than the second. The first pair of antennæ extend to the middle of the third article of the peduncle of the second pair of antennæ. The first article of the second antennæ is short and inconspicuous in a dorsal view; the second article is long, about three times longer than the first; the third is about one and a half times longer than the second; the fourth is about one and a half times longer than the third; the fifth is a little shorter than the fourth. The flagellar article is a little longer than the fourth peduncular article. The second antennæ are $7\frac{1}{2}$ mm. long, or longer than half the entire length of the body. The palp of the maxillipeds is composed of four articles.

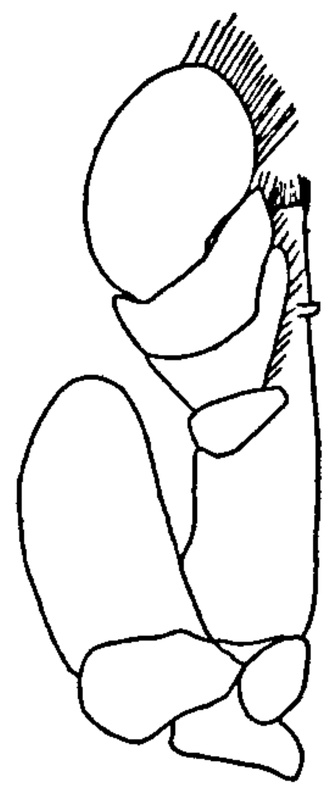

FIG. 447.—ERICHSONELLA ATTENUATA. MAXILLIPED. × $20\frac{1}{2}$.

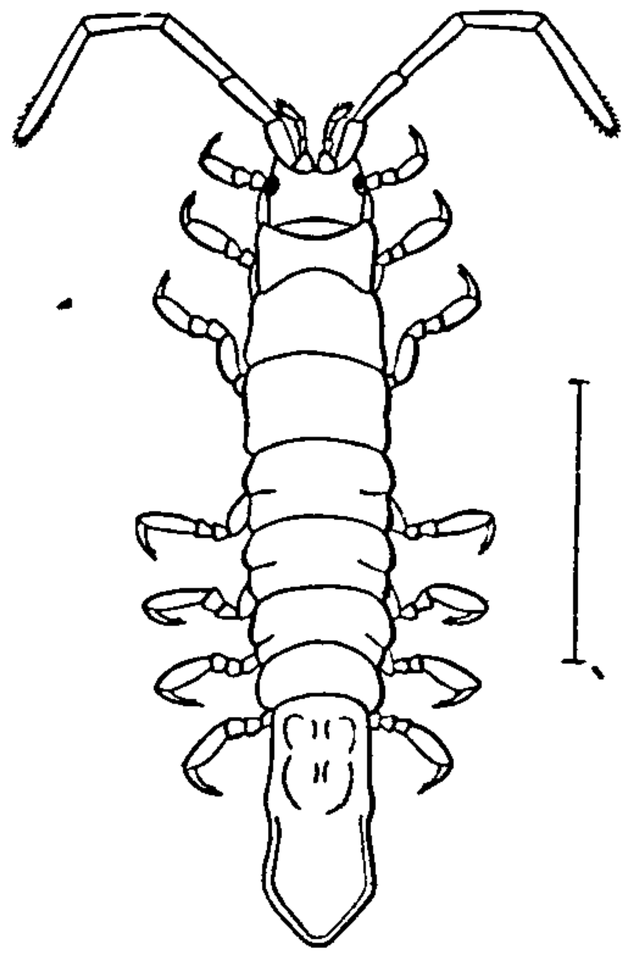

FIG. 448.—ERICHSONELLA ATTENUATA (AFTER HARGER). × 3.

The first segment of the thorax is a little shorter than any of the others except the seventh, both of which are 1 mm. long. The second, third, fourth, and fifth segments are subequal and each is about $1\frac{1}{2}$ mm. in length. The sixth segment is about $1\frac{1}{4}$ mm. long. The epimera are distinctly separated on all the segments, including the first. They are very small, almost inconspicuous, placed in the first three segments on the lateral margin anterior to the median transverse line. In the fourth segment they occupy the middle of the lateral margin. In the last four segments they are placed below the median transverse line. They give the segments a rather angular appearance.

The abdomen is composed of a single segment. About one-third the distance from the base to the posterior extremity is a small lateral process on either side. Below these processes the sides of the abdomen are nearly parallel to a point about $\frac{1}{2}$ mm. from the extremity, where they converge to a rounded apex.

The legs are all ambulatory with bi-unguiculate dactyli.

ERICHSONELLA FILIFORMIS (Say).

Stenosoma filiformis SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 424.—MILNE EDWARDS, Hist. Nat. Crust., III, 1840, p. 134.

Idotea filiformis WHITE, Hist. Crust. Brit. Museum, 1847, p. 95.

Erichsonia filiformis HARGER with VERRILL, Report U. S. Commissioner of Fish and Fisheries, 1873, Pt. 1, p. 570 (276); p. 316 (22).—HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 160; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 355–356, pl. VII, figs. 38–41.

Erichsonella filiformis RICHARDSON, American Naturalist, XXXIV, 1900, p. 228; Proc. U. S. Nat. Mus., XXIII, 1901, p. 543.

Localities.—Great Egg Harbor, New Jersey; Long Island Sound; Vineyard Sound, Massachusetts; Puntarasa, Florida; Nantucket Sound; Thimble Islands; Fisher's Island Sound; Noank, Connecticut; the Bahamas.

Depth.—~~1½~~ to 18 fathoms, in sand and gravel, algæ, etc.; low water.

Body oblong-ovate, nearly three times as long as wide, 3 mm.: 8 mm. Length of abdomen equal to a little more than one-third the length of the entire body, being 3 mm. long.

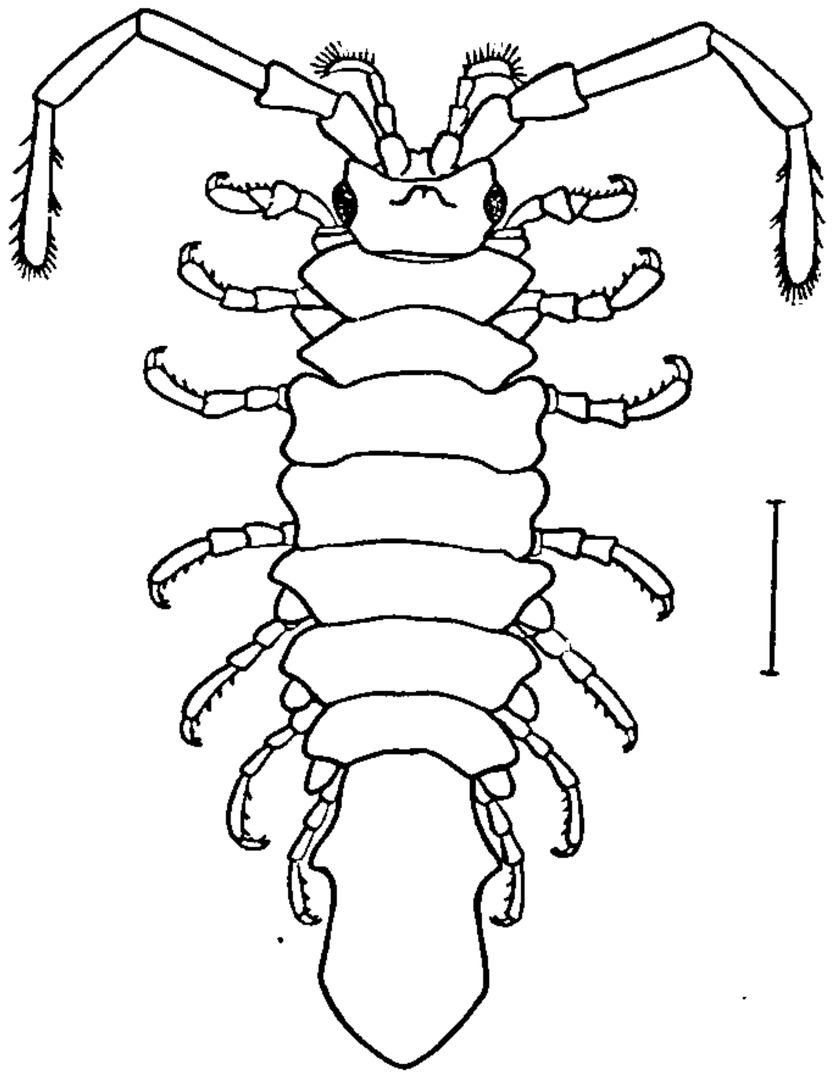

FIG. 449.—ERICHSONELLA FILIFORMIS (AFTER HARGER). × 5.

Head with front deeply excavate between the antero-lateral angles. Antero-lateral angles prominent and acute. Eyes large, round, composite, and situated about the middle of the head at the extreme lateral margins. On the dorsal surface of the head; extending from the anterior to the posterior margins, is a prominent elevation bearing two tubercles, one on either side of the median line, which, in a dorsal view, seem to project forward beyond the frontal emargination. The first pair of antennæ have the basal article large and somewhat dilated; the second and third articles are subequal, and only a little shorter than the first; the fourth article is a little longer than the third. The first antennæ extend to the end of the second article of the second antennæ. The basal article of the second pair of antennæ is short; the second is long, equal to the third article in length, and also equal to the first two articles of the first pair of antennæ; the fourth article is nearly twice as long as the third; the fifth is shorter than the fourth, being only about one and a half times longer than the third; the sixth or flagellar article is about as long as the fourth. When retracted, the second pair of antennæ extend to the posterior margin of the fifth thoracic segment. The maxilliped has a palp of four articles.

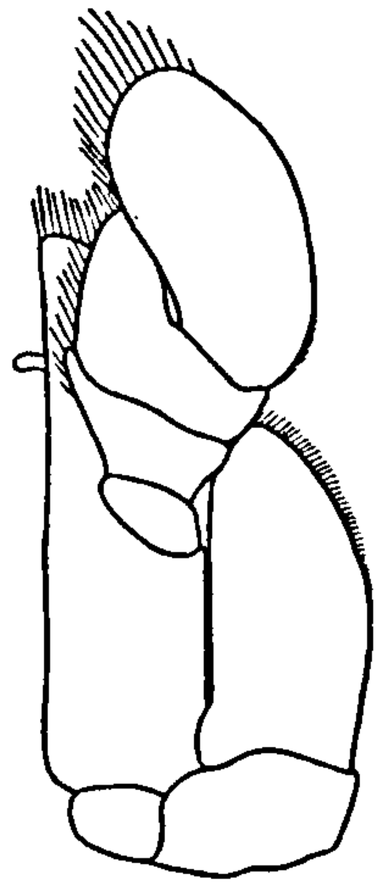

FIG. 450.—ERICHSONELLA FILIFORMIS. MAXILLIPED. × 51½.

The second, third, and fourth segments of the thorax are a little longer than any of the others, which are subequal. In the first two segments the lateral parts are produced in very acute processes, one process on either side of each segment. Just anterior to this process is the epimeron, which is also acutely produced, but lies underneath the lateral portion of the segment in a lower plane. The epimeron of the second segment is bilobate, the upper division, in a dorsal view, concealing the lower lobe, which is also very acute. The lateral parts

of the third and fourth segments are produced on each side into two acute processes—a larger anterior process and a smaller posterior process. The epimera of these segments are inconspicuous, as they are small and acute, and lie just underneath the lateral parts about the middle of the segment. In the last three segments the anterior part of the segment is acutely produced, and the acute epimeron occupies the remainder of the lateral margin, the posterior half of the lateral part of the segment not being produced. On each of the first four segments of the thorax is a small tubercle near the posterior margin in the median line.

The abdomen is composed of one segment only. About one-third the distance from the base to the extremity, on either side the lateral margin is produced in an acute angular process. About two-thirds the distance from the base to the extremity the sides are angulate. From this point the lateral margins converge rapidly to a triangulate extremity, posteriorly rounded.

The legs are all more or less alike in structure.

ERICHSONELLA FLORIDANA Benedict.[a]

Erichsonella floridana BENEDICT, in RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 543–544.

Locality.—Key West, Florida, among algæ below low tide.

The body is long and narrow, broadest at the third and fourth segments. The head is wider than long. A rectangular projection extends forward in front of the eyes. The frontal margin between the projections is arcuate. The eyes are lateral, slightly projecting. The antennæ are geniculate. The three distal segments are approximately the same length. The terminal segment or flagellum is hairy.

A large tridentate spine occupies the center of the head. The main portion of the spine has a longitudinally compressed apex, the lateral portions arise at a distance from the base and point divergently forward, falling short of the elevation of the main portion.

The third and fourth segments of the thorax are the longest and widest; the posterior segments are successively shorter. The lateral margins of the segments are concave, making the segmental angles acute. The epimera are exposed in the concave margins. On the posterior margin of each segment at the median line is a single spine pointing backward. On the

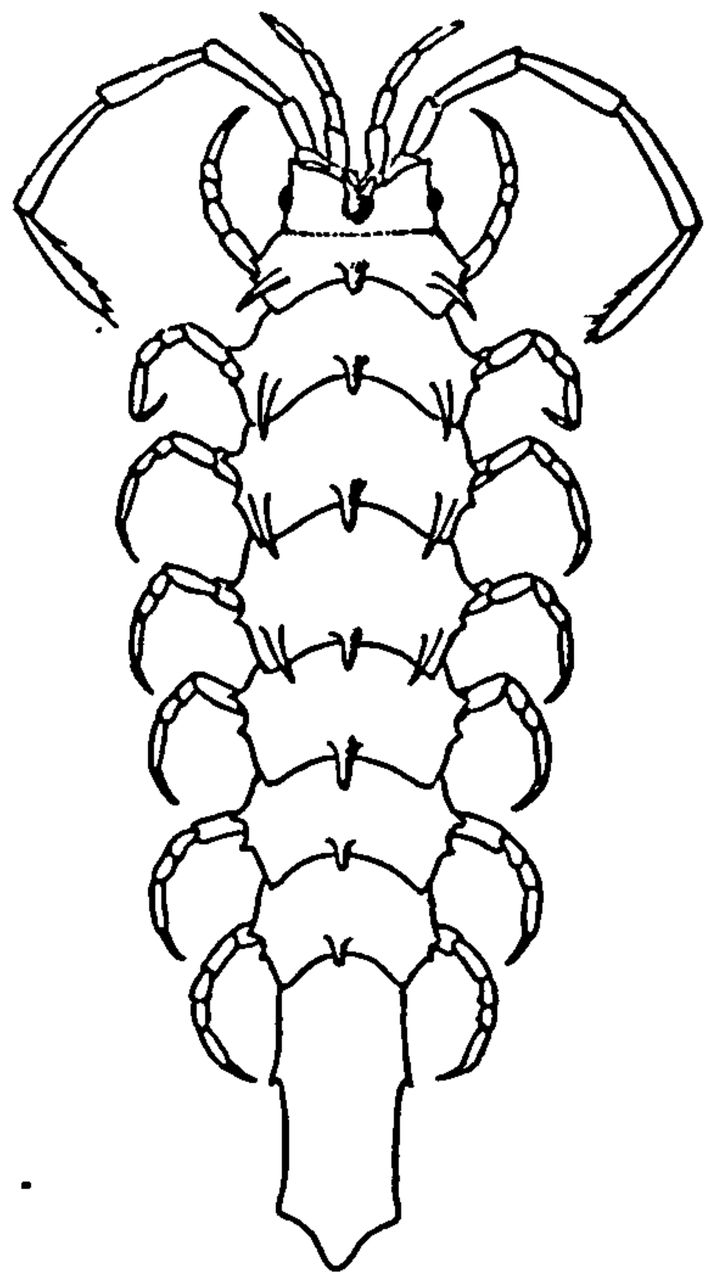

FIG. 451.—ERICHSONELLA FLORIDANA (AFTER BENEDICT).

[a] The description that follows is from Doctor Benedict's manuscript.

first four segments there are single lateral spines on the transverse median line similar in size, shape, and direction to those of the dorsal line.

The pleon consists of a single elongated segment with subparallel sides ending in a blunt apex. On each side of the pleon are two widely separated angular projections.

Type.—Cat. No. 15786, U.S.N.M.

66. Genus CLEANTIS Dana.[a]

Flagellum of second antennæ consolidated to form a single article or formed of only a restricted number of joints. Epimera of all the segments of the thorax with the exception of the first distinctly separated from the segments. Abdomen composed of more than one segment, distinct and visible in a dorsal view.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CLEANTIS.

a. Abdomen composed of four distinct segments, three short ones anterior to the terminal segment.

b. Maxillipeds with a palp composed of five articles. Posterior portion of abdomen obliquely truncated, the oblique terminus having a raised margin anteriorly. *Cleantis planicauda* Benedict

b′. Maxillipeds with a palp composed of four articles. Posterior portion of abdomen flat, in a lower plane than the anterior portion and having a median groove extending forward some distance into the anterior portion. *Cleantis occidentalis* Richardson

a′. Abdomen composed of three segments, two short ones anterior to the terminal segment ..... *Cleantis heathii* Richardson

CLEANTIS PLANICAUDA Benedict.[b]

Cleantis planicauda Benedict in Richardson, Proc. U. S. Nat. Mus., XXI, 1899, p. 851 (footnote); Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 271–273 (footnote); American Naturalist, XXXIV, 1900, p. 229; Proc. U. S. Nat. Mus., XXIII, 1901, p. 544.—Moore, Bull. U. S. Commissioner of Fish and Fisheries, XX, Pt. 2, 1902, p. 174, pl. xi, figs. 1–6.

Localities.—Pensacola, Florida; Arroyo, Porto Rico.

Body linear, densely granulated, five times longer than broad. Feet folded beneath out of view from above. Body lined longitudinally by

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[a] The type species of the genus, *Cleantis linearis* Dana, has the abdomen composed of four distinct segments, three short ones anterior to the terminal segment. *Cleantis planicauda* and *Cleantis occidentalis* agree in this respect with the type. *Cleantis heathii* may have to be removed to another genus, but as only a single specimen exists of this species, I prefer to let it remain, for the present, where it was originally placed. The maxillipeds have five joints to the palp in *C. planicauda* and four articles in *C. occidentalis*. In order to be consistent, they should also be separated into different genera, but inasmuch as I have not examined the type species of the genus it is not possible to tell which one agrees with the type in this respect, or in fact if either do. Therefore I have decided for the present to keep both species in the genus as defined by Dana.

[b] The description that follows is from Doctor Benedict's manuscript.

six more or less broken black lines. The lines on the sides are more distinct than those above.

Head subquadrate, partially immersed in the first thoracic segment and rounded on the posterior margin; sides parallel, anterior margin

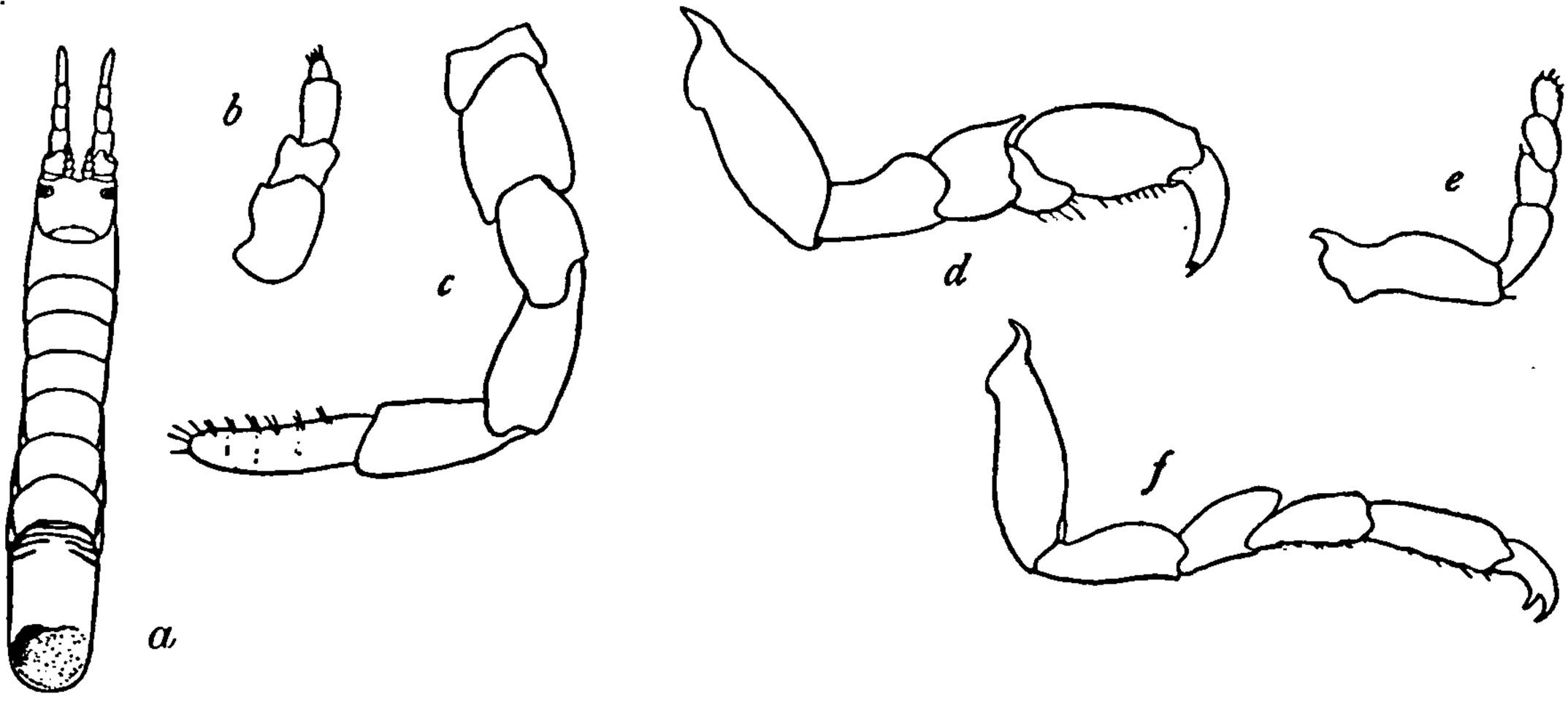

FIG. 452.—CLEANTIS PLANICAUDA (AFTER MOORE). *a*, GENERAL FIGURE. *b*, FIRST ANTENNA. *c*, SECOND ANTENNA. *d*, FIRST LEG. *e*, FOURTH LEG. *f*, SEVENTH LEG.

emarginate; a deep depression or groove runs from the median notch to the center of the head. The eyes are situated near the antero-lateral angle; post-occipital lobe distinct; antennæ with six segments; first very short and nearly immobile; second very short and stout; the third segment is equal in length to the second, but not so stout; the fourth and fifth are of equal length and about one-third longer than the second and third segments. The terminal segment or flagellum is lighter in color, and is armed with short bristles. The length of the antennæ is equal to the length of the head and first two thoracic segments. The antennulæ extend to the middle of the third segment of the antennæ. The first segment is quadrate; the second subquadrate; the third is pear-shaped; the fourth segment is very small. Maxillipeds with the palp composed of five articles.

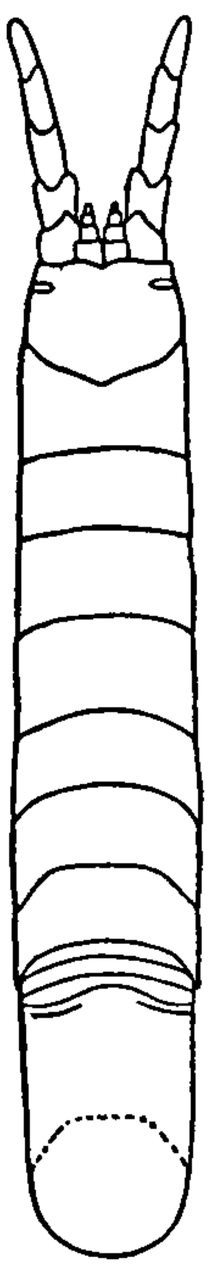

FIG. 453.—CLEANTIS PLANICAUDA.

The segments of the thorax are nearly equal in length and breadth, the third and fourth being but little longer than the others. The epimera of the second, third, and fourth segments are very small and can not be seen from above. On the fifth, sixth, and seventh segments the epimera are large and project well behind the margin of the segment in the form of an acute angle.

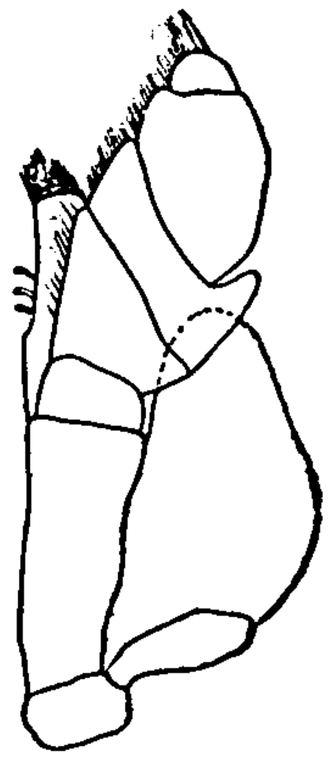

FIG. 454.—CLEANTIS PLANICAUDA. MAXILLIPED. × 20½.

The pleon is composed of four segments; the first three are very narrow; the terminal segment is elongated with subparallel sides. A

marked character of the pleon is its obliquely truncated extremity. The oblique terminus is perfectly flat, with a raised margin.

The feet of this species, as in the typical species described by Dana, are in two series. The first is composed of the first three pairs of feet, which are comparatively stout and increase in length to the third segment. The second series begins on the fourth segment with a pair of short feet, which fold transversely, the other pairs are successively longer and fold backward. The feet of the second series are much more slender than those of the first. The dactyli of all are bi-unguiculate. The carpal and propodal joints are spinulose beneath.

The operculum is not traversed by an oblique line. The sides of the basal segment are subparallel. The terminal segment is about as broad as long.

Length, 15 mm.; width, 3 mm.

Type.—Cat. No., 22579, U.S.N.M.

CLEANTIS OCCIDENTALIS Richardson.[a]

Cleantis occidentalis RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 850–851; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 270–272.

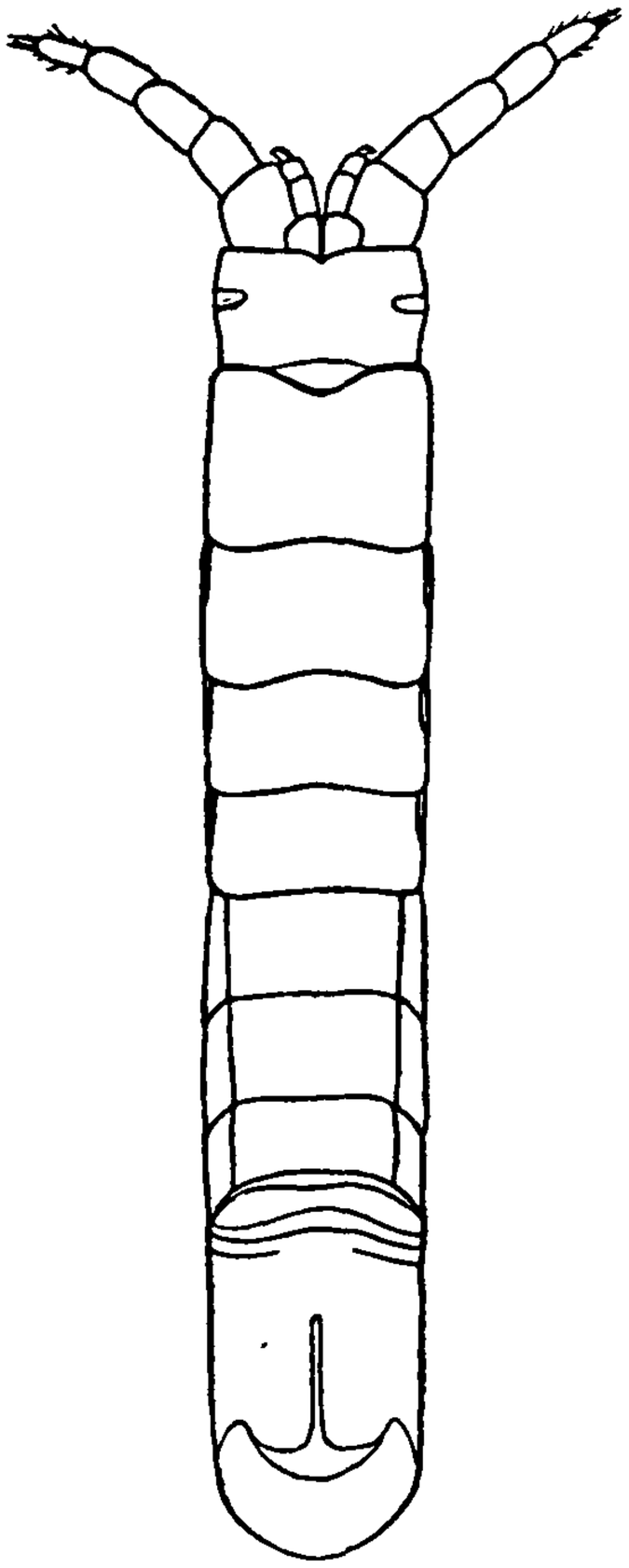

FIG. 455.—CLEANTIS OCCIDENTALIS. × 10.

Locality.—Magdalena Bay, Lower California.

Depth.—12 fathoms.

Body narrow, elongate; surface smooth.

Head of same width as thoracic segments, and with a small, median anterior depression. Eyes lateral. First pair of antennæ consisting of four joints, reach the middle of the third joint of the second pair of antennæ. Second pair of antennæ consist of six joints (five seen from a dorsal view), the last joint being the flagellum. Maxillipeds with the palp composed of four articles.[b]

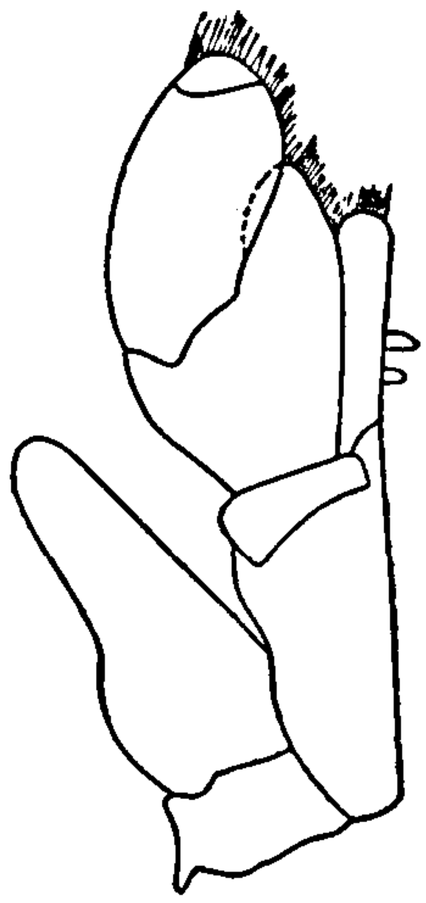

FIG. 456.—CLEANTIS OCCIDENTALIS. MAXILLIPED. × 39.

The thoracic segments show a gradual, though marked, decrease in length, the first one being the longest and somewhat excavate on its anterior margin. The epimera of the second, third, and fourth segments are short and narrow, reaching but half the

[a] The type of this species unfortunately has been lost.

[b] The palp of the maxillipeds was heretofore wrongly represented as composed of only two articles.

length of the segments, while those of the last three segments are broad, with their posterior angles produced beyond the segments.

The abdomen is composed of four segments, three short ones and the terminal segment, which bears suture lines indicative of another coalesced segment. The terminal segment is rounded posteriorly. The anterior three-fourths of the segment is raised considerably above the posterior fourth, which is flat, and there is a groove in the median line on the posterior third of the anterior part of the segment.

The legs are similar to those of the type species of the genus. The three anterior pairs increase in length, the third pair being the longest, and all are directed anteriorly. The fourth pair are very short and fold across the body. The last three pairs increase in length, the seventh pair being the longest, and all these are directed posteriorly. The legs are compact and lie folded on the ventral side and can not be seen from a dorsal view.

There is but one specimen collected by the U. S. Bureau of Fisheries steamer *Albatross* in 1888 at Magdalena Bay, Lower California; depth 12 fathoms.

Type.—Cat. No., 22578, U.S.N.M.

CLEANTIS HEATHII Richardson.

Cleantis heathii RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 851–852; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 272; American Naturalist, XXXIV, 1900, p. 229.

Locality.—Monterey Bay, Lower California.

Body slender, elongate; surface smooth.

Head with lateral margins straight; anterior margin slightly excavate. Eyes small, lateral. First pair of antennæ consist of four joints and are a little longer than half the width of the head. The second pair of antennæ are half as long as the body and are composed of nine joints, the three terminal ones forming the flagellum, which can not be distinguished from the peduncle. Palp of the maxillipeds composed of four articles.

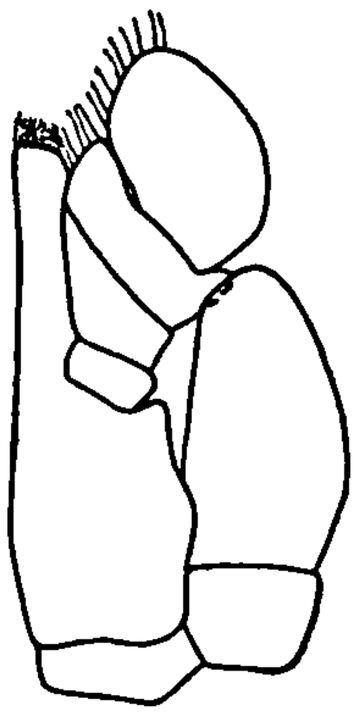

FIG. 457.—CLEANTIS HEATHII. MAXILLIPED. × 77½.

Thoracic segments subequal, with narrow epimera, those of the second, third, and fourth segments reaching but half the length of the segments, the last three epimera extending the entire length of the lateral margin.

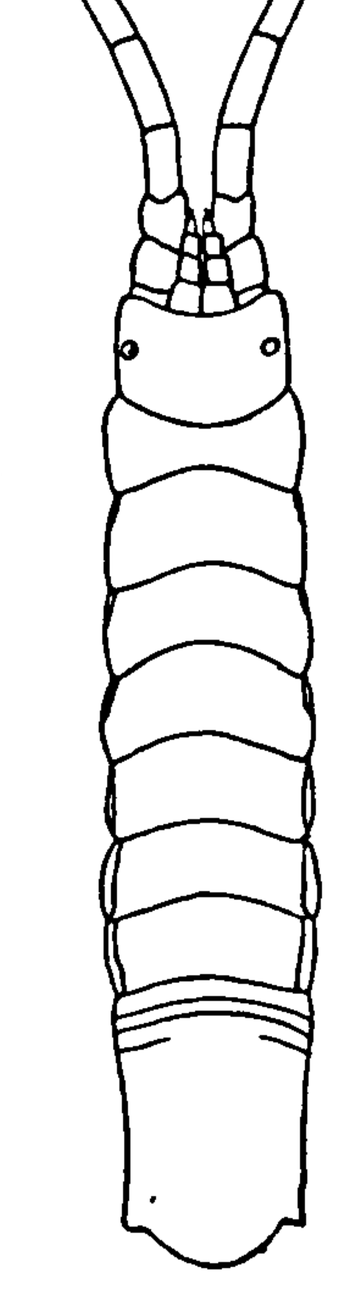

FIG. 458.—CLEANTIS HEATHII. × 6¾.

The abdomen is composed of three segments, with suture lines indicative of another. The terminal segment is broadly rounded posteriorly, with small but acute lateral angles. The sides are almost parallel.

The first four pairs of legs are directed anteriorly; the last three pairs

extend in a posterior direction. There is no perceptible inequality in length. The unguli are bifid.

Two specimens were sent by Mr. Heath from Monterey Bay, California.

Type.—Cat. No. 22577, U.S.N.M.

IV. ASELLOIDEA or ASELLOTA.[a]

Legs of the first pair not cheliform. Uropoda terminal, biramous. Pleopoda exclusively branchial, the first pair in the female 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.

Pleopoda in female reduced in number, only four pairs being present.

ANALYTICAL KEY TO THE FAMILIES OF ASELLOIDEA.[b]

a. First pair of pleopoda in the male not coupled with the second pair; the peduncles short. Second pair small and situated below the first pair. Third pair in both sexes forming a compound operculum. First pair in female small.

b. Peduncles of first pair of pleopoda in the male free. First pair of pleopoda in female consist each of a small peduncle and a single branch. Second pair of pleopoda in male with branches attached at the distal end of the peduncle, the inner branch not geniculate, the distal joint having an inner cavity; outer branch nearly as long as inner branch. Fifth pair of pleopoda with both branches ..... Family XV. ASELLIDÆ

b'. Peduncles of first pair of pleopoda fused in the male. First pair of pleopoda in female with branches fused, forming a small operculum. Second pair of pleopoda in male with branches attached at the distal end of the inner margin of the peduncle, the inner branch geniculate, the distal joint without a cavity; outer branch much shorter than inner branch. Fifth pair of pleopoda each consisting of only a single branch ..... Family XVI. STENETRIIDÆ

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[a] See Sars for characters of superfamily, Crust. of Norway, II, 1899, p. 94.

[b] Doctor Hansen (Proc. Zool. Soc. London, 1905, II, Pt. 2) divides the Asellota into but three families—the Asellidæ, the Stenetriidæ (a new family proposed by him), and the Parasellidæ—which includes all the other Asellota, and represents the families Munnidæ, Janiridæ, Desmosomidæ, and Munnopsidæ. His basis of classification is on the structure of the pleopoda alone. Although the structure of the pleopoda in this group forms excellent characters for a basis of classification, other characters must not be wholly disregarded, nor must all other characters be made subservient to this character alone. The Munnidæ, Janiridæ, and Munnopsidæ form distinct groups which differ in structures quite as essential as those recognized in other families of the order. The differentiation of the legs of the Munnopsidæ into an anterior and a posterior series, the division of the thorax into an anterior and a posterior portion, the two being quite dissimilar, are structural differences which can not be ignored. The genus *Pseudarachna* Sars has the posterior legs distinctly natatory and fringed with plumose cilia, although the joints are not as much dilated as in the other genera of the family. The Munnidæ form also a well differentiated group well separated from the Janiridæ, the characters of which are given in the following key.

a'. First pair of pleopoda in the male coupled with the second pair, the peduncles being elongate. Second pair in the male large, the peduncles situated outside of and coupled with the first pair, forming a large operculum. Third pair in both sexes not forming an operculum. First pair in female large.

b. Last three pairs of legs not natatory. Eyes usually present.

c Three posterior segments of thorax not sharply marked off from the four anterior ones, and not smaller. Caudal segment large, shieldlike. Eyes, when present, lateral or subdorsal, not placed on peduncle-like projections of the head. First pair of antennæ issuing close together. Legs subequal in length .....Family XVII. JANIRIDÆ

c'. Three posterior segments of thorax, as a rule, sharply marked off from four anterior ones, and much smaller. Caudal segment more or less vaulted above, subpyriform. Eyes, when present, placed on the tips of lateral peduncle-like projections of the head. First pair of antennæ placed widely apart. First pair of legs much shorter than others. Succeeding pairs more or less rapidly increasing in length.....Family XVIII. MUNNIDÆ

b'. Last three pairs of legs natatory, with some of joints flattened and ciliated. First pair of legs shorter than three following pairs. Second, third, and fourth pairs very elongate. Eyes wanting.....Family XIX. MUNNOPSIDÆ

Family XV. ASELLIDÆ.[a]

Body depressed.

Lateral parts of head scarcely expanded; front without rostrum.

Segments of thorax with lateral parts lamellarly expanded. Eyes, when present, small and laterally placed.

Both pairs of antennæ with multiarticulate flagella.

Peduncle of second antennæ without scale outside of third joint. First pair of legs subcheliform; six following pairs ambulatory; dactylus usually uni-unguiculate. Four pairs of pleopoda in female. The first[b] are very small, not operculiform; each consists of a minute peduncle and a single rounded lamella. The second pair are wanting. Three succeeding pairs consist each of two lamellæ. Outer lamella of third pair very large and incrusted, and forming with the corresponding lamella of the opposite side a sort of operculum.

Five pairs of pleopoda in male. First pair small with peduncles free, short, and branches single. Second pair situated below and not coupled with first pair, with branches attached to the distal margin of the peduncle; inner branch not geniculate, its distal joint inflated and containing a large cavity at its obtuse end; outer branch nearly as long as inner one, its distal joint movable. Third pair similar to that of female. Last two pairs with both branches present.

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[a] See Sars for characters of family, Crust. of Norway, II, 1899, p. 95, and Hansen, Proc. Zool. Soc. London, 1905, p. 315.

[b] Hansen writes that the first pleopoda of the female in this family are attached far from each other. This is not true of some of the species of *Mancasellus*, as shown in the figures to follow. It is also not characteristic of all the species of *Asellus* and of *Cæcidotea*, for in several species to be mentioned later I have found the reverse to be true.

The Asellidæ are mostly fresh-water forms. All the members of the genera, *Asellus*, *Mancasellus*, and *Cæcidotea*, are found in fresh-water streams, wells, pools, and lakes. The species *Janirella* Bonnier is, however, marine.

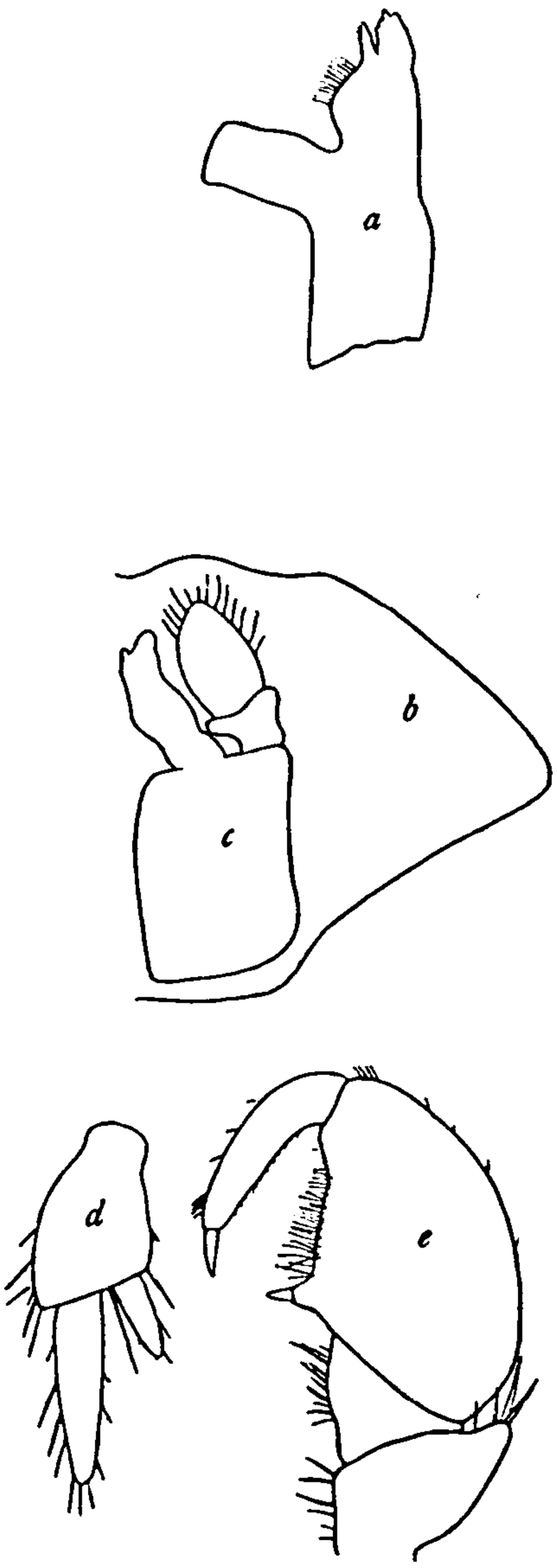


FIG. 459.—MANCASELLUS BRACHYURUS (AFTER GARMAN). *a*, MANDIBLE. *b*, OUTLINE OF ONE SIDE OF HEAD. *c*, ONE OF SECOND GENITAL PLATES OF MALE. *d*, UROPOD. *e*, HAND.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY ASELLIDÆ.

a. Mandibles without a palp. Last six pairs of legs with dactylus bi-unguiculate.
Genus *Mancasellus* Harger

a′. Mandible with a three-jointed palp.

b. Eyes present. Body oblong, depressed. Head small, narrower and shorter than first thoracic segment. Caudal segment not longer than broad.....Genus *Asellus* Geoffroy

b′. Eyes wanting. Body elongate, narrow. Head large, not narrower than first thoracic segment, and longer. Caudal segment much longer than broad.
Genus *Cæcidotea* Packard

67. Genus MANCASELLUS Harger.

Eyes present.

Mandibles without a palp. Last six pairs of legs with dactylus bi-unguiculate. Body broad, depressed. Terminal segment of body broad.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS MANCASELLUS.

a. Lateral margins of head entire.
Mancasellus brachyurus Harger

a′. Lateral margins of head not entire.

b. Uropoda shorter than terminal segment of 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 tenax dilata* 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 antennæ 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 antennæ shorter than the body. Inner branch of uropoda twice as long as outer branch.

Mancasellus danielsi Richardson

MANCASELLUS BRACHYURUS Harger.

Mancasellus brachyurus HARGER, Am. Jour. Sci. and Arts, (3), XI, 1876, pp. 304–305.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.—BOVALLIUS, Bihang till K. svenska Vet.-Akad. Handl., XI, No. 15, 1886, p. 39.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 296; Proc. U. S. Nat. Mus., XXIII, 1901, p. 551.

Localities.—McKee's spring, Lexington, Virginia; Gaylord, Virginia.

Reported injurious to water cress.

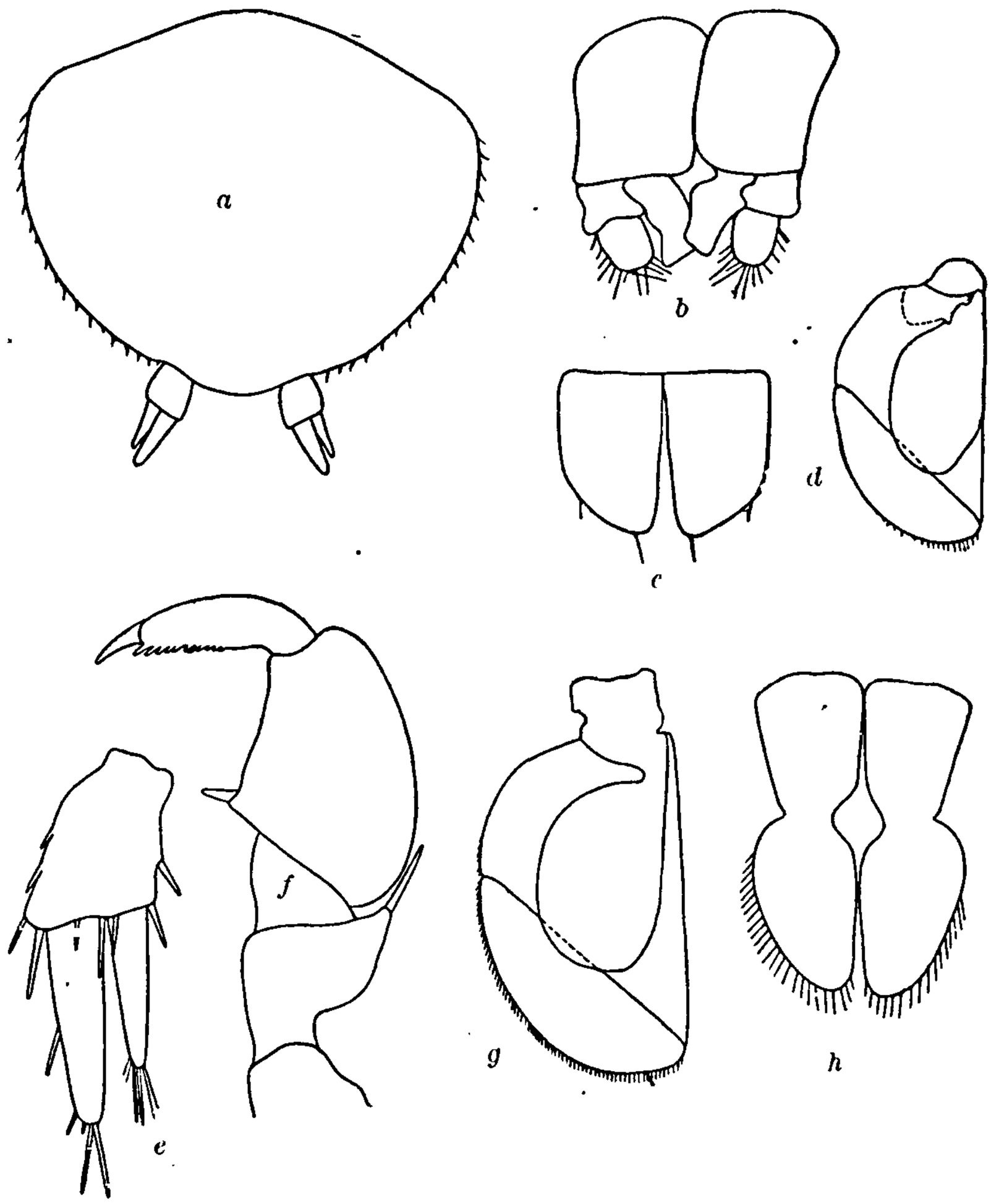


FIG. 460.—MANCASELLUS BRACHYURUS. *a*, ABDOMEN WITH UROPODA. × 9⅓. *b*, SECOND PLEOPOD OF MALE. × 27⅓. *c*, FIRST PLEOPOD OF FEMALE. × 27⅓. *d*, THIRD PLEOPOD OF MALE. × 15⅓. *e*, UROPOD. × 27⅓. *f*, FIRST LEG. × 27⅓. *g*, THIRD PLEOPOD OF FEMALE. × 15⅓. *h*, FIRST PLEOPOD OF MALE. × 27⅓.

Body about two and a third times longer than wide, 6 mm.: 14 mm.

Head a little more than twice as wide as long, 1½ mm.: 3½ mm., with the anterior margin slightly excavate between the antero-lateral angles. The sides of the head are entire. The eyes are small, round, com-

posite, and situated a short distance from the lateral margins. The first pair of antennæ have the basal article short and somewhat dilated; the second article is a little longer than the first and about half as wide; the third article is shorter than the second; the flagellum is composed of six articles. The first antennæ extend two-thirds the length of the fifth article of the peduncle of the second antennæ. The second pair of antennæ have the first article very short; the second and third are subequal and each is but little longer than the first; the fourth article is twice as long as the third; the fifth article is one and a half times longer than the fourth. The flagellum is composed of about fifty articles and extends, when retracted, to the posterior margin of the fourth thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

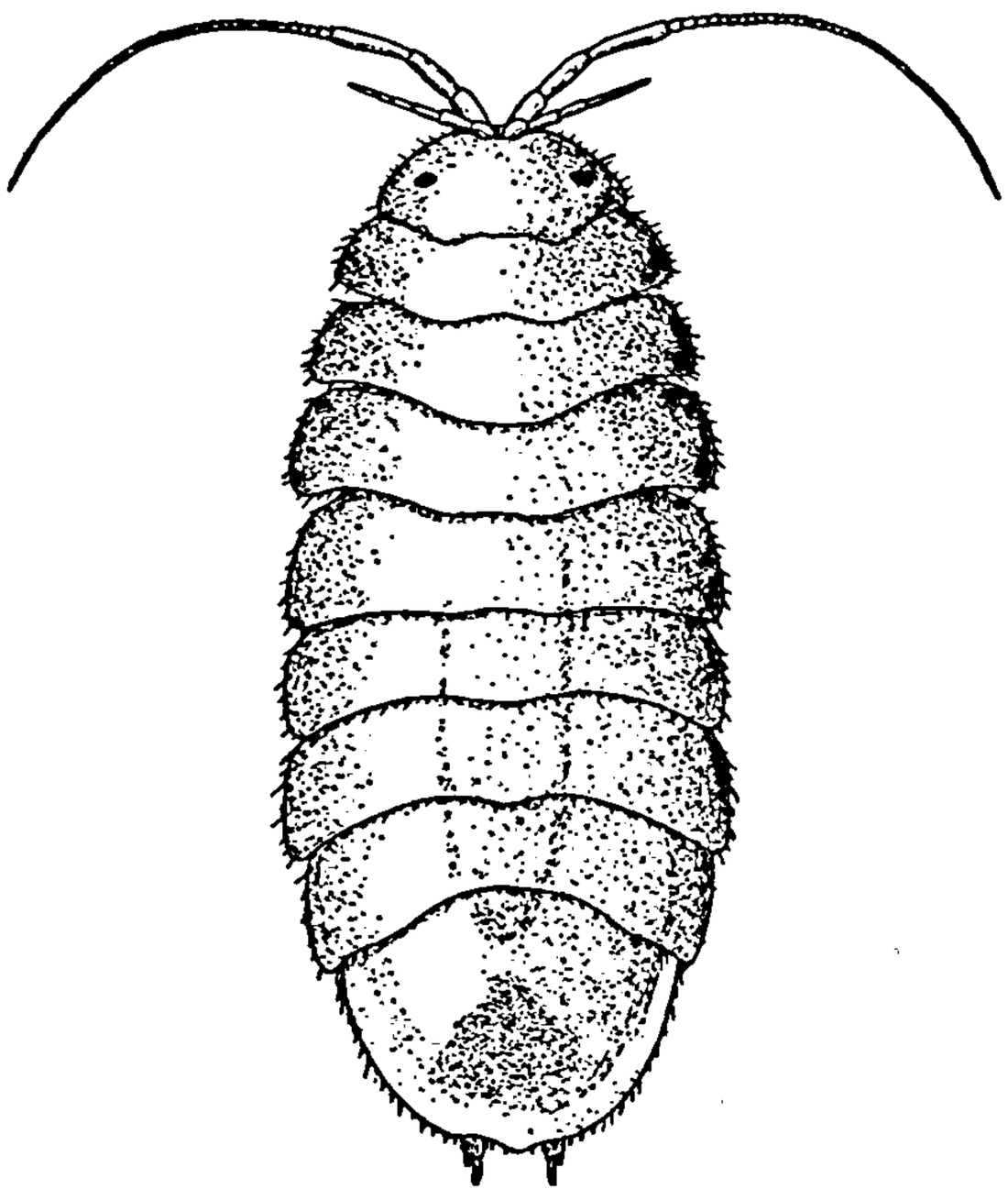


FIG. 461.—MANCASELLUS BRACHYURUS. × 4½.

The segments of the thorax are subequal, with lateral margins straight and entire. The epimera are not separated off from the segments, but are perfectly coalesced.

The abdomen is composed of a single large segment, rounded posteriorly, with a small rounded lobe between the uropoda. The uropoda are very short, being only 1 mm. long, or one-fourth the length of the abdomen, which is 4 mm. long. The peduncle is about as long as broad and shorter than the branches. The inner branch is one and a half times longer than the peduncle; the outer branch is a little shorter than the inner branch. In the female the first pleopoda are attached close together, as shown in fig. 460 *c*.

The first pair of legs are subchelate. The propodus is armed with a single large spine on the inferior margin. The dactylus is furnished with a row of small spines along the inferior margin.

MANCASELLUS MACROURUS Garman.

Mancasellus macrourus GARMAN, Bull. Essex Institute, XXII, 1890, pp. 28–30.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.—HAY, Proc. U. S. Nat. Mus., XXV, 1903, pp. 423–424.

Localities.—Kentucky; Tennessee; John Ross spring, at Rossville, Georgia; outside Nickajack Cave; "Old Mill" Devils Backbone, Hamilton County, Ohio; Redbank, Hamilton County, Ohio; Batavia Junction, Ohio; Westwood, Cincinnati, Ohio (J. Lindahl); Echo River, Mammoth Cave, Kentucky.

Body oblong-ovate, nearly two and a half times longer than wide, 5 mm. : 12 mm. Sides of body nearly parallel.

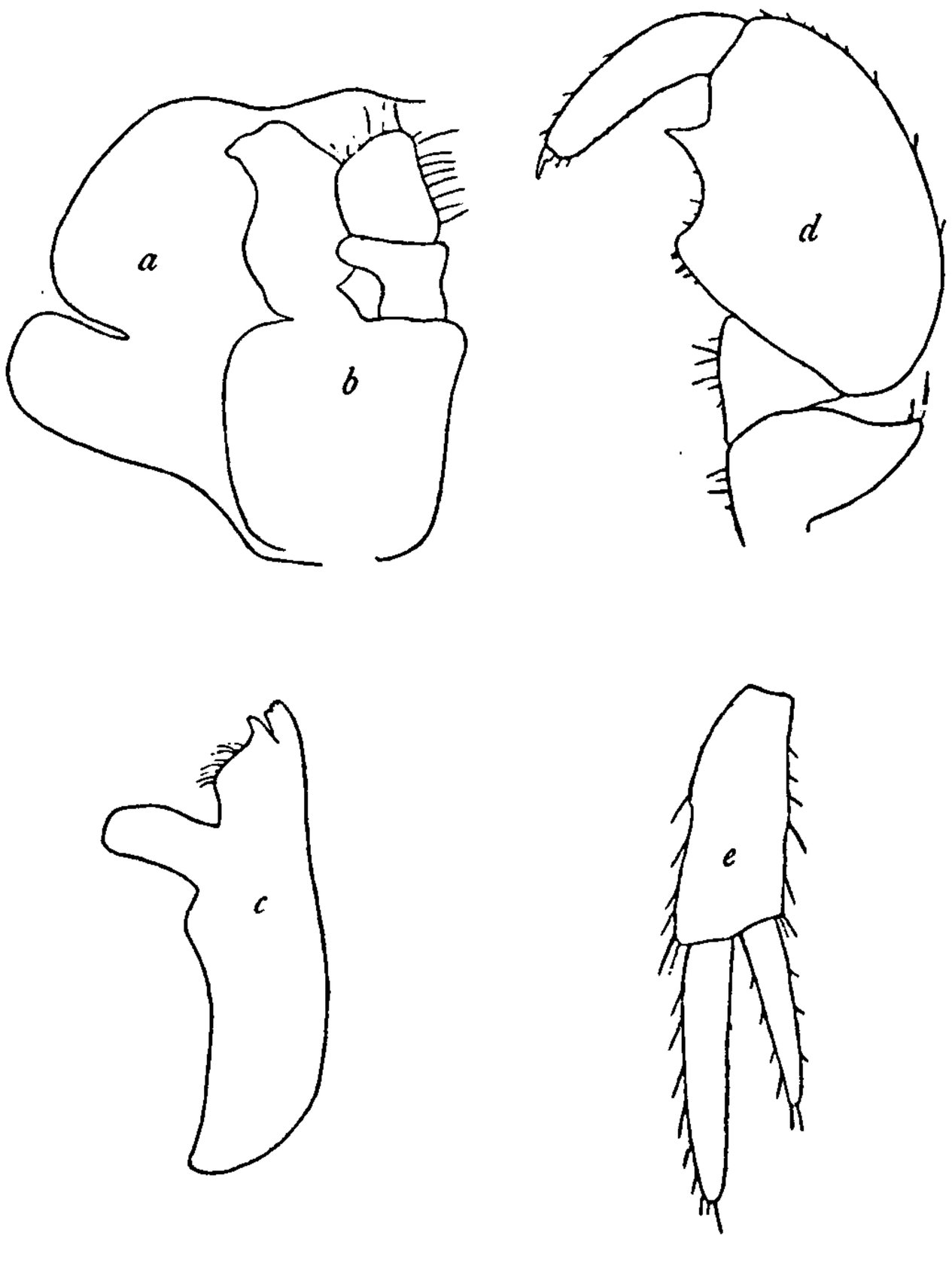


FIG. 462.—MANCASELLUS MACROURUS (AFTER GARMAN). *a*, OUTLINE OF ONE SIDE OF HEAD. *b*, ONE OF SECOND GENITAL PLATES OF MALE. *c*, MANDIBLE. *d*, HAND. *e*, UROPOD.

Head three times wider than long, 1 mm. : 3 mm., with the anterior part slightly narrower than the posterior part, the anterior margin slightly excavate on either side of a small median point, and again emarginate on either side of two small points, each lateral to the median point. The lateral margin is cleft on either side near the base, just lateral to the eyes, and the posterior part of the lateral margin below the cleft is produced into a small lobe on either side. The eyes are small, round, composite, situated near the lateral margins. The first pair of antennæ have the basal article large and dilated, and it extends to the end of the second article of the peduncle of the second pair of antennæ; the second article is a

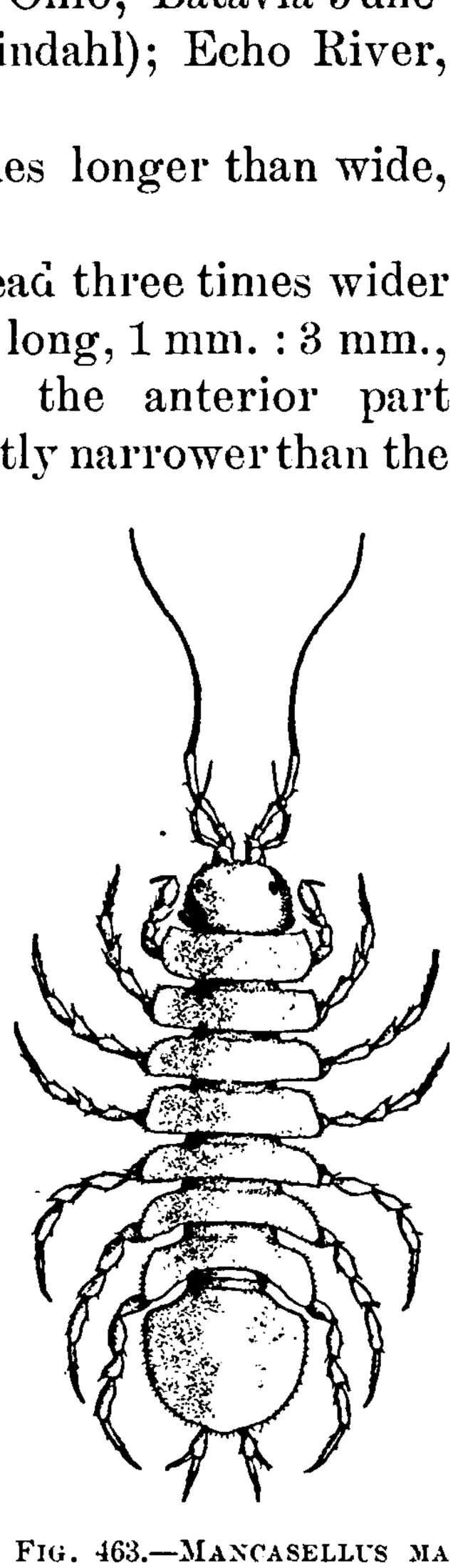


FIG. 463.—MANCASELLUS MACROURUS (AFTER HAY).

little longer than the first and half as wide; the third is half as long as the second. The flagellum is composed of six articles and extends to the middle of the fifth article of the peduncle of the second antennæ. The basal article of the second antennæ is short; the second article is about as long as the first; the third is as long as the second; the fourth is equal to the first three taken together; the fifth is one and a half times longer than the fourth. The flagellum is composed of forty-three articles and extends to the posterior margin of the sixth thoracic segment, and is 9 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is wanting.

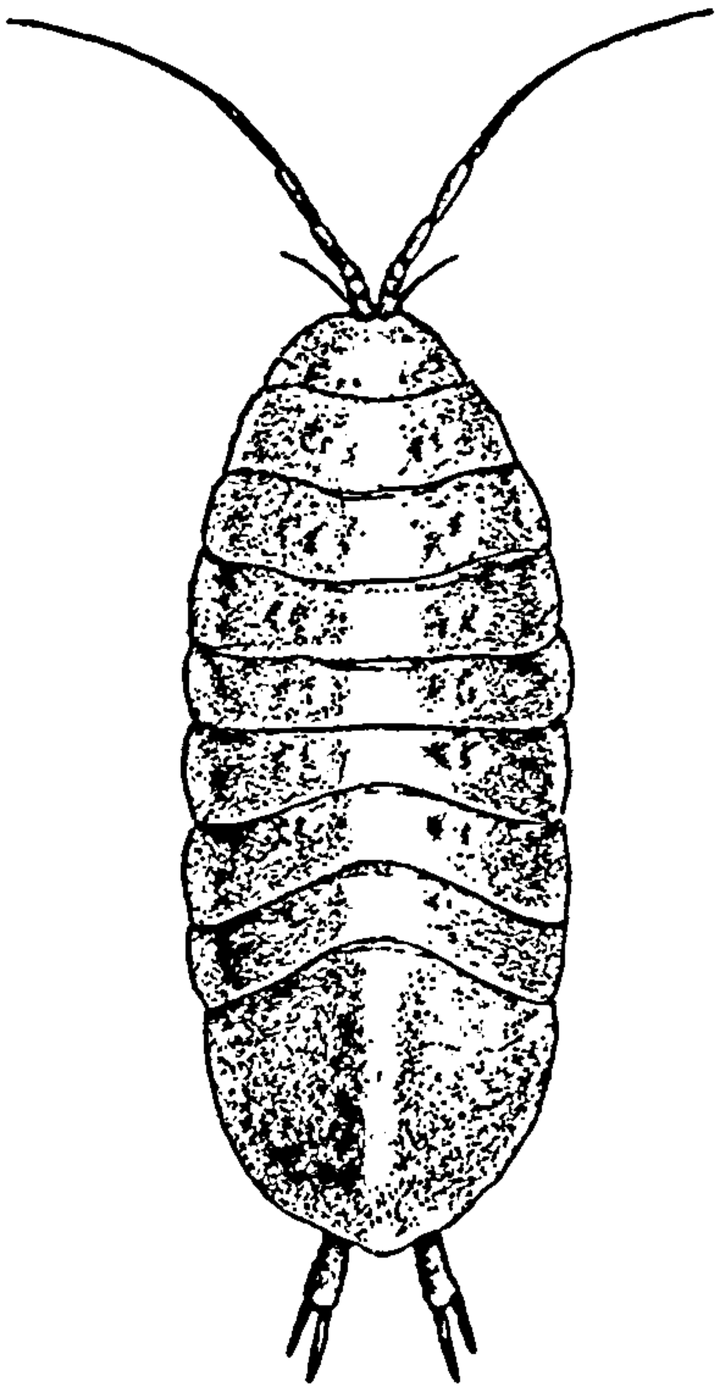


FIG. 464.—MANCASELLUS MACROURUS (AFTER GARMAN).

The first segment of the thorax is a little longer than any of the others, being 1½ mm. long. The others are subequal and each is 1 mm. in length. The lateral margins are straight and entire and the epimera are not separated off from the segments.

The abdomen is composed of one short segment, visible only in the middle of the dorsal surface and covered at the sides by the last thoracic segment, and one large terminal segment,

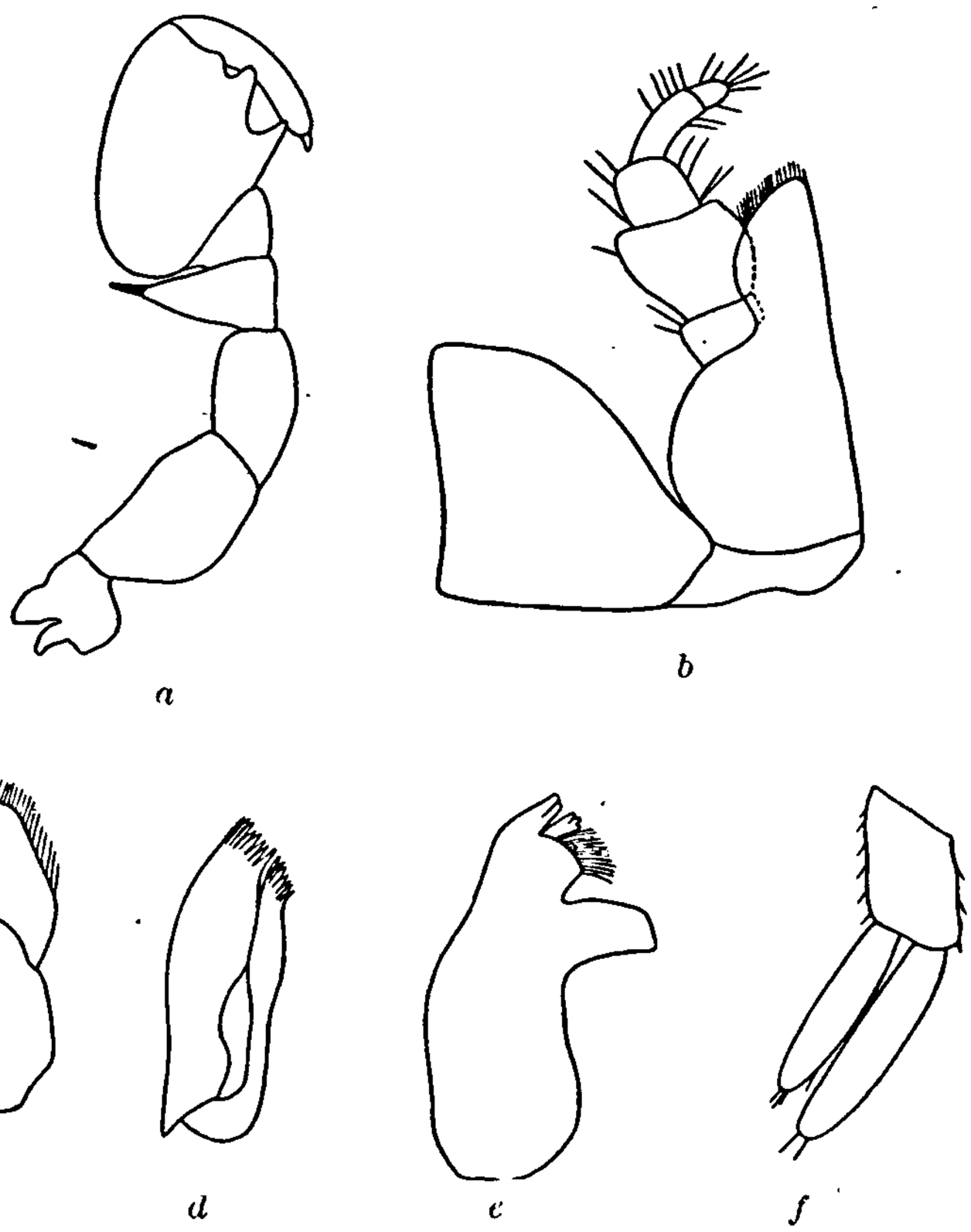


FIG. 465.—MANCASELLUS MACROURUS. *a*, FIRST LEG. × 15⅓. *b*, MAXILLIPED. × 27⅓. *c*, SECOND MAXILLA. × 27⅓. *d*, FIRST MAXILLA. × 27⅓. *e*, MANDIBLE. × 27⅓. *f*, UROPOD. × 15⅓.

which is 4 mm. in length and has the posterior margin widely rounded. The terminal segment is 5 mm. wide at the base. The uropoda are half as long as the terminal abdominal segment. The peduncle is 1 mm. long. The outer branch is 1 mm. long. The inner branch is a very little longer than the outer branch. In the female the first pleopoda are attached close together as in the preceding species.

The first pair of legs are strongly prehensile and have the propodus greatly dilated and the inferior margin armed with two triangular processes. All the other legs are ambulatory.

MANCASELLUS TENAX (Smith).

Asellus tenax SMITH, Amer. Jour. Science and Arts, (3), II, 1871, pp. 453–454.
Asellopsis tenax HARGER, Amer. Jour. Science and Arts, (3), VII, 1874, p. 601; HARGER in SMITH, Report U. S. Commissioner of Fish and Fisheries, 1874, pp. 659–660, pl. 1, fig. 3.
Mancasellus tenax HARGER, Amer. Jour. Science and Arts, (3), XI, 1876, p. 304.—HAY, Amer. Nat., XVI, 1882, p. 242.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.

Localities.—Lake Superior; Indiana; Michigan; Lake Huron.

Body oblong-ovate, a little more than two and a half times longer than wide, 3 mm. : 8 mm.

Head twice as wide as long, 1 mm. : 2 mm., with the anterior margin excavate on either side of a small median point. Lateral margins somewhat expanded in an anterior and a posterior lobe, the posterior lobe being produced laterally much beyond the anterior lobe. Between the anterior and the posterior lobe the lateral margin is slightly excavate. The eyes are small, round, composite, and situated opposite the excavation a short distance from the lateral margin. The first pair of antennæ have the first article large and dilated; the second article is half as wide as the first article and twice as long; the third article is less than half the length of the second. The flagellum is composed of six articles. The first antennæ extend to the end of the fourth article of the peduncle of the second pair of antennæ. The second antennæ have the first three articles short and subequal; the fourth is about as long as the first three taken together; the fifth is about one and a half times longer than the fourth. The flagellum is composed of thirty articles, and extends to the posterior margin of the

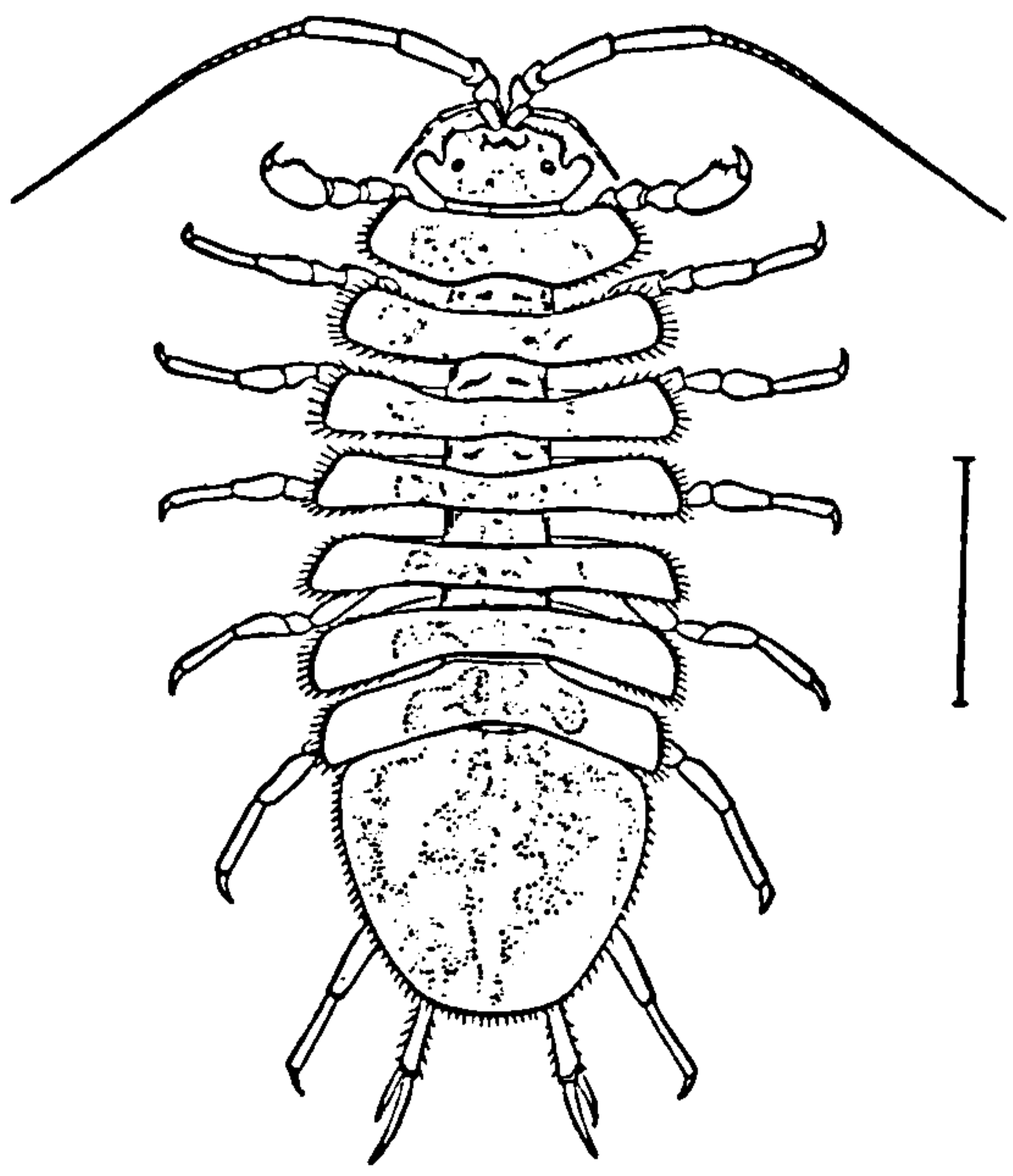


FIG. 466.—MANCASELLUS TENAX (AFTER HARGER).

sixth thoracic segment, when retracted. The maxilliped has a palp of five articles. The palp of the mandibles is wanting.

The segments of the thorax are subequal with lateral margins entire. The epimera are not separated from the segments, being entirely coalesced, with no indication of a separation.

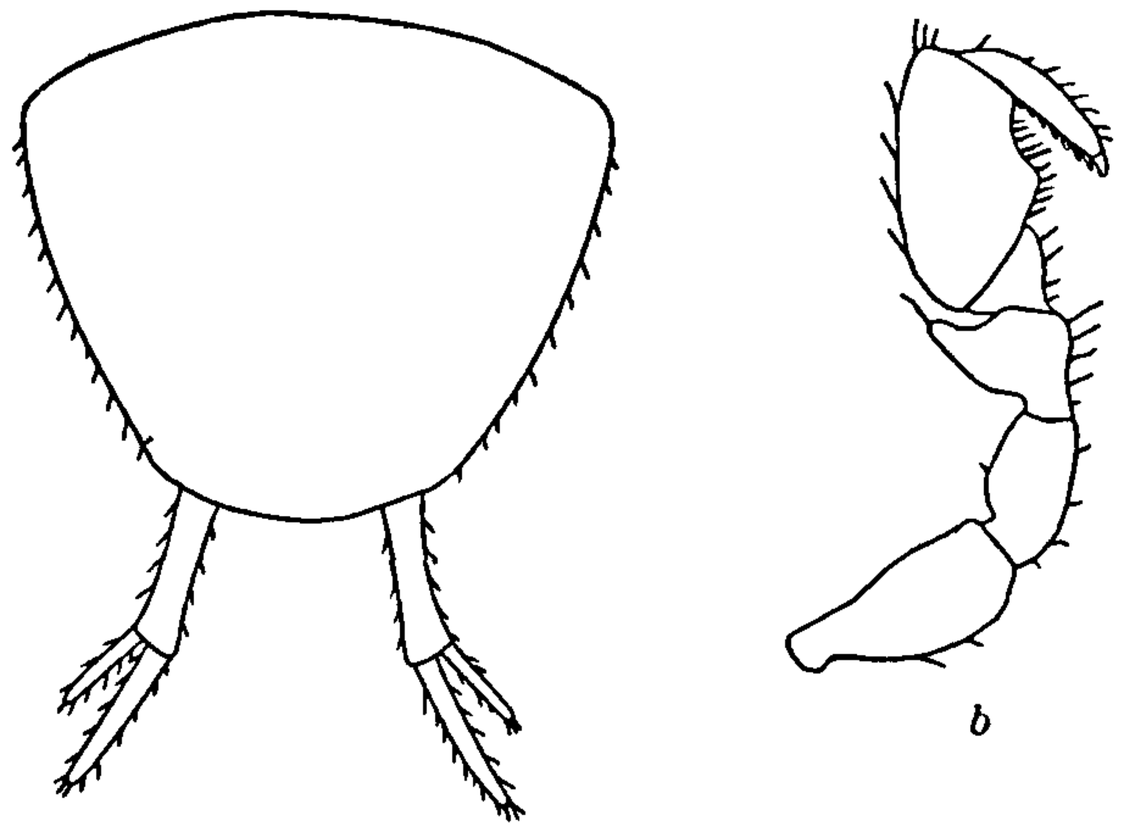


FIG. 467.—MANCASELLUS TENAX. *a*, ABDOMEN WITH UROPODA. × 11¼. *b*, FIRST LEG. × 20½.

The abdomen consists of two short segments followed by a large terminal one, rounded posteriorly. There is no lobe on the posterior margin between the uropoda. The uropoda are shorter than the terminal abdominal segment. The length of the terminal abdominal segment is 3 mm. The length of the uropoda is 2 mm. The peduncle of the uropoda is 1 mm. The inner branch is as long as the peduncle, being 1 mm. long. The outer branch is half as long as the inner branch.

The first pair of legs are subchelate. The propodus has a single triangular expansion on the inferior side. There are numerous spines on the inferior margin of the propodus and dactylus. All the other pairs of legs are ambulatory with dactyli bi-unguiculate.

MANCASELLUS TENAX DILATA Smith.

Mancasellus tenax dilata SMITH, Report U. S. Commissioner of Fish and Fisheries, 1874, p. 661.

Locality.—Detroit River.

"The flagellum of the antennulæ contains one or two more segments [than in the preceding species]. 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."—SMITH.

MANCASELLUS LINEATUS (Say).

Asellus lineatus SAY, Jour. Acad. Nat. Sci. Phila., I, 1818, p. 428.—DE KAY, Nat. Hist. New York, Pt. 6, 1844, p. 50.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.

Mancasellus lineatus RICHARDSON, American Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, p. 551.

Locality.—South Carolina.

"Body oblong; interior antennæ 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; antennæ, 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, laciniæ 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 the 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. It might be referred to the genus *Janira* of Doctor Leach."—Say.[a]

MANCASELLUS DANIELSI Richardson.

Mancasellus danielsi Richardson, Proc. U. S. Nat. Mus., XXV, 1902, pp. 505–507.

Locality.—Lily Lake, La Porte, Indiana.

Body broadly oval, with lateral parts of segments widely expanded. Head broader posteriorly than anteriorly, the posterior part being as wide as the first thoracic segment. Lateral margins have a deep and wide incision which separates the narrower anterior lobes from the widely expanded posterior lobes. The eyes are opposite these incisions. The frontal margin is produced in a small median point, on either side of which is a shallow depression, followed by another point, in turn succeeded by a slight depression. The antennulæ are short, reaching only to the extremity of the fourth joint of the peduncle of the antennæ; the flagellum consists of eight joints. The antennæ are very long, extending nearly the entire length of the body. The mandible is without a palp.

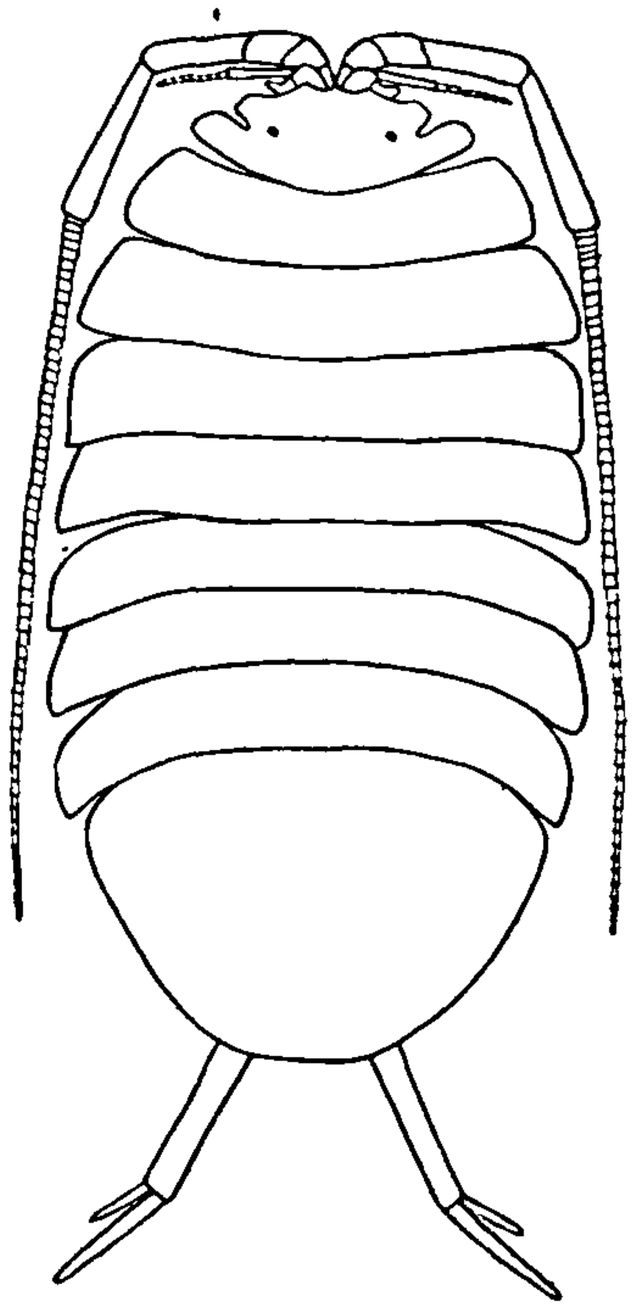


FIG. 468.—MANCASELLUS DANIELSI. × 3¼.

The thoracic segments are subequal in length. The lateral parts are widely expanded, with lateral margins entire.

The caudal segment is narrower posteriorly than anteriorly, with

[a] Jour. Acad. Nat. Sci. Phila., I, 1818, p. 428.

the end obtusely rounded. Width of segment at base about one and one-half times its length.

The caudal stylets are long and slender, the length of the stylet being equal to the length of the caudal segment. The basal joint is equal to the length of the fifth peduncular joint of the antennæ. The outer branch is half as long as the inner branch.

The first pair of legs are subchelate. The propodus is broadly expanded and armed on the inner margin with a large tooth about halfway between the base and the articulation of the joint with the dactylus. Between the tooth and the articulation of the dactylus with the propodus is a process having a blunt, truncate extremity. The dactylus is provided with two teeth near the base on the inner margin. The carpus is small and triangular in shape. The merus is produced at the upper outer angle.

FIG. 469.—MANCASELLUS DANIELSI. MANDIBLE.

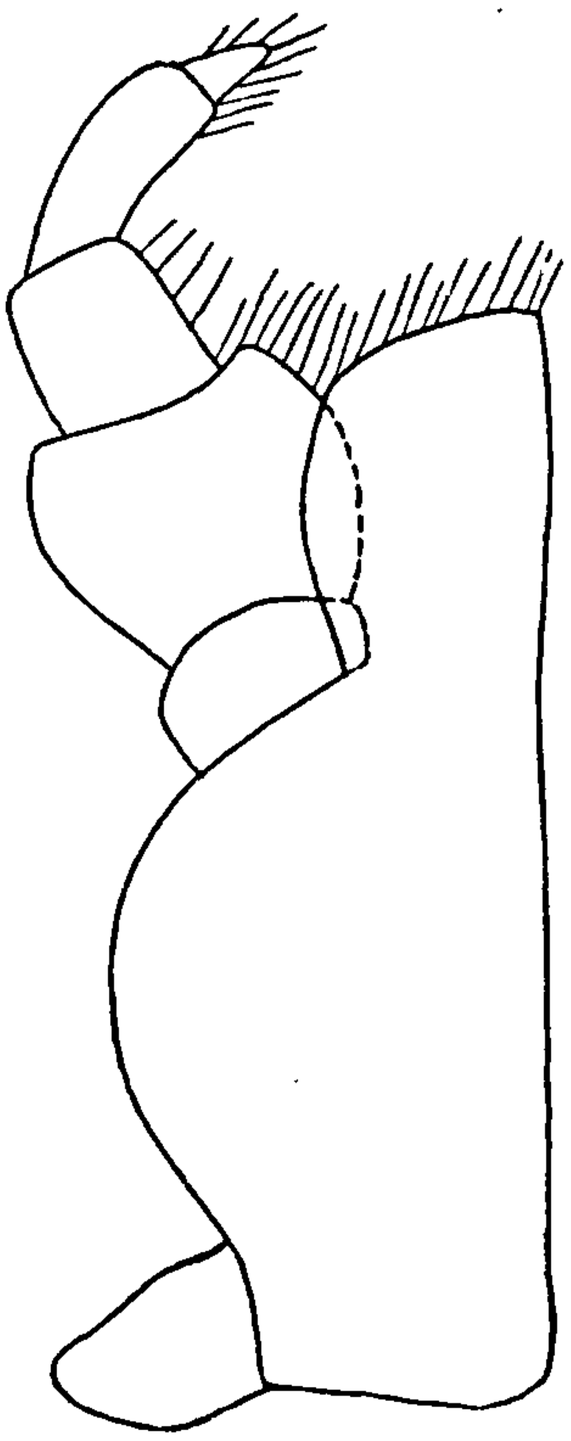


FIG. 470.—MANCASELLUS DANIELSI. MAXILLIPED. (GREATLY ENLARGED.)

The remaining six pairs of legs are similar in structure and ambulatory in character, with biunguiculate dactyli.

Three specimens were found at Lily Lake, Laporte, Indiana, by Mr. Daniels.

Type.—Cat. No. 25693, U.S.N.M.

This species is more closely related to *M. tenax* (Smith) than to any other species of the genus. It differs, however, from *M. tenax* in the greater length of the antennæ, which extend nearly the entire length of the body, while in *M. tenax* they are only half the length of the body; in the greater width of the caudal segment in proportion to its length, the width being one and one-half times the length, while in *M. tenax* the width and length of this segment are about equal; in the greater length of the caudal stylets, which are equal to the length of the caudal segment, while in *M. tenax* they are only a little longer than half the length of the caudal segment; in the greater length of the basal segment of the stylet, its length being equal to the length of the fifth joint of the peduncle of the antennæ, while in *M. tenax* it is equal to the length of the fourth joint of that organ (the fourth joint of the peduncle of the antennæ in both species being shorter than the fifth joint); in the greater breadth of the entire body in proportion to its length, *M. tenax* being narrower in width as compared to its length; and in the difference in the legs of the first pair, the propodus

in *M. tenax* being armed with one broad low tubercle (in the subspecies *dilata* the propodus is armed with three acute teeth), while in *M. danielsi* the propodus is armed with one large tooth and one bluntly ending, truncate process, the dactylus being provided with two teeth at the base, the dactylus in *M. tenax* being armed with spines on the inner margin, of which the distal ones are the larger, and at the end with a large spine.

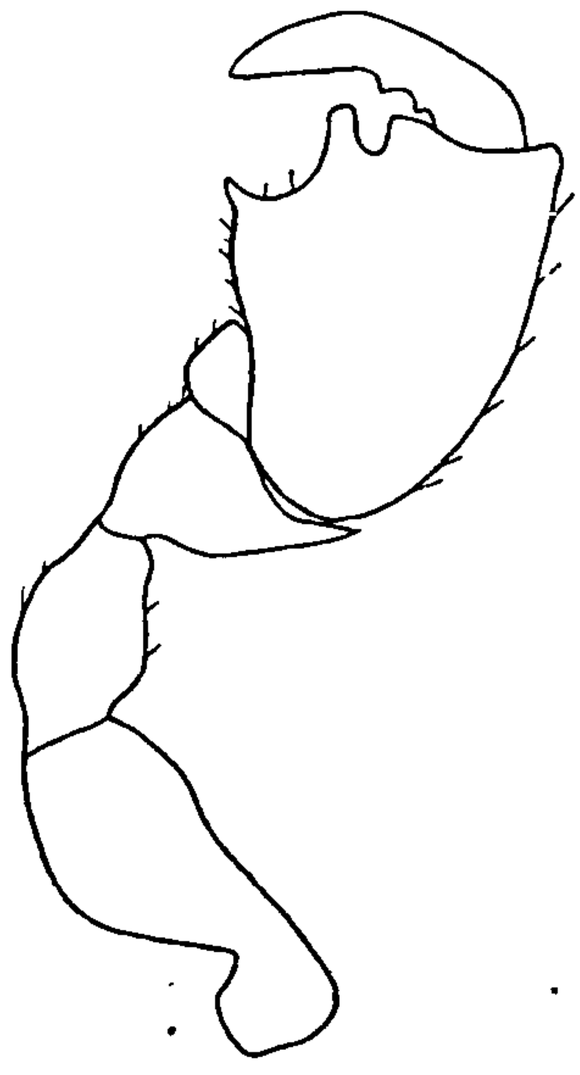


FIG. 471.—MANCASELLUS DANIELSI. LEG OF FIRST PAIR. × 14⅜.

This species differs from *M. lineatus* (Say) in having antennæ somewhat shorter, in the fact that the propodus of the first pair of legs is provided with a bluntly ending process between the long tooth, situated about the middle on the inferior margin, and the articulation of the dactylus with the propodus, and in the longer outer branch of the caudal stylets, it being half as long as the inner branch, while in *M. lineatus* it is only one-third the length of the inner one.

Named for Mr. L. E. Daniels, by whom the specimens were collected.

68. Genus ASELLUS Geoffroy.

Mandibles with a palp. Last six pairs of legs with dactylus uniunguiculate. Eyes present.

Body broad, depressed. Head small, narrower and shorter than first thoracic segment.

Terminal segment of body very broad, not longer than broad.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS ASELLUS.

a. Propodus of first pair of legs armed with two triangular processes, one or both processes sometimes replaced by a strong spine.

b. Uropoda almost as long as the terminal segment of the body. Epimera present on all the segments of the thorax.

c. Head with lateral margins not produced in a lobe on either side. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment. First pair of antennæ extend to the end of the peduncle of the second antennæ; flagellum composed of fourteen articles.

Asellus communis Say

c'. Head with lateral margins produced in a lobe on either side. Second pair of antennæ extend to the posterior margin of the seventh thoracic segment. First pair of antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ; flagellum composed of nine articles.

Asellus intermedius Forbes

b'. Uropoda about half as long as the terminal segment of the body. Epimera not present on all the segments of the thorax.

c. Epimera present on the first segment of the thorax only. Head with the lateral margins produced in a lobe on either side. First pair of antennæ, with a flagellum of twelve articles, extend to the middle of the fifth article of the peduncle of the second antennæ. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment. Inner branch of the uropoda is as long as the peduncle. Uropoda one-fourth of a millimeter longer than half the length of the terminal segment of body.

Asellus brevicauda Forbes

c'. Epimera not evident on any of the segments of the thorax. Head with the lateral margins not produced in a lobe on either side. First pair of antennæ, with a flagellum of seven articles, extend almost to the end of the fourth article of the peduncle of the second antennæ. Second pair of antennæ extend to the posterior margin of the seventh thoracic segment. Inner branch of uropoda is twice as long as peduncle. Uropoda one-third of a millimeter shorter than half the length of the terminal segment of the body ..... *Asellus hoppinæ* Faxon

a'. Propodus of first pair of legs not armed with two triangular processes.

b. Propodus of first pair of legs furnished with few spines.

c. Second pair of antennæ as long as the body. Propodus of first pair of legs elliptical in outline and armed with one long spine. Terminal segment of body with median lobe small ..... *Asellus attenuatus* Richardson

c'. Second pair of antennæ extend to the posterior margin of the fifth thoracic segment. Propodus of first pair of legs produced in the male on the inferior margin in a roundly triangulate expansion furnished with three long spines. Terminal segment of body with median lobe large and conspicuous ..... *Asellus aquaticus* (Linnæus)

b'. Propodus of first pair of legs furnished with numerous short spines or stiff hairs ..... *Asellus tomalensis* Harford

ASELLUS COMMUNIS Say.

Asellus communis Say, Jour. Acad. Nat. Sci. Phila., I, 1818, pp. 427–428.
Asellus vulgaris Gould, Invertebrata of Massachusetts, 1841, p. 337.
Asellus communis De Kay, Nat. Hist. New York, Pt. 6, 1844, p. 49.—Smith, Report U. S. Commissioner of Fish and Fisheries, 1874, Pt. 2, p. 657, pl. 1, fig. 4.
Asellus militaris Hay, Bull. Ill. State Lab. Nat. Hist., No. 2, 1878, p. 90.
Asellus communis Hay, American Naturalist, XVI, 1882, p. 241.—Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 358.—Richardson, American Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, p. 551.—Paulmier, Bull. New York State Museum, 1905, p. 178.

Localities.—Schuylkill River, Pennsylvania; Connecticut; Massachusetts; New York; Indiana; Illinois; Michigan; Mississippi; Sandusky, Ohio (E. L. Moseley); Cincinnati, Ohio; Rhode Island; edge of Potomac River, Virginia side.

Body oblong-ovate, three times longer than wide, 5 mm.:15 mm. Sides of body almost parallel.

Head twice as wide as long, 1½ mm.:3 mm., with the anterior margin excavate. The head is narrower anteriorly than posteriorly, being only 2 mm. wide in front. The eyes are small, round, composite, and situated at the sides of the head, halfway between the anterior and the posterior margins. The first pair of antennæ have the basal articles

wide but short, and extending to the end of the second article of the peduncle of the second pair of antennæ; the second article is one and a half times longer than the first article; the third article is three-fourths as long as the second. The flagellum is composed of fourteen articles, and extends to the end of the peduncle of the second pair of antennæ. The second pair of antennæ have the first three articles short and subequal; the fourth article is as long as the first three taken together; the fifth is one and two-thirds times longer than the fourth. The flagellum is composed of about ninety articles, and extends to the posterior margin of the fifth thoracic segment, and is 10 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

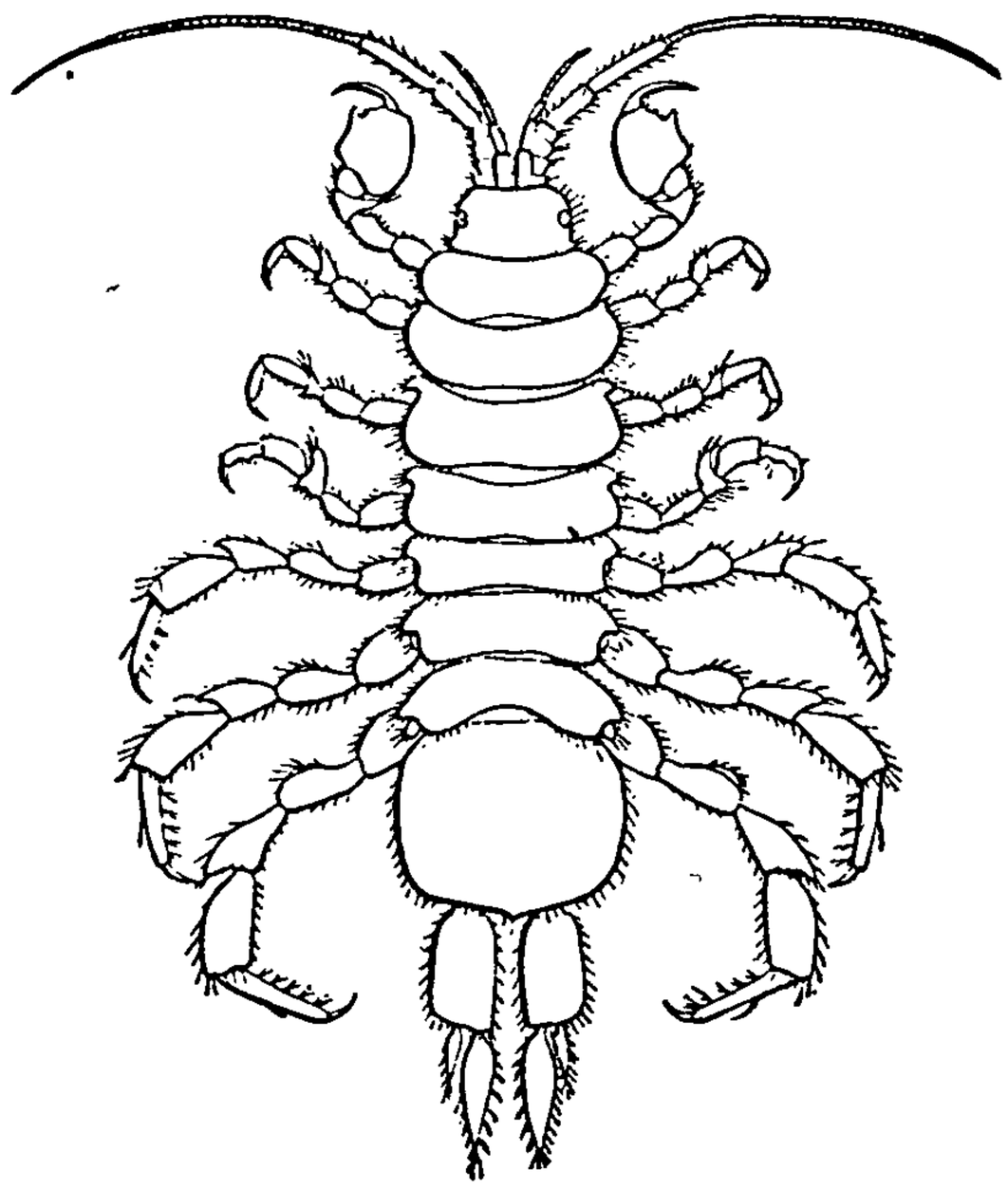


FIG. 472.—ASELLUS COMMUNIS (AFTER SMITH).

The first segment of the thorax is slightly longer than any of the others, which are subequal, being each 1 mm. in length. The first segment is 1½ mm. long. All the segments, including the first, have small epimera situated at the antero-lateral angles of the segments.

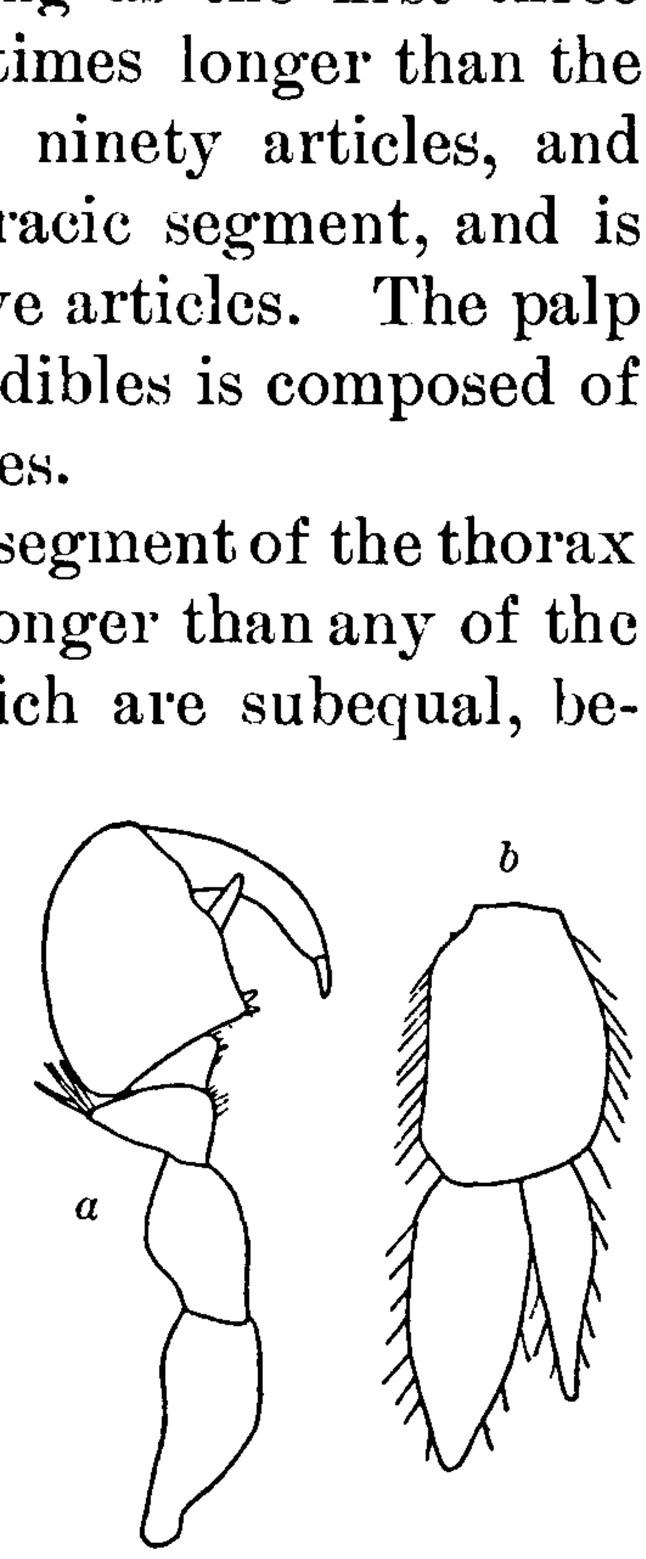


FIG. 473.—ASELLUS COMMUNIS. *a*, FIRST LEG OF MALE. × 11½. *b*, UROPOD. × 11½.

The abdomen is composed of two short segments, visible only in the middle of the dorsal surface, and a large terminal segment, 5 mm. wide and 4½ mm. long, with the post-lateral angles rounded and the posterior margin produced in a broad triangular process between the uropoda. The uropoda are about as long as the terminal abdominal segment, being 4 mm. long. The peduncle is 2 mm. in length and is 1 mm. wide. The inner branch of the uropoda is broad and tapers to a narrow, acute extremity. The outer branch is half as wide and is about two-thirds the length of the inner branch; it is also produced to a narrow and pointed extremity. In the female the first pleopoda are attached close together.

The first pair of legs are prehensile and have the propodus greatly expanded, and the inferior margin produced in one long and one short triangular process. All the other legs are ambulatory.

ASELLUS INTERMEDIUS Forbes.

Asellus intermedius FORBES, Bull. Ill. Museum of Nat. Hist., No. 1, 1876, pp. 10–11.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 358.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.

Localities.—Found in hill country of southern Illinois, under stones in small streams.

Body oblong-ovate, about three times as long as wide, 2 mm.: 7 mm. Head wider than long, 1 mm.: 1½ mm., with the anterior margin straight. Sides of head entire, with a small lobe on either side near the base. Eyes small, composite, and situated close to the lateral margins, halfway between the anterior and the posterior margins. The first pair of antennæ have the basal article large and somewhat dilated; the second article is half as wide as the first and about as long; the third article is a little more than half as long as the second. The flagellum is composed of nine articles and extends to the middle of the fifth article of the peduncle of the second pair of antennæ. The second antennæ have the first three articles short and about equal in length; the fourth article is about as long as the first three taken together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about fifty articles and extends a short distance beyond the posterior margin of the seventh thoracic segment. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles.

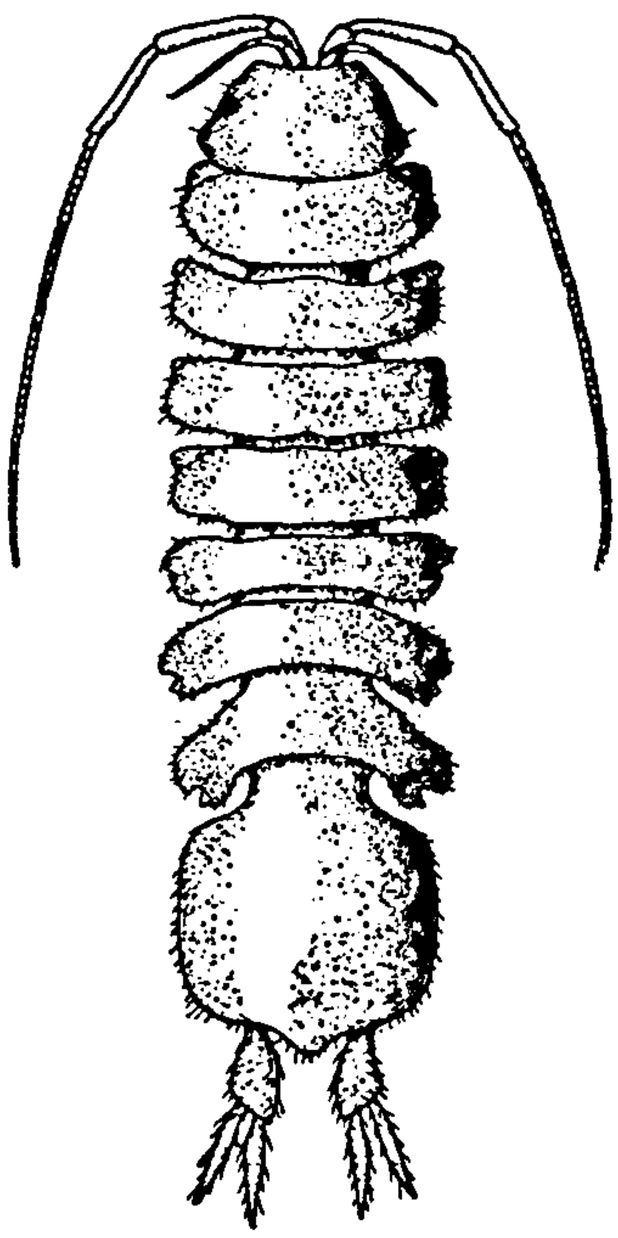


FIG. 474.—ASELLUS INTERMEDIUS. × 7.

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,

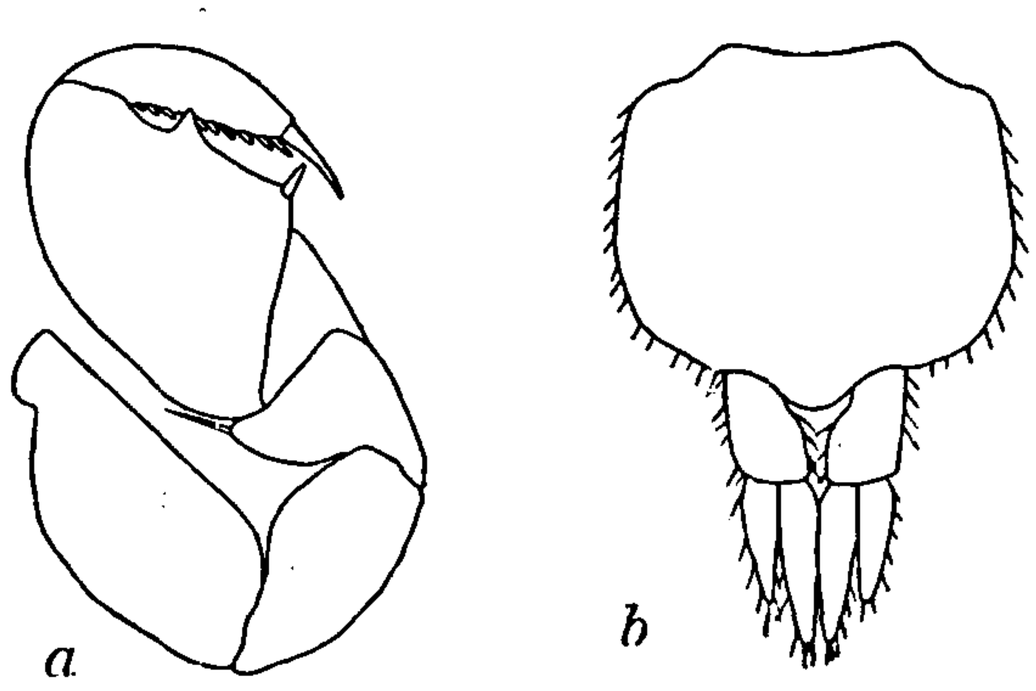


FIG. 475.—ASELLUS INTERMEDIUS. *a*, FIRST LEG. × 39. *b*, ABDOMEN WITH URPODA. × 11¼.

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 abdomen is composed of two short segments followed by a large terminal segment, which has a large rounded median lobe on the posterior margin between the uropoda. The uropoda are as long as the terminal abdominal segment. The outer branch is as long as the peduncle. The inner branch is one and one-third times longer than the outer branch.

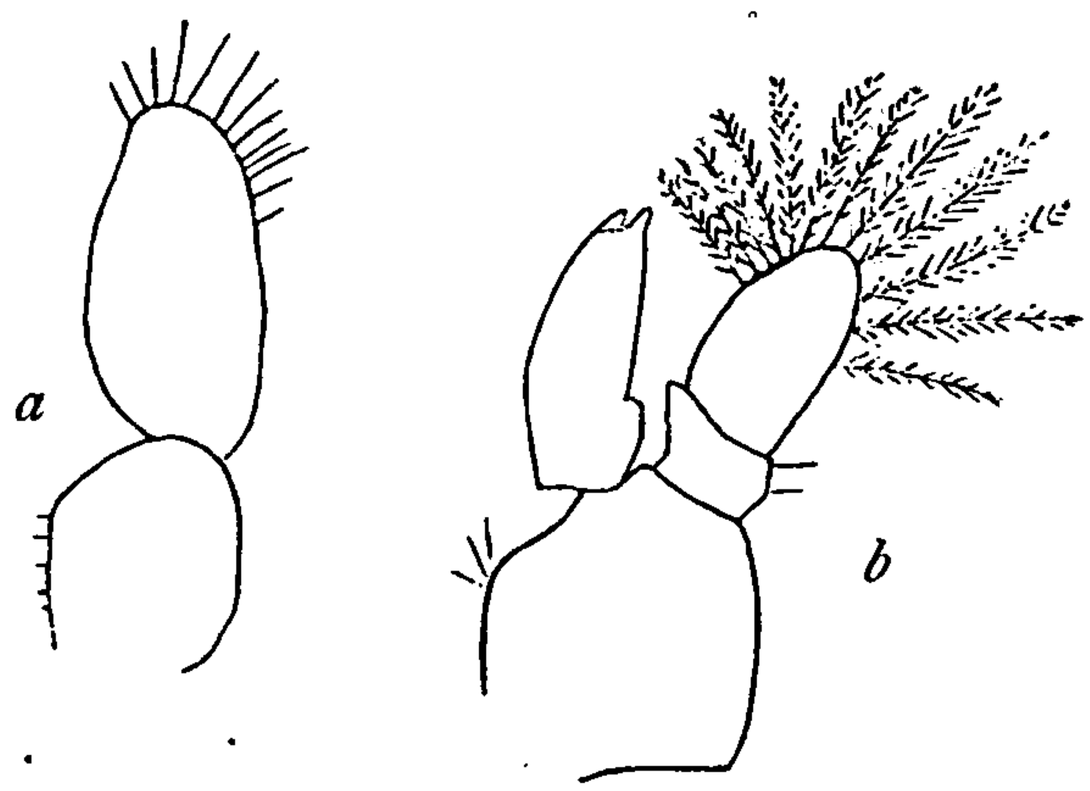


FIG. 476.—ASELLUS INTERMEDIUS (AFTER FORBES). *a*, ONE OF FIRST PAIR OF GENITAL PLATES OF MALE. × 51. *b*, ONE OF SECOND PAIR OF GENITAL PLATES OF MALE. × 51.

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.

The types of this species from which the above description is made were sent to me from the Museum of Comparative Zoology of Harvard University.

Specimens collected in the Potomac River near Wasnington 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 antennæ, the flagellum of the second antennæ 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.

ASELLUS BREVICAUDA Forbes.

Asellus brevicauda FORBES, Bull. Ill. Museum Nat. Hist., No. 1, 1876, pp. 8–10.—UNDERWOOD, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 297.

Localities.—Found in clear, rocky rills in Jackson and Union counties, in southern Illinois; small creek emptying into Redfoot Lake, Tennessee.

Body oblong-ovate, three times longer than wide, 4 mm.: 12 mm.

Head more than twice as wide as long, 1 mm.: 2½ mm., with the anterior margin excavate and the antero-lateral angles somewhat truncate. The eyes are small, round, composite, and situated at the

sides of the head, halfway between the anterior and the posterior margins. The lateral margin of the head near the base is produced in a small lobe on either side. The first pair of antennæ have the basal

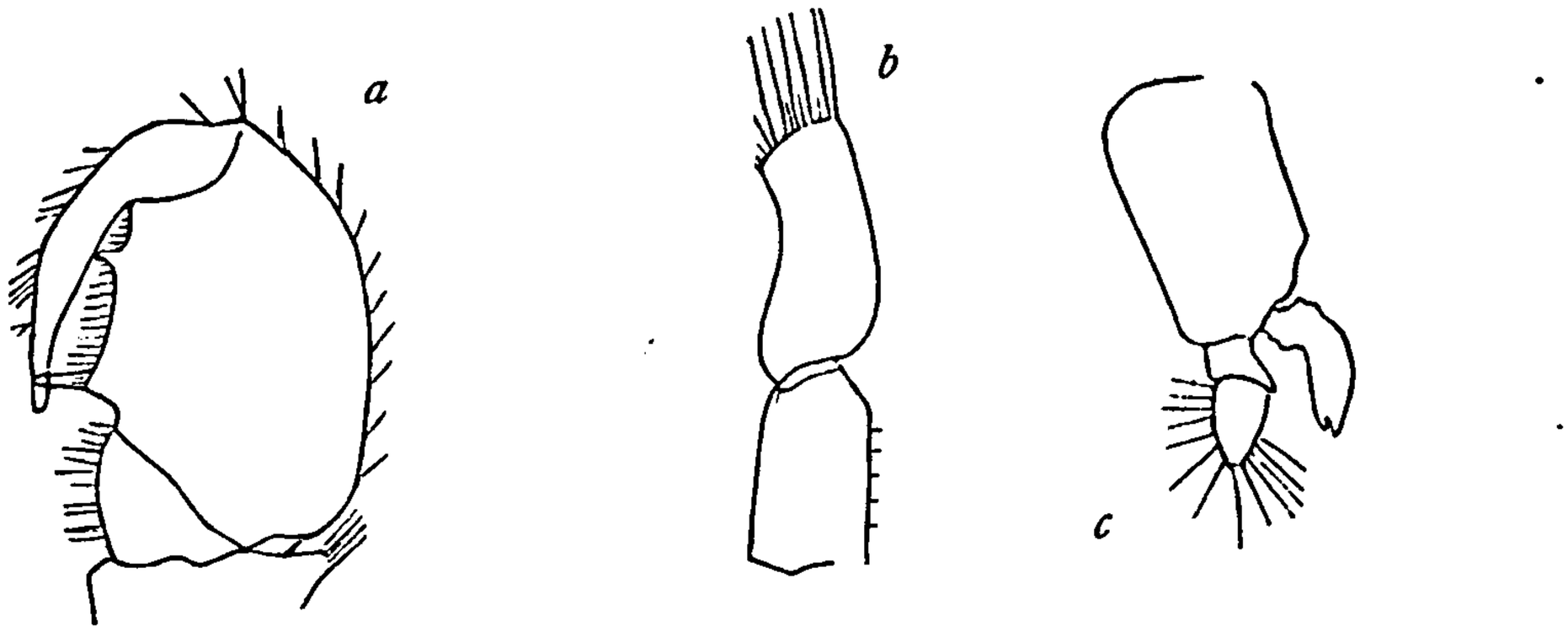


FIG. 477.—ASELLUS BREVICAUDA (AFTER FORBES). *a*, HAND OF MALE. × 27. *b*, ONE OF FIRST PAIR OF GENITAL PLATES OF MALE. × 51. *c*, ONE OF SECOND PAIR OF GENITAL PLATES OF MALE. × 25.

article short and broad; the second article is a little longer than the first and more slender; the third article is about half as long as the second. The flagellum is composed of twelve articles. The first antennæ extend to the middle of the fifth article of the peduncle of the second pair of antennæ. The first three articles of the second antennæ are short and subequal; the fourth article is as long as the first three together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about seventy-five articles and extends to the posterior margin of the fifth thoracic segment and is 6 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

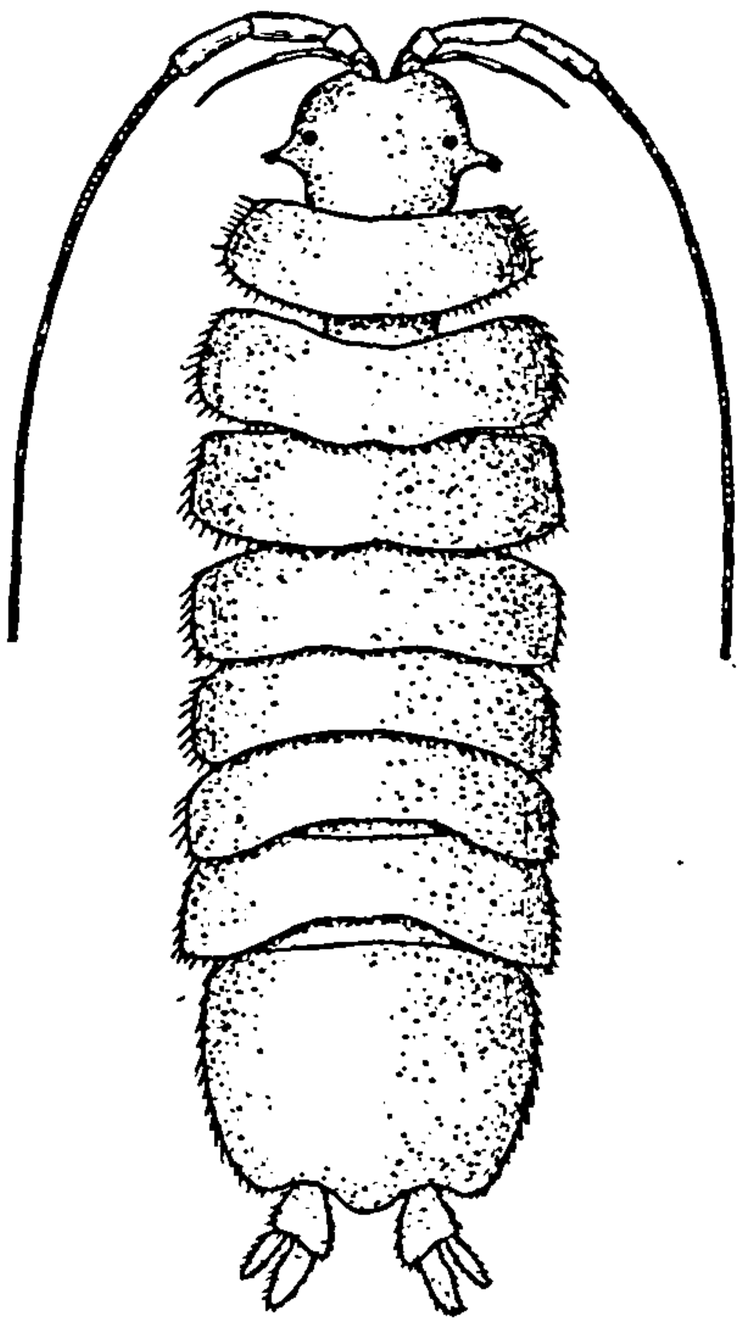


FIG. 478.—ASELLUS BREVICAUDA. × 5.

The segments of the thorax are subequal, each being about 1 mm. in length. The lateral margins of all the segments are straight and entire.

Epimera are present on the first segment only and are placed at the antero-lateral angles.

The first two segments of the abdomen are short and visible only in the middle of the dorsal surface, being covered at the sides by the seventh thoracic segment. The terminal segment is 4 mm. wide and 3½ mm. long. The post-lateral angles are rounded and the posterior margin produced in a broadly rounded lobe between the uropoda.

The uropoda are 2 mm. long. The peduncle is 1 mm. long and 1

mm. wide. The inner branch is 1 mm. long. The outer branch is narrower and slightly shorter than the inner branch.

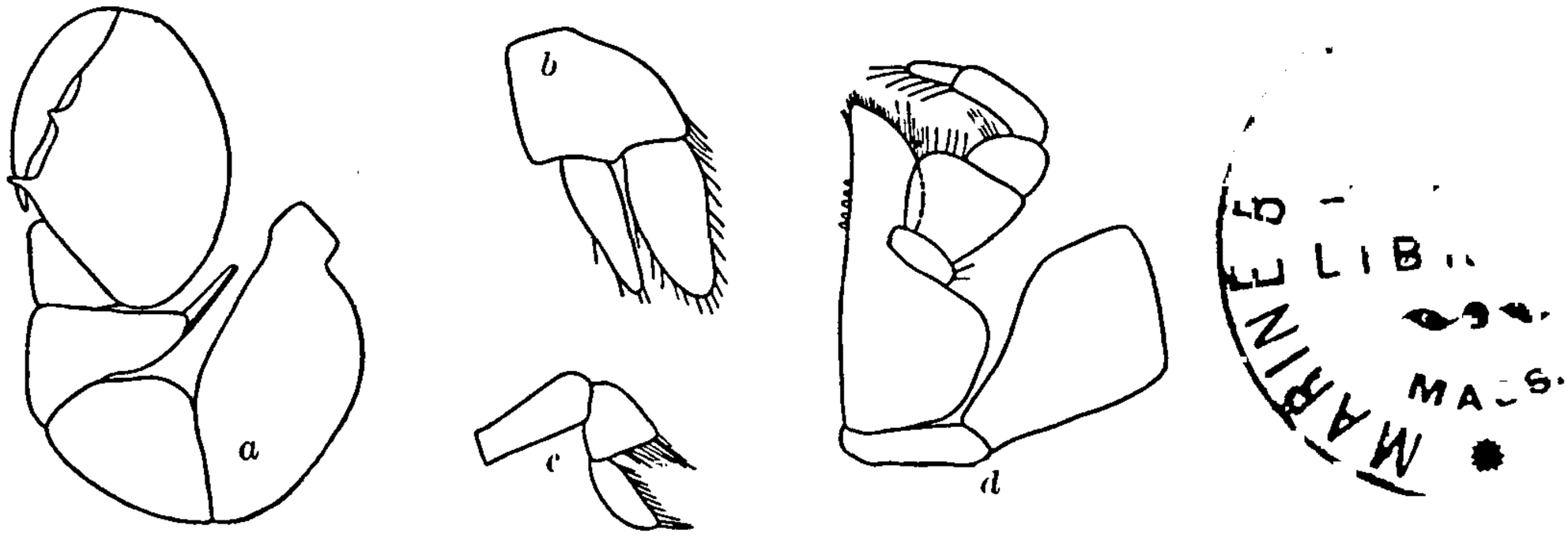


FIG. 479.—ASELLUS BREVICAUDA. *a*, FIRST LEG. × 27⅓. *b*, UROPOD. × 15⅓. *c*, PALP OF MANDIBLE. × 27⅓. *d*, MAXILLIPED. × 27⅓.

The first pair of legs are strongly prehensile, with the propodus greatly dilated and the inferior margin produced into two spines. All the other legs are ambulatory.

ASELLUS HOPPINÆ Faxon.

Asellus hoppinæ FAXON in GARMAN, Bull. Mus. Comp. Zool., XVII, No. 6, 1888–89, p. 225–239.

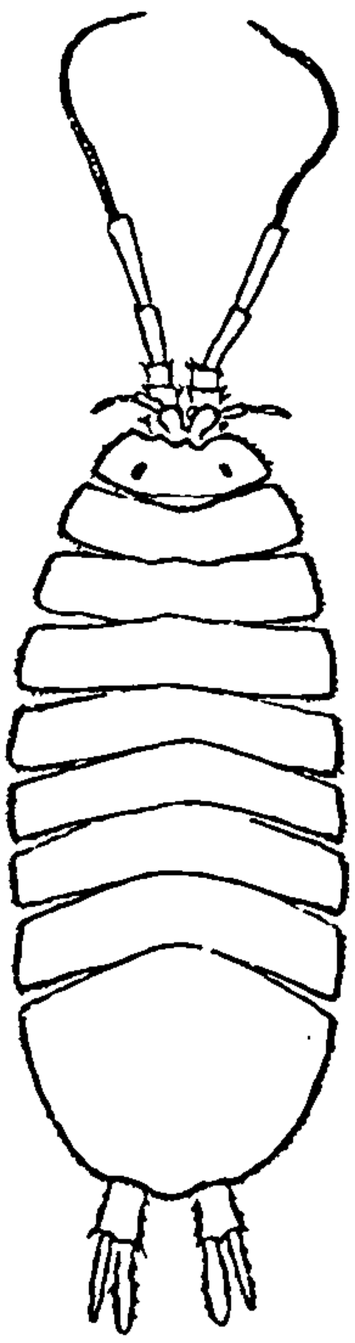


FIG. 480.—ASELLUS HOPPINÆ (AFTER FAXON). × 4.

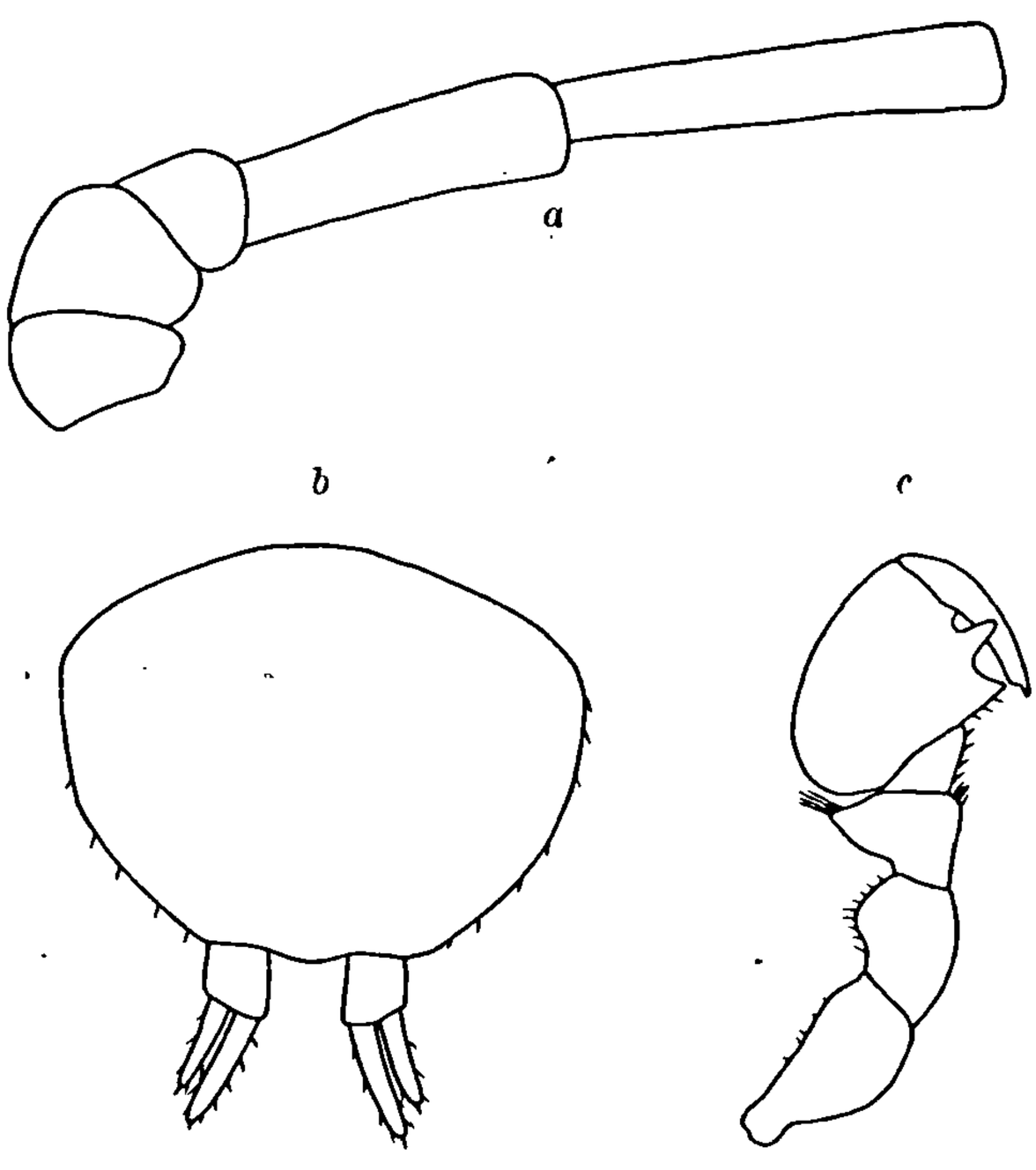


FIG. 481.—ASELLUS HOPPINÆ. *a*, PEDUNCLE OF SECOND ANTENNÆ. × 15⅓. *b*, ABDOMEN WITH UROPODA. × 9⅔. *c*, FIRST LEG. × 15⅓.

Locality.—Day's Cave, Missouri, in mud under stones.

Body oblong-ovate, a little more than twice as long as wide, 4½ mm. : 10½ mm.

Head twice as wide as long, 1½ mm. : 3 mm., with the anterior margin sinuate on either side of a small median point. Eyes dorsally situated, with the sides of the head expanded. Lateral margins entire. The first pair of antennæ have the basal article large and expanded; the second article is as long as the first article and half as wide; the third is short, about half as long as the second. The flagellum is composed of seven articles, and extends almost to the end of the fourth article of the peduncle of the second pair of antennæ. The second antennæ have the first two articles short and subequal; the third is a little shorter than either of the first two; the fourth article is as long as the first two taken together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about forty-one articles. The second antennæ are about 9 mm. long and extend to the posterior margin of the seventh thoracic segment. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

The segments of the thorax are subequal, with lateral margins straight and entire. The epimera are not evident and are not separated from the segments.

The abdomen is composed of a single segment. It is rounded posteriorly, with a slight indication of a median lobe between the uropoda. The uropoda are short, being less than half the length of the abdomen. The length of the abdomen is 3½ mm.; that of the uropoda is 1½ mm. The basal segment or peduncle of the uropoda is ½ mm. long. The inner branch is 1 mm. long. The outer branch is a little shorter than the inner branch, being about three-fourths its length.

The first pair of legs are subchelate, with the propopus armed with two triangular processes on the inferior margin. All the other legs are ambulatory.

ASELLUS ATTENUATUS Richardson.

Asellus attenuatus RICHARDSON, American Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 552–553.

Locality.—Washington Ditch, Dismal Swamp, Virginia.

Body narrowed anteriorly, gradually increasing in width backward.

Head narrower than the first thoracic segment, rounded at the sides with margins entire and a small lobe near the base on either side; front somewhat excavate for the reception of the antennæ. Eyes distinct, lateral. First pair of antennæ as long as the peduncle of the second pair; first joint short and broad; second joint more slender; third joint not quite as long as second joint; flagellum composed of thirteen joints. Second pair of antennæ as long as the body; first, second, and third joints short, about equal in length; fourth and fifth joints long; flagellum multiarticulate.

Segments of the thorax with the lateral margins of the first segment slightly emarginate anteriorly, the emargination being filled by the

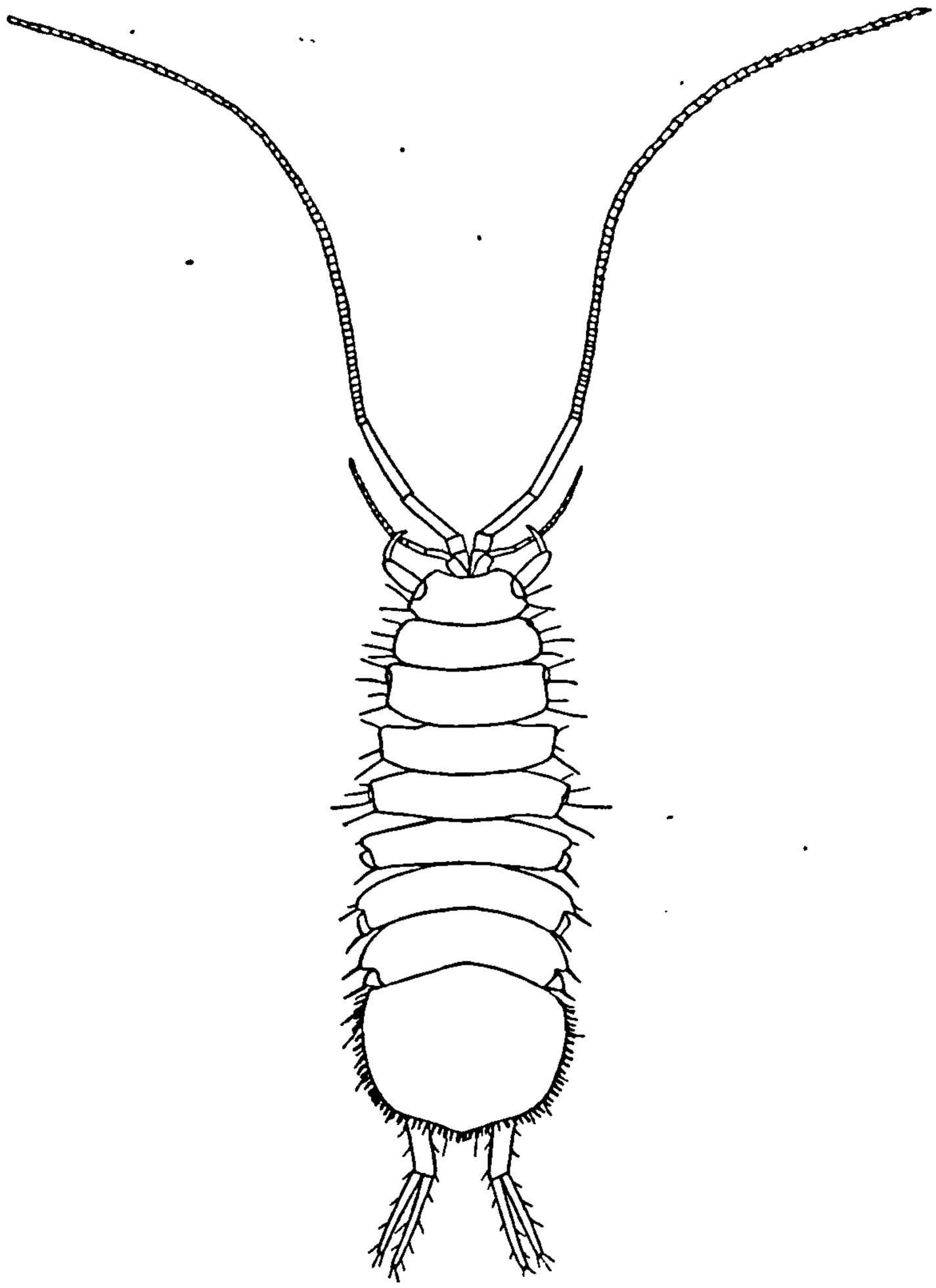


FIG. 482.—ASELLUS ATTENUATUS.

epimeron; second, third, and fourth segments with the margins entire, the epimera evident at the extreme anterior angles; the fifth segment with the posterior two-thirds emarginate, the epimeron conspicuous in the emargination; the sixth and seventh segments posteriorly emarginate, with prominent epimera.

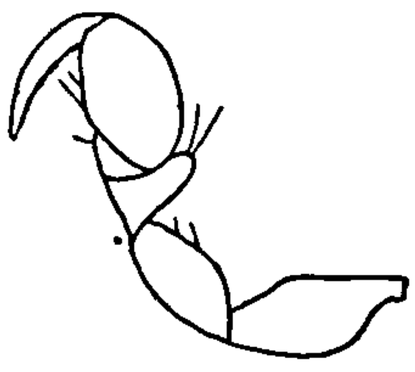
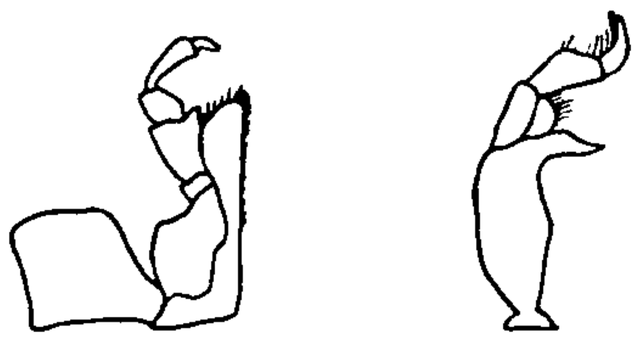


FIG. 483.—ASELLUS ATTENUATUS. LEG OF THE FIRST PAIR OF FEMALE.

Terminal segment of the body about as broad as long, with a small rounded lobe in the middle of the posterior margin. The uropoda are somewhat longer than the terminal segment, extremely slender and cylindrical in shape, with both branches nearly equal in length, and longer than the peduncle. The first pleopoda in the female are attached close together.



a *b*

FIG. 484.—ASELLUS ATTENUATUS. *a*, MAXILLIPED. *b*, MANDIBLE.

The legs of the first pair are slender; the dactylus is serrate with numerous closely set short spines along the inner margin, the propodus is narrow, oval in shape, and armed in the male with one long spine.

The color is reddish-brown mottled with white. All the free margins of the body are fringed with hairs. The lateral margins of the segments and the caudal segment are armed with spines. The uropoda and the legs are spinulose.

A large number of specimens were collected by Mr. William Palmer and Dr. Paul Bartsch at Washington Ditch, Dismal Swamp, Virginia.

Type.—Cat. No. 23910, U.S.N.M.

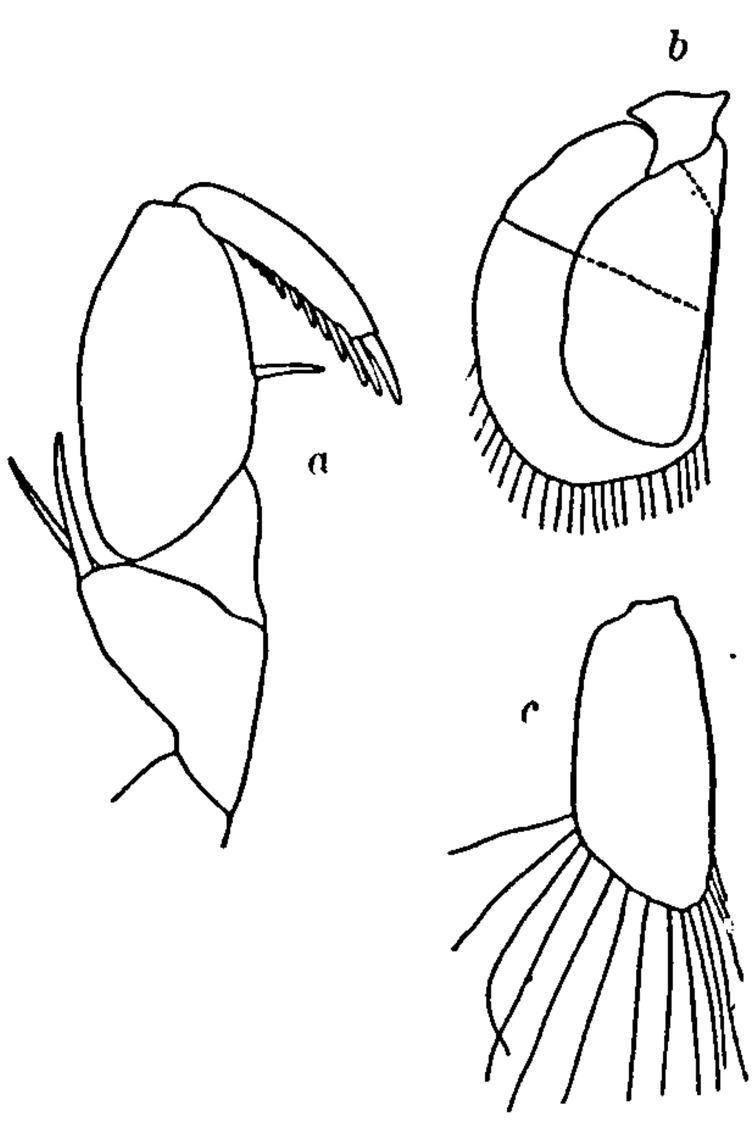


FIG. 485.—ASELLUS ATTENUATUS. *a*, LEG OF THE FIRST PAIR. × 39. *b*, THIRD PLEOPOD OF FEMALE. × 20½. *c*, FIRST PLEOPOD OF FEMALE.

ASELLUS AQUATICUS (Linnæus).

Oniscus aquaticus LINNÆUS, Fauna Suecica, 2d ed., 1761, p. 500.

Squilla asellus DE GEER, Mémoires pour servir à l'histoire des Insectes, VII, 1778, p. 496.

Oniscus aquaticus O. FABRICIUS, Fauna groenlandica, 1780, p. 251.

Asellus vulgaris LATREILLE, Hist. Nat. Crust. et des Insectes, VI, 1803, p. 359; VII, pl. LVIII, fig. 1.

Idotea aquatica LATREILLE, Encycl. Méth., Pt. 24, 1818, p. 6, pl. CCCXXVIII, figs. 21–22.

Asellus vulgaris DESMAREST, Consid. Generales sur la classe des Crustacés, 1825, p. 313, pl. XLIX, figs. 1–2.

Asellus grönlandicus? KRØYER, Kongelige danske videnskabernes Selskabs naturvidenskabelige og mathematiske Afhandlinger, VII, 1838, p. 318.

Asellus aquaticus GUÉRIN-MÈNEVILLE, Iconographie du Règne animal de Cuvier, pl. LI, fig. 3.—SARS, Histoire naturelle des Crustacés d'eau douce de la Norvège, 1867, p. 46, pls. VIII–X.

Asellus grönlandicus PACKARD, Mem. Bost. Soc. Nat. Hist., I, 1867, p. 296.

Asellus aquaticus BATE and WESTWOOD, Brit. Sessile-eyed Crust., II, 1868, p. 341.—BOVALLIUS, Bihang till K. Sv. Vet.-Akad., Handl., XI, No. 15, 1886, pp. 7–10. (See Bovallius for full synonymy.)

Asellus grønlandicus? HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 190.

Asellus aquaticus G. O. SARS, Crust. of Norway, II, 1899, p. 97.

Localities.—Greenland (Fabricius); Greenland (Krøyer); Labrador at Square Island and Hopedale (Packard); ponds and streams all over Europe.

This species has three times been recorded from Greenland. O. Fabricius recorded it as *Onisous aquaticus*. Krøyer records it as *Asellus grönlandicus?* He says of it:[a]

This species is without doubt the one mentioned by Fabricius under No. 227, and which he himself did not see, although it does not appear to be rare. It approaches so closely our *Asellus vulgaris* that it is extremely difficult to find sufficient distinguishing characters in the two. Nor am I entirely certain that I have found such distinguishing characters, and therefore hesitatingly give this animal as a distinct species, although it seems almost incredible to me that the fresh waters of both Europe and Greenland should be inhabited by the identical species of *Asellus*.

Hansen[b] says of *Asellus grønlandicus* that it is probably not different from *Asellus aquaticus*.

Packard records it from Greenland as *Asellus grönlandicus*.

Specimens collected in Greenland, sent to me from the Museum of Comparative Zoology at Harvard University and labeled *Asellus grönlandicus*, do not differ in any respect from *Asellus aquaticus* as described and figured by G. O. Sars.

Body narrow, elongate, nearly three times as long as wide, 3 mm: 8½ mm., narrower anteriorly and becoming wider posteriorly. 3 mm. is its greatest breadth.

Head about twice as wide as long, 1 mm: 2 mm., with the anterior margin slightly excavate. Lateral margins entire, with a small lobe on either side near the posterior margin. Eyes small, distinct, composed of only three or four ocelli and situated close to the lateral margin, halfway between the anterior and posterior margins. The first pair of antennæ have the basal article large and dilated; the second article is half as wide and but little longer; the third article is two-thirds the length of the second. The flagellum is composed of eleven articles and extends to the end of the peduncle of the second pair of antennæ. The second pair of antennæ have the first two articles short and subequal; the third is one and a half times longer than the second; the fourth article is nearly as long as the first three taken together; the fifth is one and two-thirds times as long as the fourth. The flagellum is composed of about forty-four articles, and extends to the posterior margin of the fifth thoracic segment. It measures 6 mm. in length.

The first segment of the thorax has the epimera conspicuous and situated in the antero-lateral corners. In the second and third segments they are small and almost inconspicuous lobes situated at the antero-lateral corners of the segments. In the fourth segment they are small and inconspicuous and situated just below the antero-lateral

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[a] Kongelige danske videnskabernes Selskabs naturvidenskabelige og mathematiske Afhandlinger, VII, 1838, p. 318.

[b] Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 190.

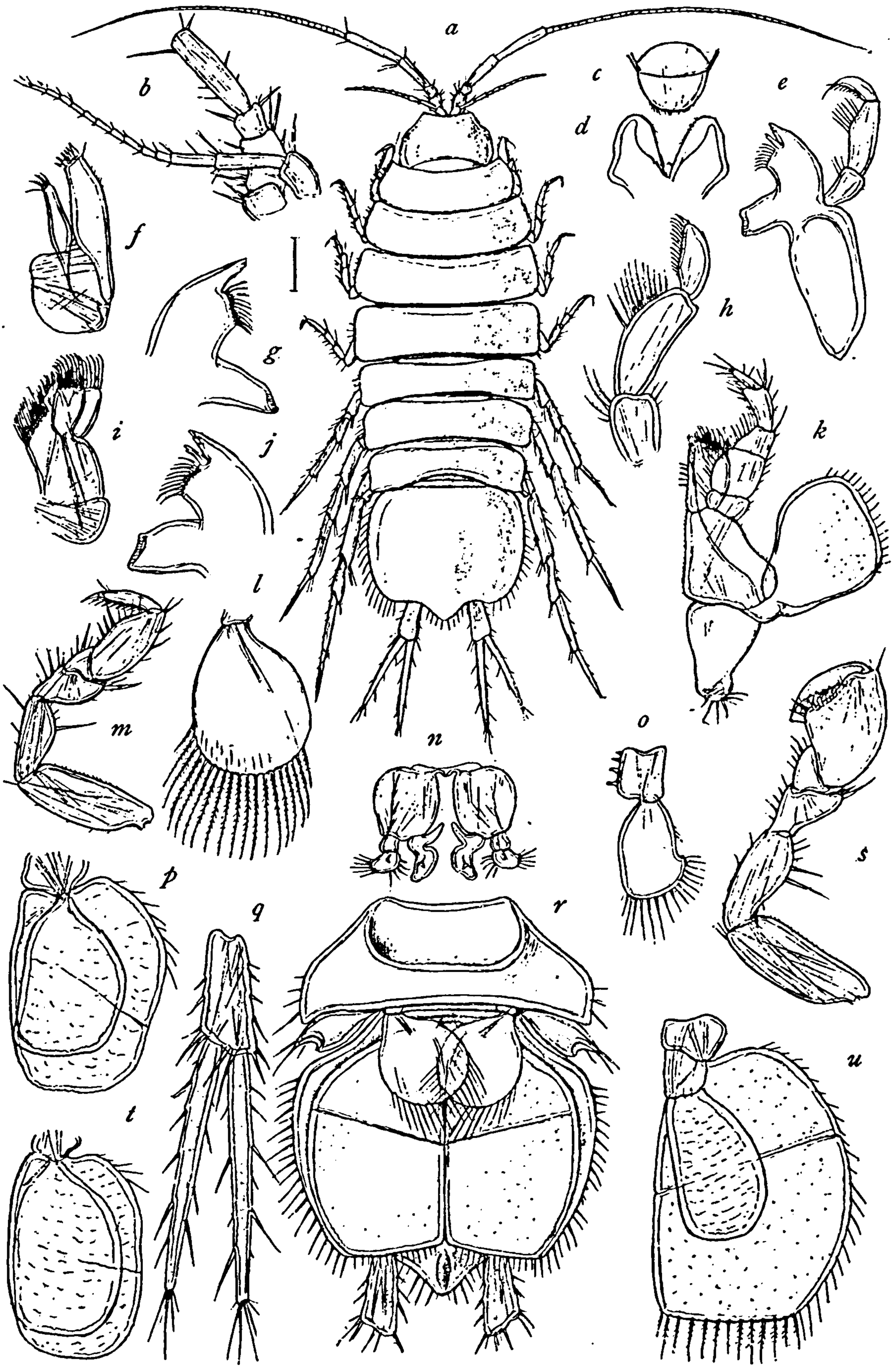

FIG. 486.—ASELLUS AQUATICUS (AFTER SARS). *a*, DORSAL VIEW OF FEMALE. *b*, FIRST AND SECOND ANTENNÆ. *c*, UPPER LIP. *d*, LOWER LIP. *e*, LEFT MANDIBLE. *f*, FIRST MAXILLA. *g*, RIGHT MANDIBLE. *h*, PALP OF MANDIBLE. *i*, SECOND MAXILLA. *j*, LEFT MANDIBLE. *k*, MAXILLIPED. *l*, FIRST PLEOPOD OF FEMALE. *m*, FIRST LEG. *n*, SECOND PLEOPOD OF MALE. *o*, FIRST PLEOPOD OF MALE. *p*, FOURTH PLEOPOD OF FEMALE. *q*, UROPOD. *r*, ABDOMEN OF FEMALE. *s*, FIRST LEG OF MALE. *t* FIFTH PLEOPOD OF FEMALE. *u*, THIRD PLEOPOD OF FEMALE.

angle of the segment. In the fifth segment they are large and conspicuous and situated about the middle of the lateral margin. In the sixth and seventh segments they are large and conspicuous and situated in the posterior corners of the segments.

The abdomen is composed of two short segments, followed by the large terminal segment, which has the posterior margin produced in a large triangular median lobe between the large post-lateral expansions. The peduncle of the uropoda is twice as long as wide. The branches are of equal length and two and a half times longer than the peduncle.

The first pair of legs are subchelate. The propodus in the male has the inferior margin near the proximal end produced in a rounded expansion, bearing three long spines. The inferior margin of the dactylus is furnished with spines along the entire margin. All the other legs are ambulatory, with dactylus uni-unguiculate.

ASELLUS TOMALENSIS Harford.

Asellus tomalensis HARFORD, Proc. Cal. Acad. Sci., VII, Pt. 1, 1877, pp. 54–55.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 856; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 322; American Naturalist, XXXIV, 1900, p. 297; Harriman Alaska Exp., Crust., X, 1904, pp. 224–226; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 668–669.—HOLMES, Proc. Cal. Acad. Sci. (3), III, 1904, pp. 321–323, pl. XXXVII, figs. 39–42.

Localities.—Tomales Bay, California; Lake Washington, Seattle.

The description of this form is given in the following concise manner:

Head a little transverse, narrower than the body. Upper antenna not reaching to the extremity of the peduncle of the lower. Flagellum of lower antennæ longer than its peduncle. Body narrow in front, gradually increasing in width toward the tail. Peduncle of caudal appendages more than half the length of the terminal filaments. Length $\frac{6}{20}$ inch.

The description is from a single specimen.

Eight specimens of a species of *Asellus* were collected by the Harriman Alaska Expedition at Lake Washington, Seattle. I have referred them to the above species, being unwilling to describe a new species of *Asellus* from a locality so close to that from which *A. tomalensis* was found, when so little is known about *A. tomalensis*. Some of the specimens were sent to Dr. William E. Ritter for comparison with the type and only specimen of *A. tomalensis* in the collection of the California Academy of Sciences. The result of his comparison is given in the following quotation from his letter:

About the only difference that I am able to make out is in the fact that the inner ramus of the sixth pleopods (uropods?) of *A. tomalensis* is about half as long as the exopodite, and that neither is armed with a tuft of hairs at the tip. This is the case with the one appendage present, but its mate is gone. It is possible that the hair tuft may have been broken off, but the tips of the rami themselves are perfectly smooth. They show no evidence of having lost anything. The fact, however, that

the general hairiness of the Academy specimen is about the same as that of your specimen makes me suspicious that the tuft referred to has been removed. The antennæ and antennules differ in no essential respect, so far as I can see. The chelipeds of the type specimen I am, unfortunately, unable to find.

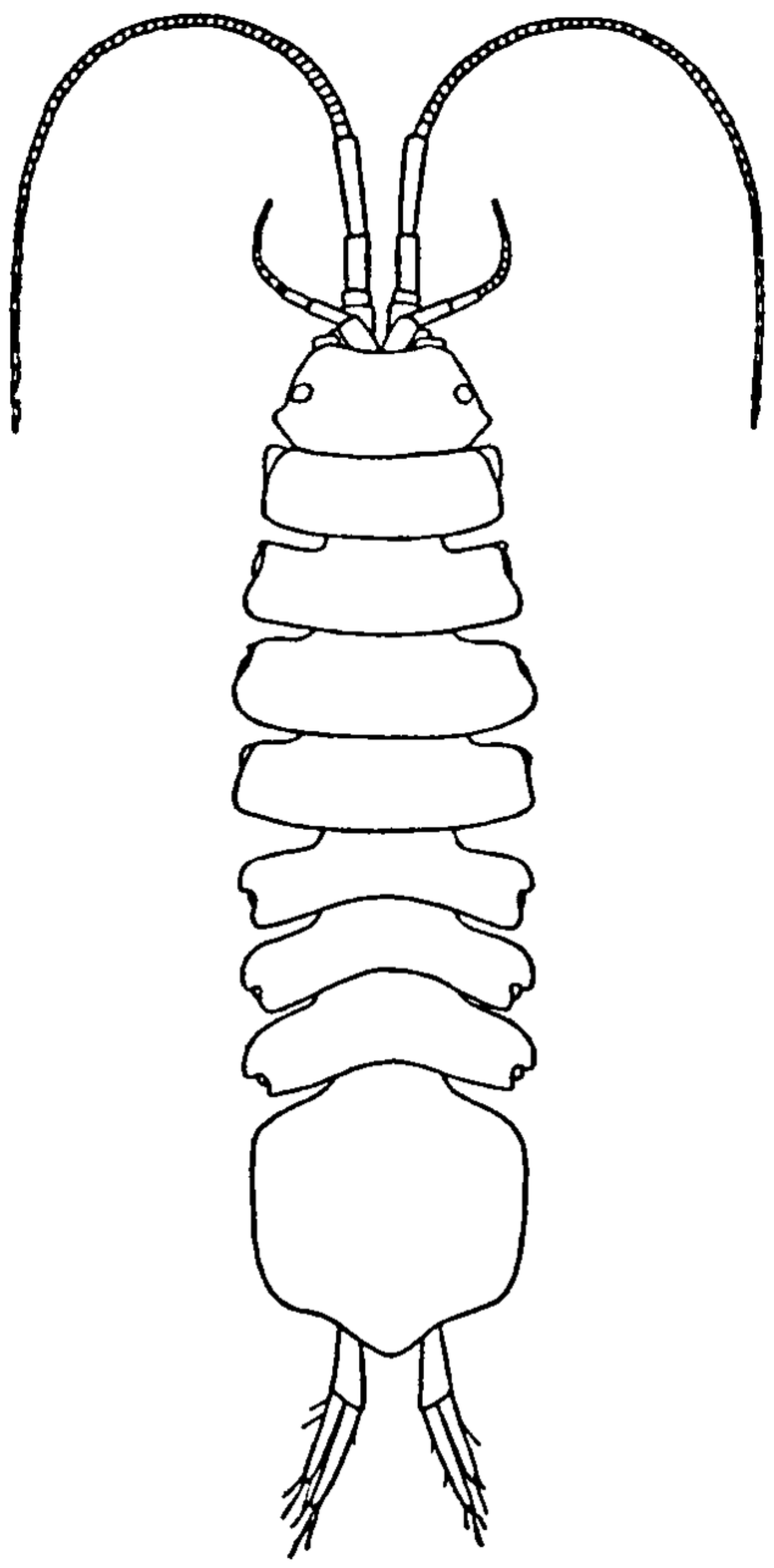

FIG. 487.—ASELLUS TOMALENSIS. × 9.

Description.—Body narrow, elongate, gradually widening somewhat from the anterior to the posterior extremity.

Head but little narrower than the first thoracic segment and about twice as wide as long; frontal margin slightly excavate and without median process between the antennæ; lateral margins straight, with a small lobe on either side near the base of the head. Eyes lateral, situated in the median transverse line. First pair of antennæ reach the extremity of the peduncle of the second pair of antennæ; flagellum consists of about ten joints. Second pair of antennæ are about two-thirds the length of the body; the flagellum consists of about 55 joints.

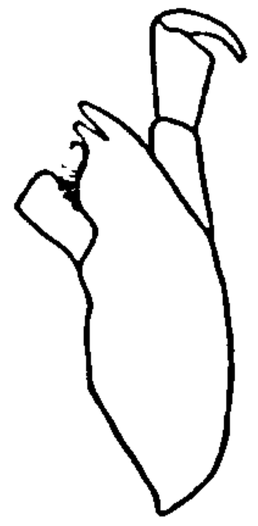

FIG. 488.—ASELLUS TOMALENSIS. MANDIBLE.

The first segment of the thorax has the epimeral lobes distinct and visible from a dorsal view at the antero-lateral angles of the segment. In the second and third segments the epimera are bilobed and occupy the anterior portion of the lateral margins. In the fourth segment the epimeron is a small lobe situated at the antero-lateral extremity of the segment. In the fifth and sixth segments the epimeron is a small lobe about the middle of the lateral margin. In the seventh segment it has more of a posterior position on the lateral margin.

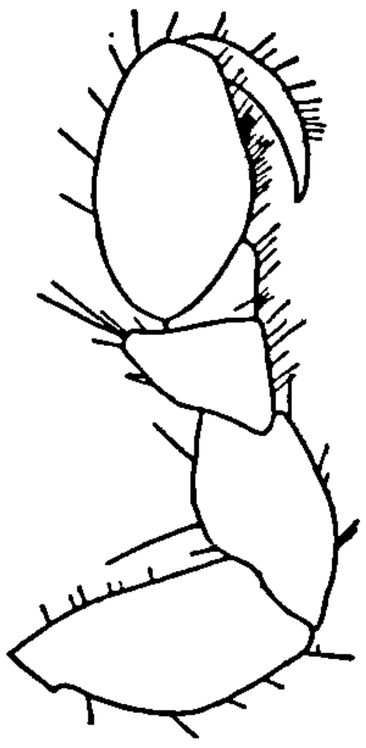

FIG. 489.—ASELLUS TOMALENSIS. LEG OF FIRST PAIR. × 20¼.

The abdomen is broad, with the sides nearly parallel. Posteriorly it is produced in the center in a large triangularly shaped lobe with rounded apex. The uropoda are slender appendages; the peduncle is somewhat shorter than the branches. The inner branch is about a fifth longer than the outer branch. The margins of all the segments, the uropods, and the legs are fringed with hairs.

The legs of the first pair are subcheliform; the propodus is elliptical in outline, with the inferior margin straight. The other legs are similar and ambulatory in character.

The color of the species is a light brown, somewhat mottled.

Prof. S. J. Holmes describes the type specimen[a] of this species, which I have not been fortunate enough to obtain for examination. The description given above is from specimens collected at Lake Washington, Seattle, and which I still do not think differ from the type as described by Professor Holmes in any essential characters. The type specimen is imperfect, one uropod being gone and the other with the inner branch partly regenerated. The specimens which Professor Holmes collected at Point Arena have "caudal stylets shorter than the abdomen," as is also true of my specimens, and he considers the Point Arena specimens as young specimens of this species.

A slight difference in the length of the antennæ often occurs among the individuals of a species where the flagellum is multi-articulate. It may be due to a difference in sex or a difference in age.

The only important difference is in the fact that the three last segments of the thorax are entire in the type, as described by Professor Holmes, whereas they are posteriorly notched in the specimens from Lake Washington. The margins of the segments often appear entire when the emargination is filled by the epimeron, so that without having seen the type I would be unwilling to give a new name to the specimens from Lake Washington, which are otherwise in so close agreement with Professor Holmes's description.

69. Genus CÆCIDOTEA Packard.

Body narrow, elongate. Eyes wanting. Head large, not narrower than the first thoracic segment and longer. Terminal segment of body much longer than broad.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS CÆCIDOTEA.

a. Propodus of first pair of legs armed with one or more triangular processes.
  b. Propodus of first pair of legs armed with two long triangular processes and three short ones. Uropoda about as long as the terminal segment of the body; the inner branch of the uropoda is two-thirds as long as the peduncle; the outer branch is two-thirds as long as the inner branch .... *Cæcidotea stygia* Packard
  b'. Propodus of first pair of legs armed with a triangular process near the distal end and with a long spine at the proximal extremity. Uropoda shorter than terminal abdominal segment, about one-half its length; the peduncle is as long as the inner branch; the outer branch is one-fourth shorter than the inner branch ..... *Cæcidotea nickajackensis* Packard
a'. Propodus of first pair of legs not armed with triangular processes, but edged inside with spines.
  b. First pair of antennæ, with flagellum composed of eleven articles, extend one-third the length of the fifth article of the peduncle of the second antennæ.

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[a] Proc. Cal. Acad. Sci. (3), III, 1904, pp. 321–323.

Second antennæ longer than the body; flagellum composed of about eighty-six articles ..... *Cæcidotea richardsonæ* Hay

b'. First pair of antennæ, with flagellum composed of five articles, extend half the length of the peduncle of the second antennæ. Second pair of antennæ "probably as long as body;" flagellum is composed of "at least forty segments" ..... *Cæcidotea smithsii* Ulrich[a]

CÆCIDOTEA STYGIA Packard.

Cæcidotea stygia Packard, Amer. Naturalist, V, 1871, p. 752, figs. 132–133.

Cæcidotea microcephala Cope, Amer. Naturalist, VI, 1872, p. 411, fig. 109; 3d and 4th Report Geol. Indiana, 1872, pp. 163, 174–175.—Smith, Amer. Naturalist, VII, 1873, p. 244.

Cæcidotea stygia Packard, 5th Report Peabody Acad. Science, 1873, p. 95.—Smith, Report U. S. Commissioner of Fish and Fisheries, 1874, p. 661.

Asellus stygius Forbes, Bull. Ill. State Lab. Nat. Hist., No. 1, 1876, p. 11.

Cæcidotea stygia Hubbard, Amer. Entomologist, new series, I, 1880, pp. 36, 79, 80, fig. 10.

Asellus stygius Underwood, Bull. Ill. State Lab. Nat. Hist., II, 1886, p. 359.

Cæcidotea stygia Richardson, Amer. Naturalist, XXXIV, 1900, p. 297; Proc. U. S. Nat. Mus., XXIII, 1901, p. 553.

Localities.—Graham's Spring, Lexington, Virginia; also Mammoth Cave, Kentucky, and wells in Indiana; Illinois in deep wells; "Richardson's Spring," Mammoth Cave, Kentucky.

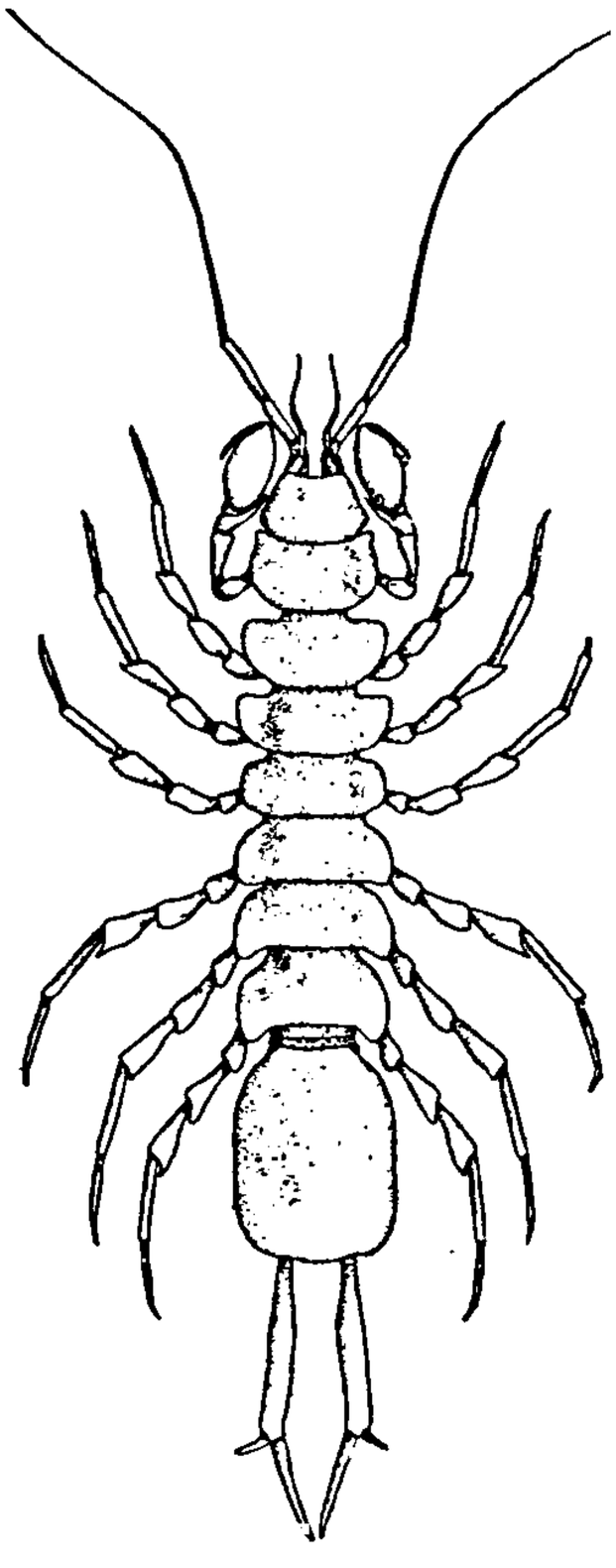

Fig. 490.—Cæcidotea stygia (After Hay).

Body narrow, elongate, five times longer than wide, 2 mm.: 10 mm.

Head a little wider than long, 1 mm.: 1½ mm., with the anterior margin slightly excavate. The eyes are absent. The first two articles of the first pair of antennæ are subequal in length, the second one being more slender than the first; the third article is about two-thirds the length of the second. The flagellum is composed of about twelve articles. The first three articles of the second antennæ are short and about equal in length; the fourth is about as long as the first three together; the fifth is one and a half times longer than the fourth. The flagellum is composed of about seventy articles. The maxilliped has a palp of five articles. The palp of the mandibles is composed of three articles.

The segments of the thorax are loosely articulated. The lateral margins of the segments are not contiguous, but are

[a] The first pair of legs in *Cæcidotea smithsii* are not described in detail; they are simply spoken of as being "subchelate." From the figure, however, they appear to be armed not with triangular processes, but furnished instead with spines on the inferior margin of the propodus.

separated by a deep and wide incision between the segments. The segments are about equal in length. Epimera are present on all the segments. On the first three they are small and narrow plates placed just below the antero-lateral angles. On the fourth segment they occupy the middle of the lateral margin. On the last three segments they are post-laterally placed.

The first two segments of the abdomen are short. The third or terminal segment is narrow,

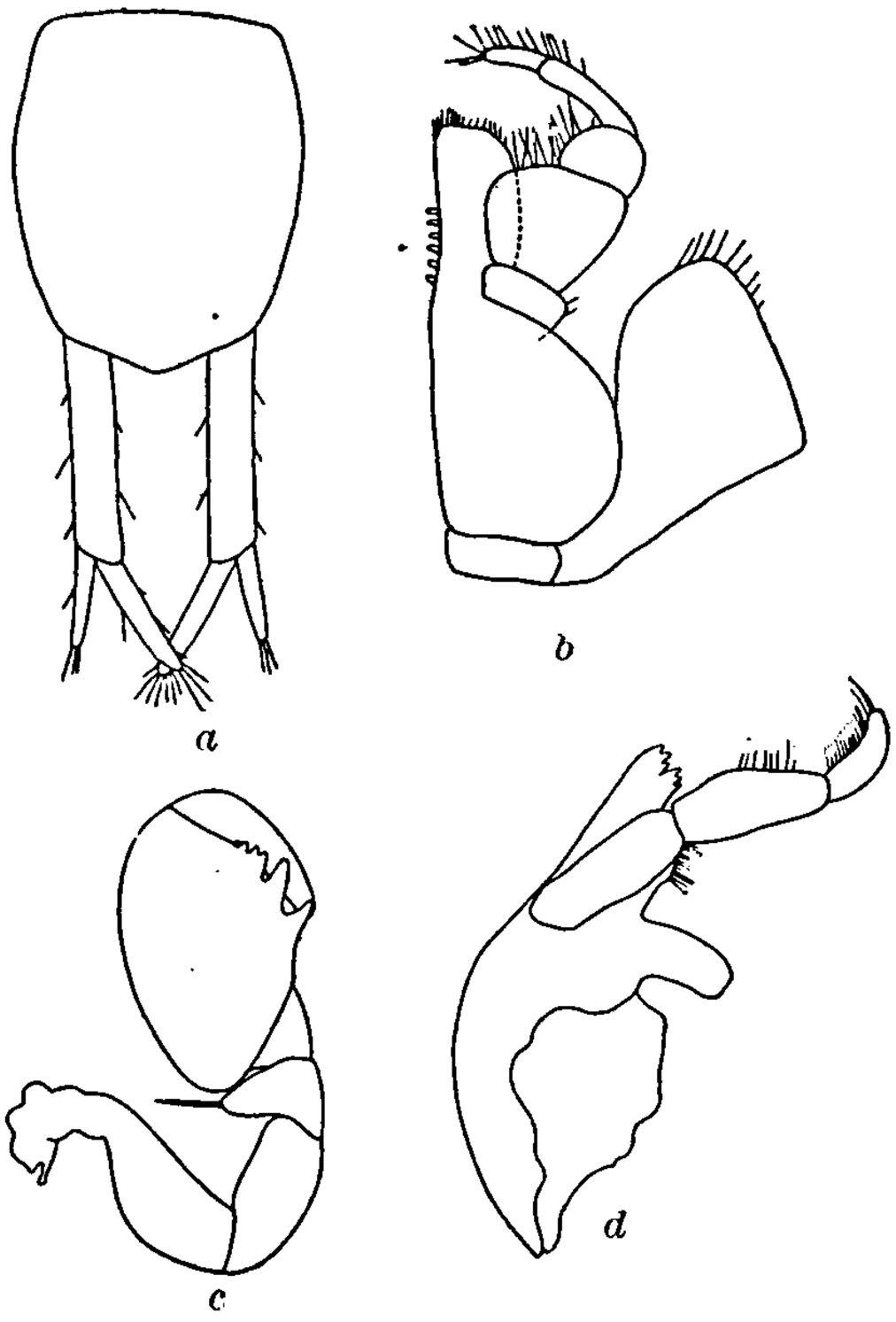

FIG. 491.—CÆCIDOTEA STYGIA. *a*, TERMINAL SEGMENT OF BODY AND UROPODA. × 20½. *b*, MAXILLIPED. × 38¾. *c*, FIRST LEG. × 20½. *d*, MANDIBLE. × 38¾.

elongate, the posterior margin being almost truncate, the median terminal lobe being broadly rounded and not prominent, almost vanishing. The terminal segment is one and a half times longer than wide, 2 mm.: 3 mm. The uropoda are about as long as the terminal segment. The peduncle is long and narrow and is about two-thirds as long as the terminal segment. The inner branch of the uropoda is two-thirds as long as the peduncle. The outer branch is two-thirds as long as the inner branch. In the female the first pleopoda are attached close together.

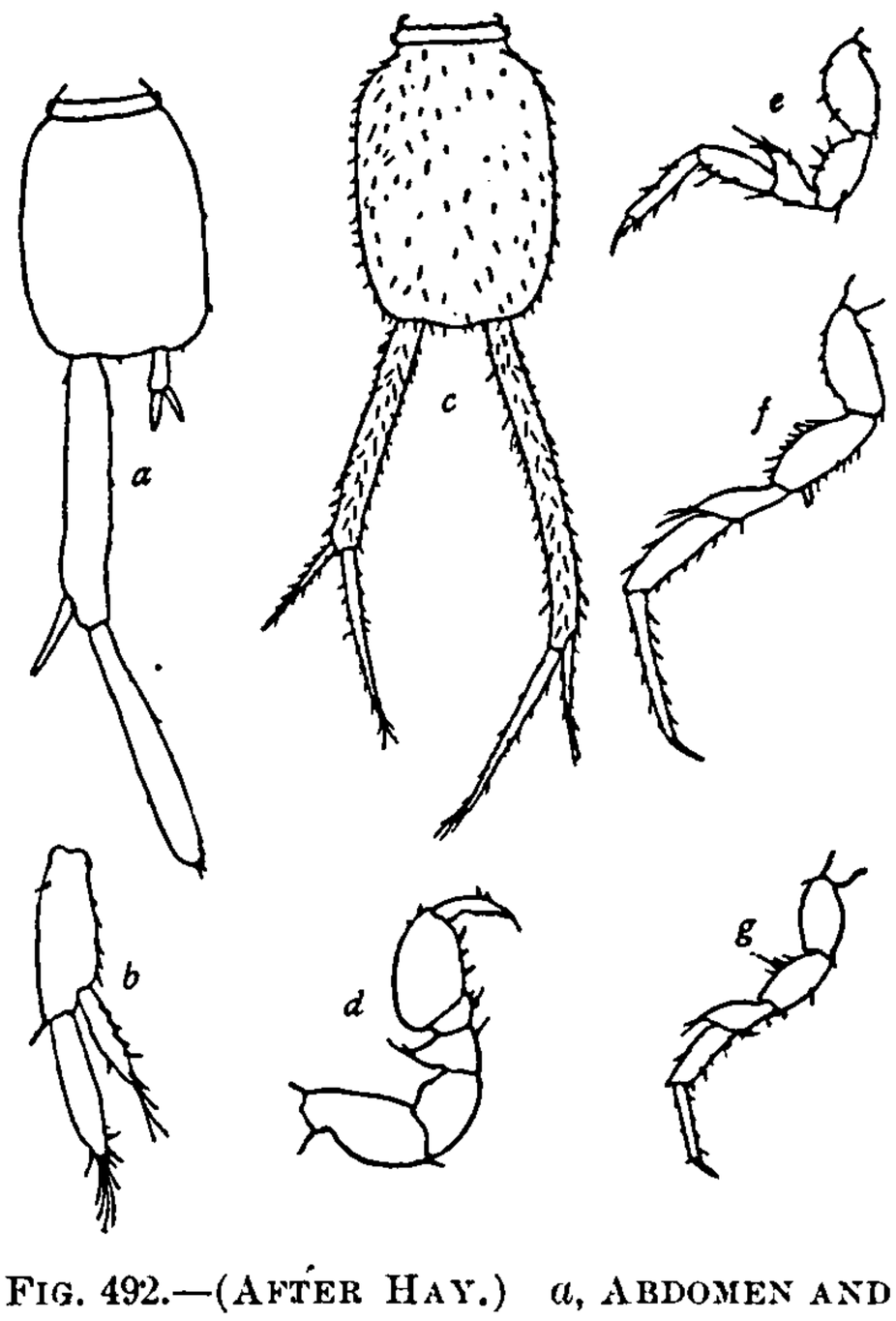

FIG. 492.—(AFTER HAY.) *a*, ABDOMEN AND UROPODA OF CÆCIDOTEA STYGIA (MAMMOTH CAVE). *b*, UROPOD OF CÆCIDOTEA NICKAJACKENSIS (METCALF, GEORGIA). *c*, ABDOMEN AND UROPODA OF CÆCIDOTEA RICHARDSONÆ (NICKAJACK CAVE). *d*, GNATHOPOD OF CÆCIDOTEA NICKAJACKENSIS (METCALF, GEORGIA). *e*, FIFTH LEG OF CÆCIDOTEA NICKAJACKENSIS (METCALF, GEORGIA). *f*, FIFTH LEG OF CÆCIDOTEA RICHARDSONÆ (NICKAJACK CAVE). *g*, FIFTH LEG OF CÆCIDOTEA STYGIA (MAMMOTH CAVE).

The first pair of legs are prehensile, with propodus greatly dilated and armed on the inferior margin with two long triangular processes and three short ones. All the other legs are ambulatory.

CÆCIDOTEA NICKAJACKENSIS Packard.

Cæcidotea nickajackensis PACKARD, Amer. Naturalist, XV, 1881, p. 879.—UNDERWOOD, Bull. State Lab. Nat. Hist., II, 1886, p. 359.—RICHARDSON, Amer. Naturalist, XXXIV, 1900, pp. 297–298.—HAY, Proc. U. S. Nat. Mus., XXV, 1903, pp. 426–429.

Localities.—Tennessee; Metcalf, Georgia.

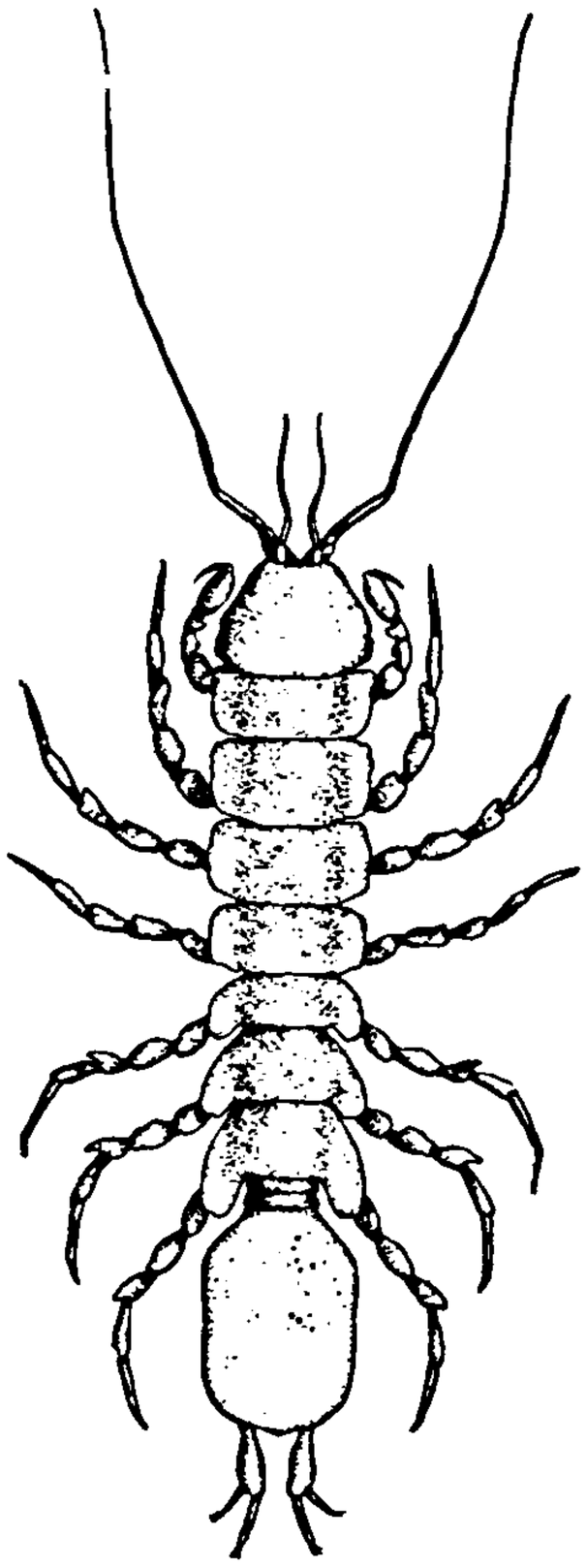

FIG. 493.—CÆCIDOTEA NICKAJACKENSIS (AFTER HAY). METCALF, GEORGIA, SPECIMEN.

Body narrow, elongate, about seven times longer than wide, 1 mm. : 7 mm.

Head wider than long, with the anterior margin excavate. Sides of head entire. Eyes absent. First pair of antennæ with the first article about twice as long as broad; second article a little longer than the first; third article one-third the length of the second. The flagellum is composed of nine articles. The second pair of antennæ have the first two articles short and about equal in length; the third is about one-half the length of the second; the fourth is as long as the first three taken together; the fifth is one and a half times as long as the fourth. The flagellum is composed of fifty-three articles, and is 3½ mm. long. The palp of the maxilliped is composed of five articles. The mandible has a palp of three articles.

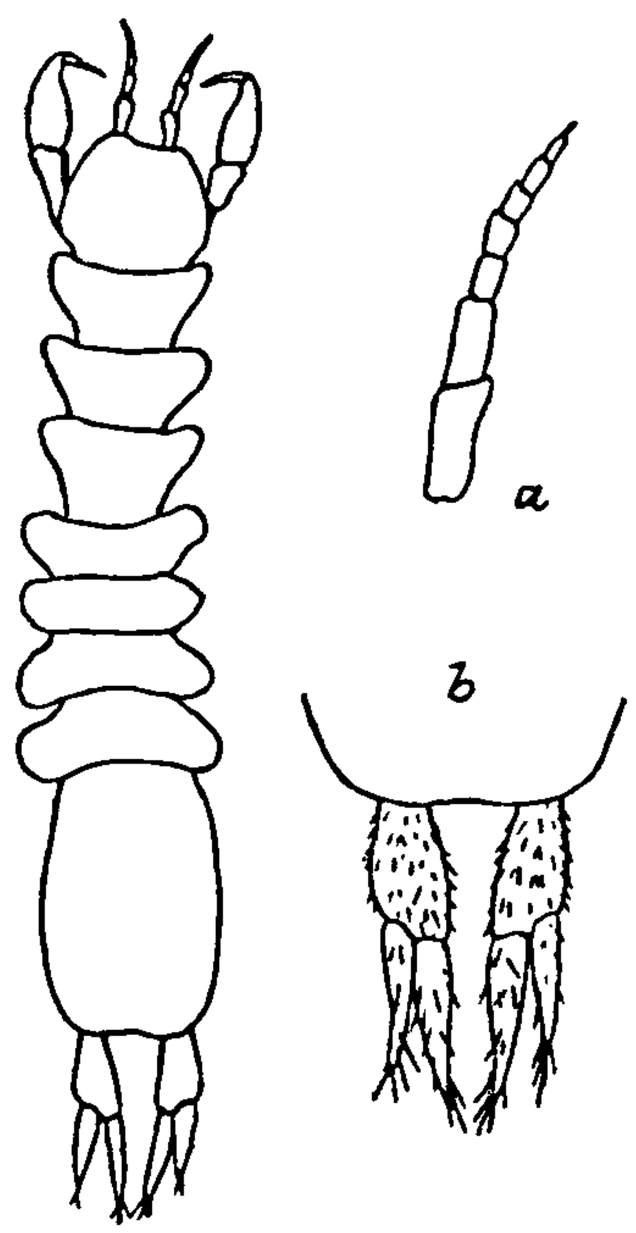

FIG. 494.—CÆCIDOTEA NICKAJACKENSIS (AFTER PACKARD). *a*, FIRST ANTENNA. *b*, UROPODA.

The first four segments of the thorax are about equal in length. The fifth is a little shorter. The sixth and seventh are about one and a half times longer than the fifth. The first three segments have the epimera present as a very small and almost inconspicuous lobe situated on the anterior part of the lateral margin. The fourth segment has the epimeron situated about the middle of the lateral margin. The last three segments have the epimera posteriorly situated.

The abdomen is composed of three segments; two short ones, subequal in length, anterior to the long, terminal one. The terminal segment is about twice as long as wide, 1 mm. : 2 mm. It is subquadrate in shape, with the post-lateral angles rounded and a very slight indication of a median lobe. The uropoda are shorter than the terminal

segment, about one-half its length. The peduncle is about as long as the inner branch. The outer branch is about one-fourth shorter than the inner branch.

The first pair of legs are subchelate. The propodus is armed on the inferior margin with a triangular process near the distal end and with a long spine at the proximal extremity. The dactylus is armed with numerous spines along the inferior margin. All the other legs are ambulatory, with dactyli uni-unguiculate.

CÆCIDOTEA RICHARDSONÆ Hay.

Cæcidotea richardsonæ HAY, Proc. Biol. Soc. Washington, XIV, 1901, pp. 179–180; Proc. U. S. Nat. Mus., XXV, 1903, pp. 424–428.

Locality.—Nickajack Cave, Tennessee.

Body narrow, elongate, four and a half times longer than wide, 2 mm. : 9 mm.

Head a little wider than long, with the anterior margin slightly excavate. Sides of head entire. Eyes wanting. The first pair of antennæ have the first article about twice as long as wide; the second article is as long as the first, but half as wide; the third article is one-third the length of the second; the flagellum is composed of eleven articles and extends one-third the length of the fifth article of the peduncle of the second pair of antennæ. The second pair of antennæ have the first two articles equal in length; the third article is about half the length of the second; the fourth is as long as the first three together; the fifth is one and a half times as long as the fourth. The flagellum is composed of about eighty-six articles. The second antennæ are longer than the body. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

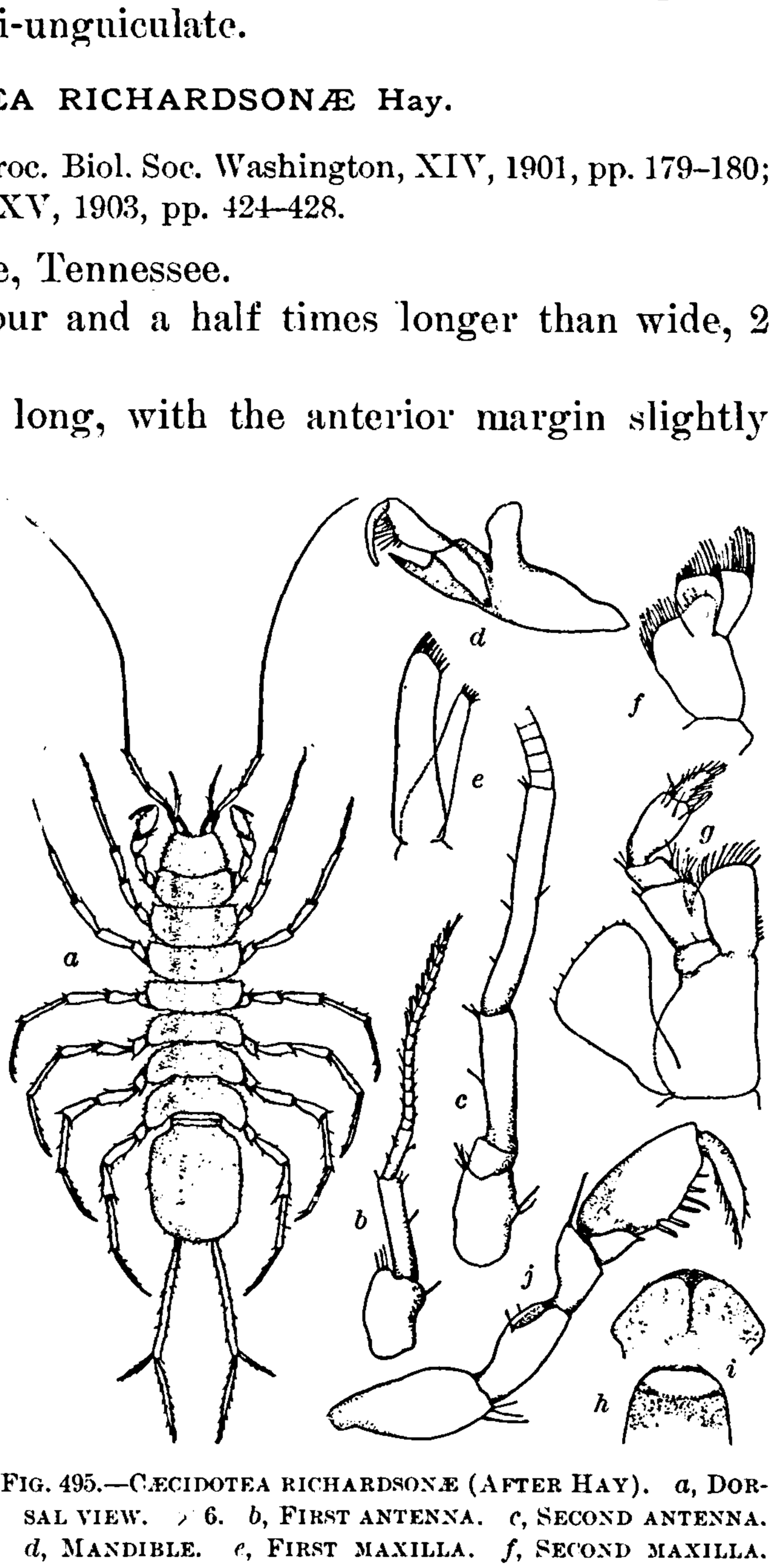

FIG. 495.—CÆCIDOTEA RICHARDSONÆ (AFTER HAY). *a*, DORSAL VIEW. × 6. *b*, FIRST ANTENNA. *c*, SECOND ANTENNA. *d*, MANDIBLE. *e*, FIRST MAXILLA. *f*, SECOND MAXILLA. *g*, MAXILLIPED. *h*, UPPER LIP. *i*, LOWER LIP. *j*, GNATHOPOD.

The first four segments of the thorax are subequal in length. The fifth is a little shorter. The sixth and seventh are subequal and each

is a little longer than the fifth. The epimera of the first three segments are small and placed antero-laterally. That of the fourth segment is also small and is placed about the middle of the lateral margin. Those of the last three segments are small and post-laterally placed.

The abdomen is composed of three segments, two short segments anterior to the terminal segment. The terminal segment is 2½ mm. long and 2 mm. wide. Its posterior margin is straight, with the post-lateral angles rounded. The peduncle or basal article of the uropoda is 2½ mm. long, or as long as the terminal segment of the abdomen. The inner branch is 2 mm. long and is twice as long as the outer branch.

The first pair of legs are subchelate. The propodus is armed on the inferior margin with about four long spines. The dactylus is armed with a row of about eleven spines along the inferior margin. All the other legs are ambulatory, with dactyli uni-unguiculate.

CÆCIDOTEA SMITHSII Ulrich.

Cæcidotea smithsii Ulrich, Trans. Am. Microscopical Soc., XXIII, 1902, p. 93, pl. xvi, figs. 10–18.

Locality.—Subterranean stream near San Marcos, Texas; Artesian well at San Marcos, Texas.

"Body of loosely jointed segments. Head as in *C. stygia* Packard.

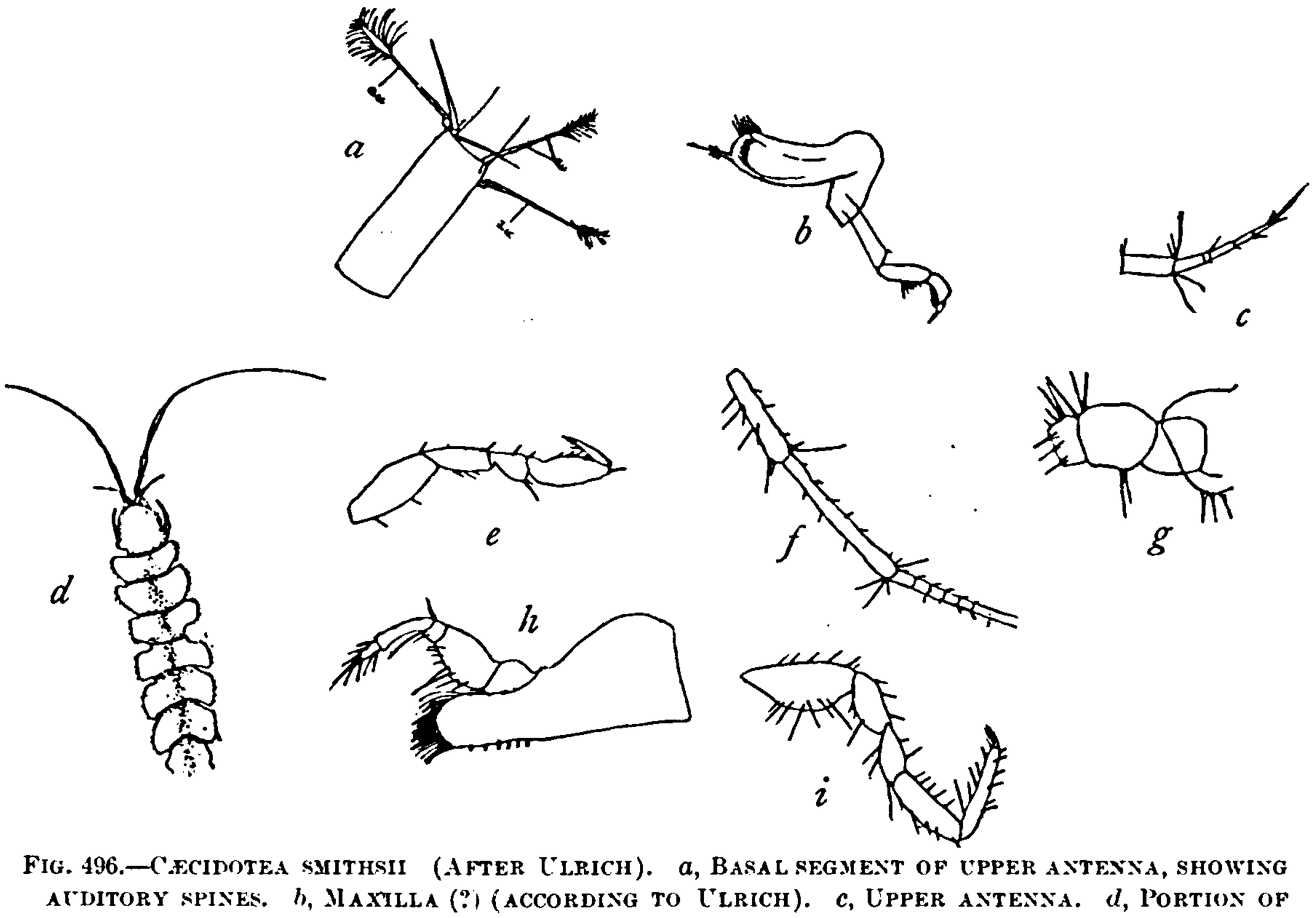

Fig. 496.—Cæcidotea smithsii (After Ulrich). *a*, Basal segment of upper antenna, showing auditory spines. *b*, Maxilla (?) (according to Ulrich). *c*, Upper antenna. *d*, Portion of body. *e*, First leg. *f*, Portion of lower antenna. *g*, Basal portion of same. *h*, Labrum. *i*, Second leg.

No trace of eyes. Inner antennæ short, not more than half as long as basal portion of outer antennæ. Flagellum of inner antennæ consists of five segments, the second one-fourth 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 two-thirds as long; another somewhat shorter olfactory club on penultimate segment. Last segment of the basal portion of the inner antennæ provided with three spines, as in *C. stygia*. Outer antennæ probably as long as body. Basal portion of five segments, the first three short and thick, the fourth and fifth much longer and more slender. The flagellum consists of at least forty 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. Size, very small, probably not over 3 mm. in length. Color, white.

"*Habitat*.—Subterranean stream near San Marcos, Texas. Collected by Dr. C. H. Eigenmann, from the U. S. Fish Commission well.

"The above description is from a fragment. The telson and caudal appendages were gone, also part of the outer antennæ. The writer hopes soon to receive the material which will enable him to fill out the gaps in the above diagnosis.

"In honor of Dr. H. M. Smith, in charge of scientific inquiry of the U. S. Fish Commission."—C. J. ULRICH.[a]

Family XVI. STENETRIIDÆ.[b]

Eyes present, large, sub-dorsal. Body depressed, elongate.

First pair of antennæ with flagellum composed of several articles. Second pair of antennæ with multi-articulate flagellum.

Mandibles with palp.

Lateral margins of thorax but little produced, not laciniate. First pair of legs in both sexes subcheliform; following pairs ambulatory, with dactylus bi-unguiculate.

Scale present outside of third joint of peduncle of second antennæ.

First pair of pleopoda in female with appendages fused to form a small operculum. Second pair wanting. Third pair with the outer branches large, and forming, with the corresponding lamella of the opposite side, a sort of operculum. Fourth pair with two branches. Fifth pair consisting of a single branch.

First pair of pleopoda in male small, with the peduncles fused; branches single. Second pair situated below and not coupled with the first pair; branches attached to the distal part of the inner margin of the peduncle; inner branch geniculate, with distal joint narrow and without cavity in its obtuse end; outer branch very short, much shorter than inner one, and unjointed. Third, fourth, and fifth pairs similar to those of female.

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[a] Trans. Amer. Microscopical Soc., 24th annual meeting, 1902, p. 93.

[b] See Hansen for characters of family, Proc. Zool. Soc. London, 1905, II, Pt. 2, p. 315.

70. Genus STENETRIUM Haswell.

Only genus.
With characters of family.

ANALYTICAL KEY[a] TO THE SPECIES OF THE GENUS STENETRIUM.

a. Terminal segment of the body armed on each side with five sharp teeth on the lateral margin. First pair of legs with the upper distal angle of the fifth article produced in a long process.....*Stenetrium serratum* Hansen

a'. Terminal segment of the body with only oné tooth at the notch on the lateral margin on each side. First pair of legs with the upper distal angle of the fifth article rectangular, without process.

b. In the male the lower margin of the hand has its proximal half concave, and at the distal end a low broad process, with three or four teeth nearly equal in size placed in a convex line. In the female the angle between the palmar and the lower margin of the hand measures about 110°; the hand is a little more than $\frac{3}{2}$ as long as deep.....*Stenetrium occidentale* Hansen

b'. In the male the lower margin of the hand has its proximal half convex, and at the distal end two processes separated by a rather deep incision; each process terminates in two teeth. In the female the angle between the palmar and the lower margin of the hand measures about 125°; the hand is twice as long as deep.....*Stenetrium stebbingi* Richardson

b''. In the male the lower margin of the hand has its proximal half convex, and at the distal end a narrow, moderately long process, with the end bifurcate, and sometimes besides a feeble tooth on its proximal margin. In the female the angle between the palmar and the lower margin of the hand measures less than 100°, and the hand is a little more than $\frac{3}{2}$ as long as deep.
Stenetrium antillense Hansen

STENETRIUM SERRATUM Hansen.

Stenetrium serratum HANSEN, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 323–324, pl. XIX, figs. 3a–3d; pl. XX, fig. 1a.

Locality.—St. Thomas, West Indies.

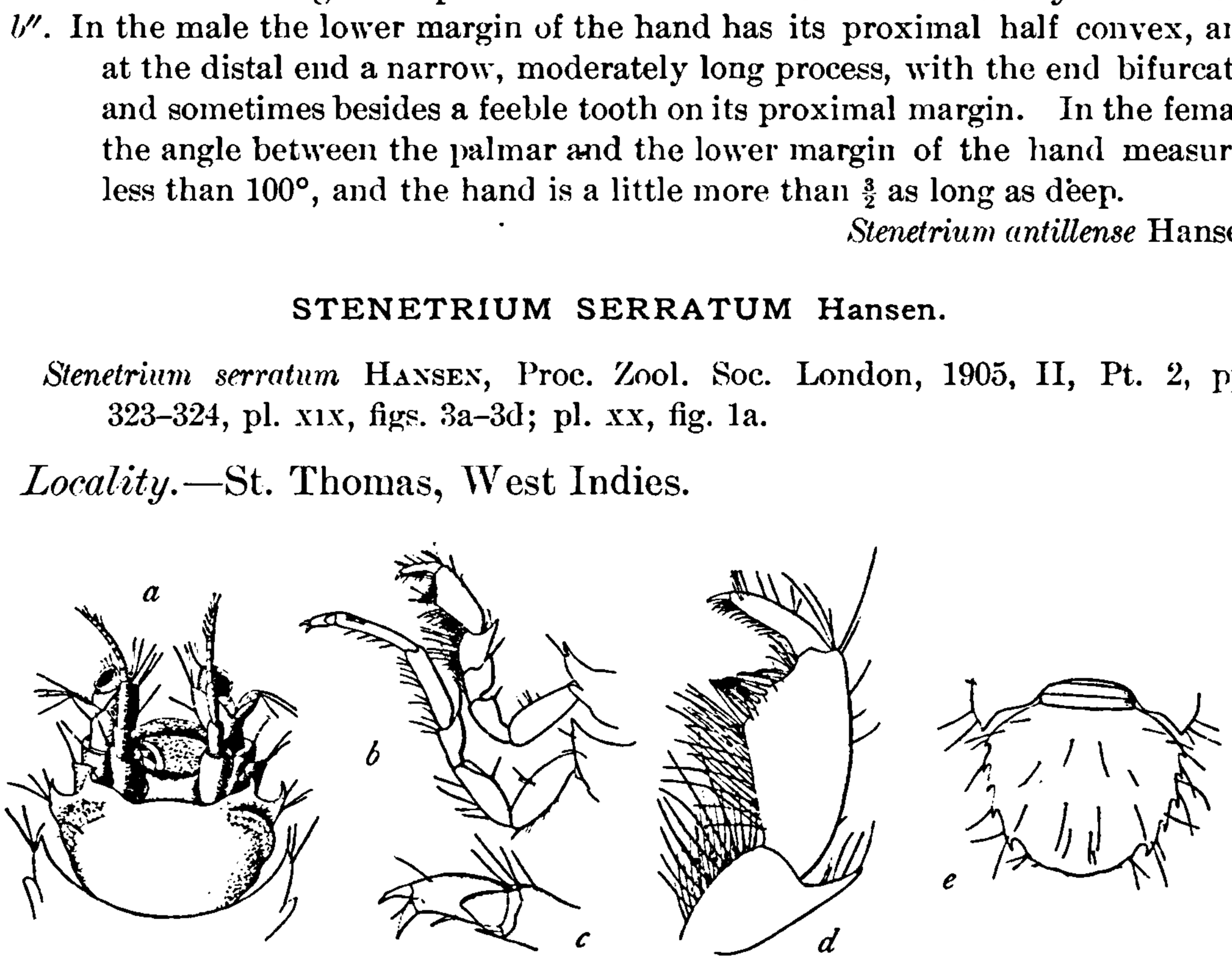

FIG. 497.—STENETRIUM SERRATUM (AFTER HANSEN). *a*, HEAD. *b*, FIRST TWO THORACIC LEGS. *c*, TERMINAL PART OF SECOND LEG. *d*, TERMINAL PART OF FIRST LEG. *e*, ABDOMEN. (ALL ENLARGED.)

"Head has its upper surface (the frontal plate excluded) nearly twice as broad as long; the lateral part is somewhat expanded and

[a] The key given below is taken from Hansen's Conspectus, given in Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 316–317.

flattened in front, and produced into a moderately large acute process; the front margin outside the base of each antennula produced into a rather large process, which is broad at the base, while its distal part is shaped as a narrow, acute hook, curved somewhat inward. Eyes large, oblong, very oblique; the outer margin extremely convex, the inner very concave; their posterior part overlaps the lateral margin of the head itself.

"Antennulæ have the second joint of the peduncle moderately robust and somewhat shorter than the third; flagellum 9-jointed, as long as the sum of the two proximal joints of the peduncle.

"Antennæ have the basal joint, seen from above, distally cut off transversely, its outer angle acute, but not produced into any process.

"First thoracic legs rather short. Third joint distally widened, but without process; fourth joint with the upper part nearly from the base strongly expanded, compressed, and distally produced into a process of moderate length and breadth; fifth joint similarly expanded and distally produced into a long slender process. Hand a little more than twice as long as deep; upper margin rather feebly convex, with a few setæ; lower margin straight, only half as long as the upper, with numerous very long hairs; distal end as long as the lower margin; palmar edge very oblique, a little sinuate, furnished with six very stiff setæ, proportionately long and increasing in length downward, pectinate along their upper margin, and at the end of the edge a moderately robust very long spine pectinate as the setæ; the angle between palmar edge and lower margin measures about 130°. Seventh joint with its claw claw-shaped, reaching a little beyond the lower end of the palmar edge; the joint is adorned below with serrated spines and finely curved setæ as in *S. mediterraneum*, but the spines are less numerous, only about ten.

"Abdominal shield is somewhat broader than long; each lateral margin is adorned with five small nearly spiniform processes, increasing in size backward and placed at regular intervals, the last of these processes being that at the usual notch. Posterior margin is rather evenly but moderately curved.

"Uropoda wanting.

"Length of the single adult female, 6 mm."—HANSEN.[a]

STENETRIUM OCCIDENTALE Hansen.

Stenetrium occidentale HANSEN, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 324–325, pl. xx, figs. 2a–2n.

Locality.—St. Thomas, West Indies.

"Head shaped as in *S. antillense;* its upper surface (the frontal plate excluded) is considerably less than twice as broad as long; the lateral part, seen from above, is feebly expanded and produced into a

[a] Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 323–324.

small acute process; the front margin outside the base of each antennula produced into a broad but rather low process, with the end obtuse. Eyes of moderate length, oblong, somewhat curved, very oblique, and considerably removed from the lateral margin of the head.

"Antennulæ with the second joint slightly longer than the third, moderately robust; flagellum in the male 9-jointed and as long as the sum of the two distal joints of peduncle, in the female still shorter, with four or five joints.

"Antennæ have the basal joint distally cut off transversely, its outer angle without processes and measuring about 90°.

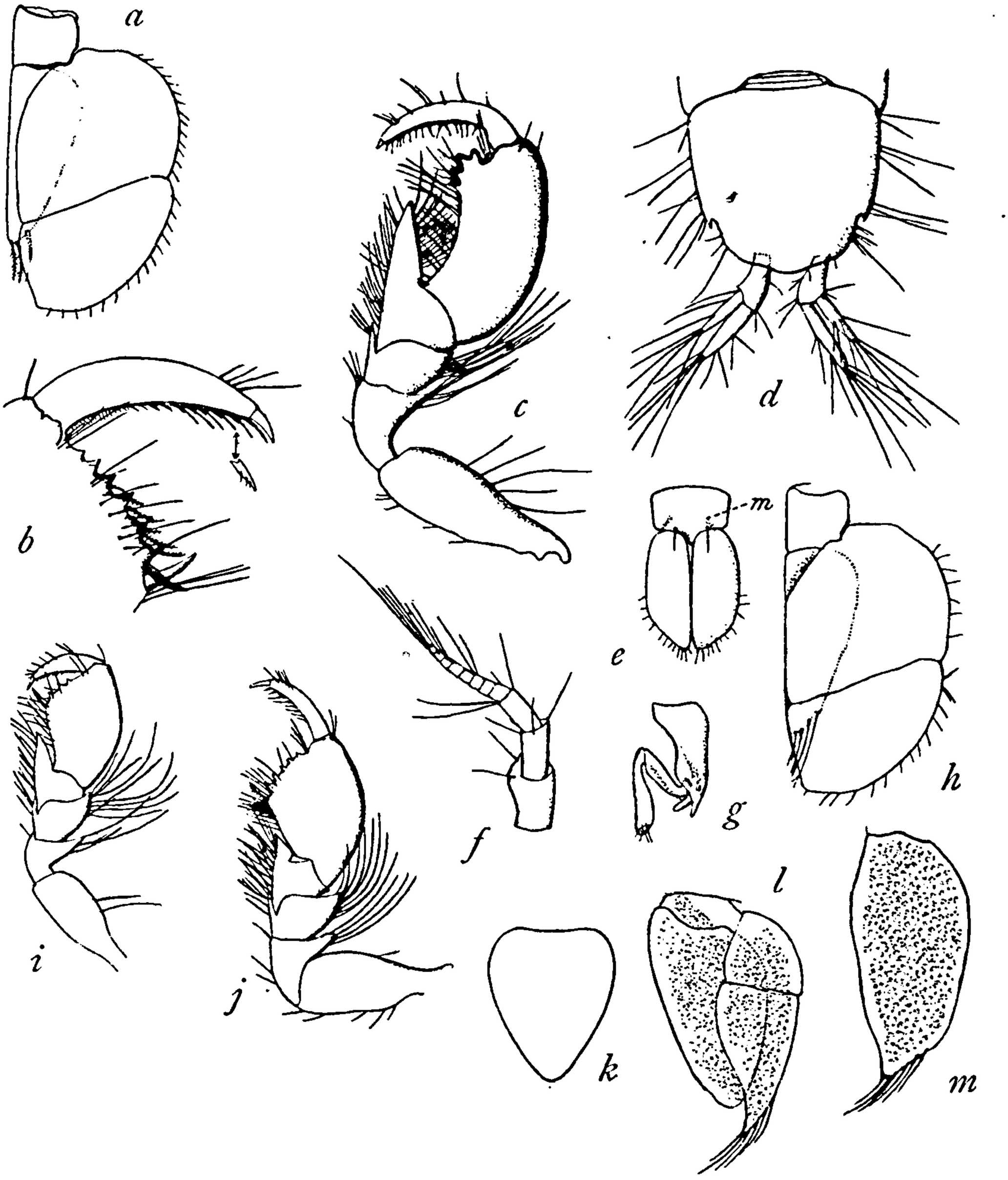

FIG. 498.—STENETRIUM OCCIDENTALE (AFTER HANSEN). *a*, THIRD LEFT PLEOPOD OF FEMALE. × 51. *b*, TERMINAL PART OF FIRST LEFT LEG OF ADULT FEMALE. × 97. *c*, FIRST LEG OF ADULT MALE. × 39. *d*, ABDOMEN OF FEMALE. × 28. *e*, FIRST PLEOPOD OF ADULT MALE. × 51. *f*, LEFT ANTENNULA OF ADULT MALE. × 39. *g*, SECOND LEFT PLEOPOD OF ADULT MALE. × 51. *h*, THIRD LEFT PLEOPOD OF MALE. × 51. *i*, FIRST LEFT LEG OF IMMATURE MALE. × 39. *j*, FIRST LEFT LEG OF ADULT FEMALE. × 39. *k*, FIRST PAIR OF PLEOPODA OF FEMALE. × 51. *l*, FOURTH LEFT PLEOPOD OF MALE. × 51. *m*, FIFTH LEFT PLEOPOD OF MALE. × 51.

"First thoracic legs very different in adult specimens of the two sexes, but in immature males nearly as in adult females. In the male they are rather long, robust; third joint is distally much expanded above and produced into a triangular process directed upward; fourth joint expands above gradually from the base, forming a broad but rather low process, a portion of the inner surface of which is furnished with numerous exceedingly long hairs. Fifth joint has the upper margin very short, without any process, but it expands below, its lower margin is several times longer than the upper, and besides it is produced into a very long oblong-triangular process, the inner side and both margins of which are closely set with long or very long hairs; the upper margin of the process is straight nearly to the insertion of the hand, and the distance from this insertion to the end of the process is longer than the distance from the insertion to the base of the joint. The hand is very large, a little broader near the end than at the base, two and a half times longer than deep; upper margin strongly convex, lower margin rather concave from the base to the distal process, which occupies the major portion of the short palmar edge; this process is low, broad, its margin more or less convex and divided into three or four teeth; the lower major portion of the inner surface of the hand is closely set with very long hairs. Seventh joint very long, much curved, especially at some distance from the base, claw-shaped, with fine, simple hairs spread along both margins and on the inner side, but without spines; the claw itself is very short. In the female the legs are much shorter than in the male, robust; process on third joint proportionately a little longer and broader, that on fourth joint a little longer than in the male; fifth joint much smaller than in the male, its lower process small. Hand much smaller than in the male, subtriangular, a little more than half as long again as deep; upper margin very convex, two and a half times longer than the lower, which is straight, with many long hairs; distal end somewhat longer than the lower margin; palmar edge feebly convex, with an angular notch at the lower end, so that the usual spine, which is strong and moderately long, is situated a little behind the edge; the edge from the 'claw' to the notch is occupied by five or six saw-teeth gradually increasing in size downward, and besides adorned with some stiff setæ pectinate along their upper margin; finally, the angle between lower margin and palmar edge measures about 110°. Seventh joint with the claw regularly claw-shaped, when extended reaching slightly beyond the notch mentioned; the major portion of the lower margin of the joint is adorned with rather slender spines, serrate along the lower margin, and some fine hairs.

"Abdominal shield slightly broader than long; lateral margin unarmed, only with the usual tooth and notch at the end; posterior margin, reckoned from the notch, is strongly and rather evenly curved.

"Uropoda considerably more than half as long as the abdominal shield; exopod slightly longer than the sympod and much shorter than the endopod.

"Second joint of the endopod of second male pleopoda with the distal half considerably broader than near the base, the end very obliquely rounded, the lower surface at the end set with numerous very short hairs.

"*Length.*—Both sexes similar in this respect, measuring about 3.3 mm."—HANSEN.[a]

STENETRIUM STEBBINGI Richardson.

Stenetrium stebbingi RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 295–296, pl. XXXIX, figs. 46–49.

Localities.—Found at low water in corallines at Bailey Bay, Bermudas, and at Harrington Sound, Bermudas.

Depth.—1 to 12 feet.

Body long, narrow, depressed. Color light yellow, with markings of black.

Head narrowed posteriorly, widening anteriorly; the antero-lateral

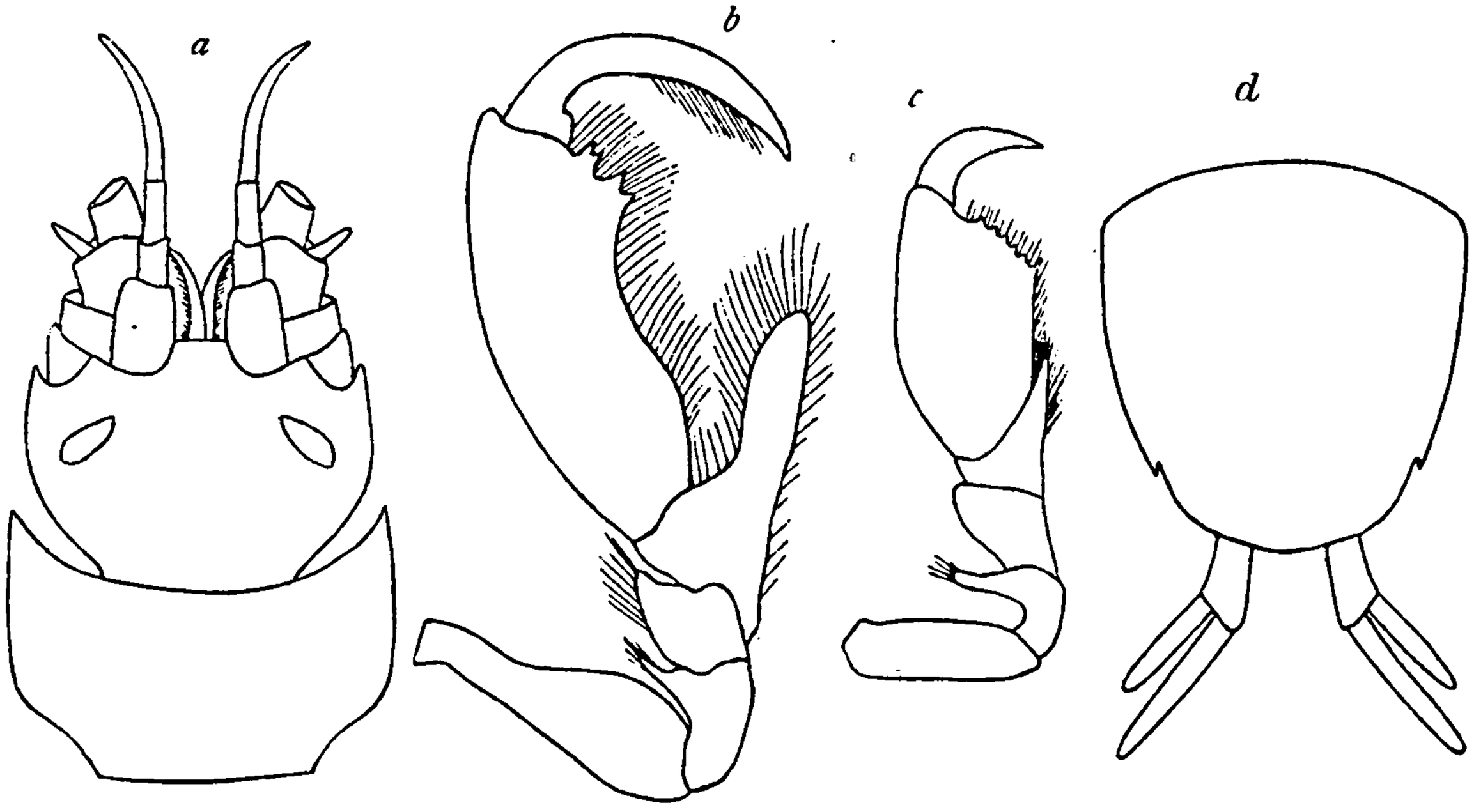

FIG. 499.—STENETRIUM STEBBINGI. *a*, HEAD AND FIRST THORACIC SEGMENTS. *b*, FIRST LEG OF MALE. *c*, FIRST LEG OF FEMALE. *d*, TERMINAL SEGMENT OF BODY AND UROPODA.

angles produced into narrow acute processes, curving slightly inward; the anterior margin is produced in a rostrum,[b] which is truncated, on either side of which is a triangular process. Eyes obliquely situated on the anterior portion of the head.

The first pair of antennæ are placed between the two triangular processes and the rostrum; the first peduncular joint is large, broad, the

[a] Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 324–325.

[b] Hansen calls this the frontal plate.

two following joints narrow; the flagellum is composed of nine joints and reaches a little beyond the middle of the fourth peduncular joint of the second pair of antennæ.

The second pair of antennæ have the first four joints short, the third joint being provided with an exopod, the fifth and sixth joints long and of equal length; the flagellum is multi-articulate.

The first thoracic segment has the lateral margins straight, the anterior angles acutely produced forward. The lateral margins of the second, third, and fourth segment are also straight, with the epimera evident about the middle.

The fifth and sixth segments have the posterior half of the lateral margin rounded, the epimera evident below. The seventh segment has the lateral margin acutely produced posteriorly, the epimera evident on the posterior margin of the segment within the processes. The thoracic segments are all widely separated from each other by deep lateral incisions.

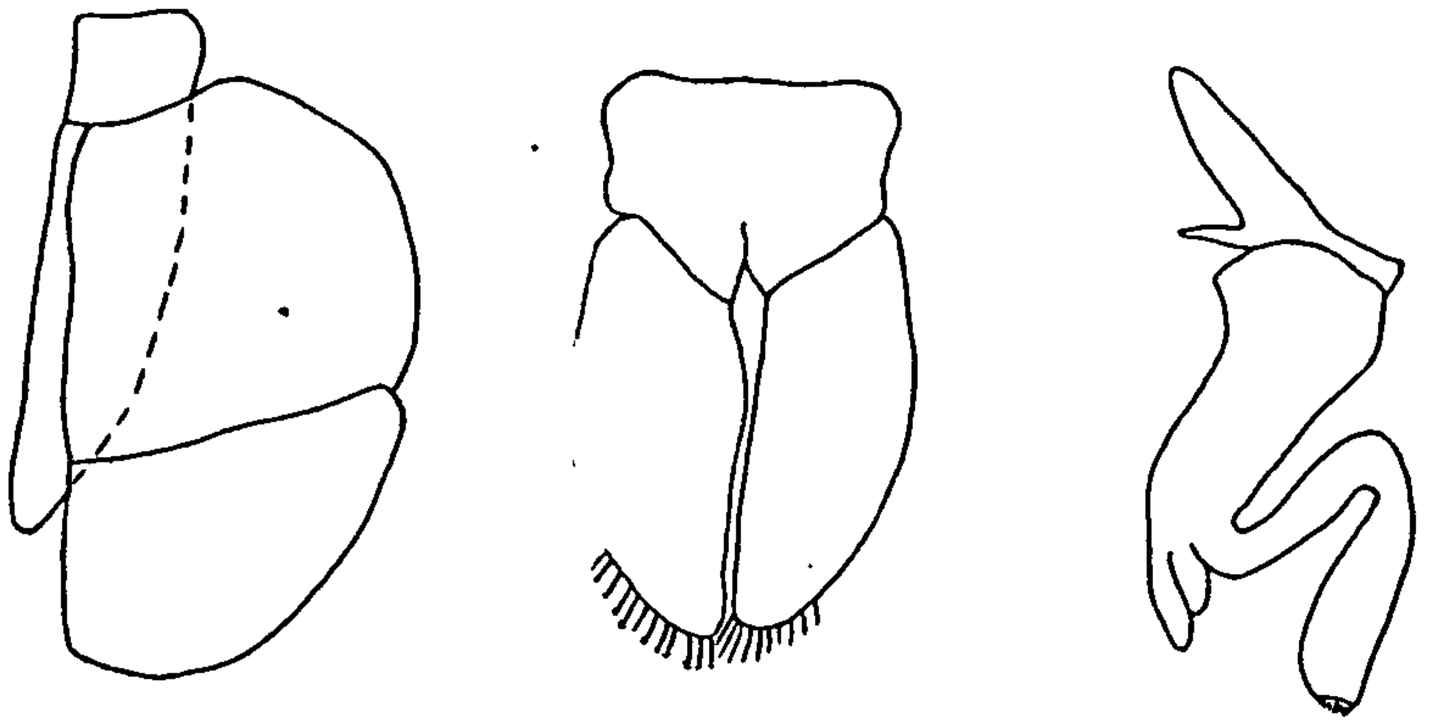

FIG. 500.—STENETRIUM STEBBINGI. *a*, THIRD PLEOPOD OF MALE. × 41. *b*, FIRST PLEOPOD OF MALE. × 77½. *c*, SECOND PLEOPOD OF MALE. × 77½.

The terminal segment of the body has the lateral margin produced backward in two small spines, between which the posterior margin is widely rounded. The uropoda are double branched, the branches being nearly equal in length and about as long as the basal joint.

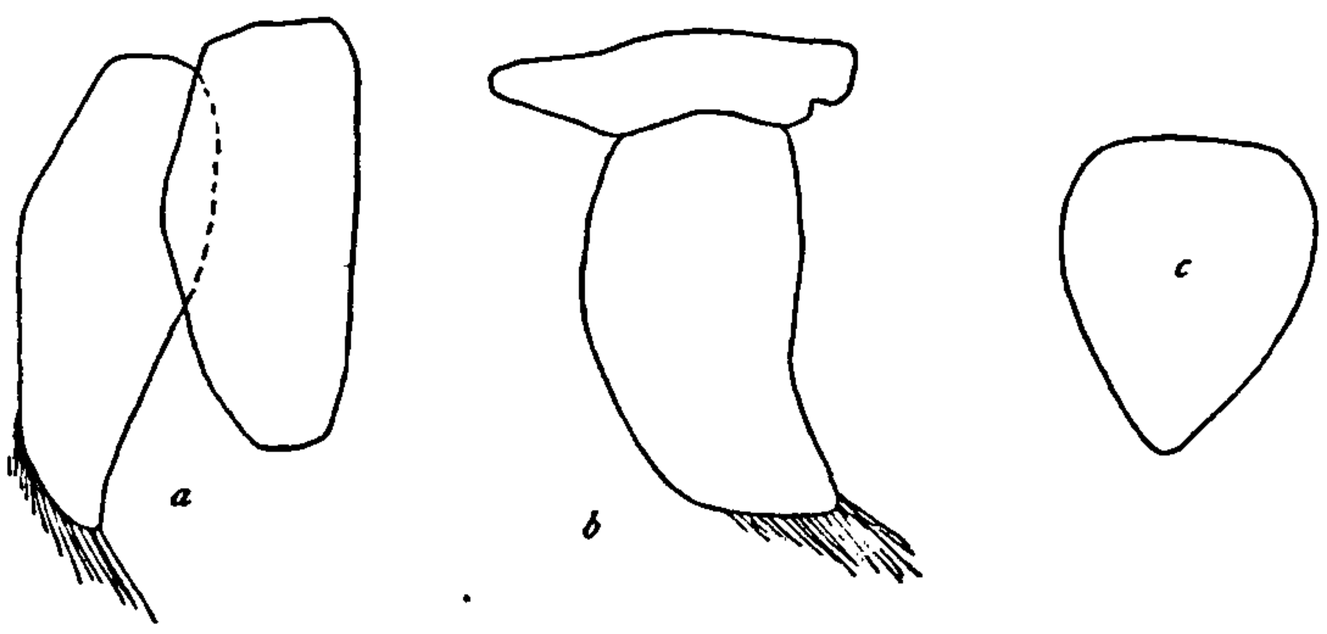

FIG. 501.—STENETRIUM STEBBINGI. *a*, FOURTH PLEOPOD OF MALE. × 41. *b*, FIFTH PLEOPOD OF MALE. × 41. *c*, FIRST PLEOPOD OF FEMALE. × 77½.

The first pair of legs are subchelate. In the male the carpus is postero-distally produced in a markedly long process, which extends half the length of the propodus, its entire margin being fringed with long hairs. The propodus is elongate, its lower two-thirds being fringed with long hairs on the posterior margin, the upper third or distal margin being provided with three large spines, the inner one being bifurcate; the dactylus is long and also fringed with hairs upon its inner margin, and extends half its length beyond the last digital

spine, almost touching the carpal process. The ischium is antero-distally produced in a short process.

The other legs are simple, bi-unguiculate.

In the female the carpus of the first pair of legs is not produced in as long a process as in the male. The propodus is shorter than in the male, more triangular in shape, denticulate on its distal margin, with a long, acute, digital spine. The dactylus does not extend beyond the digital spine. The ischium is antero-distally produced in a process fringed with hairs.

A number of individuals were taken by Prof. A. E. Verrill and party at Bailey Bay, Bermudas, in corallines, at low water, and at Harrington Sound, in 1898. Other specimens were collected at the Bermudas in 1876–77 by Dr. G. B. Goode.

Type specimens from Harrington Sound in Peabody Museum, Yale University. Cat. No. 3209.

This species is named for Rev. T. R. R. Stebbing, the English carcinologist.

STENETRIUM ANTILLENSE Hansen.

Stenetrium antillense Hansen, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 326–327, pl. xx, figs. 3–3i; pl. xxi, figs. 1*a*–1*e*.

Locality.—West Indies. Found on corals in deep water.

"This species is so closely allied to *S. occidentale* and *S. stebbingi* that it is preferable to point out the differences instead of giving a complete description.

"The head is shaped as in *S. occidentale;* the eyes have the same position.

"Antennulæ have second and third joints subequal in length; flagellum in the male about as long as the sum of the two preceding joints, with from nine to eleven joints.

"Antennæ have their basal joints as in *S. occidentale.*

"First thoracic legs show some important differences in their distal half. In the male the fifth joint is below as much produced as in *S. occidentale*, but the process is differently shaped; its proximal half is expanded above and excavated on the upper half of the outer side in order to receive the proximal lower part of the hand; the oblong-triangular, freely protruding part of the process looks therefore much shorter than in *S. occidentale*, in which it is regularly oblong-triangular and quite free to about the articulation of the hand. The hand is deeper than in *S. occidentale* and has a different shape; it is slightly more than twice as long as deep, conspicuously deeper at a shorter distance from the base than at the distal end; the upper margin is less convex than in *S. occidentale*, while the lower margin is considerably convex in its proximal and concave at its distal half; the distal process is longer but much narrower than in *S. occidentale*, bifurcate at the end

and sometimes with a feeble tooth on its posterior margin; distribution of hairs as in the species mentioned. The 'claw,' formed by the seventh joint and the claw itself, slightly longer than in *S. occidentale* and more hairy at the lower margin. In the young, probably also in the adult female, the hand differs somewhat in shape from those of

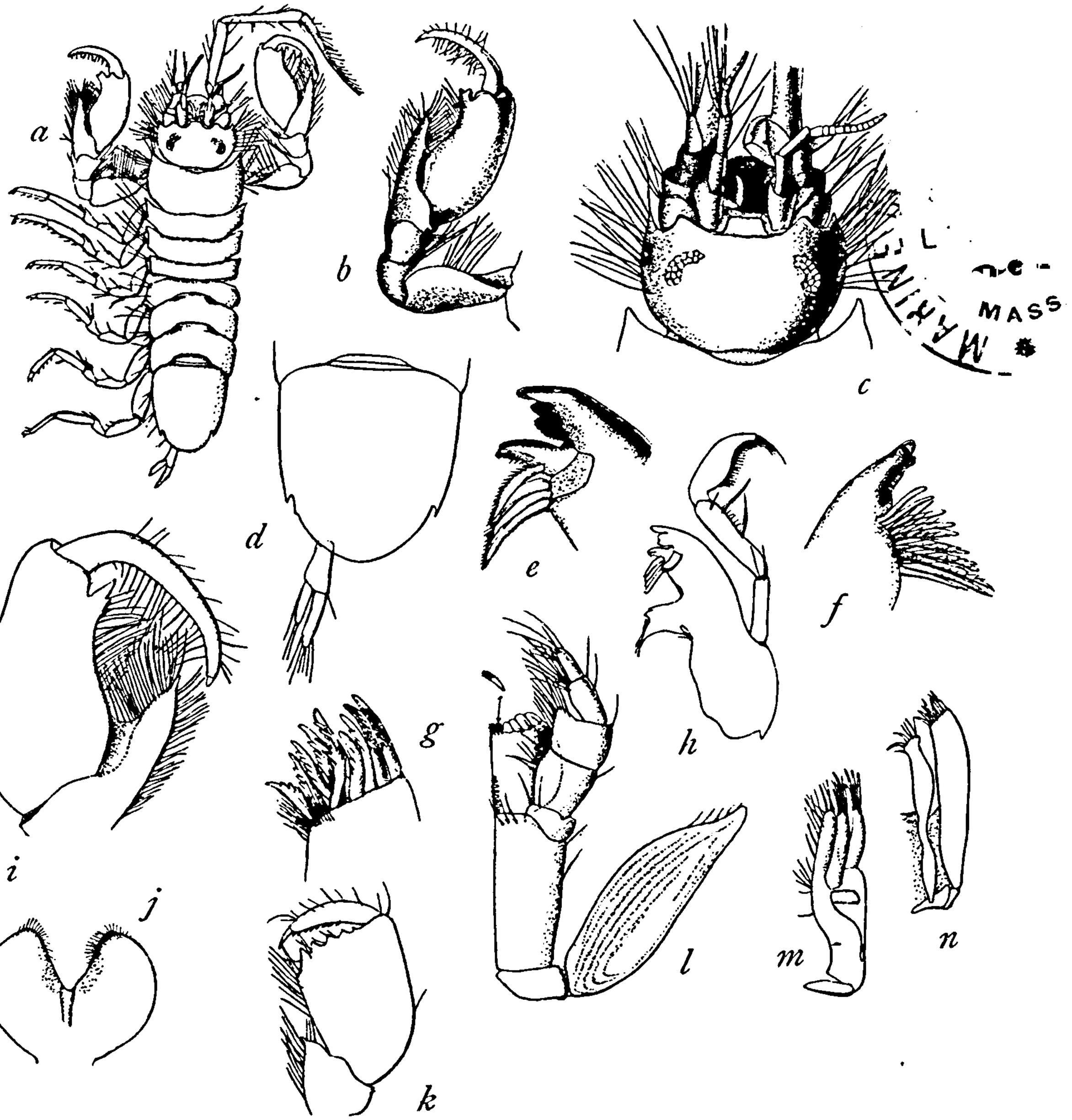

FIG. 502.—STENETRIUM ANTILLENSE (AFTER HANSEN). *a*, ADULT MALE. × 9. *b*, FIRST LEG OF ADULT MALE. × 16. *c*, HEAD OF ADULT MALE. × 24. *d*, ABDOMEN OF IMMATURE FEMALE. × 36. *e*, DISTAL PART OF LEFT MANDIBLE. × 125. *f*, DISTAL PART OF RIGHT MANDIBLE. × 125. *g*, DISTAL PART OF LORE FROM THIRD JOINT OF LEFT MAXILLULA. × 185. *h*, LEFT MANDIBLE OF MALE. × 49. *i*, FIRST RIGHT LEG (TERMINAL PART) OF ANOTHER MALE. × 28. *j*, PARAGNATHA OF MALE. × 49. *k*, DISTAL PART OF LEFT LEG OF IMMATURE FEMALE. × 53. *l*, LEFT MAXILLIPED OF MALE. × 49. *m*, LEFT MAXILLA OF MALE. × 49. *n*, LEFT MAXILLULA OF MALE. × 49.

the two preceding species: as in *S. occidentaie* it is a little more than half as long again as broad, but the lower margin is comparatively longer, measured to the base of the lower sawtooth of the palmar edge

slightly more than half as long as the upper margin, and the angle between the lower margin and the palmar edge is less than 100°; the notch at the distal end of the lower margin is longer than in *S. occidentale.*

"Abdominal shield is slightly longer than broad, otherwise as in *S. occidentale.*

"Uropoda seem to be only a little more than half as long as the abdominal shield; the rami—preserved only in the young female—a little shorter than in *S. occidentale.*

"Length of the largest male 4.5 mm."—HANSEN.[a]

Family XVII. JANIRIDÆ.[b]

Lateral parts of head lamellarly expanded. Eyes, when present, usually subdorsal. First pair of antennæ sometimes well developed with multi-articulate flagellum, sometimes small with rudimentary flagellum. Second antennæ generally with small scale outside of third joint of peduncle; peduncle composed of six articles.

First pair of legs sometimes prehensile, sometimes not differing from the six following pairs, which are ambulatory; dactylus generally bi- or tri-unguiculate.

First pair of pleopoda in female transformed into a single large opercular plate, undivided; second pair wanting; outer lamellæ of two succeeding pairs, third and fourth pleopoda, narrow and confluent with basal part; both branches well developed; fifth pair with only a single branch.

First pair of pleopoda in male coupled with the second pair and forming a sort of compound operculum. The peduncles of the first pleopoda are fused, are very long, with immovable single branches. Second pair with the distal joint of the peduncle situated outside of and coupled with the first pair of pleopods; the branches are attached to the inner margin of the peduncle; the inner branch is geniculate, two-jointed, the distal joint containing a cavity and being produced to a point; the outer branch is very short, two-jointed, and hook-shaped. The third, fourth, and fifth pairs of pleopoda are similar to those of female.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY JANIRIDÆ.

a. Second pair of antennæ long, well developed, with multi-articulate flagellum; articles of peduncle not dilated. Mandibles with cutting part composed of one or two serrated teeth.

b. First pair of antennæ extremely small, with rudimentary flagellum, composed of only two articles. Second pair of antennæ without a scale attached to the peduncle. Uropoda extremely small, branches short, nodiform.

Genus *Jæra* Leach

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[a] Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 326–327.

[b] See Sars for characters of family, Crust. of Norway, II, 1899, p. 98, and Hansen, Proc. Zool. Soc. London, 1905, II, Pt. 2, pp. 308–309, 315–316.

b′. First pair of antennæ well developed; flagellum multi-articulate. Second pair of antennæ with scale outside of third article of peduncle. Uropoda largely developed.

c. Eyes laterally placed. First pair of legs in male nearly twice the length of the body, enlarged distally, forming a club-like hand armed with triangular processes, to which is articulated a movable finger, the propodus, armed also with triangular processes.....Genus *Carpias* Richardson

c′. Eyes sub-dorsal. First pair of legs in male not twice as long as body; propodus not armed with triangular processes.

d. Maxillipeds with the second and third articles of the palp very much expanded. Distal extremity of the peduncle and the branch of the first pleopoda in the male fused and produced and dilated at the tip.
Genus *Janiropsis* G. O. Sars

d′. Maxillipeds with the second and third articles of the palp not expanded. Distal extremity of the peduncle and the branch of the first pleopoda in the male generally not fused nor produced and not dilated at the tip.

e. Terminal segment of body with post-lateral angles produced into a triangular expansion, one on either side. Segments of thorax with lateral parts produced, laciniate.....Genus *Iolella*, new name.

e′. Terminal segment of body with post-lateral angles not produced in a triangular expansion, one on either side. Segments of thorax with lateral parts not produced, not laciniate.....Genus *Janira* Leach

a′. Second pair of antennæ short, with articles of peduncle dilated; flagellum rudimentary. Second antennæ equal in length to the width of the head. Cutting part of mandibles composed of five teeth.....Genus *Jæropsis* Koehler

71. Genus JÆRA Leach.[a]

Body broad, depressed. Lateral parts of thoracic segments laminarly expanded.

Head without rostrum. Terminal segment with median emargination, within which the uropoda are placed. Eyes dorsal.

First pair of antennæ extremely small, with rudimentary flagellum. Second pair of antennæ long and well developed, without a scale attached to the peduncle of the second antennæ; flagellum multi-articulate.

Uropoda extremely small; branches short, nodiform.

Legs of all seven pairs ambulatory in structure; dactylus triunguiculate.

Distal extremity of the peduncle and the branch of the first pleopoda in the male fused and dilated at the tip.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JÆRA.

a. Anterior margin of the head broadly excavated on either side of a median lobe. Extremity of terminal segment of body notched for the insertion of the uropoda, the median point being almost imperceptible.....*Jæra marina* (Fabricius)

a′. Anterior margin of the head nearly straight. Extremity of terminal segment of body with a double excavation, the median point not extending beyond the extremity of the sides.....*Jæra wakishiana* Spence Bate

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 103–104.

JÆRA MARINA (Fabricius.)

Oniscus marinus FABRICIUS, Faun. Groenland., 1780, p. 252.

Jæra albifrons LEACH, Edinburgh Encyclop., VII, 1813–14, p. 434 (Am. ed., p. 273); Trans. Linn. Soc., XI, 1815, p. 373.—DESMAREST, Dict. Sci. Nat., XXVIII, 1823, p. 381; Consid. Crust., 1825, p. 316.—LATREILLE, Règne Anim., IV, 1829, p. 141.—EDWARDS, Annot. de Lamarck, V, 1838, p. 267; Hist. Nat. des Crust., III, 1840, p. 150.

Jæra kroyeri ZADDACH, Syn. Crust. Pruss. Prodromus, 1844, p. 11.

Jæra albifrons EDWARDS, Règne Anim., Crust., 1849, p. 204.

Jæra baltica Fr. MULLER, Arch. Naturg., I, 1848, p. 63, pl. IV, fig. 29.

Jæra albifrons LILLJEBORG, Ofvers. vet. Akad. Forh., VIII, 1851, p. 23; IX, 1852, p. 11.

Jæra copiosa STIMPSON, Smithsonian Contributions to Knowledge, VI, 1853, p. 40, pl. III, fig. 29.

Jæra albifrons M. SARS, Christ. Vid. Selsk. Forh., 1859, p. 153.—BATE, Report Brit. Assoc., 1860, p. 225, 1861.—G. O. SARS, Nyt. Magazin for Naturvidenskaberne, 1866, p. 29.

Jæra nivalis PACKARD, Mem. Bost. Soc. Nat. Hist., I, 1867, p. 296.

Jæra albifrons NORMAN, Report Brit. Assoc., 1866, p. 197, 1867; 1868, p. 288, 1869.—BATE and WESTWOOD, Brit. Sess. Crust., II, 1868, p. 317, fig.

Jæra albifrons SARS, Christ. Vid. Selsk. Forh., 1871, p. 272, 1872.

Jæra copiosa VERRILL, Am. Journ. Sci. (3), VII, 1874, p. 131; Proc. Amer. Assoc., 1873, p. 369, 1874.—HARGER with VERRILL, Report U. S. Fish Comm., 1873, Pt. 1, p. 315; p. 571.

Jæra albifrons STEBBING, Journ. Linn. Soc. London, XII, 1874, p. 149; Ann. Mag. Nat. Hist. (4), XVII, 1876, p. 79, pl. V, figs. 5–6.—MEINERT, Natur. Tidsskr. (3), XI, 1877, p. 80.—STEBBING, Trans. Devon. Assoc., 1879, p. 7.—HARGER, Proc. U. S. Nat. Mus., 1879, II, p. 158; Report U. S. Fish Comm., Pt. 6, 1880, pp. 315–318, pl. I, figs. 4–8 (see Harger for synonymy).—BOVALLIUS, Bihang till K. Sv. Vet.-Akad. Handl., XI, 1886, No. 15, pp. 42–44.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 192–193.

Jæra marina SARS, Crust. of Norway, II, 1899, p. 104.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 554.—PAULMIER, Bull. New York State Museum, 1905, pp. 178–179.

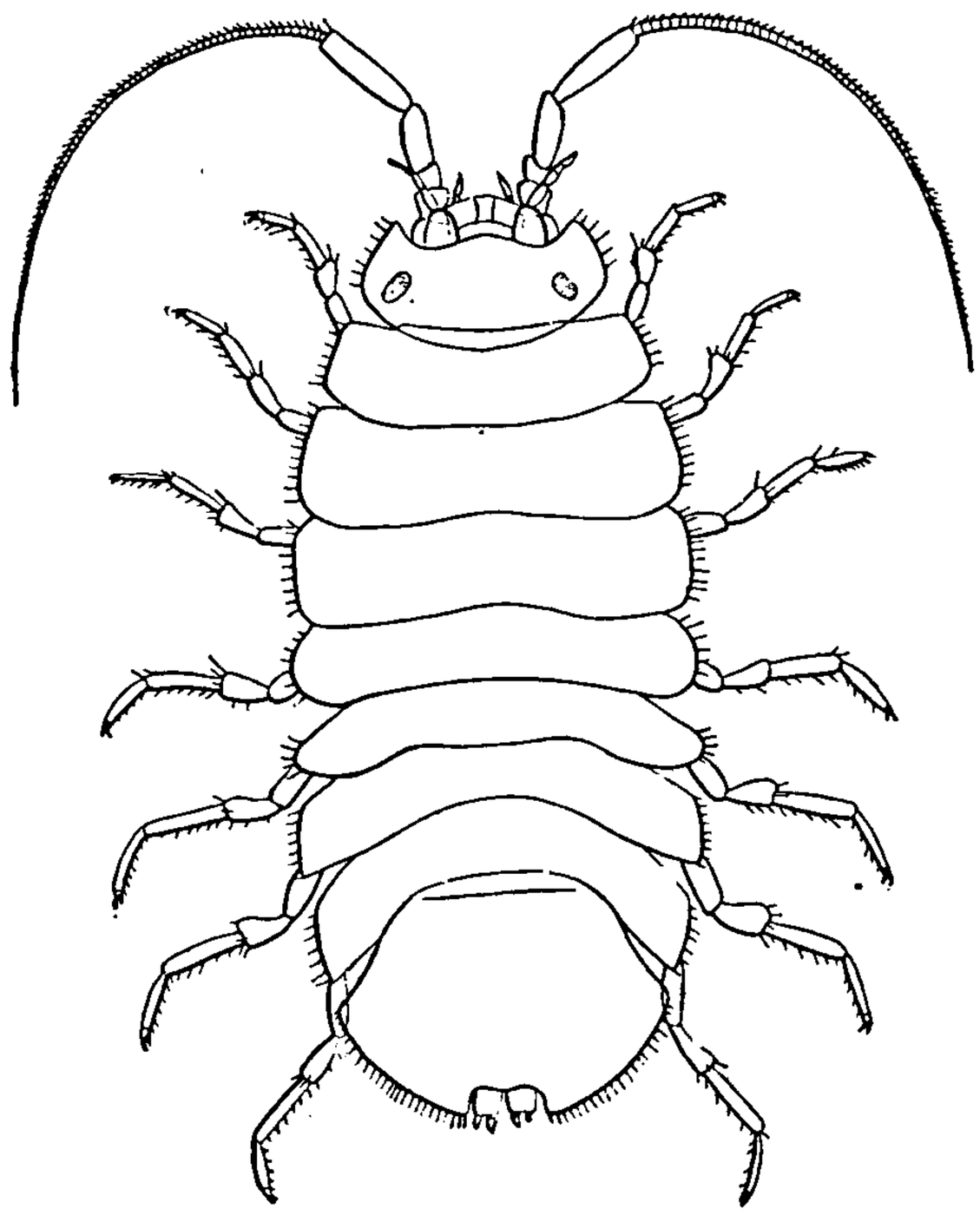


FIG. 503.—JÆRA MARINA (AFTER HARGER). × 10.

Localities.—Atlantic coast of New England; Labrador; Bay of Fundy; also coasts of England, Scotland, and Finmark; Fiskenaesset, Godhavn, and Claushavn, Greenland;

Baltic Sea; North Sea; Germany; west coast of Helgoland; Runmarö, Stockholms skärgård (J. Lindahl).

Depth.—Found on surface in tide pools; low water, under stones.

Body oblong-ovate, twice as long as wide, 1½ mm. : 3 mm.

Head about twice as wide as long, with the anterior margin produced in the middle in a large rounded lobe. Lateral margins straight, with the post-lateral angles round, the antero-lateral angles not produced. The eyes are small, oval or round, composite, and dorsally situated. The first pair of antennæ have the first article large; the second and third are about equal in length and a little shorter than the first. The flagellum is composed of two articles. The second pair of antennæ have the first four articles short and subequal; the fifth article is twice as long as the fourth; the sixth is one and a half times longer than the fifth. The flagellum is composed of about eighteen articles. The second antennæ are short, not reaching beyond the posterior margin of the fifth thoracic segment. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

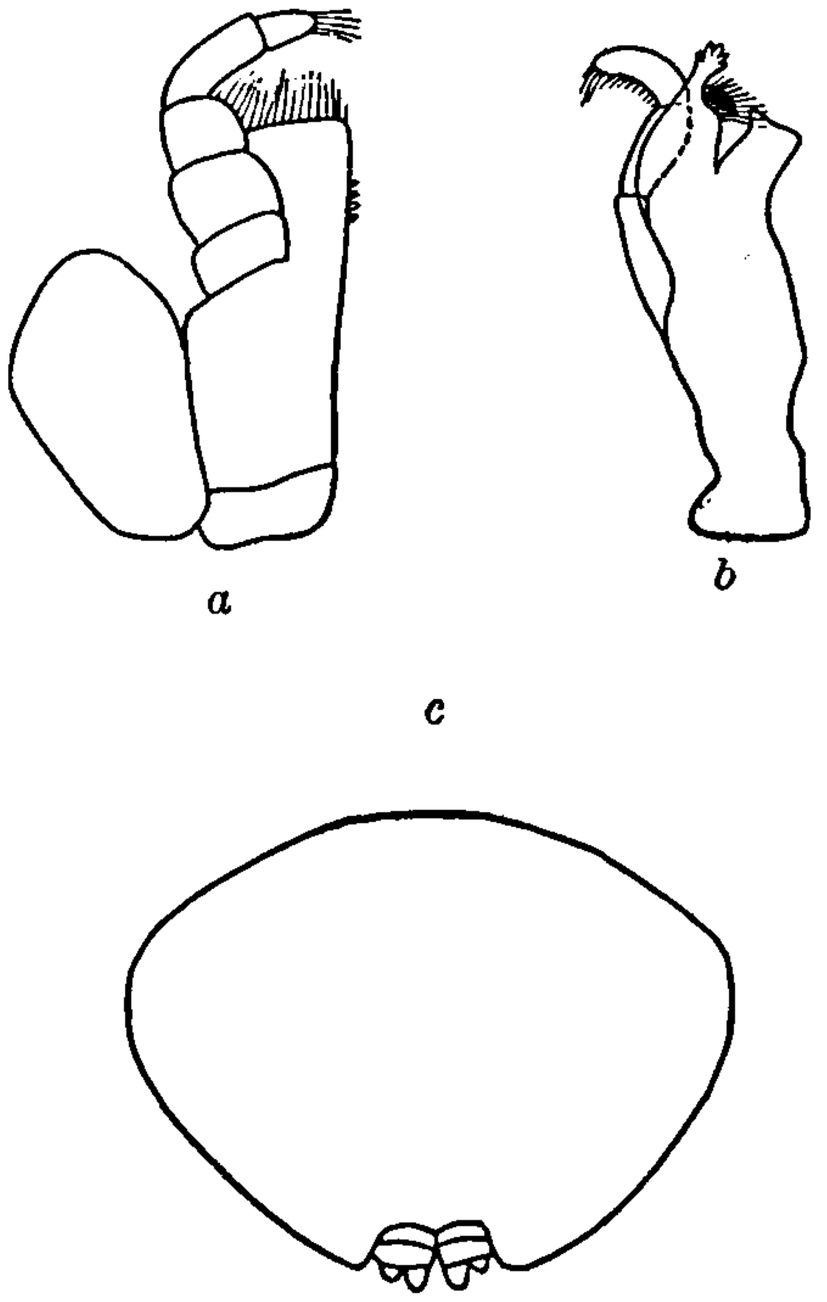


FIG. 504.—JÆRA MARINA. *a*, MAXILLIPED. × 77½. *b*, MANDIBLE. × 77½. *c*, ABDOMEN WITH UROPODA. × 41.

The lateral margins of the thoracic segments are straight and not produced into lobes. The epimera are not separated off from the segments.

The abdomen is composed of a single large segment, rounded posteriorly, with a small median excavation for the reception of the uropoda. The uropoda are short, not extending beyond the extremity of the abdomen, and situated within its posterior excavation. The outer branch is a little smaller and shorter than the inner branch.

All the legs are ambulatory, with tri-unguiculate dactyli.

JÆRA WAKISHIANA Spence Bate.

Jæra wakishiana SPENCE BATE, Lord's Naturalist in British Columbia, II, 1886, p. 282.—C. BOVALLIUS, Bihang till K. Sv. Vet.-Akad. Handl., XI, 1886, No. 15, p. 49.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 857; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 323; American Naturalist, XXXIV, 1900, p. 298.

Locality.—Esquimault Harbor, British Columbia.

"Posteriorem marginem pleonis habens bis excavatum cuspide intermedia supra cuspidatos margines non producta; antennæ inferiores non possunt extendere supra quintum segmentum; pereionis posteriora pleopoda non longiora quam posteriori margo latus est.

"Anterior margin of the cephalon nearly straight; pereion having the sides subparallel, the greatest width being at the sixth segment; pleon having a double excavation on the posterior margin, the central point not extending beyond the extremity of the sides. Superior antennæ reaching to the extremity of the fourth segment of the inferior; inferior antennæ nearly two-thirds of the length of the animal. Posterior pair of pleopoda as long as the posterior margin of the pleon, terminating in two styliform rami, each of which is tipped with a few short hairs.

"This species was taken from a sponge dredged in about eight fathoms of water in Esquimault Harbor.

"The specific name is derived from the circumstance of the animal having been found on the territory of the tribe of Wakish Indians."—SPENCE BATE.[a]

72. Genus CARPIAS Richardson.

Head without rostrum; frontal margin straight. Both pairs of antennæ multi-articulate; the second pair much longer than the body, and with a scale-like appendage articulated to the peduncle. Uropoda long, much longer than abdomen.

The first pair of legs in the male are prehensile and remarkably long, being one and two-thirds times the length of the body; they are greatly enlarged distally, forming a broad club-like hand armed with triangular processes, to which is articulated a movable finger, the propodus, likewise armed with triangular processes.

The ambulatory legs are simple, bi-unguiculate, and are of normal structure.

CARPIAS BERMUDENSIS Richardson.

Carpias bermudensis RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, pp. 294–295, pl. XL, fig. 41; pl. XXXIX, figs. 42–45.

Locality.—Bermudas.

Surface of body smooth. Color yellow, with arborescent markings of black.

Head narrower than first thoracic segment, with lateral margins rounded, entire. Frontal margin straight, antero-lateral angles not produced, rounded. Eyes large, with many ocelli, and situated on the lateral margins of the head.

The first pair of antennæ have the basal segment of the peduncle enlarged, the next two segments successively narrower, all about equal in length; the flagellum is multi-articulate, composed of about fourteen joints. The second pair of antennæ have a scale-like appendage outside of the third joint; the fifth and sixth joints are long, the sixth

[a] Lord's Naturalist in British Columbia, II, 1886, p. 282.

a little longer than the fifth; the flagellum is much longer than the body, and is composed of about one hundred joints.

The first thoracic segment is wider than the head; the lateral margins are straight, entire. The second and third segments have the lateral margins excavate, the anterior and posterior angles produced, with the epimeron situated in the excavation. The fourth segment has the anterior angle produced, the epimeron being situated in the excavation of the entire posterior part of the segment. The fifth, sixth, and seventh segments have the lateral margins entire, the epimeron showing at the posterior part of the segment.

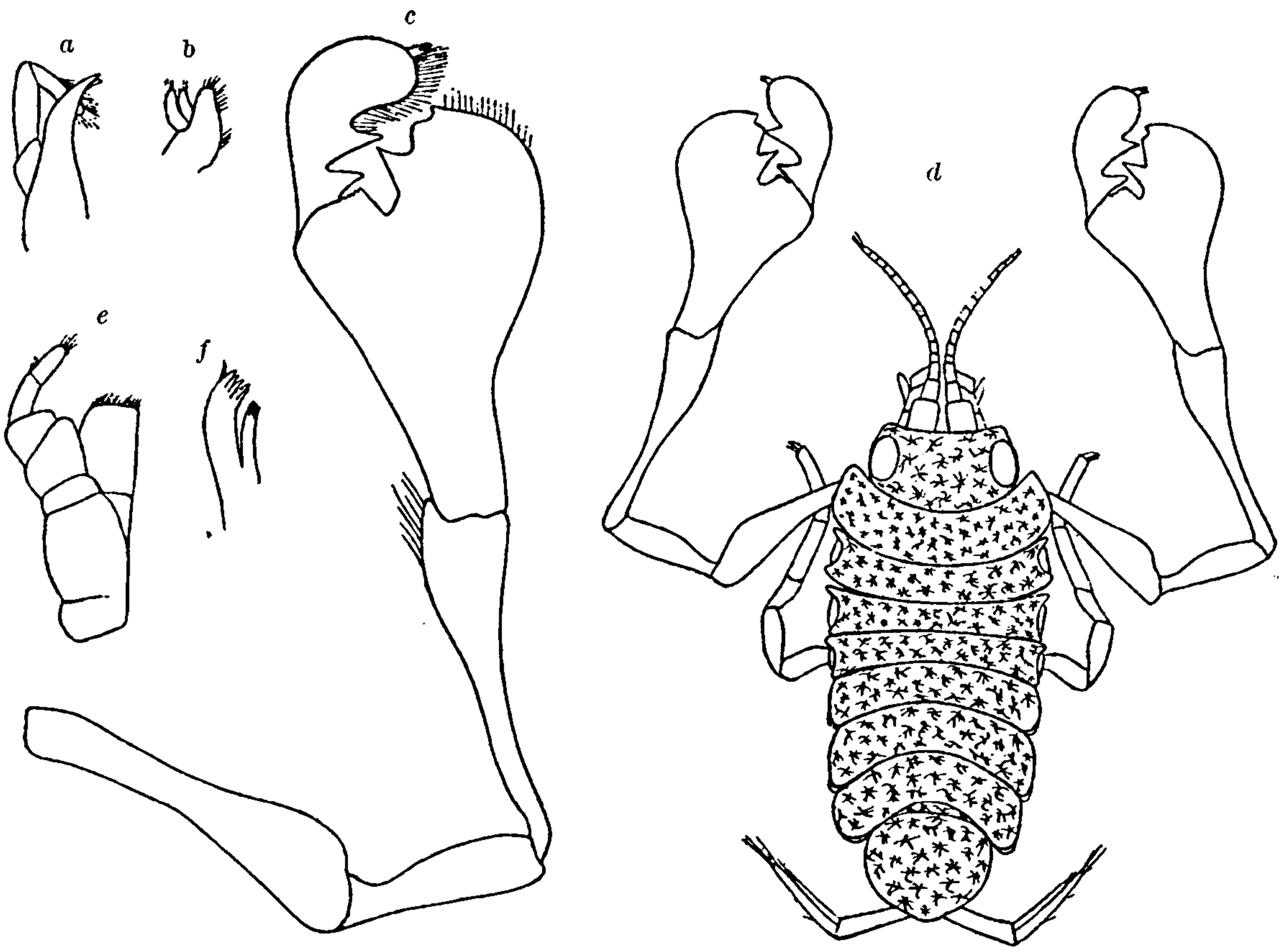


FIG. 505.—CARPIAS BERMUDENSIS. *a*, MANDIBLE. × 58. *b*, SECOND MAXILLA. × 58. *c*, FIRST LEG OF MALE. × 30¾. *d*, DORSAL VIEW OF MALE. × 18⅔. *e*, MAXILLIPED. × 58. *f*, FIRST MAXILLA. × 58.

The terminal segment of the body is about as broad as long, the entire margin smooth, with a small rounded lobe between the basal joints of the uropoda.

The uropoda are very long, much longer than the abdominal segment. The basal joint is about two-thirds the length of the abdominal segment, and is narrower at the base than at the apex. The two branches are of nearly equal length, the outer one being slightly shorter, and they are longer than the basal joint.

The first pair of legs in the male are remarkably long, being one and two-thirds times the length of the body, and are prehensile. The basis is as long as the width of the first thoracic segment, and has the

distal end very much enlarged and inflated. The isehium is not more than half the length of the basis. The merus is a little longer than the basis, and is enlarged at its distal end. The carpus is very much elongated, is longer than the ischium, is greatly enlarged distally, and has its upper distal margin armed with three large triangularly-shaped processes. The propodus has the inner surface armed with two long, sharp, triangular processes, its distal end being widely expanded and rounded on the inner surface. The dactylus is bi-unguiculate.

The other legs are of normal structure, ambulatory in character, and bi-unguiculate. In the female the first pair of legs are similar in structure and size to the other legs.

A number of individuals were collected by Dr. George Brown Goode at the Bermudas.

Type specimens in Peabody Museum, Yale University. Cat. No. 3203.

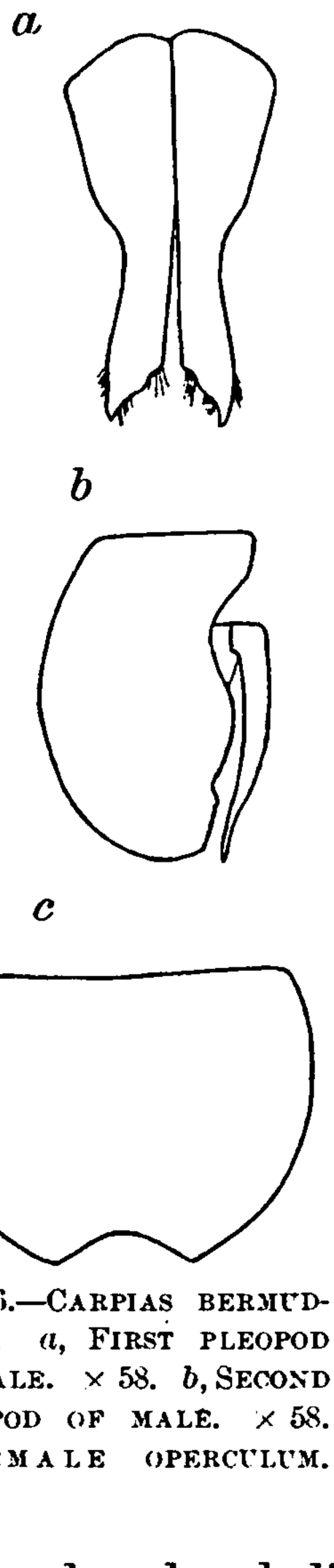


FIG. 506.—CARPIAS BERMUDENSIS. *a*, FIRST PLEOPOD OF MALE. × 58. *b*, SECOND PLEOPOD OF MALE. × 58. *c*, FEMALE OPERCULUM. × 58.

73. Genus JANIROPSIS G. O. Sars.[a]

Head without rostrum.

Lateral parts of thoracic segments but slightly expanded, not laciniate. Eyes well developed. First pair of antennæ comparatively small, with the flagellum composed of only a limited number of articles. Second pair of antennæ of moderate length; antennal scale very small, but distinctly defined.

Maxillipeds with the second and third articles of the palp very much expanded, laminar. Distal extremity of the peduncle and the branch of the first pleopoda in the male fused and produced and dilated at the tip.

Uropoda short, about half as long as abdomen.

Legs bi-unguiculate.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JANIROPSIS.

a. Head with a prominent rounded median lobe on the anterior margin. Terminal segment of body narrowly rounded, and with a small median lobe between the uropoda; no lateral lobes.....*Janiropsis californica* Richardson

a.′ Frontal margin of head nearly straight, without a median lobe. Terminal segment of body posteriorly produced in three lobes, a broadly rounded median lobe and an acute lateral lobe on either side of the median lobe.

Janiropsis kincaidi Richardson

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 102.

JANIROPSIS CALIFORNICA Richardson.

Janiropsis californica RICHARDSON, Harriman Alaska Exp., Crust., X, 1904, pp. 223–224; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 666–667.

Locality.—Sausalito, California.

Body narrow, elongate; surface smooth; color uniformly whitish. Head with a prominent rounded median lobe on the anterior margin; lateral angulations rounded; lateral margins straight and converging toward the base. Eyes black, distinct, but small, and simple in structure. First pair of antennæ are composed of six joints and extend nearly to the middle of the fifth joint of the peduncle of the second pair of antennæ. Second pair of antennæ are about equal to one-third the length of the body; the flagellum is composed of nineteen or twenty joints.

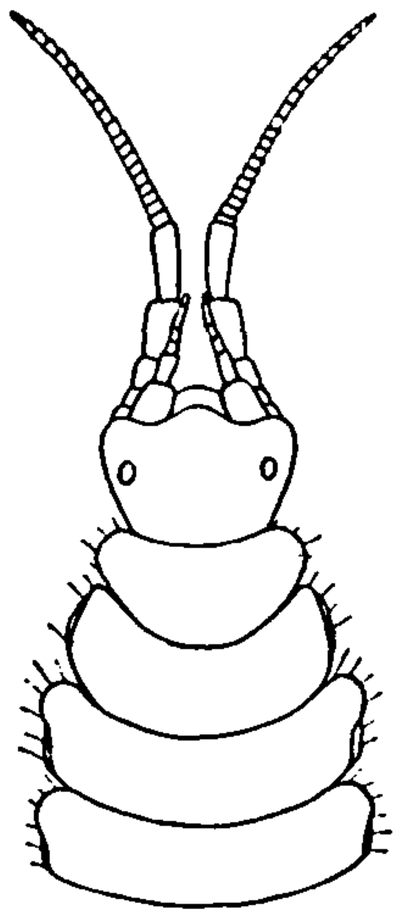


FIG. 507.—JANIROPSIS CALIFORNICA. ANTERIOR PART OF BODY. × 27.

The first thoracic segment is but little wider than the head; the margins are entire, lateral lobes rounded. The second segment has the lateral margin straight, with the epimeron showing slightly along the edge. The third and fourth segments have the antero-lateral lobe rounded, the posterior margin straight, with the epimeron showing as a rounded lobe. The fifth, sixth, and seventh segments have rounded lateral margins, with epimera showing on the posterior part of the segments.

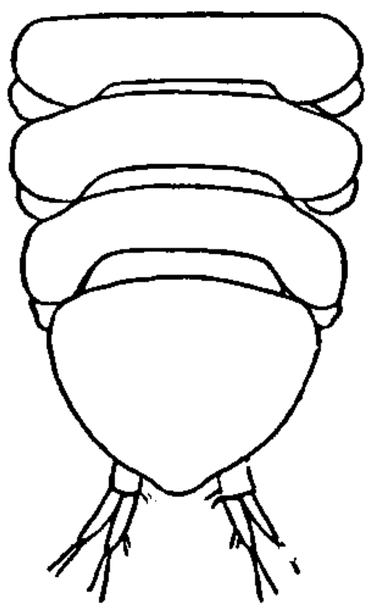


FIG. 508.—JANIROPSIS CALIFORNICA. TERMINAL PART OF BODY. × 27.

Terminal segment rounded posteriorly with smooth margins, and a median lobe between the uropoda.

Uropoda very short, about half as long as the terminal segment. Branches about equal in length and twice as long as the peduncle.

Legs simple, ambulatory, similar in shape and size, and bi-unguiculate.

Only two good specimens, both females, were taken at Sausalito, California, by Doctor Ritter and party. Two imperfect specimens also are from the same locality.

Until now the only other known species of this genus was *Janiropsis breviremus* Sars.[a] As that author has pointed out, this genus differs from *Janira*, to which it is very closely related, in the much shorter uropoda; in the shorter second pair of antennæ; in the structure of the first pair of antennæ, which have the flagellum composed of only a restricted number of articulations; in the structure of the first pair of legs in the male, these being "remarkably developed, prehensile, much longer than any of the other pairs, with the carpal joint fusiformly dilated;" in the female, however, this pair does not differ from the other legs, all being ambulatory in character.

[a] Crustacea of Norway, II, 1899, p. 98.

JANIROPSIS KINCAIDI Richardson.

Janiropsis kincaidi RICHARDSON, Harriman Alaska Exp., Crust., X, 1904, pp. 221–222; Proc. U. S. Nat. Mus., XXVII, 1904, pp. 665–667.

Locality.—Yakutat, Alaska.

Color of body light brown, profusely and densely covered with black markings.

Head wider than long; frontal margin nearly straight, with lateral angles rounded. Eyes large, black, situated some little distance from the lateral margin. First pair of antennæ short; flagellum consisting of only eight joints in the female, of ten in the male. Second pair of antennæ lost in all the specimens. Maxillipeds with palp consisting of five joints, the first three of which are very much dilated.

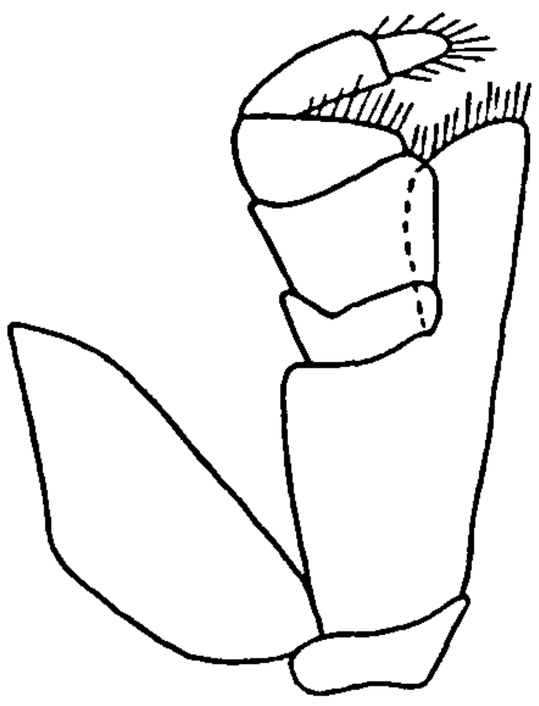


FIG. 509.—JANIROPSIS KINCAIDI. MAXILLIPED. × 77.

The first segment of the thorax has the lateral margins straight; the epimera are rather bilobed, and occupy most of the lateral margin of the segment. The second, third, fourth, and fifth segments have the antero-lateral angles produced into rounded lobes. The epimera of the second and third segments are situated about the middle of the lateral margin; those of the fourth and fifth segments occupy more of a posterior position on the lateral margin. The epimera of the last two segments are situated at the post-lateral angles of the segments.

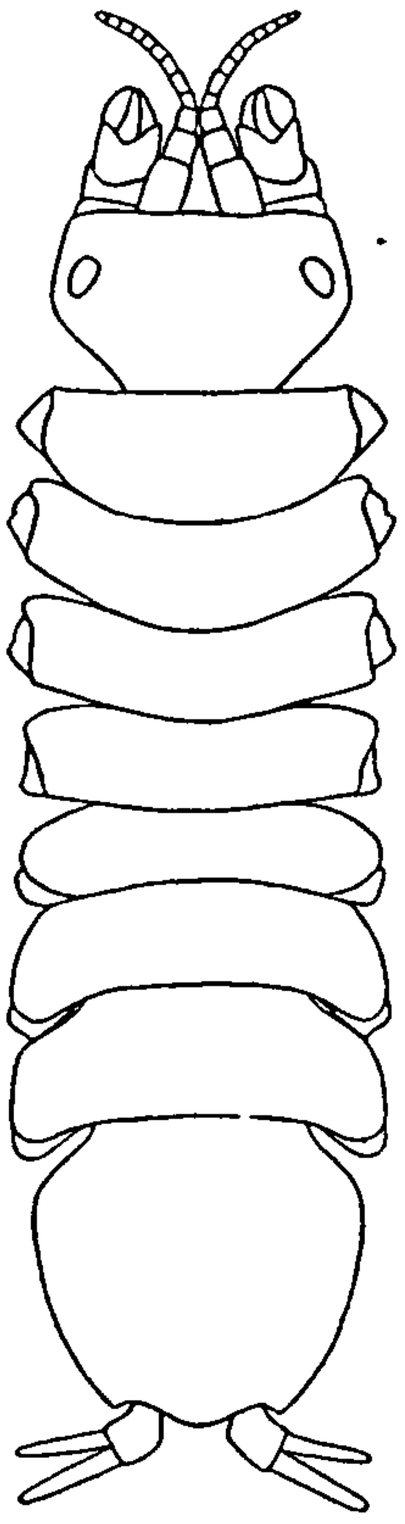


FIG. 510.—JANIROPSIS KINCAIDI. × 20½.

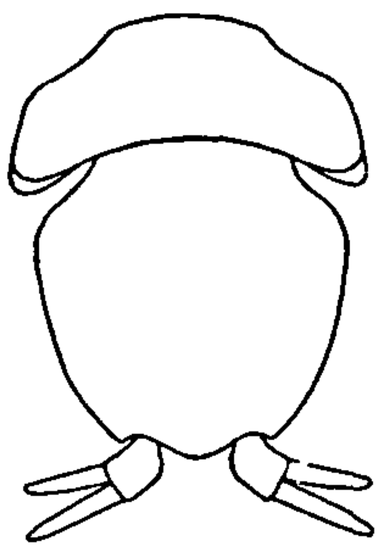


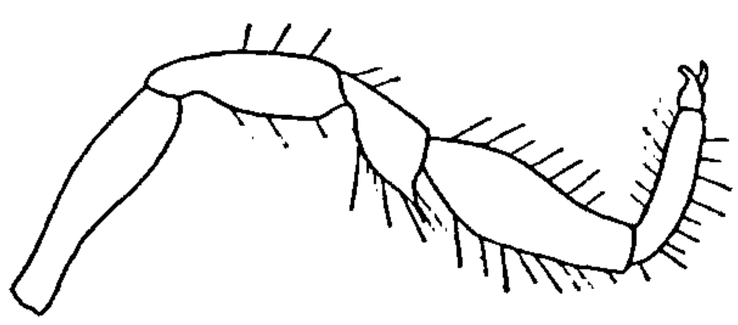
FIG. 511.—JANIROPSIS KINCAIDI. LAST THORACIC SEGMENT, ABDOMEN, AND UROPODA. × 20½.

The abdomen is broad, gradually becoming somewhat narrower toward the posterior extremity. The posterior margin is produced in three lobes, two lateral lobes, one on either side of a broadly rounded median lobe; the two lateral lobes are acute. The uropoda are short, not longer than half the length of the terminal segment of the body; the basal segment is broad, quadrate in shape, and shorter than either branch; the inner branch is somewhat longer than the outer one. The first pleopoda in the male are very similar to the figure given by Sars[a] of the first pleopoda in the type species of the genus, *Janiropsis breviremus*. The distal extremity of the peduncle and the branch are produced and fused.

FIG. 512.—JANIROPSIS KINCAIDI. UROPOD. × 77.

[a] Crustacea of Norway, II, 1899, p. 102.

Nine specimens were obtained by the Harriman Expedition at Yakutat, Alaska. They were collected by Mr. T. Kincaid, after whom the species is named. Five females and four males were collected. The legs of the first pair in the male are not greatly longer than the others; they are longer in the type species of *Janiropsis*.



The very short superior antennæ with few articulations, the greatly dilated joints of the maxillipeds, the form and shape of the peduncle of the first pleopoda in the male, which has the distal extremity fused with the branch and produced and dilated at the tip, and the shortness of the uropoda, which are only half the length of the terminal segment of the body, are characters which undoubtedly place this species with *Janropsis* Sars.

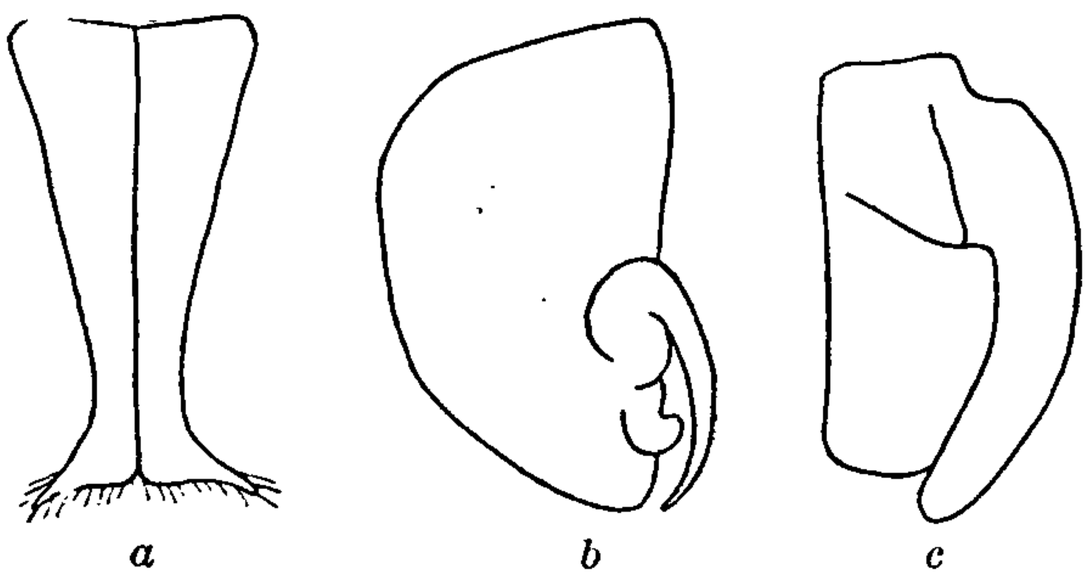


FIG. 513.—JANIROPSIS KINCAIDI. *a*, FIRST PLEOPOD OF MALE. *b*, SECOND PLEOPOD OF MALE. *c*, THIRD PLEOPOD OF MALE. ALL × 41.

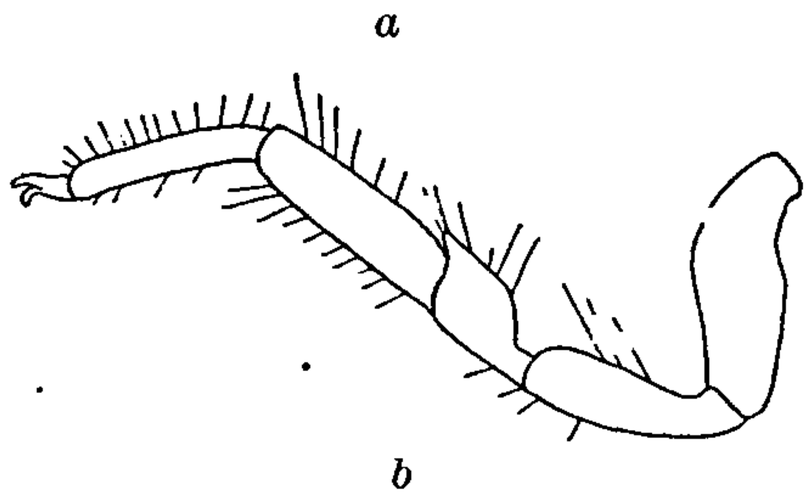


FIG. 514.—JANIROPSIS KINCAIDI. *a*, LEG OF FIRST PAIR. × 27. *b*, LEG OF SECOND PAIR. × 27.

Type.—Cat. No. 28,717, U.S.N.M.

74. Genus IOLELLA, new name.[a]

Head usually with prominent rostral projection.

Lateral parts of head usually produced into very prominent, acute lappets.

Segments of thorax with the lateral parts laciniate and produced.

Terminal segment of body forming posteriorly on each side a triangular expansion.

Other characters as in *Janira*.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS IOLELLA.

a. Segments of thorax with spines or tubercles on the dorsal surface.

b. Rostrum as long as head. Flagellum of first pair of antennæ composed of twelve articles, shorter than the breadth of the head. Flagellum of second pair of antennæ composed of fifty articles. First thoracic segment shorter than the second. Second and third segments equal, and longest, much longer than the seventh. Terminal segment smooth on dorsal side, without spine-like tubercle. Peduncles of uropoda longer than post-lateral angulations of terminal segment ..... *Iolella spinosa* (Harger)

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[a] In a recent letter, Doctor Ortmann informed me that *Tole* was a typographical error for *Iole*, and asked me to correct the mistake in this paper. As *Iole*, however, is preoccupied, having been proposed by Pascoe (Trans. Ent. Soc. London, new series, IV, 1858, p. 254) for a genus of Coleoptera, I suggest the new name, *Iolella*. In Marshall and Scudder, instead of I, J has been used for *Iole*, although I is given in the original reference. (See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 100–101.)

b'. Rostrum much longer than head. Flagellum of first pair of antennæ composed of sixty to seventy articles, nearly as long as the breadth of the head. Flagellum of second pair of antennæ composed of two hundred and eighty articles. First thoracic segment as long as second. Seventh segment longest. Terminal segment of body, with a single spine-like tubercle on its dorsal side. Peduncle of uropoda shorter than post-lateral angulations of terminal segment of body.....*Iolella speciosa* (Bovallius)

a'. Segments of thorax smooth on the dorsal surface.

b. Head with prominent rostrum.

c. Lateral margins of head produced into two angulations. Terminal segment of body with central and post-lateral lobes acute, triangular.

Iolella triangulata (Richardson)

c'. Lateral margins of head produced in one angulation. Terminal segment of body with central and post-lateral lobes rounded.

d. Lateral angulations of head long, about as long as rostrum. Median lobe of pleon about as wide and long as post-lateral lobes.

Iolella libbeyi (Ortmann)

d'. Lateral angulations of head short, much shorter than rostrum. Median lobe of pleon much narrower and shorter than post-lateral lobes.

Iolella alascensis Benedict, new species

b'. Head without rostrum, in place of which is small median point.

c. Antero-lateral angles of head acutely produced. Sides of head not produced. Epimera of second, third, and fourth segments of thorax consisting each of a single lobe. Terminal segment of body with post-lateral angles rounded.

Iolella erostrata (Richardson)

c'. Antero-lateral angles of head not produced. Sides of head produced. Epimera of second, third, and fourth segments of thorax bifurcate. Terminal segment of body with post-lateral angles acute.

d. Sides of head produced in a bifurcate process. Terminal segment of body with one large median lobe between the post-lateral angles.

Iolella holmesi (Richardson)

d'. Sides of head produced in an anterior lobe bearing three spines and a small, inconspicuous lobe armed with three feeble spines. Terminal segment of body with three small lobes between the post-lateral angles.

Iolella sarsi, new species

IOLELLA SPINOSA (Harger).

Janira spinosa Harger, Proc. U. S. Nat. Mus., II, 1879, p. 158; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 323–324.

Ianthe spinosa Bovallius, Bihang till Kgl. Sv. Vet. Akad. Handl., XI, 1886, No. 15, p. 34.

Janira spinosa Hansen (part), Vid. Medd. naturh. Foren. i Kjøbh., 1887–88, p. 191.

Ianthe spinosa Richardson, Amer. Naturalist, XXXIV, 1900, p. 299; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.

Localities.—Banquereau; latitude 65° 35′ north, longitude 54° 50′ west; latitude 66° 32′ north, longitude 55° 34′ west; latitude 67° 59′ north, longitude 56° 33′ west.

Depth.—80 to 100 fathoms.

"This species is well marked among our known Isopoda by the double row of spines along the back and the acute laciniations or angulations on the lateral margins of the thoracic segments.

"The body is robust, the length but little exceeding twice the breadth. The head is broad and produced in the median line into a prominent, acute spine, or rostrum, about as long as the head. The antero-lateral angles are also produced and very acute, but do not extend as far as the rostrum. The eyes are rounded, semi-oval, with the long axes converging toward a point near the base of the rostrum. The basal segment of the antennulæ is less than one-third the length of the rostrum. The second segment is about as long as the first, but of only about half its diameter. The flagellum equals, or slightly surpasses, the third antennal segment, and consists of about twelve segments. The scale or spine on the second segment of the antennæ is slender and considerably surpasses the third segment. The external lamella of the maxillipeds has the outer angle prominent, though not acute.

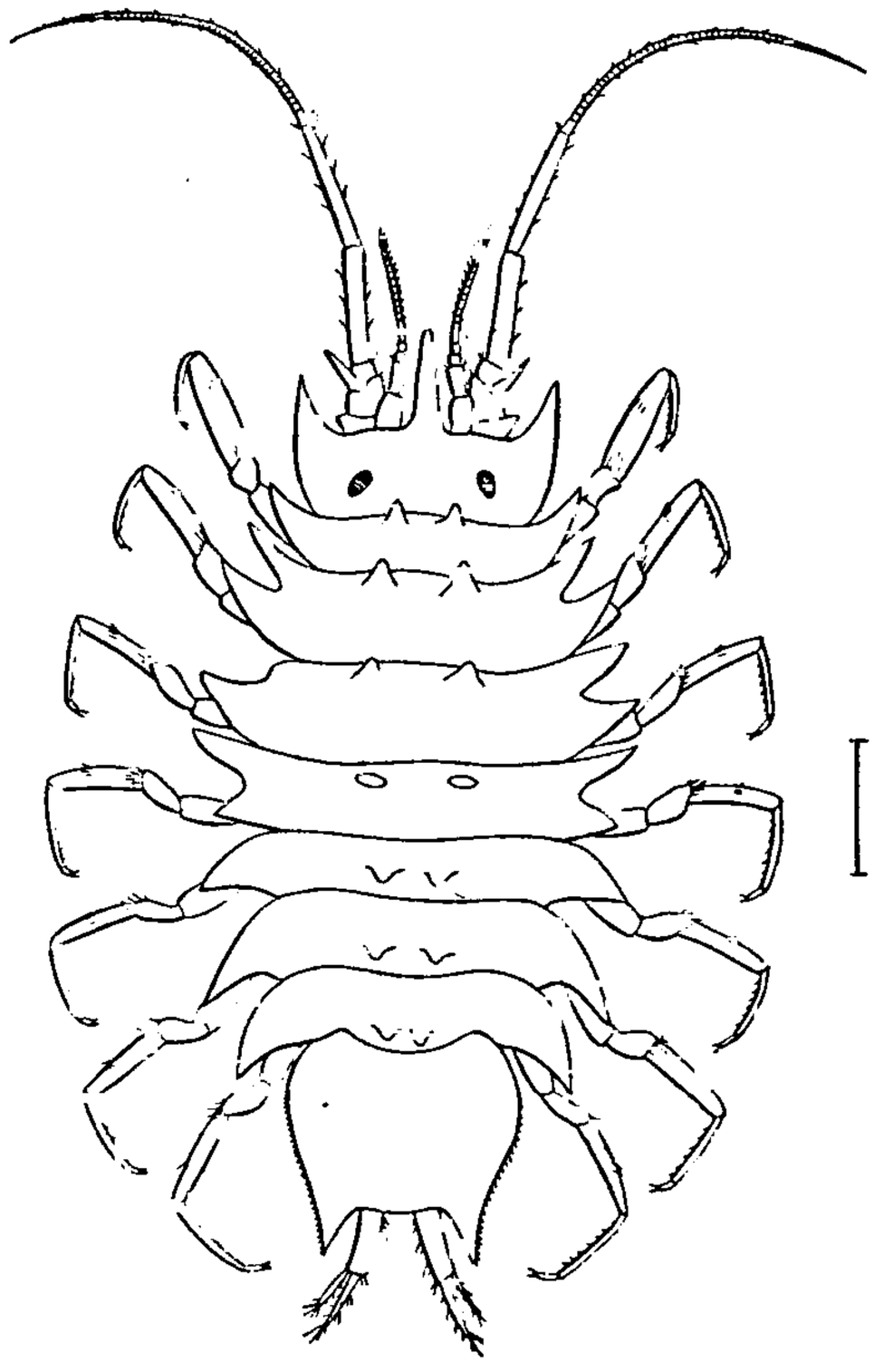

FIG. 515.—IOLELLA SPINOSA (AFTER HARGER). × 6.

"The thoracic segments are produced laterally into one or two acute angulations, giving a sharply serrated or dentated outline to the thoracic region. The first segment is shorter than the second; the second, third, and fourth are about equal in length; the fifth is about the length of the first; the sixth and seventh each a little longer. The first segment is acutely produced at the sides, around the sides of the head, and bears, near the middle of the anterior margin, two short spines, situated about half as far apart as are the eyes, and directed upward and somewhat forward. The second segment has both lateral angles produced into triangular, acute processes, of which the anterior is more slender than the posterior and directed more strongly forward. The dorsal spines on this segment are a little farther apart and larger than in the first segment. In the third segment the lateral angulations are more nearly equal than in the second segment and directed less strongly forward. In the specimen figured the third segment bears, on the left side, a single broad angulation, apparently representing the posterior, while the anterior is only indicated by a slight irregularity in the outline.

"Malformations of this kind appear to be common. The dorsal spines on the third segment are much as in the second. On the fourth segment the anterior angulation is longer than the posterior, and both are directed nearly outward. The dorsal spines on the fourth segment

are slightly smaller and nearer together than on the third; but, as in all the preceding segments, they are near the anterior border of the segment. The last three segments are acutely produced at the sides into a single angulation, which is directed more and more backward to the last segment. The dorsal spines on the fifth segment are situated nearer together than on the anterior segments and rather behind the middle of the segment. They are also smaller than on the preceding segments. On the last two segments they are near the posterior border of the segment, and become somewhat smaller and nearer together on the last segment. The legs are armed with but few and rather weak spines.

"The pleon is broadest near the base and tapers posteriorly, where the angles are acutely produced. Between these angles the margin is rounded and arched over the bases of the uropods, which are about as long as the pleon and less spiny than in *I. alta*. The lateral margin of the pleon is armed with very minute acute spinules, and under a higher power the margins of the thoracic segments and of the head are seen to be similarly armed, especially where most exposed.

"Length 8 mm., breadth 3.8 mm.; color in alcohol white."—OSCAR HARGER.[a]

IOLELLA SPECIOSA[b] (Bovallius).

Ianthe speciosa BOVALLIUS, Bihang till K. Sv. Vet. Akad. Handl., VI, 1881, No. 4, pp. 5–14, pls. I–III; XI, No. 15, 1886, p. 35.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 299; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.

Locality.—Baffin Bay.

"The rostrum is much longer than the head (7:5); the lateral angulations of the head are directed obliquely forward; they are longer than the head. The eyes are oval. The long diameter of the eyes equals a sixth of the length of the head. The flagellum of the first pair of antennæ is 60–70 articulated. The first pair of antennæ are nearly as long as the breadth of the head (18:19). The flagellum of the second pair of antennæ consists of almost 280 articuli. The first segment of the pereion is as long as the second; the seventh segment is the longest. All carry each two spine-like tubercles on the dorsal side. The lateral margins of the first segment carry one angulation on each side; the second, third, and fourth two, more or less equal; the fifth, sixth, and seventh, one large and one very minute each. The pleon carries on its dorsal-side a single spine-like tubercle, and is produced backward into two flattened, sharp-pointed angulations; between these the uropoda are attached. The peduncles of the uropoda are

[a] Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 323–324.

[b] This species is considered by Hansen and Ortmann to be a synonym of the preceding species. Since my manuscript went to press, the types of *I. spinosa* have been sent from Yale University, and I find it distinct from *I. speciosa*.

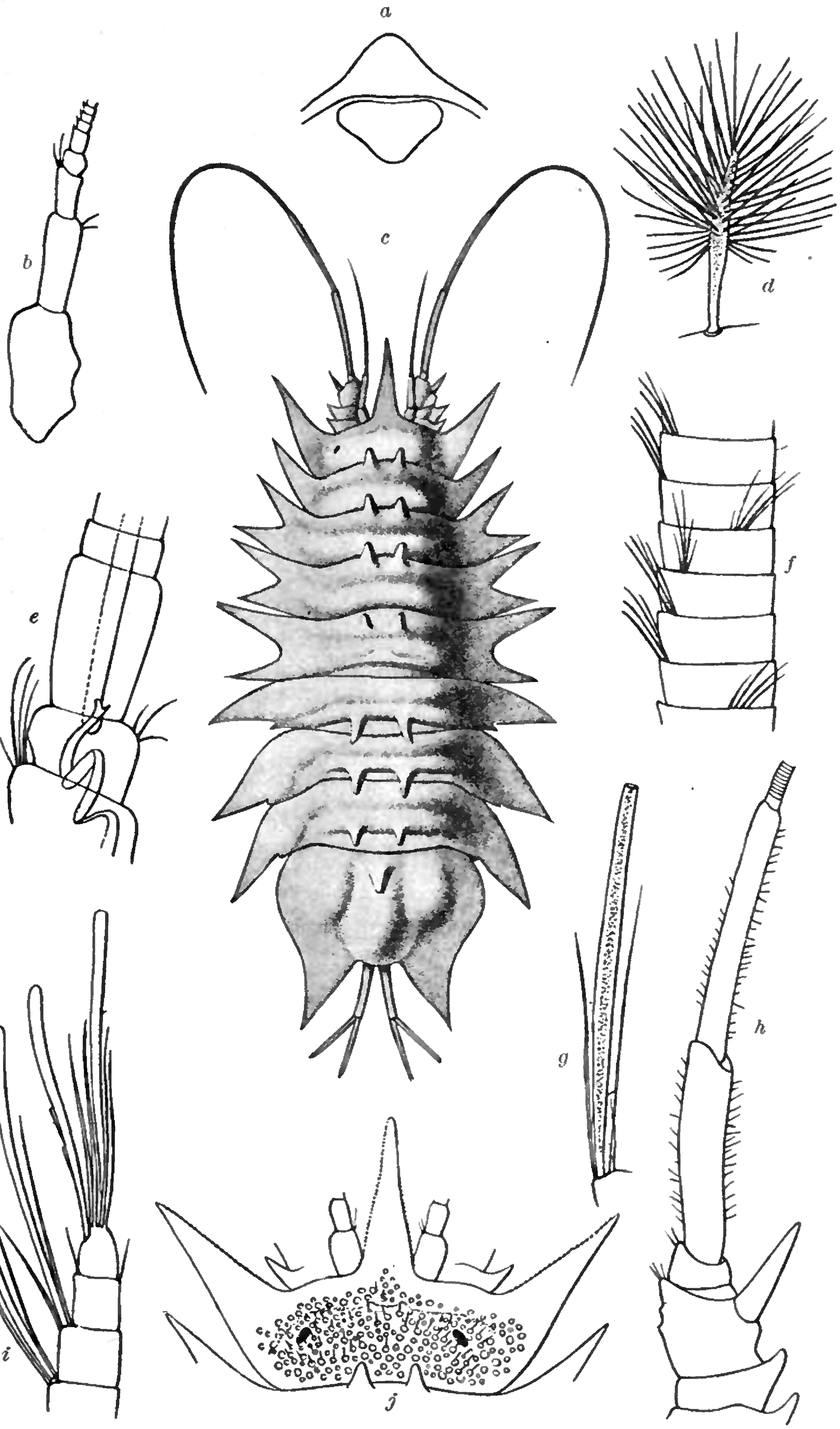

FIG. 516.—IOLELLA SPECIOSA (AFTER BOVALLIUS). *a*, LABRUM. *b*, INNER ANTENNA. × 20. *c*, DORSAL VIEW OF ANIMAL. × 4. *d*, AUDITORY BRISTLE FROM THE THIRD JOINT OF THE PEDUNCLE OF THE INNER ANTENNA. *e*, FIRST JOINTS OF THE FLAGELLUM OF THE INNER ANTENNA. × 160. *f*, SOME ARTICLES OF THE FLAGELLUM OF THE OUTER ANTENNA. × 60. *g*, AN OLFACTORY GLAND OF SAME. × 260. *h*, PEDUNCLE OF OUTER ANTENNA. × 15. *i*, THE LAST JOINTS OF SAME. × 200. *j*, HEAD. × 10.

shorter than the angulations. The outer ramus is almost as long as the inner (37: 39).

"Color, yellowish white.

"Length, 21.5 mm."—BOVALLIUS.[a]

IOLELLA TRIANGULATA (Richardson).

Ianthe triangulata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 857–858; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 323–324; American Naturalist, XXXIV, 1900, p. 299.

Locality.—Monterey Bay, California.

Surface of body smooth; color yellow, marked with black dots.

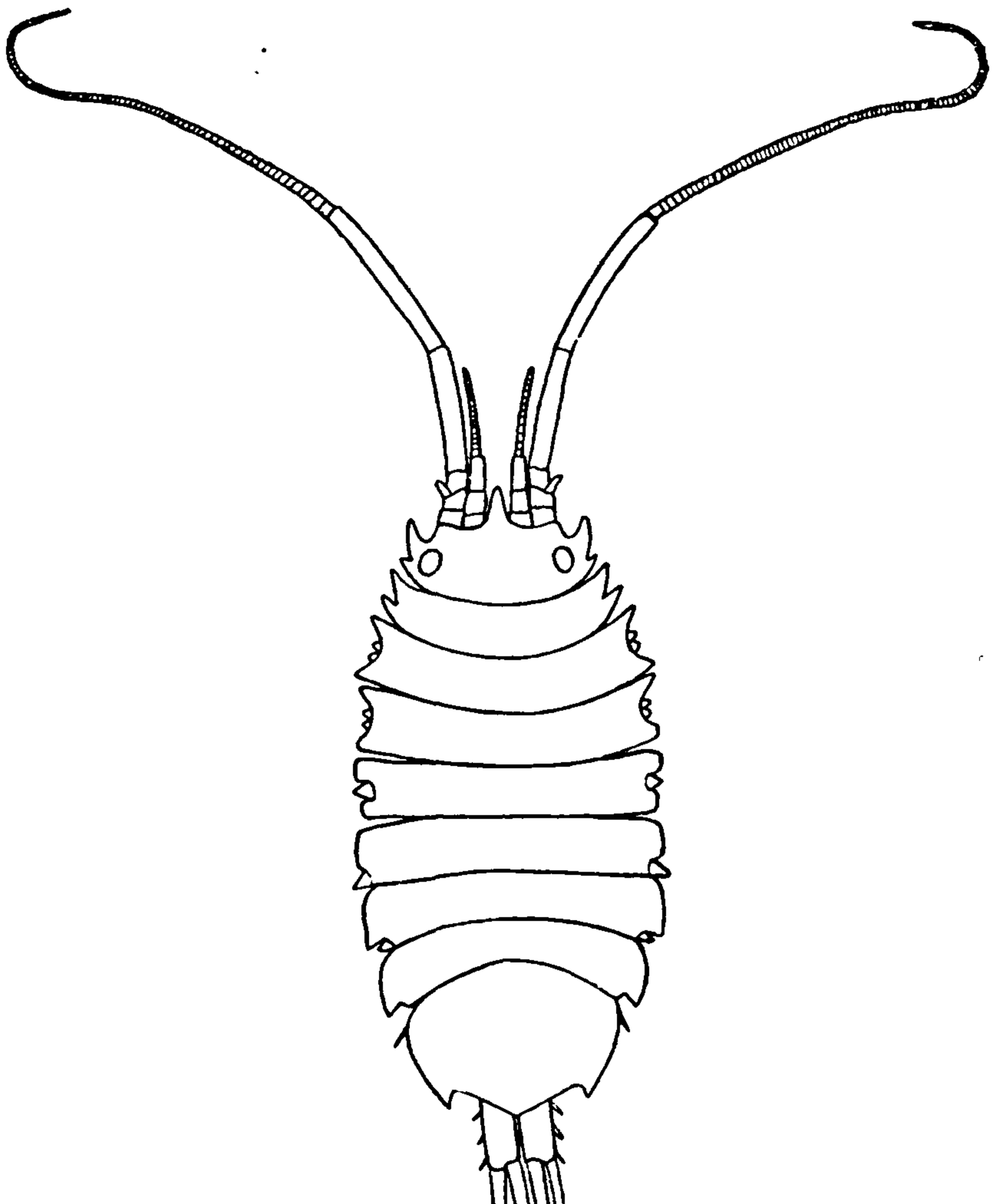

FIG. 517.—IOLELLA TRIANGULATA. × 13¾.

Head with rostrum in front equal to one-half the length of the head. Anterior margin lobate between the rostrum and the lateral angulations. The side of the head is produced in two angulations, the upper one extending in an oblique direction and not reaching beyond the anterior margin of the head. The first pair of antennæ are not as long

[a] Bihang till K. Sv. Vet. Akad. Handl., XI, No. 15, 1886, p. 35.

as the width of the head. The second pair of antennæ are longer than the body.

The lateral margins of the first segment are produced on either side into two angulations; those of the second and third into two, with the epimera produced into two-lobed angulations; those of the fourth into two lobes, the small epimeral lobe or angulation between; and those of the fifth, sixth, and seventh into one large upper lobe and one small lower lobe.

The terminal segment is produced backward at the sides into two sharply pointed angulations, with a broad triangulate central lobe between. The uropoda are longer than the terminal segment, the outer branch being somewhat shorter than the inner one, and both fringed with hairs.

The first pair of legs are prehensile; the remaining pairs simple.

Two specimens were collected by Mr. Heath at Monterey Bay, California.

Type.—Cat. No. 22582, U.S.N.M.

IOLELLA LIBBEYI (Ortmann).

Jolanthe libbeyi ORTMANN, Princeton University Bulletin, XI, No. 3, 1900, pp. 39–40.

Tole libbeyi ORTMANN, Proc. Acad. Nat. Sci. Phila., 1901, p. 157.

Locality.—Cape Alexander, North Greenland.

"Length of body 8 mm. Rostrum about as long as the head, directed obliquely upward. Head with one lateral angulation, directed forward. Eyes elliptical. Segments of pereion dorsally smooth, without any spines or tubercles. First segment laterally with two angulations, both of them directed obliquely forward. Second and third segments with four short angulations, the anterior and posterior subequal, the third the smallest. Fourth segment with two angulations, the anterior directed forward, the posterior smaller and directed a little backward. Fifth, sixth, and seventh segments with a large anterior and very small posterior angulation. All the angulations of these segments are comparatively short. Pleon with two bluntly triangular angulations on either side of a bluntly triangular central portion. Uropods about as long as pleon. styliform, outer branch a little shorter than inner. Flagellum of first antenna fifteen articulate; flagellum of second antenna with more than one hundred and fifty annulations.

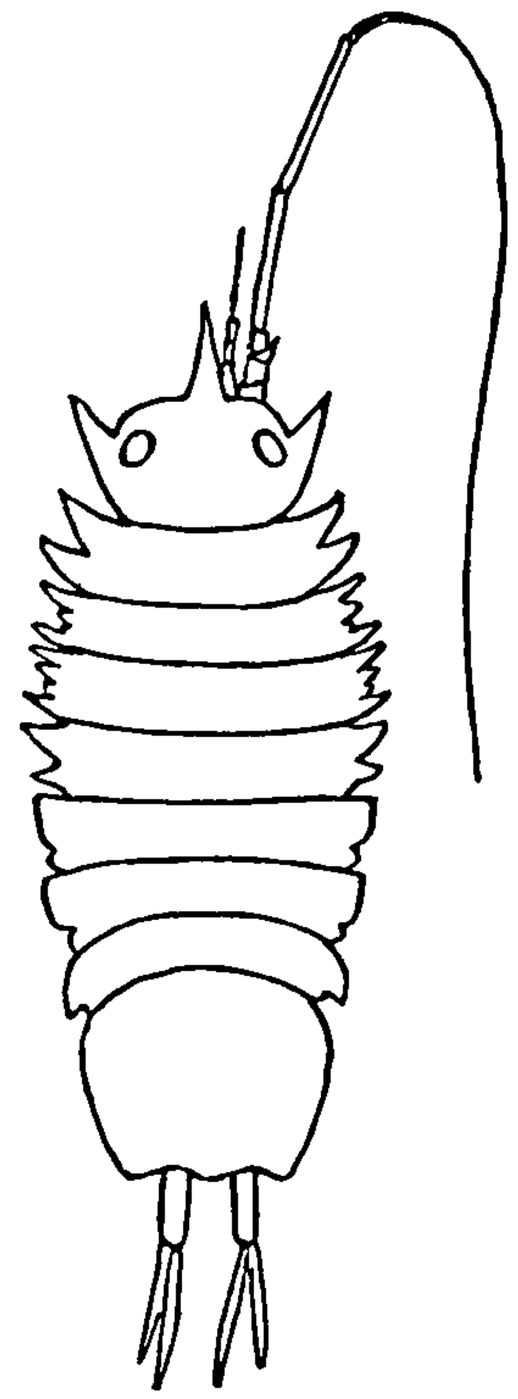

FIG. 518.—IOLELLA LIBBEYI (AFTER ORTMANN). × 6.

"In the wanting tubercles of the dorsal surface and the form of the lateral angulations this species is related to the two species of the

genus known from the North Pacific, and the form of the pleon recalls that of *I. erostrata* Richardson (Aleutian Islands). But it differs (1) in the presence of a long rostrum, (2) in the stronger development of the lateral angulations of the head, (3) in the slightly different angulations of the second and third segments of the pereion."—ORTMANN.[a]

IOLELLA ALASCENSIS Benedict, new species.[b]

The head is much broader than long; the rostral projection is nearly as long as the head itself. The rostrum is broad at the base, but narrow and tapering throughout the greater part of its length; the apex is rounded. The sides of the head are laterally expanded and produced forward beyond the line of the front; the lateral projections are accentuated by a deep concavity occupying the outer half of the front. The antennæ are both broken and lost from the distal end of the third article of the peduncles.

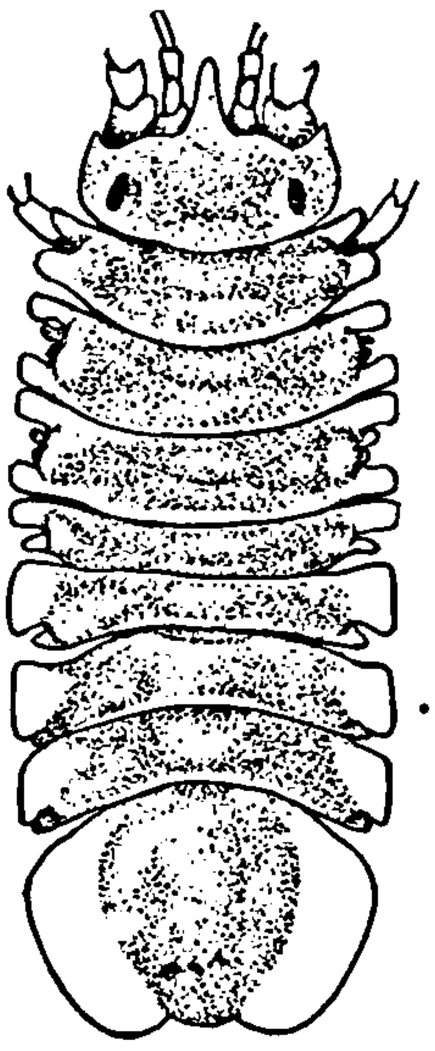

FIG. 519[c].—IOLELLA ALASCENSIS.

The first segment of the thorax is strongly produced at its posterior half; the anterior half is diagonal and emarginate. The epimeron is large and produced and placed at the anterior part of the segment. The second and third segments are strongly produced at both angles with a nearly straight margin between the projections. The epimera are bifurcate and placed between the anterior and posterior projections. The fourth, fifth, sixth, and seventh are produced at the anterior angles only, the produced portions becoming successively wider. The epimera are placed at the posterior angles.

The pleon consists of a single segment made up of three longitudinal lobes; the middle lobe is much narrower and shorter than the outer ones; all are rounded at the distal extremity.

The anterior feet are as in the genus, but the propodus is wide, with the basal half of the prehensile edge finely serrate.

From the line of the eyes to the end of the pleon the specimen is sparsely ornamented with very small rounded black spots.

Described from a single specimen taken by Captain Healy, of the U. S. revenue steamer *Corwin*, latitude 71.02 north, longitude 157.46 west, in 19 fathoms.

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[a] Proc. Acad. Nat. Sci. Phila., LIII, Pt. 1, 1901, pp. 157–158.

[b] The following description is from Doctor Benedict's manuscript, which he has very kindly permitted me to publish at this time.

[c] Fig. 519 is through the courtesy of Dr. J. E. Benedict.

IOLELLA EROSTRATA (Richardson).

Ianthe erostrata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 858–859; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 325; American Naturalist, XXXIV, 1900, p. 299.

Locality.—Chichagof Harbor, Attu (the Aleutian Islands), Alaska.

Head two and a half times broader than long, with prominent antero-lateral angulations. Lateral margins produced, entire. In place of the rostrum, which marks many of the known species of this genus, there is a small median point. The eyes are dorsally situated a short distance from the lateral edges. The first pair of antennæ are short, not equal to the width of the head. The second pair are broken in the only specimen.

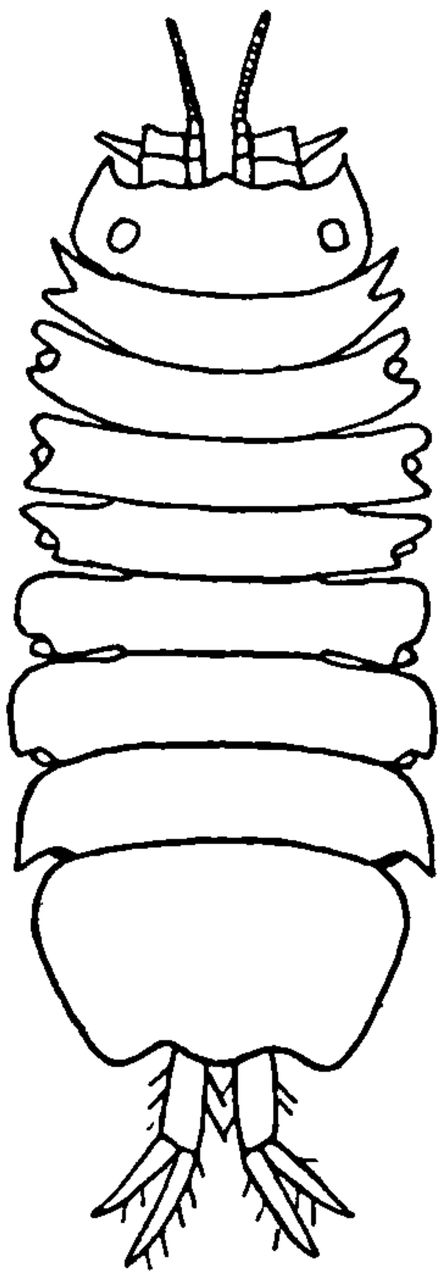


FIG. 520.—IOLELLA EROSTRATA. × 13⅓.

The first thoracic segment is produced laterally in two angulations. The second, third, and fourth segments are each produced in two angulations, with a small epimeral lobe in between. The fifth, sixth, and seventh segments have each a large anterior lobe and a small posterior epimeral lobe.

The terminal segment has two bluntly triangular angulations, one on either side of a bluntly triangular central portion. The uropoda are about as long as the caudal segment, are styliform, with branches nearly equal. The distal extremity of the peduncle and the branch of the first pleopoda of the male are fused and produced at the tip, as in *Janiropsis* Sars. The first pair of legs are prehensile. The others are simple, bi-unguiculate. One specimen, a male, was collected at Chichagof Harbor, Attu (Aleutian Islands), by Dr. W. H. Dall.

Type.—Cat. No. 22610, U.S.N.M.

IOLELLA HOLMESI (Richardson).

Tole holmesi RICHARDSON, Bull. U. S. Fish Comm., XXIV, 1905, pp. 216–217.

Localities.—Stephens Passage, southeastern Alaska; vicinity of Naha Bay, Behm Canal, southeastern Alaska.

Depth.—41 to 188 fathoms.

Body yellow in color, spotted with numerous brown dots.

Head broader than long, with frontal margin almost straight, very slightly produced in the middle. On either side, a little anterior to the middle of the lateral margin, is a process terminating in two spines. The eyes are large, composite, and placed near the lateral margin, about halfway between the posterior and anterior margins of the head. The first pair of antennæ extend to the end of the fourth joint of the peduncle of the second pair. The basal joint of the peduncle

is large, dilated; the two following joints are slender; the flagellum consists of twenty joints. The second pair of antennæ are longer than the body. The first four joints are short, with an articulated exopod on the third joint; the fifth and sixth joints are very long, the fifth being slightly longer than the sixth; the flagellum consists of numerous joints.

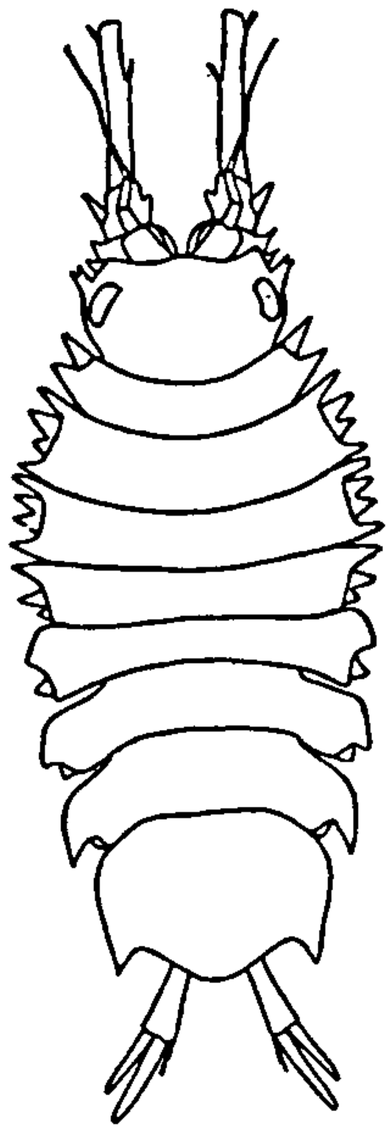


FIG. 521.—IOLELLA HOLMESI. × 7.

The posterior portion of the lateral margin of the first segment of the thorax is produced on either side in a triangular process; the epimeron is situated at the anterior portion of the lateral margin and is produced in a triangular process about as long as the posterior one. The anterior as well as the posterior lateral angles of the second and third segments are each produced in a long process, with the bifurcate epimeron situated between. The anterior portion only of the lateral margin of the fourth segment is produced with the bifurcate epimeron situated at the posterior portion of the segment. The fifth, sixth, and seventh segments have the anterior portion of the lateral margin produced in a process which extends outward and downward and in the last segment is triangularly produced at the posterior extremity, the epimeron in each segment occupying the posterior portion of the segment.

The abdomen is composed of a single segment, the posterior margin of which has a widely rounded median expansion with an acutely pointed lateral expansion on either side. The uropoda are about equal to the abdomen in length; the outer branch is slightly shorter than the inner one; the basal joint is equal in length to the outer branch.

The legs are all furnished with bi-unguiculate dactyli. The first pair are prehensile, the carpus being very large and armed with spines along the inner margin; the propodus is serrulate along the inner margin at the proximal end.

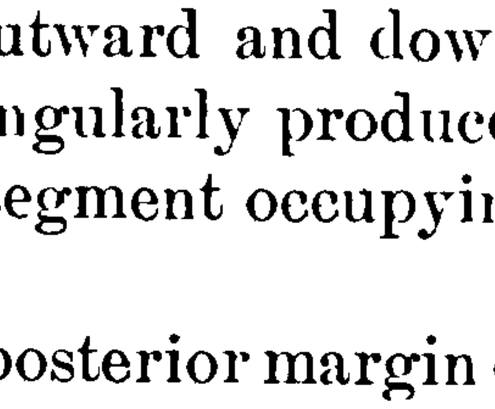


FIG. 522.—IOLELLA HOLMESI. FIRST LEG OF FEMALE. × 20¼.

Two specimens, both females, were taken by the U. S. Bureau of Fisheries steamer *Albatross* at station 4253, Stephens Passage, southeastern Alaska, and station 4228, vicinity of Naha Bay, Behm Canal, southeastern Alaska. Depth, 41 to 188 fathoms. Type in the U. S. National Museum, Cat. No. 29249.

This species is named for Dr. Samuel J. Holmes, who has done much work on the Crustacea of the Pacific coast.

IOLELLA SARSI, new species.

Body twice as wide as long, 5 mm.: 10½ mm.; surface densely covered with short, stiff hairs.

Head wider than long, 2 mm.: 3 mm. Front without rostrum; anterior margin nearly straight, with only a small, median obtuse point. Lateral margins produced in an anterior lobe bearing three feeble spines and a smaller, almost inconspicuous lobe also armed with three feeble spines. Antero-lateral angles rounded. Eyes moderately large, round, composite, situated close to the lateral margins. The first pair of antennæ have the basal article of the peduncle large and dilated; the second article is half as long and about half as wide; the third article is a little longer than the second. The flagellum is composed of numerous short articles. The second pair of antennæ are broken at the fourth article of the peduncle, and the distal parts are lost. There is a distinct scale outside the third article. The articles of the peduncle, as well as the antennal scale, are beset with spines.

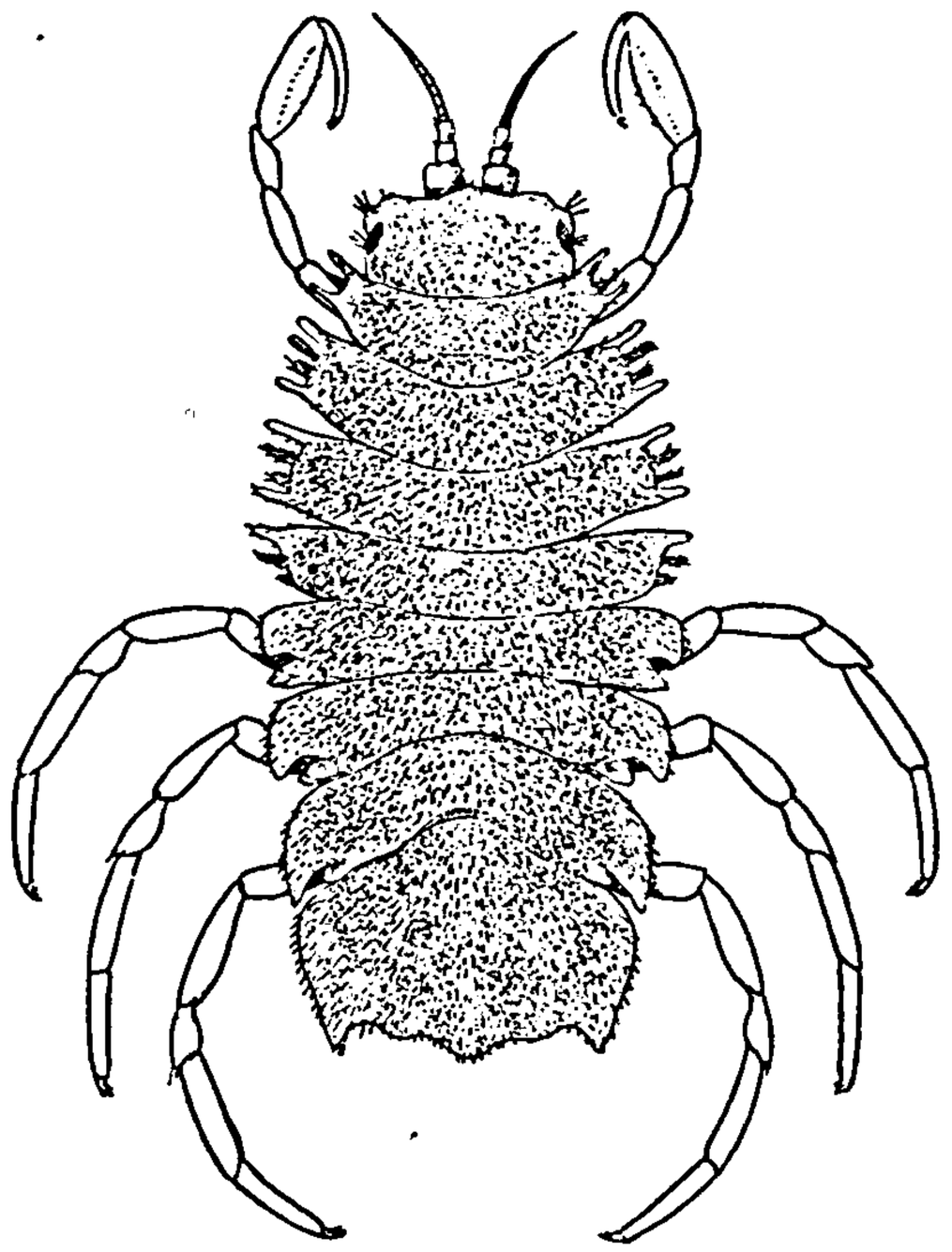


FIG. 523.—IOLELLA SARSI.

The first segment of the thorax has both the anterior and the posterior angles produced in long, narrow processes, with the epimeron, consisting of a single, narrow process, situated between the two. The second and third segments of the thorax have the anterior and the posterior margins produced into long, narrow processes, with the epimeron, consisting of two long processes, situated between the two. The fourth segment has the anterior portion only produced in a long, narrow process, with the epimeron produced in two processes, and situated in the posterior emargination of the segment. The fifth, sixth, and seventh segments have the anterior part produced and gradually increasing in width, with the epimeron situated in the posterior emargination of the segment. The lateral processes of the segments, as well as the epimera, are beset with spines.

The abdomen consists of a large terminal segment, with two short segments anterior to it, evident only in the middle part, being covered at the sides by the seventh thoracic segment.

The terminal segment is broader than long, 3 mm.: 4½ mm. The

post-lateral angles are acutely produced but short. Between the post-lateral angles the posterior margin is trilobate, the median lobe being the largest, and not longer than the post-lateral angles. The margins of the segment are beset with spines.

The uropoda are lost in the only specimen.

The distal extremity of the peduncle and the branch of the first pleopoda of the male are fused and have the tip dilated and produced as in *Janiropsis* Sars.

The type, a male, and the only specimen, was collected by Dr. W. H. Dall at Constantine Bay, Amchitka Islands, Alaska, in 1873. Depth 8 fathoms.

The type is in the U. S. National Museum, Cat. No. 32076.

This species is very closely related to *Iolella holmesi* (Richardson), but differs in the shape of the terminal abdominal segment, in having the anterior angles of the first thoracic segment produced with the epimeron situated between the antero- and post-lateral processes, and in having the lateral margins of the head but little produced and armed with numerous spines.

This species is named in honor of Prof. G. O. Sars, the distinguished carcinologist, for whose courteous and generous permission to reproduce his plates in this work, I am most grateful.

75. Genus JANIRA Leach.[a]

Body oblong, depressed. Lateral parts of head not produced or but slightly produced. Eyes distinct, sub-dorsal. Front of head obtuse or produced in a comparitively small rostrum.

First pair of antennæ well developed, with the flagellum multi-articulate. Second antennæ very much elongated, with scale outside of third article of peduncle. Maxillipeds with the second and third articles of the palp not expanded.

Segments of thorax with lateral parts not produced into lappets.

The distal extremity of the peduncle and the branch of the first pleopoda of the male not dilated at the tip.

Uropoda largely developed.

First pair of legs prehensile in both sexes; dactylus in all the legs tri-unguiculate.

Terminal segment of the body rounded, not expanded laterally.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JANIRA.

a. Anterior margin of the head straight.

b. First pair of legs alike in both sexes, with carpus large, subfusiform, and edged inside with spines. Distal part of lateral margins of terminal segment of body coarsely serrated. Epimera bilobed.....*Janira maculosa* Leach

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 98–99.

b'. First pair of legs unlike in the two sexes, though prehensile. In male the carpus of the first pair of legs is large and produced on the inside at its outer distal end in a long acute process, between which and the articulation of the propodus are two long acute processes about half as long as the outer process. Distal part of lateral margins of terminal segment of body not serrated. Epimera single lobed.....*Janira minuta* Richardson

a'. Anterior margin of the head not straight.

b. Front of head trilobate, the central lobe subacute, rather longer than others, but not rostrate.....*Janira occidentalis* Walker

b'. Front of head produced in the middle in a short, sharp rostrum, and the antero-lateral angles of the head also produced.

c. Antero-lateral angles of head sharp. Lateral margins of first four thoracic segments obtusely incised, each showing two broad angulations. Uropoda of female shorter than half the terminal segment; those of male as long as terminal segment of body.....*Janira tricornis* (Krøyer)

c'. Antero-lateral angles of the head very slightly produced and rounded. Margins of the first thoracic segment rounded, not emarginate. Uropoda alike in the two sexes, and longer than the terminal segment of the body. Abdomen serrate on posterior half of lateral margin..*Janira alta* (Stimpson)

JANIRA MACULOSA Leach.

Janira maculosa Leach, Edinburgh Encyclop., VII, 1813–14, p. 434.

Oniscoda maculosa Latreille, Cuvier's Règne Anim., 2d ed., IV, 1829, p. 141.—Milne Edwards, Hist. Nat. Crust., III, 1840, p. 151.

Henopomus muticus Krøyer, Voy. en Scand., Crust., 1849, pl. xxx, figs. 1*a–n;* Nat. Tidsskr. (2), II, 1846–49, p. 366.—Bate and Westwood, British Sessile-eyed Crust., II, 1868, pp. 338–340.—Hansen, Vid. Medd. Naturh. Foren. i Kjøbh., 1887–88, p. 190.—Sars, Crust. Norway, II, 1899, pp. 99–100, pl. xl.—Richardson, American Naturalist, XXXIV, 1900, p. 299; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.

Localities.—Latitude 66° 32′ north, longitude 55° 34′ west; latitude 72° 32′ north, longitude, 58° 51′ west; also, British Isles; Kattegat; Dutch coast; coast of France; coast of Norway.

Depth.—30 to 116 fathoms.

"Body oblong oval in form, about three times as long as it is broad, and slightly narrowed both in front and behind. Cephalon with the lateral expansions evenly rounded, frontal edge straight, without a trace of rostrum. Anterior segments of mesosome with the lateral parts slightly produced at both corners, but not covering the small coxal plates, which are bi-lobate. Caudal segment sub-circular, distal part of lateral edges coarsely serrated. Eyes well developed, rounded oval, with dark pigment. Superior antennæ reaching about to the end of the penultimate peduncular joint of the inferior ones, flagellum more than twice as long as the peduncle, and composed of about thirty articulations. Inferior antennæ considerably exceeding the length of the body, the last two peduncular joints rather elongated, subequal, flagellum about twice the length of the peduncle. Epignath of the maxillipeds with the outer edge angular in the middle. First pair of legs with the carpus about the length of the two preceding

joints combined, and armed inside with 18–20 spines; dactylar claws in all pairs nearly equal. Middle piece of male operculum not expanded at the end, which is quadrilobate. Uropoda exceeding in length the caudal segment, basal part rather elongated, though not

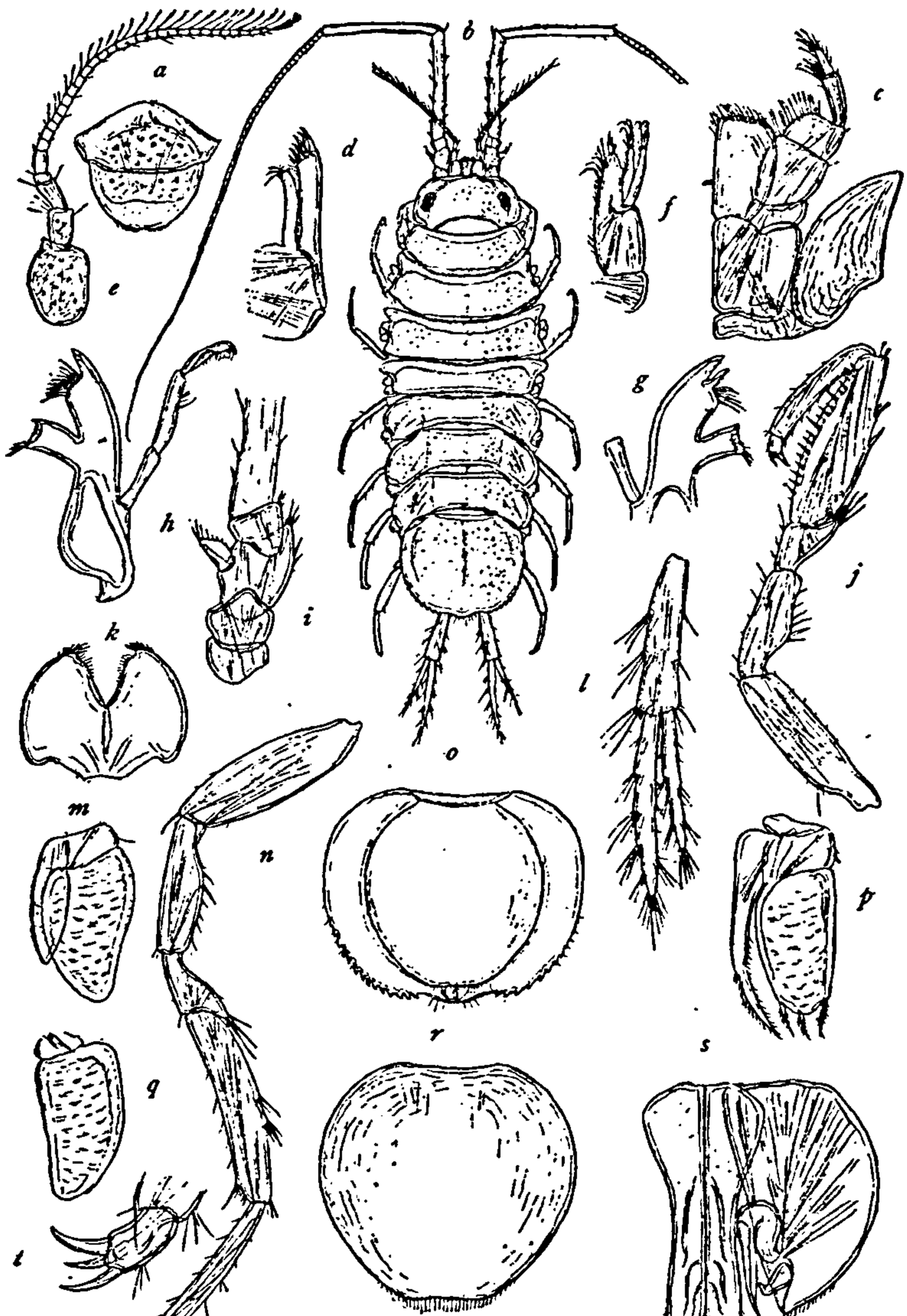


FIG. 524.—JANIRA MACULOSA (AFTER SARS). *a*, ANTERIOR LIP. *b*, DORSAL VIEW OF FEMALE. *c*, MAXILLIPED. *d*, FIRST MAXILLA. *e*, FIRST ANTENNA. *f*, SECOND MAXILLA. *g*, MANDIBLE. *h*, MANDIBLE WITH PALP. *i*, SECOND ANTENNA. *j*, FIRST LEG. *k*, POSTERIOR LIP. *l*, UROPOD. *m*, FOURTH PLEOPOD OF FEMALE. *n*, FIFTH LEG. *o*, ABDOMEN (INNER SIDE). *p*, THIRD PLEOPOD OF FEMALE. *q*, FIFTH PLEOPOD OF FEMALE. *r*, FEMALE OPERCULUM. *s*, FIRST AND SECOND PLEOPODS OF MALE. *t*, TERMINAL JOINT OF FIFTH LEG.

quite as long as the inner ramus, outer ramus somewhat smaller than the inner, both being linear in form. Color, yellowish, densely mottled with reddish brown specks. Length of adult female, 7 mm., of male, 10 mm."—G. O. SARS.[a]

[a] Crust. of Norway, II, 1899, pp. 99–100.

JANIRA MINUTA Richardson.

Janira minuta RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, p. 297, pl. XXXIX, figs. 50-52.

Locality.—Castle Harbor, Bermudas, in dead coral.

Surface of body smooth. Color light yellow, almost white, spotted with black.

Head with frontal margin straight; eyes large, conspicuous, oblong, and situated at the lateral margin. First pair of antennæ with the three peduncular articles equal in length, the first one, however, being very much the broadest, the second a little stouter than the third; flagellum multi-articulate, composed of about ten or eleven articles. The second pair of antennæ have a scale outside the third article of the peduncle; flagellum multi-articulate, much longer than the body. Thoracic segments subequal in length. First segment with the lateral margin entire, epimeron not evident from a dorsal view. Second and third segments with margins entire, straight, epimera evident about the middle of the segments. Fourth segment with the posterior half of the lateral margin slightly excavate, the epimeron evident in the excavation. The last three segments with the lateral margins entire, the epimera evident as small lobes at the post-lateral angles.

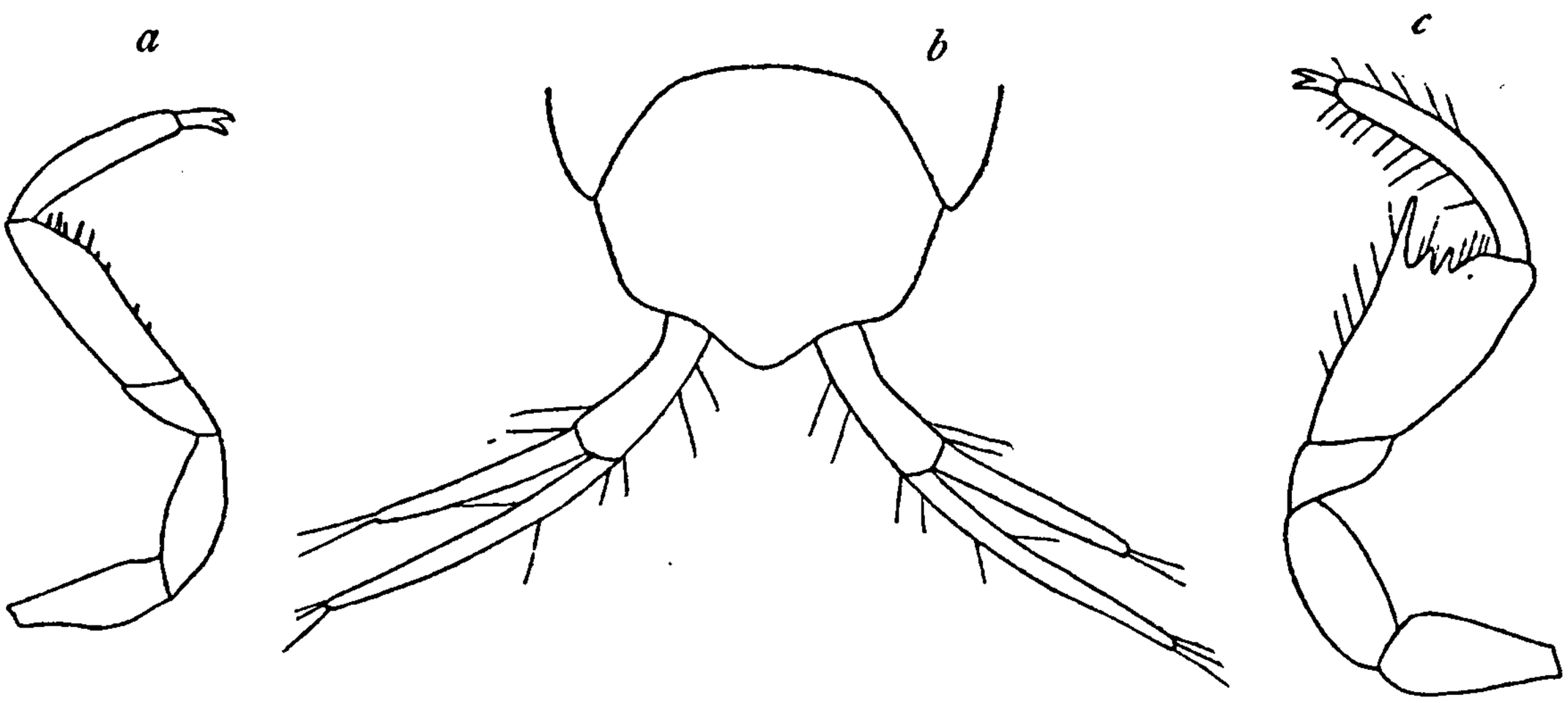
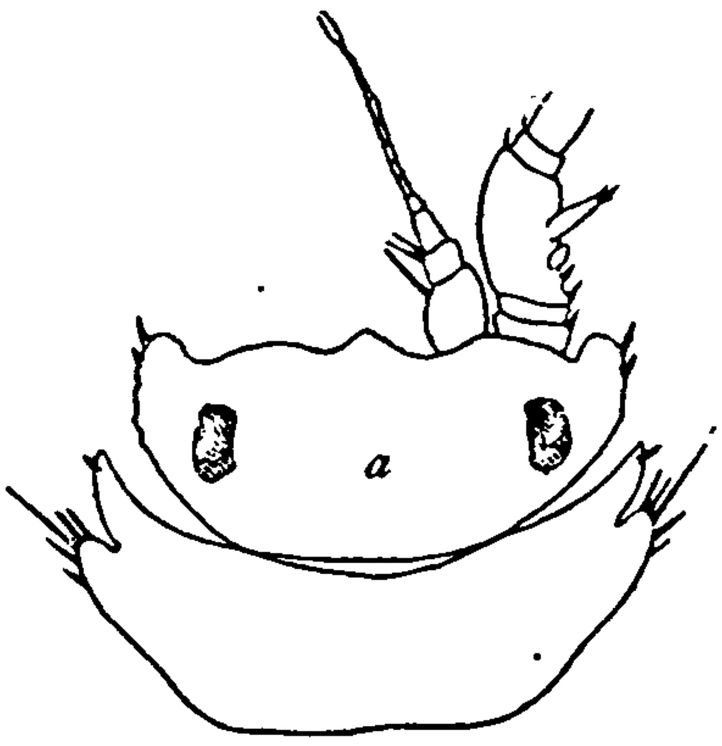


FIG. 525.—JANIRA MINUTA. *a*, LEG OF FIRST PAIR OF FEMALE. × 58. *b*, TERMINAL SEGMENT AND UROPODA. × 58. *c*, LEG OF FIRST PAIR OF MALE. × 58.

The terminal segment is about as broad as long, rounded posteriorly with a median lobe between the peduncular joints of the uropoda. The uropoda extend much beyond the terminal segment, being longer than that segment. The outer branch is somewhat shorter than the inner branch; both branches are longer than the peduncle, and are fringed with long hairs.

In the female the first pair of legs are prehensile; the others are simple walking legs, with bi-unguiculate dactyli. In the male, however, the first pair of legs are modified, though prehensile. The

carpal joint is very much enlarged and is produced on the inside, at the outer distal end, in a long, acute process, between which and the articulation of the propodus are two long acute processes about half as long as the outer process. The propodus is similar to that of the female; the dactylus is bi-unguiculate.



A number of specimens, both males and females, were collected by Prof. A. E. Verrill and party in 1898, at Castle Harbor, Bermudas.

Type specimens in Peabody Museum, Yale University. Cat. Nos. 3194 and 3261.

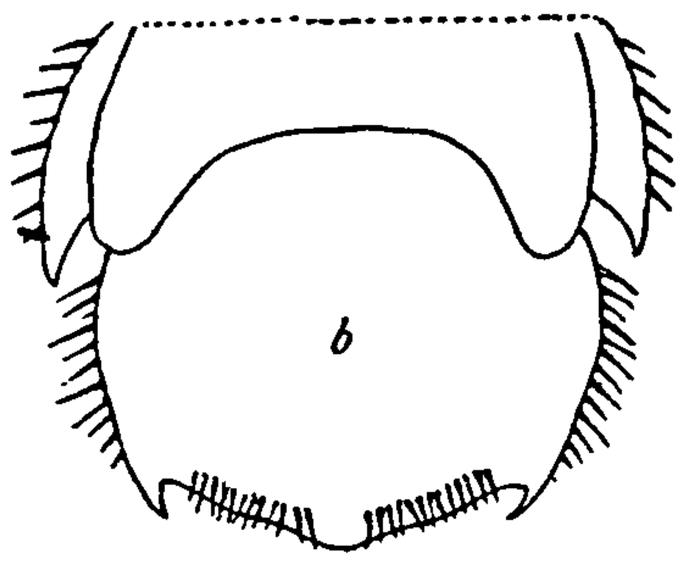


FIG. 526.—JANIRA OCCIDENTALIS (AFTER WALKER). *a*, HEAD AND FIRST THORACIC SEGMENT. *b*, ABDOMEN AND PART OF PREVIOUS SEGMENT OF THORAX.

JANIRA OCCIDENTALIS Walker.

Janira occidentalis WALKER, Trans. Liverpool Biol. Soc., XII, 1898, pp. 280–281, pl. XV, figs. 7–10.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 859; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 326; American Naturalist, XXXIV, 1900, p. 300; Harriman Alaska Exp., Crust., X, 1904, p. 224; Proc. U. S. Nat. Mus., XXVII, 1904, p. 667.

Locality.—Puget Sound, Washington.

Body oblong-ovate, three times longer than wide, 2 mm. : 6 mm.

Head, about twice as wide as long, with the anterior margin sinuate, but not produced in a frontal median process. The lateral margins are straight, with the ántero-lateral angles a little produced and rounded and the post-lateral angles rounded. The eyes are large,

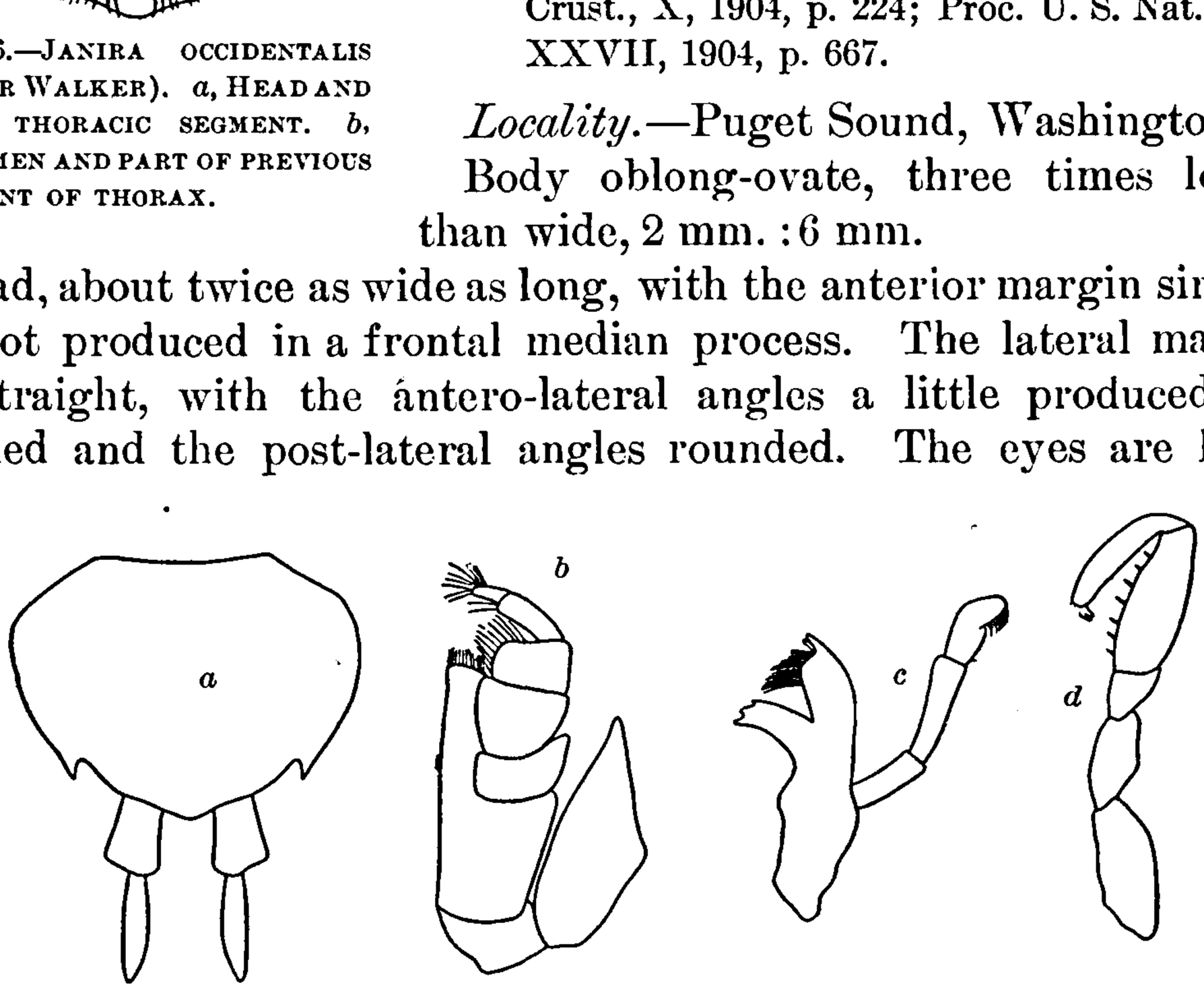


FIG. 527.—JANIRA OCCIDENTALIS. *a*, ABDOMEN WITH UROPODA.[a] *b*, MAXILLIPED. × 51⅔ *c*, MANDIBLE. × 51⅔. *d*, FIRST LEG. × 27⅓.

round, composite, and dorsally placed. The first pair of antennæ have the first and third articles about equal in length; the second is

[a] The outer branch of both uropoda is broken off and lost in the only specimen of the U. S. National Museum collection.

about one and a half times longer than the third. The flagellum is composed of eleven articles. The second pair of antennæ have the first four articles short and nearly subequal, the first two being somewhat shorter than the last two. An antennal scale is articulated to the third article. The fifth and sixth articles are long, the sixth being a little longer than the fifth. The fifth article is 1 mm. in length; the sixth is a little more than 1 mm. long. The flagellum is multi-articulate, and 2 mm. long. The maxillipeds have a palp of five articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax has the post-lateral lobe large and produced, the antero-lateral lobe obsolete, with the epimeral lobe at the antero-lateral angles. The second and third segments have the antero- and post-lateral lobes small, but produced and conspicuous, the lateral margin between them being straight; the epimeron is in two lobes, and occupies a position between the antero- and post-lateral lobes in both segments. The fourth segment has the antero- and post-lateral lobes small, but produced and conspicuous; the post-lateral lobe is smaller than the antero-lateral lobe, while in the two preceding segments the antero-lateral lobe is the smaller one; the epimeron of the fourth segment is a single lobe between the antero- and post-lateral lobes. In the fifth segment the antero-lateral lobe is large and produced, the post-lateral lobe minute, and almost inconspicuous; the epimeron is a single lobe between the two. The sixth and seventh segments have the antero-lateral lobes large and prominent, the post-lateral lobes obsolete, and the epimeron situated at the post-lateral angles.

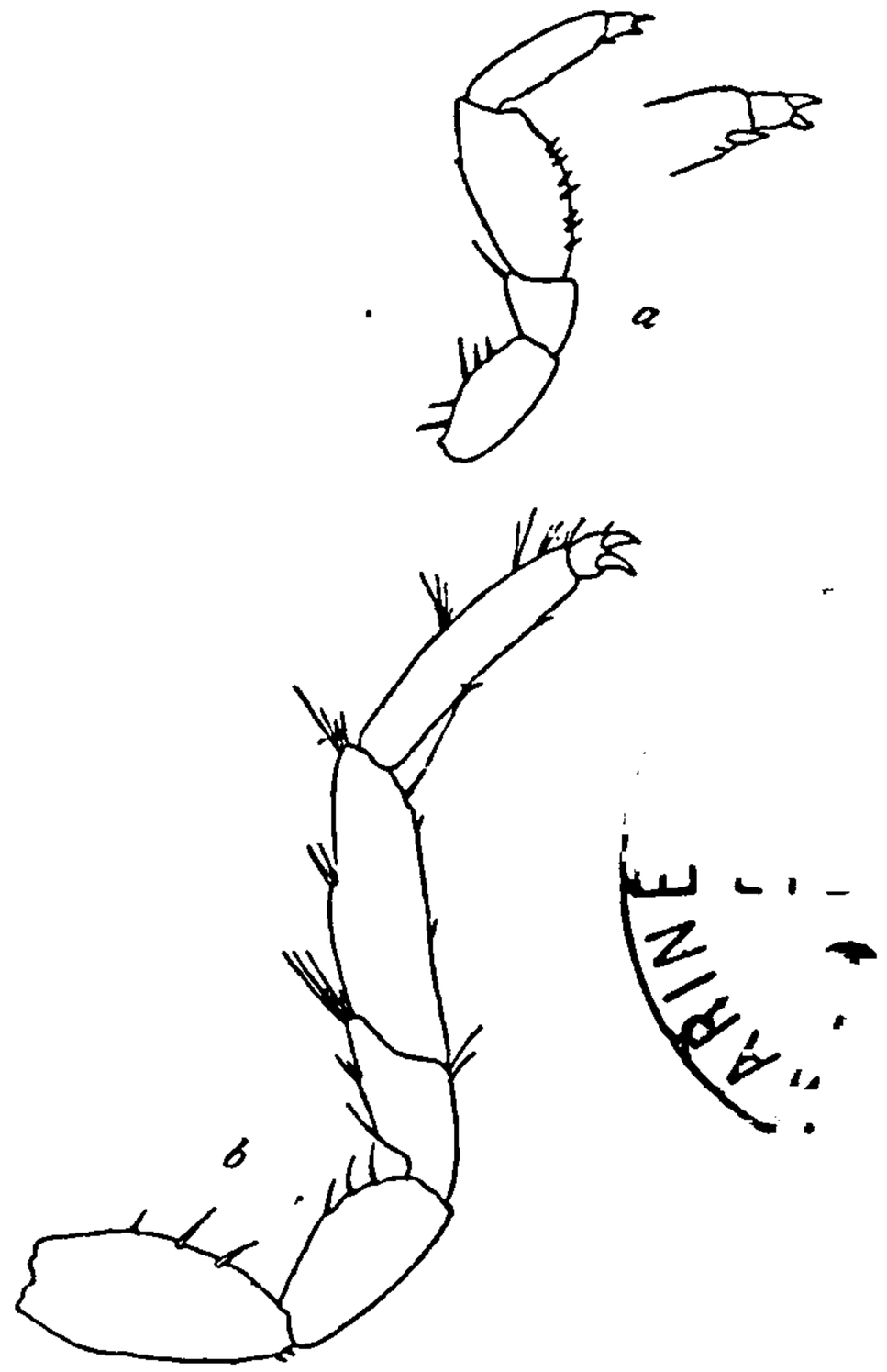


FIG. 528.—JANIRA OCCIDENTALIS (AFTER WALKER). *a*, FIRST LEG. *b*, THIRD LEG.

The abdomen is composed of a single large segment, the post-lateral angles of which are small but very acutely produced. The posterior margin has a large median rounded lobe. The uropoda are not quite as long as the abdomen. The peduncle is about one-third the length of the terminal segment. The inner branch is one and a half times longer than the peduncle. The outer branch is lost in both uropoda of the specimen examined.

The first pair of legs are prehensile, but not longer than the others. The six following pairs are ambulatory, with bi-unguiculate dactyli.

JANIRA TRICORNIS (Krøyer).

Henopomus tricornis KRØYER, Voy. en Scand., Crust., 1849, pl. XXX, figs. 2 a–q; Nat. Tidsskr. (2), II, 1846–49, p. 372–379, 380.

Janira tricornis HANSEN, Vid. Medd. naturh. Foren. i Kjøbh., 1887–88, pp. 190–191.—RICHARDSON, Amer. naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 555.—STEBBING, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—OHLIN, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 30–31.

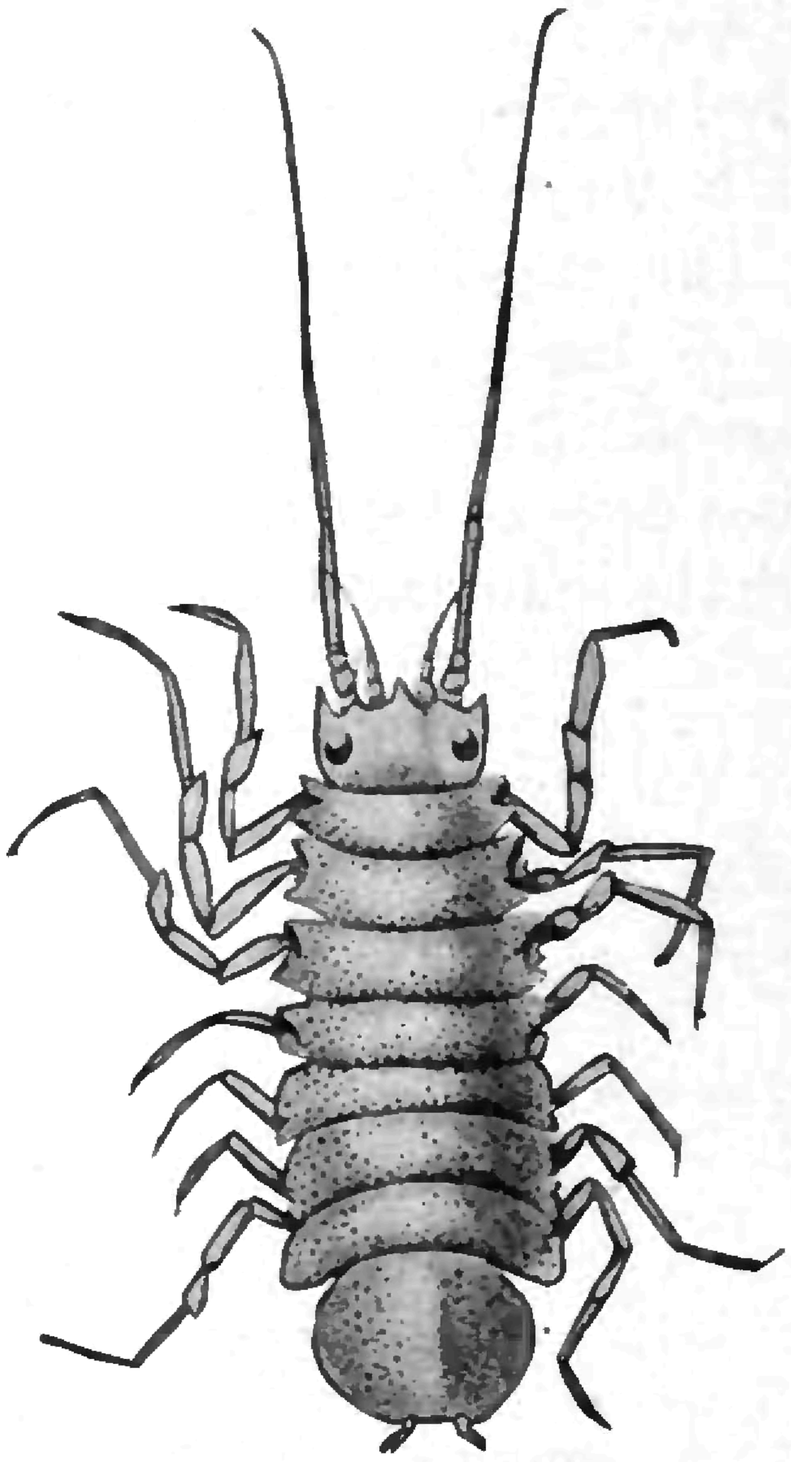


FIG. 529.—JANIRA TRICORNIS (AFTER KRØYER).

Localities.—Kangerdluarsuk; Sukkertoppen; Egedesminde; latitude 65° 11′ north, longitude 53° 33′ west.

Depth.—5 to 50 fathoms; 20 to 80 meters (Ohlin).

Body wide, the width equaling almost half the length.

Head armed anteriorly with three horns or spines, placed in a transverse series.

The second pair of antennæ are equal to the length of the body; the second article of the peduncle is very stout and armed on the exterior margin with a large spine (scale).

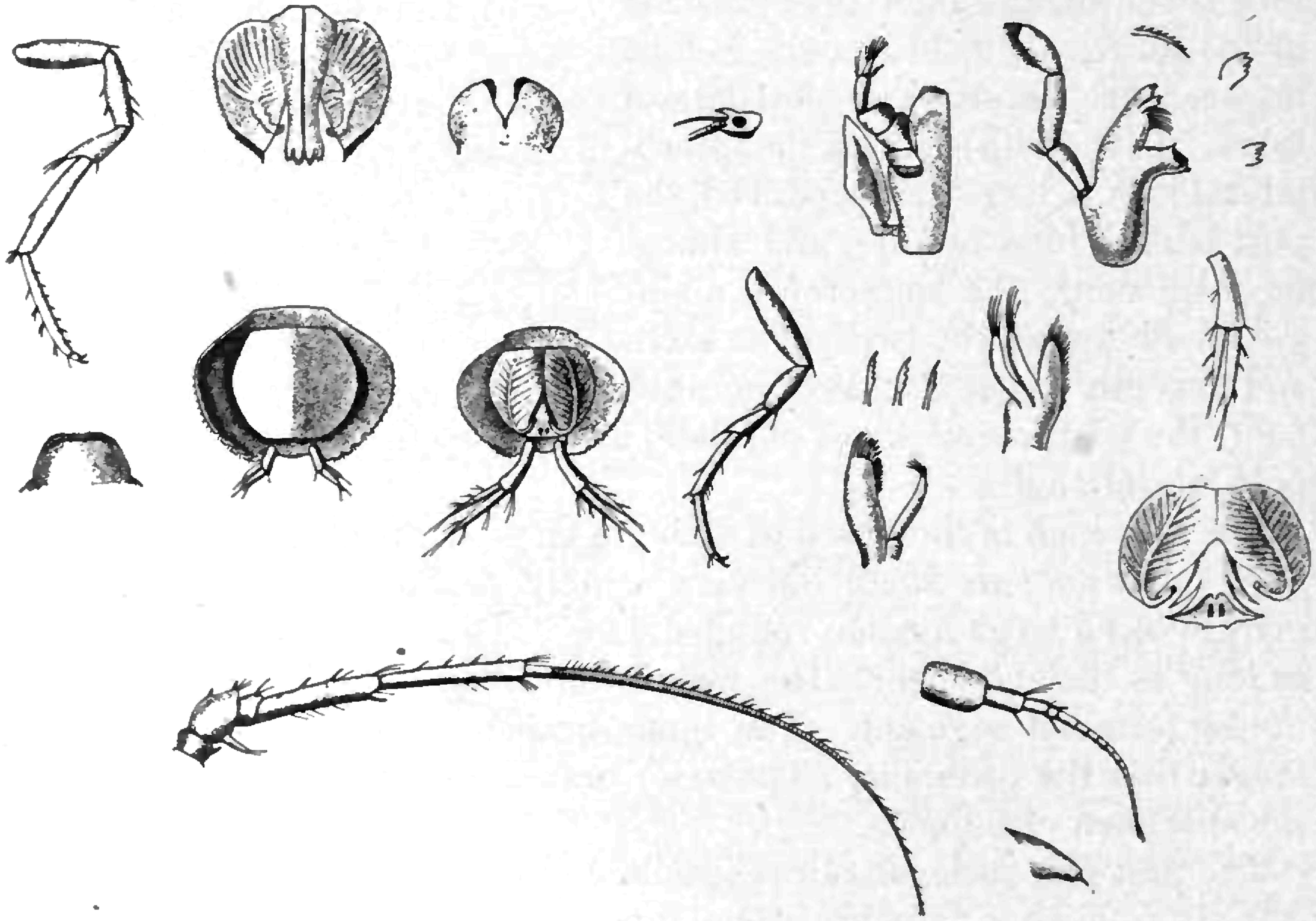


FIG. 530.—JANIRA TRICORNIS (AFTER KRØYER). SHOWING DETAILED PARTS.

The abdomen is subelliptical in shape or obsoletely six angulate, much wider than long.

The median lobe of the covering lamella of the pleopods (the peduncle of the first pleopoda) in the males is posteriorly entire.[a]

A fuller description of this species is given in the preceding pages (372–379) of the work from which the above is quoted.

JANIRA ALTA (Stimpson.)

Asellodes alta STIMPSON, Smithsonian Contributions to Knowledge, VI, 1853, p. 41, pl. III, fig. 30.—VERRILL, Am. Jour. Sci., VI, 1873, p. 439; VII, 1874, pp. 411–502; Proc. Amer. Assoc., 1874, p. 350.

Janira alta HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 158; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 321–322, pls. II–III, figs. 9, 12, 13.—RICHARDSON, American Naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 556.

Localities.—Long Island; Massachusetts Bay; near Eastport, Maine; Gulf of Maine; Grand Menan; Bay of Fundy; 120 miles south of Halifax; Grand Banks; Clarkes Ledge; 30 miles east of Sable Island; off Chesapeake Bay.

Depth.—35 to 487 fathoms.

Body oblong-ovate, nearly three times longer than wide, 2½ mm.: 7 mm., not including the uropoda.

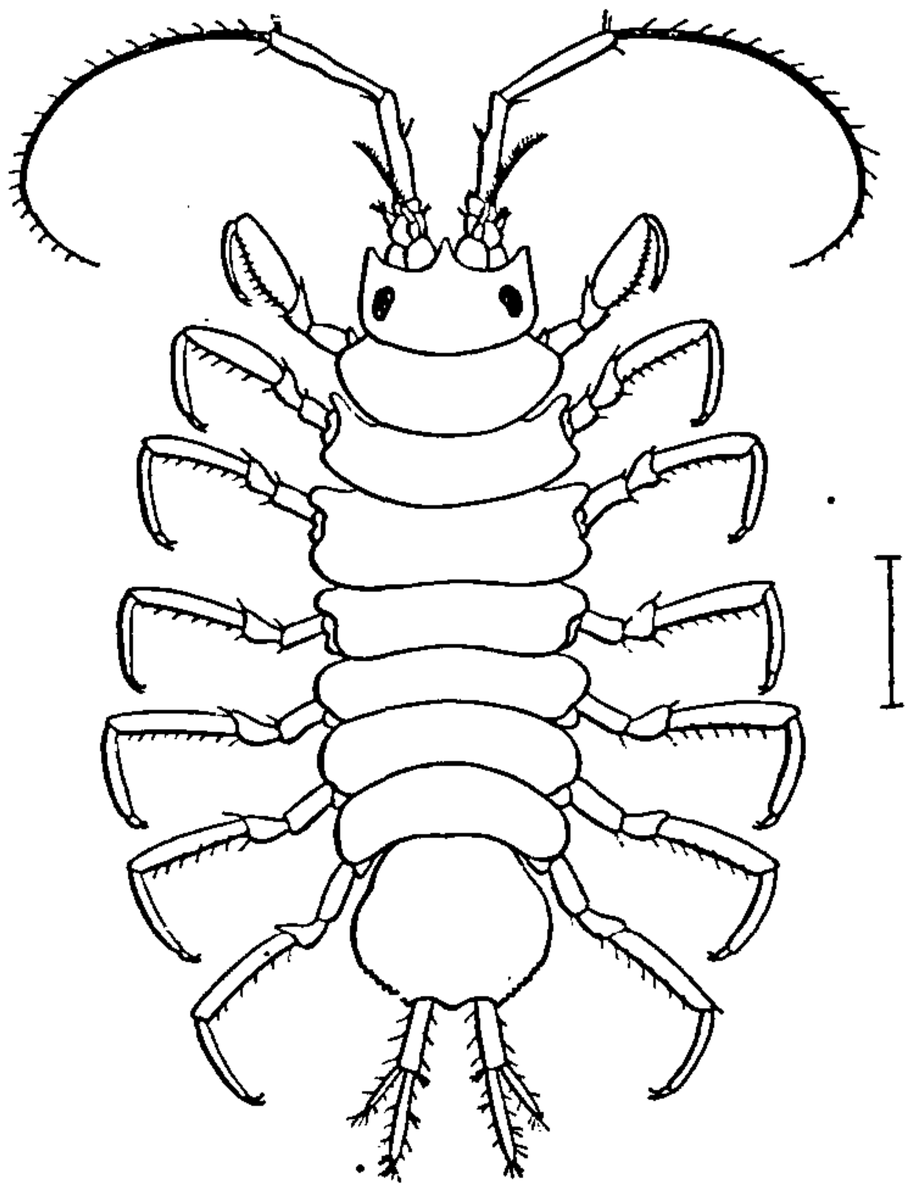


FIG. 531.—JANIRA ALTA (AFTER HARGER). × 5.

Head nearly three times as broad as long, with the lateral portions expanded and the lateral margins straight. The front is produced in the middle in a long narrow process with apex rounded. The eyes are small, round, composite, and dorsally placed. The antero-lateral angles of the head are very slightly produced and are rounded. The first pair of antennæ have the three articles, forming the peduncle, about equal in length. The flagellum is composed of fourteen articles. The second pair of antennæ have the first four articles short and subequal; the two following ones are very long, the sixth being longer than the fifth. The sixth article is 2 mm. in length; the fifth is 1½ mm. long. The flagellum is multiarticulate and is 5 mm. long. The second antennæ are as long as the body. The maxillipeds have a palp

[a] The above description is adapted from the following one of Krøyer's:

Latior (latitudo dimidiam fere æquans longitudinem). Caput antice tribus armatum cornibus vel aculeis, serie positis transversali. Antennæ inferiores longitudinem animalis æquantes, articulo pedunculi secundo crassissimo, aculeo marginis exterioris maximo. Abdomen subellipticum vel obsolete sexangulatum, multo latius quam longum. Lobus laminæ branchiarum tectoriæ intermedius apud mares postice integer.—KRØYER, Nat. Tidsskr. (2), II, 1846–49, pp. 372–379, 380.

of five articles. The palp of the mandibles is composed of three articles.

The first segment of the thorax has the post-lateral lobes large and prominent; the antero-lateral lobes are obsolete, but small epimeral lobes, one on either side, are conspicuous at the antero-lateral angles of the segment. The second, third, and fourth segments have each a conspicuous but small antero-lateral lobe on either side, produced beyond the large post-lateral portion of the segment, and between the anterior and posterior lobes is the small but conspicuous epimeral lobe. The last three segments have a large antero-lateral lobe, with the post-lateral lobe obsolete, and the small epimeral lobe situated at the post-lateral angles.

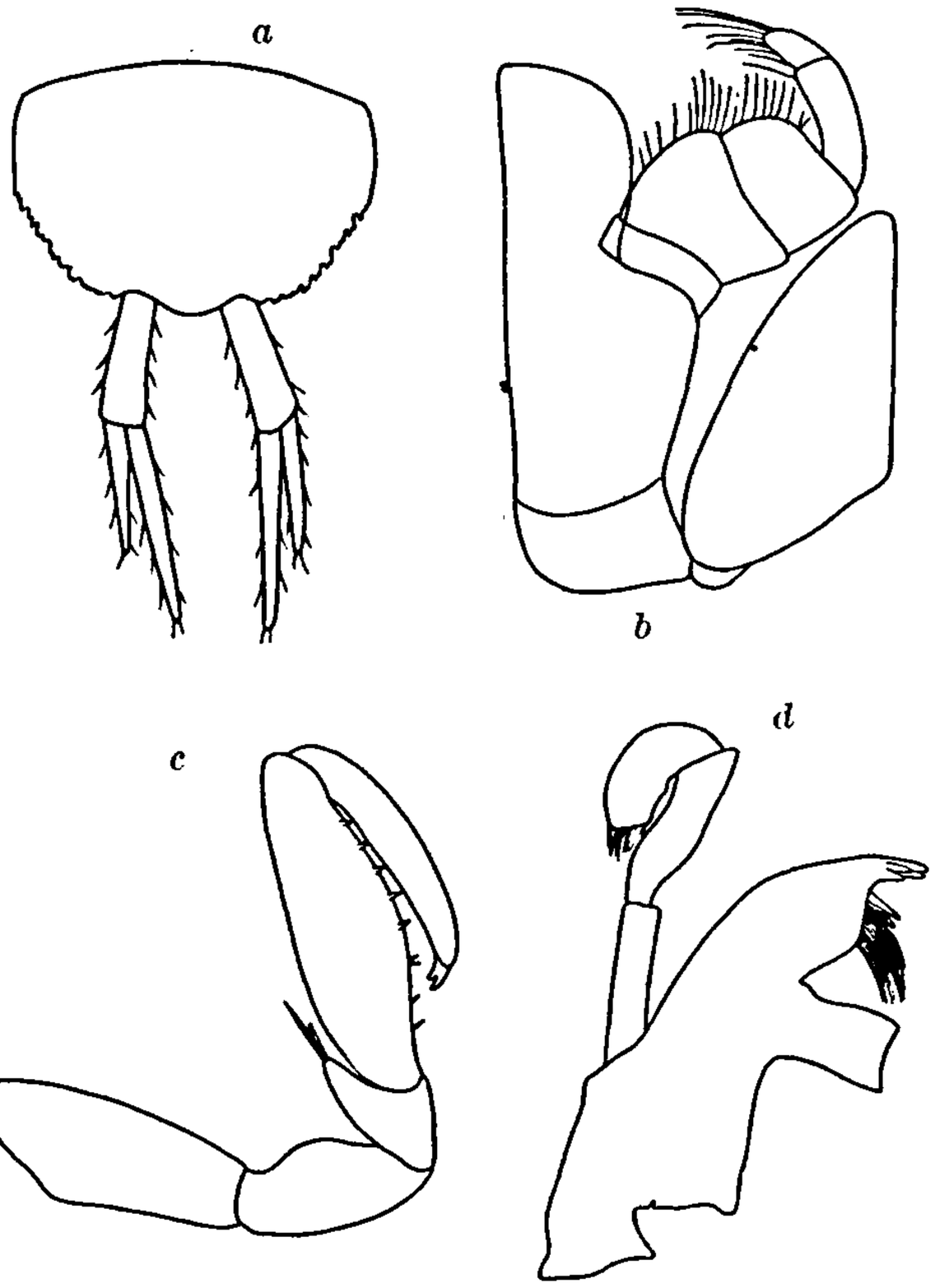


FIG. 532.—JANIRA ALTA. *a*, ABDOMEN WITH UROPODA. × 15⅓. *b*, MAXILLIPED. × 51⅔. *c*, FIRST LEG. × 27⅓. *d*, MANDIBLE. × 51⅔.

The abdomen is composed of a single large segment, the post-lateral angles of which are widely rounded, and the posterior margin has a prominent rounded median lobe. The posterior half of the lateral margins and the margins of the post-lateral angles are strongly serrate. The uropoda are about one and a fourth times longer than the abdomen. The peduncle is as long as two-thirds the length of the abdomen. The outer branch is as long as the peduncle. The inner branch is one and a half times the length of the outer branch.

The first pair of legs are prehensile, but are not longer than the others. The six following pairs are ambulatory with bi-unguiculate dactyli.

76. Genus JÆROPSIS Kœhler.

Eyes present. Both pairs of antennæ extremely small; flagellum of first pair obsolete; flagellum of second pair rudimentary. Articles of peduncle of second antennæ dilated. Epignath of maxillipeds narrow, produced to a tapering extremity. Apex of mandibles produced in five teeth.

Segments of thorax separated at the sides, not forming an unbroken continuous lateral line.

Legs simple, similar in structure; dactylus bi-unguiculate.
Uropoda short, extremely small.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS JÆROPSIS.

a. Head, second, third, fourth, and seventh thoracic segments and abdomen brown. First, fifth, and sixth thoracic segments perfectly white and colorless. Median lobe of terminal segment of body rounded. Frontal process of head as long as side of head. Eyes moderately large..... *Jæropsis lobata* Richardson

a'. Color uniformly white. Median lobe of terminal segment of body acute. Frontal process of head about half as long as lateral margin of head. Eyes small.
Jæropsis rathbunæ Richardson

JÆROPSIS LOBATA Richardson.

Jæropsis lobata RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 859–860; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 326–327; American Naturalist XXXIV, 1900, p. 300.

Locality.—Monterey Bay, California.

Surface of body smooth.

Color very peculiar and striking. The head is brown. The first thoracic segment is perfectly white, without any markings. The second, third, and fourth segments are brown. The fifth and sixth are white. The seventh thoracic segment and the caudal segment are brown. This peculiar marking gives the body a striped appearance.

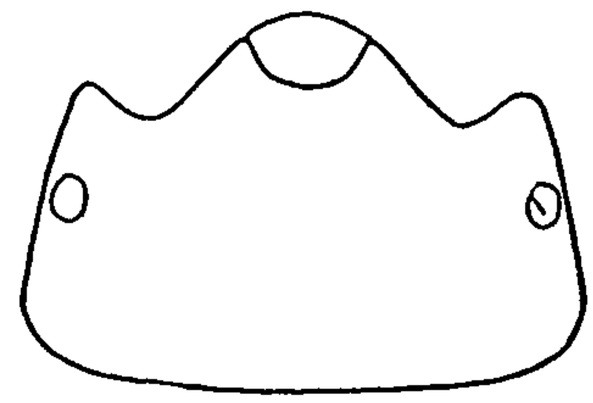
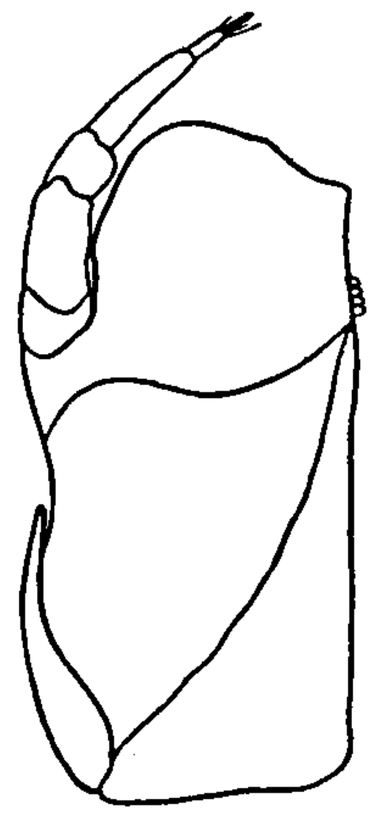


FIG. 533.—JÆROPSIS LOBATA. HEAD. × 27½.

Head large; front produced into two prominent triangular processes, on either side of a deep median excavation in which is placed a small lobe; this gives the head the appearance of being produced in a large rounded median lobe. The antero-lateral angles of the head are acutely produced on either side to a distance equal to one-third the length of the frontal process. The eyes, which are small, are situated on the extreme lateral margins of the head. The first pair of antennæ are extremely small, equal in length to less than half the width of the head; flagellum obsolete. The second pair of antennæ are also extremely short, equal in length to the width of the head, with rudimentary flagellum, composed of about five joints, and with peduncular joints dilated. Mandibles have the cutting part composed of five teeth; palp, three-jointed.



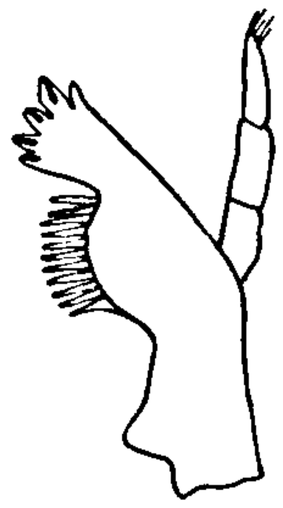


FIG. 534.—JÆROPSIS LOBATA. MAXILLIPED AND MANDIBLE.

The thoracic segments are subequal in length, with lateral edges produced, but not laciniate, and separated from each other by lateral incisions.

Caudal segment regularly rounded, with two small incisions at the place where the uropoda are attached, between which is a rounded lobe. Uropoda are extremely small, short, nodiform.

Legs simple, similar in structure, with bi-unguiculate dactyli.

Two specimens from Monterey Bay, California, were sent by Mr. Heath.

Type.—Cat. No. 22583, U.S.N.M.

This species is very close to *Jæropsis brevicornis*, but differs in the following points: The coloring of the body, which in *J. brevicornis* is perfectly transparent and colorless, with the exception of the head, which is marked with a large brown spot, while in our species the head is dark, as are also the entire second, third, fourth, and seventh thoracic segments and the terminal abdominal segment, the other segments being colorless; in the shape of the terminal segment, which is perfectly rounded in *J. brevicornis* and fringed with hairs, while in our species there are two posterior incisions for the reception of the uropoda, and an absence of hairs; in the larger median lobe on the anterior margin of the head; in the acuteness of the antero-lateral angles of the head, which are rounded in *J. brevicornis;* in the more angular post-lateral angles of the head, and in the more angular antero- and post-lateral angles of the thoracic segments. Other differences are noticed from a comparison of both pairs of antennæ.

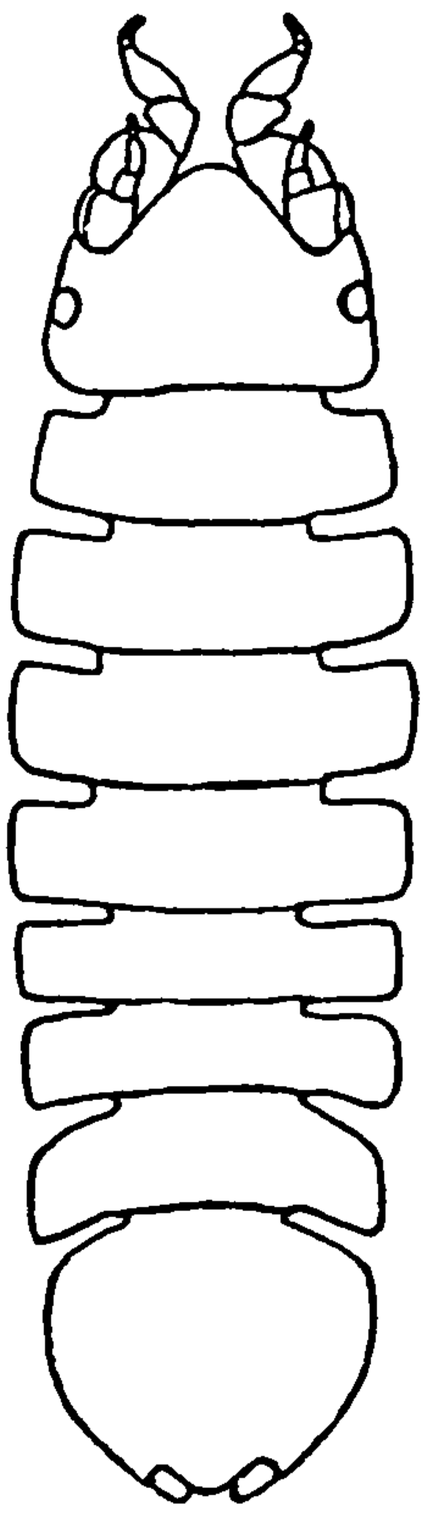


FIG. 535.—JÆROPSIS LOBATA. ×20.

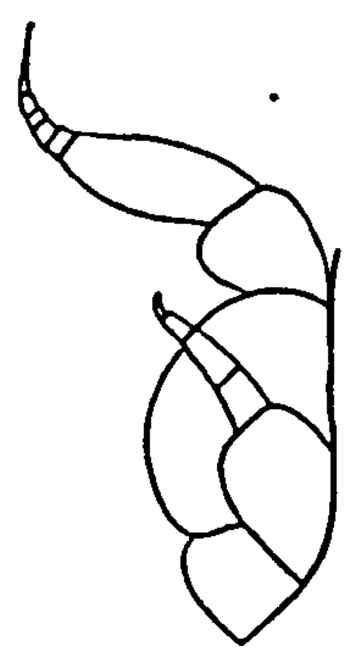


FIG. 536.—JÆROPSIS LOBATA. ANTENNÆ.

JÆROPSIS RATHBUNÆ Richardson.

Jæropsis rathbunæ RICHARDSON, Trans. Conn. Acad. Sciences, XI, 1902, p. 298, pl. XL, figs. 53–55.

Locality.—Bermudas.

Body elongate, depressed; segments loosely articulated; surface smooth; color uniformly light, almost white.

Head with a median excavation, on either side of which the frontal margin is produced into angulations. On either side of these angulations is another excavation, on the outside of which are lateral angulations. A rounded lobe is placed in the median excavation. The eyes are small and are situated near the lateral margins about halfway between the anterior and posterior margins. The first pair of antennæ consist of five joints, the two first joints being large, the three follow-

ing ones small, the last fringed with hairs. The second pair of antennæ have a rudimentary flagellum, consisting of five or six joints; the peduncle has the third and fifth joints long and oval in shape, the fourth joint somewhat triangular.

The thoracic segments are loosely articulated. The lateral margins are straight, with no indication of epimera.

The terminal segment of the body is rounded in outline, the posterior margin excavated at the insertion of the uropoda, which do not extend beyond the edge of the segment, thus preserving the oval outline. Between the uropoda there is an acute median projection.

The legs are all simple, with bi-unguiculate dactyli.

One specimen was collected by Prof. A. E. Verrill and party at the Bermudas, and another by Dr. G. B. Goode, from the same locality.

Type specimens in Peabody Museum, Yale University. Cat. No. 3251.

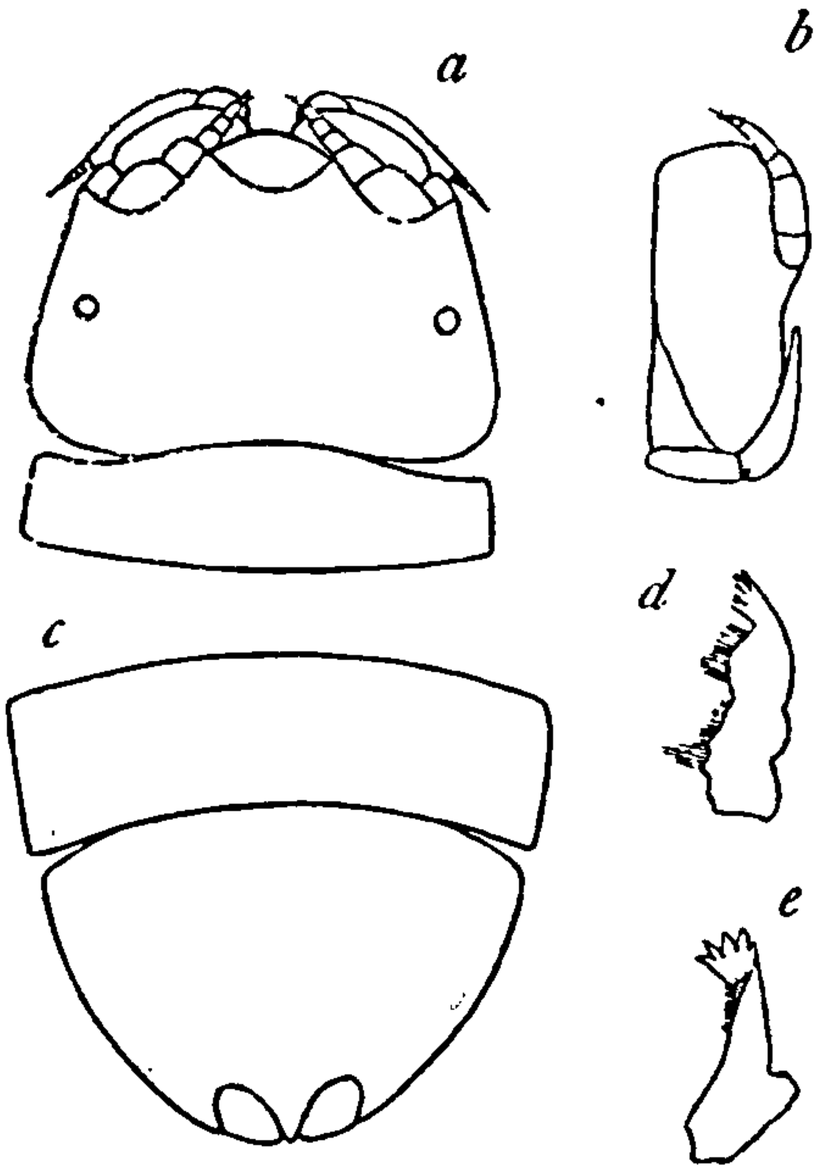


FIG. 537.—JÆROPSIS RATHBUNÆ. *a*, HEAD AND FIRST THORACIC SEGMENT. *b*, MAXILLIPED. *c*, TERMINAL SEGMENT AND UROPODA. *d*, MANDIBLE. *e*, MANDIBLE (ANOTHER VIEW).

Six species of this genus have been heretofore described: *Jæropsis lobata* Kœhler, *Jæropsis marionis* Beddard, *Jæropsis neo-zealandica* Chilton, *Jæropsis lobata* Richardson, *Jæropsis dollfusi* Norman, and *Jæropsis curvicornis* (Nicolet).[a] The present species adds another to the above list.

It is named in honor of Miss Mary J. Rathbun.

Family XVIII. MUNNIDÆ.[b]

Body ovate, short and stout, with the three posterior segments of the thorax sharply marked off from the four anterior ones and much smaller, and gradually becoming narrower. Terminal segment of body vaulted above, subpyriform.

Eyes, when present, placed on the tips of lateral peduncle-like projections of the head. First pair of antennæ placed widely apart, with the flagellum multi-articulate. Second pair of antennæ without scale.

First pair of legs much shorter than the following pairs and prehensile. Succeeding pairs more or less rapidly increasing in length, simple, ambulatory. Uropoda small, somewhat separated.

Pleopoda as in the *Janiridæ*.

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[a] *Jæra curvicornis* Nicolet, in Gay's Hist. de Chile, III, 1849, p. 263, Zoöl. Atlas, Crust., No. 3, fig. 10. This species should be referred to the genus *Jæropsis*.

[b] See Sars for characters of family, Crust. of Norway, II, 1899, p. 105.

77. Genus MUNNA Krøyer.[a]

Body sub-pyriform, vaulted, with the last three segments of the thorax very small. Terminal segment of body narrow, sub-pyriform.

First pair of antennæ short. Second antennæ very much elongated, with the last two articles of the peduncle long and slender.

First pair of legs subcheliform, comparatively small in female, but well developed in male. Last six pairs of legs ambulatory and rapidly increasing in length. Dactylus bi-unguiculate.

Uropoda small, simple.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS MUNNA.

a. Surface of body smooth. Eyes present.

b. Caudal segment with lateral edges evenly convex, and each armed with a single slender denticle; apical lamellæ distinctly serrated. Eyes large. First pair of antennæ with flagellum composed of four joints, including very small apical joint. Flagellum of second antennæ longer than peduncle. Last pair of legs scarcely longer than body. Legs slender. Uropoda obliquely truncate at tip.....*Munna fabricii* Krøyer

b'. Caudal segment with lateral edges rather bulging in front, and each armed with four strong denticles; without any serrulated lamellæ. Eyes small. First pair of antennæ with flagellum composed of three joints, including very small apical joint. Flagellum of second antennæ not attaining length of peduncle. Last pair of legs scarcely longer than anterior division of body. Legs shorter and stouter than usual. Uropoda produced at tip into several dentiform projections, one of which is hook-like.....*Munna krøyeri* Goodsir

a'. Surface of body covered with numerous spines. Eyes absent.

Munna cæca, new species

MUNNA FABRICII Krøyer.

Munna fabricii Krøyer, Naturh. Tidsskr. (2), II, 1846–1849, p. 380; Voy. en Scand., Crust., 1849, pl. xxxi, figs. 1a–q.—Reinhardt, Naturhistorisk Bidrag til en Beskrivelse af Grönland, 1857, p. 35.—M. Sars, Chr. Vid. Selsk. Forh., 1858, p. 154, 1859.—Lütken, Crust. Greenland, 1875, p. 150.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 325–328, pl. iii, fig. 14.—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 193–194.—G. O. Sars, Crust. Norway, II, 1899, pp. 108–109, pl. xlv, fig. 2.—Stebbing, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—Richardson, American Naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 556.

Localities.—South Bay, Eastport; Casco Bay; Western Bank; Browns Bank; southern Greenland; Godhaven, Egedesminde, Upernivik, latitude 66° 30′ north, longitude, 54° 50′ west; also coast of Finmark; coast of Norway.

Depth.—4 to 200 fathoms. Sars says it occurs, in moderate depths, among Hydroida.

"Body rather short and compact, with the anterior division rounded

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 106.

oval in outline. Ocular processes rather thick and less prominent than in *Munna limicola*. Caudal segment oblong oval, but slightly narrowed behind, lateral edges evenly convex, and each armed in front with a single slender denticle; apical lamellæ distinctly serrated. Eyes rather large, semi-globose. Superior antennæ scarcely reaching to the middle of penultimate peduncular joint of the inferior ones; flagellum composed of only four joints, including the very small apical one. Inferior antennæ rather slender, with the flagellum longer than the peduncle. Legs comparatively slender, though less rapidly increasing in length posteriorly than in the two preceding species (*M. boecki* Krøyer and *M. limicola* Sars); first pair, as usual, much the shortest,

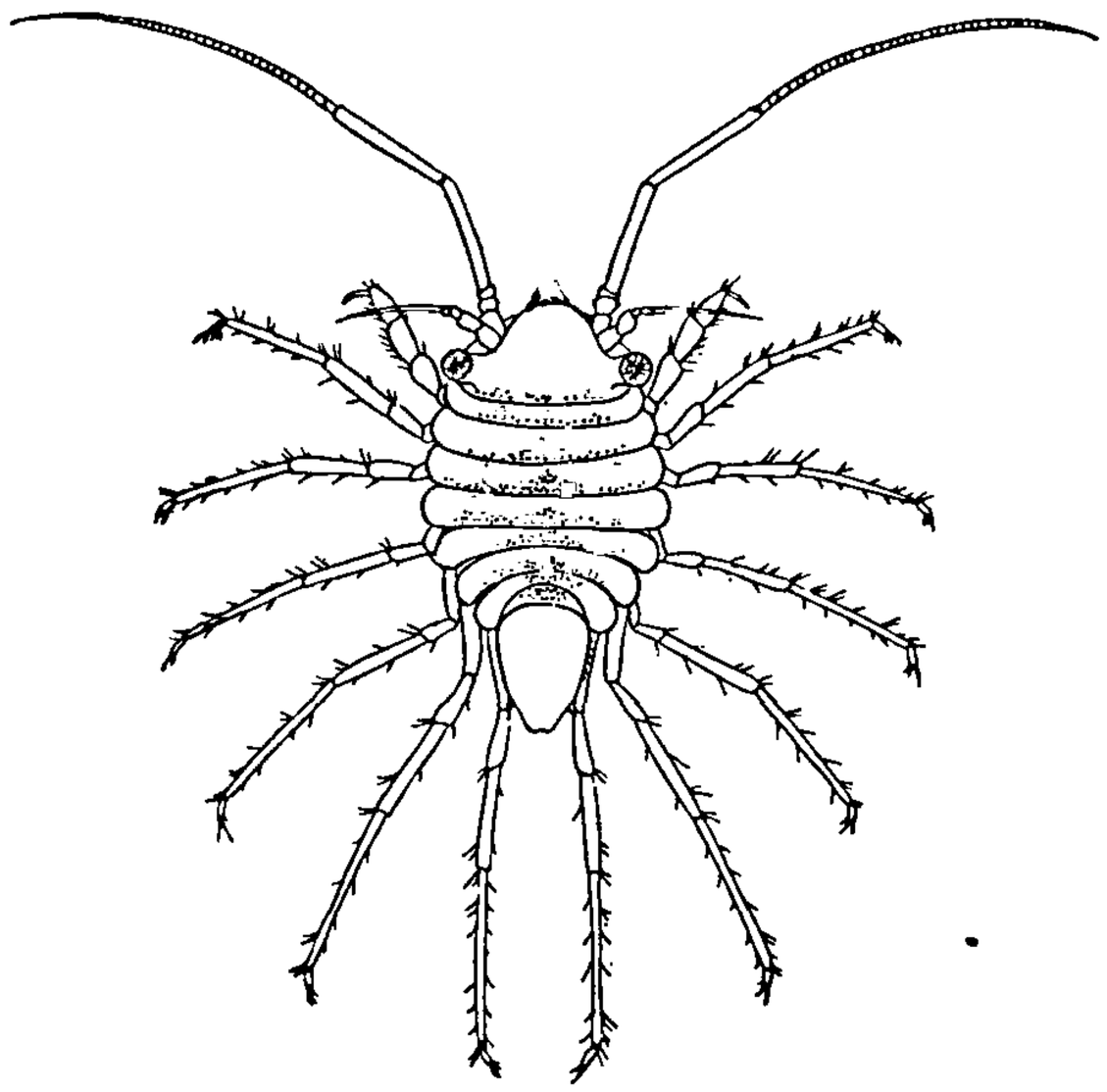

FIG. 538.—MUNNA FABRICII (AFTER HARGER). × 20.

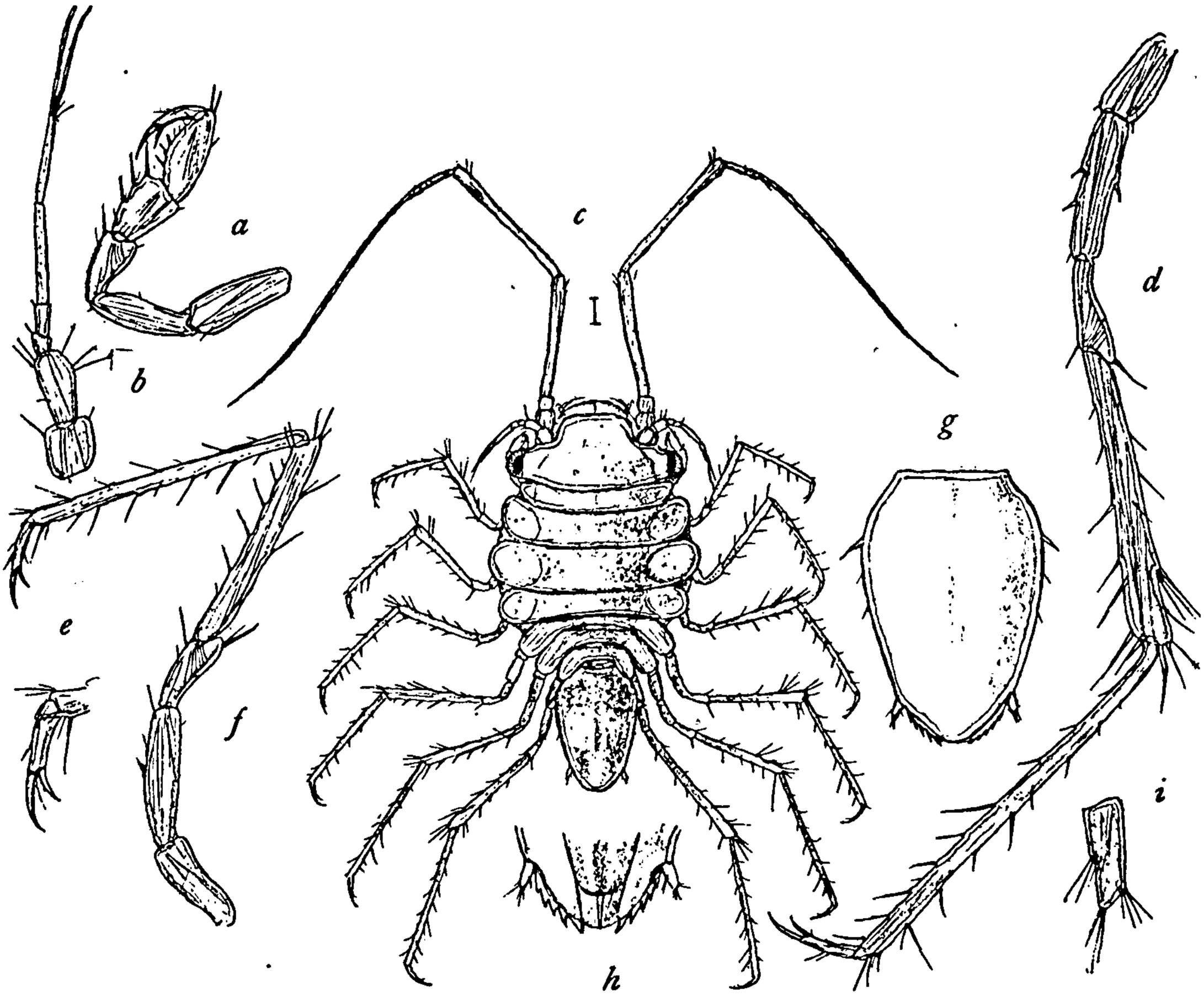

FIG. 539.—MUNNA FABRICII (AFTER SARS). *a*, FIRST LEG. *b*, FIRST ANTENNA. *c*, DORSAL VIEW OF FEMALE. *d*, SEVENTH LEG. *e*, EXTREMITY OF SECOND LEG. *f*, SECOND LEG. *g*, ABDOMEN AND UROPODA. *h*, EXTREMITY OF ABDOMEN WITH UROPODA. *i*, UROPOD.

with the carpus somewhat shorter than the propodus, and armed inside with three spines; last pair scarcely longer than the body, carpal joint somewhat dilated distally. Uropoda obliquely truncated at the tip, and setose at each corner. Color dark brown, from numerous pigmentary spots forming irregular shadows. Length of adult female scarcely reaching to 3 mm."—G. O. SARS.[a]

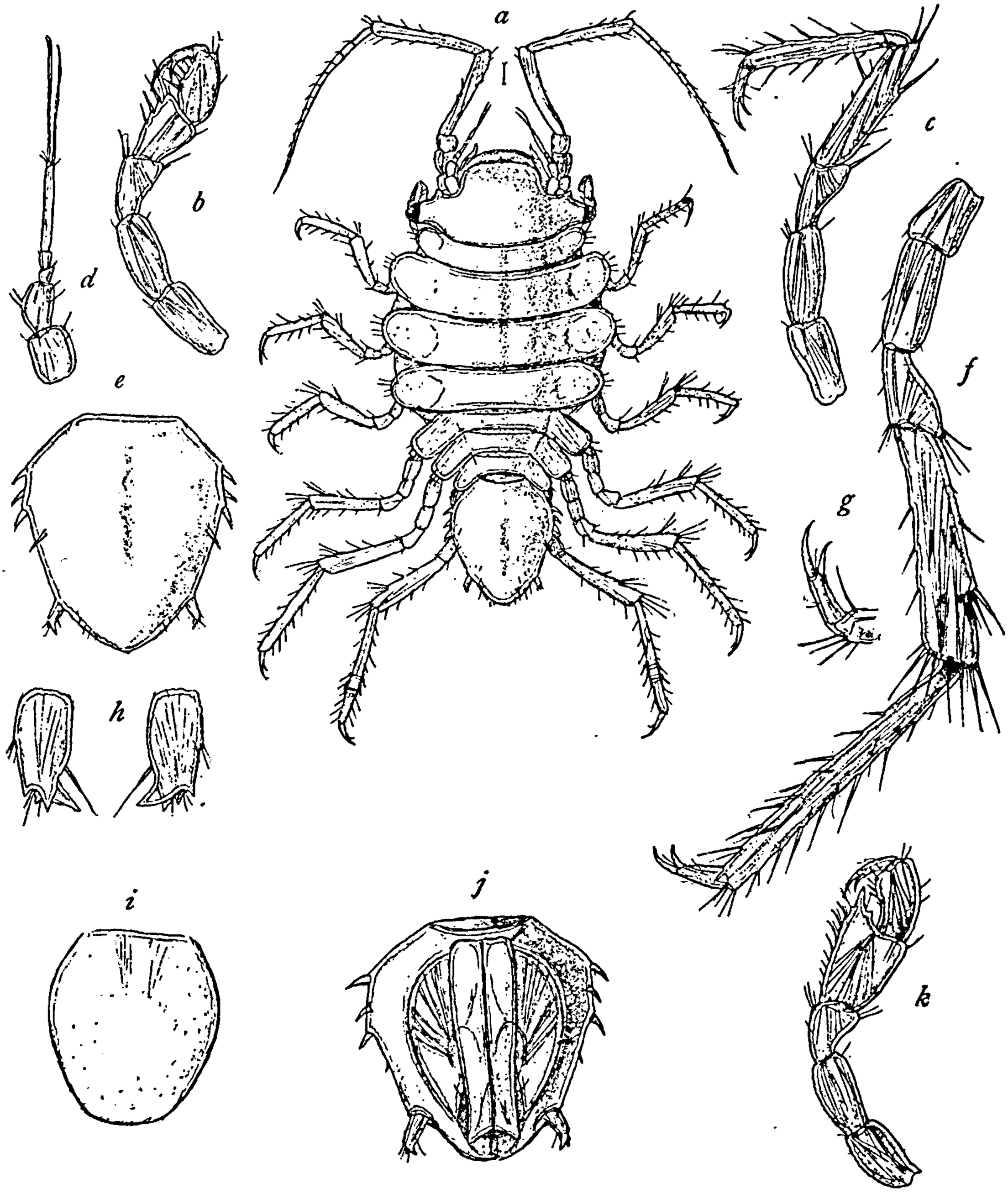

FIG. 540.—MUNNA KRØYERI (AFTER SARS). *a*, DORSAL VIEW OF FEMALE. *b*, FIRST LEG OF FEMALE. *c*, SECOND LEG OF FEMALE. *d*, FIRST ANTENNA. *e*, ABDOMEN OF FEMALE WITH UROPODA (DORSAL VIEW). *f*, SEVENTH LEG. *g*, EXTREMITY OF SEVENTH LEG. *h*, UROPODA. *i*, OPERCULUM OF FEMALE. *j*, ABDOMEN OF MALE WITH UROPODA (VENTRAL VIEW). *k*, FIRST LEG OF MALE.

[a] Crust. of Norway, II, 1899, pp. 108–109.

MUNNA KRØYERI Goodsir.

Munna krøyeri Goodsir, Edinburgh New Phil. Jour., XXXIII, 1842, p. 365, pl. VI, fig. 2.—Bate and Westwood, Brit. sessile-eyed Crust., II, 1868, p. 326.
Munna whiteana Bate and Westwood, Brit. sessile-eyed Crust., II, 1868, p. 329.
Munna krøyeri Hansen, Vid. Medd. naturh. Foren. i Kjøbh., 1888, pp. 194–195.—Sars, Crust. Norway, II, 1899, pp. 109–110, pl. XLVI, fig. 1.—Richardson, American Naturalist, XXXIV, 1900, p. 300; Proc. U. S. Nat. Mus., XXIII, 1901, p. 556.

Localities.—Godhavn and Upernivik, Greenland; also, coast of Norway.

Depth.—10 to 60 fathoms.

"Body of female somewhat robust, with the anterior division oval in form and the segments very sharply marked off from each other and clothed laterally with scattered hairs. Body in male, as usual, much narrower. Ocular processes conically tapered. Caudal segment comparatively short, scarcely more than half as long as the mesosome, and rounded oval in form, lateral edges rather bulging in front, and each armed with four strong denticles, the posterior pair subdorsal, tip bluntly produced, and without any serrated lamellæ. Eyes comparatively small, at least in female. Superior antennæ very short, extending not nearly to the middle of the penultimate peduncular joint of the inferior ones; flagellum composed of only three articulations, including the very small apical joint. Inferior antennæ, as compared with those in the other known species, of inconsiderable length, scarcely as long as the body, flagellum not attaining the length of the peduncle. First pairs of legs in female of the usual structure, in male considerably stronger, with the carpus considerably expanded and produced at the end inside to an acute thumb-like projection, the inner edge of the joint densely setiferous. Ambulatory legs in both sexes shorter and stouter than usual, last pair scarcely exceeding in length the anterior division of the body. Uropoda produced at the tip into several dentiform projections, one of which assumes a hook-like appearance. Color pale yellowish, slightly mottled with light brown. Length of adult female about 3 mm."—G. O. Sars.[a]

MUNNA CÆCA, new species.

Body ovate; surface rough and spiny, beset with numerous long and small spines.

Head produced in front between the basal articles of the antennæ in a rounded process. Eyes absent. Dorsal surface of head beset with long, narrow spines. About the middle of the head is a long median spine, with a shorter one on either side. On either side of the shorter spines is another long spine. Close to the lateral margin is a long spine. The antero-lateral lobes are produced in bifid spines.

[a] Crust. of Norway, II, 1899, pp. 109–110.

On either side of the head the lateral margin is produced in a large spine. Numerous small spines also beset the dorsal surface of the head. The first pair of antennæ have the first two articles about equal in length, the second a little more slender than the first; the third article is twice as long as the second. The flagellum is composed of twenty-three articles and extends about two-thirds the length of the fourth article of the peduncle of the second pair of antennæ. The first three articles of the peduncle of the second pair of antennæ are short and beset with numerous spines; the fourth article is very

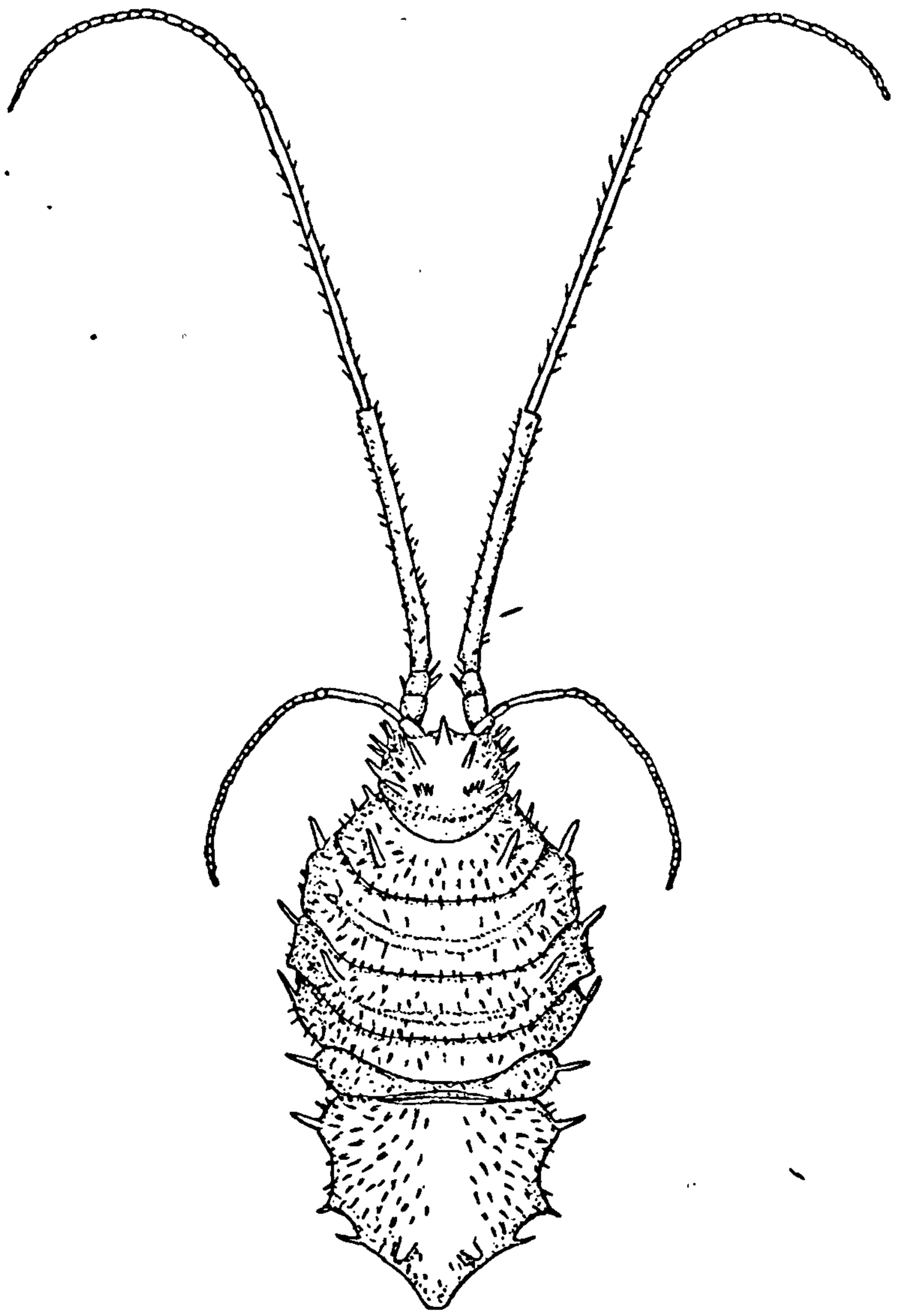

FIG. 541.—MUNNA CÆCA. × 6.

long; the fifth is equal in length to the fourth. The flagellum is composed of about twenty-seven articles.

The first four segments of the thorax are the largest. The thorax is broadest about the third and fourth segments. The following three segments become gradually much narrower and shorter. The first segment is beset with numerous long, slender spines. There is a long, conspicuous spine on either side of the lateral margin of each segment, and numerous spines, both long and short, with stiff hairs on the dorsal

surface. A long, conspicuous spine projects forward on either side of the first thoracic segment at the place of union of the lateral part of the segment with the dorsal portion. The same occurs on the third segment.

The abdomen tapers to a bluntly pointed extremity. About two-thirds the distance between the base and the extremity are two strong tubercles, one on either side of the median line. On either side of the median line, where there is a comparatively smooth area, the surface of the abdomen is covered with long and short spines. There are also two long spines on either side of the lateral margin near the middle of the segment, and numerous ones near the base.

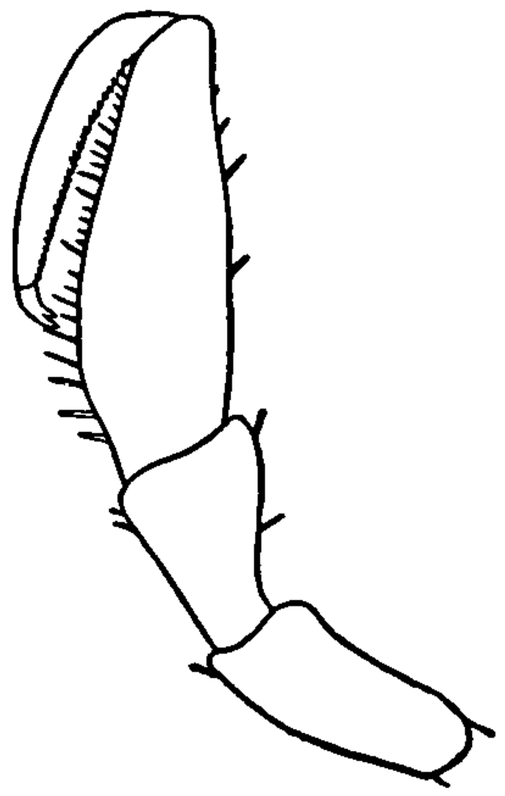

FIG. 542.—MUNNA CÆCA. FIRST LEG. × 15½.

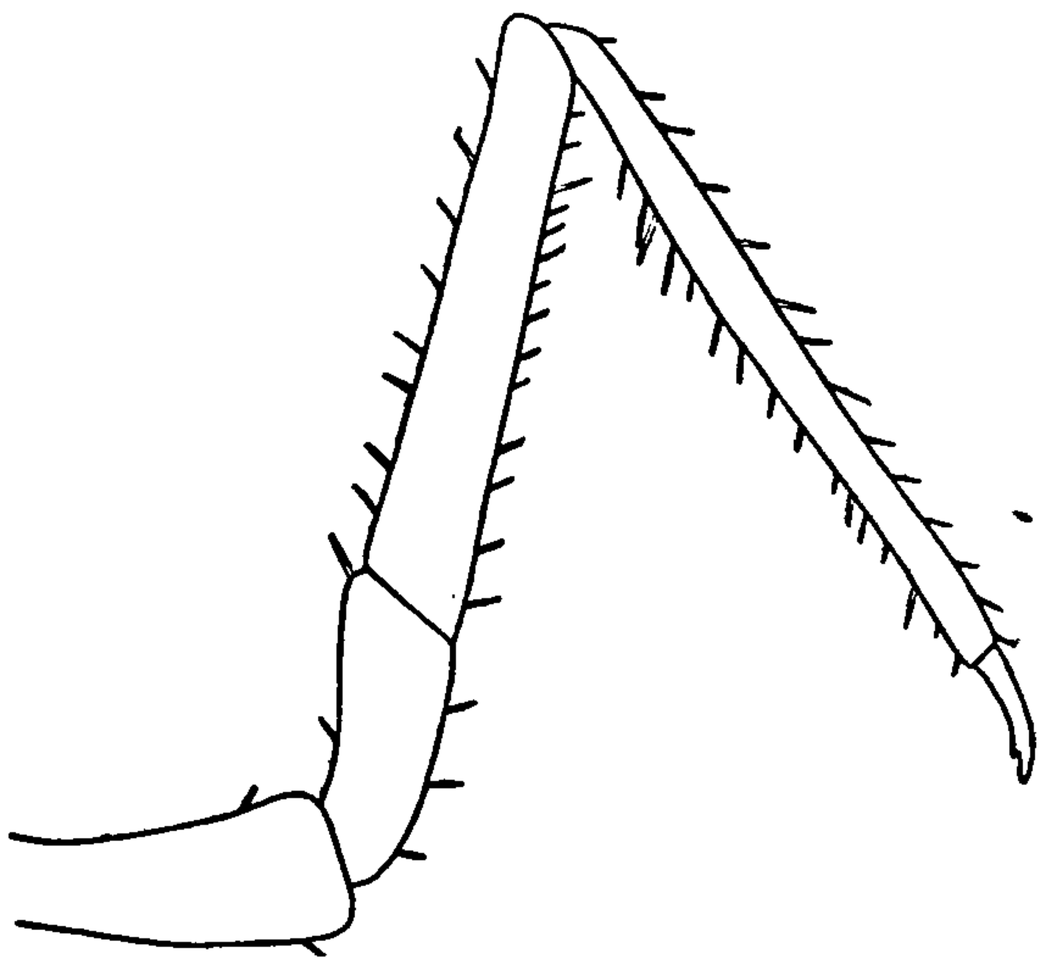

FIG. 543.—MUNNA CÆCA. SECOND LEG. × 15½.

The first pair of legs are prehensile. All the others are ambulatory, and very much elongated.

The uropoda are small, almost inconspicuous, single-branched, and composed of only one tiny article.

A single specimen of this species was collected by the U. S. Bureau of Fisheries steamer *Albatross* at Station 4390, off Santa Catalina Islands, coast of southern California, latitude 33° 2′ 15″ north, longitude 120° 42′ west. Depth, 2,182 fathoms. The type is in the U. S. National Museum, Cat. No. 32072.

Family XIX. MUNNOPSIDÆ.[a]

Eyes wanting. Two divisions of thorax sharply defined.

First pair of antennæ with flagellum well developed. Second pair of antennæ very much elongated.

First pair of legs generally smaller than the others, never subcheliform; three following pairs very much elongated and ambulatory in character; last three pairs of legs natatory in character, with some of the joints flattened and expanded, and fringed with plumose hairs.

Uropoda small.

Pleopoda as in the *Janiridæ*.

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[a] See Sars for characters of family, Crust. of Norway, II, 1899, p. 131.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY MUNNOPSIDÆ.

a. Head of moderate size, deeply emarginate on each side for the insertion of the antennæ, frontal part produced. First four thoracic segments transversely excavated dorsally. First pair of antennæ with flagellum multiarticulate. Natatory legs of the same structure, carpal joint foliaceous.

b. Body with anterior division much broader than posterior; three posterior segments densely crowded together. Mandibles without any molar expansion; cutting edge but slightly dentated. First two pairs of legs of same structure, though somewhat different in size; two succeeding pairs elongated. Dactylus wanting on natatory legs. Uropoda simple, biarticulate.

Genus *Munnopsis* M. Sars

b'. Body with anterior division less sharply marked off from posterior; three posterior segments very large and broad. Mandibles with molar expansion; cutting edge divided into strong teeth. First pairs of legs shorter than three succeeding pairs, which are subequal and very much elongated. Dactylus distinct on natatory legs. Uropoda biramous, branches single jointed.

Genus *Eurycope* G. O. Sars

a'. Head very large and broad, transversely truncated in front, lateral parts greatly expanded. First four thoracic segments slightly excavated transversely. First pair of antennæ with flagellum not much elongated. First two pairs of natatory legs of similar structure, carpal joint large and expanded, cordiform; last pair much narrower than two preceding pairs, carpal joint but slightly expanded. Caudal segment triangular in form...Genus *Ilyarachna* G. O. Sars

78. Genus MUNNOPSIS M. Sars.[a]

Anterior division of body broader than posterior division. Head moderately large, deeply emarginate on either side of a narrow frontal process. First pair of antennæ with a multiarticulate flagellum, longer in male than in female. Second pair of antennæ with the last two articles of the peduncle greatly elongated. Mandibles without molar expansion; cutting edge but slightly dentated.

First four segments of thorax transversely excavated dorsally; the three last segments crowded together and very convex.

Terminal segment of body large, oblong-ovate.

First two pairs of legs of similar structure, but differing in size; two following pairs exceedingly long and slender; natatory legs of similar structure, carpus and propodus expanded, dactylus wanting. Uropoda simple, biarticulate.

MUNNOPSIS TYPICA M. Sars.

Munnopsis typica M. Sars, Chr. Vid. Selsk. Forh., 1860, p. 84, 1861.—G. O. Sars, Chr. Vid. Selsk. Forh., 1863, p. 206, 1864; Nyt. Magazin for Naturvidenskaberne, 1866, p. 5.--M. Sars, Christ. Fjord Fauna, 1868, p. 70, pls. vi, vii, figs. 101–138; Chr. Vid. Selsk. Forh., 1868, p. 261, 1869.—G. O. Sars, Nyt. Magazin for Naturvidenskaberne, 1869, p. 44; Chr. Vid. Selsk. Forh., 1872, p. 79, 1873.—Buchholz, Zweite Deutsche Nordpolfahrt, Crust., 1874, p. 285.—Heller, Denksch. Acad. Wiss. Wien, XXXV, 1878, p. (14) 38.—Norman, Proc. Royal Soc., XXV, 1876, p. 208.—G. O. Sars, Arch. Math. Nat., II,

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 132.

1877, p. 353 (253).—Miers, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 65.—Harger, Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Comm. of Fish and Fisheries, 1880, Pt. 6, pp. 330–332, pl. II, fig. 11. (See Harger for synonymy.)—Hansen, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 195.—Axel Ohlin, Akademisk Afhandling, XXII, 1895, p. 18.—Sars, Crust. of Norway, II, 1899, pp. 133–134, pls. LVII–LVIII.—Stebbing, Ann. Mag. Nat. Hist. (7), V, 1900, p. 14.—Ohlin, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 31–33.—Ortmann, Proc. Phil. Acad. Nat. Sci., 1901, p. 159.—Richardson, Proc. U. S. Nat. Mus.,.XXIII, 1901, p. 557.

Localities.—Bay of Fundy; Gulf of St. Lawrence; Baffin Bay; Davis Straits; Murchison Sound; latitude 72° 8′ north, longitude 74° 20′

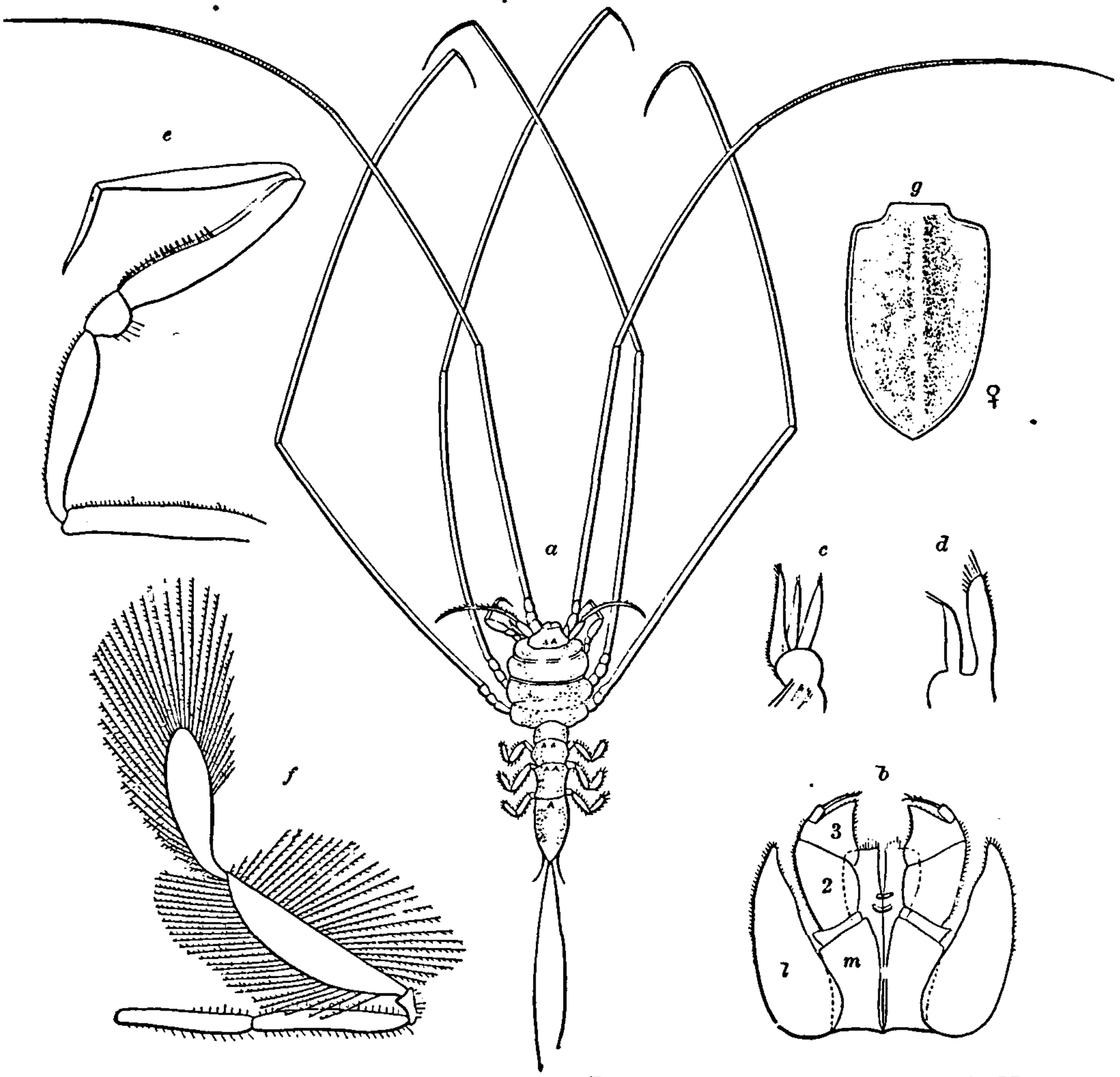

Fig. 544.—Munnopsis typica (After Harger). *a*, Dorsal view of male. × 2. *b*, Maxillipeds (*m*, basal segment; *l*, external lamella; 2 and 3, second and third segments of palp). *c*, Second maxilla. *d*, First maxilla. *e*, Second leg of male. *f*, One of natatory legs. *g*, Operculum.

west; latitude 71° 57′ north, longitude 73° 56′ west; latitude 69° 31′ north, longitude 56° 1′ west; Umanakfjord; latitude 71° 10′ north, longitude 58° 56′ west; Cape Napoleon, Grinnell Land, or latitude 79° 38′ north; Cape Frazer, or latitude 79° 44′ north; between Norway and Iceland; Christiania fjord; off Storeggen; Loffoden Islands; coast of Finmark; Spitzbergen; Arctic Ocean; Kara Sea; Foulke Fjord; Granville Bay; Olriks Bay.

Depth.—5 to 400 fathoms.

Ohlin says of the color: It is "somewhat light chestnut-brown, the second pair of antennæ and the third and fourth pair of pereiopoda of the same color, only darker, except a ring on the distal ends of the fourth and fifth joints of the antennæ and of the fourth joint of the pereiopoda, together with the whole fifth joint and the claw, which parts are white."[a]

Body narrow, elongate, the anterior portion, consisting of the head and the first four thoracic segments considerably wider than the

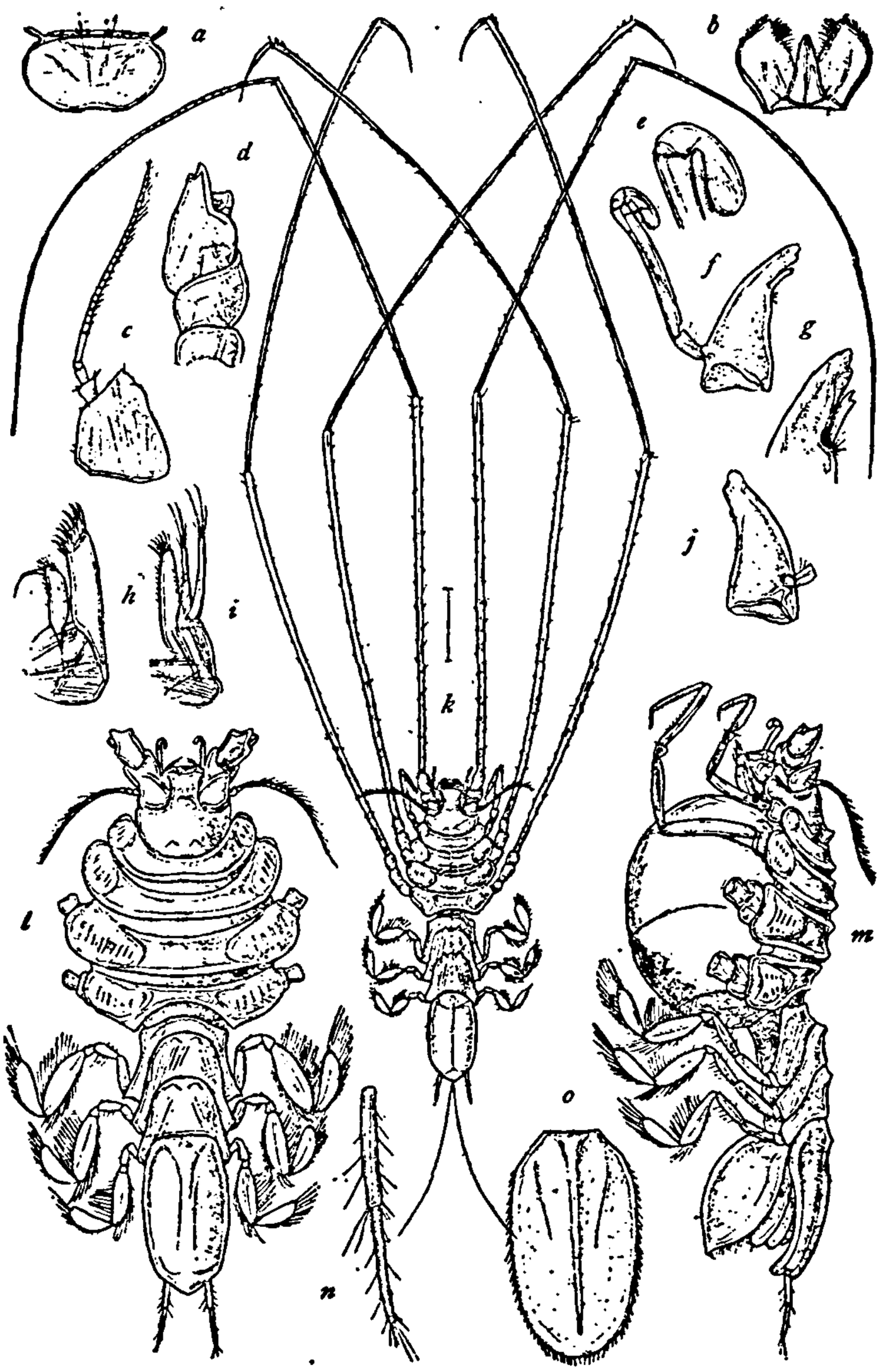

FIG. 545.—MUNNOPSIS TYPICA (AFTER G. O. SARS). *a*, UPPER LIP. *b*, LOWER LIP. *c*, FIRST ANTENNA. *d*, PART OF SECOND ANTENNA. *e*, END OF MANDIBULAR PALP. *f*, LEFT MANDIBLE. *g*, TIP OF LEFT MANDIBLE. *h*, FIRST MAXILLA. *i*, SECOND MAXILLA. *j*, RIGHT MANDIBLE. *k*, DORSAL VIEW OF MALE. *l*, DORSAL VIEW OF FEMALE. *m*, LATERAL VIEW OF FEMALE. *n*, UROPOD. *o*, FEMALE OPERCULUM.

posterior portion, consisting of the last three thoracic segments and the abdomen. Width of anterior portion, 5 mm. Width of posterior portion, 3 mm. Length of body, 13 mm.

Head with the anterior portion produced in the middle in a wide

[a] Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. IV, 1901, p. 33–34.

rostrum which is truncate in front. On either side of the rostrum there is an emargination for the reception of the basal articles of the first pair of antennæ. Eyes wanting. Two small spines are situated on the posterior margin, one on either side of the median line. The first pair of antennæ have the basal articles large and dilated. The second article is very small. The third article is about half as long as the second. The flagellum is composed of about twenty-nine articles

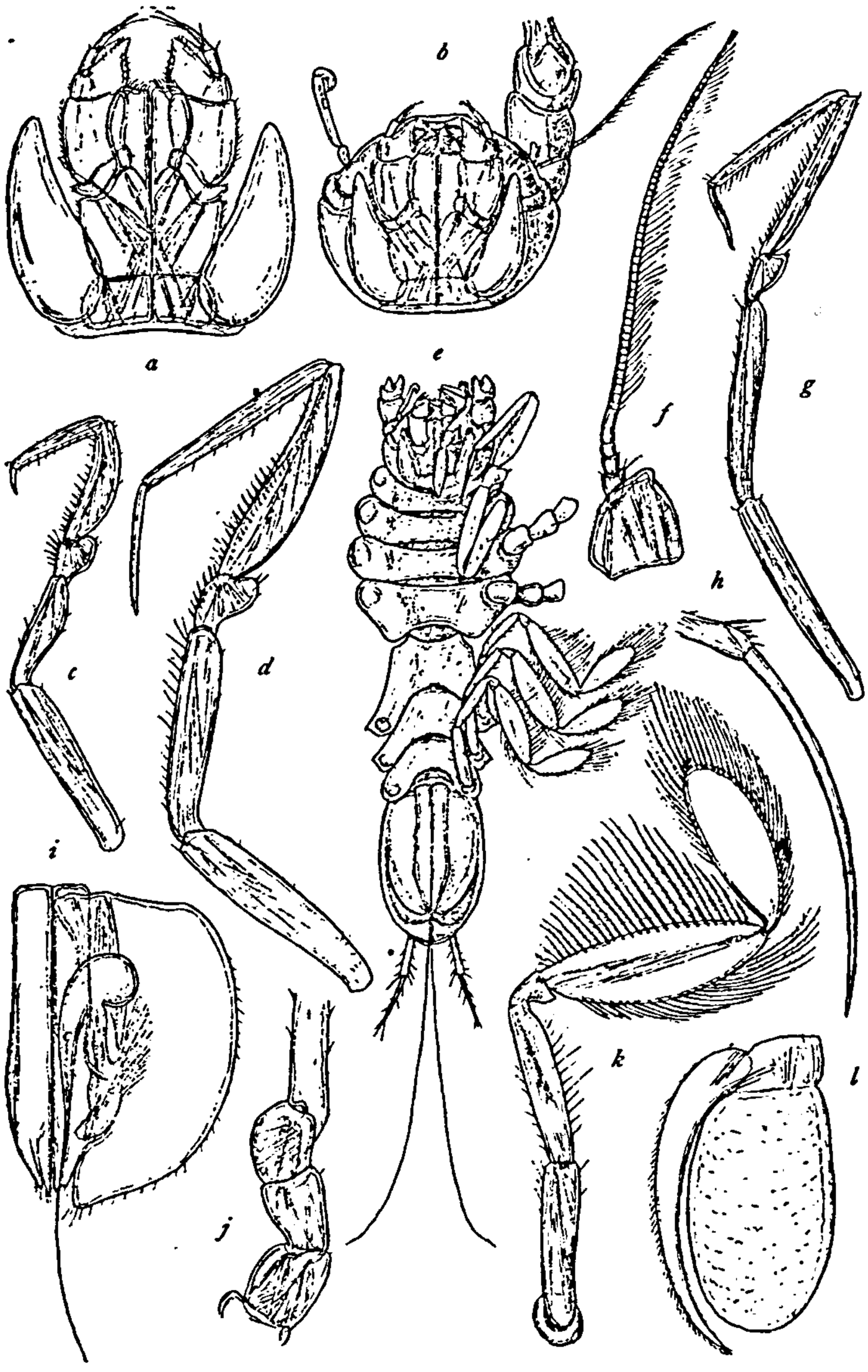

FIG. 546.—MUNNOPSIS TYPICA (AFTER G. O. SARS). *a*, MAXILLIPEDS. *b*, HEAD (VENTRAL VIEW). *c*, FIRST LEG OF MALE. *d*, SECOND LEG OF MALE. *e*, VENTRAL VIEW OF MALE. *f*, FIRST ANTENNA OF MALE. *g*, SECOND LEG OF FEMALE. *h*, EXTREMITY OF THIRD LEG. *i*, FIRST AND SECOND PLEOPODS OF MALE. *j*, THIRD LEG OF MALE. *k*, FIFTH LEG OF MALE. *l*, THIRD PLEOPOD OF FEMALE.

and extends to the middle of the second thoracic segment. The second pair of antennæ have the first three articles short and about subequal; the fourth article is equal in length to the first three taken together; the fifth is eight times longer than the fourth article; the sixth is about as long as the fifth. The flagellum is composed of numerous articles. The second pair of antennæ are many times longer than the body.

The first two segments of the thorax are about equal in length. The third and fourth are slightly longer. The segments increase a little in width from the first to the fourth. The last three segments are abruptly narrower than the first four. The fifth, sixth, and seventh are equal in length, and the last two bear each two spines near the anterior margin, one on either side of the median line. The post-lateral angles of the fifth and sixth segments are produced in a small small spine on either side.

The abdomen is composed of a single segment, narrow, elongate, with the sides rounded and the posterior margin triangular between the small post-lateral angles. At the base of the segment is a small median spine. The uropoda are simple, single-branched, with each branch composed of two articles.

The legs are differentiated in two series. The four anterior pairs are ambulatory; the three posterior pairs natatory. The legs of the first four pairs are of different lengths. Those of the first pair are the shortest, the second pair being somewhat more elongated. The third and fourth pairs are greatly elongated, being many times longer than the body, the basis, ischium, and merus being short, the carpus and propodus enormously elongated. The carpus is 13 mm. long. (In a larger specimen it is 21 mm. long and the propodus 26 mm. long.) The last three pairs of legs are natatory, with the carpus and propodus enlarged and fringed with long hairs.

The operculum of the female has a longitudinal median keel or crest. The fifth segment of the thorax on the ventral side has a conspicuous median spine. There is a smaller one on the ventral side of the sixth segment also.

79. Genus EURYCOPE G. O. Sars.[a]

Body compact, depressed, oval in outline. Anterior division of thorax less sharply marked off from posterior division.

Head moderately large, deeply emarginate on either side of a frontal process. First pair of antennæ with multi-articulate flagellum. Second pair of antennæ elongated. Mandibles with molar expansion and cutting edge divided into strong teeth.

Four anterior segments of thorax short, subequal, transversely excavated dorsally; the three posterior segments very large and broad, convex.

First pair of legs shorter than three following pairs, which are subequal and very much elongated; natatory legs of similar structure with dactylus distinct, and carpus and propodus expanded. Uropoda small, double-branched, branches uniarticulate.

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, p. 144.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS EURYCOPE.

a. Front of head produced to an acute rostriform projection. Base of head without short transverse ridge. First, second, third, and fourth segments smooth, and produced on each side to acute, anteriorly pointed lappets. Three posterior segments smooth, with antero-lateral angles acutely produced. Caudal segment large, semioval in form, edges evenly curved, and perfectly smooth.

Eurycope cornuta G. O. Sars

a'. Front of head has appearance of rostral point caused by frontal margin extending between antennulæ. Base of head with short transverse, tubercular ridge; two oblong, low tubercles situated behind peduncles of antennulæ. First segment of thorax with transverse groove. Second, third, and fourth segments have deep transverse depressions, with a sharp spine on anterior portion of each segment, and a compressed protuberance on the posterior portion. Antero-lateral angles of each of these segments produced in short, sharp spines. Epimera of first segment has a single spine, of three following segments two spines each. Three posterior segments of thorax have each two spines, one on either side of median line. Spine present at base of abdomen. At extremity of terminal segment is a spine, on either side of which is a lateral triangular spine....*Eurycope caribbea* Benedict

EURYCOPE CORNUTA G. O. Sars.

Eurycope cornuta G. O. Sars, Chr. Vid. Selsk. Forhandl., 1863, p. 5, 1864.

Eurycope robusta Harger, Am. Jour. Sci. (3), XV, 1878, p. 375; Proc. U. S. Nat. Mus., II, 1879, p. 159; Report U. S. Commissioner of Fish and Fisheries, 1880, Pt. 6, pp. 332–334, pl. III, fig. 15.—Hansen, Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 1887–88, pp. 195–196.

Eurycope cornuta Sars, Crust. Norway, II, 1899, p. 145, pl. LXIV.—Richardson, American Naturalist, XXXIV, 1900, p. 301; Proc. U. S. Nat. Mus., XXIII, 1901, p. 558.

Localities.—Gulf of St. Lawrence; Atlantic coast of North America; also coast of Norway; Skagerak; Umanakfjord, Greenland; Kara Sea; latitude 71° 10′ north, longitude 58° 56′ west.

Depth.—50 to 400 fathoms.

"Body oblong oval in outline, being more than twice as long as it is broad, and with the anterior division not attaining half the length of the posterior. Cephalon with the lateral corners pointed, front produced to an acute, rostriform projection, which, however, does not extend to the end of the basal joint of the superior antennæ. The four anterior segments of mesosome comparatively short, and produced on each side to acute, anteriorly pointed lappets. The three posterior segments of mesosome of nearly equal size, and distinctly defined, antero-lateral corners acutely produced. Caudal segment very large, nearly as long as the two preceding segments combined, semi-oval in form, edges evenly curved and perfectly smooth, antero-lateral corners projecting. Superior antennæ in male fully half the length of the body, in female somewhat shorter, flagellum very slender and flexible, being composed of twenty in female, in male of about fifty articulations, carrying delicate sensory filaments. Inferior antennæ more than three

times as long as the body, penultimate joint of the peduncle clothed everywhere with adpressed spines, some of which, attached to the inner edge and tip, are stronger than the others. Epignath of maxilliped securiform, outer edge angularly produced. First pair of legs with the propodus much shorter than the carpus, both simple, linear, and clothed with short bristles, dactylus very small; the succeeding pairs very slender, somewhat exceeding the body in length. Natatory

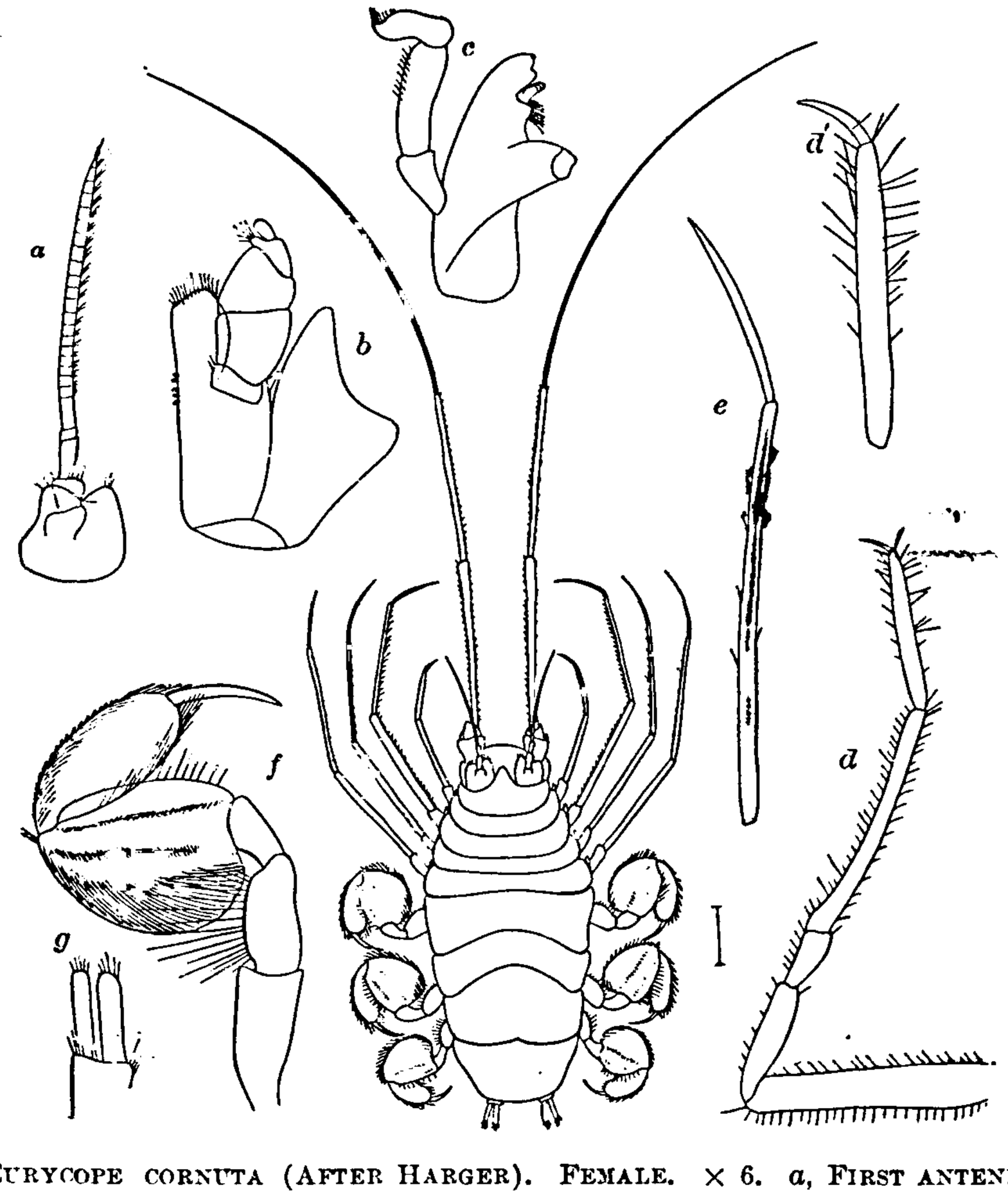

FIG. 547.—EURYCOPE CORNUTA (AFTER HARGER). FEMALE. × 6. *a*, FIRST ANTENNA. × 20. *b*, MAXILLIPED. × 20. *c*, MANDIBLE. × 20. *d*, FIRST LEG. × 20. *d'*, PROPODUS AND DACTYLUS OF SAME. × 38. *e*, PROPODUS AND DACTYLUS OF SECOND LEG. × 20. *f*, SIXTH LEG. × 20. *g*, UROPOD. × 20.

legs with the carpal joint cordiform, propodal one of about the same length, but somewhat narrower, oblong oval, dactylus scarcely exceeding half the length of the former. Female operculum subpentagonal in form, and distinctly carinated along the middle; male operculum transformed in the usual manner. Uropoda with the rami subequal in length, the outer one narrower than the inner. Color of the whole dorsal face light reddish brown. Length of adult male 4 mm."—G. O. SARS.[a]

[a] Crust. of Norway, II, 1899, p. 145.

EURYCOPE CARIBBEA Benedict.

Eurycope caribbea BENEDICT, in RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 558–560.

Locality.—Windward Islands, West Indies.

Depth.—687 fathoms.

The head is much wider than long. From the point between the antennulæ a depression curves backward and outward to the post-lateral margin. On the base of the head is a short, transverse, tubercular ridge. Two oblong, low tubercles are situated closely behind the peduncles of the antennulæ. The sides of the head are swollen. The peduncles of the antennæ and antennulæ occupy a space inclosed by the front and sides of the head; the margin surrounding these appendages is strongly raised.

The front of the head running between the antennulæ has the appearance of a rostral point; here the raised margins unite in the narrowest place and then immediately diverge and extend downward perpendicularly and around underneath the appendages, where they meet and lap with the produced and bent antero-lateral projections. The first joint of the peduncles of the antenna is very stout, with numerous depressions and prominences; the fourth segment is very long; the terminal portions are broken in all the specimens. The first joint of the peduncle of the antennula is excavated on one side to receive the curvature of the antennal peduncle; the other segments of the peduncle are very small; the flagellum is long and slender, with a great number of articles.

The first segment of the thorax is very narrow; nearly the whole surface is occupied by a transverse groove; on the median line and posterior ridge is a prominent granule; the antéro-lateral angles of this segment are rounded. The second, third, and fourth segments are also short and have deep transverse depressions which are much narrower than the one in the first segment; on the median line of these segments the space between the groove or depression and the anterior margin is occupied by the compressed base of a sharp spine which is directed forward; between the depression and the posterior margin is a compressed protuberance; between the protuberances the transverse groove runs as a narrow cut rounded and enlarged at the bottom. The antero-lateral angles of the second, third, and fourth segments are produced forward in short, sharp spines.

The epimera of the four anterior segments have projecting spines; the first having a single spine, the other three having two spines each. The three posterior segments of the thorax are very much the same as in *E. fragilis;* the spines on either side of the median line decrease in size successively.

The spine on the base of the abdomen is short; there are two con-

spicuous granules nearly in the center and bottom of the two longitudinal depressions. The extremity of the abdomen is formed by a decurved spine; the upper surface of the spine is concave; on either side of the base of the terminal spine is a lateral triangular spine; these lateral spines do not in any measure curve forward, as is the case with *E. fragilis*.

On the median line of the ventral surface of the thorax there is a sharp, curved spine on the first segment, prominent longitudinal

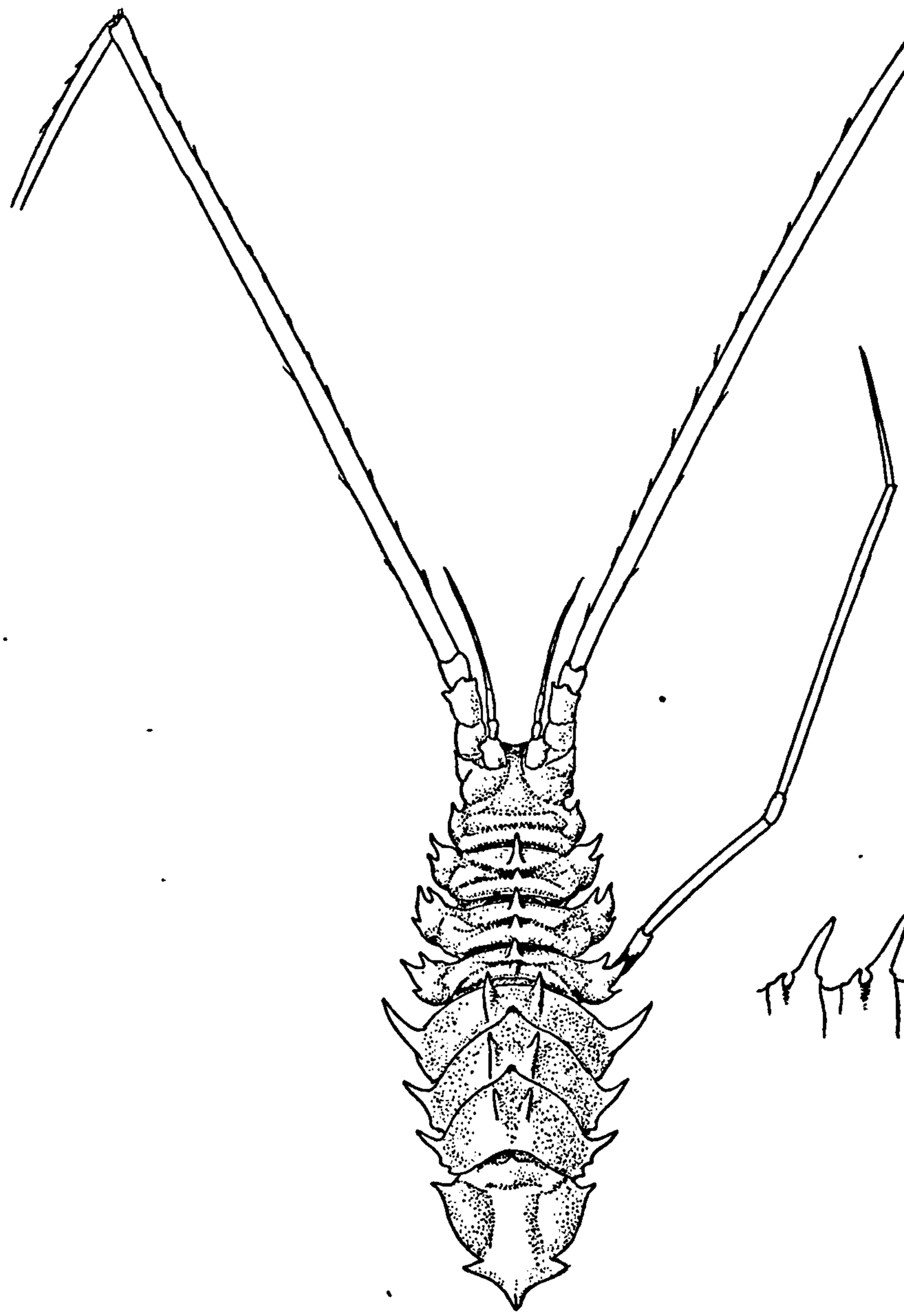

FIG. 548.—EURYCOPE CARIBBEA.

ridges on the second, third, and fourth segments, and a spiny tubercle followed by four longitudinal ridges. The ridges are separated by transverse grooves on the coalesced fifth, sixth, and seventh segments.

Type.—Cat. No. 23911, U.S.N.M.[a]

[a] This description is from Doctor Benedict's manuscript.

80. Genus ILYARACHNA G. O. Sars.[a]

Body compact, attenuated behind, with a strongly marked median constriction.

Head very large and broad, transversely truncated in front, lateral parts greatly expanded. First pair of antennæ with flagellum not much elongated. Second pair of antennæ longer than the body. Mandibles with molar expansion; cutting edge not divided; palp feeble.

The first four segments of the thorax crowded together and slightly excavated transversely; last three segments large and convex, the fifth segment scarcely narrower than the preceding segments.

Terminal segment of body narrow and triangular.

First pair of legs small, simple; second pair larger; two following pairs slender and elongated; first two pairs of natatory legs of similar structure; carpus expanded, cordiform, propodus much narrower, oblong, dactylus well developed; last pair much narrower with carpus but slightly expanded, propodus linear, dactylus elongated.

Uropoda small, biarticulate.

ILYARACHNA HIRTICEPS G. O. Sars.

Ilyarachna hirticeps Sars, Forh. Vid. Selsk. i Christiania, 1869, p. 167, 1870.—Hansen, Vid. Medd. naturh. Foren. i Kjøbh., 1887–88, p. 195.—Sars, Crust. of Norway, II, 1899, p. 137, pl. lx.—Richardson, American Naturalist, XXXIV, 1900, p. 301; Proc. U. S. Nat. Mus., XXIII, 1901, p. 560.—Ohlin, Bihang till K. Sv. Vet.-Akad. Handl., XXVI, Afd. iv, No. 12, 1901, pp. 35–36.

Localities.—Latitude 66° 32′ north, longitude 55° 34′ west; latitude 71° 10′ north, longitude 58° 56′ west; latitude 72° 41′ north, longitude 59° 50′ west. (Greenland.)

Depth.—100–227 fathoms; 20 to 435 meters (Ohlin).

"Body of a similar appearance to that in the type species, but more than twice as large, and somewhat more robust. Cephalon very broad, with the dorsal face strongly vaulted, and densely clothed with short, stout bristles. Anterior edge of the first four segments of mesosome very distinctly elevated, and minutely crenulated throughout; lateral parts of first segment imperfectly developed. The three posterior segments of mesosome combined about the length of the preceding part of the body; the anterior segment evenly emarginated behind. Caudal segment of a similar form to that in *I. longicornis*. Superior antennæ comparatively short, not nearly reaching to the middle of the penultimate peduncular joint of the inferior ones, basal joint armed along the inner edge with scattered denticles, flagellum, in female, not attaining the length of the last two peduncular joints combined.

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 134–135.

Inferior antennæ scarcely twice as long as the body, penultimate joint of the peduncle armed inside with seven strong spines. Legs, on the whole, resembling in structure those in the type species, though the third and fourth pairs are somewhat less elongated, and the natatory

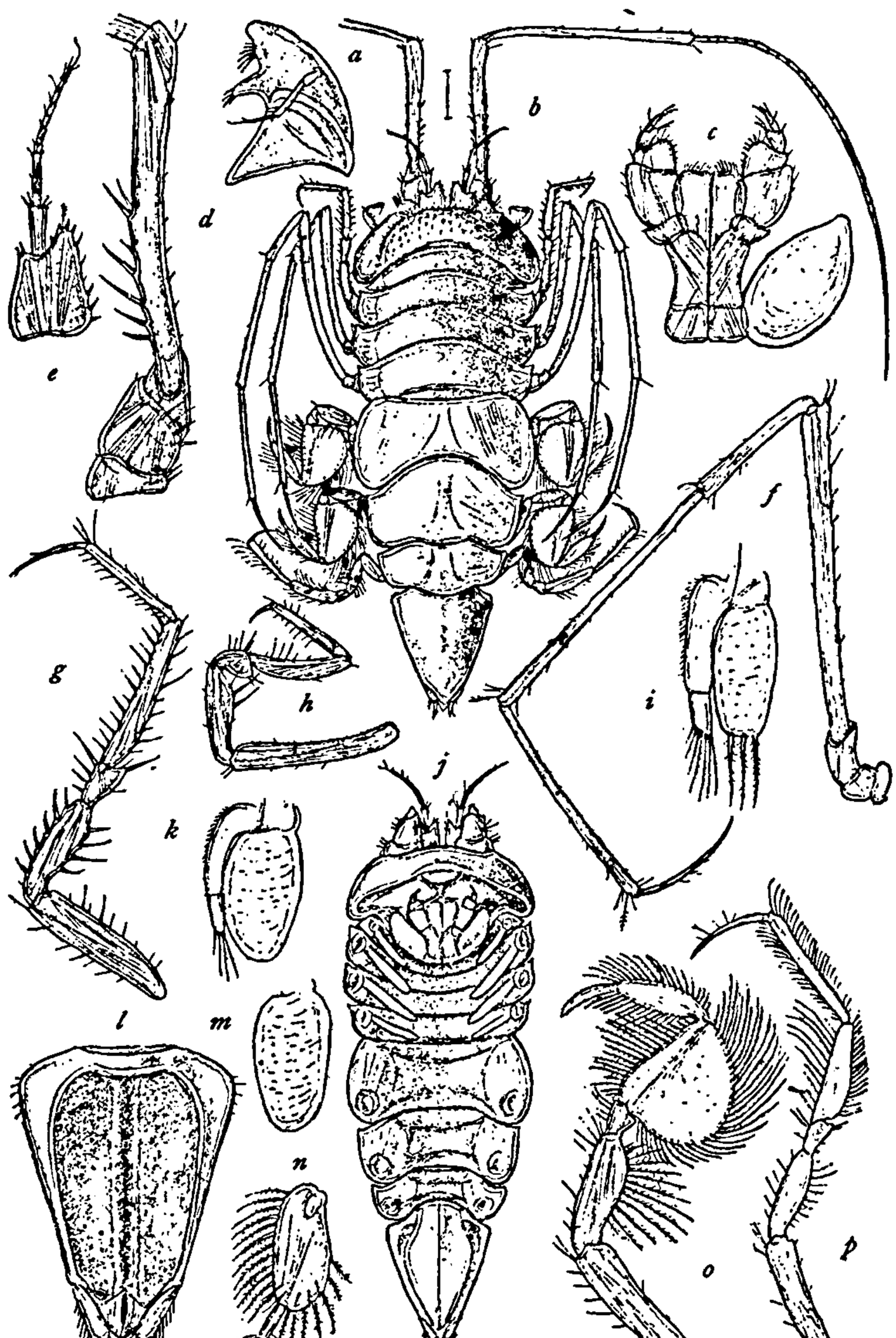

FIG. 549.—ILYARACHNA HIRTICEPS (AFTER SARS). *a*, MANDIBLE. *b*, DORSAL VIEW OF FEMALE. *c*, MAXILLIPEDS. *d*, SECOND ANTENNA. *e*, FIRST ANTENNA. *f*, SECOND ANTENNA. *g*, SECOND LEG. *h*, FIRST LEG. *i*, THIRD PLEOPOD. *j*, VENTRAL VIEW OF FEMALE. *k*, FOURTH PLEOPOD. *l*, ABDOMEN (VENTRAL VIEW). *m*, FIFTH PLEOPOD. *n*, UROPOD. *o*, FIFTH LEG. *p*, SEVENTH LEG.

legs more densely fringed with setæ. Uropoda with the proximal joint rather large, and somewhat widening distally, marginal setæ about 20 in number, distal joint very narrow, linear. Color whitish grey. Length of adult female 7½ mm."—G. O. SARS.[a]

[a] Crust. of Norway, II, 1899, p. 137.

V. BOPYROIDEA OR EPICARIDEA.[a]

Parasitic forms, ectoparasites, their hosts being other crustacea. Sexual dimorphism in all the forms is strongly marked.

Female is often very asymmetrical; segmentation is sometimes entirely lost.

Head usually carries two pairs of rudimentary antennæ. Mouth parts are reduced, the mandibles and maxillipeds only being developed.

Rudiments of the second maxillæ sometimes present.

Legs, when present, are prehensile.

Pleopods, in adult, all branchial in character.

Uropoda simple, usually very small, and terminal.

Male, when compared with female, is of diminutive size, and different in appearance from female. Development is in the form of a regressive metamorphosis; there are two and in some forms three larval stages.

ANALYTICAL KEY TO THE FAMILIES OF BOPYROIDEA.

a. Body of female not a simple sac filled with eggs, and having true limbs and some or all of the appendages. Male passing beyond the last larval stage of female into a stage different from it.

b. Body of female distinctly segmented, more or less asymmetrical, twisted either to right or left. Maxillipeds lamellar, biarticulate, and more frequently exhibiting a small terminal joint. Legs in seven pairs, sometimes obsolete on one side with the exception of the first. Five pairs of incubatory plates present, more or less arching over the ventral surface of the thorax. Pleopoda simple, biramous or triramous, all of the same structure, rarely obsolete. Male with all the segments of the thorax sharply defined. Last larval stage with the flagellum of the second antennæ composed of four articles; legs of uniform structure; uropoda with inner branch shorter than outer. Parasitic on decapodous crustacea .....Family XX. BOPYRIDÆ

b'. Body of female perfectly symmetrical, the segmentation, when present, only visible in the middle of the dorsal face. Maxillipeds lamellar, without any terminal joint. Only five pairs of legs present. Incubatory plates comparatively small, sometimes greatly reduced in number, and scarcely at all partaking in the formation of the marsupium, which constitutes two separate cavities bounded by the lateral walls of the body. Pleopoda generally rudimentary or wholly absent. Male with head and first segment of thorax coalesced. Last larval stage with the flagellum of the second antennæ composed of five articles; legs of the first pair shorter and thicker than the others; uropoda with the branches subequal. Parasitic on *Schizopoda*.

Family XXI. DAJIDÆ

a'. Body of female forming a simple sac, with no true limbs, and all or most of the appendages lost. Male not different from last larval stage of female, and not passing beyond this stage.....Family XXII. CRYPTONISCIDÆ

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[a] See G. O. Sars for characters of tribe or superfamily, Crust. of Norway, II, 1899, pp. 193–194.

Family XX. BOPYRIDÆ.[a]

Body of female distinctly segmented and somewhat asymmetrical.

Both pairs of antennæ rudimentary. Maxillipeds composed of two articles, and very frequently with a small terminal article, the palp; two curved lanceolate appendages at the base represent the epignaths.

Coxal plates usually defined.

There are five pairs of incubatory lamellæ; the first pair is composed of two segments.

Abdomen more or less distinctly defined. Pleopoda simple, biramous, or triramous; sometimes obsolete. Uropoda, when present, simple, lanceolate.

Legs usually in seven pairs, sometimes absent on one side with the exception of the first; all are similar in structure, short, prehensile.

Male symmetrical. Head rounded in front. All seven segments of thorax distinct. Segments of abdomen sometimes distinct, sometimes united. Legs similar in structure, all prehensile.

Parasitic on decapods.

ANALYTICAL KEY TO THE GENERA OF THE FAMILY BOPYRIDÆ.

a. Body of female with one side greatly swollen and much longer than other side. Abdomen composed of only five segments. Only first leg present on larger side; others absent. Coxal plates only visible on shorter side. Marsupial plates largely developed on longer side of body, and inclosing the entire incubatory cavity; incubatory lamellæ of shorter side small.

Genus *Phryxus* Rathke

a′. Body of female with neither side swollen. Abdomen usually composed of six segments. All the legs of both sides present.

b. Abdomen of female with the lateral parts or pleural lamellæ elongated, digitate.

c. All six segments of the abdomen with the pleural parts elongated, digitate. Male with the lateral parts of the segments of the abdomen or pleural lamellæ elongate.....Genus *Ione* Latreille

c′. Only the five anterior segments of the abdomen with the pleural parts elongated, digitate. Male with the lateral parts of the segments of the abdomen not elongate.

d. Female without median dorsal tubercles on sixth and seventh segments of thorax. Exopods present on all seven pairs of legs. Uropoda of male filiform.....Genus *Leidya* Cornalia and Panceri

d′. Female with median dorsal tubercle on sixth and seventh thoracic segments. Exopods not developed on any of legs. Uropoda of male represented by two bunches of stiff hairs.

Genus *Grapsicepon* Giard and Bonnier

b′. Abdomen of female with the lateral parts or pleural lamellæ not elongated or digitate.

c. Lateral parts or pleural lamellæ of abdomen of female produced lamellarly.

d. Uropoda in female double-branched. Abdomen in male with segments fused.....Genus *Munidion* Hansen

d′. Uropoda in female single-branched. Abdomen in male with segments distinct.

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[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 195–196.

e. Sixth abdominal segment in male with post-lateral angles produced in long processes.....Genus *Cryptione* Hansen
e′. Sixth abdominal segment in male with post-lateral angles not produced in long processes.....Genus *Pseudione* Kossmann
c′. Lateral parts or pleural lamellæ of abdomen of female rudimentary or absent.
d. Pleopods present in female.
e. Some or all of pleopoda in female tri-ramous.
f. All the pleopoda in female tri-ramous. Sixth segment of thorax greatly longer than any of others. Uropoda in female oval, with a small conical process between them.....Genus *Stegophryxus* Thompson
f′. First three pairs of pleopods tri-ramous; last two pairs bi-ramous. Sixth segment of the thorax not greatly longer than any of the others. Uropoda elongated, with no process between them.
Genus *Stegias* Richardson
e′. None of pleopoda tri-ramous in female.
f. Pleopoda bi-ramous in female.
g. Uropoda present in female.
h. Uropoda bi-ramous in female.....Genus *Bathygyge* Hansen
h′. Uropoda simple, single-branched in female.
i. Both branches of pleopoda in adult female similar in size and shape, narrow, elongated. Male with segments of abdomen distinct and with a pair of elongated appendages to each of the first five segments. Uropoda present in male, single-branched. First abdominal segment in both sexes furnished with two dorsal papillæ.....Genus *Phyllodurus* Stimpson
i′. Branches of pleopoda in adult female unlike; outer branch narrow, elongated; inner branch oval, small. Male with segments of abdomen fused and without any appendages to the abdomen; without uropoda. First abdominal segment in both sexes not furnished with two dorsal papillæ.
j. Posterior lobe of lateral margins of all the segments of the thorax more or less produced into processes. Abdomen of male narrow, tapering, not furnished with dorsal tubercle.
Genus *Argeia* Dana
j′. Posterior lobe of lateral margins of thoracic segments not produced into processes. Abdomen of male large, rounded, and furnished with a prominent median dorsal tubercle near the base.....Genus *Parargeia* Hansen
g′. Uropoda wanting in female.
h. Segments of abdomen fused in male. Segments of abdomen distinct in female.....Genus *Probopyrus* Giard and Bonnier
h′. First three segments of abdomen distinct in male; last three segments fused. First four segments of abdomen distinct in female; last two segments fused .....Genus *Bopyriscus*, new genus
f′. Pleopoda simple, single-branched in female.
Genus *Bopyrina* Kossmann.
d′. Pleopoda wanting in female.....Genus *Bopyroides* Stimpson

81. Genus PHRYXUS Rathke.[a]

Abdominal parasites.

Body of female very asymmetrical, one side being very much larger than the other.

[a] See Sars for characters of genus, Crust. of Norway, II, 1899, pp. 214–215.

Segments of thorax distinct on the dorsal surface. Lateral parts of thoracic segments and epimera defined only on the shorter side.

Abdomen consists of five segments only; the fifth or terminal segment is small and narrow, bifid at the tip.

Palp of the maxillipeds wanting.

Incubatory plates of the longer side large and well developed and concealing the entire incubatory pouch; those of the shorter side very small.

Legs of the larger side of the body all wanting, with the exception of the first one.

There are four pairs of single-branched pleopoda, the lamellæ of the longer side of the body being larger than those of the opposite side.

Male with all the segments of the thorax distinct; those of the abdomen fused, though more or less indicated at the sides, on the lateral margins. Uropoda wanting. Pleopoda wanting.

PHRYXUS ABDOMINALIS (Krøyer).

Bopyrus abdominalis KRØYER, Nat. Tidsskr., III, 1840–1841, pp. 102–112, 289–299, pls. I, II; Kongelige Danske Videnskabenes Selskabs naturvidenskabelige og mathematiske Afhandlinger, IX, 1842, p. 263.

Phryxus hippolytes RATHKE, Nova Acta Academiæ Cæsariæ Leopoldino-Carolinæ Naturæ Curiosorum, 1843, p. 40, pl. II, figs. 1–10.

Bopyrus abdominalis KRØYER, Voy. en Scand., Crust., 1849, pl. XXIX, fig. 1.

Phryxus abdominalis LILLJEBORG, Œfvers. Kongl. Vet. Akad. Forh., IX, 1852, p. 11.—STEENSTRUP and LÜTKEN, Vidensk. Meddelelser, 1861, p. 275 (9) 1862.—BATE and WESTWOOD, Brit. Sessil-eyed Crust., II, 1868, p. 234.—NORMAN, Rep. Brit. Assoc., 1869, p. 288; Proc. Royal Soc. Lond., XXV, 1876, p. 209.—MIERS, Ann. Mag. Nat. Hist. (4), XIX, 1877, p. 65 (15).—SMITH in HARGER, Proc. U. S. Nat. Mus., II, 1879, p. 158.—HARGER, Rep. U. S. Fish Comm., 1880, Pt. 6, p. 312.—HANSEN, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn, 1887–88, p. 196.—AXEL OHLIN, Akademisk Afhandling, XXII, 1895, pp. 18–19; Bihang till K. Svenska Vet.-Akad. Handl., XXVI, Afd. IV, No. 12, 1901, pp. 38–39.—SARS, Crust. of Norway, II, 1899, pp. 215–217. pls. XC, XCI.—RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 577; XXVII, 1904, pp. 58–59; Bull. U. S. Fish Comm., XXIV, 1905, p. 220.

Localities.—Circumpolar in distribution.

Atlantic coast localities: Massachusetts Bay, on *Pandalus borealis*, *Spirontocaris spinus*, *S. liljeborgii*, and *Pandalus montagui;* Cashes Ledge, Gulf of Maine, on *Pandalus borealis* and *S. pusiola;* Georges Bank on *Pandalus leptocerus;* Halifax, Nova Scotia, on *S. pusiola*, *S. spinus*, and *S. liljeborgii;* northeastern part of Grand Bank on *S. gaimardii* and *S. gibba;* Cape Cod on *P. montagui*, *P. leptocerus*, *S. liljeborgii*, *S. pusiola*, and *S. polaris;* Grinnell Land, Discovery Bay, Greenland, Cape Dudley Digges on *S. phippsii* and *S. polaris;* Inglefield Gulf on *S. polaris;* latitude 73° 48′ north, longitude 80° 30′ west, on *S. polaris;* latitude 64° 56′ north, longitude 66° 18′ west, on *S. phippsii;* off Marthas Vineyard, on *Pandalus leptocerus* and *S. lilje-*

borgii; Casco Bay, Maine, on *P. borealis;* West Greenland; North Greenland; Baffin Land; East Greenland.

Pacific coast localities: Admiralty Inlet, Puget Sound, Washington, on *Spirontocaris grœnlandica;* off North Head, Akutan Island, Alaska, on *S. arcuata;* Straits of Fuca, between Washington and Vancouver Island, on *S. townsendi;* Admiralty Inlet, Puget Sound, Washington, on *S. tridens;* Washington Sound, Straits of Fuca, Washington, on *S.*

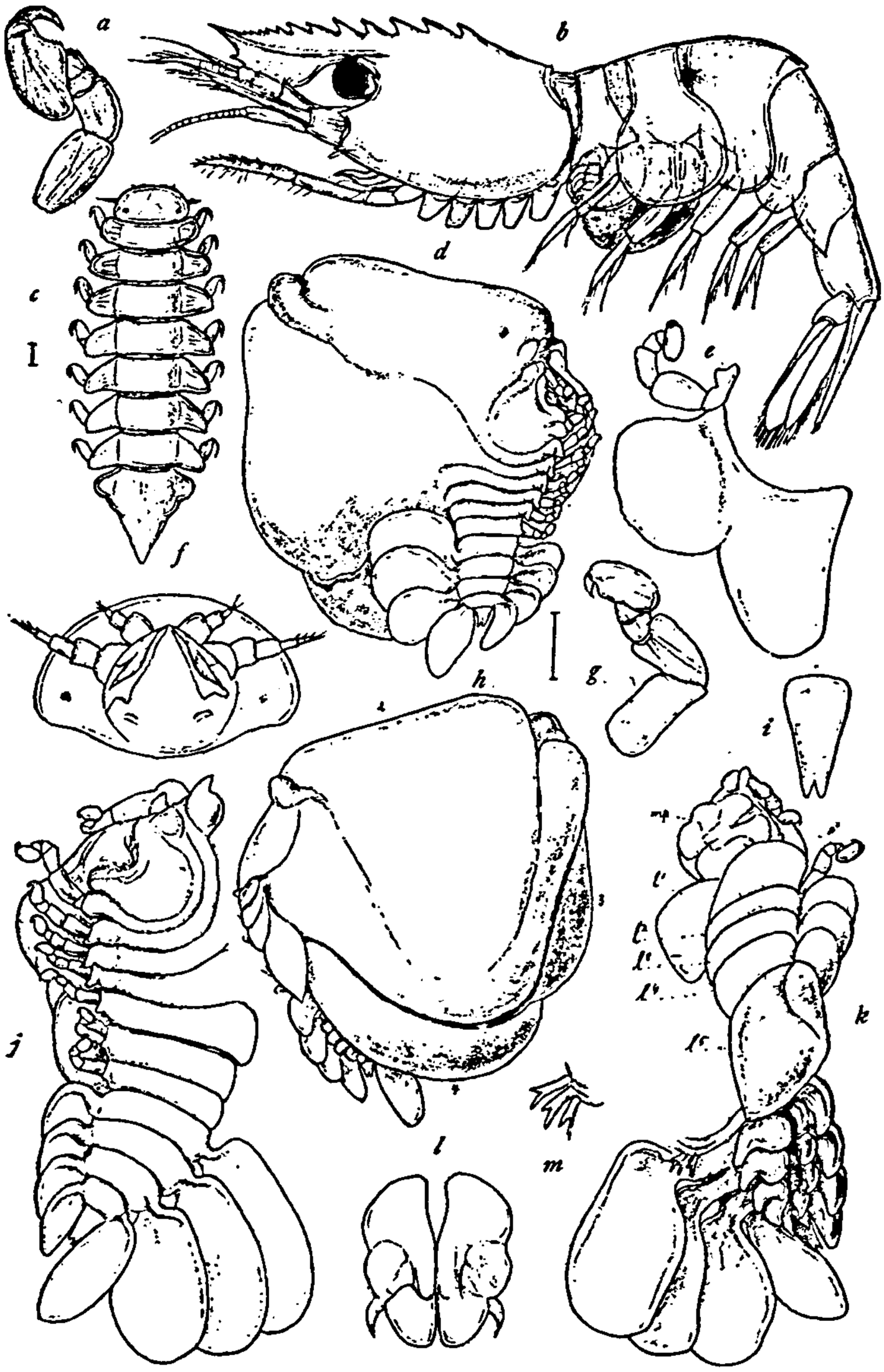

FIG. 550.—PHRYXUS ABDOMINALIS (AFTER SARS). *a*, LEG OF MALE. *b*, SPECIMEN OF SPIRONTOCARIS LILLJEBORGII INFESTED WITH PARASITE. *c*, MALE (DORSAL VIEW). *d*, DORSAL VIEW OF FEMALE. *e*, FIRST LEG OF FEMALE. *f*, HEAD OF MALE (VENTRAL VIEW). *g*, FOURTH LEG OF FEMALE. *h*, VENTRAL VIEW OF FEMALE. *i*, LAST SEGMENT OF ABDOMEN OF FEMALE. *j*, RIGHT PART OF BODY OF FEMALE. *k*, SAME (VENTRAL SIDE). *l*, MAXILLIPEDS. *m*, FIFTH TO SEVENTH RUDIMENTARY LEGS.

tridens; off Queen Charlotte Sound, British Columbia, on *S. macrophthalma;* off Yahwhit Head, Washington, on *S. nacrophthalma;* Iliuliuk Harbor, Unalaska, on *S. suckleyi;* Arctic Ocean on *S. gaimardii belcheri* (Bell); Plover Bay, East Siberia, on *S. polaris* (Sabine); Alaska on *S. polaris* (Sabine); off Cape Strogonoff, Alaska, on *S. fabricii*

(Krøyer); off Shumagin Bank, Alaska, on *S. biunguis* Rathbun; off Point Arena, California, on *S. macrophthalma;* Straits of Fuca on *S. townsendi* Rathbun; Philippine Islands on *Plesionika semilævis* (according to Spence Bate);[a] Gulf of Georgia, off Nanaimo, Vancouver Island, British Columbia, on *Spirontocaris bispinosa* Holmes; Admiralty Inlet, vicinity of Port Townsend, on *Spirontocaris tridens* Rathbun; vicinity of Naha Bay, Behm Canal, southeast Alaska, on *Spirontocaris macrophthalma* Rathbun; Uyak Bay, Kadiak Island, on *Spirontocaris suckleyi* (Stimpson); latitude 66° 30′ north, longitude 54° 50′ west, on *Pandalus montagui* Leach; latitude 66° 32′ north, longitude 55° 34′ west, on *Spirontocaris spinus* (Sowerby); latitude 66° 45′ north, longitude 59° 30′ west, on *Spirontocaris spinus;* Ikertokfjord on *Spirontocaris spinus;* latitude 66° 56′ north, longitude 54° 45′ west, on *Spirontocaris spinus;* latitude 67° 51′ north, longitude 55° 15′ west, on *Spirontocaris spinus;* latitude 69°54′ north, longitude 55° 34′ west, on *Spirontocaris spinus;* Upernavik on *Spirontocaris gaimardii* Milne Edwards and *Spirontocaris phippsii* Krøyer; Grinnell Land, Franklin Pierce Bay, or latitude 79° 29′ north; Cape Napoleon, or latitude 79° 38′ north, on *Spirontocaris polaris* (Sabine); Discovery Bay, or latitude 81° 44′ north, on *Spirontocaris polaris* (Sabine); Greenland on *Spirontocaris spinus*, *Spirontocaris phippsii*, and *Spirontocaris gaimardii.*

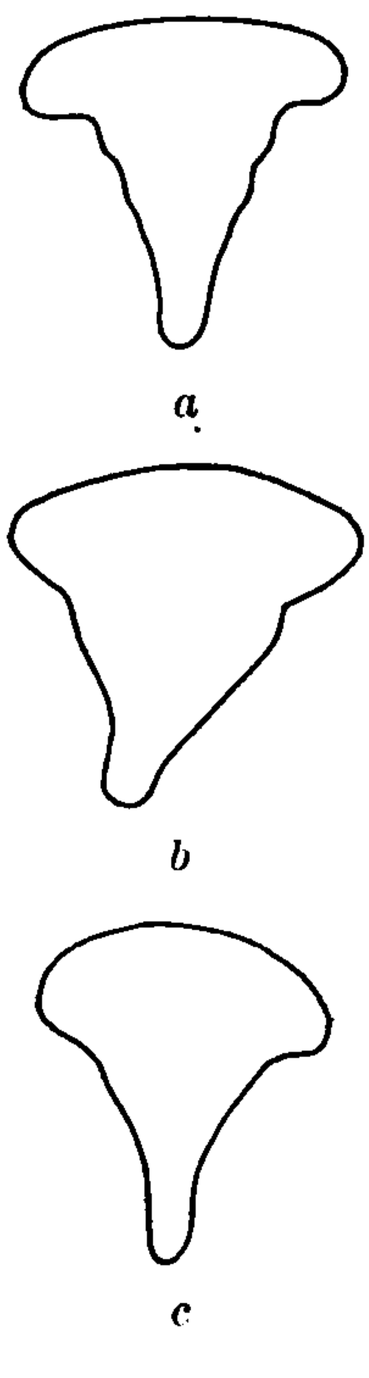

FIG. 551.—PHRYXUS ABDOMINALIS. ABDOMEN OF MALE FROM SPECIMENS FOUND ON: *a*, PANDALUS LEPTOCERUS FROM OFF BLOCK ISLAND. × 27½. *b*, PANDALUS LEPTOCERUS FROM MARTHAS VINEYARD. × 27½. *c*, PANDALUS LEPTOCERUS FROM OFF BLOCK ISLAND. × 27½.

Also recorded from the British Isles; Scandinavian coast; Spitzbergen; Kara Sea; coast of Norway.

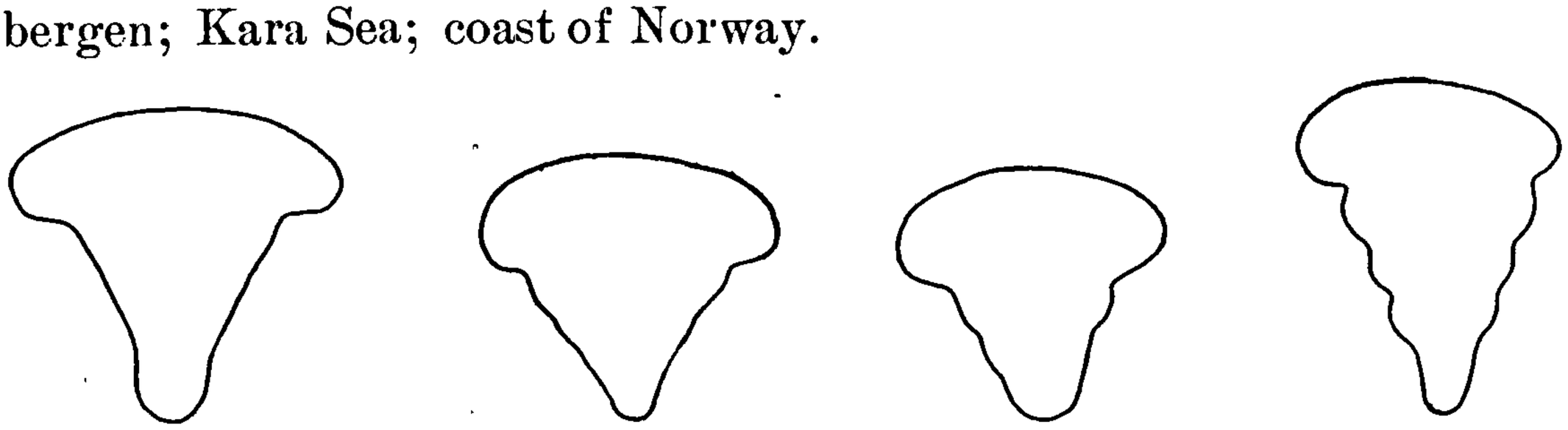

FIG. 552.—PHRYXUS ABDOMINALIS. ABDOMEN OF MALE FROM SPECIMENS FOUND ON: *a*, SPIRONTOCARIS GRŒNLANDICUS FROM ADMIRALTY INLET, VICINITY OF PORT TOWNSEND. × 27½. *b*, PANDALUS LEPTOCERUS FROM OFF BLOCK ISLAND. × 27½. *c*, SPIRONTOCARIS SICA FROM OFF SAN LUIS OBISPO BAY, CALIFORNIA. × 27½. *d*, SPIRONTOCARIS SICA FROM OFF SAN SIMEON BAY, CALIFORNIA. × 20½.

Depth.—5 to 351 fathoms.

Body of female very asymmetrical. Length 9 mm. Width 7 mm.

[a] Challenger Report, 1888: Crustacea Macrura, XXIV, pp. 645–646.

Head as wide as long, 1½ mm. : 1½ mm., with the anterior margin straight and produced at the sides in small lateral processes. Posterior margin rounded. Head deeply set in thorax. Eyes absent.

The seven segments of the thorax are well defined on one side and in the dorsal region. On the opposite side, however, they merge into and are continuous with the large marsupial pouch which occupies the entire ventral and lateral portion of the individual.

All seven legs are present on the side of the body which has the segments well defined. On the opposite side, however, only the first leg is present. Ovarian bosses are present on the first four segments on the shorter side. Lateral to these are the epimera which occupy the whole of the lateral margin. Epimera are also present on the last three segments on the shorter side. Neither ovarian bosses nor epimera are present on the longer side of the body.

The abdomen is composed of five segments, all distinct. The fifth segment is very small and tapers posteriorly to a pointed extremity.

There are no uropoda. There are four pairs of double-branched pleopoda. The outer branches are large oval, elongated lamellæ, leaf-like in shape and larger on the larger side of the body, where they lie upon the dorsal surface of the marsupium in its expanded lateral portion. The inner branches are small. There are five pairs of incubatory lamellæ, of which those of one side are large and greatly developed, occupying the whole of the lateral and ventral side of the body and completely inclosing the eggs, while those of the shorter side of the body are very small and much reduced in size.

The male is narrow, elongate, 3 mm. long and 1 mm. wide. The head is rounded anteriorly and the eyes are present. The first pair of antennæ consist of three articles. The second pair of antennæ are composed of four or five articles.

The seven segments of the thorax are well defined, and have the lateral margins straight. All the segments of the abdomen are coalesced in a single segment which tapers to a pointed extremity. There are no uropoda or pleopoda.

The specimen described is found parasitic on *Spirontocaris townsendi* Rathbun.

82. Genus IONE Latreille.

Female with the lateral parts or pleural lamellæ of the abdomen elongated, digitate.

There are usually five pairs of double-branched pleopoda. The uropoda consist of two elongate simple curved processes, with margins smooth, not digitate. Male with the segments of the abdomen more or less fused; lateral parts or pleural lamellæ in the form of narrow elongated processes.

Branchial parasites.

ANALYTICAL KEY TO THE SPECIES OF THE GENUS IONE.[a]

a. Lateral parts or pleural lamellæ of the abdominal segments in female twice as long as the uropoda. Basal article of legs with an elevated eminence the margin of which is irregular. Abdominal segments in male completely fused. *Ione brevicauda* Bonnier

a'. Lateral parts or pleural lamellæ of the abdominal segments in the female not longer than the uropoda. Basal article of legs with two elevations or carinæ the margins of which are regular. Abdominal segments in male less completely fused..... *Ione thompsoni* Richardson

IONE CORNUTA Spence Bate.

Ione cornuta SPENCE BATE, Proc. Zool. Soc. London, 1864, p. 668; Lord's Naturalist in British Columbia, II, 1866, p. 282.—BATE and WESTWOOD, British Sessile-eyed Crustacea, II, 1868, p. 253.—GIARD and BONNIER, Travaux de l'Institute Zool. de Lille et du Laboratoire Maritime de Wimereux, V, 1887, p. 77.—RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 869; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 338; American Naturalist, XXXIV, 1900, p. 308.—BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 245–247.—RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, p. 75.

Localities.—Esquimault Harbor, British Columbia, on *Callianassa longimana;* Vancouver Island.

"Mas: pleonem terminatum rotunde.

"The male differs from the description of the European species chiefly in having the caudal extremity terminating obtusely and in having shorter antennæ.

"Fœm., subequilateralis, lateralia cornua cephalonis habens recurvata, pleopoda longa et arborea.

"The female has the antero-lateral horn-like process of the cephalon curved posteriorly. The pereion is not quite equilaterally developed. The coxæ of the four anterior pairs of the pereiopoda are round, and all attached to the antero-lateral margin of the segments of the pereion. The coxæ of the three posterior are the larger, and produced posteriorly to a point. The pleopoda are long and fringed with arborescent branchiæ.

"This is the only species known besides that taken by Colonel Montagu on the southern coast of England.

"Length, male, $\frac{1}{4}$; female $\frac{3}{4}$ of an inch.

"Taken attached to the branchia of *Callianassa longimana.*"—SPENCE BATE.[b]

"This species is much larger than that of the European form and differs from it chiefly in having the lateral extremities of the somite or segment which bears the antennæ, posteriorly produced up each side of the head, after the manner of lateral horns. All the pereiopoda

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[a] *Ione cornuta* Spence Bate is not included in the key because the description of this form does not give details as to the characters, and because it is very probable that the form described by Bonnier is identical with *Ione cornuta.*

[b] Lord's Naturalist in British Columbia, II, 1866, p. 282.

are short and powerfully subchelate. The branchial appendages are arborescent and pendulous; to the inner extremity of which two appendages are attached, each of which inversely increases as the other decreases; so that one is largest nearest the pereion of the animal, while the other is longest nearest the caudal extremity. To the posterior of these the male animal attaches itself by means of the seventh pair of pereiopoda." SPENCE BATE.[a]

IONE BREVICAUDA Bonnier.

Ione brevicauda BONNIER, Trav. de la Station Zool. de Wimereux, VIII, 1900, pp. 248–250, pl. IV.

Localities.—California, at San Francisco, on *Callianassa* William Stimpson; Gulf of Georgia.

The adult female measures 6.7 mm. and differs at first sight from *Ione thoracica* and *Ione vicina* in the compact form of the body and the large dimensions of the dorsal surface, which is perfectly symmetrical; the pleural lamellæ of the first thoracic segments do not present the differences in dimensions of the other species of the genus; those of the first two segments are, on the right as on the left, almost equal and do not extend backward beyond the following segment; those of the two following segments are smaller, and are inserted in a small and narrow portion of the pleural margin of the segment, on the anterior part; finally the pleural lamallæ of the last three segments, and especially those of the sixth and seventh, are not longer than the prolongations of the entire lateral margin, the width of which they have, with, moreover, some small sinuses in their inferior margin.

The first four thoracic segments, moreover, have each a pair of pleural bosses, regularly rounded and very distinct. The appendages of the head do not present anything of importance; one can only point out that the palp of the maxillipeds is exceedingly reduced and is merely a small lamella inserted in a notch and terminating in three little hairs, and also that the inferior lamella of the head is relatively much larger and that the secondary lamellæ are more developed; the third, the inner lamella, exists also in this American species. The legs are identical with those of *I. thoracica*, except perhaps the irregular elevations (or carinæ) of the basis are more accentuated. The oostegites (or incubatory lamellæ) are identical with those of the other species and, as with them, are covered on their external parts with simple or bifid hairs having rough extremities; the only difference to be noted is that, in the first oostegite (lamella), the digitations of the inner ridge are much smaller and more numerous and there is also a difference in the arrangement of the hairs on the inferior margin.

[a] Brit. Assoc. Adv. Sci., 1863, XXXII, p. 98.

The ventral surface of the last segments of the thorax and the first segments of the abdomen has longitudinal keels as is usual.

The abdomen is also very characteristic; the prolongations of the

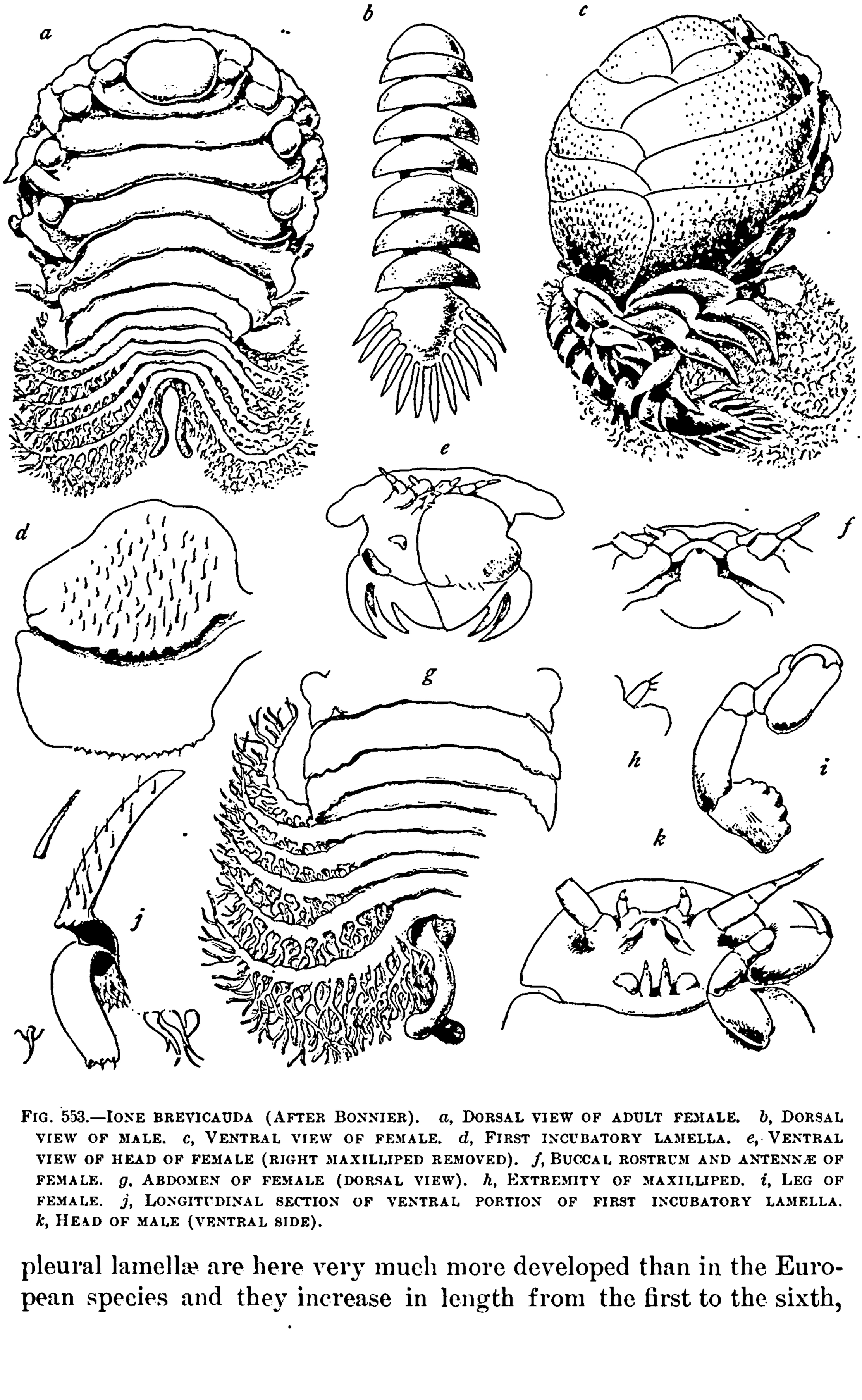

FIG. 553.—IONE BREVICAUDA (AFTER BONNIER). *a*, DORSAL VIEW OF ADULT FEMALE. *b*, DORSAL VIEW OF MALE. *c*, VENTRAL VIEW OF FEMALE. *d*, FIRST INCUBATORY LAMELLA. *e*, VENTRAL VIEW OF HEAD OF FEMALE (RIGHT MAXILLIPED REMOVED). *f*, BUCCAL ROSTRUM AND ANTENNÆ OF FEMALE. *g*, ABDOMEN OF FEMALE (DORSAL VIEW). *h*, EXTREMITY OF MAXILLIPED. *i*, LEG OF FEMALE. *j*, LONGITUDINAL SECTION OF VENTRAL PORTION OF FIRST INCUBATORY LAMELLA. *k*, HEAD OF MALE (VENTRAL SIDE).

pleural lamellæ are here very much more developed than in the European species and they increase in length from the first to the sixth,

which is twice as long as the first; they are like long branches which become narrower toward the distal extremity and they are divided into distinct articles each one of which gives origin, on its inferior margin to long ramified digitations, those near the base being especially long. On the ventral side there are two pairs of bi-ramous pleopods, the branches of which are of equal length, but not of the same width; the inner branches are certainly much larger, especially on the first pairs. The uropoda have the usual form of the other species of the genus, but they are here relatively much shorter and do not reach even half the length of the pleural prolongation of the sixth segment of the abdomen.

The male measures 4.5 mm.; it is relatively large in comparison with the size of its European congeners and does not present any differences except in the form of the pleural prolongations of the abdomen; they are slightly attenuated at their two extremities, especially at the distal extremity. The first three pairs of legs have the dactylus pointed while those of the other pairs are blunt, recalling the form of the corresponding organs in the female.[a]

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[a] The above description is adapted from the following one of Bonnier's:

La femelle adulte (fig. 1 et 2) mesure 6 mm. 7 et diffère à première vue d'*Ione thoracica* et d'*I. vicina* par la forme ramassée du corps et la large dimension de la surface dorsale, qui est parfaitement symétrique; les lames pleurales des premiers somites thoraciques ne présentent pas les inégalités de dimensions des autres espèces du genre; celles des deux premiers sont, à droite comme à gauche, à peu près équivalentes et ne dépassent pas en arrière le somite suivant; celles des deux segments suivants sont plus petites, insérées par une partie rétrécie au bord pleural du somite, sur la partie antérieure; enfin les lames pleurales des trois derniers somites ne sont plus, surtout celles des sixième et septième, que les prolongements de tout le bord latéral dont elles ont la largeur et avec, en plus, quelques petites sinuosités à leur bord inférieur. Les quatre premiers somites thoraciques portent en outre chacun une paire de bosses pleurales régulièrement arrondies et très nette. Les appendices de la tête n'offrent rien de particulier: on peut seulement noter que la palpe du maxillipède est excessivement réduit, ce n'est plus qu'une toute petite lamelle découpée dans une échancrure et terminée par trois petits poils (fig. 5), et aussi que la lame inférieure du céphalon est relativement beaucoup plus large et que les lamelles secondaires sont plus développées; la troisième, la lamelle interne, existe aussi dans cette espèce américaine. Les péreiopodes sont identiques à ceux de *I. thoracica*, sauf peut-être que les éminences irrégulières du basipodite sont plus accentuées (fig. 8). Les oostégites sont identiques à ceux des autres espèces et, comme eux, couverts dans leurs parties externes de poils simples ou bifides à extrémités squameuses: la seule différence à noter est que, dans le premier oostégite, les digitations de la crête interne sont beaucoup plus fines et plus nombreuses (fig. 7) et il a aussi une différence dans l'implantation des poils du bord inférieur (fig. 6). La surface ventrale des derniers somites du péreion et des premiers du pléon est plissée longitudinalement, comme cela se présente d'ordinaire.

Le pléon (fig. 9) est aussi très caractéristique: les prolongements des lames pleurales sont ici bien plus développés que dans les espèces d'Europe et ils croissent de longueur du premier au sixième qui est deux fois plus long que le premier: ce sont des sortes de longues tiges qui vont en s'amincissant vers l'extrémité distale et elles se divisent en de véritables articles distincts dont chacun émet sur son bord inférieur

IONE THOMPSONI Richardson.

Ione thompsoni RICHARDSON, Proc. U. S. Nat. Mus., XXVII, 1904, pp. 75–78.

Locality.—North Falmouth, on *Callianassa stimpsoni.*

Body of female longer than broad.

Head deeply set in thorax, its anterior margin produced in a crenulated border. The antero-lateral lobes of the frontal border extend some distance beyond the sides of the head. The posterior portion of the head is evenly rounded. The first antennæ are three jointed; the second pair are five jointed.

All the thoracic segments are distinct, with distinct epimera. ("lames pleurales" of Giard and Bonnier), in the form of large rounded lobes, not elongated. In the first two segments these epimeral lobes occupy the anterior portions of the lateral parts of the segments; in the third segment they are placed about the center of the lateral margin; in the fourth and fifth segments they occupy more of a posterior position; in the sixth and seventh segments they occupy the entire lateral margin. Ovarian bosses are present on the first four segments, along the anterior portion of the segment.

The six segments of the abdomen are distinct, and are produced laterally, each in a pair of elongated and jointed appendages, furnished with numerous mammilliform, branching appendages, originating from the posterior margin and extending downward. Thus there are six pairs of appendages corresponding to the "lames epimeriennes du pleon" of Giard and Bonnier.

The pleopoda consist of four pairs of double-branched appendages and one pair of single-branched appendages.[a] The inner branches of the first four pairs fold over the ventral side, meeting in the median line. These branches are all large and of nearly equal size and thickly

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de longues digitations ramifiées qui le sont d'autant plus qu'elles sont plus près de la base. A la face ventrale (fig. 2) on voit deux paires de pléopodes biramés, dont les rames sont de même longueur, mais non de même largeur: les endopodites sont beaucoup plus larges en effet, surtout sur les premières paires. Les uropodes ont la forme ordinaire des autres espèces du genre, mais ils sont ici relativement beaucoup plus courts et n'atteignent même pas la moitié de la longueur du prolongement pleural du sixième somite du pléon.

Le mâle (fig. 10) mesure 4 mm. 5; il est grand, relativement à la taille de ses congénères d'Europe et il ne présente de différences que dans la forme des prolongements pleuraux du pléon: ils sont légèrement atténués à leurs deux extrémités, surtout à la distale. Les péreiopodes des trois premières paires ont des dactylopodites aigus, tandis que ceux des autres paires sont émoussés et rappellent la forme des organes correspondants dans la femelle.—JULES BONNIER, Travaux de la Station zool. de Wimereux, VIII, 1900, pp. 248–250.

[a] The young female of *Ione thompsoni* has the last pair of pleopoda double-branched, the two branches similar, however. The inner branches of the first four segments are quite different from those of the outer branches, as is true of the adult female, and lie folded over the abdomen as in the adult described.

tuberculate, the first two pairs being somewhat larger than the last two pairs. The outer branches of the first four pairs and the fifth pair of pleopoda consist of narrow, elongated appendages crenulated on their outer margins and thickly tuberculate. The appendages of

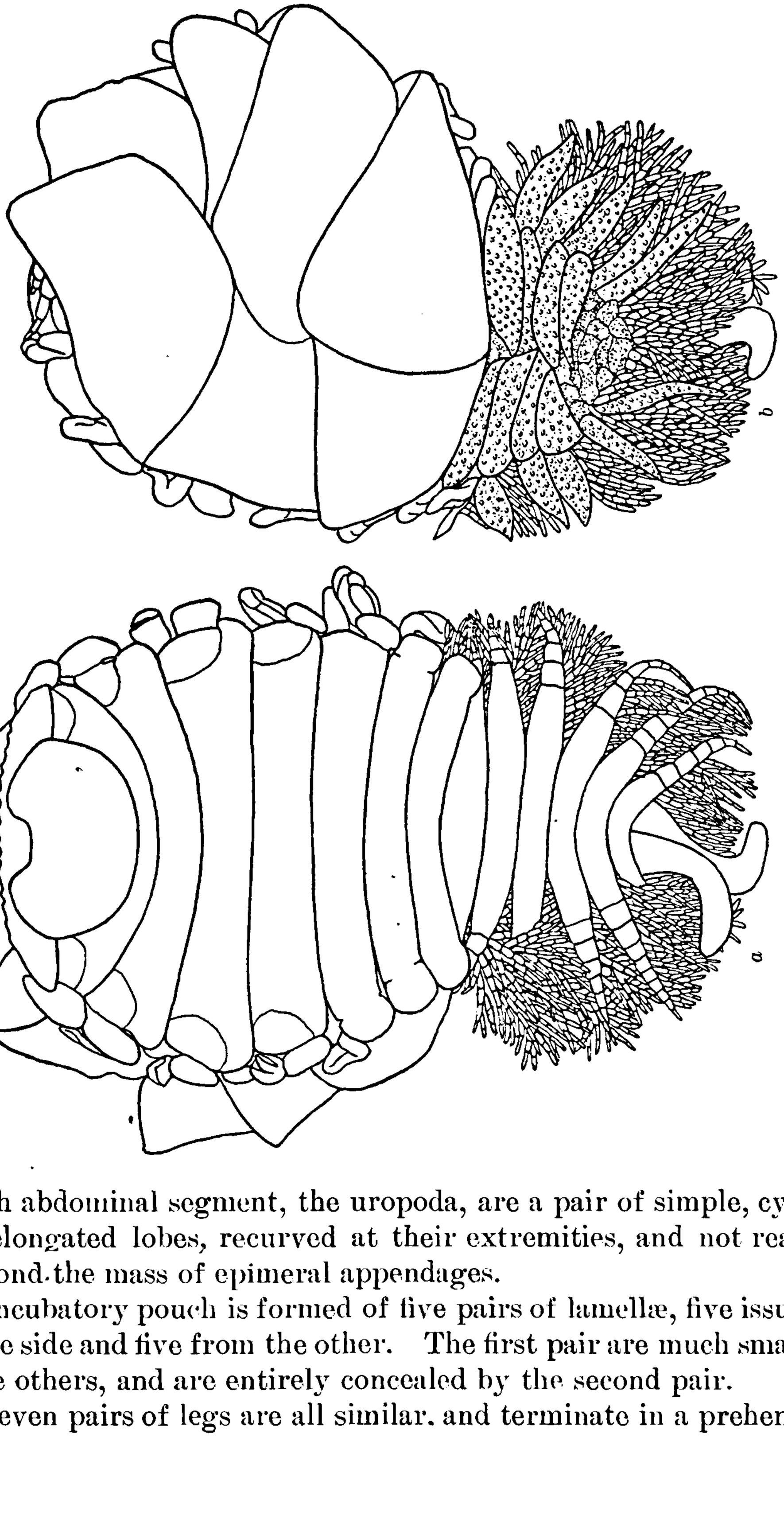

FIG. 554.—IONE THOMPSONI. *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF SAME. × 6.

the sixth abdominal segment, the uropoda, are a pair of simple, cylindrical, elongated lobes, recurved at their extremities, and not reaching beyond the mass of epimeral appendages.

The incubatory pouch is formed of five pairs of lamellæ, five issuing from one side and five from the other. The first pair are much smaller than the others, and are entirely concealed by the second pair.

The seven pairs of legs are all similar, and terminate in a prehensile

hand. There are two expansions or carinæ on the basis of all the legs, the anterior one being only half as long as the other.

Male with all the segments of the thorax distinct. Eyes wanting. Antennæ conspicuous, six jointed. Antennulæ, three jointed. The segments of the abdomen are more or less distinct, all six furnished each with a pair of elongated leaf-like tapering appendages.

FIG. 555.—IONE THOMPSONI. MAXILLIPED.

Two specimens were collected by Mr. G. M. Gray at North Falmouth, Massachusetts. They were found on *Callianassa stimpsoni*.

The species is named for Dr. Millett T. Thompson, from whom the specimens were received.

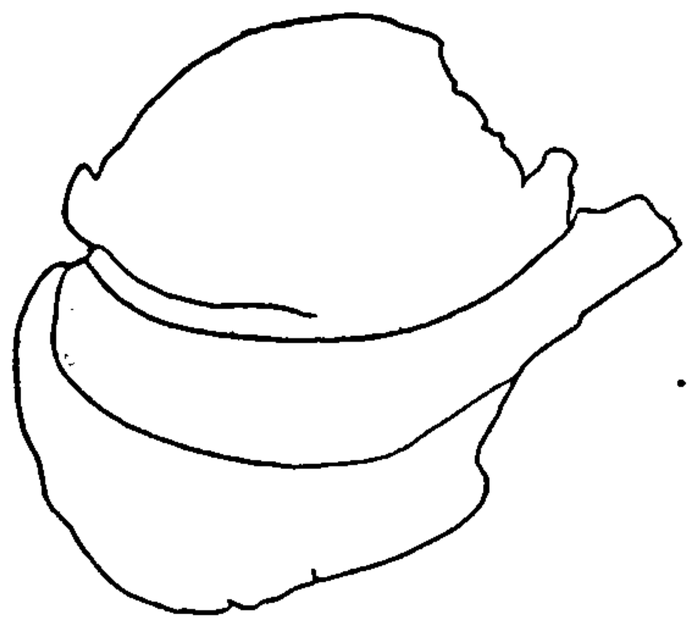

FIG. 556.—IONE THOMPSONI. FIRST LAMELLA OF MARSUPIUM. × 10.

Type.—Cat. No. 29091, U.S.N.M.

This species is apparently very close to *I. cornuta* Spence Bate, from Vancouver Island. It agrees with *I. cornuta* in the absence of the elongated epimeral lobes (lames pleurales), in which both species differ from *I. thoracica* (Montagu). *Ione thompsoni* and *I. cornuta* are both much larger species than *I. thoracica*. In the description of *I. cornuta*,[a] the author says that the coxæ of the three posterior segments of the thorax are larger than the four anterior, and are produced posteriorly to a point. This is not true of *I. thompsoni*, in which the epimera of the three posterior thoracic segments are smaller than those of the anterior segments, although they occupy the entire lateral margin, and they are rounded posteriorly and not produced to a point. Spence Bate also speaks, in reference to *I. cornuta*, of the antero-lateral "horn-like process of the cephalon[b] curving posteriorly." In *I. thompsoni*, these lateral processes or lobes extend out straight at the sides. Bate and Westwood, in describing *I. cornuta*, state that the last pair of inner saccular branches of the pleopoda are almost obsolete. There are but four pairs of inner branches in *I. thompsoni*. The above quoted authors also describe the inner branches of the pleopoda as gradually diminishing in size to the last pair, whereas the outer branches gradually increase in size. This is not true of *I. thompsoni*.

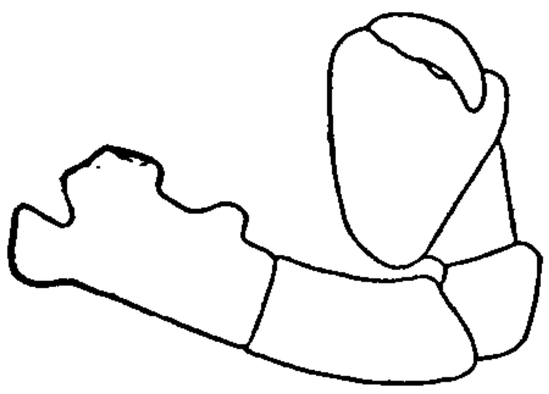

FIG. 557.—IONE THOMPSONI. LEG OF SIXTH PAIR OF ADULT FEMALE. × 11¼.

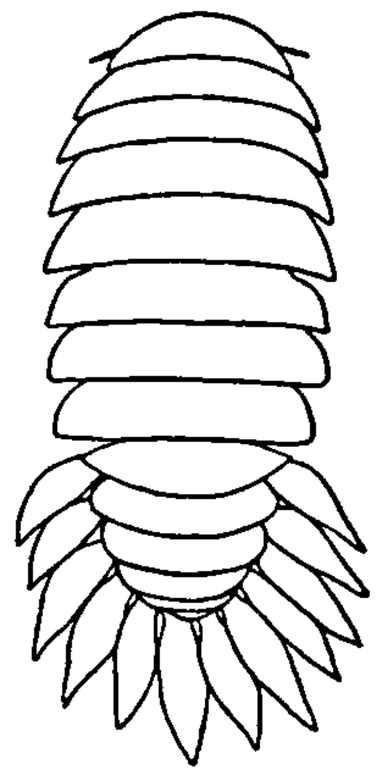

FIG. 558.—IONE THOMPSONI. MALE. ×8.

[a] Proc. Zool. Soc. London, 1864, p. 668.

[b] British Sessile-eyed Crustacea, II, 1868, p. 254.

83. Genus LEIDYA Cornalia and Panceri.

Abdomen distinctly segmented. Pleural lamellæ or lateral parts of the first five segments of the abdomen lanceolate, finely fringed.

Legs of female terminate in a short, blunt claw.

Exopods present and nearly equal on all seven pairs of legs.

The pleopods are "lanceolate and fringed."

Male has the abdomen distinctly segmented. There are five pairs of simple rudimentary pleopods. Uropoda simple, in the form of two long appendages attached to the sixth abdominal segment.

Branchial parasites.

LEIDYA DISTORTA (Leidy).

Cepon distortus LEIDY, Journ. Acad. Nat. Sci. Phila. (2), III, 1855, p. 150, pl. XI, figs. 26–32.

Leidya distorta CORNALIA and PANCERI, Mem. R. Acad. Sci., Torino (2), XIX, 1858–1861, p. 114.

Cepon distortus HARGER, Rep. U. S. Fish Comm., Pt. 1, 1873, p. 573 (279); Proc. U. S. Nat. Mus., II, 1879, p. 157; Rep. U. S. Fish Comm., 1879, p. 157; Pt. 6, 1880, p. 311.—KOSSMANN, Zool. Ergeb. einer Reise in die Küst. des Rothen Meeres, III, Malacostraca, 1880, p. 122; Mittheil. aus der Zool. Station zu Neapel, III, 1881, first half, p. 182.

Phryxus distortus WALZ, Arbeit. aus d. Zoolog. Instit. d. Univers. Wien, IV, 1882, p. 59.

Leidya distorta GIARD and BONNIER, Trav. du Labor. de Wimereux, V, 1887, p. 68, fig. 12.

Cepon distortus RICHARDSON, Am. Nat., XXXIV, 1900, p. 309.

Leidya distorta RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, p. 579.

Locality.—Atlantic City, New Jersey, in the branchial cavity of *Uca pugilator*.

"Female: Body compressed and distorted ovoid, white; abdominal scales completely concealing the pinkish white ova. Head prominent, provided with a pair of large oval disks situated posteriorly. Mouth minute, at the summit of a trilobate papilla. Antennæ very small and indistinct. Divisions of the thorax posteriorly strongly costate. Feet in seven pairs, curved forward and downward, ending in a short recurved, abortive hooklet. Abdomen deeply segmented. Branchial appendages lanceolate, fringed.

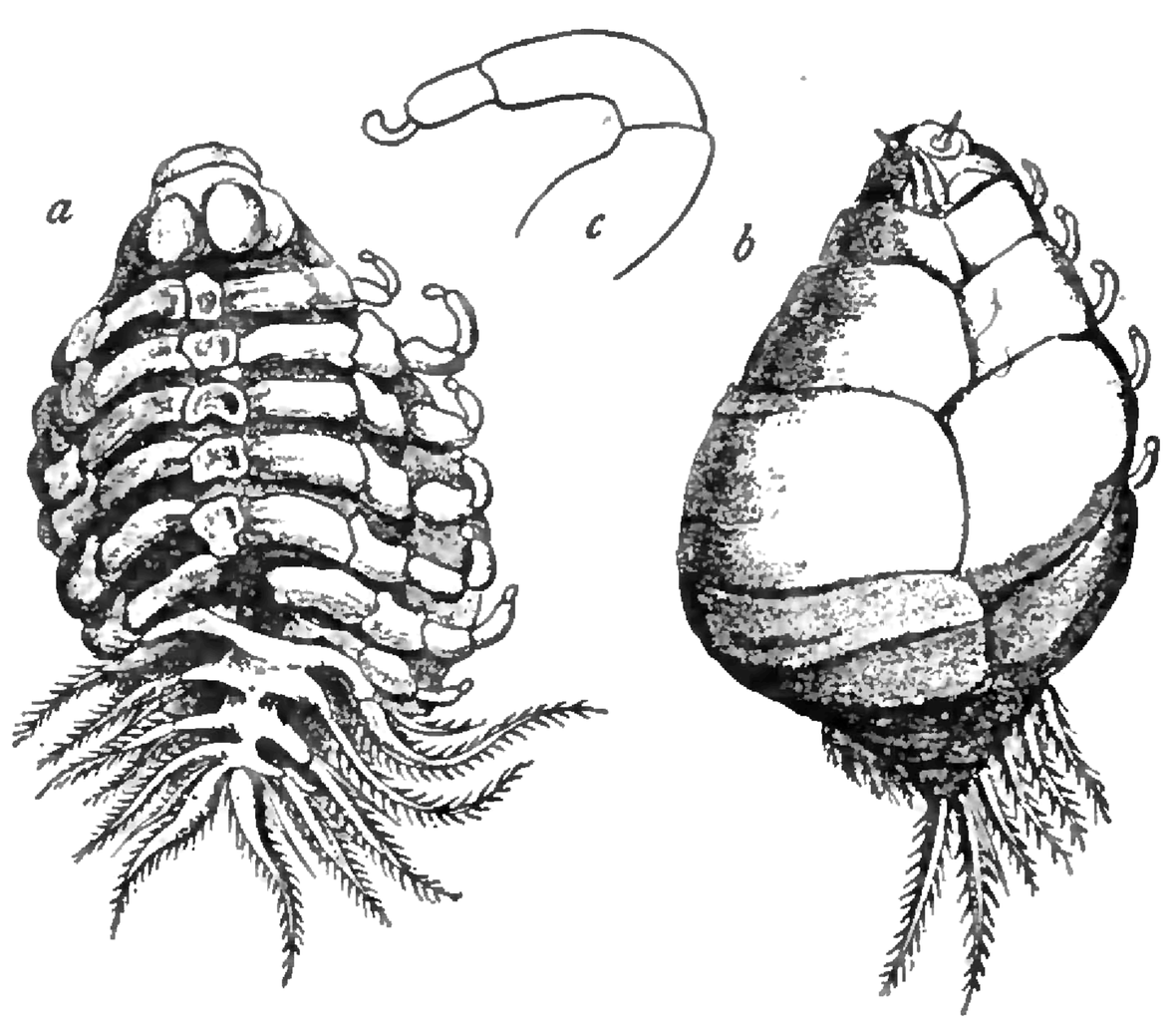

FIG. 559.—LEIDYA DISTORTA (AFTER LEIDY). *a*, DORSAL VIEW OF FEMALE. *b*, VENTRAL VIEW OF FEMALE. *c*, LEG OF FEMALE.

"Male: Body long and slender, divided into fourteen segments. Head subrotund. Internal antennæ short and robust, 3-jointed; joints spinous. External antennæ long, 7-jointed; the first two joints spinous, the others bristled. First joint of the thorax transversely oblong, the remainder depressed, pyriform in outline. Feet in seven pairs, the ante-penultimate joint spinous, the penultimate joint broad and with the claw recurved. Abdominal segments depressed, pyriform in outline, each provided with a pair of peculiar ventral appendages, and, except the fifth one, with a lateral irregular pigment cell. Caudal segment round, with a pair of divergent appendages. Length of female four lines, breadth three lines; length of male one and a quarter lines."—LEIDY.[a]

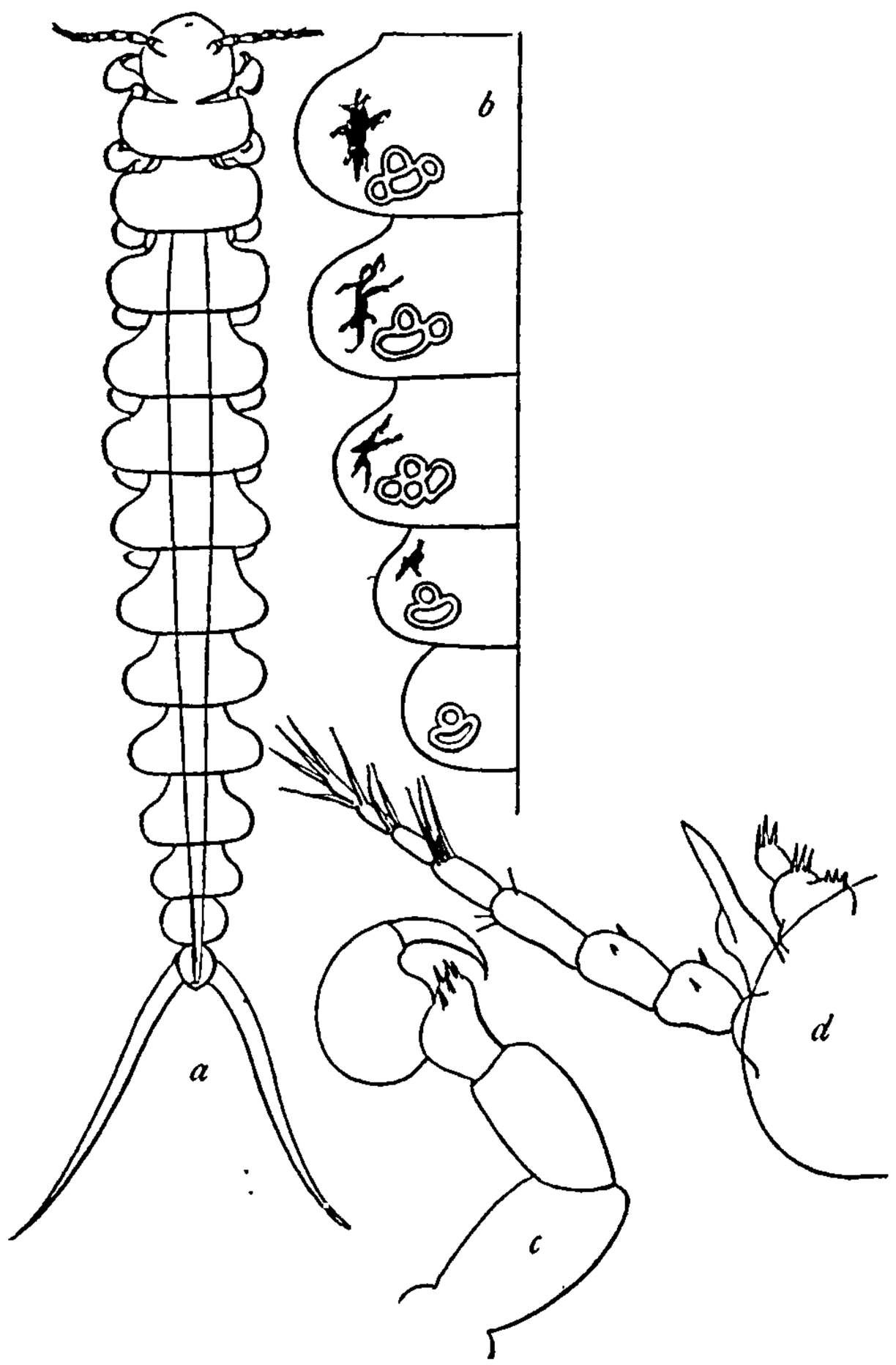

FIG. 560.—LEIDYA DISTORTA (AFTER LEIDY). *a*, DORSAL VIEW OF MALE. *b*, ABDOMINAL SEGMENTS OF MALE WITH PECULIAR APPENDAGES. *c*, RIGHT LEG OF MALE. *d*, HEAD OF MALE WITH ANTENNÆ. ALL MAGNIFIED.

84. Genus GRAPSICEPON Giard and Bonnier.

Female with two median dorsal tubercles, one on the sixth and the other on the seventh thoracic segment.

Five anterior segments of abdomen with the lateral parts or pleural lamellæ produced into long, tapering prolongations, which are digitate. Abdomen distinctly segmented. Pleopoda in five pairs, well developed, double-branched; outer branches similar to the pleural lamellæ of the segments; inner branches in the form of large tubercles.

Uropoda consisting of two elongate lamellæ similar to the outer branches of the pleopoda or the pleural lamellæ of the abdominal segments.

Male with all the segments of the thorax and abdomen distinct. There are five pairs of rudimentary pleopods. The uropoda are represented by two bunches of stiff hairs.

Branchial parasites.

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[a] Journ. Acad. Nat. Sci. Phila. (2), III, 1855, p. 150, pl. XI, figs. 26–32.

GRAPSICEPON EDWARDSII Giard and Bonnier.

Grapsicepon edwardsii GIARD and BONNIER, Compt. Rend. Acad. Sciences, CVII, 1888, p. 1.—HANSEN, Ergebn. d. Plankton Exped. der Humboldt Stiftung, II, 1895, p. 43.—GIARD and BONNIER, Travaux de la Station Zool. de Wimereux, VIII, 1900, pp. 263–266, pls. VIII, IX.

Localities.—Florida stream; also Sargasso Sea.

The adult female has a general globular form, flattened on the dorsal surface and terminated at its posterior extremity by a group of slender appendages with digitate edges; it measures 1.9 mm. from the frontal border to the sixth segment of the abdomen. The head forms a single and projecting mass, which is surrounded anteriorly and on the sides by a large undulating anterior lamina or border; on the inner side are found the very small, three-articulate first antennæ, which are situated some distance apart; the last two articles are furnished with several small hairs having a rough surface; the second pair of antennæ are equally short, the first article is large, half consolidated with the head, and the other four articles decrease in size to the last, which is furnished with several hairs; their surface presents the same appearance as that of the first pair of antennæ. The rostrum is elevated and particularly distinct; from the notched point of the inferior lip one can see the tip of the mandibles projecting, which is in the form of the bowl of a spoon with the edge finely denticulate. The maxilliped possesses an elongated palp terminating in little, short hairs. The inferior margin of the head is cut up on both sides in a pair of little lamellæ of almost equal size, the cuticle of which is rough and the extremity blunt.

The first four thoracic segments are large and are in the form of cushions; on their lateral margins are strong pleural bosses with contours rather indistinct and with a rudimentary pleural lamella; the three other segments are much narrower, their pleural lamella is rather distinct, and the dorsal surfaces of the sixth and seventh segments are elevated in very sharp points in the median line of the body. The ventral side of the thorax is completely hidden by the incubatory cavity, which is very regularly developed; the first of the oostegites (lamellæ) has an inner edge with several large digitations, and its posterior part does not present a margin dentated or notched. The legs are very reduced, which is in correspondence with the almost useless part which they have to play in the fixation of the parasite, firmly maintained in place by all the carapace of the host. The fourth of these appendages is figured; under the rounded lateral margin, the coxa shows a very solid chitinous armature, intended to move the oostegite (lamella), which is attached there by the median nerve; the basis is very large, flattened, and almost square; the ischium is much narrower; the two following articles are fused and the propodus