ON COPEPODA AND OTHER CRUSTACEA TAKEN OFF NORTHUMBERLAND AND DURHAM IN JULY, 1904.

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(Read March 14th, 1905).

(Plates III.–VI.).

On Copepoda and other Crustacea taken off Northumberland and Durham in July, 1904. By GEORGE STEWARDSON BRADY, M.D., LL.D., D.Sc., F.R.S.

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ON the 15th of July, 1904, Mr. Dent kindly placed his steamer "Stanley" at the disposal of the Northumberland Coast Club for a short dredging excursion. I was not myself able to be present, but Messrs. Meek and Gill kindly handed to me afterwards part of the results in the shape of washings from the dredged material. These washings were in very small compass, but nevertheless proved to be of extreme interest, containing a few undescribed species of Copepoda and several others new to our own district and to the British Seas. The area which was dredged over extended from off St. Mary's Island on the north to opposite Souter Point southward—a range of about six miles, the depth being about 25 fathoms. The following list embraces all the Crustacea noted by me in the washings, but, of course, many of the larger forms, as well as animals belonging to other groups, did not come under my notice at all.

CUMACEA.

Eudorella truncatula, Sp. Bate.

AMPHIPODA.

Metaphoxus fultoni (T. Scott).
Ampelisca assimilis., Boeck.
Paratylus vedlomensis (Sp. Bate).
Amphilochus manudens, Sp. Bate.
Amphilochoides odontonyx, Boeck.
Photis reinhardi, Kröyer.
Dulichia porrecta, Sp. Bate.

ISOPODA.

Leptognathia filiformis, Lilljeborg.
„ *breviremis*, Lilljeborg.
„ *longiremis*, Lilljeborg.
Pleurogonium inerme, G. O. Sars.

COPEPODA.

Longipedia coronata, Claus.
„ *scotti*, G. O. Sars.
Microsetella rosea (Dana).
Delavalia pygmaea, n. sp.
Amymone falcata, Norman.
Ameira breviremis, n. sp.
Stenhelia meeki, n. sp.
„ *limicola*, Brady.
„ *denticulata*, I. C. Thompson.
Tetragoniceps bradyi, T. Scott.
Laophonte denticulata, T. Scott.
Cletodes limicola, Brady.
Thalestris robusta, n. sp.
„ *denti*, n. sp.
Oncaea anglica, n. sp.
Cyclopina littoralis, Brady.

Respecting these lists the following items of interest may be noted. *Pleurogonium inerme* had not previously been recognized with certainty as belonging to our district—nor had the typical *Longipedia coronata*, Claus, the form heretofore ascribed to that species being really a closely allied one which has been provided by Professor G. O. Sars with a new name—*L. scotti*. *Tetragoniceps bradyi* and *Laophonte denticulata* are interesting additions to the local fauna, but had been previously found and described by Dr. Scott. The two new species of *Thalestris* are described on the strength of single male specimens only, but are nevertheless, as I think, quite sufficiently characterised. The genus *Oncaea* has not previously been met with, as I believe, in the British area, though many species from more

southern habitats have been described by Giesbrecht and other writers. I cannot, however, identify our Northumbrian specimen with any of these: it is here figured as fully as possible. An interesting fact connected with this collection is that two such extremely distinct and easily recognized creatures—both of them of distinctly southern distribution—should have occurred in this dredging, but have never before been found in British waters. It seems probable that both species—which are really pelagic in habit—were captured not at the bottom, but on the passage of the dredge upward to the surface. And it is not unreasonable to suspect that there may have been a previous prevalence of southerly winds or currents which might have brought into our latitude these certainly unusual visitors. It should be noted here also that one of the new species of *Thalestris* (*T. robusta*) was taken, not on the dredging excursion here recorded, but on the shore at Cullercoats.

Genus MICROSETELLA, Brady and Robertson.

Body cylindrical, tapering towards each extremity (Plate III., fig. 1), head coalescent with the first thoracic segment, cephalothorax composed of four, abdomen of five segments, caudal segments short and bearing long terminal setæ, rostrum short, falciform. Antennules of moderate length (fig. 2) five-jointed, bearing on the third joint a stout sensory appendage. First four pairs of feet (fig. 3) having both branches three-jointed, the outer branch shorter than the inner, fifth pair (fig. 4) foliaceous. (The antennule of the *male* forms a strong prehensile organ, and the feet of the fifth pair are much smaller than those of the female.—Giesbrecht).

The genus *Microsetella* was established by myself in concert with my friend the late Dr. Robertson in 1873, but I afterwards * withdrew the generic name, uniting the genus with the previously described *Ectinosoma* from which the comparatively small differences seemed to me scarcely sufficient

* See Monograph of the British Free and Semiparasitic Copepoda, vol. ii., p. 13.

to separate it. But Dr. Giesbrecht has still more recently restored the term *Microsetella*, and has been followed by Professor G. O. Sars in his great work on the Crustacea of Norway. The distinctive characters are perhaps as good as are now generally held sufficient in other cases, and I here, though with some misgivings, follow the lead of these excellent authorities in reinstating the original name. The genus differs from *Ectinosoma* chiefly in the greater length of the antennules and tail setæ, and in its purely pelagic habitat.

Microsetella rosea, Dana (Plate III., figs. 1–4).

1852. *Canthocamptus roseus*, Dana, Crustacea of the U.S. Exploring Expedition, p. 1189, plate 83, fig. 10.

1892. *Microsetella rosea*, Giesbrecht, Systematik und Faunistik der pelagischen Copepoden des Golfes von Neapel, p. 550, Taf. 44, figs. 32, 35, 37, 38, 41, 43, 46, 48^{8}, 49.

This species is easily distinguished from *M. atlantica* by its larger size and its extremely long tail setæ, which are not far from twice as long as the body of the animal; the feet of the fifth pair are also quite different. The male is unknown. Length (exclusive of tail setæ) ·80 mm. Only one specimen was seen, notwithstanding a most careful hunt over the entire washings from the dredge. The animals belonging to this genus are, however, so far as at present known, entirely pelagic in habit, and seem ill-adapted for life on the sea bottom. It is therefore probable that our specimen was captured by the dredge on its way up from the bottom, and though the tow-nettings taken on the same excursion did not contain further specimens, it is not unlikely that more might have been obtained in nets worked at some distance from the surface. This specimen was evidently imperfect, having, as shown in the figures, lost many small setæ from feet and antennæ. The only previously recorded habitats are the Sooloo Sea (Dana), in lat. 0°–11° N., long. 108°–124° W., depth up to 1000 meters, and at Naples (Giesbrecht).

Genus DELAVALIA, Brady.

Delavalia pygmaea, n. sp. (Plate III., figs. 5–10).

Female.—Antennules (fig. 5) eight-jointed, short and rather stout, scarcely as long as the first cephalo-thoracic segment, clothed with numerous long hairs, first and third joints considerably longer than the rest, which, except the very short fifth, are nearly equal in length. Antennæ (fig. 6) quite equal in length to the antennules, bearing a long, slender three-jointed secondary branch, the middle joint very short. Inner branch of the first pair of feet (fig. 7) equal in length to the outer branch, two-jointed and destitute of setæ except at the apex, the distal joint equal in length to the two terminal joints of the outer branch; outer branch composed of three equal joints, first and second joints bearing a single stout seta at the external distal angle, last joint with four slender apical setæ: second, third, and fourth pairs sparingly setiferous (fig. 8), the outer branch longer than the inner. Fifth pair (fig. 9) small and foliaceous, basal joint very wide and short, bearing five rather widely separated setæ on the inner lobe, and one seta on the outer angle; second joint obovate, its distal margin bearing four subequal setæ. Caudal stylets (fig. 10) short, fully twice as long as broad, the longest of the terminal setæ about thrice as long as the stylet. Male unknown.

One specimen only was taken, and this was dissected without measurements and general drawings having been made. The mouth organs were not seen, but the general aspect of the animal agreed with that of the family to which it belongs. It is, however, much more minute than other described species of *Delavalia*.

Genus AMEIRA, Boeck.

Ameira breviremis, n. sp. (Plate III., figs. 11–14; Plate IV., figs. 1–6).

Female.—Animal rather robust and stout, rostrum short and slender, limbs unusually short (Plate 4, fig. 1), caudal stylets

rather longer than broad (Plate 4, fig. 6), the principal tail seta about half as long as the body. Antennules short and moderately stout (Plate 3, fig. 11), equal in length to the antennæ, eight-jointed and densely setiferous; antennæ (Plate 3, fig. 12) bearing a small one-jointed secondary branch; posterior footjaw (Plate 3, fig. 14) having an angular subquadrate hand with a flexuous terminal claw and two marginal setæ, the basal joint also bears two or three setæ near its distal extremity. Inner branch of the first pair of swimming feet (Plate 3, fig. 13) slender, elongated, its first joint somewhat longer than the entire outer branch, the two distal joints short and nearly equal, and bearing two long slender apical setæ; outer branch three-jointed, joints nearly equal, setose on the outer margin, and with a long spine-like seta at each apex, the last joint bearing also slender terminal setæ; second, third, and fourth pairs (Plate 4, fig. 3) composed of two equal three-jointed branches; fifth pair with a very broad and shallow basal joint (Plate 4, figs. 4, 5) and an elongated narrow distal joint, which is abruptly tapered at each extremity, bearing several marginal setæ and, near the apex of the inner margin, a single spine-like seta: the basal joint is armed with a long seta at its inner angle, following which is a stout spine divided at its apex into three hair-like processes, then a shorter lancet-shaped spine, followed by a still smaller one of the same type, and one or two very small hairs; the outer angle bears the usual seta. Length, exclusive of tail setæ, 0·38 mm. (1-66th in.).

This species, of which only one example was taken, is very similar in most respects to *Delavalia mimica*, T. Scott,* and had it not been for the equality of length in the branches of the swimming feet I should have been disposed to refer it to that species, though there are in addition to this character some other rather important differences. The antennule in Dr. Scott's species seems to be longer, the inner branch of the first foot considerably stouter, and the armature

* Fifteenth Annual Report of the Fishery Board for Scotland (1897), p. 150, pl. 1, figs. 1-9.

of the fifth pair of feet somewhat different, though the same in general character. Perhaps a more important divergence is in the antennæ, which in *D. mimica** are similar "to those of *D. reflexa*": these appendages in *D. reflexa* have a three-jointed secondary branch, while in *A. breviremis* the branch consists only of a single joint.

Genus STENHELIA, Boeck.

Stenhelia meeki, n. sp. (Plate IV., figs. 7–16).

Female.—Antennules eight-jointed and densely clothed with setæ (fig. 7), the first two joints wider than the rest, outer margin of the fourth joint much produced distally, last joint dilated and truncated at the apex, about twice as long as broad, considerably longer than any of the four preceding joints. Secondary branch of the antennæ two-jointed (fig. 8): chewing lobe of the mandible divided into several slender teeth, and at the inner angle bearing several fine hairs (fig. 9). Posterior footjaw somewhat elongated and slender, basal joint with two apical setæ; hand oblong-ovate, bearing on the proximal margin several fine short hairs, and distally two long slender setæ; terminal claw long and slender (fig. 11). Outer branch of the first pair of feet (fig. 12) about equal in length to the first joint of the inner branch; marginal spines very long and slender; the two distal joints of the inner branch very slender, and together equal in length to the first joint: the second, third, and fourth pairs having both branches of nearly equal length (fig. 13); basal joint of the fifth pair (fig. 14) deeply excavated, the outer lobe elongated, tapering, and bearing a single seta; inner lobe obliquely truncated, with three or four terminal setæ and two marginal spines; distal joint elongated, subovate, and fringed with about five slender setæ. Caudal stylets (fig. 16) nearly thrice as long as broad, with obtuse, subtruncate apices; terminal setæ short, and apparently arising from elongated pits in the substance of the furca.

* Dr. Scott's species is, I think, wrongly referred to *Delavalia*, in which genus the inner branch of the first foot is only two-jointed.

This is a very minute species, and only one specimen was seen. It is in some respects very like *Stenhelia hirsuta*, Thompson, but the antennules, mandible, caudal stylets, and secondary antennal branch—which is distinctly two-jointed—are very different. The specific name is given in recognition of Mr. Meek's unwearied and very efficient services to the marine Natural History and Fisheries of our district.

Genus TETRAGONICEPS, Brady.

Tetragoniceps bradyi, Scott (Plate V., figs. 1–10).

Tetragoniceps Bradyi, Scott, Tenth Annual Report of the Fishery Board for Scotland, p. 253, Plate 9, figs. 19–32.

Female.—Antennules nine-jointed (fig. 2) about as long as the first cephalo-thoracic segment, first joint as long as the united lengths of the five following joints, second produced into a strong curved spine; last joint equal to the conjoined length of the three preceding ones: antennæ bearing a small one-jointed secondary branch. Posterior footjaws three-jointed (fig. 3), slender, elongated, with a long slender terminal claw and two or three marginal setæ. All the swimming feet have a two-jointed inner and a three-jointed outer branch; inner branch of the first pair (fig. 4) twice as long as the outer branch, its proximal joint very slender, and four times as long as the small distal joint. Second, third, and fourth pairs (figs. 5, 6, 7) having the outer branches very much longer than the inner, and increasing progressively in length from the second to the fourth pair, the inner branches decreasing in a like ratio; fifth pair unusually large (fig. 8), enveloping the entire ovisac, ovate, with crenulated margins which are sparingly setiferous, distal extremity truncated: caudal stylets (figs. 9, 10) bulbously dilated at the base, the inner margin of which is deeply sinuous, and ends in one moderately long seta and a much shorter external one. Length 0·77 mm. The male is unknown.

I have seen only one specimen of this interesting species, the details of which are here figured so far as I have been

organs of the male like those of the female. Antennules of the *female* six-jointed, with a long middle joint. Antennæ three-jointed. Anterior maxilliped with plumose segments. Posterior maxillipeds four-jointed, margin of the hand fringed with setæ. Outer branches of the swimming feet armed with lancet-shaped spines, the edges of which are finely denticulated. Abdomen of the *male* five-segmented, the median segment very short, genital segment voluminous, with produced lateral angles. Posterior maxilliped more movably jointed than in the *female*, its claw more strongly bent: the three short terminal joints of the antennules anchylosed: other sexual characters unimportant.

The foregoing generic definition is taken—with some abbreviation—from Giesbrecht's work on the Neapolitan Copepoda. Some of the characters I have had no opportunity of verifying—the specimen here described and figured being the only one known to me.

Oncaea anglica, n. sp. (Plate VI., figs. 1–9).

Female.—General appearance much like *Corycaeus*. Last thoracic segment short and small (fig. 9), first abdominal segment very large, more than twice as long as the combined length of the four following segments (fig. 9), caudal stylets nearly thrice as long as broad, quite equal in length to the united fourth and fifth abdominal segments, bearing on the outer margin a single rather long seta near the base, and at the apex five setæ of various length, the longest about equal in length to the whole abdomen. Antennules six-jointed (fig. 1), the third and sixth joints bearing numerous long setæ. Antennæ four-jointed (?), the last joint bearing at the proximal end four strong curved setæ, and at the distal end five similar but larger setæ (fig. 2). Anterior maxilliped (fig. 3) divided apically into two digitiform processes which bear numerous marginal setæ: posterior maxilliped ending in a powerfully clawed hand (fig. 4), the inner margin of which is armed with two spine-like setæ; the claw nearly as long as the hand itself,

and finely setose for nearly its whole length. Outer branches of the swimming feet (figs. 5, 7) three-jointed, the middle joint small, outer margins bearing foliaceous lancet-shaped spines with finely denticulated edges, the spines arranged on the various joints as follows—on the first foot 1, 1, 3, second foot 1, 1, 3, third foot 1, 1, 2, fourth foot 1, 1, 2; besides the marginal spines there is on each foot an apical spine, longer than the rest, but denticulated only on the outer edge; the inner margin of the limbs setiferous: inner branches of all the feet three-jointed, the third joint variable in length, but always much longer than the combined lengths of the first two joints—that of the first foot (fig. 5) bearing a single lancet-shaped apical spine; second foot produced at the apex into a short, blunt process, and bearing on the margin near the apex two slender pectinated spines (fig. 6); inner branch of the third foot (fig. 7) having a slender produced apex, at each side of which are two pectinated spines; fourth foot (fig. 8) very much like the third, but having in addition a small marginal seta attached not far from the apical spines; fifth pair of feet (fig. 9 *a*) minute, one-jointed, with two fine apical setæ.

Only one specimen—a female—of this interesting species could be found, notwithstanding a most careful search over the whole gathering. I am therefore unable to confirm Giesbrecht's definition as to the characters of the male. I have some doubt, however, as to the three-jointed character of the antennæ. In my specimen there seems to be a fourth (basal) joint as shown in the figure, but this is only rather obscure, and it is possible that the species may, in this respect also, conform to Giesbrecht's definition.

EXPLANATION OF PLATES.

PLATE III.

MICROSETELLA ROSEA. ♀

Fig. 1. Seen from right side × 84.
2. Antennule × 280.
3. One of the swimming feet × 210.
4. Foot of fifth pair × 210.

DELAVALIA PYGMAEA. ♀

5. Antennule × 440.
6. Antenna × 440.
7. Foot of first pair × 440.
8. ,, fourth pair × 300.
9. ,, fifth pair × 440.
10. Posterior abdominal segments and tail × 210.

AMEIRA BREVIREMIS. ♀

11. Antennule × 210.
12. Antenna × 210.
13. Foot of first pair × 210.
14. Posterior footjaw × 440.

PLATE IV.

AMEIRA BREVIREMIS. ♀

Fig. 1. Seen from right side × 150,
2. Anterior footjaw × 440.
3. Foot of third pair × 210.
4. ,, fifth pair × 210.
5. ,, ,, × 550.
6. Furca × 210.

STENHELIA MEEKI. ♀

7. Antennule × 210.
8. Secondary branch of antenna × 280.
9. Chewing lobe of mandible × 440.
10. Anterior footjaw × 300.
11. Posterior footjaw × 300.
12. Foot of first pair
13. ,, third pair } × 210.
14. ,, fifth pair
15. Posterior segments of abdomen and furca × 120.
16. Caudal stylet × 400.

Plate V.

Tetragoniceps bradyi. ♀

Fig. 1. Female, seen from left side × 90.
2. Antennule × 210.
3. Posterior footjaw × 300.
4. Foot of first pair × 250.
5. ,, second pair × 250.
6. ,, third pair × 250.
7. ,, fourth pair × 210.
8. ,, fifth pair × × 90.
9. Abdomen and tail × 84.
10. Base of caudal stylet × 210.

Thalestris robusta. ♂

11. Antennule
12. Posterior footjaw
13. Foot of first pair
14. ,, second pair, inner branch } × 240.
15. ,, fourth pair
16. Fifth pair of feet
17. Caudal stylet and setæ

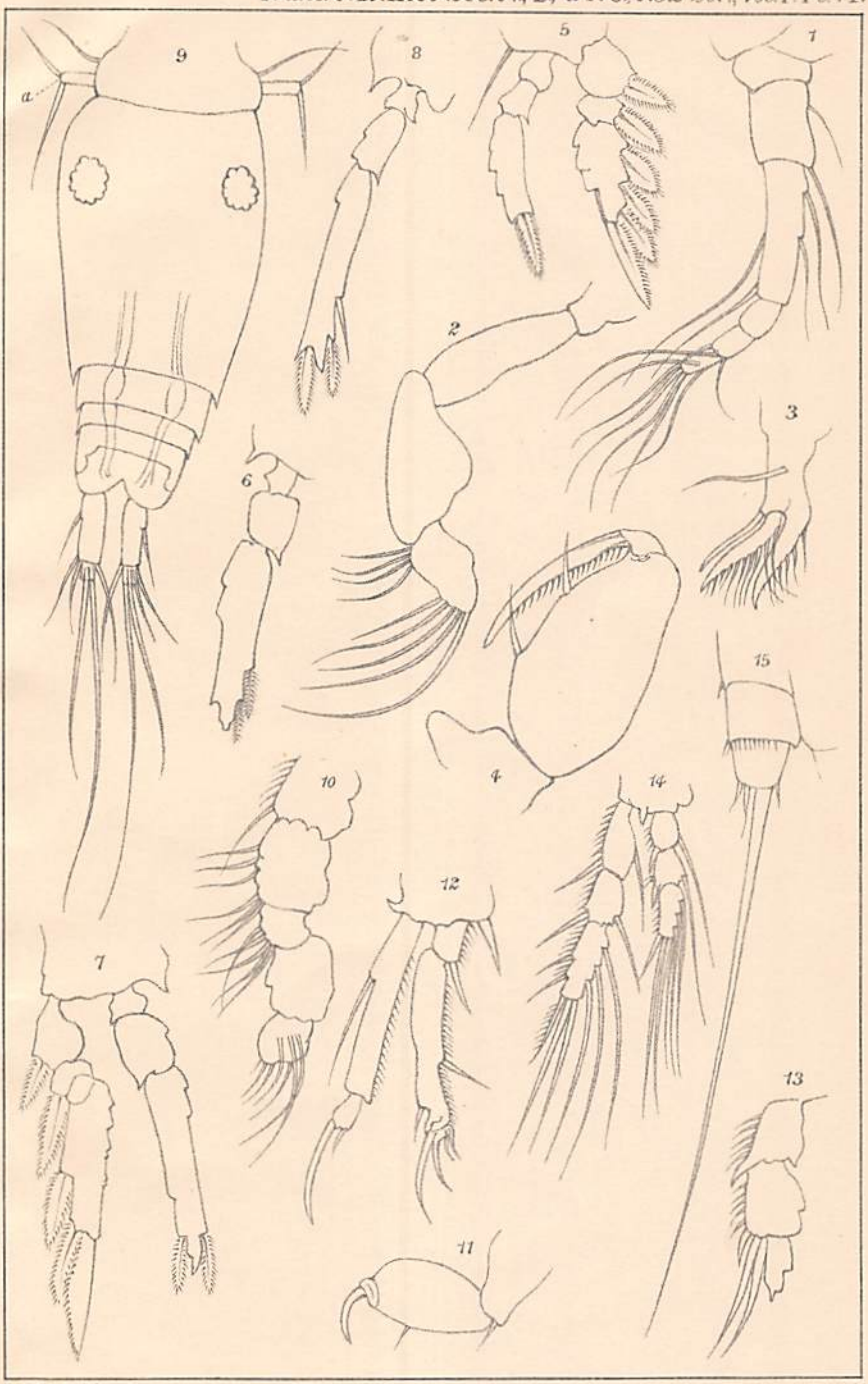
Plate VI.

Oncaea anglica. ♀

Fig. 1. Antennules × 140.
2. Antenna × 240.
3. Anterior footjaw × 300.
4. Posterior footjaw × 240.
5. Foot of first pair × 140.
6. ,, second pair, inner branch } Marginal setæ omitted × 140.
7. ,, third pair
8. ,, fourth pair, inner branch
9. Abdomen and furca × 140.
with fifth pair of feet (*a*)

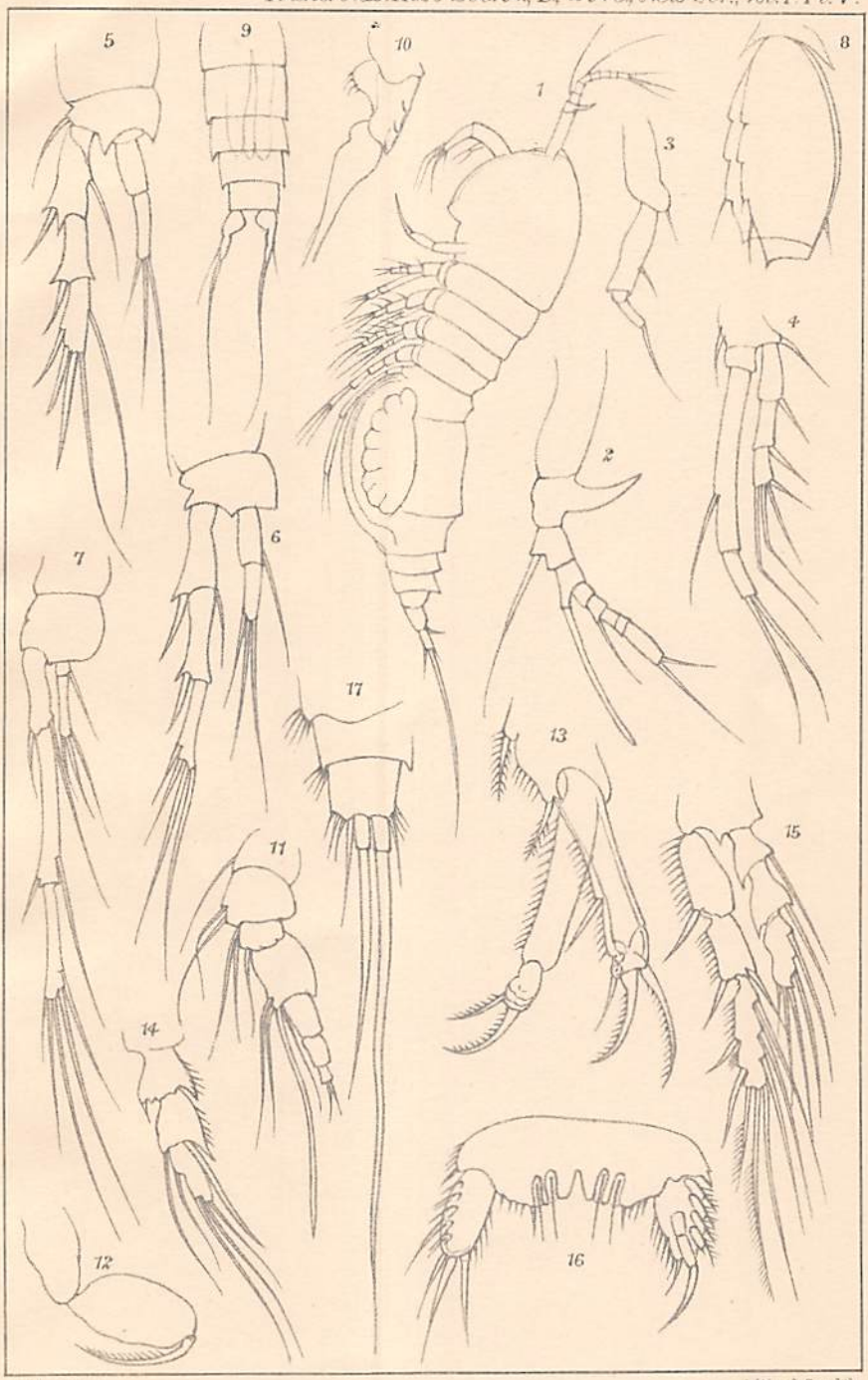
Thalestris denti. ♂

10. Antennule × 200.
11. Posterior footjaw × 240.
12. Foot of first pair × 240.
13. Inner branch of second foot × 240.
14. Foot of third pair × 150.
15. Caudal stylets ×



G.S.Brady del. G. West & Sons lith.

1-9. ONCAEA ANGLICA.
10-15. THALESTRIS DENTI.



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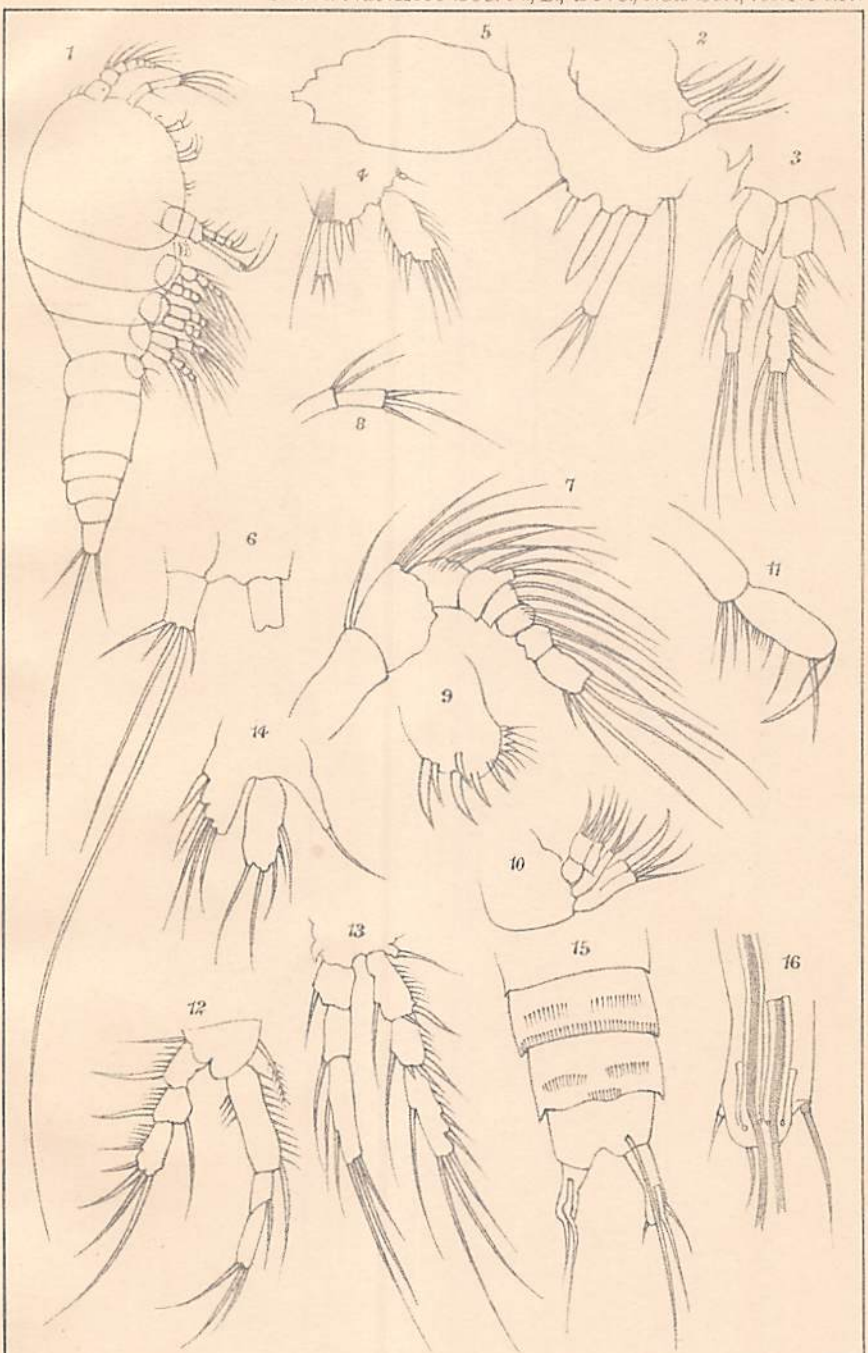
1-10. TETRAGONICEPS BRADYI.
11 17. THALESTRIS ROBUSTA.



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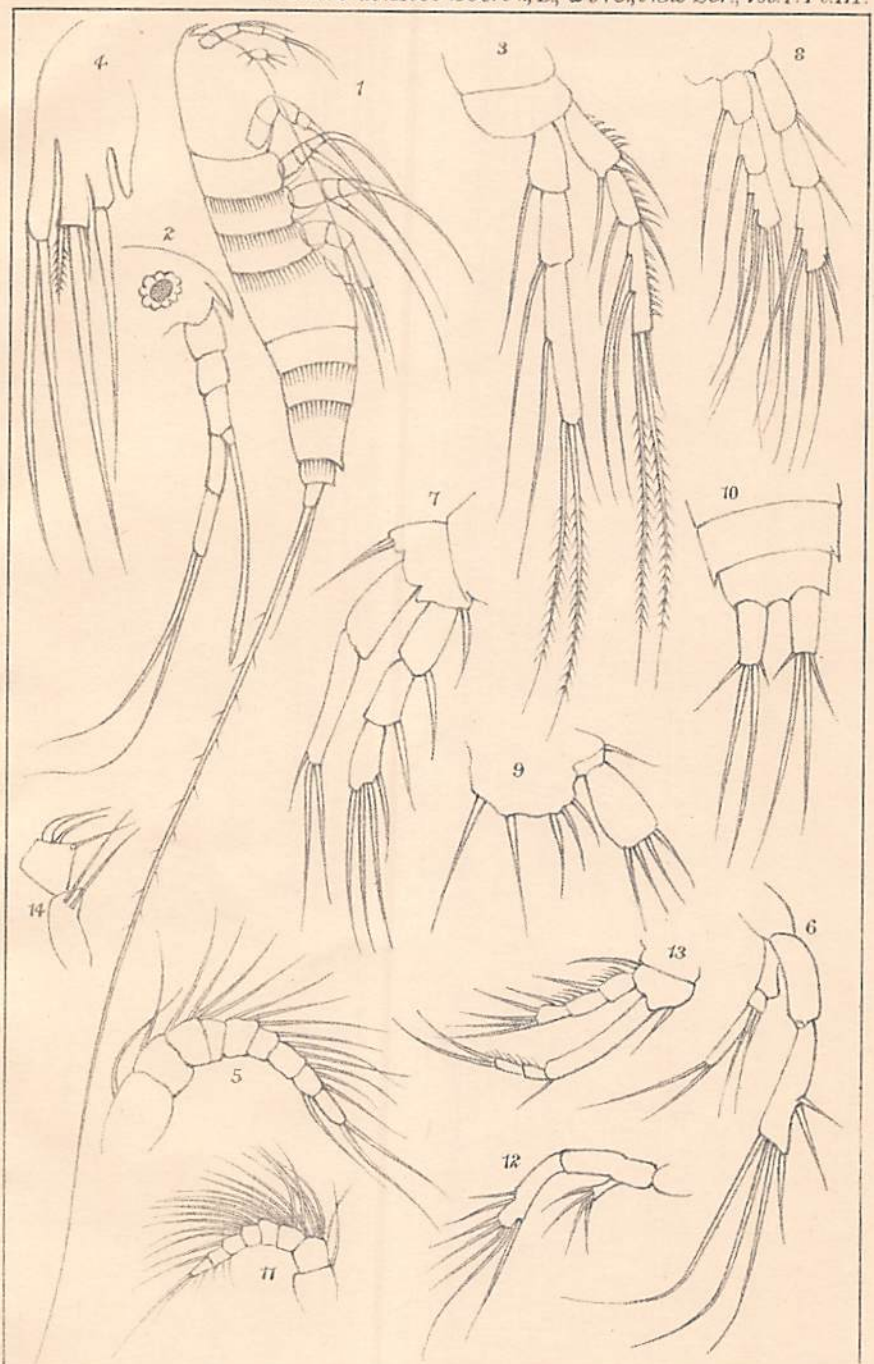
1–6. AMEIRA BREVIREMIS.
7–16. STENHELIA MEEKI.



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1–4. MICROSETELLA ROSEA.
5 10. DELAVALIA PYGMÆA.
11 14. AMEIRA BREVIREMIS.