

DESCRIPTIONS OF NEW SPECIES OF PARASITIC COPEPODS, BELONGING TO THE GENERA TREBIUS, PERISSOPUS, AND LERNANTHROPUS.

By RICHARD RATHBUN.

(With Plates XXIX-XXXV.)

Trebius tenuifurcatus Rathbun, new species.

Plate XXIX; Figs. 1-3.

This species differs from *Trebius caudatus* Kroyer in having a proportionally much smaller cephalothorax, while the tail is apparently jointed only near the middle, being three-jointed in the latter species. It is founded upon two specimens, a female with egg-tubes attached and a cast skin of the same sex, both of which were taken from a sting ray captured in Vineyard Sound, Massachusetts, by the Fish Commission in 1871. They have only recently been examined, and the single complete specimen, the only one upon which reliance could be placed in determining the shape and proportions of the segments of the body, has become hardened and somewhat distorted after long preservation in alcohol. The dorsal view represented in Fig. 1, Plate XXIX, is to be considered, therefore, as only approximately correct and not at all complete. The transparent border to the cephalothorax is mostly destroyed, and no attempt has been made to represent it. The feet, which project from the sides of the body back of the cephalothorax, have also been omitted, not being in the proper condition to show their precise positions.

The cephalothorax is nearly one-third the length of the entire body, its margins very regularly curved, with the postero-lateral corners reaching about as far back as the posterior margin of the first free thoracic segment. Its width slightly exceeds its length and is greatest posteriorly. The first free thoracic segment is wide and short, the second much narrower and longer, and rounded in outline. The exact proportions and shape of the genital segment are not determinable. The tail is very slender, elongate, somewhat more than one-third the entire length of the body, and is articulated very near the middle.

The appendages agree for the most part very closely with those of *Trebius caudatus*, but the furca presents sufficient differences to afford a good means of distinguishing the species. In *caudatus*, the furca (Pl. XXIX, Fig. 5) is broad with short and stout rami, the anterior ovate portion being very large, only slightly horny, and separated from the furcate portion, which is very thick and rigid. In *tenuifurcatus*, on the contrary, the furca (Pl. XXIX, Fig. 3) is relatively narrow and united in one piece, which is of uniform consistency throughout. The anterior portion is

PRIVATE LIBRARY OF

Chas. B. Wilson.

short, semicircular in outline, the rami very long, slender, and slightly curved. Most of the remaining appendages are also relatively more slender in the new species than in *caudatus*, but the long distal joint of the posterior antennæ is stouter in the former. (Compare Fig. 2 with Fig. 4, on Plate XXIX.) Entire length of the female, without the egg-tubes, 6.5 millimeters. European specimens of *caudatus*, in the collection of the National Museum, average about 8 millimeters in length.

Perissopus communis Rathbun, new species.

(Plate XXIX, Figs. 6, 7; Plate XXX, Figs. 1-6.)

This species is closely related to *Perissopus dentatus* Stn. & Ltk. Besides the typical form I have recognized one variety, called *Stimpsoni*, which differs from it almost exclusively in the characters of the dorsal surface. The typical form has been taken from four species of fish, and ranges from Massachusetts to Florida, while the variety is represented by a single specimen, the host of which is unknown, collected many years ago at Great Egg Harbor, New Jersey, by Dr. William Stimpson. Only the female of both forms is known.

Typical form.—This form is distinguished from *P. dentatus* by its proportionally longer and narrower body, less strongly produced postero-lateral angles of the cephalothorax, the shape of the dorsal plates of the second body segment, the narrower and deeper indentation of the posterior margin of the fifth segment, and the characters of the swimming feet, especially the third pair. The cephalothorax is semi-elliptical in outline, very slightly wider than long, the lateral margins nearly straight or gently convex, and very gradually divergent, the greatest width being at or near the posterior angles, which are only slightly produced and appear angular from above instead of long and well-rounded. The posterior margin is straight or very slightly concave, with sometimes a minute spine on either side. The antero-lateral angles are regularly curved, and the anterior margin is considerably produced, in a broad frontal process, sinuous along the front, with a slight indentation near the middle, the free extremities at the sides being rounded and cut off somewhat obliquely inward. The dorsal plates of the second, third, and fourth body segments are variable in shape, but those of the second segment have always a very slightly oblique position, with the outer margin gently convex or nearly straight, and exposed for its entire length, while those of the fourth segment are only very slightly exposed at the sides.

The fifth segment is generally slightly wider than the cephalothorax, and about three-fourths as long as wide, the greatest width being near the middle. The sides are gently and regularly convex throughout their entire length, and the postero-lateral angles are each produced in the shape of a small, slender, acute spine, which, in some of the specimens, is more or less worn away. The posterior margin forms a mod-

erate and regular outward curve from side to side, broken in the center by a relatively deep and narrow indentation, through which a large part of the posterior ventral appendage is plainly visible from above. The specimen from which the general figure represented on Plate XXIX was made, measures about 5.5^{mm} in length of body, and this is the extreme length afforded by our collection. The greatest width is about 2.5^{mm}. Some specimens are proportionally wider, but only to a slight extent. The egg-tubes are small, cylindrical, straight, and considerably longer than the body.

Variety Stimpsoni.—I was at first inclined to regard this variety as a separate species, but as it agrees closely with the typical form in all the ventral appendages, it does not seem to merit such distinction. The body is proportionally wider than in both *communis* and *dentatus*. The cephalothorax is semi-oval in outline, about one and one-half times wider than long, and widest at the extreme posterior end, where the lateral angles are produced in broad, rounded, wedge-shaped projections, which are shorter and more divergent than in *dentatus*, and larger and broader than in *communis*. The lateral margins are moderately convex and diverge rapidly backward from the frontal process, which is narrower than in the typical form, gently convex on each side of the slightly excavated middle portion, and more obliquely cut at the free ends. The posterior margin is straight between the projecting angles.

The dorsal plates of the second body segment are widely separated, very oblique, their laterally exposed margins very strongly rounded and projecting far beyond the lateral margins of the plates of the fourth segment. The fifth segment is about one-fourth wider than long, the width greatest near the middle and very little less than that of the cephalothorax. Outer margin gently convex to near the posterior angles, where they form a very slight re-entering curve and terminate in a stout, acute spine on each side. The posterior margin is broadly indented in the middle, on each side of which it is first strongly convex, and then forms a deep re-entering curve, extending close up to the lateral spines. Entire length of the body 4.75^{mm}; extreme width nearly 3^{mm}. The egg cases are similar to those of the typical form.

Only alcoholic specimens of both of these forms have been seen by the writer. The specimen of var. *Stimpsoni* has been in alcohol for many years and is of a very dark brown color, while all of those of the typical form are very light yellowish. The dorsal surface of the fifth segment is very slightly horny, while the upper plates of the four anterior segments are hard and rigid as in *Pandarus*. Viewed from the ventral side, the dorsal plates of the second segment present features by which this species may be distinguished from *dentatus*. In the typical form, the outer margin of these plates extends far forward under the cephalothorax, reaching quite to the reniform processes of the second maxillipeds, and only the edges are exposed. In var. *Stimpsoni* it reaches nearly as far forward, but a greater width is exposed, more as in *dentatus*.

Appendages.—The appendages of the ventral side correspond very closely with those of *dentatus*, but the third pair of feet present sufficient differences to characterize the species. I have figured only the four pairs of swimming feet of the var. *Stimpsoni*, and note below the slight variations which they present when compared with those of the typical form.

The anterior antennæ are two-jointed, the basal joint being much wider and nearly twice as long as the terminal, and exposed for about one-third its length beyond the sides of the frontal process. The terminal joint is subelliptical in outline, and rounded at the tip, which bears numerous very small elongate papillæ. Larger papillæ of the same character border the distal end of the basal joint and extend a short distance inward along its front edge. The posterior antennæ apparently consist of three short, stout, basal joints in addition to the long, slender terminal one, which is very slightly curved just at the tip. The proboscis is long, tapering, and becomes very slender toward the tip. The reniform processes of the second maxillipeds are shorter and stouter in the typical form than in *dentatus*, and in var. *Stimpsoni* are somewhat larger than in the first named.

The swimming feet consist each of a basal joint and two rami, with an elongate, flexible spine attached just outside of the outer ramus. The rami of the two anterior pairs are each two-jointed; those of the two posterior pairs, each one-jointed, though the inner ramus of each is more or less lobed. The outer rami all bear stout spines, the inner never more than a single very small spine, which has been observed only in the first and second pairs.

The basal joint of the first pair of feet is comparatively small. The outer ramus consists of a very stout proximal joint, much wider and longer than the distal, the inner margins of both continuous, the outer margin of the proximal projecting far beyond that of the distal, and at the outer angle furnished with a very long, stout, curved spine. The terminal joint bears along the distal margin four similar spines, of which the three outer ones are about three-fourths as long as the former, the inner one short, and all strongly curved. The proximal joint of the inner ramus is short and broad, the distal joint about twice as long and irregularly elongate, ovate in outline, with a minute spine about midway of the inner margin. The basal joint of the feet of the second pair is of moderate size, and the outer ramus resembles that of the first pair, but is somewhat smaller, and the spines of the distal joint are subequal in size. The two joints of the inner ramus are subequal in length, the basal broadest and cut off obliquely at the distal end, the terminal sub-circular, with a narrow indentation on the distal margin and a minute curved spine on the inner margin. The basal joints of the third and fourth pairs are very large, as in *dentatus*, and the rami relatively small, those of the third pair, however, being considerably larger than those of the fourth pair. The outer ramus of the third pair is elongate-ovate in

outline, smallest at the distal end, which is somewhat indented on the outer side, and with four stout, tapering spines, three at the tip, and a single one, the largest, just below the middle on the outer margin. The inner ramus is located close by the outer one, and is very broad and divided distally into two rounded lobes, of which the outer is much the wider. The outer ramus of the fourth pair is similar to that of the third pair, but smaller, with a spine on the outer margin and apparently four spines at the distal end, of which only two were preserved in the specimen figured. The inner ramus is distant from the outer one, is very short and broad, and divided into two subequal, rounded, overlapping lobes.

The above descriptions of the swimming feet and the figures to which they refer are taken from var. *Stimpsoni*. The typical form presents only slight variations, mostly limited to the inner rami of the second, third, and fourth pair of feet. In the second pair the distal joint of the inner ramus is slightly more elongate and ovate in shape. The inner lobe of the corresponding ramus of the third pair is much elongate, with subparallel sides, and is curved strongly inward toward the tip. The corresponding lobe of the fourth pair of feet is also somewhat longer than the outer lobe, and four spines are preserved on the distal end of the outer ramus in all the specimens examined.

The typical form has been obtained by the U. S. Fish Commission from four species of fish, as follows: The dusky shark, *Carcharinus obscurus*, collected in Vineyard Sound, Massachusetts, 1887 (12685), and at Noank, Conn., 1874 (8181); the blue shark, *Carcharinus Milberti*, Vineyard Sound, 1884 (8180); the shovel-head shark, *Reniceps tiburo*, mouth of St. Mary's River, Florida, 1884 (8182); and the sharp-nosed shark, *Scoliodon terra-nova*, Pensacola, Fla., Silas Stearns (6085). The single specimen of the var. *Stimpsoni* (4414) was collected at Great Egg Harbor, New Jersey, by Dr. William Stimpson; its host is unknown.

Lernanthropus Brevoortiae Rathbun, new species.

(Plate XXX, Figs. 7, 8; Plates XXXI, XXXII).

This species is above medium size, and is readily distinguished by the shape and proportions of the thoracic feet of the third and fourth pairs, which are very greatly developed, the latter being exceedingly long, broad, foliaceous. The following description, excepting in so far as it applies to the microscopic appendages, has been drawn up mainly from living specimens.

The cephalothorax is oblong in outline, as viewed from above, the length, however, being only slightly greater than the width. The anterior margin is broad, slightly convex, and rounded at the corners; the sides diverge gradually and may be slightly convex, slightly concave, or straight along the middle, but at the hinder end, where the width is greatest, they are always convex and well rounded, as is also

the posterior margin. In alcoholic specimens the shape changes more or less, the greatest width frequently occurring farther forward. The cephalothorax is distinctly marked off from the remainder of the body, though closely adjoining and overlapping it.

Back of the cephalothorax the body is elongate, with indications, more or less distinct, of four segments, but the posterior limitations of the thorax proper with respect to the dorsal shield are difficult to determine. Two general divisions of this portion of the body may be recognized from above. The anterior division which composes slightly less than one-half its entire length, is nearly square in outline, slightly wider than long, of nearly uniform width throughout or enlarging somewhat posteriorly, and with well rounded corners. It is considerably wider than the cephalothorax and than the third division of the body which follows it. Near the middle it is slightly indented on the sides, but in alcoholic specimens it is also seen to be marked by a furrow across the back, which is generally faint near the median line, but deeper midway between the middle and the sides and often appearing there like an elongate pit, which stops short of the margin.

The posterior division (the third of the entire body) is much narrower than the preceding one, from the hinder margin of which it originates abruptly, as shown in Fig. 2, Pl. XXXI. It is elongate-ovate in outline, with indented sides; broadest anteriorly, about one-third longer than the second division, and about two-thirds as long as wide, except when contracted in alcohol. That portion of it in advance of the lateral indentations, being much thickened and giving origin directly to the fourth pair of feet, should probably be regarded as the fourth thoracic segment, while the hinder part alone can properly be designated as the dorsal shield. In alcoholic specimens, the fourth thoracic segment is separated from the third by a dorsal furrow similar to that between the second and third segments, but less distinct across the median line, and with the lateral pits shorter, rounder, and deeper. The dorsal shield is subovate in outline and rounded at the posterior end, but is often narrower than represented in the general figure (Fig. 2, Pl. XXXI). It is very thin, delicate, flexible, and translucent, almost transparent in living specimens.

The cephalothorax and thorax are both strongly arched dorsally. The former is moderately thick, the sides curving round to form a narrow elongate lobe or check on each side of the lower surface, reaching well up to the appendages. The thorax is much thickened, the ventral surface of the first (more properly second) segment being concave between two lateral, elongate, raised folds.

The thoracic feet of the third pair are very large, prominent, hood-shaped, and project far out on each side of the body, as shown in both the dorsal and ventral views represented on Plate XXXI, Figs. 1, 2. Each consists of a large, strongly recurved lobe, attached along the inner margin, presenting a convex surface anteriorly, with the lateral margins curved and subparallel, and the inclosed space opening obliquely

outward and downward. The anterior part of each lobe is much thickened, while the ends are thin, and more or less extended, the inner ones somewhat the longest and reaching about to the caudal segment. The shape of these appendages may change considerably in alcoholic specimens. The thoracic feet of the fourth pair are very elongate, foliaceous, bilobed. They originate just in front of the genital ring, and each consists of one principal process and an inner, shorter one. The former is rather broad, sublanceolate in outline, narrow toward the base, becoming broadest near the middle, and tapering from there toward the hinder end, which is rounded. Its greatest width is equal to about one-fourth its length or slightly more, and it projects for fully one-half its length back of the posterior extremity of the dorsal shield. The inner process is an elongate lobe, rounded posteriorly, and with a convex inner margin, which originates at the posterior extremity of the thorax; the outer margin is only about one-half as long as the inner margin, and merges into the ventral surface of the outer process about one-third the length of the latter from its base. The length of the inner process, as measured on its longer margin, is about two and one-half times its greatest width, and a little more than one-half the length of the outer process. It extends a short distance back of the posterior extremity of the dorsal shield.

The abdomen is very small, with few, slight, transverse constrictions. It is located under the front part of the dorsal shield. The caudal segment is short, simple, nearly square in transverse section, and terminates in two very small conical or rounded knobs, one on each side.

The egg-tubes are slender, approximately straight, and may equal in length the entire body with its appendages.

The microscopic appendages are as follows: The anterior antennæ are very small, slender, rounded, and originate on the front margin of the cephalothorax, near the dorsal surface and at some distance from the middle. They are generally folded against the surface, but when raised project slightly beyond the sides, and consist apparently of three joints of which the basal is much the largest and the distal the smallest. The latter terminates in two or more small rounded knobs and numerous papillæ; two similar papillæ also arise from the front side of the median joint. The posterior antennæ or prehensile claws consist of a very large basal joint, broad at the base and rapidly tapering, and a much smaller, rather slender, curved and sharply pointed terminal joint. The details of the horny frame-work to which they are attached are represented in Fig. 1, Plate XXXII. The proboscis is elongate, conical in shape, becoming quite slender near the tip which is small, rounded. The palpi (maxillæ) consist of an elongate terminal joint, armed at the tip with two slender acute spines, one of which is jointed, the other not, and, apparently, of one irregular basal joint, with a small jointed spine projecting from the posterior margin.

The first maxillipeds consist of three joints, the basal relatively large, long, simple, with a moderately convex anterior and a nearly straight posterior margin; the second, slender, a little more than half as long as the basal; the terminal very small, slightly curved, tapering, and pointed. A row of minute spines begins upon the posterior margin of the second joint near the outer end and continues over upon the distal joint. The second maxillipeds consist of two distinct joints, the basal very large and broad, the terminal slender, and partly divided transversely near the outer end. The anterior margin of the basal joint is very strongly convex, the posterior nearly straight, the inner end abruptly constricted. The second joint is somewhat more than half as long as the basal, moderately broad at the inner end and gradually tapering to an acute point, the outer portion being strongly curved. In the figure of this appendage (Fig. 4, Pl. XXXII) the width of the basal joint is slightly exaggerated through compression.

The thoracic feet of the first pair are situated only a short distance back of the maxillipeds, and consist of a small, elongate, rectangular basal process and three appendages. The outer appendage is the largest and is attached to the anterior edge of the basal process near the outer end. It is irregularly subovate or oblong in outline, the distal end broad, slightly curved, and armed with five stout, acute spines, of which the innermost one is larger than the others and is slightly curved at the tip. The median appendage is attached just within the middle of the basal process, is much smaller than the other one, stout, fusiform in shape, with an elongate terminal spine. The innermost appendage is very minute, circular, with two slight projections from the outer end. The feet of the second pair are much smaller than those of the first, being minute and situated some distance back of the latter, and near the sides of the body, where they may be readily overlooked. They consist of a basal lobe-like process, with two irregular lobes attached to the posterior margin, and a third process at the outer end, similar to the corresponding one of the first pair, but much smaller and with only three marginal spines. Just outside of these processes is a minute, slender, pointed seta, arising directly from the ventral surface.

The entire body is very soft, and all parts except the thickened thorax are very translucent, almost transparent, so that underlying appendages can generally be made out through them. Even the appendages of the cephalothorax can be partly distinguished from the dorsal side by strong transmitted light. The color of living specimens is a bright red, due to the large quantity of blood diffused through the entire body, and making it difficult to detect them when attached to the gills, except by means of the egg-tubes, which are dark brown. The actual color of the body appears to be light yellowish. Specimens have been kept alive several days in dishes of sea-water, the red color gradually fading out. The posterior antennæ, maxillipeds, basal processes of the first

pair of feet, and the median ventral frame-work of the cephalothorax are of a light horn color, while the proboscis, palpi, appendages of the first pair of thoracic feet, and the entire second thoracic feet are colorless, and of a very delicate texture. The remaining appendages are like the body in consistency and appearance. The length of the entire body is 5^{mm}; the length of the body, together with the fourth pair of feet, 7^{mm}.

This species has so far been observed only on the gills of the menhaden, *Brevoortia tyrannus* Latrobe, taken in Vineyard Sound, Massachusetts, by the U. S. Fish Commission. It is very abundant at times, and many specimens often occur on a single fish. No males have yet been found. The specimens are catalogued as follows in the record books of the National Museum: 6025, 6064, 6080, 6149, 6170.

Lernanthropus Pomatomi Rathbun, new species.

(Plates XXXIII-XXXV.)

This species is of about the same size as *Lernanthropus Brevoortiae*, but may be readily distinguished from it by the size and shape of the thoracic appendages corresponding to the third and fourth pairs of feet and by the contour of the posterior part of the body. Other less conspicuous features differ to the same extent, and the two species are very distinct. A number of specimens of the males of this species were obtained with the females and are described below. The original figures, representing the general characters of the animal and the larger appendages, were drawn from living or fresh specimens, and the following description is made up from the same kind of material, unless otherwise expressly stated. By contraction in alcohol the shape of the body and of the softer appendages is greatly changed.

Female.—A dorsal view of a living specimen is represented in Fig. 3, Plate XXXIII, and the same view of one that had long been preserved in alcohol in Fig. 4 of the same plate. In the former the cephalothorax is elongate, narrowest at the front, the lateral margins diverging and generally slightly concave near the middle, but becoming convex and regularly rounded near the posterior corners, where the greatest width occurs. The anterior margin is broadly excavated, convex in the middle, and with the corners somewhat prolonged and rounded; the posterior margin is strongly and regularly curved, and may be closely pressed against the anterior end of the thorax or separated from it, according to the state of contraction of the specimen. In alcoholic specimens the front margin remains about the same, but the sides are convex; the greatest width occurs near or in advance of the middle, and the hinder part of the cephalothorax becomes much narrowed and more strongly rounded than in living specimens, producing a suboval outline. The thorax forms a square figure, as in *L. Brevoortiae*, but is proportionately wider and shorter, widest posteriorly, with well rounded corners, and more or less

indented sides. Upon contraction in alcohol the outline changes greatly, the width becoming much reduced anteriorly, the sides slightly sinuous and diverging more or less rapidly from the head backwards, as represented in Fig. 4, Plate XXXIII.

There are no indications of segmentation or divisions on the dorsal surface back of the cephalothorax, except such as result from the indentations of the margins. Back of the thorax, last above described, is a large, broad, dorsal shield, from the ventral surface of which, near the front, arise the thoracic feet of the fourth pair, precisely as in *L. Brevoortia*. The lateral margins of this division of the body are not indented, however, in living specimens, and very rarely in alcoholic ones. In the former it is oblong or broadly subovate in outline, with the posterior margin rounded or straight, the greatest width, which is generally less than that of the thorax, being near the middle. At the front, where it joins the thorax, the body is abruptly constricted on the sides, as shown in the several general views. In alcoholic specimens the dorsal shield is widest near the front, whence the sides, which are sometimes slightly indented near the middle, converge toward the posterior end, the latter being cut off more or less squarely. The cephalothorax and thorax do not differ much in length, but the dorsal shield is somewhat longer than either, and both the thorax and shield, whatever their shapes may be, are generally considerably wider than the cephalothorax.

In side view the cephalothorax appears thick, especially near the front, where the sides are more or less extended in a square or rounded lobe, as shown in Fig. 2, Plate XXXIII. In ventral view the cheeks are shorter and broader than in *L. Brevoortia*, not extending backward much beyond the middle. The thorax proper is relatively stout, as is also the median portion of the dorsal shield as far down as the fourth pair of feet and the abdomen, but towards the margins the dorsal shield thins out. In alcoholic specimens, however, the latter segment becomes greatly inflated and bag-like, and its shape is entirely changed. The feet of the third pair are longer, but much narrower than in *L. Brevoortia*. They appear not unlike short sleeves to a man's coat, cut away on the lower side, and directed downward and backward. In alcohol the walls are often so swollen as to entirely close the central opening. They are not visible at the sides of the thorax in dorsal view. The feet of the fourth pair consist each of two rami, as in *L. Brevoortia*, the inner rami, however, being only slightly shorter than the outer, and both very elongate, narrow, thin, generally acute, but sometimes rounded at the tips. They are united near the base, and about two-thirds of their length is exposed beyond the posterior margin of the dorsal shield. In alcohol they become narrower and slightly thicker, and are almost invariably placed in the symmetrical positions represented in Fig. 4, Plate XXXIII.

The abdomen is small, subcircular, or transverse; the caudal segment elongate, terminating posteriorly in two large, elongate, rather stout,

tapering processes. The brown globular bodies at the posterior end of the abdomen are proportionally large and prominent. The egg-tubes are slender, elongate, and of a dark brown color.

The anterior antennæ originate at the front margin, just within the produced lateral corners, and do not reach quite to the sides. They are slender, gradually tapering, and consist of about eight joints, of unequal lengths, not regularly alternating as to length. A few pointed papillæ of different sizes occur at irregular intervals along the antennæ, and several at the distal end. The posterior antennæ or prehensile claws are very large, and taper gradually and regularly from the base to the tip, near which they become strongly curved. The basal joint is much longer than the distal, and much more slender than the corresponding joint in *L. Brevoortia*. The proboscis is oblong in its main portion with straight and parallel sides, but rapidly narrows toward the end, which is produced in a moderately slender tip, in which the ends of the mandibles are plainly distinguishable. The palpi at the sides of the proboscis are stout, arise from several large, rounded, lobe-like processes, and terminate in two stout, pointed, closely-placed spines, one of which is about twice as long as the other. The first maxillipeds consist of a moderately broad, elongate, basal joint, a slender second joint of about half the length of the former, and with a small spine on the outer margin near the distal end, and a short pointed, rapidly tapering and very slightly curved terminal joint, bearing a row of minute spines along the concave side. The second maxillipeds are much larger than the first, and consist of a rather broad basal joint (much narrower, however, than the corresponding one in *L. Brevoortia*) with the posterior margin slightly concave, the anterior strongly convex, and a terminal joint of about half the same length, partly divided near the distal end, stout at the base, but otherwise rather slender, tapering and slightly curved near the tip.

The thoracic feet of the first pair, which follow closely after the last maxillipeds, consist of a broad basal process and two principal appendages. The larger appendage is attached at the outer end of the basal process, and is oblong in shape, with straight and nearly parallel sides of which the inner is shorter than the outer. The proximal end is cut off obliquely, the distal rounded and provided with five closely placed, subequal, stout, acute, and slightly curved spines. The inner appendage is attached near the middle of the basal process, and is composed of an elongate, subovate joint, terminating in a single, elongate, slender spine of about its own length. Another shorter and stouter acute spine, directed backwards, originates just within the base of this appendage. The feet of the second pair consist of three minute appendages, apparently originating directly from a fold of the surface. The innermost appendage resembles the corresponding one of the first pair, and terminates in a similar but shorter spine or papilla, which appears to be retractile. The middle appendage is ovate in outline, the distal end

armed with about five stout spines. The outer appendage is a long, slender spine or seta, arising from a minute fold of the skin.

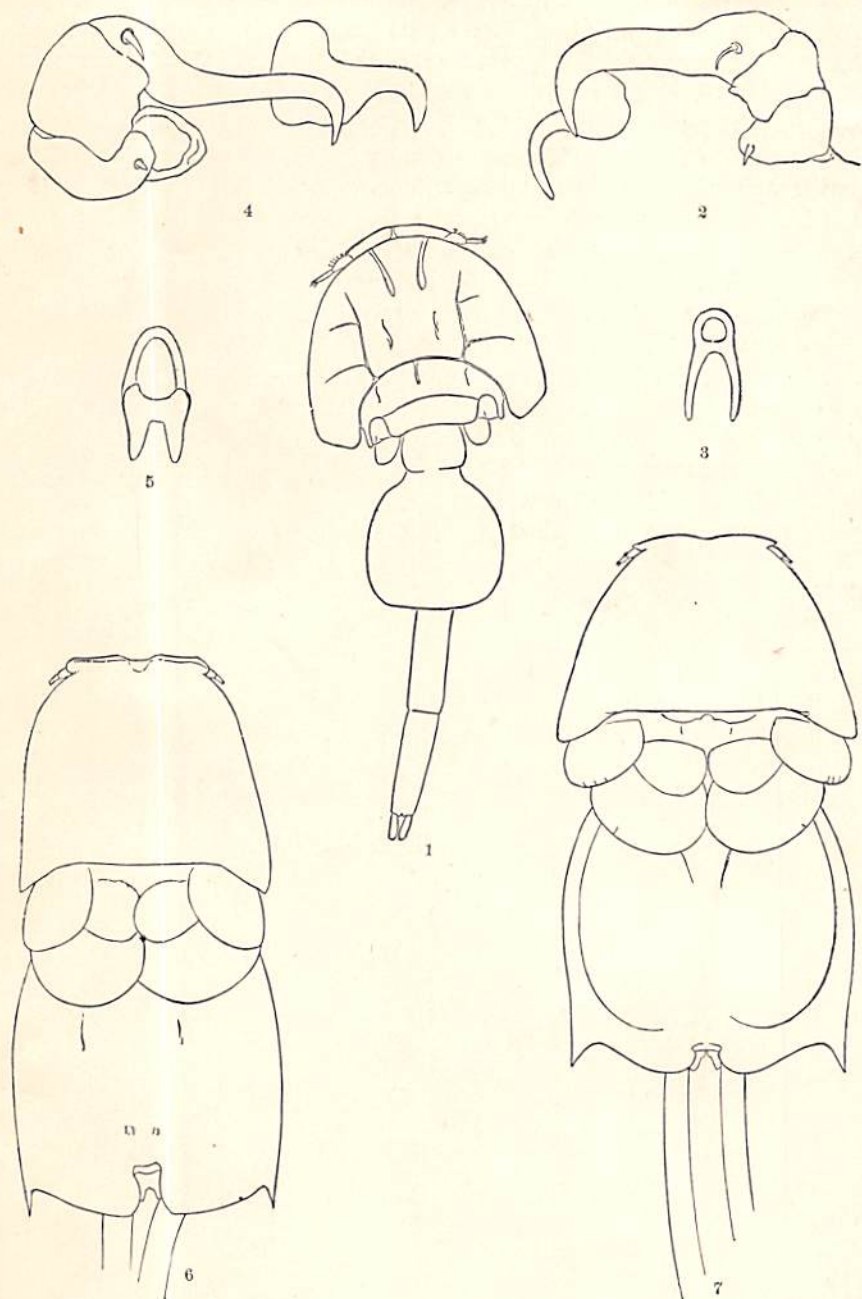
Male.—The males of this species are much smaller than the females, being more slender and measuring only from two-fifths to one-half as long. The cephalothorax is very large, composing very nearly one-half the entire body in length, and is generally slightly wider than the widest part of the thorax. It is subovate or subpyriform in outline, from above, with the smallest end directed forward; thick, prominent, and elevated above the plane of the thorax, from which it is well marked off. The front margin is rather broad, nearly straight or very slightly convex, with the corners more or less abruptly rounded, back of which the margins are slightly concave for a short distance; but the posterior three-fourths in length of this segment form a very regular oval figure. The thorax is narrowest directly back of the cephalothorax, but from there it widens rapidly to near the middle, where the third pair of feet originate, and where the width may nearly or quite equal that of the first body segment. The feet of the third pair consist each of a simple, narrow, elongate, gradually tapering appendage, terminating in an acute or small rounded tip. They start from the lateral margins of the thorax, and are directed outwards and slightly backwards at a wide angle with the sides of the thorax. Directly back of them the thorax is again slightly and abruptly constricted, but immediately widens again to give origin to the fourth pair of feet, the bases of which occupy the remainder of the thoracic margins. These appendages are very elongate-lanceolate in shape, broaden gradually from the base for about one-third their length, and thence taper to acute or very small rounded tips. Their total length is equal to the entire length of the thorax and abdomen, plus one-third that of the cephalothorax, and they are directed backward and slightly outward, as represented in Figs. 1, 2, Plate XXXIV. In fresh specimens, their greatest width is about one-fifth their length, but in alcohol, both the third and fourth pair of feet become slightly narrower and thicker. Though of the same consistency as the body, they have a somewhat stiff appearance, and their proportions and positions are very constant in all the specimens examined.

The abdomen is short, with convex sides. The caudal segment is somewhat broader than long, abruptly constricted at the hinder end, and terminates in two simple, elongate, tapering appendages, bluntly rounded at the tips, and bearing three long, slender, acute papillæ each, one of which is at the tip and two in front of the middle.

The appendages in advance of the third pair of feet are all proportionally large, and when compared with the corresponding appendages of the females are seen to resemble them closely in shape and structure. As they are all figured on Plates XXXIV and XXXV, detailed descriptions of them will not be given. The anterior antennæ project considerably at the sides of the head, and consist of at least six segments, with numerous elongate terminal papillæ and a few distributed else-

where. The posterior antennæ are exceedingly large and prominent. They are attached just within the front margin of the cephalothorax and are generally directed more or less forward, as indicated in the two general figures (Plate XXXIV, Figs. 1, 2). Their spread is usually a little greater than the width of the cephalothorax. The two pairs of maxillipeds and the first pair of feet project far beyond the margins on either side, and are very conspicuous in dorsal view. The feet of the second pair differ most widely from those of the female, as will be readily observed on comparing Fig. 4 with Fig. 8, Plate XXXV.

The color of this species is the same as that of *L. Brevoortia*. Many specimens were obtained from the gills of bluefish (*Pomatomus saltator*), caught in Vineyard Sound, Mass., in 1883 and 1885, by the U. S. Fish Commission, and this is the only host of the species so far as known. A few males were occasionally found with the females, but, though diligently searched for, the former sex has always been of rare occurrence. The specimens are now contained in the National Museum, and are catalogued as follows: Females, 6026, 6050, 6056, 6156, 12684; males, 6027, 6051.

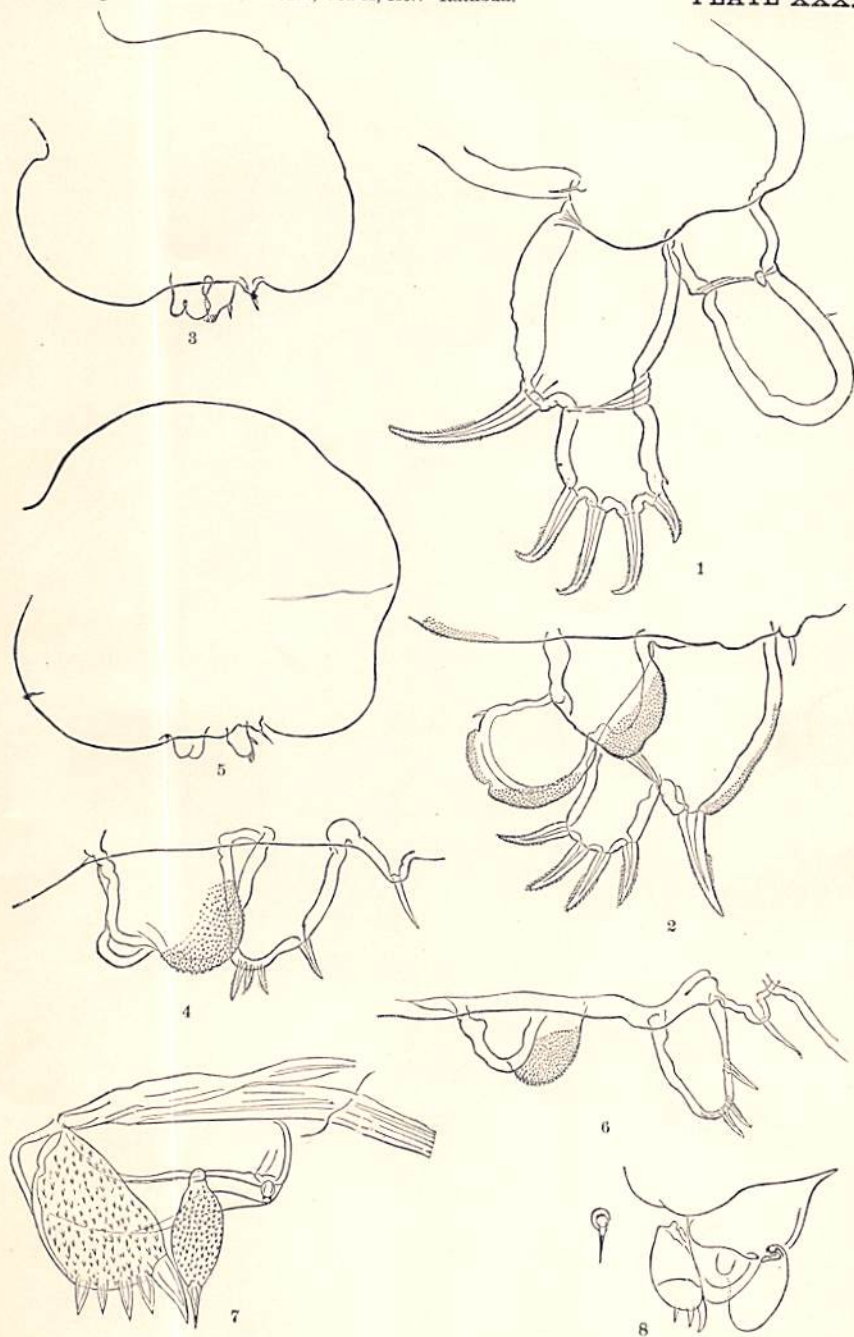


Trebius tenuifurcatus Rathbun, sp. nov., ♀. Fig. 1, dorsal view, enlarged about 11 diameters; 2, posterior antenna and accessory hook of one side, $\times 45$ dia.; 3, furca, $\times 45$ dia. (p. 559.)

Trebius caudatus Kröyer, ♀. Fig. 4, posterior antenna and accessory hook, $\times 45$ dia.; 5, furca, $\times 45$ dia. (p. 559.)

Perissopus communis Rathbun, sp. nov., ♀. Fig. 6, typical form, dorsal view, $\times 14$ dia.; 7, var. *Stimpsoni* Rathbun, dorsal view, $\times 14$ dia. (p. 560.)

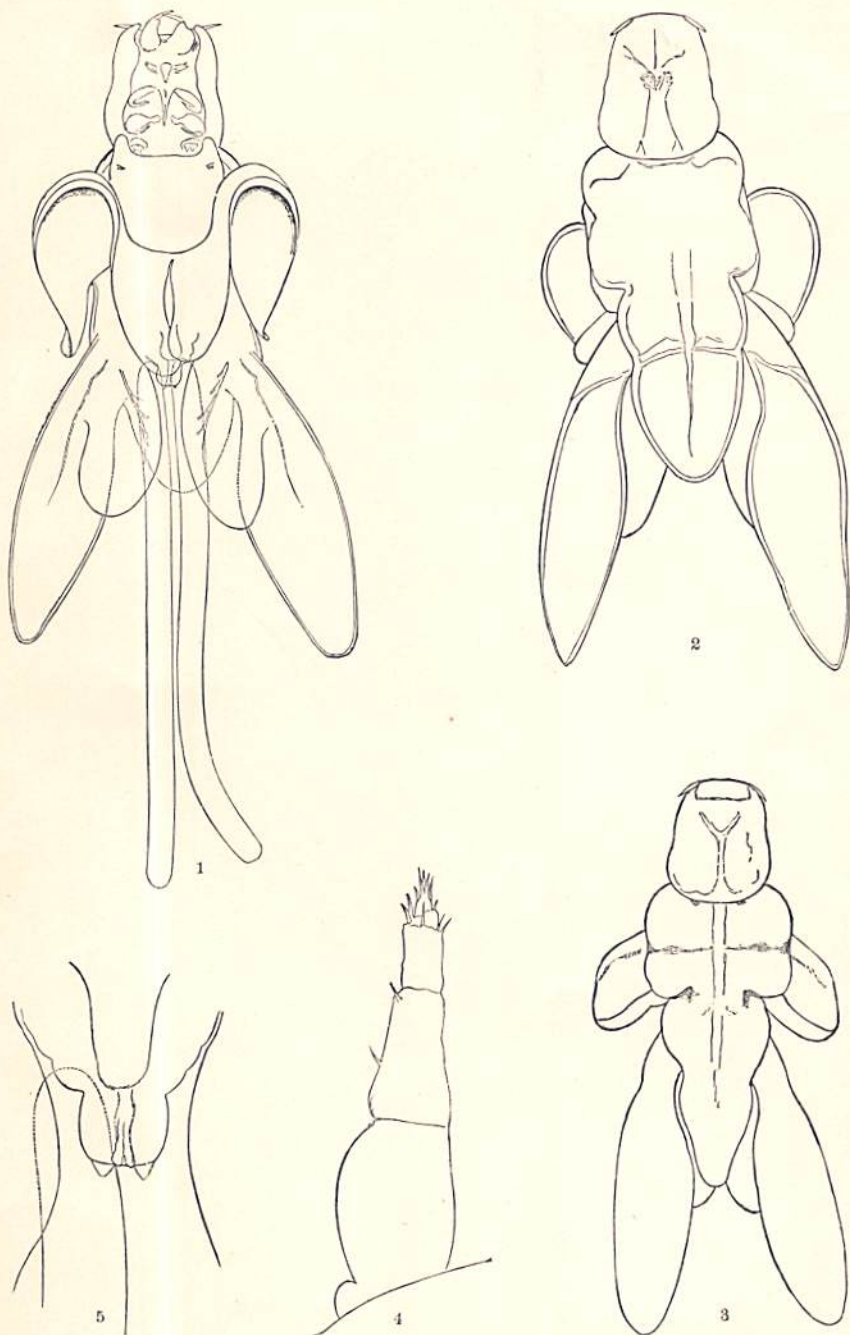
(Figs. 6 and 7 were drawn by Mr. A. H. Baldwin; the remainder by the author.)



Perissopus communis, var. *Stimpsoni* Rathbun, ♀. Fig. 1, foot of first pair, $\times 160$ diameters; 2, foot of second pair, $\times 160$ dia.; 3, foot of third pair, $\times 46$ dia.; 4, appendages of same, $\times 160$ dia.; 5, foot of fourth pair, $\times 46$ dia.; 6, appendages of same, $\times 160$ dia. (p. 560.)

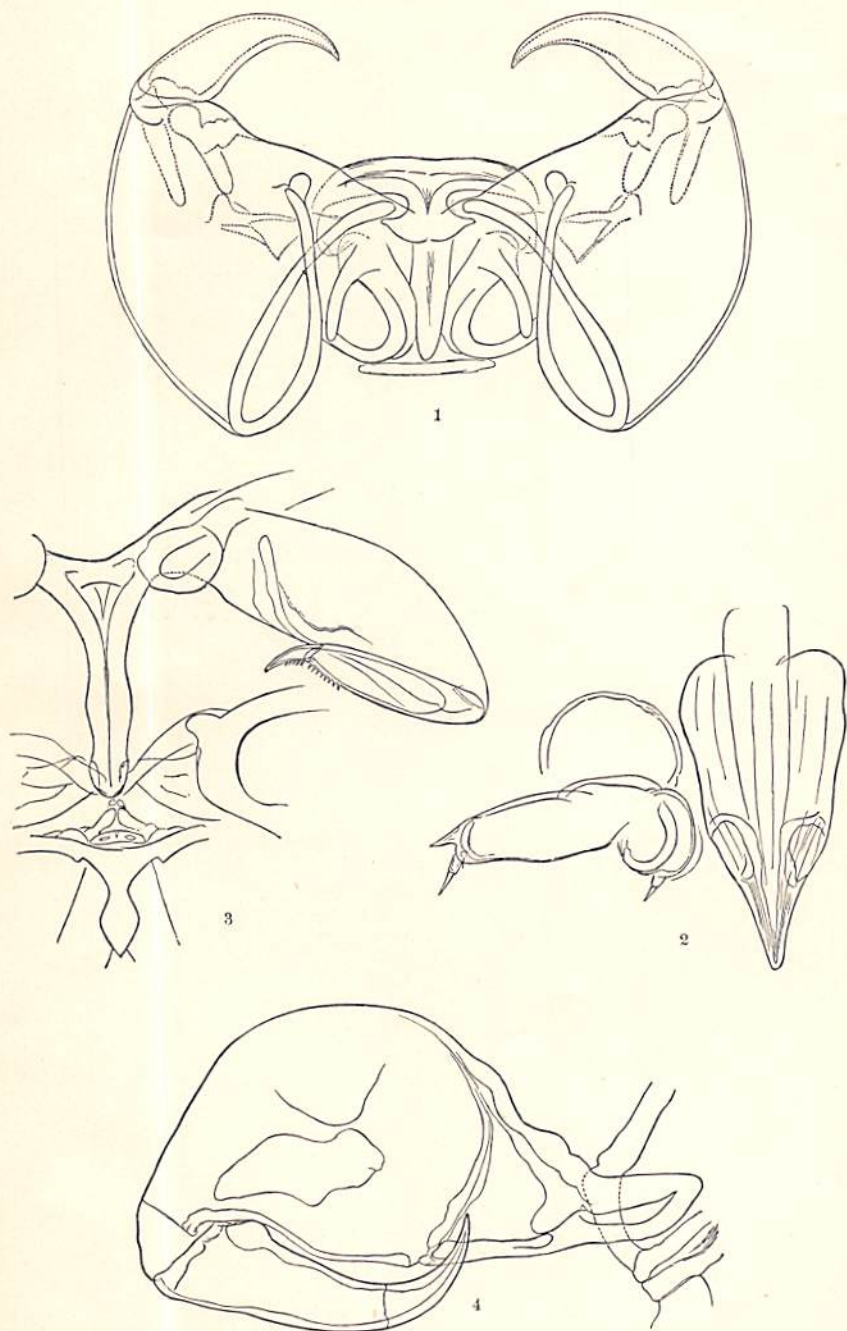
Lernanthropus Brevoortia Rathbun, sp. nov., ♀. Fig. 7, thoracic foot of first pair, $\times 195$ dia.; 8, thoracic foot of second pair, $\times 195$ dia. (p. 563.)

(From drawings by the author.)



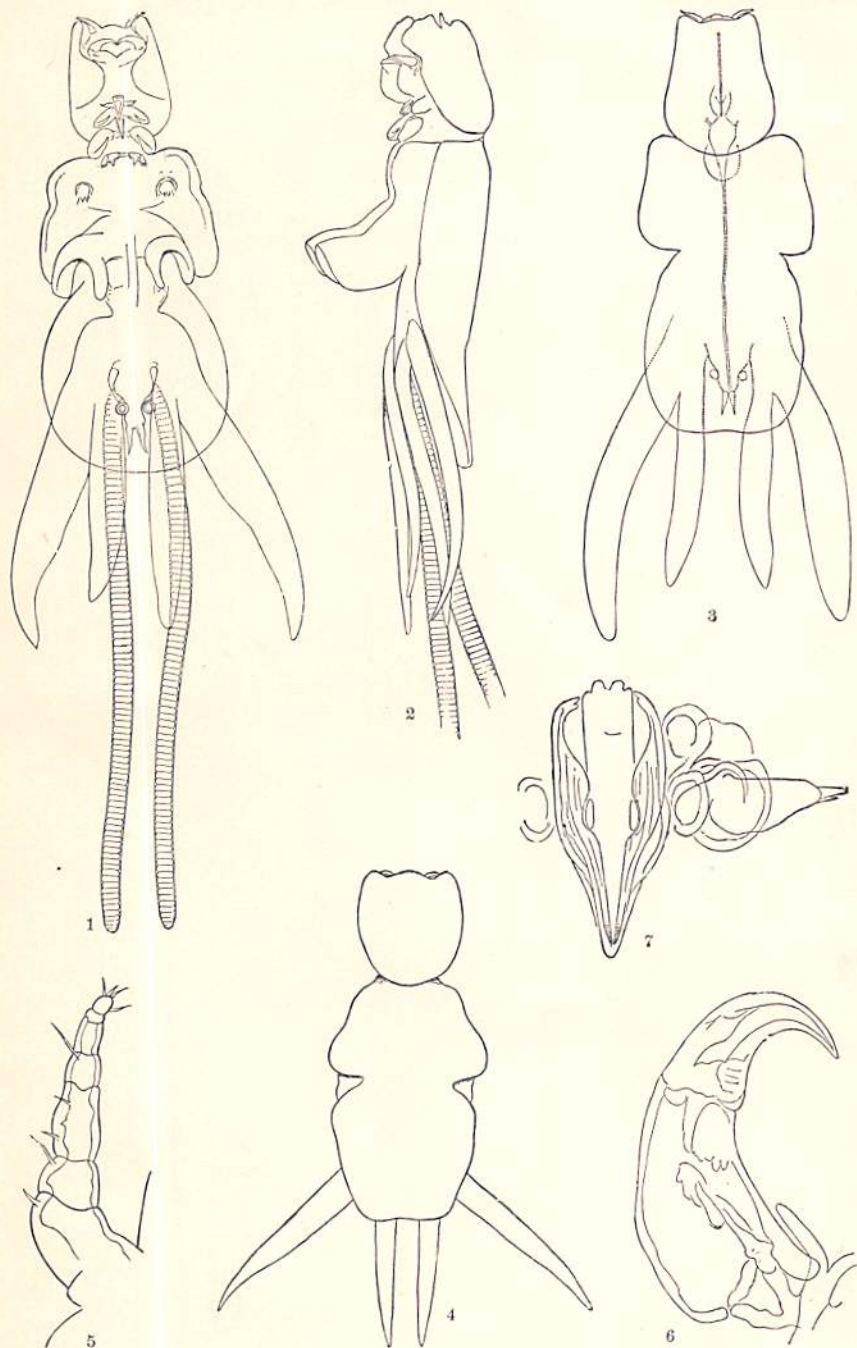
Lernanthropus Brevoortia Rathbun, sp. nov., ♀. Fig. 1, ventral view, from living specimen, enlarged 12 diameters; 2, dorsal view, from living specimen, $\times 12$ dia.; 3, dorsal view, from alcoholic specimen, \times about 11 dia.; 4, anterior antenna, $\times 130$ dia.; 5, abdomen and caudal segment, enlarged. (p. 503.)

(Fig. 3 was drawn by Mr. A. H. Baldwin; the remainder by the author.)



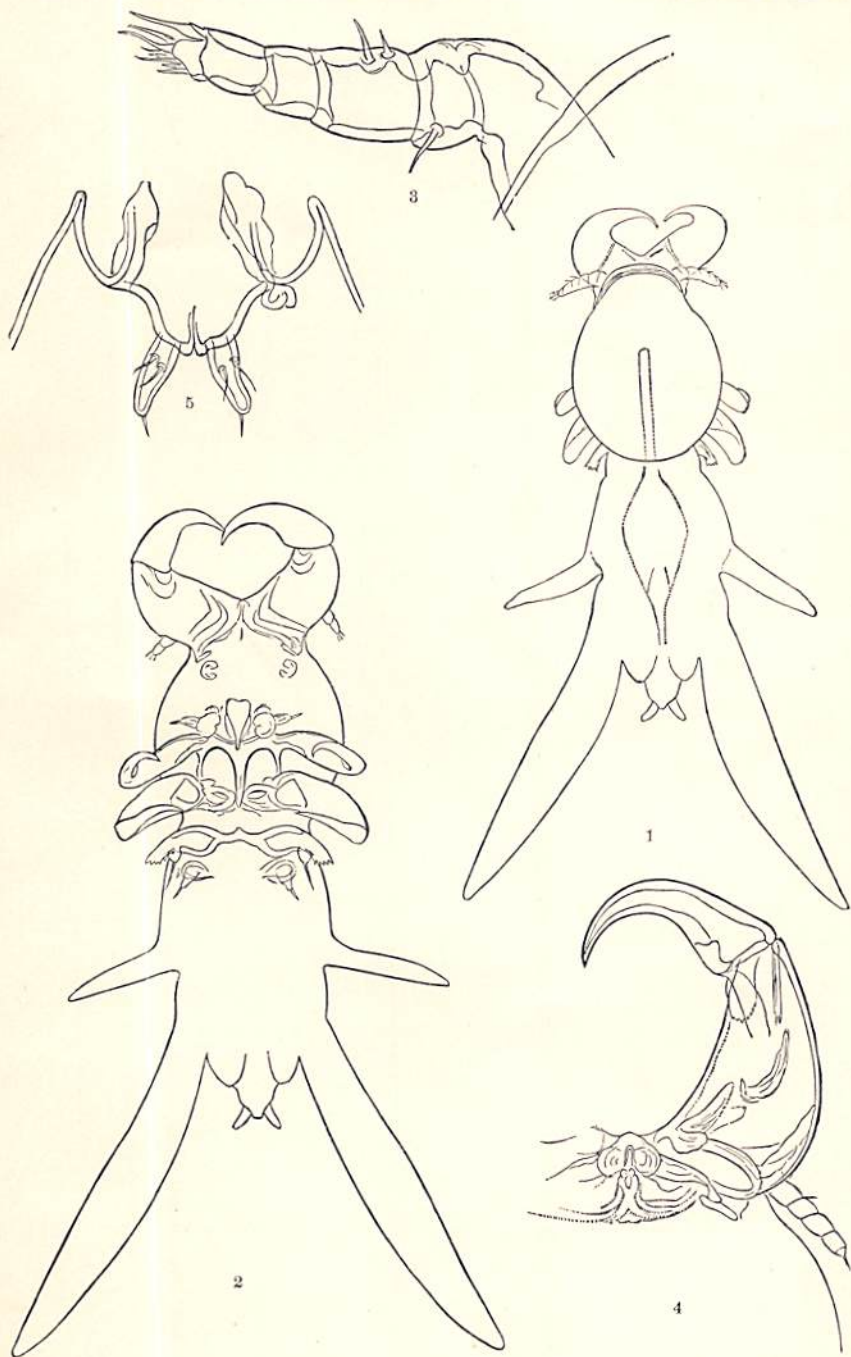
Lernanthropus Brevoortiae Rathbun, sp. nov., ♀. Fig. 1, posterior antennae, enlarged 83 diameters; 2, proboscis and palpus, $\times 173$ dia.; 3, first maxilliped, and the median horny frame-work for the attachment of both pairs of maxillipeds, $\times 113$ dia.; 4, second maxilliped, showing attachment to the median horny frame-work, $\times 113$ dia. (p. 563.)

(From drawings by the author.)



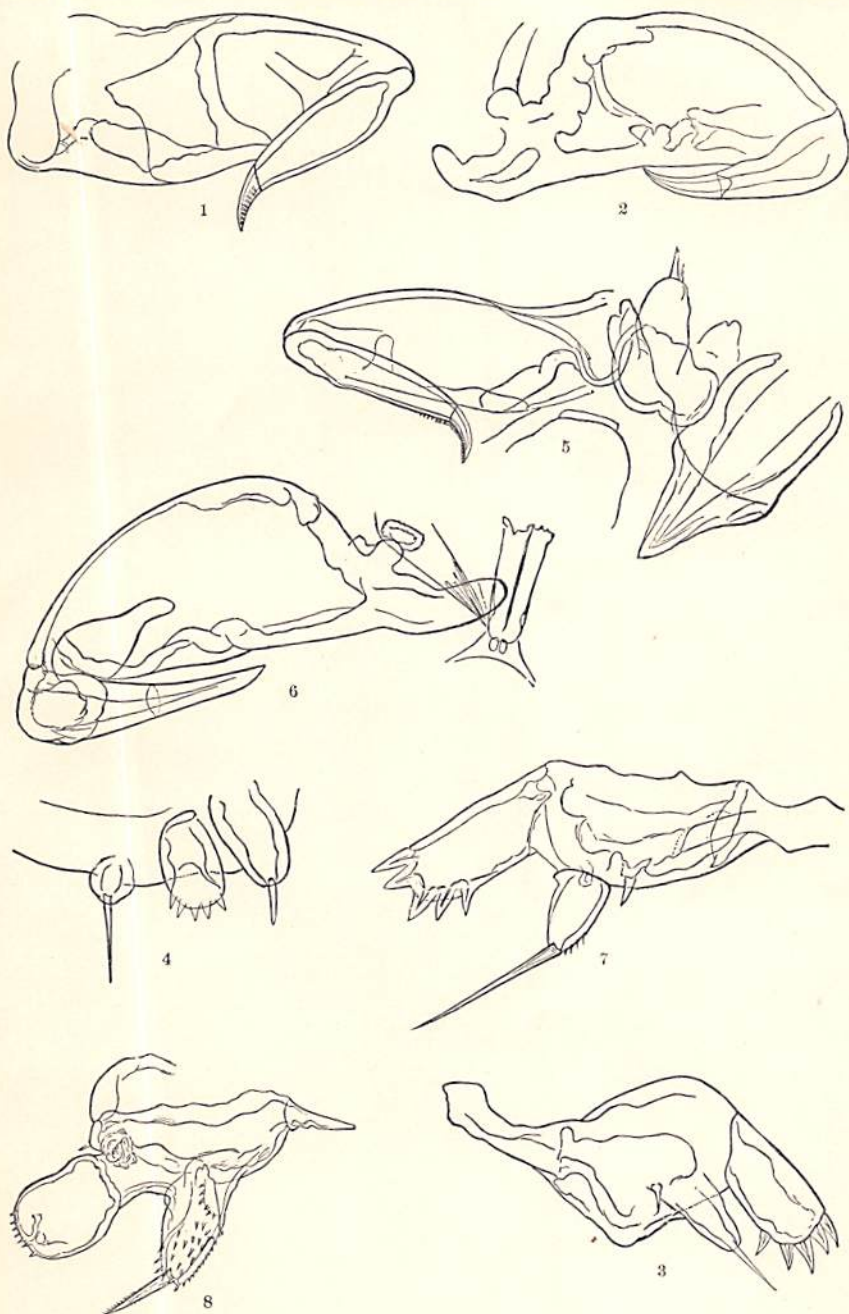
Lernanthropus Pomatomi Rathbun, sp. nov., ♀. Fig. 1, ventral view, from living specimen, enlarged 10 diameters; 2, lateral view of same specimen, $\times 10$ dia.; 3 dorsal view, from living specimen, $\times 10$ dia.; 4, dorsal view, from alcoholic specimen, $\times 12$ dia.; 5, anterior antenna, $\times 167$ dia.; 6, posterior antenna, $\times 130$ dia.; 7, proboscis and palpus, $\times 183$ dia. (p. 567.)

(Figs. 1 and 2 were drawn by Mr. J. H. Emerton; the remainder by the author.)



Lernanthropus Pomatomi Rathbun, sp. nov., ♂. Fig. 1, dorsal view, enlarged 28 diameters; 2, ventral view, showing the appendages, $\times 37$ dia.; 3, anterior antenna, $\times 163$ dia.; 4, posterior antenna, $\times 86$ dia.; 5, showing abdomen, caudal segment, appendages, and openings, somewhat broadened by compression, and enlarged. (p. 570).

(From drawings by the author.)



Lernanthropus Pomatomi Rathbun, sp. nov., ♀. Fig. 1, first maxilliped, enlarged 167 diameters; 2, second maxilliped, $\times 116$ dia.; 3, thoracic foot of first pair, $\times 167$ dia.; 4, thoracic foot of second pair, $\times 267$ dia. (p. 567).

Lernanthropus Pomatomi Rathbun, sp. nov., ♂. Fig. 5, first maxilliped, proboscis, and palpus, $\times 167$ dia.; 6, second maxilliped, $\times 167$ dia.; 7, thoracic foot of first pair, $\times 184$ dia.; 8, thoracic foot of second pair, $\times 184$ dia. (p. 570.)

(From drawings by the author.)