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ON NEW AND RARE CRUSTACEA FROM THE EAST COAST OF SCOTLAND.

By Thomas Scott, F.L.S., and Andrew Scott.

Plates VI. and VII.

Lichomolgus aberdonensis, n. sp. (Plate VI. Figs. 1-12).

Length, exclusive of tail setæ, 1.46 mm. (about $\frac{1}{18}$ of an inch). The cephalo-thorax is composed of five segments, the first of which is longer than the combined length of the other four, rounded in front, and not produced into a rostrum; the fifth segment is rather longer than, and little more than half the breadth of, the preceding segment. Abdomen in both sexes composed of five segments, the first segment nearly twice the breadth of the next one, and as long as the second and third together. In the male the lateral distal angles of this segment are furnished with two small unequal spines (Fig. 12). The fourth segment of the abdomen in both sexes is shorter than either of the other segments. The whole length of the abdomen (exclusive of the caudal stylets) is scarcely half the length of the cephalo-thorax. Caudal stylets about half as long again as the last abdominal segment and furnished with six setæ, the fourth seta (counting from the outside) is considerably longer than the entire length of the abdomen and caudal stylets combined. Anterior antennæ seven-jointed, alike in both sexes, and

provided with numerous setæ; the proportional length of the joints are nearly as shown by the annexed formula:—

$$\frac{5 \cdot 5 \cdot 2 \cdot 7 \cdot 6 \cdot 5 \cdot 6}{1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7}.$$

Posterior antennæ four-jointed; the first and second joints are elongate, the third and fourth very short (Fig. 3). Mandible short and moderately stout, armed at the extremity with two processes and two spiniform setæ; one of the processes is conical and tooth-like, and serrate on the inner edge, the other is somewhat cylindrical, and rounded at the end—the margin that is opposed to the tooth-like process, and also the end, being hispid (Fig. 4). Maxillæ stout, broad, and bearing a number of terminal spiniform setæ. Anterior foot-jaws stout, with a proportionally large marginal setiferous lobe, and several terminal spines (Fig. 5). Posterior foot-jaws two-jointed, those of the male armed with a strong, uncinate, and sinuous terminal claw, which is considerably longer than the stout broad joint from the end of which it springs, and with which it forms a powerful grasping organ. At the base of the claw, on the inside, there is a stout, short, and blunt spine. The inner edge of the last joint of the foot-jaw is furnished with a double (? or treble) row of elongate blunt-pointed teeth. Two long stout plumose setæ spring from the inner margin, and near the distal end of the first joint. The terminal claw probably passes down between these two setæ, and forms with them an interlocking apparatus (Fig. 7). The posterior foot-jaws in the female, are also moderately stout, but the terminal claw is feeble; the last joint is not so broad, and its inner margin bears two setiferous spines instead of the double row of teeth possessed by that of the male. The first, second, third, and fourth pairs of swimming-feet are nearly alike; both branches are short (the outer being rather shorter than the inner) and three-jointed. The outer branch is armed exteriorly with a number of dagger-like spines, as shown in the figures (Figs. 8 and 9). The inner distal angle of the first basal joint of all the four pairs bears a spiniform seta. The inner distal angle of the second basal joint of the first pair bears also an elongate dagger-like spine, while a moderately long and stout seta springs from the outer margin of the same joint. The fifth pair of feet are

broad and foliaceous—more so in the female than the male, as shown in the figures (Figs. 10 and 11).

Habitat.—Aberdeen Bay. Several specimens were obtained in bottom-townet material collected in 1891, but only a few of them were mature.

Lichomolgus aberdonensis resembles in general form and structure the species described in the "Tenth Annual Report of the Fishery Board for Scotland" under the name of *Lichomolgus littoralis*, but differs from it in several important points, as in the proportional length of the joints of the anterior and posterior antennæ, in the form of the posterior foot-jaw and fifth pair of feet, and in the proportional length of the segments of the abdomen.

Lichomolgus arenicolus, Brady (Plate VII. Figs. 1-10).

1872. *Boeckia arenicola*, Brady, "Nat. Hist. Trans. of Northumberland and Durham," vol. iv. p. 430.

1880. *Lichomolgus arenicolus*, Brady, "Mon. Brit. Copep." vol. iii. Plate LXXXVII. Figs. 1-7.

Female.—Length, exclusive of tail setæ, 2·3 mm. Anterior antennæ not more than half the length of the first body segment, and composed of six joints, which are all more or less setiferous; the proportional length of the joints are nearly as in the formula:—

$$\frac{11 \cdot 18 \cdot 6 \cdot 14 \cdot 12 \cdot 17}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}.$$

Posterior antennæ stout, four-jointed; the first two joints short, the third about twice the length of the second, and the last about two-thirds the length of the preceding one. The last joint is armed with three stout terminal clawed spines, which are elongate, and distinctly articulated and swollen near the middle—the distal half being strongly curved and claw-like. There is a fourth terminal articulated spine, but it is more slender and less curved than the other three (Fig. 3). Mandibular stylets two, the upper one provided with a row of marginal teeth, the first two of which are large, while the others gradually decrease in size towards the distal end. The lower stylet bears a number of fine hairs on its upper margin (Fig. 4). The maxillæ consist of a broad laminar plate rounded at the end, and

furnished with a moderately long terminal spine; there is also a small marginal bifid process on the one side, while a small seta springs from the margin on the other side (Fig. 5). The last joint of the anterior foot-jaw terminates in four moderately large subequal sub-marginal spines, and a small lateral spine springs from near the proximal end of the joint (Fig. 6). Posterior foot-jaw rudimentary, moderately broad and stout, and having a very small subterminal tooth-like process (Fig. 7). The first, second, third, and fourth pairs of swimming-feet nearly alike; both branches short (the inner rather longer than the outer one), and three-jointed (Figs. 8 and 9). The armature of the inner branches differs to some extent, especially in the following manner: the last joint of the inner branches of the first pair is provided with one submarginal short and stout dagger-shaped spine, and round the distal end with five moderately long setæ, as shown in Fig. 8. In the second pair the last joint bears one terminal and two submarginal dagger-shaped spines, which are rather longer than that of the first pair, and three submarginal setæ. In the third pair the last joint bears two terminal and two submarginal spines, and two marginal setæ. In the fourth pair the last joint is armed with the same number of spines as in the third pair, but with only one marginal seta, as shown in Fig. 9. Fifth pair elongate, foliaceous, furnished with one short seta on the external margin and near the distal end; immediately anterior to the seta is a number of small marginal teeth. The somewhat truncate extremity of the foot bears three setæ, the middle one of which is very small, while the other two are moderately long and stout, and nearly of equal length (Fig. 10). Abdomen four-jointed, the first segment about twice the length of the next, and somewhat dilated; the other three segments are subequal, the last being rather longer than either of the other two. Caudal stylets rather longer than the last abdominal segment, and about three times as long as broad; each stylet is furnished with several terminal plumose setæ, and with one seta near the middle of the exterior margin.

Habitat.—Off St. Monans, Firth of Forth. One specimen only (a female) of this interesting species was obtained, and is recorded (but not described or figured) in

the "Tenth Annual Report of the Fishery Board for Scotland" (1892).

Lichomolgus arenicolus appears to be a rare species. Some important details of structure not noticed in "British Copepoda" are here described and figured, as are also several others, to illustrate the description of the species, viz.: the posterior antennæ with its remarkably articulated and clawed terminal spines, the rudimentary female posterior foot-jaw, and the fourth pair of swimming-feet, which, like the other three pairs, has both branches three-jointed, and which in this respect forms, with *Lichomolgus aberdonensis*, *Lichomolgus littoralis*, and *Lichomologus sabellæ*,[1] a distinct group — the other species of *Lichomolgus* being distinguished from these three by having the inner branches of the fourth pair of swimming-feet one- or two-jointed. The one- or two-jointed inner branches of the fourth pair of feet constitute one of the characters of the genus *Lichomolgus*, while a second character is that of the mandible, which has the form of "a slender stylet, dilated at the base, but excessively slender and filiform beyond the middle." In *Lichomolgus arenicolus* there are two mandibular stylets, and in *Lichomolgus aberdonensis* and *littoralis* the mandible, which is moderately stout and broad, has no stylets, but is armed at the extremity with one or two tooth-like processes and a few setæ. In consequence of this divergence from some of the generic characters of *Lichomolgus*, it may become necessary to institute one, or possibly two, sub-genera for the reception of these aberrant forms, or otherwise to alter the generic definition of *Lichomolgus* so as to include them.

Should it be found desirable, for the reasons stated, to remove *Lichomolgus littoralis* and *aberdonensis* into a different genus or sub-genus, we would suggest *Platycheiron* as an appropriate generic name,—being descriptive of the remarkably broad ultimate joint of the male posterior foot-jaws of the two species referred to.

[1] A species described by I. C. Thompson in "Proc. Liverpool Biol. Soc.," vol. ii. p. 68. He also records *L. albens*, Thorell, from Liverpool Bay, but we have not as yet seen any description of this species. Another species (apparently new), having the inner branches of the first four pairs of swimming-feet three-jointed, has just been obtained by us, and will be described and figured later.

TABLE, showing some of the more important points of difference between the British species of *Lichomolgus*, including those described here, and in the Fishery Board's "Tenth Annual Report" (1892).

Name of Species.	Anterior antennæ.	Posterior antennæ.	Mandibular stylets.	Last joint of the posterior foot-jaw (male).	Inner branch of fourth pair of swimming-feet.	Foot of fifth pair (male).
Lichomolgus fucicolus .	7-jointed	3-jointed	One	Ovate, with a terminal falciform claw	2-jointed	Elongate, narrow, with two apical setæ
Lichomolgus liber . .	7-jointed	(?) 5-jointed	One	Slender, with a terminal curved claw	(?) 1-jointed	A slender subulate joint, with stout basal seta.
Lichomolgus thorelli . .	7-jointed	4-jointed	(?) One	Broadly ovate, with curved terminal claw	1-jointed	Very small, bisetose
Lichomolgus furcilatus .	6-jointed	Doubtful	One	Doubtful	2-jointed	Elongate, narrow, with two apical setæ
Lichomolgus forficula .	6-jointed	3-jointed	One	Somewhat like *L. fucicolus*	2-jointed	Small, bisetose
Lichomolgus concinnus .	7-jointed	4-jointed	Doubtful	Doubtful	2-jointed	Somewhat like *L. fucicolus*
Lichomolgus arenicolus .	6-jointed	4-jointed	Two	Moderately broad, with strongly curved claw	3-jointed	Long, subclavate
Lichomolgus littoralis .	7-jointed	4-jointed	No stylets—mandible broad, with one stout conical tooth and two setæ	Broadly triangular, with long curved claw	3-jointed	Broadly foliaceous
Lichomolgus aberdonensis	7-jointed	4-jointed	No stylets—mandible broad, with two tooth-like processes and two setæ	Broad, with long sinuous claw	3-jointed	Broadly foliaceous
Lichomolgus sabellæ	7-jointed	4-jointed	(?)	Somewhat like *L. fucicolus*	3-jointed	Small, bisetose

Thysanoessa borealis (G. O. Sars).

1882. *Thysanoessa borealis*, "Oversigt over Norges Crustaceer," Bd. I. pp. 52, 53.

This Schizopod has been obtained in various parts of the Firth of Forth, but never in quantity—one, or at most only a few specimens being taken at a time. *Thysanoessa* has the first pair of legs long, but not so long or so slender as those of *Nematocelis*, which it somewhat resembles. It is further distinguished from *Nematocelis* by the penultimate joint of the first pair of legs being provided throughout its length with stout ciliated setæ, the last joint—which is very small—being also furnished with a number of hairs. On the other hand, the first pair of legs in *Nematocelis* have both the penultimate and antipenultimate joints (which are long and slender) naked, but there is a bunch of spiniform setæ at the apex of the legs. The first legs are very easily broken, so that in handling specimens, or in collecting them, great care is required to keep the legs intact. We are indebted to the Rev. A. M. Norman for the name of the *Thysanoessa* here recorded.

Among a few specimens of Forth Schizopoda forwarded to Dr. Norman for identification, and which included the *Thysanoessa* referred to above, he observed what he considers to be a specimen of *Nematocelis megalops* (G. O. Sars); but the specimen he examined, and one or two others that seem to belong to the same species, having lost their first legs, and thus wanting the character which chiefly distinguishes them, it is perhaps better for the present to leave the claim of *Nematocelis megalops* for a place in the Forth fauna in abeyance till more satisfactory specimens turn up. Dr. Norman informs us that *Nematocelis megalops* was sent to him from Banff by Thomas Edward twenty or thirty years ago; from Aberdeen by Mr. Sim in 1872; and that it has quite recently been obtained at Redcar.

The eyes of *Thysanoessa* and *Nematocelis* have a marked constriction near the middle, which divides the eye into what appears to be a lower and upper eye, and thus imparts to them a peculiar and rather striking appearance, and which

serves to distinguish them at a glance from either *Boreophausia* or *Nyctiphanes*.

Explanation of Plate VI.

Lichomolgus aberdonensis, n. sp.

Fig. 1. Adult female . . . . . × 40
„ 2. Anterior antenna . . . . . × 95
„ 3. Posterior antenna . . . . . × 125
„ 4. Mandible; *a*, maxilla . . . . × 125
„ 5. Anterior foot-jaw . . . . . × 190
„ 6. Posterior foot-jaw (female) . . . × 190
„ 7. Posterior foot-jaw (male) . . . × 190
„ 8. Foot of first pair . . . . . × 125
„ 9. Foot of fourth pair . . . . . × 85
„ 10. Foot of fifth pair (female) . . . × 125
„ 11. Foot of fifth pair (male) . . . . × 125
„ 12. Abdomen of male . . . . . × 40

Explanation of Plate VII.

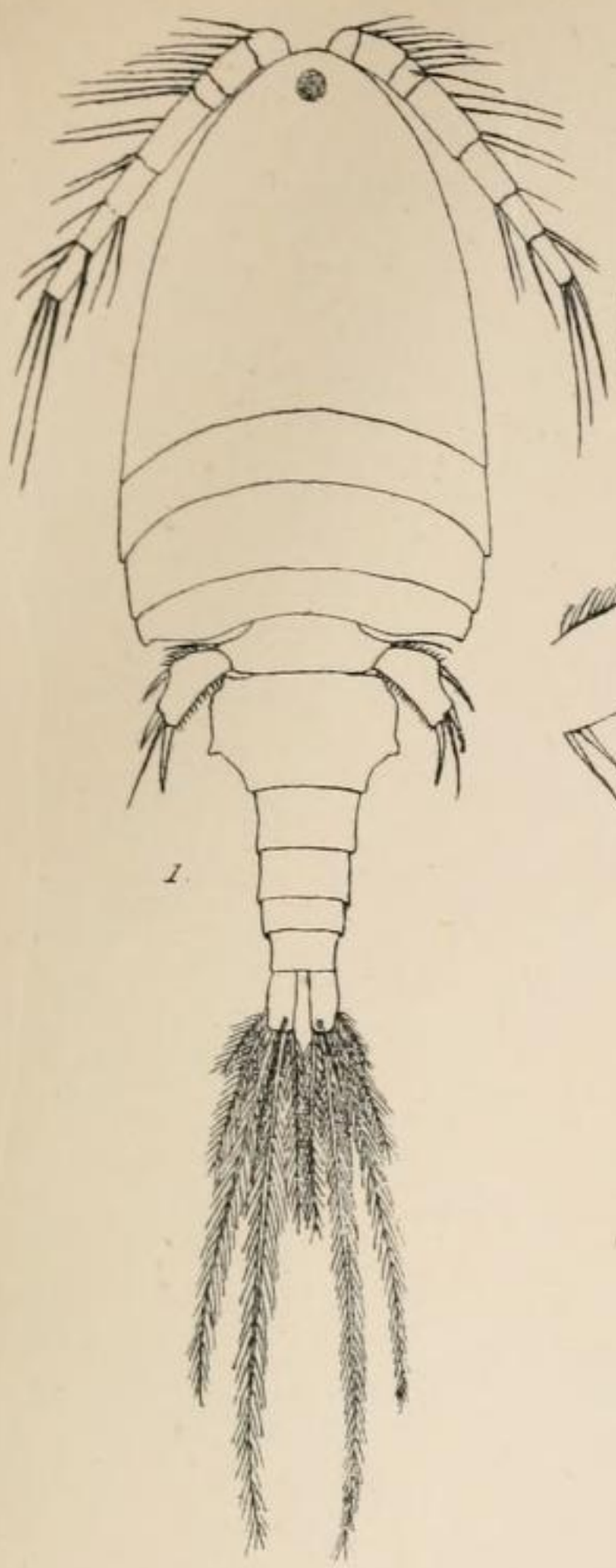
Lichomolgus arenicolus, Brady.

Fig. 1. Adult Female . . . . . × 40
„ 2. Anterior antenna . . . . . × 125
„ 3. Posterior antenna . . . . . × 190
„ 4. Mandible . . . . . × 250
„ 5. Maxilla . . . . . × 280
„ 6. Anterior foot-jaw . . . . . × 280
„ 7. Posterior foot-jaw . . . . . × 280
„ 8. Foot of first pair . . . . . × 125
„ 9. Foot of fourth pair . . . . . × 85
„ 10. Foot of fifth pair . . . . . × 190

CONTRIBUTIONS TO THE VERTEBRATE FAUNA OF SUTHERLAND AND CAITHNESS.

By T. E. Buckley, B.A., F.Z.S., etc.

The object of the following notes is to enable us to bring the Fauna of Sutherland and Caithness up to date. One bird, the Ruff, is new to the Sutherland list, and we are able to show the spread of certain other species, such as the Stock Dove, Tree Pipit, etc.



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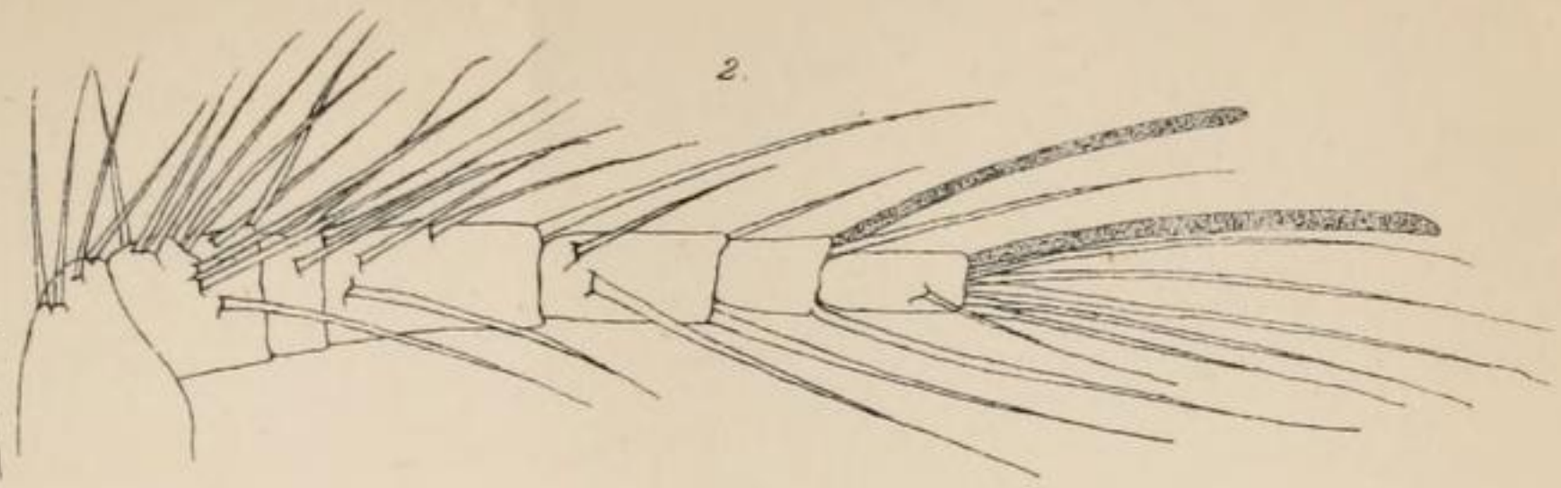

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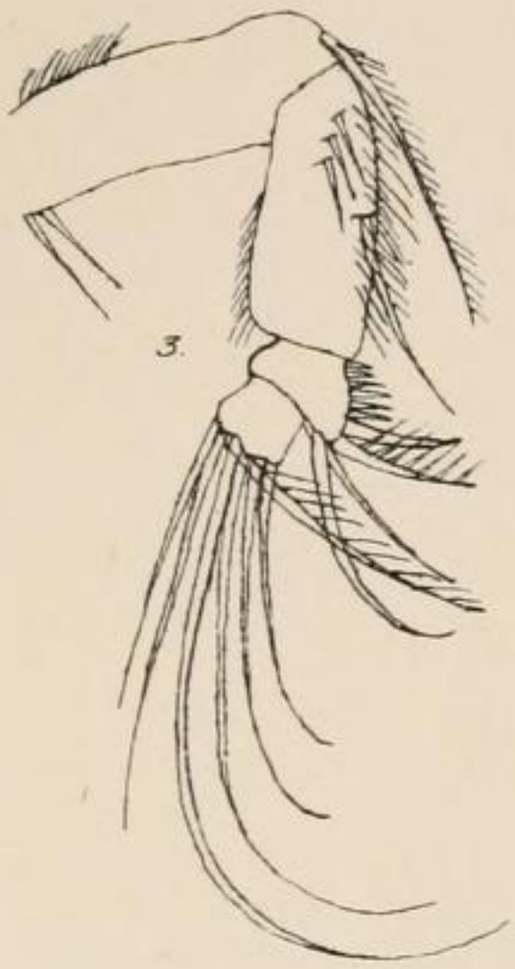

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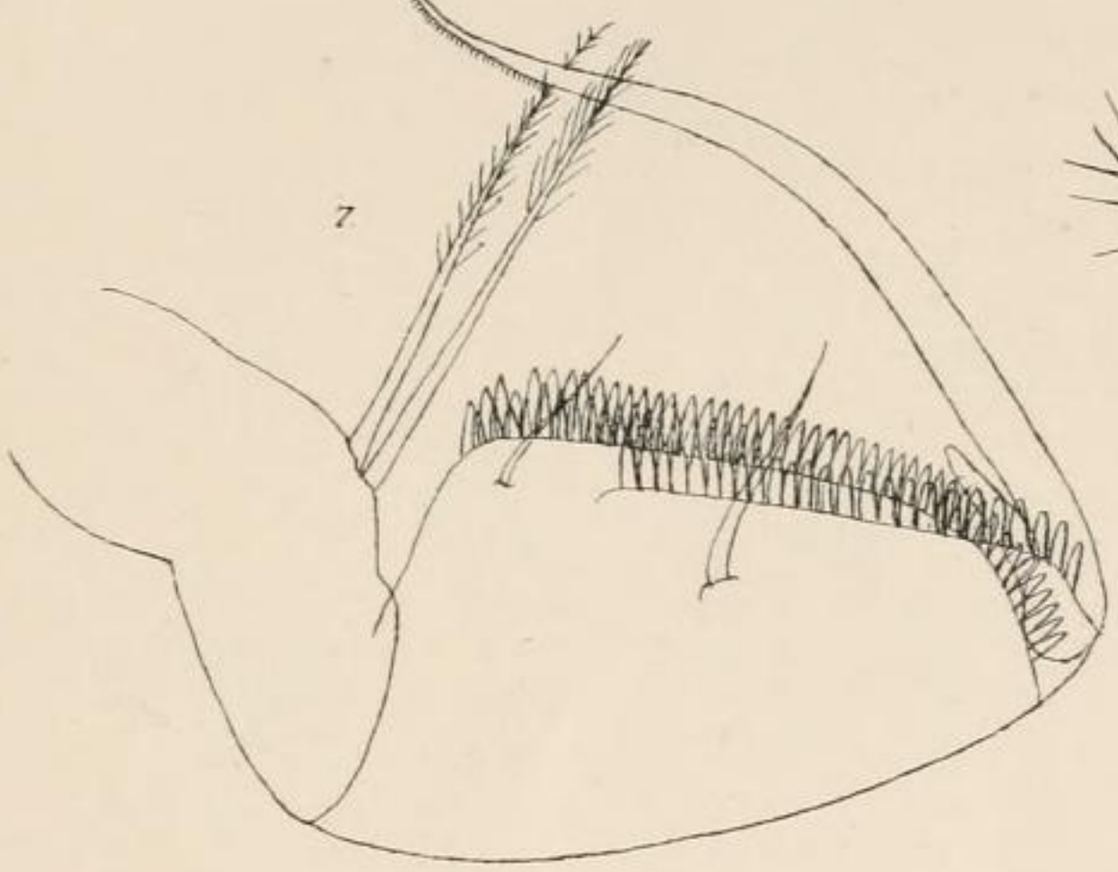

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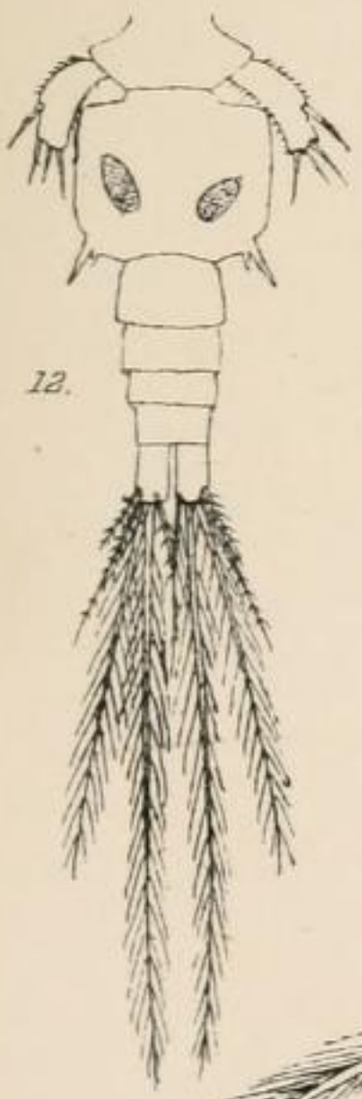

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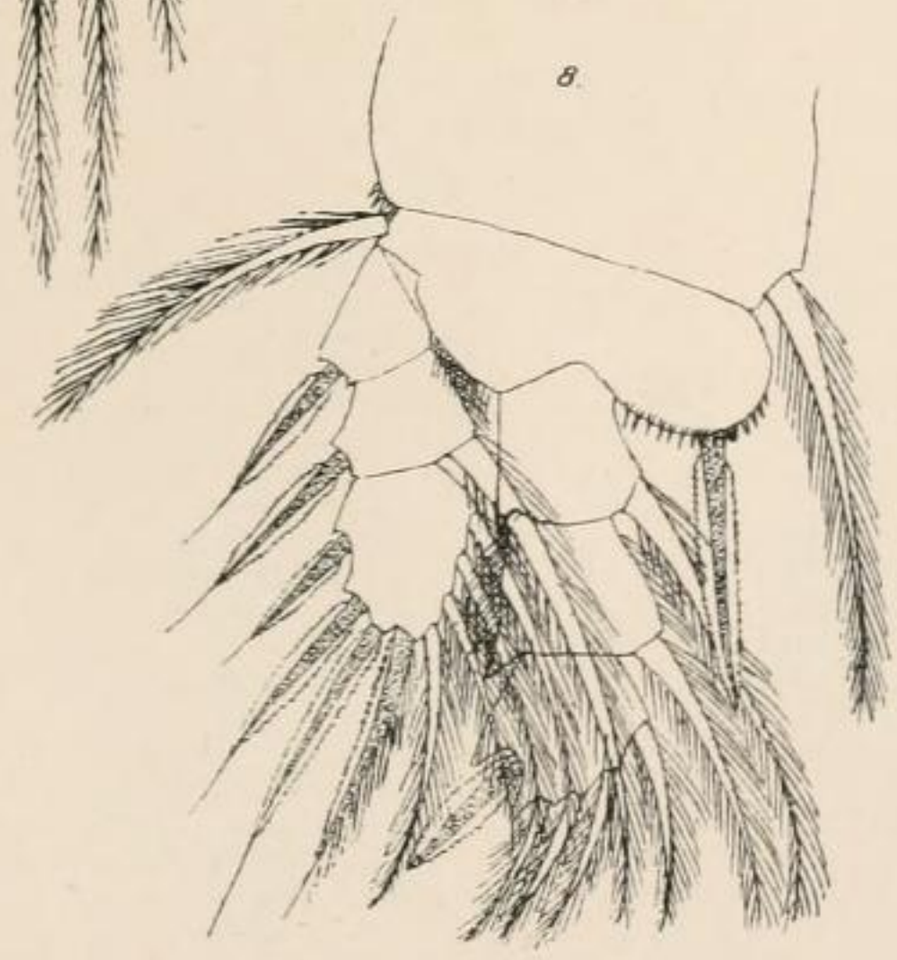

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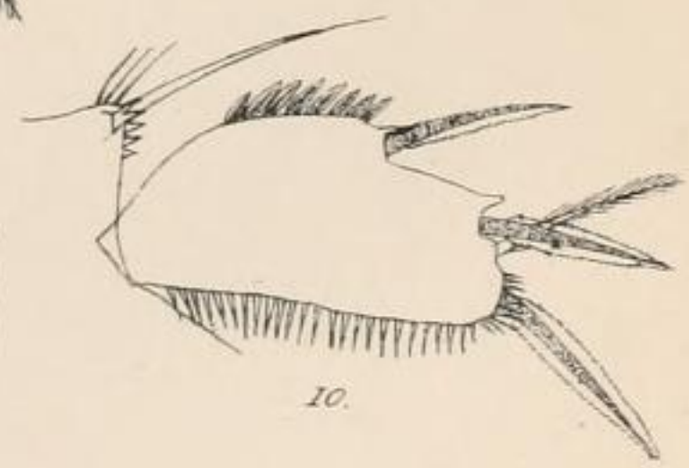

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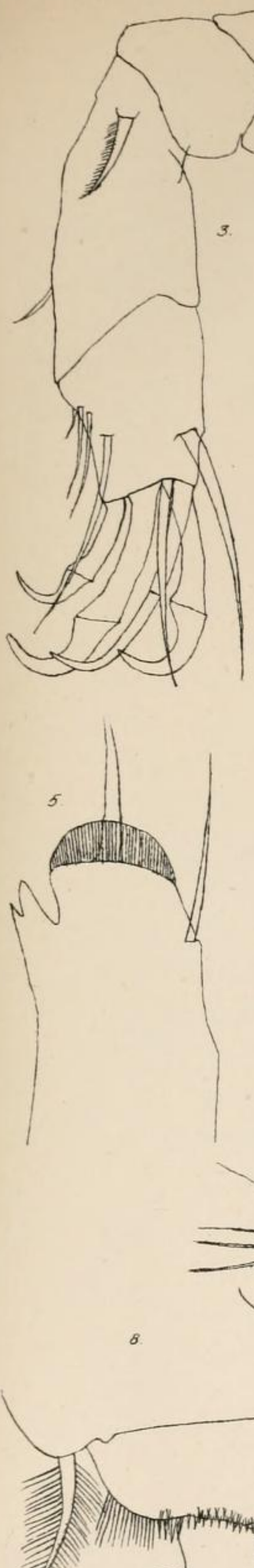
LICHOMOLGUS ABERDONENSIS, *N. Sp.*

R. & R. Clark imp.



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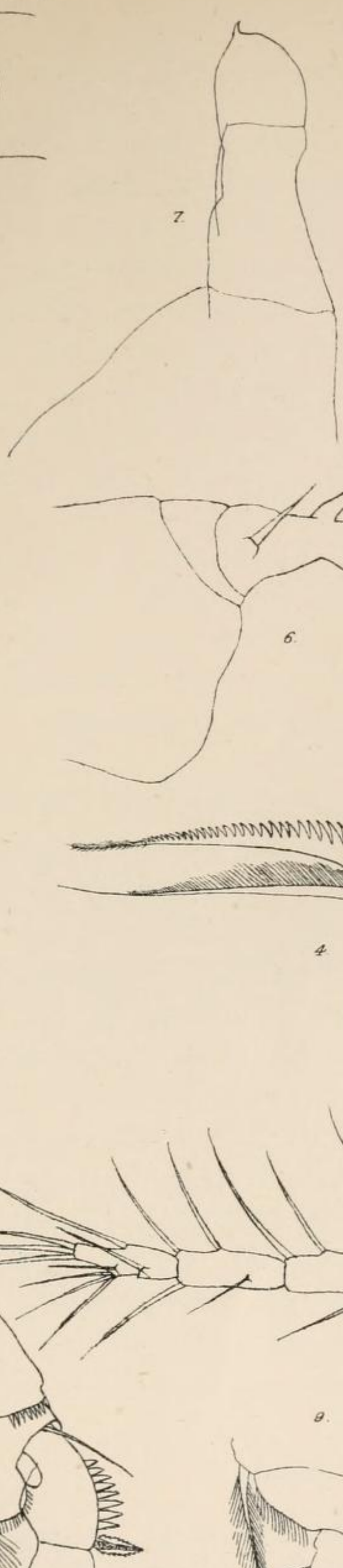

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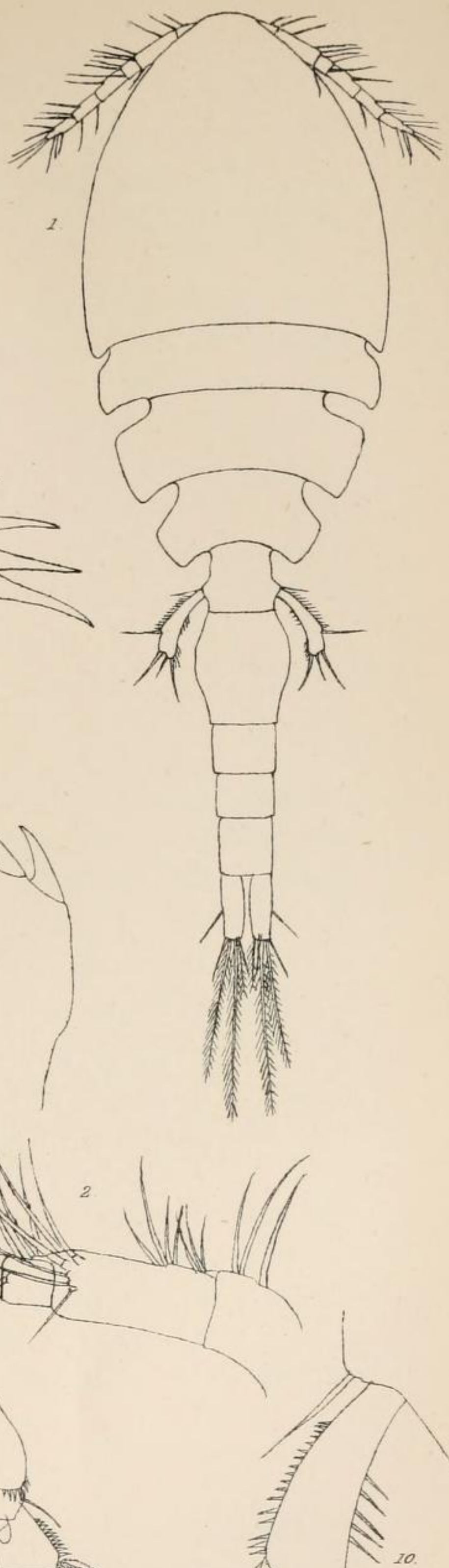

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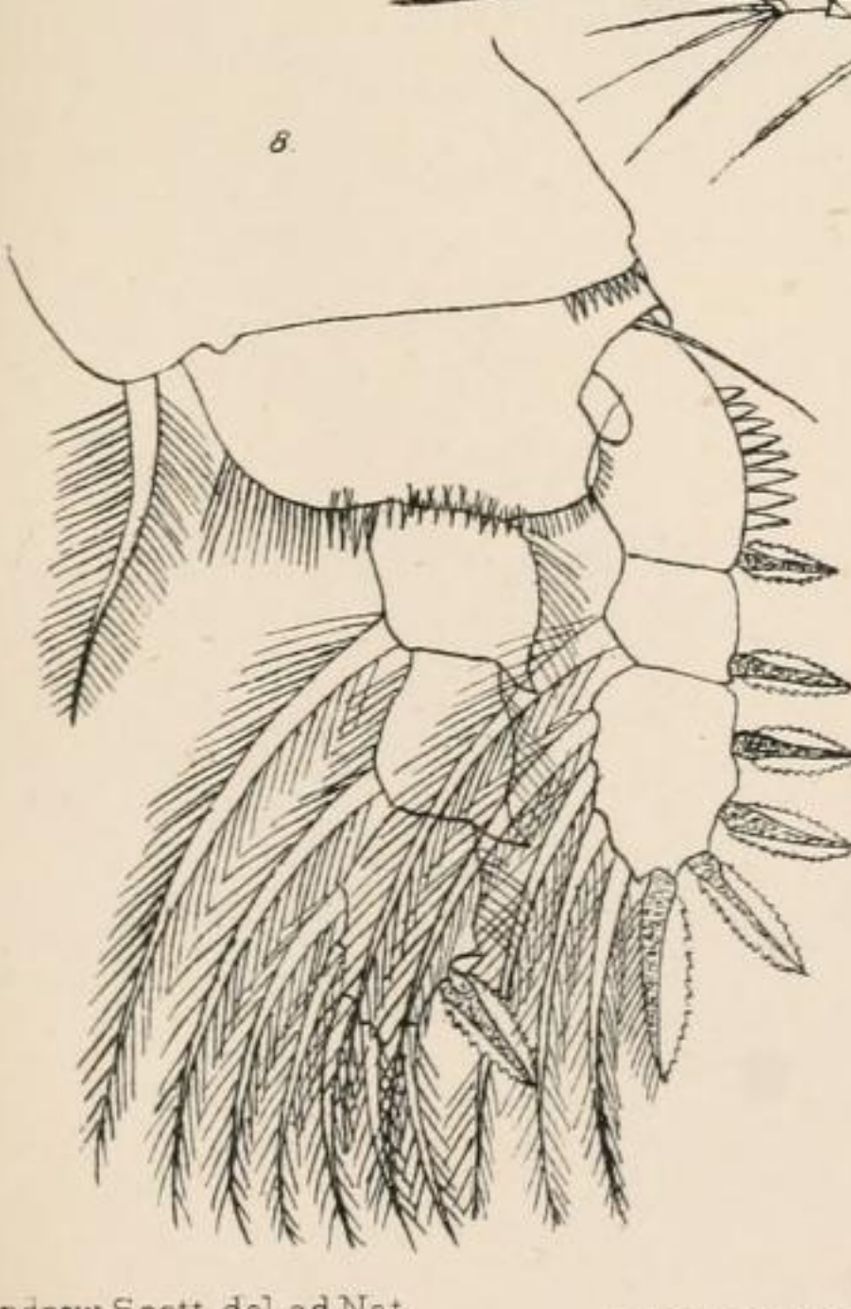

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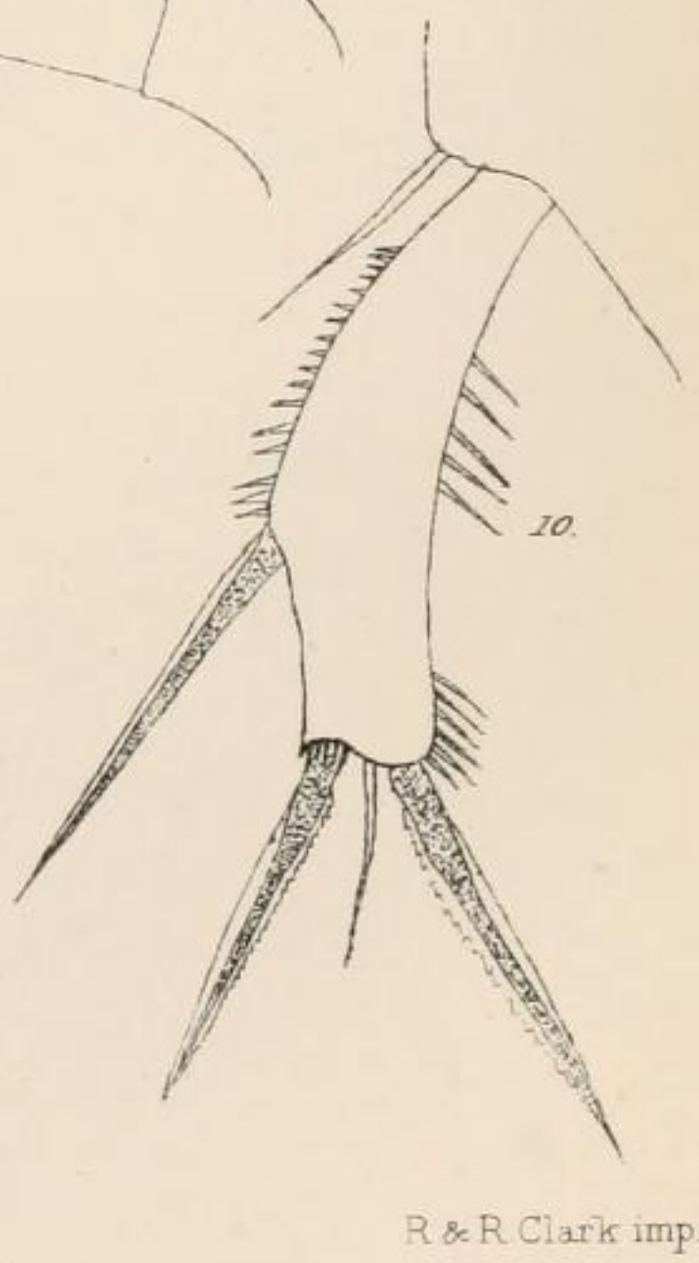

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LICHOMOLGUS ARENICOLUS, *Brady*

R & R Clark imp.