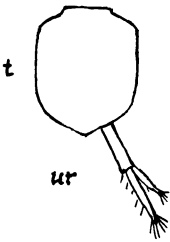


Fig. 298. *Caecidotea smithii* Ulrich. From specimen from Pine Run Cave, Mo., perhaps referable to this species.

“Size.—Very small, probably not over 3 mm. in length.

“Color.—White.” (Ulrich, 1902, p. 93.)

LOCALITY.—Subterranean stream near San Marcos, southern Texas. Collected by Dr. C. H. Eigenmann from the United States Fish Commission well. “The above description is from a fragment.” (Ulrich). The American Museum of Natural History has a few small fragmentary specimens (Cat. No. 6085) including no males with chelae, from Pine Run Cave, Stone County, southern Missouri, which may belong to this species or to *C. antricola* Creaser, or to an undescribed species.

***Caecidotea tridentata* Hungerford, 1922**

Figure 299

*Caecidotea tridentata* HUNGERFORD, 1922, p. 175, Pl. xv.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

The illustrations, based on those of Hungerford, show the distinguishing characters of this species. First antennae with from twelve to eighteen articles in the flagellum, the flagellum of the second antennae has sixty to eighty articles.

“In the males the propodus is very large and bears three well developed processes, one at the base and two near the distal end. The



basal one is bifurcate in some and in others bears instead a strong seta. . . . The uropods are longer than the abdominal segment that bears them, the relative length being 5:3. The two branches are of very unequal length. . . . There is considerable variation in the comparative length of these parts. . . . The females are smaller than the males and do not have as well-developed propodi." (Hungerford, 1922.)

This is the largest species of the genus, the body length ranging from 9 mm. to 19 mm.

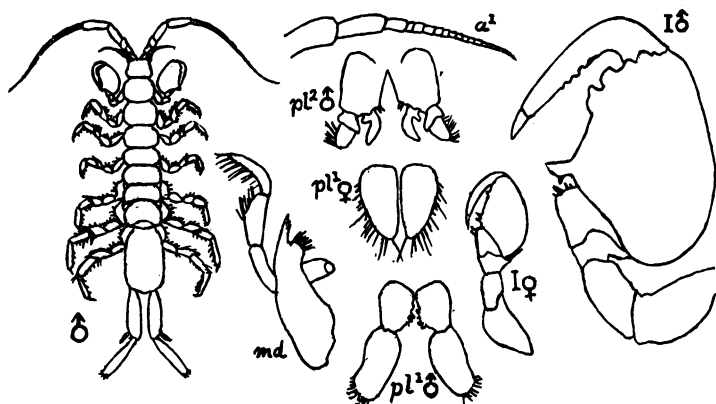


Fig. 299. *Caecidotea tridentata* Hungerford. Adapted from Hungerford, 1922.

LOCALITIES.—Type locality a cistern (according to Hungerford's statement, apparently supplied only by rain water from a roof) in Lawrence, Kansas. Specimens, including the types, in the Kansas University Collection. Specimens of this species donated by E. A. Popenoe, Topeka, Kansas (no further information regarding their locality), are in the U. S. National Museum, according to Hungerford.

***Caecidotea antricola* Creaser, 1931**

Figure 300

*Caecidotea antricola* CREASER, 1931, p. 1 (orig. descr.), Pls. I, II.—MILLER, 1933, p. 102.

Only the male is described at length and figured in detail. The male attains a large size; body length 18 mm., with second antennae 41 mm. long, and uropoda 19 mm. long. Dimensions of female not given, and only the chela figured.

The following details from the description of the male are quoted

to supplement the figures here reproduced (Creaser figures also the maxilliped, first maxilla, and mandible):

“First antenna with broad basal segment armed with three spines.

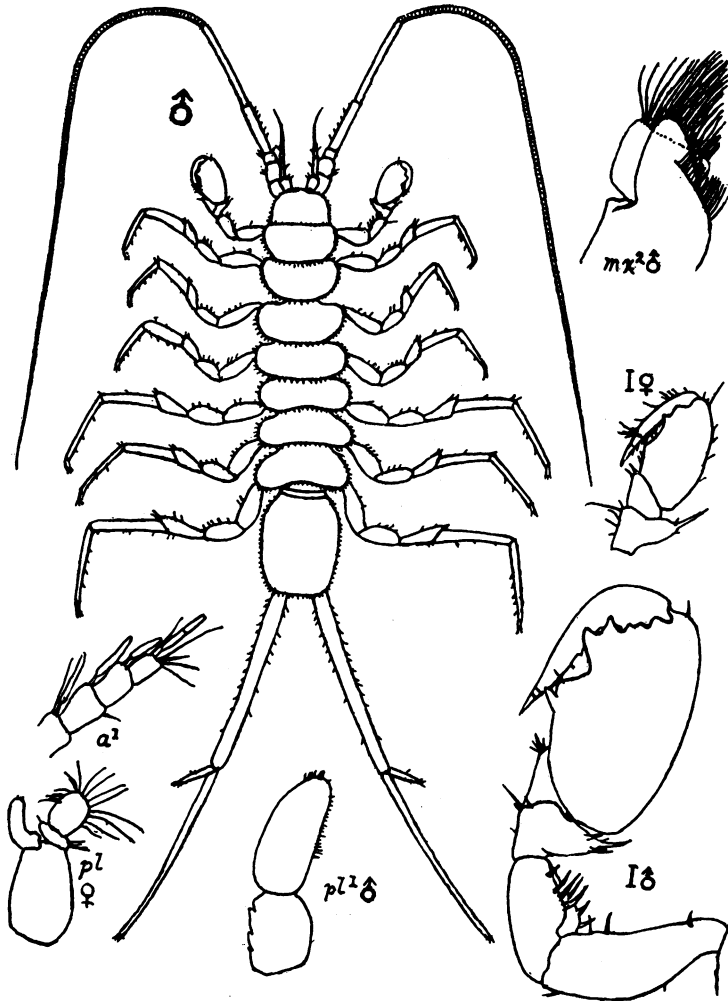


Fig. 300. *Caecidotea antricola* Creaser. Adapted from Creaser, 1831.

. . . Flagellum composed of 20 segments. Apices of segments 12, 13, 15, 17, 18, 19, and 20 with a single club-shaped seta (perhaps of a sensory nature) in addition to normal setae which are found on almost every

segment. . . . Second antennae with a . . . flagellum with more than 109 segments, the first one enlarged. About every fifth segment near middle of flagellum bearing a cluster of 3 or 4 setae.

“Mandible with two series of teeth at apex, the outer with four, the inner with three. Margin of mandible below inner row of teeth with plumose setae. Mandibular palp with three segments, the last two bearing many long setae. . . .

“Color milky white, the dark intestine showing through.”

LOCALITY.—River Cave, Snyder Estate, Hahatonka, Camden County, Central Missouri, where it was found to be “very abundant” in August, 1930. Types in the University of Michigan Museum. (See also remarks under *C. smithii*.)

#### MANCASELLUS HARGER, 1876

New name substituted for the original generic name *Asellopsis* Harger (1874, p. 601) on account of preoccupation (Harger, 1876, p. 305).

Resembles *Asellus* in most characters but the mandibles are without a palp. Epimera coalesced with their segments. Eyes are present. Dactylus of last six pairs of legs ending in two claws. Type *M. tenax* (Smith), 1871.

Five American species and one variety have been described but they are all so similar that it seems best to devote space chiefly to the distinguishing characters though the reliability of some of these is open to question. Most of the figures given by the authors are here reproduced in outline. The key for distinguishing them, given by Richardson, 1905, p. 410, is as follows:

- a.—Lateral margins of head entire. . . . . *Mancasellus brachyurus* Harger.
- a'.—Lateral margins of head not entire.
- b.—Uropoda shorter than terminal segment of the body.
- c.—Uropoda half as long as terminal segment of body. Propodus of first pair of legs armed with two triangular processes. Lateral margins of head with a deep cleft on either side. . . . *Mancasellus macrourus* Garman.
- c'.—Uropoda two-thirds as long as terminal segment of body. Propodus of first pair of legs armed with one triangular process or three acute teeth. Lateral margins of head with a large rounded sinus on either side.
- d.—Propodus of first pair of legs armed with one triangular process. Sides of sinus on lateral margins of head not meeting. . . . .
- . . . . . *Mancasellus tenax* Smith.
- d'.—Propodus of first pair of legs armed with three acute teeth. Sides of sinus on lateral margins of head sometimes meeting. . . . .
- . . . . . *Mancasellus dilatus* Harger.

- b'.—Uropoda as long as terminal segment of body.
- c.—Propodus of first pair of legs armed with one triangular process. Second pair of antennae as long as or longer than the body. Inner branch of uropoda nearly three times as long as outer branch.....  
 ..... *Mancasellus lineatus* (Say).
- c'.—Propodus of first pair of legs armed with two processes, one triangular and the other truncate. Second pair of antennae shorter than the body. Inner branch of uropoda twice as long as outer branch.....  
 ..... *Mancasellus danielsi* Richardson.

*M. herricki* is insufficiently known to locate exactly in such a key, but would be placed near to *M. tenax*.

***Mancasellus tenax* (Smith), 1871**

Figures 301, 302

*Mancasellus tenax* HARGER, 1876, p. 304.—HAY, 1882, p. 242.—HERRICK, 1887, p. 40.—UNDERWOOD, 1886, p. 359.—STEBBING, 1893, p. 377.—RICHARDSON, 1900a, p. 297; 1905, pp. 415, 416 (descr.), Figs. 466, 467.—PEARSE, 1910, p. 73.—HUNTSMAN, 1913, p. 274; 1918, p. 148.—RACOVITZA, 1920, p. 105; 1920a, p. 28, Figs. 85-113.—JOHANSEN, 1920, pp. 127, 146; 1926, p. 95, Fig.—RACOVITZA, 1923, p. 118; 1925, pp. 584, 610, 620, Figs. 203, 206-208.—RAWSON, 1928, p. 90.—JOHANSEN, 1931, p. 83.

*Asellopsis tenax* SMITH, 1874, p. 659 (orig. descr. by Harger), Pl. I, fig. 3; 1874a, pp. 695, 706.—HARGER, 1874, p. 601.

*Asellus tenax* SMITH AND VERRILL, 1871, p. 453 (orig. descr.).

See also remarks under *M. dilatus* below.

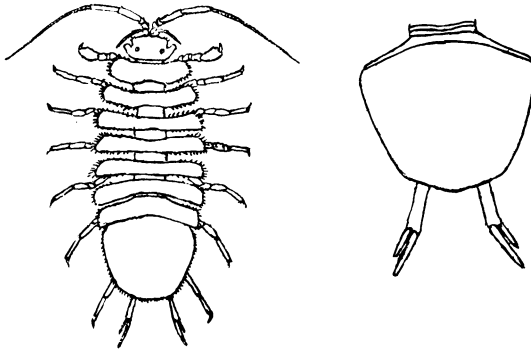


Fig. 301. *Mancasellus tenax* (Smith). Adapted from Harger (in Smith, 1874), and Richardson, 1905 (details).

“Anterior margin of the head broad, excavated for the bases of the antennulae; external angles rounded; margin expanded with a large, rounded sinus on a line with the eyes; behind this the margin expands

into a rounded lobe. The posterior margin of the head is broad and rounded behind, adapted to the first thoracic segment. Eyes of more than twenty facets, considerably within the margin of the head, oval or somewhat reniform." (Smith, 1871, p. 659.)

First antennae with a flagellum of about five articles; second antennae about half as long as the body with a flagellum of about thirty articles.

"First pair of thoracic legs chelate; carpus small, triangular, and closely united with the propodus, which is thickened in the male, with a broad, low tubercle on the inner margin a little above the base; dactylus

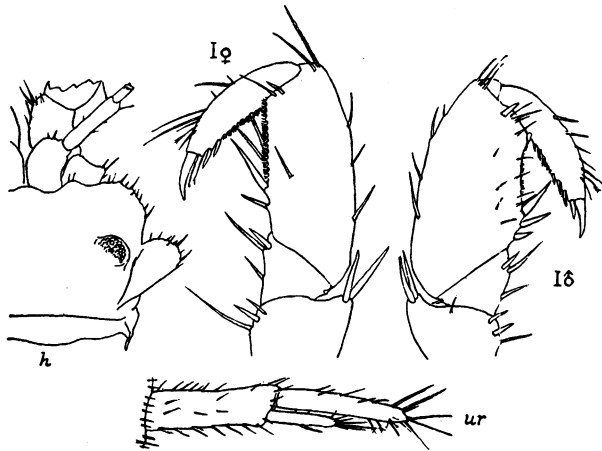


Fig. 302. *Mancasellus tenax* (Smith). Adapted from Racovitza, 1920.

more than half as long as the propodus, its palmary edge armed with spines, of which the distal ones are the larger, and at the end with a large spine." (Smith, 1871, p. 660.)

Color above dark fuscous, spotted and mottled with yellowish. According to Johansen, 1920, p. 146, young individuals have four longitudinal dark stripes.

Length, excluding appendages, 8 to 13 mm.

DISTRIBUTION.—Points in Lake Superior in 4 to 13 fathoms (type locality south side of St. Ignace among *Cladophora*); Thunder Bay, Lake Huron, 30 fathoms among algae (Smith); and Johansen, 1920, Alexandria Bay, Thousand Islands, New York, and several localities in southern Canada (Provinces of Ontario and Quebec). Johansen states that it is often found under stones (in shallow water). Specimens

from Irvington, Indiana, reported by Hay, 1882, may belong rather to *M. dilatus* (see below).

This species was carefully redescribed and its details figured by Racovitza, 1920a, from specimens (probably original material of Smith) from Lake Superior, received from the U. S. National Museum.

#### **Mancasellus dilatus** (Smith), 1874

*Asellopsis tenax* var. *dilata*, SMITH, 1874, p. 661 (orig. descr.).

*Mancasellus tenax* var. *dilata* RICHARDSON, 1905, p. 410, 416 (descr.).—HUNTS-  
MAN, 1913, p. 274.—PEARSE, 1910, p. 73.—RACOVITZA, 1920a, p. 44.

See remarks below regarding *M. tenax* Hay, 1882, p. 242.

Smith, 1874, p. 661, described a variety *dilata* of *M. tenax* as follows (description quoted also in Richardson, 1905, p. 416):

“The flagellum of the antennulae contains one or two more segments. The lateral portions of the head and segments of the body, especially in fully adult specimens, are expanded so that the outline of the animal is a broader oval. The open sinus in the lateral margin of the head is a narrow incision, rounded at the bottom, but with the sides sometimes meeting. The propodus in the first pair of legs is nearly as much enlarged in the males as in *A. communis*, and is armed on its palmary margin with three acute teeth, of which the middle one is the largest.”

LOCALITIES.—Detroit River at Ecorse, Michigan, type locality (Smith). Racovitza, 1920, doubtfully refers to this variety (which he considers may perhaps be a distinct species) specimens from Irvington, Indiana, recorded as *M. tenax* by Hay, 1882. It would appear quite as worthy of recognition as a species as some of the others of the American species of this family that have been described.

#### **Mancasellus brachyurus** Harger, 1876

Figures 303, 304

*Mancasellus brachyurus* HARGER, 1876, p. 304 (orig. descr.).—UNDERWOOD, 1886, p. 359.—BOVALLIUS, 1886, p. 39.—HERRICK, 1887, p. 40.—H. GARMAN, 1890, p. 29, Figs. *c, e, g, i, k*.—STEBBING, 1893, p. 377.—RICHARDSON, 1900a, p. 296; 1901, p. 551; 1902a, p. 505; 1905, p. 411 (descr.), Figs. 459–461.—FOWLER, 1912, p. 522.—RACOVITZA, 1920a, p. 44 (*brachiurus*).

Lateral margins of head entire. First antennae with six, the second with about fifty-five articles in the flagellum. Propodus of first legs of male with a prominent acute tooth on the palmar margin near the base.

Length about 15 mm.

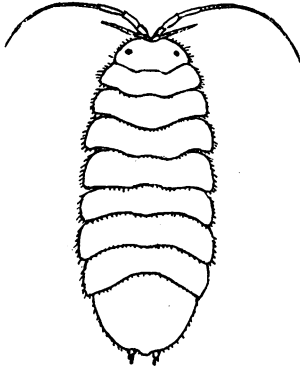


Fig. 303. *Mancasellus brachyurus* Harger. Adapted from Richardson, 1905.

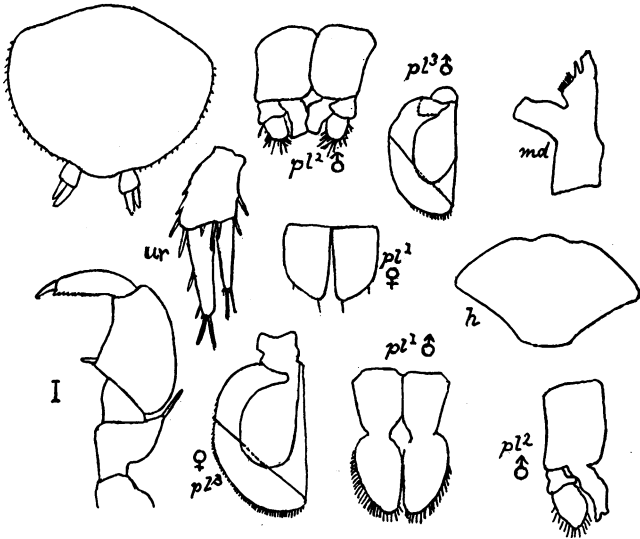


Fig. 304. *Mancasellus brachyurus* Harger. Adapted from Richardson, 1905, and Garman, 1890.

LOCALITIES.—McKee's Spring, Lexington, Virginia, and Gaylord, Virginia. Reputed injurious to water cress. There are a few specimens from the former locality in the American Museum of Natural History, also a considerable number from the ponds of the fish hatchery at Pleasant Mount, in the northeastern corner of Pennsylvania (watershed of the Delaware River) where it is found among water cress, and is an important food of the trout.

**Mancasellus macrourus** Garman, 1890

Figures 305, 306

*Mancasellus macrourus* GARMAN, 1890, p. 28, Figs. a, b, d, f, h, i.—RICHARDSON, 1900a, p. 297; 1902a, p. 505.—HAY, 1902, p. 423, Fig. 1.—RICHARDSON, 1905, p. 413 (descr.), Figs. 462–465.—ZELENY, 1907, pp. 325 ff., Pls. VI–XII.—PRATT, 1916, p. 377.—RACOVITZA, 1920, pp. 103, 105; 1920a, p. 45 (descr.); 1923, p. 118; 1925, pp. 583, 586, 610, 620, Figs. 202, 204, 205 (name misspelled, *macrurus*), Figs. 114–134.—CHAPPUIS, 1927, p. 61.—MARKUS, 1930, p. 220, etc.—PRATT, 1935, p. 439.

Lateral margins of head converging toward the front and cleft opposite the eyes, which are situated some distance within the margin,

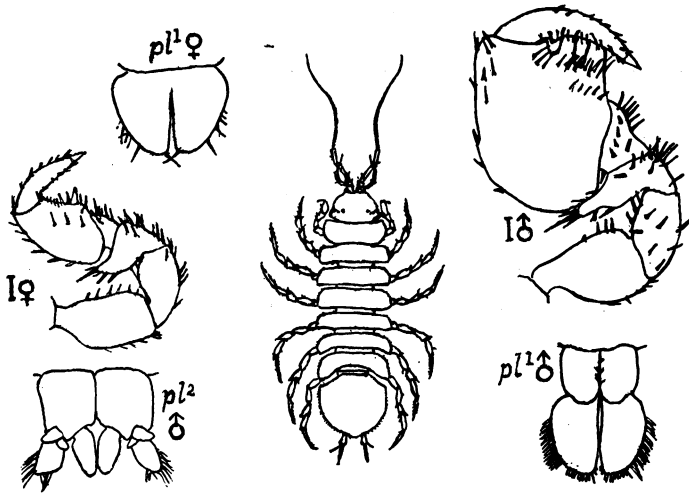


Fig. 305. *Mancasellus macrourus* Garman. Adapted from Hay, 1903 (entire animal), and Markus, 1930 (details).

by a narrow notch or fissure extending in at right angles. First antennae with a flagellum of six to eight articles; that of the second with thirty-five to forty-three articles.

DISTRIBUTION.—Types from "eastern Kentucky, where it is abundant in springs and spring-fed rivulets and ponds," according to Garman. Other authors record it from points in southern Ohio, Kentucky, Tennessee and northwestern Georgia, including Echo River in Mammoth Cave, Kentucky, apparently the only record from subterranean waters, though Hay, 1902, p. 423, reports it from just outside Nickajack Cave, near Chattanooga, Tennessee.



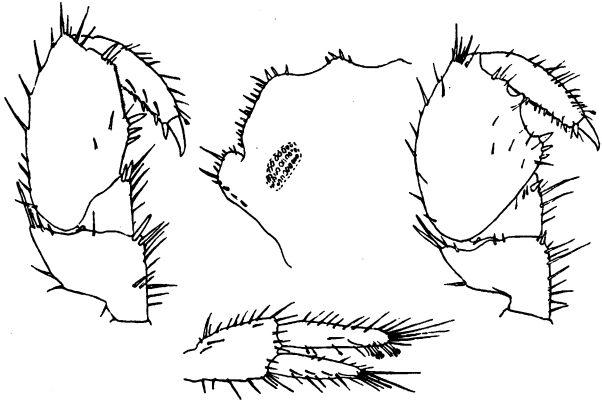


Fig. 306. *Mancasellus macrourus* Garman. Details. Adapted from Racovitza, 1920.

This species has been carefully redescribed and details figured by Racovitza, 1920, from specimens from Nashville, Tennessee, received from the U. S. National Museum.

***Mancasellus danielsi* Richardson, 1902**

Figure 307

*Mancasellus danielsi* RICHARDSON, 1902a, p. 505 (orig. descr.), Figs. 1-4; 1905, p. 417 (descr.), Figs. 468-471.—SHELFORD, 1913, pp. 135, 154, 174.—ALLEE, 1929, p. 24.

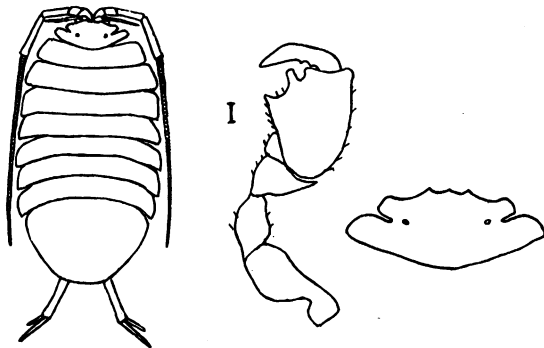


Fig. 307. *Mancasellus danielsi* Richardson. Adapted from Richardson, 1905.

Closely related to *M. tenax*, from which Richardson distinguishes it because of its longer antennae and uropoda, a wider caudal segment, and teeth on the grasping edges of the chelae of the first pair of legs, as

shown in her figures here reproduced. The first antennae are stated to have a flagellum of eight articles. The figure shows nearly sixty articles in the flagellum of the second antennae, which are about as long as the body.

LOCALITY.—Lily Lake, at Laporte, Indiana (Richardson); Fox Lake, Illinois (Shelford); Dune Creek, Northern Indiana (Allee). Type in U. S. National Museum (Richardson).

**Mancasellus herricki**, new name

Figure 308

*Mancasellus* sp. HERRICK, 1887, p. 40, Pl. v, fig. 8.

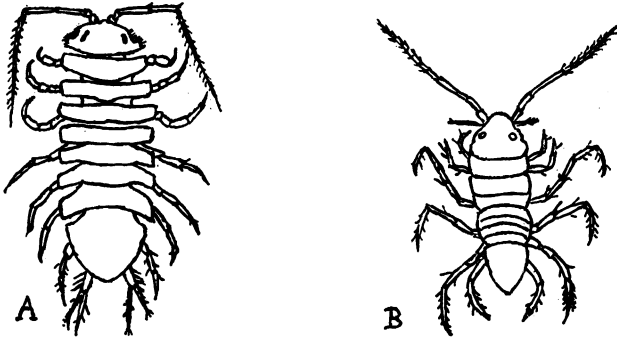


Fig. 308. *Mancasellus herricki*, new name. Adapted from Herrick, 1887.

I propose this name for a species figured by Herrick in the above work, but not named or described except by a statement that the head has the lateral margins emarginated as in *M. tenax*, the segments more closely associated, the pleon excavated in front on either side and not truncate posteriorly but rather acute, and the caudal stylets short with the outer ramus at least two-thirds as long as the inner.

LOCALITY.—Tuscaloosa, Alabama. Type apparently not preserved.

I cannot identify this with any other described form. Herrick also figures on the same plate (Fig. 9) a larval form which he states is "apparently a larva of some member of this genus."

**Mancasellus lineatus** (Say), 1818

*Asellus lineatus* SAY, 1818, p. 428 (orig. descr.).—DE KAY, 1844, p. 50.—UNDERWOOD, 1886, p. 359.

*Mancasellus lineatus* RICHARDSON, 1900a, p. 297; 1901, p. 551; 1905, p. 416 (orig. descr. quoted).

I follow Richardson in placing this species in *Mancasellus* rather than *Asellus* though no real evidence for the change seems to be available, since the presence of a cleft or sinus in the margin of the head is not conclusive (see *Asellus incisus*). All that has been published about it seems to be based on Say's original description, which is as follows:

"Body oblong; interior antennae much shorter than the peduncle of the exteriors; caudal appendices, peduncle cylindrical.

"Inhabits South Carolina.

"Cabinet of the Academy.

"Body oblong, not distinctly attenuated before; segments subequal, entire; head at base equal to the preceding segment, a sinus each side in the middle; eyes prominent, black; antennae exteriors as long as the body in one sex; in the other, longer, interiors nearly attaining the tip of the second joint; hands with a prominent angle on the middle of the inferior edge, thumb closing on and surpassing the angle, shorter than the hand; nails somewhat bifid at tip; terminal caudal segment longitudinally subovate, styles elongated cylindrical, equal to the terminal segment of the body, laciniae very unequal, inner one nearly thrice the length of the outer one, truncate at tip; color, pale brown with a double dorsal brown line, united at tip of the tail, a brown line or two each side of the tail. Length nearly one-fourth of an inch.

"This animal is not an uncommon inhabitant of the swamps in the forests of South Carolina." (Say, 1818, p. 428.)

#### SUBORDER EPICARIDEA OR BOPYROIDEA

A group of Isopoda that are parasites of other Crustacea, commonly living in the branchial cavity or attached to the underside of the abdomen of their host.

The females are large and become profoundly modified for their parasitic existence; they do not move when they have once attained their position on the host, and when inhabiting the branchial cavity they cause a conspicuous swelling on the side of the carapace of the host. The males are very minute and much less modified from the ordinary isopod type. They remain capable of locomotion, but one may usually be found clinging to the ventral side of the body of the much larger female, whose marsupium, when fully developed, is very large and commonly distended with a great number of small eggs.

#### Bopyridae

The chief family of the order; its members are parasitic on Deca-

poda (chiefly on *Macrura* or *Anomura*). In the females, the body is usually quite asymmetrical; its segmentation is distinct and the usual seven pairs of thoracic limbs are developed, though small and weak; there are five pairs of incubatory plates, and most or all of the pleopoda are recognizable, though of simple or more or less rudimentary structure. The males have all the thoracic segments well defined, and well-developed prehensile legs. Their abdominal segments are often more or less, coalesced and have only rudimentary appendages, if any at all.

**PROBOPYRUS GIARD AND BONNIER, 1888**

Parasites in the branchial cavity of shrimps, especially those of the family Palaemonidae. When the host is of a species that grows large, only young individuals are found infested (up to about 80 mm. long, as far as the writer has observed).

"Segments of abdomen in female dorsally defined; lateral parts or pleural lamellae not developed. Five pairs of double-branched pleopods are present. Uropoda wanting.

"Segments of abdomen in male fused dorsally, but defined on the lateral margins. Five pairs of small tuberculiform pleopods present. Uropoda wanting." (Richardson, 1905, p. 553.)

*Palaegyge* Giard and Bonnier, 1888, is a synonym (see Nierstrasz and Brender à Brandis, 1929, p. 18). Though both genera were established in the same article, *Probopyrus* has page precedence.

The female parasite lies in the branchial chamber of the shrimp, with the head directed posteriorly and usually somewhat dorsally, relative to the host's body, and with the ventral aspect outward and the dorsal aspect, which is perfectly flat, against the gills of the host. The body is asymmetrical to a varying, but usually considerable, degree: the convexity of the long axis is toward the ventral side of the host, and consequently toward the left if the parasite was borne in the left branchial chamber of the host, and toward the right in the opposite case.

**Probopyrus bithynis Richardson, 1904**

Figures 309, 310, 311

*Palaegyge meeki* RICHARDSON, 1912, p. 521 (orig. descr.), Figs. 1-4.—CHOPRA, 1923, p. 486.—NIERSTRASZ AND BRENDER À BRANDIS, 1923, p. 93; 1925, p. 7.—VAN NAME, 1926, p. 2 (Paraiso, Canal Zone, in fresh water, on *Macrobrachium acanthurum*).

*Probopyrus bithynis* RICHARDSON, 1904, p. 68 (orig. descr.), Figs. 46-51; 1905, p. 557 (descr.), Figs. 606-611.—PEARSE, 1911, pp. 108, 109; 1915, p. 550.—CHOPRA, 1923, p. 510.—NIERSTRASZ AND BRENDER À BRANDIS, 1923, p. 94; 1929, pp. 21, 23.—VAN NAME, 1925, p. 481 (descr.), Figs. 24, 25.

*Probopyrus bithynis* var. *gigas* NIERSTRASZ AND BRENDER à BRANDIS, 1929, p. 20.

*Probopyrus floridensis* var. *gigas* NIERSTRASZ AND BRENDER à BRANDIS, 1925, p. 5 (descr.).

*Probopyrus* sp. BEEBE, 1925, p. 59.

*Probopyrus panamensis* RICHARDSON, 1912b, p. 523 (orig. descr.), Figs. 5-8.—RATHBUN, 1912, p. 460.—VAN NAME, 1925, p. 483; 1926, p. 2.—NIERSTRASZ AND BRENDER à BRANDIS, 1929, p. 20 (fresh waters of Canal Zone, on *Macrobrachium jamaicense* or *M. olfersii*).

*Probopyrus meeki* NIERSTRASZ AND BRENDER à BRANDIS, 1929, p. 23.

See also remarks below on *Probopyrus pandalicola* (Packard).

I can find no sufficient grounds for regarding the above forms otherwise than as representatives of a single species. The following description is from British Guiana specimens:

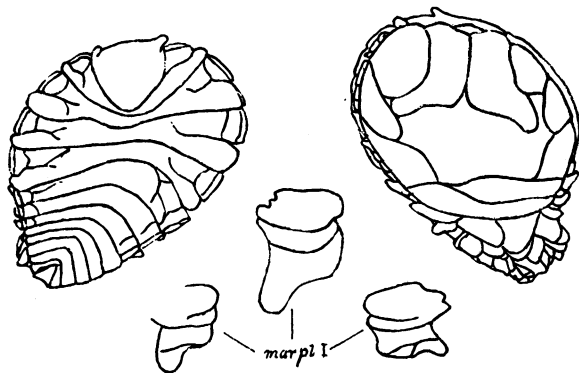


Fig. 309. *Probopyrus bithynis* Richardson. Adapted from Richardson, 1904. Specimens from Mississippi River. The small figures show 1st marsupial plates of three individuals to illustrate variation.

The female is without eyes, and measures 10 to 11 mm. in greatest length in the case of the largest individuals, which are naturally to be found in the larger and older shrimps. The marsupial plates, which are far too short to completely cover the immense mass of eggs that the animal bears, are more or less pigmented with conspicuous blackish pigment, some of which also occurs on the lateral parts of the segments of the shorter side of the body on both ventral and dorsal sides of the thorax, on the dorsal side especially along the lines of articulation between these segments. The amount and intensity of the pigment is variable, but usually quite conspicuous, even through the carapace of the host, which exhibits a large localized swelling over the location of the

parasite. The head may or may not have the anterior lateral angles produced into more or less distinct lobes. Each of the pleopoda consists of a short basal portion bearing two broad leaf-like smooth-edged branches. There are five pairs, decreasing in size from the first to the fifth segment of the abdomen. Uropoda are wanting.

The males vary in length from 1.7 mm. to about 3 mm., this difference being due in part to actual individual variation, but still more largely to the state of contraction of the body muscles, the body being very soft. This is clearly shown in the outlines of four individuals

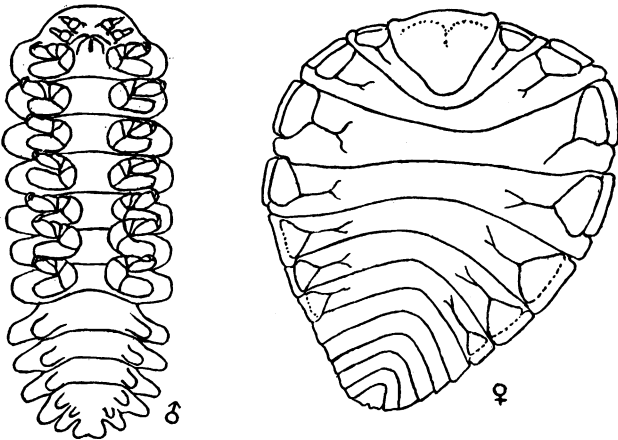


Fig. 310. *Probopyrus bithynis* Richardson. From Van Name, 1925, *Zoologica*, VI, p. 481. Male, ventral aspect; female, dorsal aspect. Specimens from British Guiana.

shown in the figure, which also brings out the fact that the amount of constriction between segments is largely a matter of degree of contraction and cannot be relied on as a specific character. They have two pairs of small antennae, eyes, if any are discernible, represented by small pigment spots, and small but well-developed prehensile legs. The head and thoracic segments are distinct and separate, but all the abdominal segments are fused into a semicircular mass with ten lobes around the edge representing the ends of the segments, and a median lobe, often more or less emarginate or cleft at the end, representing the telson. The pleopoda are represented by five pairs of small, soft, rounded projections on the lower surface. No uropoda are present.

DISTRIBUTION.—Parasitic on the following species of shrimps of

the genus *Macrobrachium* (= *Palaemon*, or *Bithynis* of some authors) inhabiting rivers and streams.

*M. ohionis* (Smith), Mississippi River near New Orleans (type locality). Type in U. S. Nat. Museum. Richardson, 1904.

*M. acanthurum* (Wiegmann) Escondido River, Nicaragua. Richardson, 1905.

*M. olfersii* (Wiegmann) Cuatotolapam, Vera Cruz, Mexico, Pearse, 1911, and La Rosa, Santa Marta, Colombia, Pearse, 1915.

*M. amazonicum* (Heller) formerly not distinguished from the closely allied *M. lemarrei* of the Old World. Kartabo, British Guiana, Van Name, 1925; Surinam, and Essequibo River, British Guiana; Nierstrasz and Brender à Brandis, 1925, 1929.

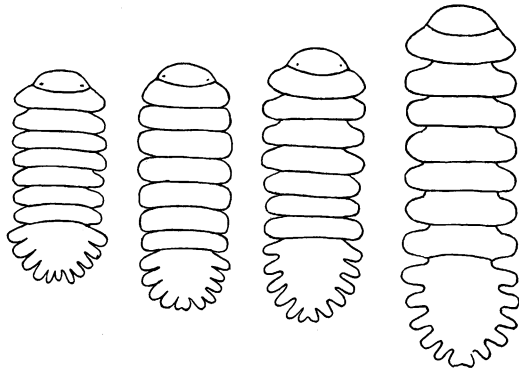


Fig. 311. *Probopyrus bithynis* Richardson. Four males (dorsal view) showing variation in size and form. Specimens from British Guiana.

Also recorded from the fresh waters of the Canal Zone (under the names *P. panamensis* and *Palaegyge meeki* Richardson, 1912) on *M. jamaicense*, *acanthurum*, and *olfersii*.

Nierstrasz and Brender à Brandis make *P. bithynis* a subspecies of *P. floridensis* Richardson, 1904, parasitic on a small shrimp, *Palaemonetes exilipes* Stimpson, which is marine or perhaps to some extent an inhabitant of brackish water. I hesitate to accept this view as the above species of *Macrobrachium* are true fresh-water forms and according to Richardson's figure, *P. floridensis*, has the ends of the abdominal segments much more rounded off than is the case in *bithynis*. But even if the two forms are only subspecifically distinct, *P. bithynis* would be the name of the form parasitic on *Macrobrachium* and *P. bithynis flori-*

*denis* that infesting *Palaemonetes exilipes*, as the name *bithynis* has page precedence over *floridensis*.

*Probopyrus bithynis* is also very closely allied to *P. pandalicola* Packard, 1879 (see Richardson, 1905, p. 554 (descr.), Figs. 599–601, also Ward and Whipple, 1918, p. 842), parasitic on a small shrimp, *Palaemonetes vulgaris* (Say), of the Atlantic coast of the United States, which often ascends streams into brackish or even almost fresh water.

**Probopyrus oviformis** Nierstrasz and Brender à Brandis, 1929

Figure 312

*Probopyrus oviformis* NIERSTRASZ AND BRENDER À BRANDIS, 1929, p. 22 (orig. descr.), Fig. 24.

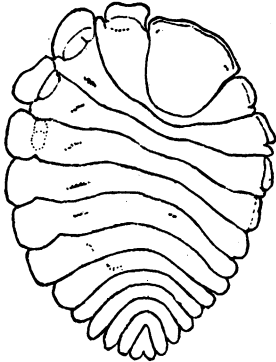


Fig. 312. *Probopyrus oviformis* Nierstrasz and Brender à Brandis. Adapted from illustration of the above authors, 1929.

This species is based on a single female specimen only 2.5 mm. long and 2 mm. wide, bearing no eggs and very probably not fully adult. Its characters can be better appreciated from the figure here reproduced than by quoting from the description, though attention should be called to the small size, the large size of the coxal plates of the longer side of the body, the rounded-off ends of the abdominal segments and the narrow, notched telson. It will require the collection of more material to determine to what extent these characters should be considered specific rather than individual.

LOCALITY.—Jolly Hill, St. Croix, West Indies, on a *Macrobrachium* ("Palaemon") found in a small brook.



ADDITIONAL ISOPODA WHICH HAVE BEEN REPORTED, APPARENTLY  
INCORRECTLY, AS FRESH-WATER SPECIES

**Colamura porteri** Boone, 1920

(Suborder Flabellifera, Family Anthuridae)

A marine form listed incorrectly among land and fresh-water isopods in Zool. Record for 1920. (See Boone, 1920, Rev. Chilena Hist. Nat., XXIV, no. 2, pp. 25, 31.)

**Lathraena insidiosa** Schioedte and Meinert, 1881

(Suborder Flabellifera, Family Cymothoidae)

This is a marine and brackish water species parasitic on the fish *Centengraulis edentulus* from a river at Santos, Brazil, near its mouth. Listed as fresh-water species by Richardson, 1904, p. 23, and Weber, 1892, p. 538. For description and figures, see Schioedte and Meinert, 1881, p. 98, Pl. VII, figs. 14, 15.

**Haplophthalmus puteus** Hay, 1899

(Suborder Oniscoidea, Family Trichoniscidae)

See under *Haplophthalmus danicus*, page 91.

**Cassidinidea ovalis** (Say), 1818

(Suborder Flabellifera, Family Sphaeromidae)

A marine species (see Richardson, 1905, p. 274, also in Introduction, p. ix). Hansen, 1905, Quart. Jour. Micro. Sci., XLIX, p. 131, mentions a specimen "from Cincinnati," doubtless an erroneous locality, if the city in Ohio is implied.

**Glossobia laticauda** (Milne-Edwards), 1840

(Suborder Flabellifera, Family Cymothoidae)

Parasitic on flying fishes and other pelagic fishes, incorrectly included among fresh-water forms by Richardson, 1904, p. 23 (under name *Ceratothoa laticauda*).

## BIBLIOGRAPHY

- ABBOTT, C. H. 1918. 'Reaction of land isopods to light.' Jour. Exper. Zool., XXVII, pp. 193-246, text figs.
- ALLEE, W. E. 1926. 'Distribution of animals in a tropical rain-forest with relation to environmental factors.' Ecology, VII, pp. 445-468.
1929. 'Studies in animal aggregations: natural aggregations of the isopod *Asellus communis*.' Ecology, X, pp. 14-36.
- ARCANGELI, A. 1914. 'La collezione di isopodi terrestri del R. Museo di Zoologia degli Invertebrati di Firenze.' Atti. Soc. Ital. Sci. Nat. Milano, LII, pp. 455-486.
1921. 'Note isopodologiche. Il genere *Platyarthus* Brandt.' Atti. Soc. Ital. Sci. Nat. Milano, I, X, pp. 189-210, Pl. VII.
1922. 'Isopodi terrestri del Museo Zoologico della R. Università di Napoli.' Ann. Mus. Zool. Univ. Napoli, V, No. 2, pp. 1-8, Fig. 1.
1923. 'Revisione del gruppo degli *Haplophthalma*, isopodi terrestri.' Arch. Zool. Ital., X, pp. 259-321, Pls. VII, VIII.
1925. 'Gli isopodi terrestri della Sardegna.' Boll. Mus. Zool. Comp. Anat. Univ. Torino, (N. S.), XXXIX, 75 pp., 2 Pls.
1926. 'Contributo alla conoscenza della fauna isopodologica delle terre circostanti all'alto Adriatico.' Atti. Mus. Civico di Storia Nat., XI, pp. 1-62, 1 Pl.
1927. 'Isopodi terrestri raccolti nell'Estremo Oriente dal Prof. Filippo Silvestri.' Boll. Lab. Zool. Gen. Agrar. Portici, XX, pp. 211-269, Figs. 1-22.
- 1927a. 'Revisione dei generi degli isopodi terrestri. 1. Sopra alcuni generi di Africa e di America.' Atti. Soc. Ital. Sci. Nat. Milano, LXVI, pp. 126-141.
1929. 'Isopodi terrestri raccolti in Cuba dal Prof. F. Silvestri.' Boll. Lab. Zool. Gen. Agrar. Portici, XXIII, pp. 129-148, Figs. 1-6.
1930. 'Isopodi terrestri raccolti nelle isole Canarie dal Prof. Filippo Silvestri (con aggiunte).' Boll. Lab. Zool. Gen. Agrar. Portici, XXIV, pp. 82-91, 1 text fig.
- 1930a. 'Contributo alla conoscenza del "Microgenton" di Costa Rica.' Boll. Lab. Zool. Gen. Agrar. Portici, XXV, pp. 1-29, 8 Figs.
- 1930b. 'Due nuove specie del genere "*Rhyscotus*" B.-L., isopodi terrestri.' Boll. Lab. Zool. Gen. Agrar. Portici, XXV, pp. 30-38, Figs. 1, 2.
1931. '*Circoniscus bezzii* Arc., nuova specie di isopodo terrestre del Brasile.' Boll. Zool. Napoli, II, pp. 115-122, Pl. II.
- 1931a. 'Sul rapporto numerico dei sessi negli isopodi terrestri.' Boll. Mus. Anat. Comp. Univ. Torino, (3) XLI, No. 13, pp. 1-34.
1932. 'Isopodi terrestri raccolti dal Prof. Silvestri nel Nord-America.' Boll. Lab. Zool. Gen. Agrar. Portici, XXVI, pp. 121-141, Figs. 1-7.
- 1932a. 'Considerazioni sopra la validità dei nomi generici *Armadillo*, *Armadillidium*, *Oniscus*, *Porcellio*.' Boll. Zool. Napoli, III, pp. 123-127.

- 1932b. 'Escursione zoologica all "Oasi di Marrakesch nell" Aprile 1930. Isopodi terrestri.' Boll. Zool. Napoli, III, pp. 225-232, Pl. II.
- 1932c. 'Isopodi terrestri di Dominica (Piccole Antille).' Boll. Mus. Anat. Comp. Univ. Torino, (3) XLII, No. 18, pp. 1-6, Figs. 1-14.
1934. 'Note di revisione sulla famiglia Armadillidae.' Boll. Mus. Anat. Comp. Univ. Torino, XLIV, pp. 84-119.
- ATWOOD, W. G., AND JOHNSON, A. A. 1924. 'Marine structures, their deterioration and preservation.' Nat. Research Coun., Washington, pp. 1-534, figs. and charts 1-169.
- BANTA, A. M. 1910. 'A comparison of the reactions of a species of surface isopod with those of a subterranean species. Part. I.' Jour. Exper. Zool., VIII, pp. 243-310, 6 figs.
- BARNARD, K. H. 1932. 'Contributions to the crustacean fauna of South Africa, No. 11. Terrestrial Isopoda.' Ann. South African Mus., XXX, part 2, pp. 179-388, Figs. 1-80.
- BARNES, T. C. 1932. 'Salt requirements and space orientation of the littoral isopod *Ligia* in Bermuda.' Biol. Bull., LXIII, pp. 496-504, Fig. 1.
- BATE, C. S. 1868. 'Carcinological gleanings, No. 3,' Ann. Mag. Nat. Hist., (4) I, pp. 442-448, Pl. XXI. (Includes information received by letter from R. O. Cunningham.)
- BEEBE, W. 1924. 'Galapagos: World's End.' New York, pp. i-xxii, 1-443, 107 illus.
1925. 'Studies in a tropical jungle. One quarter of a square mile of jungle at Kartabo, British Guiana.' Zoologica, VI, pp. 1-193, Figs. 1-16.
- BENEDICT, J. E. 1896. 'Preliminary description of a new genus and three new species of crustaceans from an artesian well at San Marcos, Texas.' Proc. U. S. Nat. Mus., XVIII, pp. 611-617.
- BILIMEK, D. 1867. 'Fauna der Grotte Cacahuamilpa in Mexico.' Verh. Zool.-bot Gesell. Wien, XVII, pp. 901-908.
- BIRSTEIN, J. 1933. 'Die Land- und Süßwasser-Isopoden des arktischen Gebietes.' Fauna Arctica, VI, pp. 471-476.
- BLAKE, C. H. 1929. 'Notes on the wood-lice of New England.' Bull. Boston Soc. Nat. Hist., No. 50, pp. 9-12, Figs. 1-4.
1930. 'Redescription of *Armadilloniscus ellipticus* (Harger) with some account of its habits.' (On Isopoda Oniscoida, first paper.) Occas. Papers Boston Soc. Nat. Hist., V, pp. 279-284, Figs. 1-11.
1931. 'New land isopods from New England.' (On Isopoda Oniscoida, second paper.) Occas. Papers Boston Soc. Nat. Hist., V, pp. 341-348, Figs. 1, 2.
- 1931a. 'Distribution of New England wood-lice.' (On Isopoda Oniscoida third paper.) Occas. Papers Boston Soc. Nat. Hist., V, pp. 349-355.
- BLATCHLEY, W. E. 1896. 'Indiana caves and their fauna.' 21st Ann. Rep. Dept. of Geology of Indiana.
- BOONE, (P.) L. 1918. 'Descriptions of ten new isopods.' Proc. U. S. Nat. Mus., LIV, pp. 591-604, Pls. LXXXIX-XCII.
1920. 'Isopoda.' Rep. Canadian Arctic Exp., VII, part D, 40 pp.

1921. 'Report on the Tanidacea and Isopoda collected by the Barbados-Antigua Expedition from the University of Iowa in 1918.' Univ. of Iowa Studies, IX, pp. 91-98, 1 Pl.
1934. 'New and rare Cuban and Haitian terrestrial Isopoda.' Bull. Amer. Mus. Nat. Hist., LXVI, pp. 567-598, Figs. 1-14.
- BORRE, A. P. DE. 1886. 'Crustacés Isopodes recueillis par feu Camille Van Volxem, pendant son voyage en Portugal en 1871.' Ann. Soc. Ent. Belgique, XXX (Comptes-Rendus, (3) No. 72), pp. cxii-cxiii.
- BOVALLIUS, C. 1886. 'Notes on the family Asellidæ.' Bihang K. Dansk. Vet. Akad. Handl., XI, No. 15, pp. 1-52.
- BRANDT, J. F. 1833. 'Conspectus monographiæ Crustaceorum Oniscodorum Latreillii.' Bull. Soc. Imp. Nat. Moscou, VI, pp. 171-193, Pl. IV. (Also published with separate paging.)
- BRIAN, A. 1923. 'Descrizione di un rarissimo isopodo cavernicolo *Trogloæga virei* Valle.' Ann. Mus. Civ. Stor. Nat. Genova, LI, pp. 115-126, Pls. I, II.
1929. 'Descrizione di un nuovo genere di isopodo terrestre troglobio raccolto dal Prof. Silvestri in una grotta di Cuba.' Boll. Lab. Zool. Gen. Agr. Portici, XXII, pp. 188-197, Pls. I-III.
- BRUES, C. T. 1924. 'Observations on animal life in the thermal waters of Yellowstone Park, with a consideration of the thermal environment.' Proc. American Acad. Arts Sci., LIX, pp. 371-437, 1 Pl.
- BUDDE-LUND, G. 1879. 'Prospectus generum specierumque Crustaceorum Isopodum terrestrium.' Pp. 1-10. Copenhagen.
1885. 'Crustacea Isopoda Terrestria per familias et genera et species descripta.' Pp. 1-319. Hauniæ.
1893. 'Landisopoder fra Venezuela indsamlede af Dr. Fr. Meinert.' Entom. Meddel., pp. 111-129.
1899. 'A revision of Crustacea Isopoda Terrestria, with additions and illustrations. I, *Eubelum*.' Entom. Meddel., pp. 67-97, Pls. I-v. (Also published as separate, pp. 1-31, Pls. I-v.)
1904. 'A Revision of Crustacea Isopoda Terrestria with additions and illustrations.' II, *Spherilloniæ*, III, *Armadillo*. Copenhagen, pp. 33-144, Pls. VI-x.
1908. 'Die Landisopoden der deutschen Südpolar-Expedition 1901-1903, mit Diagnosen verwandter Arten. Deutsche Südpolar-Expedition,' IX (Zool. I), pp. 69-92, Pls. III-IV.
- 1908a. 'Isopoda von Madagaskar u. Ostafrika.' In: Voeltzkow, 'Reise in Ostafrika in d. Jahren 1903-1905.' II, pp. 265-308, Pls. XII-xviii.
1909. 'Isopoda (I, Land-Isopoden).' In: Schultze, 'Zool. u. anthr. Ergebn. Forschungr. in westl. u. zentr. Südafrika.' II, pp. 53-70, Pls. v-vii, Jena.
1910. 'Crustacea. 2. Isopoda.' In: Sjöstedt, 'Wiss. Ergebn. schwed. zool. Exped. n. d. Kilimandjaro.' III, part 21, pp. 3-20, Pls. I, II.
1912. 'Terrestrial Isopoda, particularly considered in relation to the distribution of the southern Indo-Pacific species.' In: 'Rep. Percy Sladen Trust Exp.,' Trans. Linn. Soc. London, Zool., (2)

- XV, pp. 367-394, 3 Pls. (Revised and foot notes added by Rev. T. R. R. Stebbing.)
- CHAPPUIS, P. A. 1927. 'Die Tierwelt der unterirdischen Gewässer.' Die Binnen-gewässer, III, 175 pp., 4 Pls., 62 text figs.
- CHILTON, C. 1890. 'Revision of the New Zealand Idoteidæ.' Trans. Proc. New Zealand Inst., XXII, pp. 189-204.
1892. 'Notes on some New Zealand Amphipoda and Isopoda.' Trans. Proc. New Zealand Inst., XXIV, pp. 258-269.
1901. 'The Terrestrial Isopoda of New Zealand.' Trans. Linn. Soc. London, Zool., (2) VIII, pp. 99-152, Pls. xi-xvi.
1909. 'The Subantarctic islands of New Zealand.' Crustacea, pp. 601-671, Figs. 1-19; Biological Relations, pp. 793-807, Wellington.
1910. 'Additions to the terrestrial Isopoda of New Zealand.' Trans. New Zealand Inst., XLII, pp. 286-291.
1914. '*Deto*, a subantarctic genus of terrestrial Isopoda.' Jour. Linn. Soc. London, Zool., (2) XXXII, pp. 435-456, Pls. xxxix and xl.
1916. 'Some terrestrial Isopoda from the shore of the lake.' In: 'Fauna of the Chilka Lake.' Mem. Indian Mus., V, pp. 461-482, 36 text figs.
1922. 'Note on the isopod known as *Geoligia perkinsi* Dollfus (Crust.)' Proc. Hawaiian Ent. Soc., V, No. 1, 4 pp.
1924. 'Occurrence in South America of the shore isopod *Ligia novae-zealandiae* Dana.' New Zealand Jour. Sci. and Tech., VI, pp. 287, 288.
- 1924a. In: 'Tanaidacea and Isopoda.' 'Fauna of the Chilka Lake.' Mem. Indian Mus., V, pp. 875-895, Pl. lx.
1925. 'Some Amphipoda and Isopoda from the Chatham Islands.' Rec. Canterbury Mus., II, pp. 317-320.
- CHOPRA, B. 1923. 'Bopyrid isopods parasitic on Indian Decapoda Macrura.' Rec. Indian Mus., XV, pp. 411-550, Pls. xi-xxi, text figs. 1-30.
- COCKERELL, T. D. A. 1912. 'Fauna of Boulder County, Colorado, Part II.' Univ. Colorado Studies, IX, pp. 41-52.
1927. 'Zoology of Colorado.' Pp. 1-262, Pls. and text figs.
- COLLINGE, W. E. 1915. 'Description of a new genus and species of terrestrial Isopoda from British Guiana.' Jour. Linn. Soc. London, Zool., (2) XXXII, pp. 509-511, Pl. l.
1917. 'Description of *Paracubaris spinosus*, a new genus and species of terrestrial Isopoda from British Guiana.' Jour. Linn. Soc. London, Zool., XXXIV, pp. 61-63, Pl. vi.
- 1917a. 'Description of a new species of terrestrial isopod from the Guacharo Cave, Trinidad.' Jour. Zool. Research, II, pp. 29-30, Figs. 1-3.
1922. 'On the terrestrial isopod *Eluma caelatum* (Miers) = *purpurascens* Budde-Lund.' Jour. Linn. Soc. London, Zool., XXXV, pp. 103-106, Pl. viii.
- COPE, E. D. 1872. 'On the Wyandotte Cave and its fauna.' Amer. Naturalist, VI, pp. 406-422, Figs. 109-116.

- 1872a. 'Report on the Wyandotte Cave and its fauna.' 3d and 4th Ann. Rep. Geol. Surv. Indiana, pp. 157-182.
- CREASER, E. P. 1931. 'A new blind isopod of the genus *Caecidotea* from a Missouri cave.' Occ. Papers Mus. Zool. Univ. Michigan, No. 222, pp. 1-7, Pls. I, II.
- CUNNINGHAM, R. O. See Bate, C. S., 1868.
- DAHL, F. 1892. 'Die Landfauna von Bermuda.' In: 'Ergeb. Plankton Exped. Humboldt-Stiftung,' part 1, pp. 105-112, Pl. III.
1916. 'Die Asseln oder Isopoden Deutschlands.' VI, 90 pp., 107 Figs. Jena.
- DANA, J. D. 1852-1853 (1855). 'United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N.' XIII, Crustacea, 1618 pp., Atlas (dated 1855) with 96 Pls. Isopoda, Part 2, pp. 696-805, Pls. XLVI-LIII.
1856. 'Catalogue and descriptions of Crustacea collected in California by Dr. John L. LeConte.' Proc. Philadelphia Acad. Nat. Sci., VII, pp. 175-177.
- DE CALABRESE, D. See Giambiagi, D.
- DE KAY, J. E. 1844. 'Zoology of New York, or the New York Fauna, Part VI, Crustacea.' 70 pp., 13 Pls.
- DOLLFUS, A. 1889. 'Sur quelques isopodes du Musée de Leyde.' Notes Leyden Mus., XI, pp. 91-94, Pl. v.
1890. 'Isopods terrestres du Challenger.' Bull. Soc. Étud. Sci. Paris, XII, pp. 63-70, 2 Pls. (Also reprinted paged 1-8.)
- 1890a. 'Note au sujet des isopodes terrestres du Challenger.' Bull. Soc. Etud. Sci. Paris, June, 1890.
1891. 'Crustacés Isopodes.' In: 'Mission Sci. Cape Horn,' 1882-1883, VI (2), pp. F55-F76, Pls. VIII, VIIIa.
1893. '*Sphaeroma dugesi*, nova species.' Bull. Soc. Zool. France, XVIII, p. 115, Figs. 1, 2.
- 1893a. 'Voyage de M. E. Simon au Venezuela (Décembre 1887-Avril 1888).' 25me Mém. Isopodes Terrestres. Ann. Soc. Ent. France, LXII, pp. 339-346, Pls. IX, X, 1 text fig.
- 1893b. 'Sur la distribution du genre *Ligia* Fabr.' Feuil. Jeun. Nat., XXIV, pp. 23-26, Figs. 1-4.
1894. 'Viaggio del dott. Alfredo Borelli nella Republica Argentina e nel Paraguay.' Pt. VI. Isopodes Terrestres, Boll. Mus. Zool. Anat. Univ. Torino, IX, No. 183, pp. 1-3, 8 text figs.
1896. 'On West Indian terrestrial isopod Crustaceans.' Proc. Zool. Soc. London, pp. 388-400, Figs. 1-13.
- 1896a. 'Recherches zoologiques dans les serres du Museum du Paris.' Feuil. Jeun. Nat., XXVI, pp. 90-94, Figs. 1-2.
- 1896b. 'Isopodes terrestres recueillis dans le Darien par M. le Dr. E. Festa.' Boll. Mus. Zool. Anat. Univ. Torino, XI, No. 228, pp. 1-2, 3 text figs.
- 1896c. 'Les isopodes terrestres du nord de l'Afrique du Cap Blanc à Tripoli.' Mém. Soc. Zool. France, IX, pp. 523-553, Figs. 1-5.

- 1896*d*. 'Sur les Crustacés Isopodes terrestres du Mexique.' *Bull. Soc. Zool. France*, XXI, pp. 46-49, Figs. 1, 2.
- 1896*e*. 'Sur la Distribution géographique des Armadilliens en Europe.' *Compt. Rend. Séances 3me Congrès Intern. Zoologie Leyde*, 16-21 Septembre 1895, pp. 356-358.
1897. 'Les Crustacés Isopodes terrestres à grande dispersion.' *Feuil. Juen. Nat.*, XXVII, pp. 205-212.
- 1897*a*. 'Viaggio del Dott. A. Borelli nel chaco Boliviano e nella Republica Argentina.' VI, Isopodes terrestres. *Boll. Mus. Zool. Anat. Univ. Torino*, XII, No. 289, pp. 1-4, Figs. 1-4.
- EIGENMANN, C. H. 1900. 'A contribution to the fauna of the caves of Texas.' *Proc. Amer. Assoc. Adv. Sci.*, pp. 228-230; reprinted in *Science* (N. S.), XII, pp. 300-302.
1909. 'Cave vertebrates of America.' *Carnegie Inst. Washington, Pub. No. 104*, pp. 1-241, Pls. I-XXIX, text figs. 1-72.
- EVERMANN, B. W., AND CLARK, H. W. 1918. 'The crustaceans of Lake Maxinkuckee.' *Proc. Indiana Acad. Sci.*, pp. 225-229.
- FAXON, W. 1889. See Garman, S.
- FEE, A. R. 1927. 'The Isopoda of Departure Bay and vicinity, with descriptions of new species, variations, and color notes.' *Contr. Canadian Biol.* (N. S.), III, pp. 15-34, Pl. I.
- FITCH, A. 1855. 'First report on the noxious insects of New York.' *Trans. N. Y. Agric. Soc. for 1854*, pp. 705-880.
1856. 'First and second reports on the noxious, beneficial and other insects of New York.' *Albany. Isopods*, pp. 116-121.
- FORBES, S. A. 1876. 'List of Illinois Crustacea.' *Bull. No. 1, Illinois Mus. Nat. Hist.*, pp. 3-25, Figs. 1-30.
- FOWLER, H. W. 1912. 'The Crustacea of New Jersey.' *Rep. N. J. Mus.*, 1911, pp. 29-650, Pls. I-CL.
- GANDARA, G. 1926. 'Las cochinillas de la humedad (Isopoda).' *Mem. Soc. Ant. Alzate, Mexico*, XLIV, pp. 285-297.
- GARMAN, H. 1890. 'A new fresh-water crustacean.' *Bull. Essex Inst.*, XXII, pp. 28-30, 1 Pl.
- GARMAN, S. 1889. 'Cave animals from southwestern Missouri.' (Crustacea by Faxon, W.) *Bull. Mus. Comp. Zool.*, XVII, pp. 225-240, Pls. I, II.
- GAY, C. See Nicolet, H.
- GEISER, S. W. 1928. 'A simple trap for the capture of terrestrial isopods.' *Amer. Midland Naturalist*, XI, No. 5, 2 pp.
1929. 'Albinism in terrestrial isopods.' *Anat. Record*, XLIV, p. 246, 247.
1932. 'The frequency of occurrence of albinism in terrestrial isopods.' *Lab. Contr. Sci. Dept. Southern Meth. Univ.*, I, No. 1, pp. 4-7.
1933. 'Notes on Texas Crustacea.' *Field and Lab.*, II, pp. 29-32.
- GERSTAECKER, A. 1854. 'Ueber eine neue Myriapoden- und Isopoden-Gattung.' *Ent. Zeitung, Stettin*, XV, pp. 310-315, Pl. II.
1873. 'Gliederthiere,' in von der Decken, 'Reisen in Ost-Afrika in den

- Jahren 1859-1865.' III, part 2, pp. 1-542, Pls. I-XVIII (Isopoda, pp. 525-528.)
- GIAMBIAGI, D. (De Calabrese). 1922. 'Cuatro neuvos isopodos de la Argentina.' Physis, V, pp. 231-244, Pls. I-IV.
1923. 'Una nueva especie de "Tanais."' Physis, VI, pp. 248-253, 3 Figs.
1925. 'Crustaceos Isopodos.' Res. Prim. Exp. a Tierra del Fuego (1921), pp. 1-20, text figs. 1, 2, Pls. I-V. Buenos Aires.
1931. 'Oniscoideos del Río de la Plata.' Anal. Mus. Nac. Buenos Aires, XXXVI, pp. 417-429, Pls. I-IX.
- GOSSE, P. H. 1851. 'A naturalist's sojourn in Jamaica.' London. Pp. i-xii, 1-508, Pls. I-VIII.
- GOULD, A. A. 1841. 'Report on the Invertebrata of Massachusetts comprising the Mollusca, Crustacea, Annelida, and Radiata.' 373 pp., 15 Pls.
- GRAEVE, W. 1914. 'Die Trichonischinen der Umgebung von Bonn.' Zool. Jahrb., Syst., XXXVI, pp. 203-228, Pls. IV-VI.
- GUÉRIN, M. 1837. 'Sur une nouvelle espèce de Porcillion provenant de l'île de Cuba.' Compt. Rend. Acad. Sci. Paris, IV, p. 132.
- GÜNTHER, A. See Miers, E. J., 1877.
- HANSEN, H. J. 1888. 'Oversigt over det vestlige Grönlands Fauna.' Vidensk. Meddel. Nat. Foren. Kjöbenhavn, 1887, pp. 177-198.
1897. 'Reports on the dredging operations of the West Coast of Central America to the Galapagos, to the West Coast of Mexico and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer "Albatross" during 1891.' Part XXII, The Isopoda. Bull. Mus. Comp. Zool., XXXI, pp. 95-129, Pls. I-VI, 1 map.
- HARFORD, W. G. W. 1877. 'Description of a new genus and three new species of sessile-eyed Crustacea.' Proc. California Acad. Sci., VII, pp. 53-54.
- 1877a. 'Description of three new species of sessile-eyed Crustacea with remarks on *Ligia occidentalis*.' Proc. California Acad. Sci., VII, pp. 116-117.
- HARGER, O. 1873. See Verrill and Smith, 1873.
1874. 'On a new genus of Asellidae.' Amer. Jour. Sci., (3) VII, pp. 601, 602.
- 1874a. See Smith, 1874.
1876. 'Description of *Mancasellus brachyurus*, a new fresh-water isopod.' Amer. Jour. Sci., (3) XI, pp. 304, 305.
1878. 'Descriptions of new genera and species of Isopoda from New England and adjacent regions.' Amer. Jour. Sci., (3) XV, pp. 373-379.
1879. 'Notes on New England Isopoda.' Proc. U. S. Nat. Mus., II, pp. 157-165.
1880. 'Report on the Marine Isopoda of New England and adjacent waters.' In: Report of the U. S. Commissioner of Fish and Fisheries, for 1878. Part 6, pp. 297-462, Pls. I-XIII.



- HAY, O. P. 1878. 'Description of a new species of *Asellus*.' Bull. Illinois State Lab. Nat. Hist., No. 2, pp. 90-92.
1882. 'Notes on some fresh-water Crustacea together with descriptions of two new species.' Amer. Naturalist, XVI, pp. 241, 242.
- HAY, W. P. 1899. 'Description of a new species of subterranean isopod.' Proc. U. S. Nat. Mus., XXI, pp. 871, 872, Pl. LXXXVI.
1901. 'Two new subterranean crustaceans from the United States.' Proc. Biol. Soc. Washington, XIV, pp. 179, 180.
1902. 'Observations on the crustacean fauna of Nickajack Cave, Tennessee, and vicinity.' Proc. U. S. Nat. Mus., XXV, pp. 417-439, Figs. 1-8.
1903. 'On a small collection of crustaceans from the Island of Cuba.' Proc. U. S. Nat. Mus., XXVI, pp. 429-435, Figs. 1-3.
- HELLER, C. 1861. 'Vorläufiger Bericht über die während der Weltumseglung der k. k. Fregatte Novara gesammelten Crustaceen.' Verh. zool. bot. Gesell. Wien, XI, pp. 495-498.
1868. 'Crustaceen.' In: 'Reise der Oest. Fregatte "Novara" um d. Erde.' Zool., II, part 3, pp. 1-280, Pls. I-XXV. (Isopoda, pp. 130-148, Pl. XII.)
- HERRICK, C. L. 1887. 'List of the fresh-water and marine Crustacea of Alabama.' Geol. Survey Alabama, Monograph 2, Bull. No. 1, V, pp. 1-56, Pls. I-VII.
- HILTON, W. A. 1915. 'The early development of *Ligyda* with reference to the nervous system.' Jour. Ent. Zool. Pomona College, VII, pp. 211-227, Figs. 1-2, 6 Pls.
- HOLMES, S. J. 1904. 'On some new or imperfectly known species of West American Crustacea.' Proc. California Acad. Sci., (3) III, pp. 307-324, Pls. XXXV-XXXVII.
- HOLMES, S. J., AND GAY, M. E. 1909. 'Four new species of isopods from the coast of California.' Proc. U. S. Nat. Mus., XXXVI, pp. 375-379, Figs. 1-6.
- HOUSE, J. L. 1911. 'Crustacea of Winona Lake.' Proc. Indiana Acad. Sci. for 1910, pp. 129-133.
- HUBBARD, H. G. 1880. 'Two days collecting in the Mammoth Cave, with contributions to a study of its fauna.' Amer. Entomol., I, pp. 34-40, 79-84.
- HUNGERFORD, H. B. 1922. 'A new subterranean isopod.' Kansas Univ. Sci. Bull., XIV (whole ser. XXIV), pp. 175-181, Pl. xv.
- HUNTSMAN, A. G. 1913. 'Invertebrates other than insects and mollusks.' In: 'Nat. Hist. Toronto Region,' pp. 272-287.
1918. 'Freshwater Malacostraca of Ontario, Canada.' Contrib. Canadian Biol., Fasc. II, pp. 146-149.
- IVES, J. E. 1891. 'Crustacea from the northern coast of Yucatan, the harbor of Vera Cruz, the west coast of Florida and the Bermuda Islands.' Proc. Acad. Nat. Sci. Philadelphia, XLIII, pp. 176-200, Pls. v, VI.
- JACKSON, H. G. 1922. 'A revision of the isopod genus *Ligia* (Fabricius).' Proc. Zool. Soc. London, pp. 683-703, Pls. I, II.

1923. 'A revision of the isopod genus *Ligidium* (Brandt), Crustacea.' Proc. Zool. Soc. London, pp. 823-839, Figs. 1-10.
1926. 'Woodlice from Spain and Portugal, with an account of *Benthana*, a subgenus of *Philoscia*.—Crustacea.' Proc. Zool. Soc. London, I, pp. 183-201, Pls. I-VIII, 1 text fig.
- 1926a. 'The morphology of the isopod head. Part I. The head of *Ligia oceanica*.' Proc. Zool. Soc. London, II, pp. 885-911, Pls. I-IV.
1927. 'A new subgenus of *Ligia*, with further observations on the genus.' Ann. Mag. Nat. Hist., (9) XIX, pp. 129-136, Pl. II.
1928. 'Hermaphroditism in *Rhyssolus*, a terrestrial isopod.' Quart. Jour. Micro. Sci., (N. S.), LXXI, pp. 527-539, Figs. 1-6.
- 1928a. 'The morphology of the isopod head.' Part II. The terrestrial isopods. Proc. Zool. Soc. London, I, pp. 561-595, Figs. 1-20.
- JOHANSEN, F. 1920. 'The larger freshwater Crustacea from Canada and Alaska.' Parts I and II. Amphipoda and Isopoda. Canadian Field-Nat., XXXIV, pp. 126-132, 145-148.
1921. 'Freshwater Crustacea from Canada.' Canadian Field-Nat., XXXV, pp. 36, 99-100.
1922. 'The crustacean life of some arctic lagoons, lakes, and ponds.' In: 'Rep. Canadian Arctic Exp.,' VII, part N, 31 pp., 7 Pls.
- 1922a. 'A freshwater isopod new to Canada.' Canadian Field-Nat., XXXVI, p. 156.
1924. 'A biological excursion to Anticosti Island.' Canadian Field-Nat., XXXVIII, p. 161-164.
1925. 'Further notes on Canadian freshwater isopods and amphipods.' Canadian Field-Nat., XXXIX, pp. 138-139.
1926. 'Observations on Canadian freshwater Crustacea made in 1925.' Canadian Field-Nat., XL, pp. 92-96, 1 Fig.
- 1926a. '*Asellus aquaticus* not found in Labrador.' Canadian Field-Nat., XL, p. 140.
- 1926b. 'On the woodlice (Oniscoidea) occurring in Canada and Alaska.' Canadian Field-Nat., XL, pp. 165-167.
1928. 'Woodlice (Oniscoidea) from British Columbia.' Canadian Field-Nat., XLII, p. 106.
1929. 'Further observations on Canadian land and freshwater Crustacea made in 1928.' Canadian Field-Nat., XLIII, pp. 104-106.
1931. 'Observations on Canadian freshwater Crustacea made in 1927-1929.' Canadian Field-Nat., XLV, pp. 80-83.
- JOHNSON, A. A. See Atwood and Johnson.
- JOHNSON, M. E., AND SNOOK, H. J. 1927. 'Seashore animals of the Pacific Coast.' Pp. 1-659, Figs. 1-700, 1 Pl. New York, Macmillan Co.
- KESSELYAK, A. 1930. 'Ueber Isopoden.' Zool. Anzeiger, XCI, pp. 50-66, Figs. 1-25.
- KINAHAN, J. R. 1859. 'On the genus *Platyarthrus* (Brandt); with notices of allied undescribed genera.' Proc. Dublin Univ. Zool. and Bot. Assoc., I, pp. 188-201, 2 text figs., Pl. XIX.
- KOCH, C. L. 1847. 'System der Myriapoden mit den Verzeichnissen und Berich-

- tigungen zu Deutschlands Crustaceen, Myriapoden, und Arachniden. Regensburg.
- KRAEPELIN, K. 1901. 'Ueber die durch den Schiffsverkehr in Hamburg eingeschleppten Tiere.' Mitt. Naturhist. Mus. Hamburg, XVIII, pp. 185-209. (Isopoda, determined by Budde-Lund, on p. 204.)
- KRÖYER, H. 1838. 'Grönlands Amfipoder.' Kong. Danske Videns. Selsk. Afh., VII, pp. 229-326, Pls. I-IV.
- KUNKEL, B. W. 1918. 'The Arthrostraca of Connecticut.' Conn. State Geol. Nat. Hist. Survey. Bull. No. 26, 261 pp., 84 text figs.
- LEIDY, J. 1855. 'Contributions toward a knowledge of the marine invertebrate fauna of the coasts of Rhode Island and New Jersey.' Jour. Acad. Nat. Sci. Philadelphia, (2) III, pp. 135-152.
- LOCKINGTON, W. N. 1877. 'Description of seventeen new species of Crustacea.' Proc. California Acad. Sci., VII, pp. 41-48.
- LOHMANDER, H. 1927. 'On some terrestrial isopods in the United States National Museum.' Proc. U. S. Nat. Mus., LXXII, No. 2713, pp. 1-18, Figs. 1-6.
- LONGNECKER, M. 1924. 'The terrestrial isopods of Iowa.' Proc. Iowa Acad. Sci., XXX, pp. 197-199.
- MACCAGNO, T. 1931. '*Ligia porteri* Macc., nuova specie di isopodo terrestre del Cile.' Boll. Zool. Napoli, II, pp. 151-157, Pl. III.
- MALONEY, J. O. 1930. 'A new species of isopod from Potter Creek, California.' Univ. of California Pub. Zool., XXXIII, pp. 291-295, 13 Figs.
- MARKUS, H. C. 1930. 'Studies on the morphology and the life history of *Manca-sellus macrourus*.' Trans. Amer. Micros. Soc., XLIX, pp. 220-237, 1 Pl.
- MARTENS, E. V. 1869. 'Südbrazilische süss- und brackwasser-Crustaceen nach den Sammlungen des Dr. Reinh. Hensel.' Arch. Nat., XXXV, pp. 1-37, Pls. I, II. (Isopoda, pp. 33, 34.)
- MICHAELSEN, W. 1897. 'Land- und Süsswasser-Asseln aus der Umgebung Hamburgs.' Jahrb. d. Hamburg. Wiss. Anst., XIV, Beiheft 2, pp. 119-134.
- MIERS, E. J. 1877. Crustacea: in 'Account of the zoological collection made during the visit of H. M. S. "Petrel" to the Galapagos Islands.' By Arthur Günther. Proc. Zool. Soc. London, pp. 73-75, 1 Pl.
- 1877a. 'On a collection of Crustacea, Decapoda, and Isopoda chiefly from South America, with descriptions of new genera and species.' Proc. Zool. Soc. London, pp. 653-679, Pls. LXVI-LXIX.
1881. Crustacea: in 'Account of the zoological collections of H. M. S. "Alert" in the Straits of Magellan and on the coast of Patagonia.' Proc. Zool. Soc. London, pp. 61-79, Pl. VII.
- 1881a. 'Revision of the Idoteidae, a family of sessile-eyed Crustacea.' Jour. Linn. Soc. London, XVI, pp. 1-88, Pls. I-III.
- MILLER, M. A. 1933. 'A new blind isopod, *Asellus californicus*, and a revision of the subterranean asellids.' Univ. of Calif. Pub., Zool., XXXIX, pp. 97-110, Figs. 1-14.
- MILNE-EDWARDS, M. 1840. 'Histoire Naturelle des Crustacés. III.' Paris. (Isopoda on pp. 115-283, Pls. XXXI-XXXIII.)

- MONOD, T. 1922. 'Remarques sur le genre "*Aegathoa*" Dana suivies de la description d'*Ae. indicatrix*, nov. sp.' Assoc. Franc. Avanc. Sci. Congrès Montpellier, pp. 405-413, Figs. 1, 2.
1926. Tanaidacés: 'Isopodes et Amphipodes; in Résultats du voyage de la "*Belgica*" en 1897-99.' Pp. 1-67, Figs. 1-61.
1931. 'Sur un *Braga* du Paraguay.' Ann. Parasitol., IX, pp. 363-365, Figs. 1-3.
- MOORE, H. F. 1901. 'Report on Porto Rican Isopoda.' Bull. No. 20, U. S. Fish Comm., part 2, pp. 163-176, Pls. VII-XI. (Volume dated 1900.)
- MOREIRA, C. 1927. 'Duas especies novas de crustaceos isopodes terrestres do Brazil.' Bol. Biol. Lab. Parasitol. Fac. Med. Univ. São Paulo, Fasc. 10, pp. 194-200, Figs. 1-6.
1932. 'Crustacés isopodes terrestres du Brésil.' Bull. Soc. Zool. France, LVI (ann. 1931), pp. 426-433, Pls. I-III.
- NEEDHAM, J. G., AND LLOYD, J. T. 1916. 'The life of inland waters.' Pp. 1-438, Figs. 1-244.
- NICOLET, H. 1849. Isopodos: in Gay, C., 'Historia fisica y politica, Chile.' Zool. III, pp. 256-287. Atlas Zoologico (1854), II, Pls. Crustaceos III and IV.
- NIERSTRASZ, H. F. 1915-1917. 'Die Isopoden-Sammlung im Naturhistorischen Reichs-Museum zu Leiden.' I, Zool. Meddel. Rijks Mus. Nat. Hist. Leiden, ann. 1915, pp. 71-108, 2 Pls.; II, idem, ann. 1917, pp. 87-120, 2 Pls.
1931. 'Die Isopoden der Siboga-Expedition.' Flabellifera. In: 'Siboga-Exp.,' XXXIIc, pp. 121-233, 129 text figs., 2 Pls.
- NIERSTRASZ, H. F., AND BRENDER À BRANDIS, G. A. 1923. 'Die Isopoden der Siboga-Expedition.' Epicaridea. In: 'Siboga-Exp.,' XXXIIb, 65 pp., Pls. IV-IX.
1925. 'Epicaridea.' In: 'Bijdragen tot de Kennis der Fauna van Curaçao, pp. 1-8, 1 Pl.
1929. 'Epicaridea.' Part I. In: 'Papers from Dr. Th. Mortensen's Pacific Exp., 1914-1916, No. 48.' Vidensk. Meddel. Danske Nat. Foren., LXXXVII, 44 pp., 53 text figs.
- NIERSTRASZ, H. F., AND SCHUURMAN STECKHOVEN, J. H., JR. 1930. 'Isopoda genuina.' In: 'Die Tierwelt der Nord- und Ostsee,' X, part e, pp. 57-172, 126 text figs.
- NORTON, A. H. 1909. 'Some aquatic and terrestrial crustaceans of the State of Maine.' Proc. Portland Soc. Nat. Hist., II, pp. 245-255, 1 Fig.
- OMER-COOPER, I. 1924. 'The terrestrial Isopoda of Mesopotamia and the surrounding districts.' Jour. Bombay Nat. Hist. Soc., XXIX, pp. 93-105, text figs. 1, 2, Pls. I-VI.
1926. 'Revision of the genus *Periscyphis* Gerst.' (Isopoda Terrestria.) Proc. Zool. Soc. London, I, pp. 349-400, Figs. 1-79.
- ORTMANN, A. E. See Ward, H. B., and Whipple, G. C.
- PACKARD, A. S. 1867. 'View of the recent invertebrate fauna of Labrador.' Mem. Boston Soc. Nat. Hist., I, p. 296.
1871. 'The crustaceans and insects.' In Packard and Putnam: 'The

- Mammoth Cave and its inhabitants.' Amer. Naturalist, V, pp. 744-761, Figs. 122-133. (Reprinted 1872 and 1879, pp. 11-28.)
1872. See 1871.
1873. 'On the cave fauna of Indiana.' 5th Rep. Peabody Acad. Sci., pp. 93-97.
1879. See 1871.
1885. 'On the structure of the brain of *Asellus* and the eyeless form *Cecidotaea*.' Amer. Naturalist, XIX, pp. 85, 86.
- 1885a. 'On the structure of the brain of sessile-eyed Crustacea.' Mem. Nat. Acad. Sci., III, 14 pp., 5 Pls.
1888. 'The cave fauna of North America with remarks on the anatomy of the brain and origin of the blind species.' Mem. Nat. Acad. Sci., Washington, IV, part I, pp. 3-156, Pls. I-XXVII, 21 text figs.
1894. 'On the origin of the subterranean fauna of North America.' Amer. Naturalist, XXVIII, pp. 727-751, 1 Pl.
1900. 'A new eyeless crustacean from Mexico.' Proc. Amer. Assoc. Adv. Sci., XLIX, p. 228.
- PACKARD, A. S., AND COPE, C. D. 1881. 'The fauna of Nickajack Cave.' Amer. Naturalist, XV, pp. 877-882, 1 Pl.
- PACKARD, A. S., AND PUTNAM, F. W. See Packard, 1871.
- PANNING, A. 1928. 'Isopoda.' In Michaelsen: 'Deutsch-Südwestafrika,' II, pp. 169-201, Figs. 1-11.
- PAULMIER, F. C. 1905. 'Higher Crustacea of New York City.' Bull. 91, New York State Mus., pp. 117-189, Figs. 1-59.
- PEARSE, A. S. 1910. 'A preliminary list of the Crustacea of Michigan.' Rep. No. 12, Michigan Acad. Sci., pp. 68-76.
1911. 'Report on the Crustacea collected by the University of Michigan Walker Exp. in the State of Vera Cruz, Mexico.' Rep. No. 13, Michigan Acad. Sci., pp. 108-114, 2 Pls.
1913. 'Notes on Crustacea recently acquired by the museum.' Occas. Papers Mus. Zool. Univ. Michigan, No. 1, pp. 1-4.
1914. 'Report on crustacea collected by the Walker-Newcomb Expedition in Northeastern Nevada in 1912.' Occ. Papers. Mus. Zool. Univ. Michigan, No. 3, pp. 1-4.
1915. 'An account of the Crustacea collected by the Walker Expedition to Santa Marta, Colombia.' Proc. U. S. Nat. Mus., XLIX, pp. 531-556, Figs. 1-9, Pls. LXX-LXXIII.
1917. 'Isopoda collected by the Bryant Walker Expedition to British Guiana, with notes on Crustacea from other localities.' Occ. Papers Mus. Zool. Univ. Michigan, No. 46, pp. 1-8, Figs. 1-3.
1920. Univ. of Wisconsin Studies in Science. No. 1, p. 39. 'The fishes of Lake Valencia, Venezuela.'
1921. 'Crustacea from Lake Valencia, Venezuela.' Proc. U. S. Nat. Mus., LIX, pp. 459-462, Figs. 1, 2.
- PERTY, M. 1830-1834. 'Delectus animalium articulorum quae in itinere per Braziliam annis 1817-1823 . . . collegerunt.' J. B. de Spix, et C. F. Ph. de Martius. Pp. 1-224, Pls. I-XL. Monachii. (Isopods pp. 211, 212, Pl. XL.)