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III.—ADDITIONS TO THE FAUNA OF THE FIRTH OF FORTH.

PART IV. By THOMAS SCOTT, F.L.S. (Plates VII.–XIII.).

This, the fourth contribution towards a better knowledge of the fauna of the Firth of Forth, especially the invertebrate fauna, includes among other interesting forms several species of *Copepoda* now described for the first time, as well as a few not previously recorded for the east of Scotland; also a few species of *Amphipoda*, rare, or not previously recorded for the East Coast.

The species here recorded or described for the first time for the Firth of Forth comprise 25 species of *Copepoda*, 9 species of *Amphipoda*, and a rare species of *Actiniadæ*.

A description (with figures) is also given of a species of *Copepod* previously recorded in Part III. of the Eighth Annual Report, p. 320, in order to indicate more satisfactorily its position in the classification.

In the preparation of this paper I have again the pleasure of gratefully acknowledging the kindness of Professor G. S. Brady, F.R.S., also of the Rev. A. M. Norman, F.R.S., Rev. T. R. R. Stebbing, M.A., and A. O. Walker, F.L.S. I am also much indebted to Dr T. Wemyss Fulton, whose active interest in and sympathy with my work is a source of much encouragement. I also desire to say that not a little of my success in the study of the organisms recorded in this paper is due to the hearty co-operation of Captain R. E. Simpson, and to the intelligent interest shown by the mate in the investigations carried out on board the 'Garland.' My son, Mr A. Scott, has prepared the drawings which accompany this paper. He has also largely assisted me with the preparation of the dissections (a troublesome work) from which the drawings were made. Without the drawings it would have been difficult to realise the important and striking characters of the species mentioned, even though these characters have been, where necessary, fully described.

CRUSTACEA.

I. COPEPODA.

GNATHOSTOMA.

Family CALANIDÆ.

Acartia bifilosus (Giesbrecht). (Pl. VII. fig. 14).

1881. *Dias bifilosus*, Giesbrecht, 'Die Freilebenden Copepoden der Kieler Foehrde,' p. 147, pl. iii. figs. 4, 22, 23, &c.*

Habitat.—In the vicinity of Culross, near the head of the Forth estuary, a number of specimens were obtained among material collected with a small beam-trawl-like tow-net, designed by Professor M'Intosh,† and worked from a rowing or small sailing boat. *Acartia bifilosus* closely resembles *Acartia longiremis*, and requires to be very carefully diagnosed to distinguish it from that species. The inner spines of the fifth pair of

* *Vierter Bericht der Commission zur wissenchaftlichen Untersuchung. der deutschen Meere, in Kiel*, 1887–1881.

† We find this net a most effective apparatus for capturing micro-organisms and young fish should any be present to capture.

feet in the female of *A. longiremis* are usually long and bent, or geniculate, near the middle; in *A. bifilosus*, on the other hand, the inner spines are much shorter and are not geniculate (fig. 14). The male fifth feet do not differ much in the two species, except that in *A. bifilosus* they are rather stouter than those of *A. longiremis*. The caudal stylets are usually shorter in *A. bifilosus*, and the last thoracic segment appears to be destitute of setæ. After examiniug a large number of specimens of both forms, I find the difference between them to be comparatively unimportant, and coincide with Dr Brady in considering the differences as of varietal value only. The characters which distinguish *Acartia discaudata* (Giesbrecht) —a form which I have already recorded from the Forth—are more marked, and show a greater divergence from *A. longiremis*.

Eurytemora affinis (Poppe).

1881. *Temora affinis*, S.A. Poppe, Ueber Eine nene Art der Calanaden-Gattung *Temora*, Baird, p. 55, pl. iii. figs. 1–14. ‡

1881. *Eurytemora hirundo*, Giesbrecht, *loc. cit.*, p. 152,§ pl. ii. figs. 7, 12, 19, &c.

1891. *Eurytemora affinis*, Brady, Brit. F.-W. Cyclop. and Calan., p. 42, pl. xiii. figs. 6–9. ¶

Habitat.—In the upper reaches of the Forth, about Culross and between Kincardine-on-Forth and Alloa. It was moderately common in some townettings collected in July 1891, and again in February this year (1892). ♂ and ♀ were nearly equally common, and many of the latter were carrying ova-sacs. *Eurytemora affinis* is readily distinguished from other British species of *Calanidæ* by the elongate abdomen (which is thickly clothed with very small stout setæ) and caudal stylets. The terminal spines of the swimming feet are very faintly serrate on the outer margin.

It is strange that the occurrence of *Eurytemora affinis*, which is such an easily distinguished species, should have been so long overlooked, especially as it is at times comparatively common in the upper parts of the Forth estuary.

Stephos, nov. gen. (provisional name).**

Like *Pseudocalanus*, except in the following particulars:—

The anterior antennæ are twenty-four-jointed. The female possesses a fifth pair of feet, which are simple, one-branched, and two-jointed, and the same on both sides. The fifth pair in the male form powerful grasping organs; they are one-branched and dissimilar on the two sides.

The posterior antennæ and mouth organs are similar to those of *Calanus*. The outer branches of the first four pairs of swimming feet are three-jointed, the inner branches of the first pair are one-jointed, of the second pair two-jointed, of the third and fourth pairs three-jointed as in *Pseudocalanus*.

Stephos minor (nov. gen. et sp. provisional name). (Pl. VII. figs. 1–13.)

Length ·74 mm. ($\frac{1}{34}$ of an inch). Cephalothorax robust, the body segment about half as long again as the combined length of the next three. Forehead rounded. Anterior antennæ about as long as the cephalothorax,

‡ *Abhandl. des Naturn. Ver.*, Bremen, vii.

§ See also *loc. cit.*, p. 167.

¶ *Nat. Hist. Trans., Northumb., Durham, and Newcastle-upon-Tyne*, vol. xi. Part I.

** Στεφος garland. After the name of our little steamer—the Garland—by means of which we have, with more or less success, investigated the fauna of the Forth.

twenty-four-jointed, the proportional length of the joints as in the formula

18	20	6	6	5	5	5	7	4	4	4	7	6	7	6	6	5	5	6	6	7	9	10	8
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Sparingly setiferous; there appears to be a depressed lobe-like process upon the distal end of the first or proximal end of the second joint (fig. 2). Antennæ the same in both sexes; posterior antennæ nearly as in *Calanus finmarchicus*, but the primary branch is somewhat shorter proportionally; mouth organs also as in that species. First four pairs of swimming feet as in *Pseudocalanus elongatus*, fifth pair in the female simple, one-branched, two-jointed, small; first joint about one and a half time longer than broad; the second joint about twice as long as the first, diminishing in breadth from the base to the apex, and bearing two small marginal spines —one opposite the other—on the distal half. The female fifth feet resemble somewhat those of *Candace pectinata*. Fifth pair of feet in the male long and forming a powerful grasping organ; both feet are one-branched and four-jointed; the two last joints of the right foot are elongate and slender, the ultimate joint being strongly curved outward in its upper half and forming a long powerful claw. The left foot is rather shorter than the other, and terminates in two digitiform processes between which the claw-like terminal joint of the right foot interlocks. Abdomen short; in the female four-, in the male five-jointed, the last segment shorter than either of the others. Caudal stylets short, length about equal to the breadth, and furnished with four long subequal setæ, and a few small hairs.

Habitat.—Off St Monans, Firth of Forth. Several specimens were obtained.

This comes very near *Pseudocalanus*, and but for the presence of a fifth pair of feet in the female, and the powerfully developed fifth feet of the male, would have become a member of that genus; as it is, the affinities of *Stephos minor* seem to be with *Pseudocalanus* on the one hand, and *Candace* or *Acartia* on the other.

Family Misophriadæ, Brady (1878).

Pseudocyclopia, nov. gen. (provisional name).

Body robust, and resembling *Pseudocyclops* in general appearance. Head anchylosed with thorax. Basal joint of the anterior antennæ very large and nearly half the entire length of the antenna. The primary branch of the posterior antennæ three-jointed, the middle joint long; secondary branch large but scarcely so long as the primary branch, five-jointed, the third and fourth joints small. Mouth organs nearly as in *Calanus*. The outer branches of the first four pairs of swimming feet three-jointed, and longer than the inner branches; the inner branch of the first pair one-jointed, of the second pair two-jointed, of the third and fourth pairs three-jointed; the first basal joint of the third pair bears a long stout spine on the inner distal angle, longer than the inner branch. The fifth pair of feet in the female are small, one-branched, two-jointed, the first joint short, subrotund; the fifth feet in the male, elongate, one- or two-branched, unequal on the two sides, and forming powerful grasping organs. Abdomen in the female four-, in the male five-jointed.

Pseudocyclopia crassicornis, n. sp. (provisional name). (Pl. VII. figs. 15–29).

Length, exclusive of caudal setæ, ·66 mm. Cephalo-thorax robust, four-jointed, the first segment more than twice the combined length of the other three. Abdomen small, five-jointed in the male, four-jointed in the female; rostrum short, directed downwards. Anterior antennæ short,

sixteen-jointed; basal joint large and furnished with three elongate, stout, marginal sensory filaments and several small setæ; the second, sixth, tenth, and last joints are each also provided with a sensory filament, but smaller than those of the basal joint. The proportional length of the joints are very nearly as shown by the annexed formula

$$\frac{60 \cdot 6 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 6 \cdot 8 \cdot 6 \cdot 6}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9 \cdot 10 \cdot 11 \cdot 12 \cdot 13 \cdot 14 \cdot 15 \cdot 16}$$

Posterior antennæ three-jointed, the middle joint elongate with two small setæ on the exterior margin, and the last joint with a number of apical setæ. Secondary branch large, five-jointed, but shorter than the primary branch, the third and fourth joints very small. Mandibles small, consisting of a broad biting part, and a two-branched palp—one of the branches being two-, the other three-jointed. Anterior foot-jaw small, four-jointed, with several marginal setiferous processes. The basal joint of the posterior foot-jaw elongate, the lower distal angle produced, with a blunt tooth-like process; second joint also elongate, slender; the last four joints small and setiferous. The outer branch of the first pair of swimming feet three-jointed, each joint armed with a stout spine at the outer distal angle, the inner branch one-jointed and rather longer than the first joint of the outer branch. The outer branch of the second pair is also three-jointed. Each of the first and second joints bear one, and the last joint four, stout spines of variable length, that of the second joint and the terminal spine of the last joint being larger than the others; the inner branch is two-jointed and shorter than the outer one, and the first joint is rather smaller than the second. The third and fourth pairs have both branches three-jointed. A stout and nearly straight spine—longer than the inner branch—springs from the inner distal angle of the first basal joint of the third pair, otherwise the third and fourth pairs are similar. The fifth pair in the female is one-branched, two-jointed, the first joint short and somewhat dilated; the extremity of the second is produced into two elongate spiniform processes (these are not spines articulated to the end of the joint but are prolongations of it), the inner one much longer than the other; there is also a subapical spine exterior to the two processes and shorter than either. Fifth pair in the male also one-branched, four-jointed, and elongate; that of the left (?) very slender. The first joint of the right (?) foot is short and dilated, the second and third long, the last very small and furnished with a marginal hooklet and a subapical digitiform process. Caudal stylets short, each bearing four long, plumose, terminal setæ, the two middle ones being stout and spiniform. *Spermatophore* elongate, narrow, curved, and showing under the microscope a beautifully reticulated structure (fig. 29).

Habitat.—Off St Monans, Firth of Forth. Several specimens were obtained.

Pseudocyclopia minor, n. sp. (provisional name). (Pl. VIII. figs. 1–10).

Length, exclusive of caudal setæ, ·43 mm. Cephalothorax robust, four-jointed, first segment large, more than twice the combined lengths of the other three. Anterior antennæ short, setiferous, seventeen-jointed, the basal joint large, provided with a hook-like spine on the outer margin and near the middle of the joint, and with a sensory filament at the outer distal angle; the fourth, seventh, ninth, and thirteenth joints are also each furnished with a small sense-organ. The proportional length of the joints are very nearly as shown in the annexed formula

$$\frac{30 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 3 \cdot 4 \cdot 3 \cdot 3}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9 \cdot 10 \cdot 11 \cdot 12 \cdot 13 \cdot 14 \cdot 15 \cdot 16 \cdot 17}.$$

Posterior antennæ three-jointed, middle joint long, secondary branch five-jointed, shorter than the primary branch. Mouth organs as in *Pseudocyclopia crassicornis*. In the first pair of swimming feet the first joint of the outer branch is about as long as the other two together, while the one-jointed inner branch is longer than the first joint of the outer one. Each of the three joints of the outer branch is armed with a large spine at the outer distal angle; both branches are furnished with several plumose setæ. The second pair is similar to those of *Pseudocyclopia crassicornis*. The third and fourth pairs are also similar to those of that species, but the spine which springs from the inner distal angle of the first basal joint of the third pair is curved, and is longer and more powerful, and extends beyond the extremity of the outer branch. The fifth pair of feet in the female are very small and somewhat resemble those of *Pseudocyclopia crassicornis*, but the extremity is bluntly rounded and provided with three spinous setæ, the middle one of which is the longest. The fifth pair in the male form very powerful grasping organs; the left (?) foot consists of two very long branches, one of which is four-jointed, and one five-jointed; the basal point of the first (the four-jointed branch) is moderately short and dilated, the second joint is very small, the third elongate and geniculate, and bearing a curved spine at the inner distal angle; the last joint is long and slender, with a rounded extremity; the third and fourth joints of the other branch (which is rather longer than the first) are elongate and slender, while the last joint is very short and produced into a digitiform process. The right (?) foot consists of a single four-jointed branch, the breadth of the first two joints of which is rather greater than the length; the third joint is elongate, and bears exteriorly on its lower half a dense fringe of plain spinous hairs, and two stout spines interiorly The last joint, which is very short, has three small subapical lobes. Abdomen in the male five-jointed, in the female four-jointed. The second and third joints of the female abdomen are produced posteriorly on each side of the median dorsal line into sharp angular processes as shown in the figures (fig. 9); the male abdomen wants the dorsal processes possessed by that of the female. Caudal stylets short, each furnished with four long, plumose, terminal hairs, the two middle ones being stout and spiniform.

Habitat.—Off St Monans, Firth of Forth Several specimens of this species were obtained

Family Harpacticidæ.

Neobradya, nov. gen. (provisional name).

Near *Bradya*, Boeck, in form and structure. Anterior antennæ nine- or ten-jointed, scarcely if at all longer than the first body segment; those of the male hinged and adapted for grasping. Posterior antennæ large, three-jointed; secondary branch of posterior antennæ, four-jointed, the first joint as long as the entire length of the other three. Mandibles well developed, possessing a broad biting part, and a large two-branched palp, one of the branches of which is one- and the other four-jointed. Maxillæ somewhat as in *Longipedia*. Anterior foot-jaws stout, five-jointed, the first joint rather longer than the second, and furnished with three digitiform lobes, the three last joints small. Posterior foot-jaws not uncinate, resembling somewhat those of *Bradya*. Both branches of the first pair of swimming feet three-jointed and about equal in length. The outer branches of the second, third, and fourth pairs three-jointed; the inner branches two-jointed; the fifth pair small foliaceous.

*Neobradya pectinifer**, nov. gen. et sp. (provisional name) (Pl. XIII. figs. 19–32).

Female.—Body elongate, cylindrical; length, exclusive of caudal stylets, 1·2 mm. and composed of nine segments. The first cephalo-thoracic segment longer than the next two together. Rostrum short, obtusely rounded. Anterior antennæ nine-jointed, about as long as the first body segment, stout, and well furnished with setæ; the proportional length of the joints are as shown by the formula

$$\frac{13 \cdot 22 \cdot 10 \cdot 5 \cdot 3 \cdot 4 \cdot 3 \cdot 2 \cdot 5}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9}.$$

One side of the fourth joint is produced to form the base of a long olfactory appendage. Posterior antennæ large, three-jointed, the extremity of the last joint furnished with one plain and five plumose hairs; the secondary branch is four-jointed; the first joint is as long as all the other three together; the first joint bears two setæ, the second and third one setæ each, and the last two very small marginal and two long terminal setæ. The mandible is well developed, having a broad biting part and a large two-branched palp—one of the branches is four-, the other one-jointed; both the basal part and the branches of the palp are furnished with setæ. Maxillæ nearly as in *Longipedia coronata*. Anterior foot-jaw stout, five-jointed, the first joint large and possessing three marginal digitiform lobes, each of the lobes with three strong, nearly equal terminal hairs, the second joint much smaller than the first, and produced to form a stout process similar to those on the first joint, and also, like them, provided with three stout, subequal, terminal hairs; the three last joints are very small, and furnished with four moderately long hairs. Posterior foot-jaws very small, three-jointed, armed with several appressed and short, stout, blunt-pointed, marginal spines, each of which is furnished with a fringe of short hairs arranged in a pectinate manner along the upper margin (fig. 27). All the swimming feet two-branched and nearly alike in both sexes. Both branches of the first pair of nearly equal length and three-jointed, the second, third, and fourth pairs have the outer branch three-jointed; the inner branch, which is rather shorter, is two-jointed, the first joint of both branches of the first four pairs longer than any of the other joints; the second joint of the basal part of each of the four pairs is very short, that of the first pair armed with a spine on the inner distal angle; that of the second, third, and fourth pairs provided with a small setæ instead of a spine; the last joint of each branch of all the four pairs is furnished with one or two long plumose setæ and one or two smaller hairs. Fifth pair of feet small, foliaceous, the produced inner portion of the basal joint rather smaller than the outer semicircular joint, and provided with two elongate, stout, plumose setæ of unequal length. The exterior lobe of the same joint bears a very long, slender, curved hair at its apex. A long, stout, plumose hair springs from the inner distal angle of the outer semicircular joint, and three others from its outer margin. Abdomen four-jointed, the first and third segments longer than either of the other two. Caudal stylets short and furnished with a long slender terminal hair and several very small ones.

Male.—The male differs little from the female except in the form of the anterior antennæ which are distinctly geniculated and form powerful grasping organs (fig. 22).

Habitat.—Off St Monans, Firth of Forth. Obtained from dredged material from 14 fathoms water.

* Referring to the comb-like arrangement of the hairs on the marginal spines of the posterior foot-jaws.

Tachidius crassicornis, n. sp. (provisional name). (Pl. VIII. figs. 14–27).

Length, exclusive of tail setæ, ·7 mm. Body moderately stout, first cephalo-thoracic segment longer than the next two together, the forehead produced into a short rostrum. Anterior antennæ shorter than the first body segment; that of the female six-jointed, stout, and densely setiferous towards the extremity, a small sensory filament springs from fifth joint. The proportional length of the joints are nearly as in the formula

$$\frac{20 \cdot 10 \cdot 9 \cdot 5 \cdot 8 \cdot 9}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}$$

The anterior antennæ in the male form powerful grasping organs, closely resembling those of *Tachidius brevicornis* (fig. 17). Posterior antennæ short, three-jointed, the last joint nearly as long as the preceding two together; a small one-jointed secondary branch springs from the end of the first joint. Mouth organs nearly as in *Tachidius brevicornis*. The first four pairs of swimming feet nearly alike, both branches three-jointed; the first joint of the inner branches of all the four pairs smaller than either the second or third joints. The fifth pair in the female moderately large and foliaceous, furnished with three equal and plumose terminal setæ; a plumose seta springs from a rounded basal part on the anterior margin of the female fifth pair, which may represent a rudimentary second branch. The fifth pair in the male are very small, subquadrate, and furnished with one small and two moderately long setæ near the inner angle and one at the outer angle; the first abdominal segment in the male is armed with prominent lateral appendages, which are easily observed without dissection, and which consist of a broad, but short, basal part bearing three unequal spiniform and plumose marginal setæ, the inner one being longer than either of the other two. Caudal stylets short, about as long as the last abdominal segment, and furnished with four setæ,—the inner and outer being plain and very small, the other two plumose and elongate; the inner of the two principal setæ is much longer than the other; and the basal part of the proximal half is broader than the remaining portion; the broad part, which is of nearly equal breadth throughout, merges abruptly into the more slender portion as shown in the figure. Ovisac single, large, with a number of large ova.

Habitat.—Near Culross on the upper estuary of the Forth; not very rare. Obtained February 1892.

This species comes near *Tachidius brevicornis* (Müller), but differs in the form of the anterior antennæ, which are rather stouter and shorter and six-jointed; in the first joint of the inner branches of the first four pairs of swimming feet being smaller than the other two joints; and in the form of the fifth feet in the female.

Ameira longicaudata,* n. sp. (provisional name). (Pl. IX. figs. 1–18).

Body slender; length, exclusive of tail setæ, 1 mm. (25th of an inch). Anterior margin of first body segment squarely truncate; forehead produced into a short blunt rostrum. Anterior antennæ longer than the first cephalo-thoracic segment, elongate, and sparingly setiferous; that of the female eight-jointed, of the male nine-jointed; the male antennæ are distinctly hinged between the sixth and seventh joints, and indistinctly between the third and fourth joints. A long sensory filament springs from the end of the fourth joint in both sexes; the porportional length of the joints of the female and male antennæ are nearly as in the annexed formulæ

* Referring to the long caudal stylets.

Female	30	19	14	10	5	8	5	10	
	1	2	3	4	5	6	7	8	9
Male	30	19	10	14	3	7	8	4	10

Posterior antennæ of moderate length, three-jointed; joints nearly equal, a small one- (? or two-) jointed secondary branch springs from the end of the first joint, and bears three subequal terminal hairs; two of these hairs arise from a common and somewhat dilated basal part which may possibly represent a rudimentary second joint, but this is doubtful. Mandibles moderately stout, the biting part broad with several strong tooth-like processes, and a divergent, marginal, setiferous spine; the palp with two small branches and one or two terminal hairs. Maxillæ small; the terminal part, which is comparatively broad, is furnished with several spiniform teeth on the inner distal margin, and exteriorly with three small marginal setiferous lobes. Anterior foot-jaw small, two-jointed; the first joint with two marginal setiferous lobes, the last joint small and produced into an elongate slender process, bearing at its apex a stout plumose hair, and exteriorly, near the base, a plain slender seta. Posterior foot-jaw strong, and armed with a powerful clawed spine. The first four pairs of swimming feet have both branches three-jointed and elongate; the first joint of the inner branch of the first pair longer than the entire outer branch, and furnished with an elongate seta on the lower half of the inner margin; the two last joints are short, the second being the shorter of the two. Inner branches of each of the other three pairs shorter than the outer,—especially in those of the fourth pair; all the four pairs furnished with moderately long plumose setæ. The inner part of the basal joint of the female fifth pair moderately broad, furnished with four elongate setæ on its inner margin; the outer part is laterally produced and attenuated, and forms the base of a single elongate seta. The second joint is long and slender (fig. 12), and furnished with five setæ,—three on the outer margin, one on the inner margin near the apex, and an apical seta. The fifth pair in the male are very small; the basal joint is scarcely produced posteriorly, and bears three subterminal setæ the lateral produced part bears a single hair, the second joint narrow, ciliate on the outer margin, and furnished with one terminal seta, and another on the inner margin, both being of moderate length. The first abdominal segment bears two small setiferous lateral appendages, as shown in fig. 16. Caudal stylets elongate, slender, longer than the last abdominal segment, each with one extremely long and a few short terminal setæ. The posterior margins of all the cephalo-thoracic and abdominal segments are more or less distinctly denticulate.

A variety occurs, somewhat smaller than that described (figs. 17, 18), which has the antero-lateral angles of the first body segment rounded instead of angular; the posterior margins of all the body segments spiniferous instead of denticulate, and also armed at the postero-lateral angles with two strong spines and several small setæ. To distinguish this variety I have named it var. *spinosa*.

Habitat.—Off St Monans, Firth of Forth. Frequent. I first obtained this species two or three years ago, but for want of time to study its structure and affinities, it was laid aside, along with some others, till a more convenient season. With the assistance of my son, I am now able to describe this and several other interesting members of the Forth fauna.

Paramesochra,* nov. gen. (provisional name).

Body subpyriform; anterior antennæ short, seven-jointed in the female;

* Near *Mesochra*, Boeck, which it resembles in several important points, especially in the structure of the first four pairs of swimming feet.

modified, and forming powerful grasping organs in the male; posterior antennæ, with the primary branch three- or four-jointed, secondary branch very small, one-jointed. Mandibles well developed, and possessing a two-branched palp. Maxillæ small. Anterior foot-jaw with several marginal setiferous processes. Posterior foot-jaw small, feebly clawed. All the five pairs of swimming feet two-branched; both branches of the first pair two-jointed, the inner branch longer than the outer, first joint of the inner branch elongate, the last very small and imperfectly hinged; the outer branches of the second, third, and fourth pairs three-jointed, the inner branches two-jointed and shorter than the outer. Fifth pair foliaceous. The abdomen in the female four, in the male five jointed.

Paramesochra dubia, n. sp. (provisional name). (Pl. XII. figs. 18–32.)

Female.—Body subpyriform; length about ·65 mm. The postero-lateral angles of the cephalo-thoracic segment spiniform and produced backward beyond the next somite; two lenses—one on each side near the postero-lateral angles, as shown in the figure—can be easily made out with a $\frac{1}{4}$th or $\frac{1}{5}$th inch objective. Anterior antennæ short; seven-jointed basal joint very large and stout, the upper distal angle produced so as to form a stout prominent tooth, the remaining joints small, the proportional lengths of which are as shown in the formula

$$\frac{12 \cdot 4 \cdot 4 \cdot 3 \cdot 2 \cdot 3 \cdot 3}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}.$$

Posterior antennæ three- (or four?) jointed; secondary branch small, slender, one-jointed. Mandible well developed, consisting of a biting part (the apex of which is armed with several long teeth) and a two-branched palp—one branch three- the other one-jointed. Maxillæ small, with a lateral two-jointed lobe, serrate at the apex, and an intermediate appendage furnished with two short terminal hairs. Anterior foot-jaw four-jointed, with several marginal setiferous processes; posterior foot-jaw three-jointed; last joint very small, and armed with three nearly equal setæ. All the five pairs of swimming feet two-branched; both branches of the first pair two-jointed; the outer branch of the second, third, and fourth pair three-jointed; the inner branch two-jointed; the first joint of the inner branch of the first pair elongate; the last very small and imperfectly hinged; inner branch longer than the outer one, the inner branch of the following three pairs shorter than the outer. The fifth pair foliaceous; basal joint large, its inner lobe with one plain and one plumose terminal seta. The exterior lobe, which is small, is also furnished with two small setæ; the second joint with four stout marginal hairs. Abdomen four-jointed; first segment large, composed of two coalescent joints; the last segment very small. Caudal stylets longer than the two last abdominal segments, and about six times longer than broad, furnished with one very long and three short unequal terminal hairs.

Male.—Rather smaller than the female; length about ·6 mm. Anterior antennæ forming powerful prehensile organs. The basal joint of the fifth pair of swimming feet much smaller than in the female, and wanting the two setæ. Abdomen five-jointed. With these exceptions the description of the female is equally applicable to the male.

Habitat.—Firth of Forth, west of May Island, February 1892. Several specimens were obtained.

Tetragoniceps (?) *maleolata*, Brady. (Plate VIII. figs. 11, 12.)

A Copepod answering to the description and figures of *Tetragoniceps maleolata*, except in the two following particulars, was obtained in material dredged off St Monans.

1st. The anterior antennæ are nine-jointed, four small joints precede the last one in the Forth specimen (fig. 11) instead of three as described for *Tetragoniceps maleolata*. 2d. The fifth pair of swimming feet are two-branched (fig. 12) in the Forth specimen, but in *T. maleolata* they are one-branched. This difference is a more important one than that between the anterior antennæ, because the one-branched fifth feet form one of the principal characters that distinguish *Tetragoniceps* from *Normanella*. Our specimen, even though possessing a three-jointed posterior antennæ, might have been ascribed to that genus, but the general contour of the animal is that of *Tetragoniceps*, and decidedly different from either *Normanella* or *Cletodes*. It is worth noting also that the general outline of the fifth foot of our specimen—leaving out of account its two-jointed structure—has a close resemblance to the fifth foot of *Tetragoniceps*.

Tetragoniceps macronyx,† n. sp. (Pl. X. fig. 19–28.)

Length, ·54 mm. ($\frac{1}{47}$th of an inch). Body slender. Rostrum small. Anterior antennæ slender, nine-jointed in the male, eight-jointed in the female, the proportional length of the joints as in the formula

Male,	15	16	11	2	6	2	5	4	8
	1	2	3	4	5	6	7	8	9
Female,	15	15	3	15	5	5	5	9	

The male antennæ are hinged between the second and third and sixth and seventh joints. Posterior antennæ are of moderate length and three-jointed; secondary branch very rudimentary (fig. 22). Mandible palp small, one- or (?) two-branched. Anterior foot-jaw small, furnished with two marginal bi-lobed setiferous processes, and bearing at the apex a long, slender, filamentous hair and a claw-like spine. Posterior foot-jaw elongate, armed with a long, slender, sinuous, terminal clawed spine, which has a long delicate seta springing from its base. The outer branches of the first four pairs of swimming feet three-jointed—that of the first pair being shorter than those of the other three pairs; three slender subequal setæ spring from the end of the second joint of the outer branch of the fourth pair; the inner branch of the first pair are elongate, two-jointed; first joint nearly as long as the outer branch, and bearing a single delicate seta near the middle of the outer margin; second joint fully half the length of the first, and furnished with two elongate terminal hairs. The inner branches of the following three pairs are short, two-jointed, and armed with a moderately long, stout terminal spine. Feet of fifth pair foliaceous, elongate, narrow-triangular. Caudal stylets rather longer than the last abdominal segment, and furnished with a moderately long and a few small setæ. Ovisac single, and containing a few large ova.

Habitat.—Off St Monans, Firth of Forth. A few specimens only were obtained among dredged material from about 14 fathoms water, bottom clean sand.

Tetragoniceps Bradyi,* n. sp. (Pl. IX. fig. 19–32.)

Length, exclusive of tail seta, 1 mm. ($\frac{1}{25}$th of an inch). In general form like *Tetragoniceps maleolata*, but the first cephalo-thoracic segment is scarcely so angular in front. Rostrum very short, anterior antennæ about as long as the first cephalo-thoracic segment, nine-jointed, the second joint produced into a strong claw on the under side (fig. 20); the proportional length of the joints are nearly as in the annexed formula

* The name is given in compliment to Professor G. S. Brady, who instituted the genus, and to whose untiring and disinterested kindness the author of these notes owes much of his success in the study of the Entomostraca.

†Μακρός, long, and ὄνυξ, claw, referring to the long claw of the posterior foot-jaw.

$$\frac{27 \cdot 10 \cdot 7 \cdot 5 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 11}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9}.$$

The fourth joint is produced so as to form the base of a long and stout sensory filament. All the joints except the first are more or less setiferous. Posterior antennæ three-jointed, the joints subequal; a small secondary one-jointed branch springs from the end of the first joint. Mandible palp distinctly two-branched—one of the branches much larger than the other (fig. 22). Maxillæ with a broad biting part and a four-lobed branchial appendage. Anterior foot-jaw five-jointed; the broad first and second joints bear five marginal, digitiform, setiferous lobes arranged in two groups—three lobes in the one and two in the other, with a clear space between. The last three joints, which are very small, are furnished with a number of small setæ. Posterior foot-jaw three-jointed, last joint forming a base for a moderately long terminal claw and a small seta; a plumose seta springs from the inner margin, and near the middle of the second joint, anterior to the plumose seta, are a number of fine marginal cilia. The first joint is furnished with two subterminal plumose hairs. The first four pairs of swimming feet are nearly as in *Tetragoniceps maleolata*. The fifth pair, which are one-branched, are in the form of large, foliaceous concave plates, the length of which is about one-third the length of the whole animal (fig. 30). Their breadth is about equal to half their length. The extremity and outer margin are provided with a few setæ, the inner terminal seta being plumose, the others plain. A strong muscle extends down the exterior side and across the extremity, and sends off branches to the marginal setæ. Inclosed within the feet were a number of ova, having apparently no other covering than that of the enclosing large foliaceous plates. Abdomen five-jointed; the posterior ventral margin of the third segment is produced so as to form a prominent fold which extends about half-way over the next segment. Caudal stylets about as long as the last abdominal segment, and having the outer margin nearly straight and the inner strongly sigmoid; each stylet bears a long terminal seta, the base of which is considerably dilated, and a few very small hairs, as shown in figure 32. No males were obtained.

Habitat.—Off St Monans. Rare. The nine-jointed anterior antennæ, with the strong claw-like process of the second joint, together with the remarkably large, foliaceous fifth feet, render this a well-marked species.

Tetragoniceps incertus. (Pl. XII. figs. 1–17).

Female.—Body elongate, cylindrical; length, exclusive of caudal setæ, 1 mm. First cephalo-thoracic segment about as long as the next two together, forehead produced into a sharp-pointed rostrum. Anterior antennæ about as long as the first body segment, seven-jointed, the proportional length of the joints as shown in the formula

$$\frac{20 \cdot 18 \cdot 12 \cdot 7 \cdot 4 \cdot 5 \cdot 8}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}.$$

All the joints except the first sparingly setiferous; a moderately long olfactory filament springs from the end of the fourth joint. Posterior antennæ short, two- (or three-?) jointed, and possessing a very small one-jointed secondary branch which bears two terminal setæ. The apex of the last joint of the primary branch is furnished with five setæ, the three longest of which are bent near the middle, the outer one of the three having a small forward-directed spine at the bend. Mandible dilated at the base, the apex truncate, and armed with several blunt-pointed teeth; mandible palp one-branched, long, and slender. Maxillæ small, simple, with

two small lateral appendages. Anterior foot-jaw small, armed with a stout curved terminal spine and two marginal setiferous lobes. Posterior foot-jaw uncinate, forming a moderately strong prehensile organ, the terminal claw slender and strongly curved. The inner branch of the first pair of swimming feet elongate, two-jointed, the last joint small, the first nearly twice the length of the three-jointed outer branch. A small seta springs from the inner margin of the second basal joint, and another from the inner margin and near the proximal end of the elongate first joint of the inner branch. Two slender hairs, one of which is setiferous, spring from the extremity of the last joint. Each of the three joints of the outer branch is armed near the exterior distal angle with a short spinous seta; three hairs —two of which are long and setiferous and bent near the middle—spring from the extremity of the last joint. The inner branches of the second, third, and fourth pairs are one-jointed, that of the fourth rudimentary; the outer branches are three-jointed, the joints subequal and more strongly setiferous than those of the first pair. Fifth pair foliaceous,—the same on the both sides,—one-branched, and furnished with three hairs on the outer margin and four on the inner—the upper of the four being densely setiferous. The extremity of each branch terminates in a stout blunt-pointed spine nearly as long as the branch to which it appears to be articulated. Abdomen four-jointed, the first segment composed of two coalescent joints, and about twice the length of the next two together, the second, third and fourth segments subequal. Caudal stylets fully half as long as the last abdominal segment, slightly divergent, each stylet furnished with a long geniculated terminal seta and several small hairs.

Male closely resembling the female but smaller (·87 mm). Anterior antennæ eight-jointed, the two first joints long, as in the female, the fifth shorter than any of the other joints, and furnished with an olfactory appendage. The antennæ are distinctly hinged between the sixth and seventh joints, and indistinctly hinged between the third and fourth. The posterior antennæ, mouth-organs, and first pair of swimming feet as in the female. The last joint of the outer branch of the second pair of swimming feet like that of the female, but furnished with an additional and moderately stout plumose hair, the normal position of which appears to be that shown in the figure (fig. 12). A long spiniform appendage springs from the basal joint of the third pair, and close to, but inside of, the one-jointed inner branch (fig. 14). This appendage is more than twice the length of the inner branch, and as long as the two first joints of the outer branch. The fifth pair of feet is furnished with fewer marginal hairs than those of the female, and the terminal spine seems to be continuous with, and not articulated to, the basal part of the foot. Abdomen five-jointed, caudal stylets and setæ as in the female.

Laophonte horrida (Norman).

1869–70. *Cleta minuticornis*, Buchholz, 'Die zweite deutsche Nordpolar-fahrt,' p. 393, pl. xv. fig. 3.
1876. *Cleta horrida*, Norman, 'Report of the Valorus Expedition,' p. 206 (Proc. Roy. Soc.).
1880. *Laophonte horrida*, Brady, *loc. cit.*, ii. p. 74, pl. xxiv. figs. 1–11.

Habitat.—Washed from a large root of sea-weed brought up in the trawl-net near the middle of the estuary between Fidra and St Monans during February last (1892). This remarkable species is readily distinguished by the strong dorsal armature of the body segments. The first pair of feet have the basal part long and rather slender. The rostrum

is prominent and has the apex somewhat tri-lobed; the middle lobe projects forward considerably beyond the lateral ones.

It has been obtained from various parts of Great Britain. The following are some of the localities—Off the Island of Cumbrae; at Portincross, Ayrshire; Mulroy Loch, Donegal (G. S. Brady); Oban (A. M. Norman); East Loch Tarbert, Loch Fyne (Mihi). *Laophonte horrida*, so far as I have been able to know its habits, is no swimmer, but appears to frequent the muddy roots of weed and zoophytes, among which it crawls and finds food and shelter; it is usually more or less coated with mud.

Laophonte inopinata,* n. sp. (provisional name). (Pl. XI. figs. 1–12.)

Female.—Length, exclusive of caudal setæ, ·5 mm. Viewed dorsally, the body is elongate and becoming gradually narrower posteriorly, composed of ten segments, the first segment about as long as the next three together, and furnished with a few small spinous setæ at the antero-lateral angles. Rostrum short, obtuse. Anterior antennæ short and stout, six-jointed, the first three joints large, subequal, the fourth and fifth small. The proportional length of the joints are as in the annexed formula

$$\frac{7 \cdot 8 \cdot 7 \cdot 2 \cdot 2 \cdot 6}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}.$$

The fourth joint produced on one side to form the base of an elongate olfactory filament. Posterior antennæ stout, three-jointed, with four long geniculated terminal setæ and one short curved terminal spine. The margin of the last joint is also fringed with short hairs and provided with a spine near the distal end. The secondary branch, which springs from near the middle of the second segment of the primary branch, is small, one-jointed, furnished with one marginal and three short, plumose terminal setæ. Anterior foot-jaw small, two-jointed, armed with a terminal clawed spine and two elongate marginal lobes. Posterior foot-jaw two-jointed, and bearing a long terminal claw. The first pair of swimming feet nearly as in *L. similis*. The second, third, and fourth pairs nearly alike, moderately stout; fifth pair small. The basal joint is furnished with several small marginal hairs, a moderately long plumose terminal hair, and three subterminal, spinous setæ toothed near the extremity; the second joint small and provided with one long and four short terminal hairs. Caudal stylets short, each with a long curved, spreading terminal seta, beset for two-thirds of its length with numerous wooly-like curled filaments; a short terminal seta plumose on one side; and a few very short hairs. The integument is thickly covered with minute hairs, and the posterior margins of the body segments are, besides being fringed with cilia, furnished with a number of small hairs placed at regular intervals along the margin of each segment as shown in the enlarged figure.

Male.—The chief difference between the female and male is in the form of the anterior antennæ, which in the latter are distinctly hinged, and constitute powerful grasping organs.

Habitat.—Washed from a large seaweed root brought up in the trawl-net a few miles west of May Island. Several ♂ and ♀ specimens were obtained; some of the latter carried ovisacs. The long, spreading, and neatly curved caudal setæ serve to distinguish this species at a glance, and especially so when examined under the microscope; the wooly-like curled filaments with which they are covered give them a very striking character.

* *Inopinata*, unexpected.

*Cletodes lata,** n. sp. (provisional name). (Pl. X. figs. 10–18).

Length ·7 mm., body depressed, moderately broad, the last thoracic and first abdominal segments rather narrower than those that precede or follow; all the segments, but especially the three first abdominal segments, have the postero-lateral angles more or less sharply angular; the last abdominal segment nearly as long as the second and third together; the first body segment broadly triangular, the breadth being rather greater than the length. Anterior antennæ shorter than the first body segment, stout, six-jointed, the second and fourth joints smaller than any of the others, the proportional length of the joints as in the formula

$$\frac{10 \cdot 3 \cdot 8 \cdot 2 \cdot 4 \cdot 10}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}.$$

All the joints, with the exception of the first, are armed with stout spiniform setæ, and a stout elongate sensory filament springs from the third joint. Posterior antennæ two-jointed, secondary branch obsolete, and represented by a small hair arising from a slightly produced part of the margin, and near the middle of the first joint of the primary branch. Mandible with three strong teeth; mandible palp small, cylindrical, one-jointed (fig. 13). Posterior foot-paw furnished with a long slender curved terminal claw. The first joint of the outer branch of the first pair of swimming feet half as long again as either the second or the third joint; the inner branch, which consists of two short equal joints, is about as long as the first joint of the outer branch. The middle joint of the outer branches of the second, third, and fourth pairs is shorter than either the first or last joints; the first joint of the inner branches is not half the length of the second. Fifth pair foliaceous, the inner lobe of the basal joint broad, bearing two elongate, stout, subterminal setæ; the outer lobe is in the form of an elongate cyliudrical process, bearing a moderately long terminal setæ; second joint elongate, ovate, the outer margin with three small hairs widely apart, a moderately long apical seta, and a very small hair on the inner margin. A variety (?) occurs having the second joint very narrow, with the apical and three marginal hairs very long. The caudal stylets short, widely apart, and bearing one moderately long and a few small setæ.

Habitat.—Off St Monans, Firth of Forth. Several specimens were obtained among dredged material.

Thalestris harpactoides, Claus. (Pl. XI. figs. 13–16).

1863. *Thalestris harpactoides*, Claus, 'Die frei lebenden Copepoden,' p. 133, pl. xix. figs. 2–12.

1880. *Thalestris harpactoides*, Brady, 'Brit. Copep.,' vol. ii. p. 127, pl. l. figs. 9–16; pl. lix. fig. 1.

Habitat.—Off St Monans, Firth of Forth. A few species were obtained among dredged material. It somewhat resembles *Th. rufocincta*, but is more slender. The colour of the Forth specimens was bluish. There is also a narrow but distinct belt, due to difference of colour or structure, along the margins of the body segments. Its slender form, the form of the posterior foot-jaws (fig. 13), of the first pair of feet, and of the fourth and fifth pairs, serve to distinguish this from other British species of *Thalestris*. The marginal spines of the outer branches of the second, third, and fourth swimming feet of *Th. rufocincta* are strongly setose, of *Th. harpactoides* finely ciliated. In the posterior foot-jaw in *Th. rufocincta* the terminal claw has three prominent though slender setæ spring-

* *Lata*, broad, referring to its comparatively broad outline when viewed dorsally.

ing from the base, but the terminal claw of the same appendage in *Th. harpactoides* is provided with only a single delicate seta. From *Th. mysis* this species is at once distinguished by the form of the fifth feet in both ♀ and ♂ specimens.

Scutilidium fasciatum (Boeck).

1864. *Porcilidium fasciatum*, Boeck, 'Oversigt Norges Copepoder,' p. 56.
1868. *Aspidiscus fasciatus*, Norman, 'Brit. Assoc. Report,' p. 298.
1880. *Scutilidium fasciatum*, Brady, 'Monog. Brit. Copep.,' ii. p. 178, pl. lxviii. fig. 11; pl. lxix. figs. 1–9.

Habitat.—In a shore-gathering from Dunbar, collected by Mr Peter Jamieson, assistant naturalist. This and *S. tisboides* may be distinguished from most other British Copepoda by the peculiar form of the first pair of feet.

Cylindropsyllus lævis, Brady (Pl. XIII. figs. 1–18.)

1880. *Cylindropsyllus lævis*, Brady, 'Monog. Brit. Copep.,' vol. iii.

Female.—Length 1·4 mm. Animal elongate, cylindrical, cephalo-thorax five-jointed, not distinctly separated from the abdomen, which is four-jointed; the first body segment about as long as the next two together; forehead produced into a sharp rostrum. Anterior antennæ short, scarcely longer than the first body segment, seven-jointed, the proportional length of the joints as in the formula

$$\frac{10 \cdot 22 \cdot 9 \cdot 6 \cdot 5 \cdot 4 \cdot 8}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}$$

Sparingly setiferous, a long slender olfactory appendage springs from the end of the fifth joint. Posterior antennæ two-jointed, basal joint long and moderately stout, bearing near the proximal end a very small one-jointed secondary branch which is furnished with one long terminal setæ; the last joint of the primary branch is armed with several spiniform hairs. Three of those which spring from the extremity of the joint are long and bent near the middle, where, on the outer one of the three, is a produced spine-like process, which looks to be a continuation of the straight proximal half of the hair. Mandibles well developed, consisting of a stout biting part furnished with several small teeth, and a small one-branched palp bearing three moderately long terminal hairs. There is anterior to the mandibles a peculiar organ possessing at its anterior edge two subtriangular appendages which are crenate on the outer margin and measure in breadth very nearly ·01 mm. These subtriangular appendages resemble somewhat the sucking disks on the forehead of *Caligus* and may function as such, but this is very doubtful. Our dissection shows a slender muscle extending upwards and, terminating between the two appendages where it becomes dilated, and seems to connect the two.

The maxillæ (fig. 7) consist of flattened plates, ciliate on the inner margin, the cilia being bounded externally by a small spine. Anterior foot-jaws one-jointed, small, and furnished with one or two marginal processes; posterior foot-jaws stout, bearing a prominent, somewhat clawed terminal spine, and two marginal setiferous processes. Outer branches of first four pairs of swimming feet three-, inner branches two-jointed; fifth pair one-branched, foliaceous. (For description of swimming feet, caudal stylets, and setæ see 'British Copepoda,' iii. p. 30.) Ovisacs two, each containing three large ova arranged as shown in the figure. The integument

of cephalo-thorax and abdomen closely beset with minute papillæ, of which fig. 18 is an enlarged representation.

Male.—Body similar to that of the female but smaller (1·3 mm.). Anterior antennæ eight-jointed; the proportional length of the joints are as in the formula

$$\frac{10 \cdot 22 \cdot 5 \cdot 8 \cdot 3 \cdot 8 \cdot 5 \cdot 5}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8},$$

distinctly hinged between the sixth and seventh joints, and indistinctly between the third and fourth. The fifth joint, which is very short, bears a long olfactory filament. The posterior antennæ, mouth organs, and first pair of swimming feet as in the female. The last joint of the outer branches of the second pair of swimming feet bears at nearly right angles a long curved appendage closely resembling the blade of a reaping-hook, and setose on the inner margin (fig. 13). The basal joint of the inner branches of the third pair is furnished internally with a long slender process, which extends beyond the extremity of the branch, and is armed on the inner margin near the distal end with two barb-like teeth. The fourth and fifth pairs as in the female, except that the fifth is rather smaller and furnished with fewer setæ. The abdomen five-jointed; the posterior margin of the first abdominal segment bears a foliaceous appendage armed with one long and two short, stout setæ. Caudal stylets and setæ as in the female.

Habitat.—Off St Monans, Firth of Forth, in 14 to 15 fathoms water; bottom clean course sand. Not uncommon.

This interesting Copepod, which was described by Professor Brady in his monograph of the British Copepoda in 1880, is apparently local in its distribution, and is probably rare as well as local. The generic and specific descriptions given in the monograph were prepared from the examination of one specimen only—a female—and, as pointed out by Professor Brady, both descriptions were necessarily somewhat incomplete. Having some time ago in a single haul with the dredge secured a considerable number of specimens including both males and females, the opportunity was taken advantage of to make a careful examination of both sexes so as to gain some knowledge of the affinities of the species. In the monograph alluded to *Cylindropsyllus* was provisionally placed among the *Pœcilostoma* because of its apparently close relationship to that group, but as the structure of some of the mouth organs had not been satisfactorily made out no distinct place in the classification was assigned to it.

By the careful dissection of a number of specimens I have been able, with the assistance of my son, to prepare a fairly complete description, with a set of drawings, of the more important and characteristic appendages that distinguish *Cylindropsyllus lævis* from other Copepoda. It will be observed by referring to the description and drawings that there are one or two characters which render the position of *Cylindropsyllus* among the *Pœcilostoma* untenable. These are the distinctly hinged male anterior antennæ, the presence of a secondary branch on the posterior antennæ, and the form of the mandibles,—characters which indicate a closer affinity with the *Harpacticidæ* than with either the *Pœcilostoma* or the *Siphonostoma*. If, on the other hand, the appendages of the peculiar organ described as situated anterior to the mandibles be sucking disks, the position of *Cylindropsyllus* in the classification would be somewhat anomalous, as these appendages would indicate a tendency towards parasitism in this Copepod,—a tendency suggested by Dr Brady. No indication of parasitical habits has, however, been observed hitherto in any of the specimens obtained.

Cylindropsyllus minor. (Pl. XI. figs. 17–24).

Female.—In the female the body is cylindrical and elongate. Length, exclusive of tail setæ, 1 mm., the first thoracic segment nearly as long as the next three together, rostrum short with a rounded apex. Anterior antennæ about as long as the first thoracic segment, seven-jointed; the comparative length of the joints are as shown in the formula

$$\frac{7 \cdot 18 \cdot 9 \cdot 4 \cdot 5 \cdot 4 \cdot 8}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}.$$

Sparingly setiferous. An olfactory filament springs from the end of the fourth joint, which is produced to form a base for the filament. The posterior antennæ, mandibles, maxillæ, and anterior foot-jaws as in *Tetragoniceps incertus.* Posterior foot-jaw two-jointed and armed with a long, stout, terminal claw which is ciliate on the inner margin of the distal half. A spine springs from the end of the first joint and projects forward so as to be opposed to the extremity of the terminal claw. The outer branch of the first four pairs of swimming feet three-jointed, the inner branch of the first and fourth pairs two-jointed, of the second and third one-jointed, the inner and outer branches of first pair nearly equal, but the inner rather longer, sparingly setiferous. The one-jointed inner branch of the second and third pairs shorter than the first joint of the outer branch, and terminating in a short stout spine; a moderately long slender hair springs from near the middle of the one-jointed inner branch of the third pair. The outer branch of the fourth pair is nearly twice as long as that of any of the preceding pairs. The two first joints are about equal in length; the last is rather shorter, and furnished with one very short and three long setæ. The inner branch, which is two-jointed, is scarcely longer than the first joint of the outer branch, and provided with a short terminal plumose spine or stout setæ. Fifth pair foliaceous, small, one-branched, the posterior margin armed with six plain setæ, and, exteriorly, with a stout spine. Abdomen four-jointed, first segment rather longer than any of the other three. Caudal stylets about as long as the last abdominal segment, slightly divergent, and bearing a lanceolate spiniform terminal process and a few very small hairs. Ovisacs two, each with four ova placed end to end as shown in the figure.

(?) *Lichomolgus littoralis,** n. sp. (Pl. X. figs. 1–9).

Male.—Length about 1·12 mm. (exclusive of tail setæ). In form somewhat like *Lichomolgus arenicolus.* Anterior antennæ short, seven-jointed, the proportional length of the joints as shown by the formula †

$$\frac{16 \cdot 24 \cdot 12 \cdot 23 \cdot 15 \cdot 18 \cdot 16}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}.$$

All the joints more or less setiferous; the second joint is furnished with a number of moderately short, and two long setæ. Posterior antennæ stout, four-jointed, the length of the joints gradually decreasing, the last about as broad as long, quadrangular, and bearing about six long, unequal, and plain terminal hairs and one plumose seta, the exterior margin of the second and third joints ciliated. Two spines, one of which is stout and strongly curved, and two setæ, spring from the exterior distal angle of the third joint as shown in the figure. There is no secondary appendage to the posterior antennæ. Mandible stout, consisting of a broad

* Of or belonging to the shore.

† When first examined the three last joints of the anterior antennæ were observed to be nearly equal in length, but the last one became detached before the joints were measured. The length stated, though closely approximate, may therefore not be quite correct.

basal part (from the end of which spring two submarginal plumose setæ) and a strong claw-like tooth armed with a few setæ on its outer aspect, as shown in the figure. Maxillæ well developed, the biting part with three apical processes, finely serrate on the margin, the palp with several terminal plumose setæ. Second foot-jaw strong, two-jointed, last joint broadly triangular, the inner margin armed with a double row of small teeth, terminal claw stout, curved, as long as the joint from which it springs, and forming with it a powerful grasping organ; the first joint is provided with a stout plumose seta on the inner margin. Both branches of the first four pairs of swimming feet three-jointed and nearly alike; the outer branch rather shorter than the inner. The fifth pair broadly foliaceous, truncate at the end, and furnished with four stout terminal hairs; both the margins are ciliated. Abdomen five-jointed, the first segment considerably larger than the next, and armed with two short unequal spines at the postero-distal angles; the last four segments gradually decrease in length and breadth. Caudal stylets short and broad, about as long as the last abdominal segment, and furnished with one long and two short terminal plumose setæ and three very short hairs.

Habitat.—Vicinity of Culross, on the north side of the Forth. One specimen only was obtained. The remarkable form of the posterior foot-jaws, so closely resembling the Gnathopods of some of the Amphipoda, and the broad fifth pair of swimming feet, enable the species to be readily distinguished. A full-sized drawing of the animal was to have been prepared, but unfortunately the cover-glass of the slide on which the Copepod was mounted preparatory to being figured was accidentally pressed down so that the thorax became abnormally flattened; for this reason a correct full-sized drawing could not be prepared.

Lichomolgus concinnus,* n. sp. (provisional name). (Pl. XI. figs. 25–23).

Female.—Length, exclusive of caudal setæ, ·9 mm. Cephalo-thorax broadly ovate. Abdomen short, narrow, four-jointed, first abdominal segment large, longer than the following three together, and as broad as long, the postero-lateral angles not produced nor furnished with spines. Caudal stylets stout, about as long as the last abdominal segment, and provided each with one marginal and four terminal setæ. Forehead rounded. Anterior antennæ shorter than the first cephalo-thoracic segment, seven-jointed, sparingly setiferous, the proportional length of the joints as in the formula

$$\frac{12 \cdot 28 \cdot 7 \cdot 18 \cdot 15 \cdot 12 \cdot 7}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}.$$

A short olfactory filament springs from near the middle of the fifth joint. Posterior antennæ stout, four-jointed, and armed with a short and strong terminal claw; the second joint is longer than the next two together, the third is small. There is no secondary branch. The anterior foot-jaw is in the form of an elongate curved spine, having a dilated base and a long slender extremity; it resembles in form and marginal pectination the anterior foot-jaw of *Lichomolgus liber*. Posterior foot-jaw three-jointed, similar to that of *L. thorellii*. Second joint dilated and bearing two slender spines; the last joint smaller, with two stout terminal spines, one of which is setose. The first three pairs of swimming feet as in *L. liber*, the inner branch of the fourth pair two-jointed, the second joint twice as long as the first. The foot of the fifth pair consists of a stout cylindrical joint bearing two elongate terminal hairs, which are articulated near the base; ovisacs two. No male has been observed.

Habitat.—Off St Monans, Firth of Forth. Rare.

* *Concinnus*, neat.

Lichomolgus arenicolus, Brady.

1872. *Boeckia arenicola*, Brady, 'Nat. Hist. Trans. Northumb. 'and Durham,' vol. iv. p. 430.
1880. *Lichomolgus arenicolus, idem.*, 'Brit. Copep.,' vol. iii. p. 46, pl. lxxxvii. fig. 1–7.

Habitat.—Off St Monans, Firth of Forth. One specimen only of this fine and distinct species was obtained. It occurred among material dredged in about 14 fathoms water; bottom, clean sand.

Cyclopicera gracilicauda, Brady.

1880. *Cyclopicera gracilicauda*, Brady, *loc. cit.*, vol. iii. p. 58, pl. lxxxiii. figs. 1–10.

Habitat.—Off St Monans, Firth of Forth. Several specimens were obtained among dredged material. This was readily recognised by the slender abdomen and long caudal stylets. It appears to be a somewhat rare species.

PARASITA.

Family CHONDRACANTHIDÆ.

Chondracanthus zei, Delaroche.

1811. *Chondracanthus zei*, Delaroche, 'Nouv. Bull. des Sc. de la 'Soc. Philm.,' vol. ii. p. 270, t. 2, fig. 2.
1850. *Chondracanthus zei*, Baird, 'Brit. Entom.,' p. 327, pl. xxxv. fig. 1.

Habitat.—On the gills of a 'John Dory' (*Zeus faber*), caught in the vicinity of Largo Bay, Firth of Forth. Baird (*loc. cit.*) gives a very characteristic figure of this *Chondracanthus*. The arrangement of the numerous elongate appendages (they can scarcely be called spines as Baird describes them) which surround the parasite is such as to impart to it a somewhat handsome appearance. There does not appear to be any previous record of this species from the Firth of Forth.

Chrondracanthus merluccii, Holten.

From the skin of the branchial cavity of a Hake. *Merlucius vulgaris*, landed at Newhaven, February 1885.

AMPHIPODA.

Family GAMMARIDÆ.

Cressa dubia (Spence Bate) Pl. VIII. fig. 13.

1855. *Montagua dubia*, Spence Bate, 'Report Brit. Assoc.'
1857. *Danaia dubia, idem.*, 'Ann. and Mag. Nat. Hist.,' xix. p. 137.
1870. *Cressa schiodtei*, Boeck, 'Crust. Amph. bor et Arct.'

Habitat.—From a large 'root' of *Laminaria* brought up in the trawl-net at Station V., Firth of Forth, in February 1892. Several specimens were obtained. From what I can learn regarding this species it appears to be somewhat rare in the British seas. It was first obtained by Spence Bate among trawl refuse 'from near the Eddystone Lighthouse.' David Robertson records having taken it 'off stones and nest of *Lima hians*

'that were dredged in 7 to 8 fathoms west of Tan Bouy, Cumbrae,' and he adds, 'This was the only time I met with it.'*

In 'British Sessile-eyed Crustacea,' vol. i. p. 67, it is stated in the generic description of *Danaia* that the mandibles are 'destitute of a palpi-'form appendage.' That is not so. They possess an elongate three-jointed palp (fig.) which has somehow been overlooked by the author when preparing the description of the genus. The Rev. T. R. R. Stebbing in his valuable work on the Challenger Amphipoda, referring to this genus in a foot-note at p. 1671 (vol. xxix. of the Challenger Reports), points out that 'in 1849 'Milne Edwards and J. Haime, ("Comptes Rendus," t. xxix. p. 261), gave 'the name *Dania* to a genus of fossil Corals; this name they spell '*Danaia* in the general index to their Monograph of the British Fossil 'Corals, Palæont. Soc. vol. for 1854, published 1865. *Danaia*, Spence 'Bate, must therefore give way to the later Cressa, Boeck, with which a 'specimen of the type species recently obtained and dissected proves it to 'be certainly synonymous.' See also a foot-note at p. 747 of Mr Stebbing's work referred to above.

Halimedon parvimanus (Bate and Westwood).

1862. *Westwoodilla cæcula*, Bate, 'Cat. Amphip. Brit. Mus.,' p. 102.
1862. *Westwoodilla hyalina*, *idem*, *ibedem*, p. 103.
1863. *Œdiceros parvimanus*, Sp. Bate and Westwood, 'Brit. Sess.-'eyed Crust.,' vol. i. p. 161.
1870. *Halimedon Mülleri*, A. Boeck, 'Crust. Amphip. bor. et 'Arct.,' p. 89.
1889. *Halimedon parvimanus*, Norman, 'Ann. and Mag.,' S. 6, vol. iii, p. 455, pl. xx. figs. 10–14.

Habitat.—From trawl refuse from Station V., Firth of Forth, February 1892, and on one or two previous occasions from other parts of the Forth. This species seems to be rare in the Forth, as only one specimen at a time has been obtained. The Forth specimens agree very closely with the figures and description in the 'British Sessile-eyed Crustacea,' in having the Gnathopods distinctly subchelate, the rostrum strongly produced, the eye large and near the apex of the rostrum.

Pontocrates haplocheles (Grube).

1864. *Kroyeria haplocheles*, Grube, 'Die Insel Lussin und ihre 'Meeresfauna. Nach einen sech wöchentlichen aufenthalte ges-'childert, von Dr Adolph Eduard Grube.' Breslau, 1864.
1868. *Kroyera brevicarpa*, Bate and Westwood, 'Brit. Sess.-eyed 'Crust.,' vol. ii. p. 508.
1870. *Pontocrates haplocheles*, Boeck, 'Crust. Amphip. bor. et Arct.'

Habitat.—Largo Bay, dredged 1889. One specimen only of this apparently rare amphipod was obtained. In this species the first Gnathopods are short and comparatively broad, and the produced part of the carpus terminates in a distinct finger-like process. The propodos of the second Gnathopods are long and slender; the lower angle of the carpus is very little produced, which thus differs from other British species of *Pontocrates* that have the lower angle of the carpus of the second Gnathopods produced as far as, or beyond, the extremity of the propodos. In *Pontocrates haplocheles* the lower produced part of the propodos, which forms the palm of the *chela*, consists of two distinct portions, the outer or lower is much more slender than the other, and terminates in a slightly curved point a little beyond the end of the *chela*. This structure, which seems to be

* Amphipoda and Isopoda of the Clyde, p. 15 (1888).

indicated by the double line in the drawing of the second Gnathopod at p. 508 of the second vol. of 'Brit. Sess.-eyed Crust.,' can only be satisfactorily observed with a moderately high power of the microscope, as a $\frac{1}{4}$ or $\frac{1}{6}$ inch objective. This species has been taken at Banff by Thomas Edward.

Haustorius arenarius (Slabber).

1769. *Oniscus arenarius*, D. M. Slabber, 'Natuurkundige Verlus-
'tigingen behelzende microscopise Waarneemingen van in-*en*
'uitlandse water-en Land-Dieren, elf de Stukje,' pp. 92–96.
Te Haarlem (1769).

1775. *Haustorius arenarius*, P. L. S. Müller. A Translation into German (with Notes) of Slabber's work. Pub. Nürnberg.

1818. *Lepidactylis dytiscus*, T. Say, 'An Account of the Crust
'of the U.S.A.' (Jour. Acad. Nat. Sc. Phil.)

1825. *Pterygocera arenaria*, P. A. Latreille, 'Fam. nat. Reg.
'Animal.,' &c.

1851. *Bellia arenaria*, Spence Bate, 'Ann. and Mag. Nat. Hist.,' ser. 2, vol. vii. pp. 318–320, pl. xi. figs. 1–8; pl. x. fig. 10.

1854. *Sulcator arenarius*, *idem*, *ibidem*, vol. xiii. p. 504.

1863. *Sulcator arenarius*, Bate and Westwood, 'Brit. Sess.-eyed
'Crust.,' vol. i.

1880. *Lepidactylis arenarius*, S. J. Smith, 'Trans. Connecticut
'Acad.,' vol. iv. (July 1880).

1888. *Haustorius arenarius*, Stebbing, 'Report on the Amphipoda
'of the Challenger Expedition,' vol. xxix. (text, first half), p. 39. (Notes on Müller's translation of Slabber's work.)

Habitat.—Sandy shore east of Burntisland. This species seems to be rather uncommon within the Forth area. There does not appear to be any previous record of it from the Forth. I obtained it by digging up the sand down to 4 or 5 inches, and then passing the sand through a fine wire sieve. It 'has been taken near Falmouth by Dr Leach; at Moray 'Firth by the Rev. G. Gordon; on the coast of Cumberland by Mr 'Albany Hancock; and in Oxwick Bay by Mr Moggridge and Dr J. 'Gwyn Jeffreys.'* Mr David Robertson of Cumbrae records it as 'moderately common all round our sandy shores near low water, and 'taken most successfully by the sieve.'†

It will be observed from the references given that this pretty Amphipod has received a considerable amount of attention from authors. Rev. Mr Stebbing remarks (*loc. cit.*): 'The excellent name *Sulcator* might well 'have been allowed to stand, but since that has been displaced on grounds 'of priority, first by *Pterygocera* and then by *Lepidactylis*, it seems only 'just to go back a step farther to Müller's *Haustorius*.' I have adopted this very reasonable proposal.

Melphidippa (?) *spinosa* (Goes).

1865. *Gammarus spinosus*, Goes, 'Crust. Amphip. Spitsb.'

1870. *Melphidippa spinosa*, Boeck, 'Crust. Amphib. bor. et Arct.'

Habitat.—Firth of Forth, west of May Island, taken with tow-net fixed to the head of the beam trawl. This appears to be a rare species in the Firth of Forth. It somewhat resembles *Dexamine* or *Atylus*. The one or two specimens I have observed in the Forth were, when captured, of a bright red colour, but from some cause none of them were perfect.

* Amphipoda and Isopoda of the Clyde, p. 28 (1888).
† *Idem.*

Gammarus marinus, Leach.

1815. *Gammarus marinus*, Leach, 'Linn. Trans.,' vol. xi. p. 359.
1863. *Gammarus marinus*, Bate and Westwood, 'Brit. Sess.-eyed 'Crust.,' vol. i. p. 370.

Habitat.—Firth of Forth, inshore, in the vicinity of Culross. *Gammarus marinus* is easily distinguished by the very short inner ramus of the posterior pleiopoda. This species does not appear to have been previously recorded for the Forth, though it is not uncommon towards the head of the estuary, especially where there are sea-weeds between the tide marks.

Photis longicaudata (Bate and Westwood).

1863. *Eisciadus longicaudatus*, Bate and Westwood, 'Brit. Sess.-'eyed Crust.,' vol. i. p. 412.
1877. *Photis longicaudata*, Meinert, 'Crust. Isop. Amphip. et 'Decapoda Daniæ.'

Habitat.—Firth of Forth, off St Monans. Several specimens were obtained by dredging.

Family HYPERIIDÆ.

Parathemisto gracilipes (Norman).

1868. *Hyperia oblivia*, Bate and Westwood (non Kröyer), 'Brit. 'Sess.-eyed Crust.,' vol. ii. p. 16.
1869. *Hyperia gracilipes*, Norman, 'Report on dredging among the 'Shetland Islands (in Report of the 38th Meeting of the Brit. 'Assoc., 1868.' London 1869).
1887. *Parathemisto longipes*, Bovollius, 'Sytem. list of the Amphip. 'Hyperiidea' (Behang till K. svenska Vet.-Akhad. Handlingar. Band. 11, No. 16. Stockholm 1887).

Habitat.—Largo Bay. A number of specimens taken with tow-net. The specimens here ascribed to *Parathemisto gracilipes*, Norman, are small (4 to 5 mm.), apparently all ♂, and most of them with ova. They differ in several respects from *Parathemisto oblivia*, Kröyer, and particularly in the carpus of the second Gnathopods being much less produced inferiorly,—the carpal process being only about one-third of the length of the propodos;—and in the pereiopods being less slender and not so elongate proportionally. Rev. T. R. R. Stebbing, who kindly examined one or two specimens for me, writes:—'The Small Hyperid is apparently *Parathemisto gracilipes*, Norman, wrongly described and named *Hyperia oblivia*, Kröyer, in B. and W.'

Euthemisto compressa (Goes).

1865. *Themisto compressa*, Goes, 'Øfvers. af Kgl. Svenska Vetensk 'Akad. førhandl.,' p. 533, pl. xli. fig. 34.
1870. *Parathemisto compressa*, Boeck, 'Crust. Amph. bor. et Arct.' (Særskilt aftryht af Vidensk. Selsk. Forhandlinger).
? 1878. *Lestrigonus spinidorsalis*, Sp. Bate, 'Ann. and Mag. Nat. 'Hist.' (May 1878), p. 411, fig. 2.
1890. *Euthemisto compressa*, G. O. Sars, 'Crustacea of Norway,' vol. i. p. 12, pl. v. fig. 2.

Habitat.—West of May Island, February 1892. This species was obtained among tow-net material collected when trawling Station V. Attention was first drawn to it by its larger size and darker colour than *Parathemisto oblivio*. It is readily distinguished by the body being much compressed, by the dorsum being distinctly keeled, and by the two last segments of the percion and the two first of the pleon being produced

posteriorly in the median dorsal line into more or less sharp tooth-like processes. The posterior pleopods have the outer ramus much shorter than the inner.

The name *Euthemisto* was established by Dr Bovallius in 1887 to replace *Themisto*, Guiérin (1828), which was pre-occupied. Professor G. O. Sars describes three species of *Euthemisto* as belonging to the Norwegian Fauna.

Rev. Mr Stebbing suggests that the *Lestrigonus spinidorsalis*, Spence Bate, from the Aberdeenshire coast, and recorded in the *Annals and Magazine of Natural History* for May 1878, is the *Euthemisto compressa* (Goes). There seems to be little doubt that Mr Stebbing's suggestion is correct.

Zoantharia.

Cerianthus lloydii (Gosse).

Habitat.—Off St Monans, in about 14 fathoms water; bottom clean, but not very fine sand. Fragments consisting of the head and tentacles of this sea anemone have been obtained on one or two occasions among sand dredged at the locality mentioned. I have obtained the same species at extreme low water in Rothesay Bay near the Royal Aquarium, but in this case also it was only the head part. The difficulty of capturing a whole specimen is indicated by the following remarks of Mr Robertson of Millport—'It must be approached with the greatest caution, and a spade 'or other such implement placed in the gentlest manner 4 or 5 inches 'from the spot where it is, and when all is ready, drive the spade suddenly 'in beneath it, cutting off its escape by passing through the tube. If the 'animal takes the alarm before the thrust is made, I should say, speaking 'from my own experience, that it is almost hopeless to follow up the 'pursuit.'* The one or two fragments obtained off St Monans evidently show that the dredge in passing through the sand had come upon the creatures unawares and cut their heads off.

Additional Notes.

Lichomolgus agilis, n. sp.

A species of *Lichomolgus*, apparently new, and of which a description with figures is being prepared for publication by my son, Andrew Scott, and myself, has been found living inside the siphons, and between the branchial folds and the body of the common cockle (*Cardium edule*). My son first discovered the *Lichomolgus* a short time ago, while examining some cockles from Morecambe Bay, Lancashire; more recently we have obtained the same Copepod also in specimens of the common cockle from the neighbourhood of Cramond Island, Firth of Forth. This Copepod agrees with *Lichomolgus litoralis* and one or two others in having the inner branches of the first four pairs of swinging feet all three-jointed, but differs from any species known to us in several important points. It is very active (hence the specific name we have provisionally adopted) and transparent. If a cockle be opened in such a way that a portion of the contained water will remain within the hollow of the opened valves of the shell, specimens of the *Lichomolgus* may be observed darting hither and thither with great rapidity, their presence being in many cases only rendered apparent by the dark coloured line of the alimentary tract. The ovisacs are very large—about half the length of the animal; the

* 'On the Sea Anemones of the Shores of the Cumbraes' (*Proc. Nat. Hist. Soc. of Glasgow*, vol. ii. pp. 24-30).

inner margin of the ovisacs is nearly straight, the outer margin forms a flat but more or less regular curve; they contain numerous, moderately large ova, and, as a considerable number of the Copepods are females, we find, what in such circumstances might be expected, that the species is a comparatively common one,—we have obtained as many as sixteen specimens from a single cockle.

The fact that this *Lichomolgus* has been obtained in cockles from the coast of Lancashire and from the Firth of Forth, and that most of the cockles examined were infested with the Copepod, seems to imply that it is a generally distributed species; if this be so, it may then be of interest to inquire further, whether (*a*) the *Lichomolgus* is found at particular seasons or all the year round, (*b*) as a semi-parasite or as commensal only, (*c*) if its presence has any connection with a healthy or unhealthy condition of the mollusc. Though Copepods, when present in more or less abundance in fresh water, may, in some cases, be rightly considered as 'danger signals,' they are in themselves innoxious, and their presence, though sometimes in considerable numbers, in the cockles, may after all be no indication of hurtful conditions.

Cyclopicera nigripes, Brady and Robertson.

This handsome species has only recently been observed within the Forth area. It was obtained by washing a quantity of Zoophytes brought up in the trawl-net while working some miles east of May Island. This is readily distinguished from other species of *Cyclopicera* by its large size and by the dark colour of the foot-jaws and swimming feet. Dr Brady records its occurrence from several places of the North East Coast of England, Shetland (Norman), the Firth of Clyde, and from Lough Swilly, Ireland. I have taken it in Cromarty Firth and in East Loch Tarbert (Loch Fyne).

Thysanoessa borealis (G. O. Sars).

This Schizopod has been taken in several parts of the Forth area. I am indebted to Rev. A. M. Norman for the name of the species. He also informs me that among a few Schizopoda sent to him, including the *Thysanoessa*, was what he considers to be a specimen of *Nematocelis megalops* (G. O. Sars.), but it wanted the long slender first pair of legs, which had become detached, and which form one of the chief distinctive characters of the species. The eyes of *Thysanoessa* and *Nematocelis* are distinctly constricted near the middle, so that they appear to consist of an under and upper eye, and this character enables them to be readily distinguished from *Boreophausia* and *Nyctiphanes*.

DESCRIPTION OF THE PLATES.

PLATE VII.

Stephos minor, nov. gen. et. sp.

Fig. 1.	Female, dorsal view,	magnified	80 diameters.
Fig. 2.	Anterior Antenna,	,,	130 ,,
Fig. 3.	Posterior Antenna,	,,	130 ,,
Fig. 4.	Mandible and palp,	,,	253 ,,
Fig. 5.	Anterior foot-jaw,	,,	253 ,,
Fig. 6.	Posterior foot-jaw,	,,	253 ,,
Fig. 7.	Foot of first pair,	,,	190 ,,
Fig. 8.	Foot of second pair,	,,	190 ,,
Fig. 9.	Foot of fourth pair,	,,	190 ,,
Fig. 10.	Fifth pair of feet—female,	,,	380 ,,
Fig. 11.	Fifth pair of feet—male,	,,	190 ,,
Fig. 12.	Abdomen of female,	,,	130 ,,
Fig. 13.	Abdomen of male,	,,	130 ,,

Acartia bifilosus (Giesbrecht).

Fig. 14.	Foot of fifth pair—female,	magnified	253 diameters.

Pseudocyclopia crassicornis, nov. gen. et. sp.

Fig. 15.	Female, lateral view,	magnified	80 diameters.
Fig. 16.	Anterior antenna,	,,	380 ,,
Fig. 17.	Posterior antenna,	,,	190 ,,
Fig. 18.	Mandible,	,,	253 ,,
Fig. 19.	Mandible palp,	,,	253 ,,
Fig. 20.	Anterior foot-jaw,	,,	500 ,,
Fig. 21.	Posterior foot-jaw.	,,	253 ,,
Fig. 22.	Foot of first pair,	,,	190 ,,
Fig. 23.	Foot of second pair,	,,	190 ,,
Fig. 24.	Foot of third pair,	,,	190 ,,
Fig. 25.	Fifth pair of feet—female,	,,	380 ,,
Fig. 26.	Fifth pair of feet—male,	,,	253 ,,
Fig. 27.	Abdomen of female,	,,	95 ,,
Fig. 28.	Abdomen of male,	,,	95 ,,
Fig. 29.	Spermatophore,	,,	190 ,,

PLATE VIII.

Pseudocyclopia minor, nov. gen. et. sp.

Fig. 1.	Female, lateral view,	magnified	180 diameters.
Fig. 2.	Anterior antenna,	,,	500 ,,
Fig. 3.	Posterior antenna,	,,	380 ,,
Fig. 4.	Foot of first pair,	,,	380 ,,
Fig. 5.	Foot of third pair,	,,	380 ,,
Fig. 6.	Foot of fourth pair,	,,	380 ,,
Fig. 7.	Fifth pair of feet—female,	,,	760 ,,
Fig. 8.	Fifth pair of feet—male,	,,	380 ,,
Fig. 9.	Abdomen of female,	,,	190 ,,
Fig. 10.	Abdomen of male,	,,	190 ,,

? *Tetragonicaps maleolata*, Brady.

Fig. 11.	Anterior antenna—female,	magnified	253 diameters.
Fig. 12.	Foot of fifth pair—female,	,,	380 ,,

Cressa dubia (Spence Bate).

Fig. 13.	Mandible and palp,	magnified	253 diameters.

Tachidius crassicornis, nov. sp.

Fig. 14. Female, lateral view, ... magnified 80 diameters.
Fig. 15. Male and female—lateral view, . . ,, 80 ,,
Fig. 16. Anterior antenna—female, . . . ,, 380 ,,
Fig. 17. Anterior antenna—male, . . . ,, 380 ,,
Fig. 18. Posterior antenna, ... ,, 380 ,,
Fig. 19. Mandible and palp, ... ,, 500 ,,
Fig. 20. Maxilla, ... ,, 500 ,,
Fig. 21. Anterior foot-jaw, ... ,, 760 ,,
Fig. 22. Posterior foot-jaw, ... ,, 500 ,,
Fig. 23. Foot of first pair, ... ,, 380 ,,
Fig. 24. Fifth pair of feet—female (minus lateral seta on one side), 500 ,,
Fig. 25. Foot of fifth pair, male, . . . ,, 1000 ,,
Fig. 26. Appendage to first abdominal segment—male, . ,, 1000 ,,
Fig. 27. Last abdominal segment and caudal stylets, . ,, 190 ,,

Plate IX.

Ameira longicaudata, nov. sp.

Fig. 1. Female, lateral view, ... magnified 53 diameters
Fig. 2. Anterior antenna, female, . . . ,, 126 ,,
Fig. 3. Anterior antenna, male, . . . ,, 126 ,,
Fig. 4. Posterior antenna, ... ,, 190 ,,
Fig. 5. Mandible and palp, ... ,, 380 ,,
Fig. 6. Maxilla . . . . . ,, 380 ,,
Fig. 7. Anterior foot-jaw, ... ,, 380 ,,
Fig. 8. Posterior foot-jaw, ... ,, 400 ,,
Fig. 9. Foot of first pair, ... ,, 190 ,,
Fig. 10. Foot of third pair, ... ,, 190 ,,
Fig. 11. Foot of fourth pair, ... ,, 126 ,,
Fig. 12. Foot of fifth pair—female, . . . ,, 250 ,,
Fig. 13. Foot of fifth pair—male, . . . ,, 250 ,,
Fig. 14. Appendage of first abdominal segment—male, . ,, 250 ,,
Fig. 15. Part of abdomen, and caudal stylets, . . ,, 95 ,,
Fig. 16. Posterior margin of abdominal segment, . ,, 380 ,,
Fig. 17. Female, lateral view—variety, . . . ,, 53 ,,
Fig. 18. One of the abdominal segments—variety, . ,, 190 ,,

Tetragoniceps bradyi, nov. sp.

Fig. 19. Female, lateral view, ... magnified 80 diameters.
Fig. 20. Anterior antenna, ... ,, 250 ,,
Fig. 21. Posterior antenna, ... ,, 190 ,,
Fig. 22. Mandible and palp, ... ,, 250 ,,
Fig. 23. Maxilla, ... ,, 380 ,,
Fig. 24. ? Mouth, ... ,, 190 ,,
Fig. 25. Anterior foot-jaw, ... ,, 380 ,,
Fig. 26. Posterior foot-jaw, ... ,, 380 ,,
Fig. 27. Foot of first pair, ... ,, 190 ,,
Fig. 28. Foot of third pair, ... ,, 190 ,,
Fig. 29. Foot of fourth pair, ... ,, 190 ,,
Fig. 30. Foot of fifth pair, ... ,, 190 ,,
Fig. 31. Abdomen and caudal stylets . . . ,, 90 ,,
Fig. 32. One of the caudal stylets . . . ,, 250 ,,

Plate X.

? *Lichomolgus littoralis*, nov. sp. ♂

Fig. 1. Anterior antenna, ... magnified 126 diameters.
Fig. 2. Posterior antenna, ... ,, 126 ,,
Fig. 3. Mandible, ... ,, 190 ,,
Fig. 4. Maxilla. 4 *a*. Anterior foot-jaw, . . ,, 190 ,,
Fig. 5. Posterior foot-jaw, ... ,, 190 ,,
Fig. 6. Foot of first pair (inner branch minus last joint), ,, 126 ,,
Fig. 7. Foot of fourth pair, ... ,, 126 ,,
Fig. 8. Foot of fifth pair, ... ,, 280 ,,
Fig. 9. Abdomen and caudal stylets . . . ,, 190 ,,

Cletodes lata, nov. sp. ♀

Fig. 10. Female, dorsal view, ... magnified 80 diameters.
Fig. 11. Anterior antenna, ... ,, 380 ,,
Fig. 12. Posterior antenna, ... ,, 500 ,,
Fig. 13. Mandible and palp, ... ,, 760 ,,
Fig. 14. Posterior foot-jaw, ... ,, 500 ,,
Fig. 15. Foot of first pair, ... ,, 380 ,,
Fig. 16. Foot of third pair, ... ,, 380 ,,
Fig. 17. Foot of fifth pair, ... ,, 250 ,,
Fig. 18. Foot of fifth pair—variety, . . . ,, 250 ,,

Tetragoniceps macronyx, nov. sp.

Fig. 19. Female, lateral view, ... magnified 160 diameters.
Fig. 20. Anterior antenna—female, . . . ,, 250 ,,
Fig. 21. Anterior antenna—male, . . . ,, 250 ,,
Fig. 22. Posterior antenna, ... ,, 760 ,,
Fig. 23. Anterior foot-jaw, ... ,, 500 ,,
Fig. 24. Posterior foot-jaw, ... ,, 250 ,,
Fig. 25. Foot of first pair, ... ,, 380 ,,
Fig. 26. Foot of fourth pair, ... ,, 190 ,,
Fig. 27. Foot of fifth pair—female, . . . ,, 500 ,,
Fig. 28. Foot of fifth pair—male, . . . ,, 500 ,,

Plate XI.

Laophonte inopinata, nov. sp.

Fig. 1. Female, lateral view, ... magnified 160 diameters.
Fig. 2. Male, dorsal view, ... ,, 160 ,,
Fig. 3. Anterior antenna—female, . . . ,, 500 ,,
Fig. 4. Anterior antenna—male, . . . ,, 500 ,,
Fig. 5. Posterior antenna, ... ,, 500 ,,
Fig. 6. Anterior foot-jaw, ... ,, 500 ,,
Fig. 7. Posterior foot-jaw, ... ,, 500 ,,
Fig. 8. Foot of first pair, ... ,, 380 ,,
Fig. 9. Foot of third pair, ... ,, 500 ,,
Fig. 10. Foot of fifth pair . . . . ,, 380 ,,
Fig. 11. One of the caudal stylets . . . . ,, 250 ,,
Fig, 12. One of the body segments, . . . ,, 500 ,,

Thalestris harpactoides, Claus.

Fig. 13. Posterior foot-jaw, ... magnified 250 diameters.
Fig. 14. Foot of first pair, ... ,, 190 ,,
Fig. 15. Foot of second pair—male, . . . ,, 190 ,,
Fig. 16. Foot of fifth pair—male, . . . ,, 125 ,,

Cylindropsyllus minor, nov. sp.

Fig. 17. Female, dorsal view, ... magnified 80 diameters.
Fig. 18. Anterior antenna, ... ,, 250 ,,
Fig. 19. Posterior foot-jaw, ... ,, 760 ,,
Fig. 20. Foot of first pair, ... ,, 380 ,,
Fig. 21. Foot of second pair, ... ,, 380 ,,
Fig. 22. Foot of third pair, ... ,, 380 ,,
Fig. 23. Foot of fourth pair, ... ,, 380 ,,
Fig. 24. Foot of fifth pair, ... ,, 190 ,,

Lichomolgus concinnus, nov. sp.

Fig. 25. Female, dorsal view, ... magnified 60 diameters.
Fig. 26. Anterior antenna, ... ,, 190 ,,
Fig. 27. Posterior antenna, ... ,, 190 ,,
Fig. 28. Anterior foot-jaw . . . . ,, 500 ,,
Fig. 29. Posterior foot-jaw, ... ,, 500 ,,
Fig. 30. Foot of first pair, ... ,, 125 ,,
Fig. 31. Foot of fourth pair, ... ,, 125 ,,
Fig. 32. Foot of fifth pair, ... ,, 500 ,,
Fig. 33. Abdomen and caudal stylets, . . . ,, 195 ,,

Plate XII.

Tetragoniceps incertus, nov. sp.

Fig. 1. Female, lateral view, ... magnified 80 diameters.
Fig. 2. Male, dorsal view, ... ,, 80 ,,
Fig. 3. Anterior antenna, female, . . . ,, 250 ,,
Fig. 4. Anterior antenna, male, . . . ,, 250 ,,
Fig. 5. Posterior antenna, ... ,, 760 ,,
Fig. 6. Mandible and palp, ... ,, 380 ,,
Fig. 7. Maxilla, ... ,, 380 ,,
Fig. 8. Anterior foot-jaw . . . . ,, 500 ,,
Fig. 9. Posterior foot-jaw, ... , 500 ,,
Fig. 10. Foot of first pair, ... ,, 380 ,,
Fig. 11. Foot of second pair—female, . . . ,, 380 ,,
Fig. 12. Foot of second pair—male, . . . ,, 380 ,,
Fig. 13. Foot of third pair—female, . . . ,, 380 ,,
Fig. 14. Foot of third pair—male, . . . ,, 380 ,,
Fig. 15. Foot of fourth pair, ... ,, 380 ,,
Fig. 16. Fifth pair of feet—female, . . . ,, 380 ,,
Fig. 17. Foot of fifth pair—male, . . . ,, 380 ,,

Paramesochra dubia.

Fig. 18. Female, dorsal view, ... magnified 125 diameters.
Fig. 19. Male, dorsal view, ... ,, 125 ,,
Fig. 20. Anterior antenna, female, . . . ,, 500 ,,
Fig. 21. Anterior antenna, male, . . . ,, 500 ,,
Fig. 22. Posterior antenna, ... ,, 760 ,,
Fig. 23. Mandible, ... ,, 760 ,,
Fig. 24. Mandible palp, ... ,, 760 ,,
Fig. 25. Maxilla, ... ,, 500 ,,
Fig. 26. Anterior foot-jaw, ... ,, 760 ,,
Fig. 27. Posterior foot-jaw, ... ,, 760 ,,
Fig. 28. Foot of first pair, ... ,, 500 ,,
Fig. 29. Foot of second pair, ... ,, 500 ,,
Fig. 30. Foot of fourth pair, ... ,, 500 ,,
Fig. 31. Foot of fifth pair—female, . . . ,, 500 ,,
Fig. 32. Foot of fifth pair—male, . . . ,, 500 ,,

Plate XIII.

Cylindropsyllus lævis, Brady.

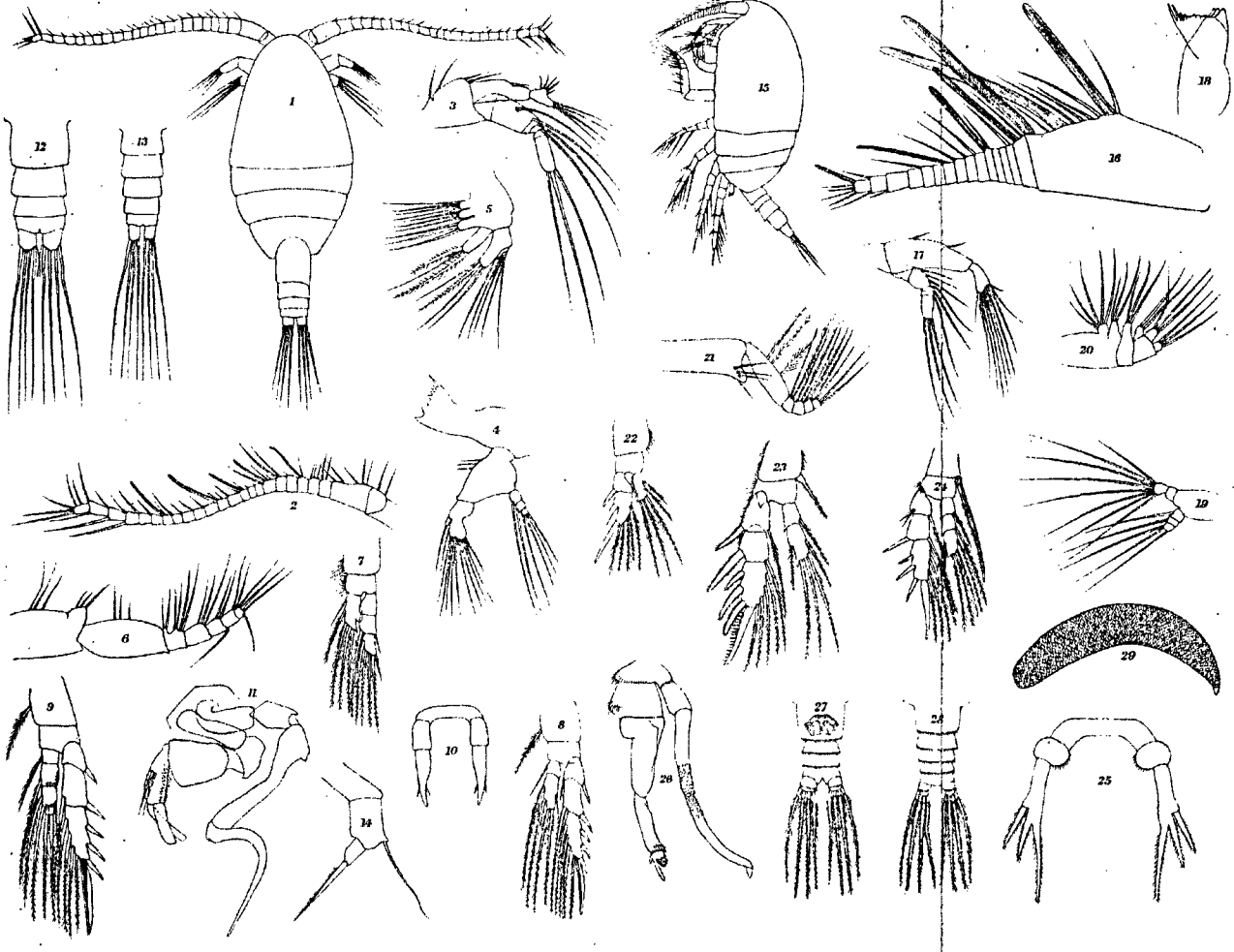
Fig. 1. Female, lateral view, ... magnified 80 diameters.
Fig. 2. Male, lateral view, ... ,, 80 ,,
Fig. 3. Anterior antenna—female, . . . ,, 250 ,,
Fig. 4. Anterior antenna—male, . . . ,, 250 ,,
Fig. 5. Posterior antenna, ... ,, 250 ,,
Fig. 6. Mandible and palp, ... ,, 500 ,,
Fig. 7. ? Maxillæ and mouth, ... ,, 500 ,,
Fig. 8. ? Rabium, ... ,, 500 ,,
Fig. 9. Anterior foot-jaw, side view, . . . ,, 760 ,,
Fig. 10. ,, ,, front view, . . . ,, 570 ,,
Fig. 11. Posterior foot-jaw, ... ,, 500 ,,

Fig. 12. Foot of first pair, ... magnified 250 diameters.
Fig. 13. Foot of second pair—male, . . . ,, 250 ,,
Fig. 14. Foot of third pair—male, . . . ,, 250 ,,
Fig. 15. Foot of fifth pair—female, . . . ,, 500 ,,
Fig. 16. Foot of fifth pair—male, . . . ,, 380 ,,
Fig. 17. Appendage of first abdominal segment—male, . ,, 380 ,,
Fig. 18. Structure of carapace, highly magnified.

Neobradya pectinifer, nov. gen. et. sp.

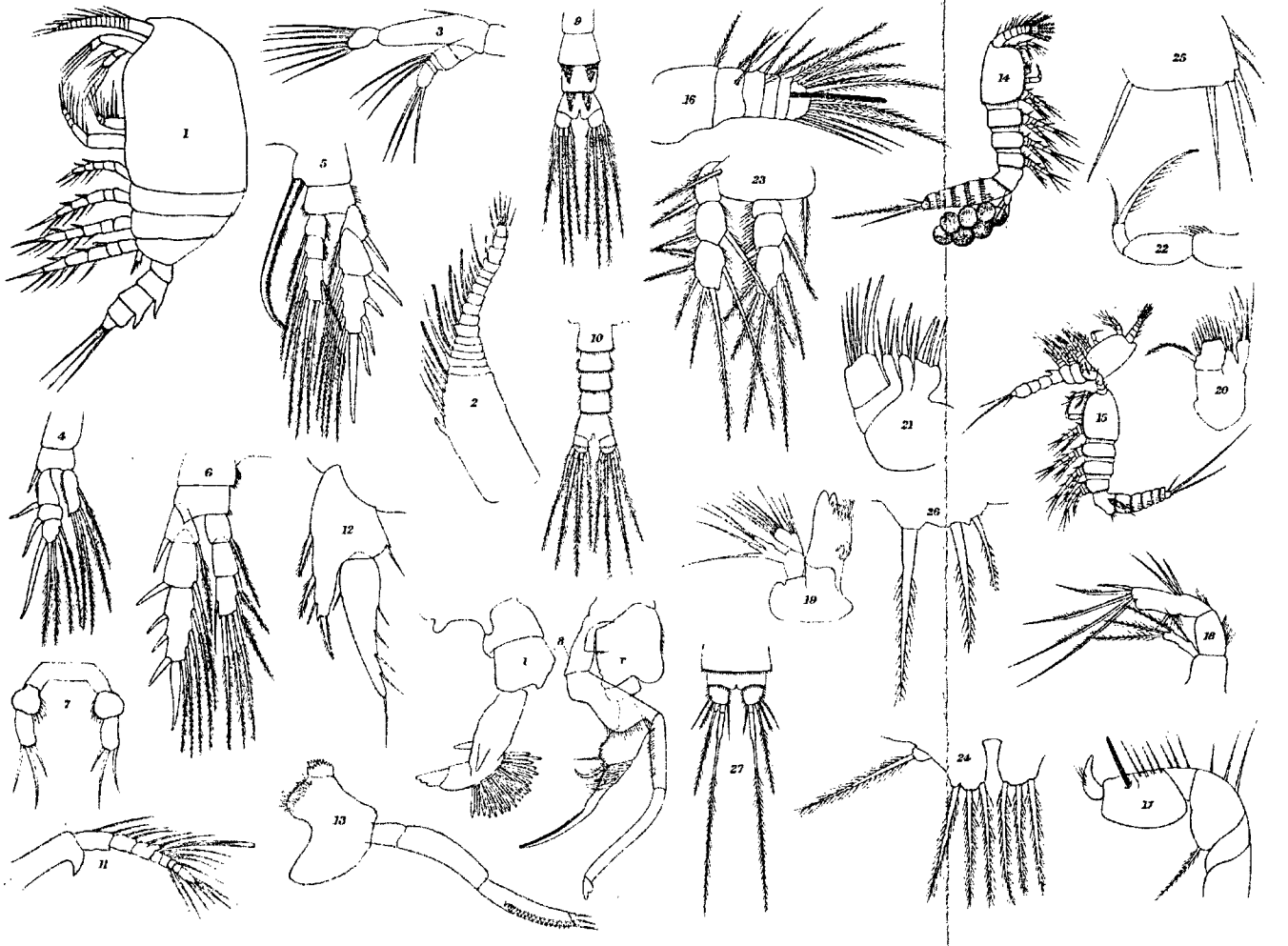
Fig. 19. Male, dorsal view, ... magnified 53 diameters.
Fig. 20. Female, lateral view, . . . ,, 53 ,,
Fig. 21. Anterior antenna—female, . . . ,, 190 ,,
Fig. 22. Anterior antenna—male, . . . ,, 190 ,,
Fig. 23. Posterior antenna, ... ,, 380 ,,
Fig. 24. Mandible and palp, ... ,, 190 ,,
Fig. 25. Maxilla, ... ,, 340 ,,
Fig. 26. Anterior foot-jaw, ... ,, 340 ,,
Fig. 27. Posterior foot-jaw, ... ,, 510 ,,
Fig. 28. Foot of first pair, ... ,, 225 ,,
Fig. 29. Foot of second pair, ... ,, 225 ,,
Fig. 30. Foot of fourth pair, ... ,, 225 ,,
Fig. 31. Foot of fifth pair—female, . . . ,, 340 ,,
Fig. 32. Foot of fifth pair—male, . . . ,, 340 ,,

PLATE VII.



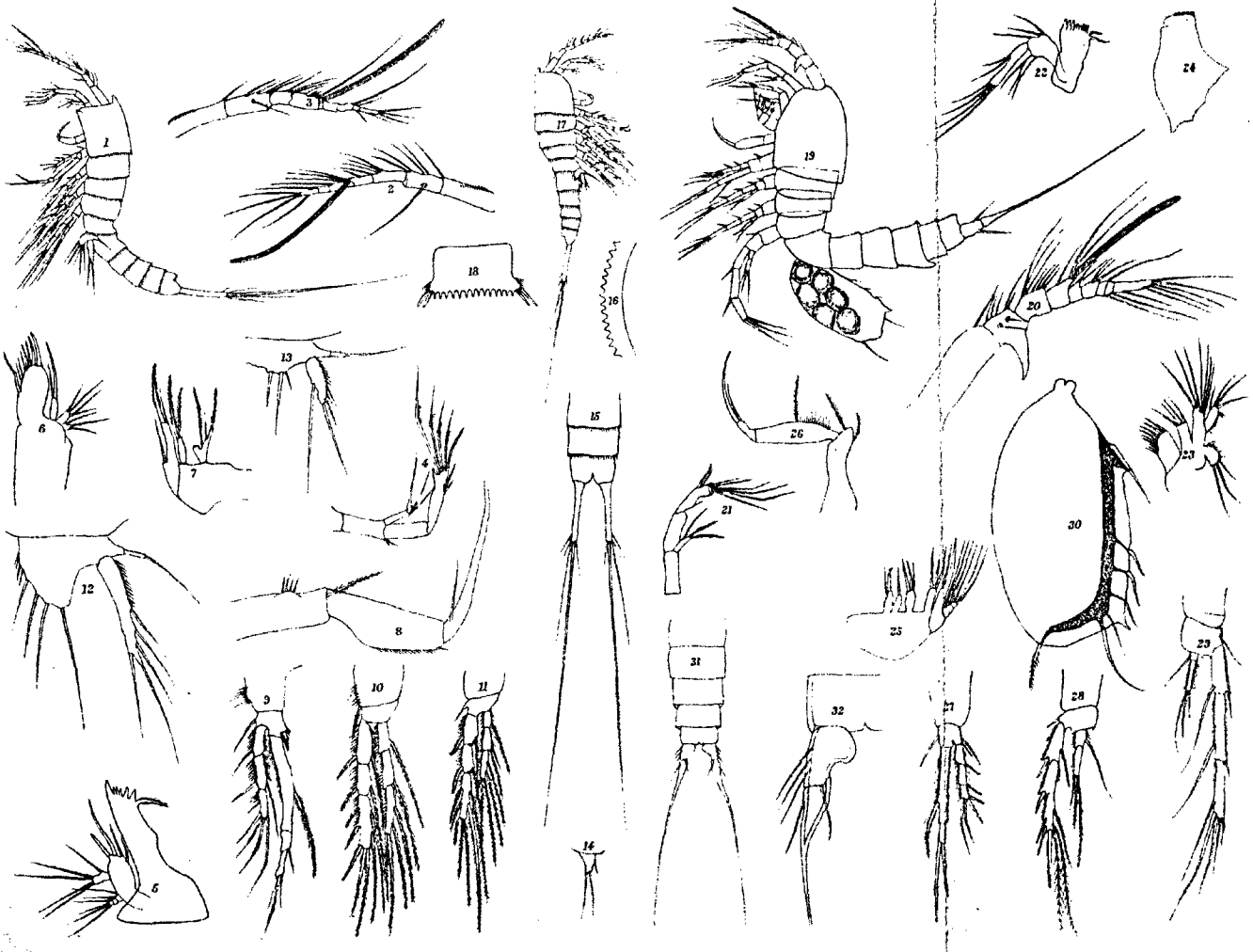
Andrew Scott, del. ad nat.

Figs. 1 12.—Stephos minor, *nov. gen. et sp.* Fig. 14.—Acartia bifilosus (*Giesbrecht*). Figs. 15 29.—Pseudocyclopia crassicornis, *nov. gen. et sp.*



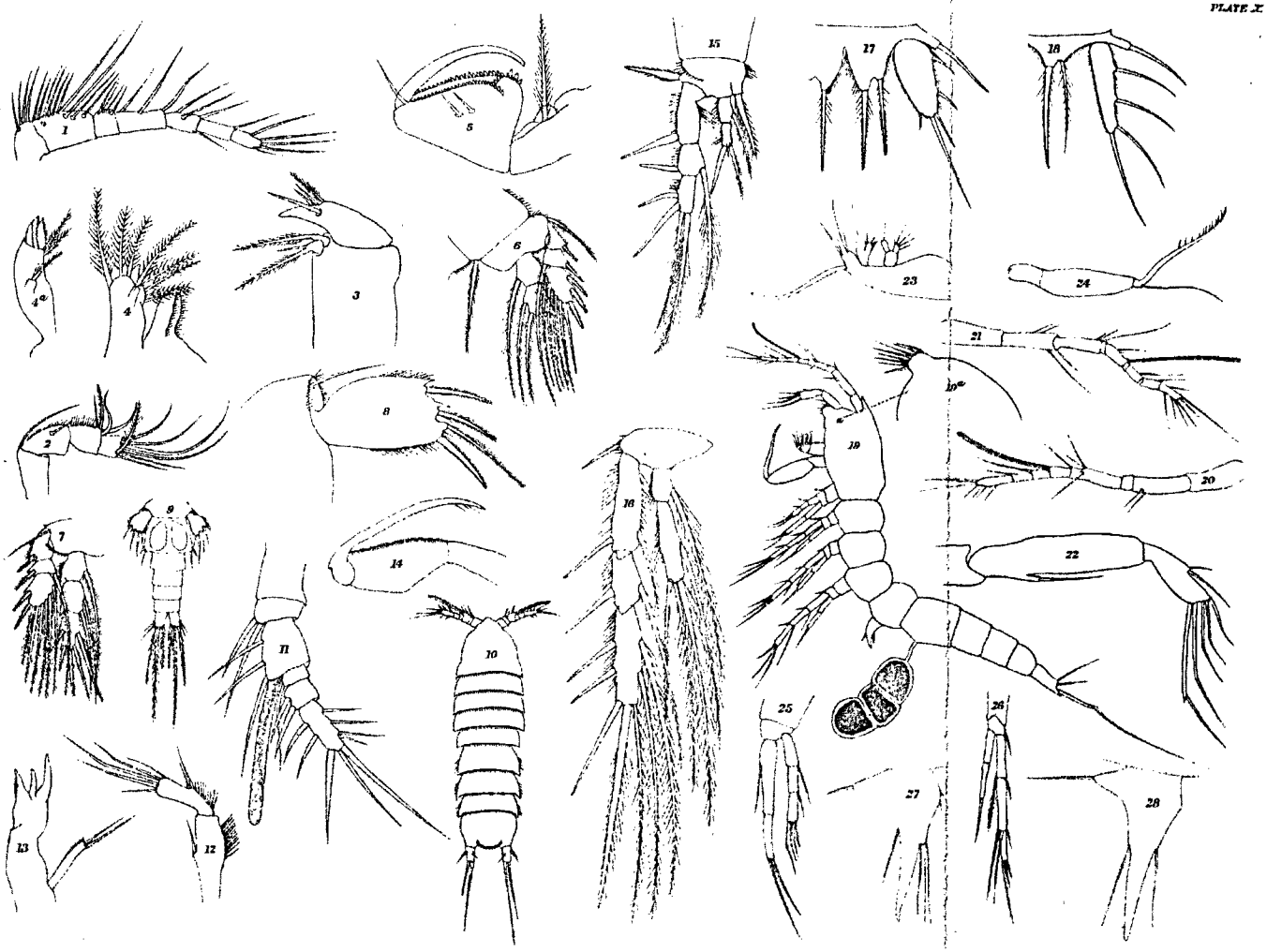
Andrew Scott, del. ad nat.

Figs. 1–10.—Pseudocyclopia minor, *nov. gen. et sp.* Figs. 11, 12.—? Tetragoniceps maleolata (*Brady*). Fig. 13.—Cressa dubia (*Spence Bate*). Figs. 14–27.—Tachidius crassicornis, *nov. sp.*



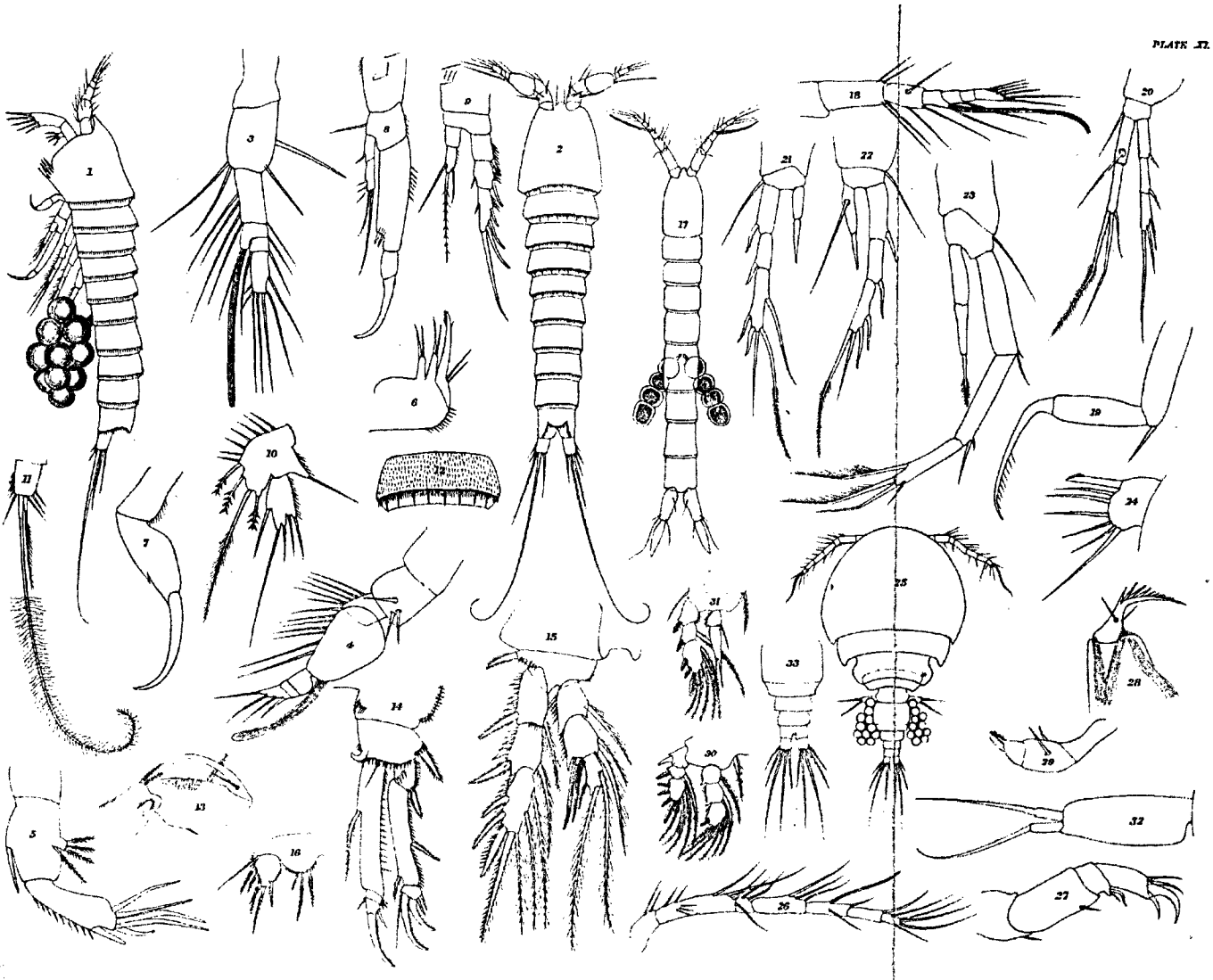
Andrew Scott, del. ad nat.

Figs. 1 18.—Ameira longicaudata, nov. sp. Figs. 19 32.—Tetragonicops bradyi, nov. sp.



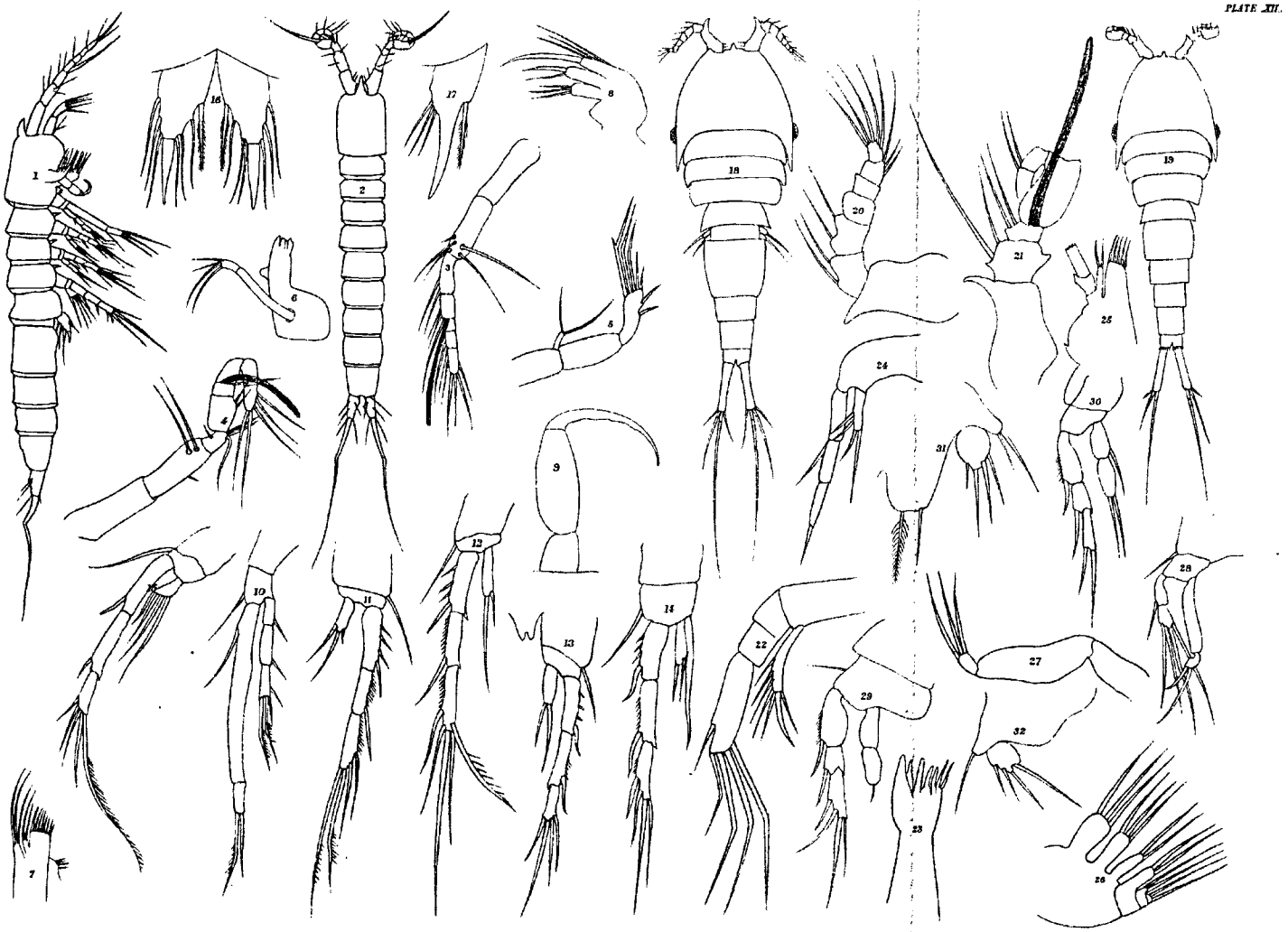
Andrew Scott, del. ad nat.

Figs. 1 9.—? Lichomolgus littoralis nov. sp. Figs. 10 18.—Cletodes lata, nov. sp. Figs. 19 28.—Tetragoniceps macronyx, nov. sp.



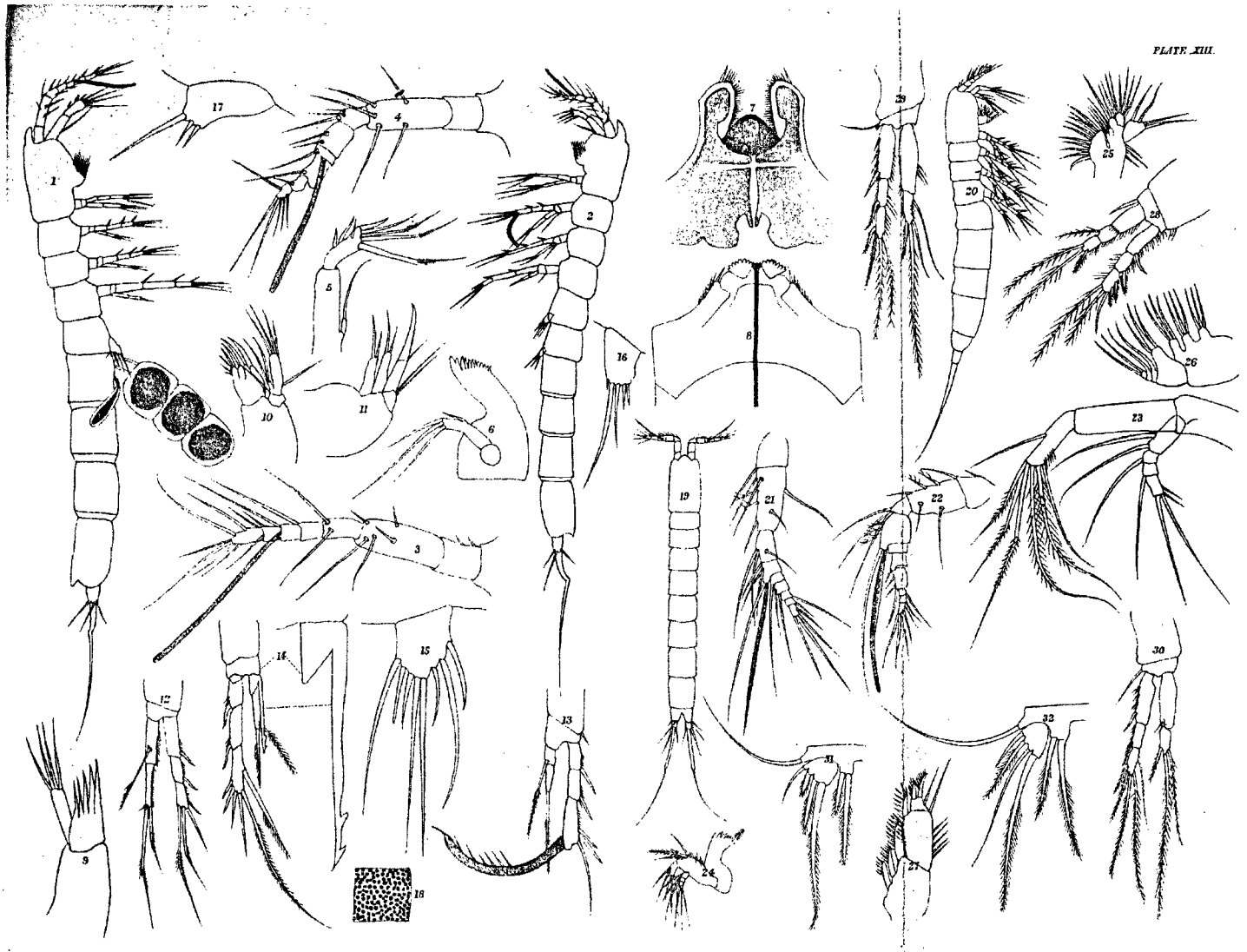
Andrew Scott, del. ad nat.

Figs. 1 12.—Laophonte inopinata, *nov. sp.* Figs. 13 16.—Thalestris harpactoides (Claus). Figs. 17 24.—Cylindropsyllus minor, *nov. sp.* Figs. 25 33.—Lichomolgus concinnus, *nov. sp.*



Andrew Scott, del. ad nat.

Figs. 1–17.—Tetragonicops incertus, *nov. sp.* Figs. 18–32.—Paramesochra dubia, *nov. gen. et sp.*



Andrew Scott, del. ad nat.

Figs. 1 16.—Cylindropsyllus laevis (*Brady*). Figs. 19 32.—Neobradya pectinifer, *nov. gen. et sp.*