1900

XI.—NOTES ON SOME GATHERINGS OF CRUSTACEA COLLECTED FOR THE MOST PART ON BOARD THE FISHERY STEAMER "GARLAND" AND EXAMINED DURING THE PAST YEAR (1899).

By Thomas Scott, F.L.S., Mem. Zool. Soc. de France.

(Plates XIII. and XIV.)

The following "Notes" are intended to supplement a somewhat similar series published in Part III. of the *Seventeenth Annual Report*. These notes deal entirely with the Crustacea, and refer to species that have been observed in various gatherings of tow-net and dredged materials examined during the past year, and collected for the most part on board the "Garland." The majority of the species referred to have been obtained in gatherings collected in Loch Fyne and in the seaward portion of the Firth of Clyde, but a few are also from other parts of the Scottish coasts; moreover, with the exception of one or two brackish-water forms those recorded are all marine species.

A few of the copepods mentioned in the sequel are apparently undescribed, but most of the other forms have already been recorded. Further information concerning these has, however, been obtained bearing on their structural details or on the distribution of the species, which it will be of interest to notice.

My son, Mr. Andrew Scott (assisted by Mrs. Scott), has prepared drawings to illustrate where necessary the various objects described. Several forms other than those mentioned in the sequel have had to stand over, but these will be described later.

Copepoda.

Eucalanus crassus, Giesbrecht.

1888. *Eucalanus crassus*, Giesb., Atti Acc. Lincei, Rend. (4), vol. iv,, sem. 2, p. 333.

A considerable number of specimens of this species were obtained in a bottom tow-net* gathering collected in Dornoch Firth, November 19th, 1898. The depth at which the tow-net was worked varied from 8 to 16 fathoms. A large proportion of the specimens obtained were more or less immature. This *Eucalanus* has been obtained in the Moray Firth district on several occasions during the past few years, but it was apparently more frequent in the present gathering than in any of those previously examined. It is somewhat difficult to distinguish the immature forms of the species, but the adults are comparatively easily distinguished. When it is remembered that the distribution of *Eucalanus crassus* extends south as far at least as the Gulf of Guinea, its presence in the Moray Firth from time to time is of more than usual interest.

* What is here called the "bottom tow-net" is the tow-net that is fastened to the trawl-head in such a way that when the trawl is working the tow-net just clears the sea-bottom.

pp. 384–407

Eucalanus elongatus (Dana).

1849. *Calanus elongatus*, Dana, Proc. Amer. Acad., vol. ii, p. 18.

A single specimen—a female—was obtained in the same gathering with the last. This is a larger species than *Eucalanus crassus*; the specimen referred to here measured fully 6mm. in length (about a quarter of an inch). In this species the last thoracic segment has the sides produced posteriorly into short pointed processes. The presence of *Eucalanus elongatus* in the Moray Firth is also of interest as bearing on the question of the distribution of species. These copepods are probably carried into the estuary by regular tidal currents or by temporary currents set up by the wind, should it happen to blow from one particular direction for a more or less lengthened period.

Neither of the two species named have yet been observed in the Firth of Forth or the Firth of Clyde. These two estuaries, though extending for a considerable distance inland, are comparatively narrow, and the entrance to each is obstructed to some extent by an island; the Moray Firth, on the other hand, presents an extensive opening to the North Sea and narrows very gradually westwards. Such a difference in the general contour of these inlets has probably a more or less distinct influence on the distribution of their local faunas.

Paracalanus parvus (Claus).

1863. *Calanus parvus*, Claus, Die freileb. Copep., p. 173, Pl. XXVI., figs. 10–14; Pl. XXVII, figs. 1–4.

This small species has been observed in gatherings collected during the past year both in the Clyde and Loch Fyne, and usually in bottom tow-net gatherings. It was, for example, observed in a bottom-gathering from Station V. (Whiting Bay, Arran), collected September 8th, and in another from Station XVII. (near the head of Loch Fyne), collected September 29th.

Stephus fultoni, T. and A. Scott.

1898. *Stephus fultoni*, T. and A. Scott, Ann. and Mag. Nat. Hist. (7). vol. i., p. 185, Pl. X., figs. 1–8; Pl. II., figs. 1–4.

Stephus fultoni has apparently not yet been observed outside the Clyde area. It was first observed in 1896 in some material dredged in Kilbrennan Sound, and subsequently in a small gathering of crustacea collected near the Spit, Loch Fyne, in 1897. I have now to record its occurrence for the second time at this Loch Fyne Station; the material in which it was obtained on the present occasion was collected during the early part of this year (1899), and a few specimens only were observed. *Stephus fultoni*, which seems to be a rare species, is comparatively easily distinguished from the other members of the genus by the somewhat larger size of the female and by the male having the fifth thoracic feet conspicuous and furnished with horn-coloured processes.

Bradyidius armatus (Vanhöffen).

*1897. *Bradyanus armatus* (Vanhöffen in:) Chun, Arkt. antarkt. Plankton, p. 28.

It was pointed out in my "Notes" last year that *Bradyidius armatus* was one of the more widely diffused of the Clyde copepods, and that it was also occasionally observed on the East Coast. During the past year

* *Vide* Das Tierreich, p. 32.

it has again been observed in several of the gatherings sent to the Fishery Board's Laboratory from the Clyde. In 1897 a new genus was instituted for this copepod by Dr. W. Giesbrecht, of Naples, but it appears to be one of those species whose lot it is to undergo several removals ere it reaches its ultimate destination, as indicated by the following quotation from a work lately published by Herr. O. Nordgaard, entitled, "Report on Norwegian Marine Investigations, 1895–97." At page 21 of his report, Herr. Nordgaard refers to the species under consideration as follows:—

"In 'Undersögelser over Dyrelivet i Arktiske Fjorde' Herr Sparre Schneider has mentioned a copepod that is called *Undinopsis bradyi*, G. O. Sars. This species is said to have been found in Kvænangen and at Tromsö. In the summer of 1897 I showed Professor Sars a preparation of a copepod that I was unable to identify. He then declared it to be the very *Undinopsis bradyi*, and afterwards informed me in a letter that the said copepod had been described by Mr. Brady (Monograph of the Copepoda of the British Islands, i., p. 46, Pl. IV., figs. 1–11).

The species was, however, there wrongly identified with *Pseudocalanus armatus*, Boeck, which, according to Mr. Sars, is another species. As Mr. Sars in his gigantic revision of Norwegian Crustacea will soon come to the Copepoda, I shall do nothing but here note the occurrence of *Undinopsis bradyi* at the following places:—

March 14th, 1896, Vestfjord (67° 32·5′ N.; 130° 24·5′ E.) in Plankton 0·200m.

March 5th, 1897; Ostnes-fjord in Lofoten.

March 7th, 1897, Irold-fjord in Lofoten, Plankton 0·65m.

Besides, I have this year (1899) taken several specimens of the species in fjords near Bergen."

This note by Herr. Nordgaard is of interest, if for nothing else than the information he gives concerning the distribution of the species, but it also indicates that Professor Sars' designation is likely to take precedence over that of *Bradyidius armatus* of Drs. Giesbrecht and Vanhöfen. It is doubtful, however, if this copepod will be allowed to rest under *Undinopsis bradyi*, for it is by no means a rare species, and, as Herr. Nordgaard and Professor Sars have shown, it has a wide distribution. It is probable, therefore, that it has not escaped the notice of some of the earlier naturalists, and may be described and named in their published works by a designation different from any of those referred to.

Isias clavipes, Boeck.

1864. *Isias clavipes*, Boeck, Forh. Vid. Selsk., Christiania, p. 18.

This, which is a moderately rare species, has again been observed in several of the tow-net gatherings forwarded from the Clyde during recent months. The specimens obtained were found for the most part in gatherings collected in the tow-net fixed to the head of the trawl, and appeared to be most frequent in the gatherings collected in September. The species was taken in Kilbrennan Sound at Stations III. and IV., near Sanda Island, and in the vicinity of Ailsa Craig. I have no records of *Isias* from Loch Fyne this year. It may be of interest to mention that it was also during September last year that *Isias* was chiefly observed.

Eurytemora velox (Lilljeborg).

1853. *Temora velox*, Lillj., De Crustac. ex ordin. tribus; Cladoc. Ostrac. et Copep. in Scania occurr., p. 177, Pl. XX., figs. 2–7.

This species was found in a small pond near the New Zoological

Station at Millport, Cumbrae, and also in shore pools at the south-west corner of the island on May 6th, 1899. Professor G. S. Brady obtained the species from Cumbrae many years ago, and it is interesting to find it in the same localities in which it was then observed.

Eurytemora affinis (Poppe).

1880. *Temora affinis*, Poppe, Abhandl. d. Naturw. Ver. Bremen, Bd. vii., pp. 55–60, Pl. III.

I find this species in rock pools near low-water mark at Bay of Nigg, Aberdeen (just in front of the New Laboratory of the Fishery Board for Scotland), where it is not uncommon. It also occurred in a large pool left by the ebbing tide near the bridge where the railway crosses the River Dee. These species of *Eurytemora* require careful examination in order to distinguish the one from the other.

Metridia lucens, Boeck.

1864. *Metridia lucens*, Boeck, Forh. Vid. Selsk., Christiania, p. 14.

This species was moderately frequent in a bottom tow-net gathering of Crustacea collected during the past year in Aberdeen Bay. In the Firth of Clyde, *Metridia lucens* appears to be one of the resident copepods, as it may be obtained there all the year round, though usually in small numbers. The more recent Clyde gatherings in which the species occurred, and of which I have notes, were collected in the bottom tow-net near the seaward part of the estuary.

Paramesophria cluthæ, Th. Scott.

1897. *Paramesophria cluthæ*, Th. Scott, *Fifteenth Rep. Fish. Board Scotl.*, Part III., p. 147, Pl. II., figs. 3–8; Pl. III., figs. 13–16.

This moderately large and distinct species was described from specimens dredged off Largabruach, Upper Loch Fyne, and I have now to record its occurrence at Tarbert Bank (off East Tarbert), Lower Loch Fyne; it was obtained amongst some material dredged from about 17 to 20 fathoms on October 21st, 1899. In one of the more recently published works on the Copepoda (Das Tierreich, Lief. 6), *Paramesophria* takes its place amongst the Centropagidæ.

Labidocera wollastoni (Lubbock).

1857. *Pontella wollastoni*, Lubbock, Ann. and Mag. Nat. Hist. (2), vol. xx., p. 406, Pls. X.–XI.

Last year I recorded this fine species from two Clyde stations, both of which are near the seaward limits of the estuary. This year I have to record its occurrence in a bottom tow-net gathering (12 to 26½ fathoms), collected in the vicinity of Sanda Island, near the mouth of the Clyde, on September 5th, 1899; it was also obtained in a second gathering collected two days later in about 55 fathoms and somewhat further seaward. In a gathering collected in November a number both of males and females were found. This gathering was also from the mouth of the estuary. I also take this opportunity to record *Labidocera wollastoni* from the Firth of Forth. During the past summer I overhauled some tow-net gatherings that had been collected a few years ago, and found that one or two of them had not before been examined; in one collected to the east of

Inchkeith on June 8th, 1891, I found amongst other things a single male specimen of the *Labidocera* referred to. I do not think that this species has been before recorded from the Firth of Forth.

Cyclopina gracilis, Claus.

1863. *Cyclopina gracilis*, Claus, Die frei-leb. Copep., p. 104, Pl. X., figs. 8–15.

Specimens of this small but distinct species were obtained in a gathering of material dredged in the vicinity of Otter Spit, Upper Loch Fyne, during the early part of the year. This gathering contained a large number of comparatively rare copepods, several of which are referred to in the present "Notes."

Notodelphys prasina, Thorell.

1859. *Notodelphys prasina*, Thorell, Bidr. till Känned. om Krustac. i Ascid., p. 46, Pl. V., fig. 7.

This copepod has occurred frequently in Ascidians dredged from Tarbert Bank, Loch Fyne, during recent months. *N. prasina* has very short caudal furca, and by this character alone it may be readily distinguished from the other species of *Notodelphys* hitherto recorded from Scotland. *Notodelphys allmani*, Thorell, is also occasionally found in Clyde Ascidians, but does not seem to be just so common as the species first named.

Doropygus pulex, Thorell.

1859. *Doropygus pulex*, Thorell, op. cit., p. 46, Pl. VI., fig. 8.

A few specimens of this curious species were obtained in Ascidians dredged at Tarbert Bank, Loch Fyne (17-20 fathoms), in October 1899. In this species the caudal furca are "slightly elongate" and "becoming gradually thin, or tapering, towards the distal end" (Canu, Copep. du Boulonn., p. 195). *Doropygus pulex* appears to be somewhat rare in the Clyde area.

Doropygus (?) *gibber*, Thorell.

1859. *Doropygus gibber*, Thorell, op. cit., p. 52, Pl. VIII., fig. 11.

One or two specimens of a *Doropygus*, apparently belonging to this species, were found in some dredged material from Tarbert Bank, Loch Fyne. Dr. Giesbrecht* considers this to be more nearly related to *Notopterophorus* than to *Doropygus*.

Doropygus porcicauda, G. S. Brady.

1878. *Doropygus porcicauda*, Brady, Mon. Brit. Copep., vol. i., p. 138, Pl. XXVII., figs. 1–9; Pl. XXXIII., figs. 14–16.

Several specimens of this large and apparently distinct species were obtained in the same dredged material as the last. In this species the caudal rami are of considerable length, somewhat divergent and more or less curved. It does not seem to be very uncommon in Loch Fyne Ascidians.

Enterocola (?) *fulgens*, Van Beneden. (Pl. XIII., figs. 21-27.)

1860. *Enterocola fulgens*, Van Ben., Bull. Acad. Belg. (2), vol. ix., p. 151, Pl. I.

I have on one or two different occasions found in gatherings of dredged material from the Clyde odd specimens of an *Enterocola* usually of a

* *Mittheil. Zool. Stat. Neapel*, vol. iii., p. 328 (1882).

larger size than either *Enterocola fulgens*, Van Beneden, or *Enterocola betencourti*, Canu, and which to some extent differs also in some of its structural details from both these forms. I prefer, however, in the meantime to regard our specimens as a "form" or variety of Van Beneden's *Enterocola fulgens* rather than institute a new species for their reception.

These Clyde specimens are found in the intestine—not the branchial cavity—of a small Ascidian. Usually only one Copepod is observed in each specimen of the Ascidian in which the parasites occur, and it also usually so fills up the part of the intestine in which it is lodged that it is with difficulty detached with its ovisacs *in situ*, one or both frequently breaking away while removing the Copepod from its environment.

All the specimens of the Copepods obtained as described, and which I have examined, appear to belong to the one species, but they vary greatly in size. The specimen represented by the drawing (fig. 21), measures little more than two millimetres (2·2mm.) in length, whilst another that I have measured extends to at least four millimetres. The ovisacs are of a distinctly reddish colour, so that when examining the Ascidians in which the Copepods occur one can see at a glance and without dissection whether a parasite is present by the red colour of the ovisacs showing itself through the thin wall of the intestine of the host.

The mouth-organs of the *Enterocola* are difficult to make out; they are all simple, and do not show much structure. Figures 22 and 23 represent what appear to be one of the antennules and one of the antennæ. The mouth takes the form of a short and somewhat cone-shaped process. There appears to be no mandibles properly so called, and, according to Dr. Canu, the absence of mandibles is one of the distinctive characteristics of the genus *Enterocola*. The (?) maxillæ (fig. 24) are broad foliaceous appendages, bearing on their distal margin a number of stout ciliated spines. The posterior foot-jaws are very stout, and terminate in very short but strong claw-like processes (fig. 25).

The first four pairs of thoracic feet are all very much alike. They are two-branched; the outer branches appear to be one-jointed, and are moderately stout, and taper towards the distal end; they are also furnished with two moderately long and plumose terminal setæ; the inner branches consist of short, stout, tapering appendages of a simple and almost rudimentary character (figs. 26 and 27). The fifth pair are conspicuous and broadly dilated appendages. The caudal furca are about twice as long as broad. The female carries two ovisacs, which in well grown specimens are about as long as the body of the copepod.

Gunenotophorus (?) *globularis*, Costa. (Pl. XIII., figs. 28–34; Pl. XIV., figs. 37 and 38).

1852. *Gunenotophorus globularis*, Costa, Fauna del Regno di Napoli, Entom. (1840).

A somewhat curious copepod, agreeing in almost every detail of structure with the species described by O. G. Costa under the name of *Gunenotophorus globularis*, was obtained in some dredged material from the vicinity of Sanda Island, Firth of Clyde, in December 1898. The species is said to occur in the branchial cavity of Ascidians, but this Clyde specimen (only one was obtained) occurred free amongst the dredged material, having probably come from a dredged Ascidian.

The entire length of the specimen was about five millimetres (about one-fifth of an inch). The body was considerably dilated, but the abdomen was more slender, and was quite distinct; the whole animal was strongly incurved, as shown by the figure (fig. 28, Pl. XIII). The specimen, which had a somewhat macerated appearance, did not exhibit much segmentation

of the cephalon or thorax, but the abdomen, which was moderately elongated and cylindrical, was divided into four distinct segments, the first three of which were smaller than the last one; the last—or anal segment—was about as long as the combined length of the two that preceded it. The caudal furca were short and very divergent, extending outwards at almost right angles to the abdominal segment (fig. 34, Pl. XIII.). The antennules, which showed very little jointing, were very short and stout except the end joint, which was a small one (fig. 29, Pl. XIII.) The antennæ (fig. 30, Pl. XIII.) were also short and stout, and armed with a moderately strong but short and slightly clawed terminal spine. The mandibles with their palps resembled very closely the figures of these appendages given by Dr. Canu in his interesting work on the marine Copepoda (*Les Copepodes du Boulonnais*, Pl. XI., figs. 3 and 4). The biting part of the mandible is armed with five large teeth, arranged widely apart, and several minute, close-set, and slightly elongated spinules, while the palp ends in two short setiferous branches (fig. 31, Pl. XIII.). The maxillæ are broadly foliaceous, the masticatory lobe is armed with a series of spiniform setæ along the margin, and a number of stout, elongated plumose setæ adorn the margins of the maxilla-palp. The anterior foot-jaws are stout but simple one-jointed appendages furnished with several stout plumose terminal setæ (fig. 37, Pl. XIV.). The posterior foot-jaws (fig. 32, Pl. XIII.) are moderately stout, and armed with a short but comparatively strong terminal claw. There are also a number of setæ on the inner margin of these appendages.

The first pair of thoracic feet (fig. 38, Pl. XIV.) are stout and moderately short; both branches are three-jointed and of nearly the same length, and they are both provided with elongated and densely plumose setæ on the inner margins. The next three pairs, which are somewhat similar to each other, have the inner branches short and slender and apparently three-jointed, while the outer branches, which are also three-jointed, are moderately stout and elongate; neither the inner nor outer branches were observed to carry setæ, their only armature appeared to consist of one or two minute spines. The fifth feet appeared to be obsolete, but this appearance may have been due to the specimen being somewhat imperfect.

When it is remembered that the specimen here described was found free amongst a quantity of mixed dredgings, and not *in situ* in any Ascidian, and that, moreover, from the habitat of the animal its whole structure is more or less flaccid and more liable to injury than the stronger free-swimming forms, it need not be surprising that it should differ to a small extent from the more perfect and better preserved specimens. After a careful study of the characters of this Clyde specimen, I have little doubt that it belongs to the species to which it has been ascribed.

There does not seem to be any previous British record of *Gunenotophorus globularis*, and its occurrence in the Clyde estuary is therefore of interest.

Botryllophilus (?) *ruber*, Hesse.

1864. *Botryllophilus ruber*, Hesse, Ann. Sci. Nat. Zool. (5), t. i., Pl. XII., figs. 1 and 2.

I have noticed two, or perhaps three, specimens of a *Botryllophilus* in some material that was dredged at Tarbert Bank, Lower Loch Fyne, in the vicinity of East Tarbert. The specimens were not found *in situ* within any Ascidian, but were mixed up amongst the debris; their host had probably been damaged by the lip of the dredge so that they escaped.

According to Dr. Canu, the characteristics of the genus *Botryllophilus* are shown particularly—First, in the structure and position of the thoracic feet; second, in the almost constant existence of a single ovigerous sac of a strictly spherical form sheltered between the fifth feet.

The peculiarity in the fifth thoracic feet in *Botryllophilus* consists mainly in their position on the last thoracic segment. Instead of occupying a position more or less on the ventral aspect of the segment, as is usual amongst the copepoda, the position of the fifth feet is more or less round towards the dorsal aspect, and as they each consist of a single-jointed, elongated, and somewhat curved spine-like appendage which projects more or less out from the body, they impart to the copepod a rather curious appearance.

After the above note on *Botryllophilus* had been sent to the printer, several specimens of the copepod were obtained *in situ* in a specimen of *Botryllus* sp. collected at Station X. in the Moray Firth on the 16th of June 1898. Some of the specimens carried a globular ovisac on the dorsal aspect between the fifth feet as stated above, but the ovisacs appear to be easily detached; they were of a pale cream colour, due, probably, to the long immersion in spirit of the *Botryllus*.

Canuella perplexa, T. and A. Scott.

1893. *Canuella perplexa*, T. and A. Scott, Ann. Scot. Nat Hist, vol. ii., p. 92, Pl. II., figs. 1–3.

This copepod was obtained in shore gatherings of Crustacea collected at Cumbrae, Firth of Clyde, between tide-marks May 6th, 1899, and in shore pools at Inverkip on the 13th of the same month. The species appeared to be moderately rare at both places. *Canuella* is widely distributed, but is apparently more frequent amongst weed and where the bottom is of a sandy nature.

Ectinosoma gracile, T. and A. Scott.

1896. *Ectinosoma gracile*, T. and A. Scott, Trans. Linn. Soc. (2. z.) vol. vi., p. 429. Pls. XXXVI., XXXVII., XXXVIII.

A few specimens of this very small species were obtained in shore pools at Inverkip, Firth of Clyde, May 13th, 1899. *Ectinosoma gracile* has already been recorded from near Sanda Island, Firth of Clyde; it appears to be widely distributed, but being very small is easily overlooked.

Tachidius brevicornis (Müller).

1776. *Cyclops brevicornis*, Müller, Zool. Dan., Prodr. (2414).

Though *Tachidius brevicornis* appears to be generally distributed, there are apparently few or no records of it as a member of the Clyde fauna. Being a brackish-water species, it need not be sought for except where such conditions exist, and as there are few shores around the British Islands where brackish-water pools are not to be found, the distribution of the species is correspondingly extensive. There are two species of *Tachidius* recorded for Britain, but the one referred to is readily distinguished by the structure of the fifth thoracic feet, which are of the form of two comparatively broadly, roundish plates, the free margins of which are fringed with setæ. The species was found in shore pools at Cumbrae in May 1899. The second species *Tachidius littoralis*, Poppe, has already been recorded from Hunterston, Firth of Clyde.*

Amymone nigrans, T. and A. Scott.

1894. *Amymone nigrans*, T. and A. Scott, Ann. and Mag. Nat. Hist. (6), vol. xiii., Pl. VIII., figs. 1–7.

This curious copepod is rather less than half a millimetre across the

* *Proc. Nat. Hist. Soc. Glasg.*, vol. V. (N.S.), p. 351, 1900.

longest diameter, and is of a blackish colour; it is therefore easily overlooked. The species have only hitherto been observed in Cromarty Firth, where it is not uncommon. I now record it for Loch Fyne, some specimens having been obtained in a gathering of dredged material collected near Otter Spit, Upper Loch Fyne, on January 12th, 1899.

Jonesiella fusiformis (Brady and Robertson).

1875. *Zosime fusiformis*, B. and R., Brit. Assoc. Rep., p. 196.

This seems to be the most frequent representative of the genus in Loch Fyne; in the Firth of Forth it is *Jonesiella spinulosa.*, B. and R., that is the more frequent species. *Jonesiella fusiformis* occurs not rarely in material dredged on Tarbert Bank, Lower Loch Fyne; it is collected here in almost every dredging that is taken. The latest record I have of *Jonesiella fusiformis* from this locality is December 12th, 1899.

Stenhelia blanchardi, T. and A. Scott.

1895. *Stenhelia blanchardi*, T. and A. Scott, Ann. and Mag. Nat. Hist. (6), vol. xvi. p. 353, Pl. XV., figs. 1–10.

This distinct but apparently rare copepod was dredged off Arisaig, Argyleshire, in 1892, though not described till 1895. No further specimens were observed till the present year (1899), when the species was again found; this time in some material dredged in the "Fluke Hole," off St. Monans, Firth of Forth, in 1896, and the examination of which had been delayed for want of time. This species is readily distinguished from others of the same genus by the form of the secondary branches of the fifth pair of thoracic feet, which terminate in hook-like processes. The occurrence of the species in the Firth of Forth tends to indicate that, though it seems to be rare, it may at the same time be widely distributed.

Canthocamptus inconspicuus, sp. n. (Pl. XIV., figs. 1–8.)

Description of the Female.—In general appearance this species is somewhat similar to *Canthocamptus parvus*, T. and A. Scott. The length of the specimen figured measures from the forehead to the end of the caudal furca 54mm. (about $\frac{1}{46}$ of an inch). The antennules, as in the species mentioned, are short and six-jointed; the third joint is longer than any of the others, being about equal to the entire length of the two joints preceding as well as of the two that follow it. The formula shows approximately the proportional lengths of the different joints—

Proportional lengths of the joints,	13 · 12 · 32 · 15 · 13 · 20
Number of the joints,	1 · 2 · 3 · 4 · 5 · 6.

The antennæ are each furnished with a one-jointed secondary branch. The mandibles are small, and they are provided with a small one-branched but moderately elongated palp (fig. 3). The first pair of thoracic feet have both branches three-jointed; the inner branches are considerably longer than the outer, and the first joint exceeds in length that of the second and third combined, as shown in the figure (fig. 5). The inner branches of the second, third, and fourth pairs, which are shorter than the outer branches, are only two-jointed, but the outer branches are three-jointed, moderately elongated, and sparingly setiferous (fig. 6). The fifth pair are small and foliaceous; the basal joint is broadly sub-triangular, while the secondary one is small and ovate; both are provided with a few setæ, arranged as shown in the drawing (fig. 7). The caudal segments are slender and about as long as the anal segment (fig. 8). The female carries one ovisac.

Remarks.—This copepod has a superficial resemblance to a small form, with six-jointed antennules, described by T. and A. Scott under the name of (?) *Canthocamptus parvus.** Like that form, the copepod now described has the antennules six-jointed, and the inner branches of the second, third, and fourth pairs of thoracic feet two-jointed, but the proportional lengths of the joints of the antennules are different, and the caudal furca, which in *Canthocamptus parvus* are very short, are in the species now described as long as the anal segment. No males have been observed.

Habitat.—Moray Firth; obtained amongst some dredged material.

Mesochra spinicauda, T. and A. Scott.

1895. *Mesochra spinicauda*, T. and A. Scott, Ann. and Mag. Nat. Hist. (6), vol. xv., p. 52, Pl. V., figs. 12–25.

This was one of several curious species that were found in shore pools at Musselburgh, Firth of Forth; the pools occurred between tide marks, but nearer low water, and were surrounded on all sides by beds of mussels. I am now able to record the occurrence of the species in shore pools near Millport, Cumbrae; it was obtained in some gatherings collected by hand-net on May 6th, 1899.

Tetragoniceps (?) *malleolata*, Brady. (Pl. XIV., figs. 9–17.)

1880. *Tetragoniceps malleolata*, Brady, Mon. Brit. Copep., vol. ii., p. 66, Pl. LXXVIII., figs. 1–11.

In Part III. of the *Tenth Annual Report of the Fishery Board for Scotland* (1892), p. 252,† I recorded the occurrence of a species of copepod which had been obtained in the Firth of Forth off St. Monans, and which I had ascribed to *Tetragoniceps malleolata*, G. S. Brady. I then pointed out, however, that this copepod, while agreeing in most points with the genus and species named, differed in so far as it possessed nine-jointed instead of eight-jointed antennules, and in the fifth pair of thoracic feet being two-jointed instead of being composed of only one joint. At the time the record was published, I was quite aware that the second of these two differences was, in view of the definition of the genus, a somewhat important one, but considered that, as the copepod referred to resembled the species named in almost all the other details of structure, it was better to ascribe it to that species rather than to institute a new genus or species for its reception.

During the past year I have obtained, in some dredged material from the Firth of Forth collected in 1896, but only recently examined, a few more specimens of the copepod referred to above, as well as of another and somewhat closely allied form that appears to be undescribed.

When the supposed *Tetragoniceps malleolata* was recorded in the *Tenth Annual Report* no detailed description of the form was given; a reference to the two principal points of difference was considered to be at that time all that was necessary for the identification of the form. The occurrence, however, of the closely allied and apparently undescribed species which I have alluded to makes it desirable that a description of both forms should now be given, so that the differences that have been observed between them may be more clearly indicated.

It may be considered doubtful whether the two forms to be described should be retained in the genus *Tetragoniceps*, but for the present, at

* *Ann. and Mag. Nat. Hist.* (6), vol. xviii., p. 6, Pl. II., figs. 14–22 (1896).

† Additions to the Fauna of the Firth of Forth, Part IV.

least, I prefer to leave them there. The earlier recorded form will be described first.

Description of (?) *Tetragoniceps malleolata*, Brady.

The body of this copepod is elongated and slender, tapering more or less gradually from the head to the extremity of the abdomen; the rostrum is short, the cephalic and thoracic appendages are moderately elongate, and the entire length of the specimen figured is ·89mm. (the $\frac{1}{28}$ of an inch). The antennules in the female are nine-jointed; the first joint is long, and the inner distal angle is produced into a stout and somewhat triangular tooth-like process; the next three joints are considerably shorter than the first; the last joint is about as long as the fourth, but the four joints that precede the last one are small; a moderately long sensory filament or *asthetask* springs from the end of the fourth joint as shown in the drawing (fig. 10). The antennæ, mandibles, and maxillæ are nearly similar to those in *Tetragoniceps bradyi.** The posterior foot-jaws are three-jointed, but the end joint is very small; there are two terminal setæ—one moderately elongate, the other smaller and slightly plumose. The outer branches of the first to the fourth pairs of thoracic feet are all three-jointed, but all the inner branches are two-jointed. In the first pair, which are comparatively slender, the inner branches are elongate, the first joint being rather longer than the entire length of the outer branches; the second joint, which is scarcely half the length of the first, carries two stout terminal setæ—the inner one being the longer; there is also a small seta on the lower half of the inner edge of the first joint. The inner branches of the second, third, and fourth pairs are considerably shorter than the outer branches; those of the second and third pairs extend slightly beyond the second joint of the outer branches; but in the fourth pair the inner scarcely reach the middle of the second joint of the outer branches, and this difference is owing, in part at least, to the outer branches of the fourth pair being proportionally more elongated than the outer branches of the two preceding pairs. The fifth pair of feet are two-jointed; the basal joint is foliaceous and somewhat triangular in outline; it is provided with three small setæ on the lower half of the inner margin, and with a small apical seta. The second joint is elongated and narrow, and it tapers gradually till it becomes somewhat attenuated at the extremity; this joint is provided with a few small setæ on the outer edge and one on the inner, and also with a slender terminal hair. The caudal segments are slender, and about as long as the last abdominal segment.

The female carries one ovisac, which contains a few moderately large ova arranged in a single series.

The male differs little from the female, except that the antennules are hinged, and otherwise modified for grasping; the fifth pair of feet are also less fully developed; the basal joint is sub-quadrate, and the inner portion slightly produced distally and furnished with two moderately stout, spiniform apical setæ; the secondary joint is sub-cylindrical, and is armed with a moderately stout and elongated spine near the distal end of the inner margin. The first abdominal segment in the male bears slightly produced lateral appendages provided with three moderately long setæ; these appendages are situated immediately posterior to the fifth thoracic feet.

Habitat.—Firth of Forth, off St. Monans; rather rare.

Tetragoniceps brevicauda, sp. n. (Pl. XIV., figs. 18–22.)

As already stated, this copepod does not differ very greatly from

* *Vide* Part III. *Tenth Ann. Report Fishery Board for Scotl.*, p. 253, Pl. IX. (1892).

(?) *Tetragoniceps malleolata*, but, for the reasons stated below, I prefer to describe it under a distinct name rather than as a "variety" of the species referred to; for, after all, the question as to whether a thing is a "species" or a "variety" is very much a matter of opinion.

Description of the Female.—In general appearance the female of *Tetragoniceps brevicauda* is not unlike the form just described, but is somewhat smaller. The specimen figured (fig. 18) is only about ·7mm. (about $\frac{1}{36}$ of an inch in length). The antennules have a structure somewhat similar to those of (?) *Tetragoniceps malleolata*, and there is the same hook-like process on the distal extremity of the first joint; the proportional lengths of the nine joints are, however, somewhat different. The mouth-organs and swimming-feet resemble those of the species named, except that the first feet appear to be rather more slender, and the fifth pair are proportionally somewhat smaller, but the secondary joint of the fifth pair is distinctly more elongated proportionally than that of the fifth pair in (?) *Tetragoniceps malleolata* (fig. 21). The caudal segments (fig. 22) are distinctly shorter than those of the species named, and they are also proportionally stouter; the size and form of the caudal furca of the species under description are so different from those of the closely allied form previously recorded as not only to have suggested the name that has been applied to it, but were the chief characters that first attracted my attention when examining the material in which it was found.

No males of this form and only very few females have been observed.

Habitat.—Firth of Forth, off St. Monans.

Pseudolaophonte spinosa (I. C. Thompson).

1893. *Laophonte spinosa*, I. C. Thompson, Revised Report on the Copepoda of Liverpool Bay, Trans. L'pool. Biol. Soc., vol. vii., p. 24, Pl. XXX., figs. 1–13.

1896. *Pseudolaophonte aculeata*, A. Scott, Report Lancashire Sea Fisheries (1895), p. 11, Pl. III., figs. 7–23.

This rare copepod species occurred in a gathering of dredged material collected near Otter Spit, Loch Fyne; a male and a female specimen were obtained. The antennules in this species are each furnished with a prominent and strong spine on the lower (exterior) aspect of the second joint; both the male and female possess these spines; the female antennules appear to be only four-jointed. The species has a close general resemblence to *Laophonte*, so much so that, like Mr. I. C. Thompson, I was at first inclined to regard it as a member of that genus, but a close examination of the thoracic appendages, and especially of the swimming-feet, bring to light structural differences that must exclude it from the genus *Laophonte*. The principal differences, as pointed out by Mr. A. Scott, are observed in the structure of the second and third pairs of swimming-feet. In the second pair each foot consists of a single one-jointed branch, and in the third pair, though each foot is two-branched, both branches are only two-jointed. This interesting and somewhat anomalous copepod has not before been recorded from the Clyde district.

Leptopsyllus minor, T. and A. Scott.

1895. *Leptopsyllus minor*, T. and A. Scott, Ann. Scot. Nat. Hist. (Jan. 1895), p. 31, Pl. II., figs. 15–22.

This species belongs to a group of peculiarly slender copepods, the first of which was added to the British fauna in 1894.* Hitherto all the

* Part III. of *Twelfth Ann. Report of the Fish. Board for Scot.* (1894), p. 254.

described species have been found either in shore pools or in comparatively shallow water. The females do not appear to be very prolific; they usually carry but one ovisac, which contains only a few—frequently not more than three or four—ova. It is interesting to note, however, that though the creatures are small their ova are comparatively of large size.

Leptopsyllus minor, which has not before been recorded from the Clyde, was obtained in shore pools near Millport, Cumbrae, and also at Inverkip during the past summer.

Leptopsyllus herdmani, I. C. Thompson and A. Scott.

1900. *Leptopsyllus herdmani*, I. C. Thomp. and A. Scott, Trans. L'pool Biol. Soc., vol. xiv., p. 141, Pl. VIII.

A few specimens of this minute species were obtained, along with the species just recorded, in the shore pools at Millport, Cumbrae, in May 1899. One of the principal differences between this species and *Leptopsyllus minor* is in the comparative lengths of the inner and outer branches of the first thoracic feet; in the present form the inner branches are considerably longer than the outer ones, while in *Leptopsyllus minor* the inner are scarcely longer than the outer branches. There are some other differences, but they are less obvious than the one referred to.

Nannopus palustris, G. S. Brady.

1878. *Nannopus palustris*, G. S. Brady, Mon. Brit. Copep., vol. ii., p. 01, Pl. LXXVII., figs. 18–20.

This curious copepod was obtained in brackish-water pools at Inverkip, Firth of Clyde, on May 13th, 1899, but it did not appear to be very common. It has a superficial resemblance to *Platychelipus*, and may have sometimes been passed over as such. There are very few Clyde records for *Nannopus*.

Cylindropsyllus minor, T. Scott. (Pl. XIV., figs. 23–32.)

1892. *Cylindropsyllus minor*, T. Scott, Part III., *Tenth Ann. Report Fish. Board for Scot.*, p. 260, Pl. XI., figs. 17–24.

The copepod described under this name was discovered in 1891 off St. Monans, Firth of Forth. At that time no males had been observed, and therefore, though the characters of the female, so far as they could be made out, agreed very well with the definition of the genus *Cylindropsyllus*, there was still the probability that the species might not after all be a true member of that genus.

During the past year the examination of a gathering of entomostraca collected in the same locality where the species was first discovered yielded several additional specimens to those already observed, and this time both males and females were obtained. The occurrence of these specimens has enabled me not only to revise the previous description of the female, but to add to that a description also of the male, and to show conclusively that the species is a true *Cylindropsyllus*.

Description of the Female.—Body cylindrical (fig. 23); length of the specimen figured, 97mm. (fully $\frac{1}{2\frac{1}{5}}$ of an inch). The antennules, which are comparatively short, are nine-jointed; the second joint is considerably longer than any of the other joints. Their proportional lengths are shown approximately by the formula :—

Proportional lengths of the joints,	7 · 43 · 14 · 10 · 10 · 8 · 16
Numbers of the joints,	1 · 2 · 3 · 4 · 5 · 6 · 7

The antennæ closely resemble those of *Cylindropsyllus lævis*, but the end joints are proportionally rather longer; the secondary branches (protopodites) appear also to be slightly more elongated. The mandible-palp, which is moderately slender, is of greater length than the same appendage in *Cylindropsyllus lævis*, and is composed of two joints, but the last joint is small (fig. 24). The maxillæ appear to be similar to those of the species named. The anterior foot-jaws (first maxillipedes) are small and apparently one-jointed; the single joint is somewhat dilated, and bears two elongate processes at the distal end of the inner margin; the terminal claw is also moderately large and stout (fig. 25). The posterior foot-jaws (second maxillipedes) are slender and two-jointed, and armed with a moderately long, slender, almost setiform, terminal claw (fig. 26). All the thoracic feet are as previously described. The caudal segments are nearly as long as the anal segment, and they are each furnished with a broad, sabre-like terminal spine nearly of the same length as the furcal segment, and each spine bears a secondary setiform process on the outer margin (fig. 29). The segments are also provided with one or two minute hairs.

Description of the Male.—The antennules of the male are modified for grasping. The cephalo-thoracic and other appendages are similar to those of the female, except in the following particulars:—(1) The outer branches of the second pair of thoracic feet, which are moderately stout and elongate, are each armed with a stout elongated falciform terminal process, bent inwardly at nearly right angles to the joint from which it springs. These processes are somewhat similar to those on the outer branches of the second feet of the male of *Cylindropsyllus lævis*, but the apex is somewhat differently modified, as shown by the drawing (fig. 30). (2) The short inner branches of the third pair differ from those of the female in having the first joint produced interiorly into a stout tapering spine, which is slightly sinuate, and extends beyond the end of the second joint; the second joint is dilated—both margins being convex (fig. 31). (3) The caudal segments are provided with terminal spines that are stout and tapering (fig. 32). It may also be noted that the exterior spine with which each of the fifth feet in the female is armed is wanting in those of the male.

Cylindropsyllus minor, though apparently not very common, is a widely distributed species; it has been obtained not only off St. Monans, Firth of Forth, but also at Ballantrae Bank, Firth of Clyde. I have not, however, observed male specimens other than those referred to in the preceding description, which are from the Forth estuary; probably the males are scarcer than the other sex.

Huntemannia jadensis, S. A. Poppe.

1884. *Huntemannia jadensis*, S. A. Poppe, Abhandl. d. Nat. Ver. Bremen, Bd. IX., p. 59.

In previous years I have recorded this curious species from the head of West Loch Tarbert (Cantyre), and from the Cromarty Firth, which hitherto appeared to be the only two Scottish localities where this copepod was known to occur. I have now to report two additional stations for *Huntemannia*, both of which are in the Clyde district. It was taken with the hand-net in shore-pools a little below high-water mark at the south-west corner of the Greater Cumbrae on May 6th, 1899, and in shore-pools at Inverkip on the 13th of the same month. At the latter place I obtained for the first time one or two females with ovisacs. I find that the females of this species carry two ovisacs of average size, which contain a considerable number of small ova. What

we know of the distribution of this species tends to show that it is more or less restricted to brackish water.

Ilyopsyllus coriaceus, Brady and Robertson.

1873. *Ilyopsyllus coriaceus*, B. & R., Ann. and Mag. Nat. Hist. (4), vol. xii., p. 132, Pl. IX., figs. 1–5.

I have to record the occurrence of this small but interesting species from the Cromarty Firth. It was obtained in a brackish-water pool at the mouth of the River Alness in the summer of 1893, and only one specimen was observed. It was not recorded at that time, as it was expected that other specimens might be found, when a description with drawings of the species would have been prepared. No more specimens have, however, been discovered, and I now therefore place on record the solitary specimen obtained, which appears to be a female.

Quite recently the Rev. A. M. Norman very kindly presented me with a few specimens of this species collected by himself at Birterbuy Bay, Ireland, in 1874. These at first sight looked as if they belonged to another species, for, instead of the broad spathulate furcal setæ referred to in Prof. G. S. Brady's description and figures, the principal furcal setæ were long and slender; but this, it was afterwards found, was merely a sexual difference, the specimens I had received from Dr. Norman being males, whereas the Cromarty Firth specimen, like that described by Prof. Brady, was a female. Moreover, it was observed that a form of *Ilyopsyllus*, which, in my report on some Entomostraca from the Gulf of Guinea, I had described under the name of *Ilyopsyllus affinis*, resembled so closely these Birterbuy males that it is probably only a southern form of *Ilyopsyllus coriaceus*. The Gulf of Guinea specimens were obtained in a shore-gathering collected at the Island of Sao Thome. These Copepods are strongly gibbous on the dorsal aspect, and the peculiar spathulate furcal setæ of the female of *Ilyopsyllus coriaceus* serve to distinguish it readily from its congeners.

Scutellidium tisboides, Claus.

1866. *Scutellidium tisboides*, Claus, Die Copep.-Fauna v. Nizza, p. 21, t. iv., figs. 8–15.

This somewhat rare copepod has been obtained at various times in shore-pools between tide-marks at Bay of Nigg, Aberdeen. The species does not appear to be very rare in some of the gatherings obtained here. On the other hand, I have as yet failed to obtain it in the Firth of Clyde, and neither Mr. Robertson nor Prof. Brady appear to have observed it there; neither do I remember of its having been observed by us in the Firth of Forth—probably its distribution is local rather than rare. The colour of the Bay of Nigg specimens was generally not very pronounced; some were colourless, but usually they were tinged more or less with a light brownish pigment.

Clausia cluthæ, T. and A. Scott.

1896. *Clausia cluthæ*, T. and A. Scott, Ann. and Mag. Nat. Hist. (6), vol. xviii., p. 1., Pl. I., figs. 1–12.

Several specimens of this curious copepod have been obtained in dredged material from Tarbert Bank, Lower Loch Fyne. Though this is apparently the first time that *Clausia cluthæ* has been recorded from Loch Fyne, it is not the first time for the Clyde generally; the specimens from which the species was described were discovered in Ayr Bay in

1896. In this species the fifth thoracic feet project outward from each side of the body, and are more or less conspicuous. The genus *Clausia* was established by Claperède in 1863. Boeck, not knowing this, established a genus of free-swimming Copepods under a similar name in 1864, but in 1872 Boeck changed his "*Clausia*" to "*Pseudocalanus*."

Corycæus anglicus, Lubbock. (Pl. XIII., figs. 1–14.)

1857. *Corycæus anglicus*, Lubbock, Ann. and Mag. Nat. Hist. (2), vol. XX., Pl. XI., figs. 14–17.

This pretty species was added to the British fauna by Sir John Lubbock in 1857 from specimens which had been obtained at Weymouth. For a considerable number of years afterwards our knowledge of the British distribution of the species was almost entirely limited to the information contained in the description which Sir John had published.

In 1880 Prof. G. S. Brady, by the publication of the third volume of his monograph of British Copepoda, was able to considerably extend the known distribution of our *Corycæus*. But though our knowledge of its British distribution continued to increase from year to year, there has apparently been no record of it from the Scottish seas till 1896, when a report of its occurrence in the Firth of Forth was published in Part III. of the *Fourteenth Annual Report of the Fishery Board for Scotland*. So far as I know, no further captures of *Corycæus* have been made in Scottish waters till the past summer, when it was taken in the Firth of Clyde. It occurred in a surface tow-net gathering collected in the vicinity of Ailsa Craig on the 29th of May.

The presence of *Corycæus anglicus* in our Scottish estuaries may be owing to changes in the trend of oceanic currents induced by the prevalence of certain winds,* or it may be that the methods of research being now more perfect than formerly, the presence of such organisms is more readily detected. Several specimens of *Corycæus* were obtained in the Clyde gathering collected on the 29th of May, and some of the colouring of the species still remained when they first came under my observation. Both males and females were obtained.

The female represented by the drawing on Plate XIII. measured slightly over one millimetre in length, while the length of the male, which is represented by one or two detailed figures on the same plate, was slightly less than that of the female. The female antennules are short and six-jointed. The proportional lengths of the joints are shown approximately by the formula:—

Proportional lengths of the joints,	8 · 8 · 8 · 10 · 7 · 5
Number of the joints,	1 · 2 · 3 · 4 · 5 · 6

The antennæ (fig. 3) are stout; each is armed with a moderately strong and slightly-hooked terminal claw; an elongated spine springs from the inner distal angle of the first joint, while one or two smaller spines occur on the other joints. In the male the terminal claws of the antennæ are long and sickle-shaped (fig. 12). The biting part of the mandible is armed with a few moderately long teeth, and one or two spine-like lateral appendages. The palp is very small, and composed of a single one-jointed branch (fig. 4). The maxillæ are simple, one-jointed and moderately stout, and armed with a few short, stout, apical, and sub-apical spines (fig. 5). The anterior foot-jaws (fig. 6) are short and very stout, their structure is somewhat rudimentary, and their armature consists of several

* My son, Mr. Andrew Scott, in a letter to me on July 28th, incidentally mentioned that Mr. I. C. Thompson "had been getting *Corycæus anglicus* in abundance off Port Erin, Isle of Man, a week or two ago." That would be nearly about the time it was observed in the Clyde.

variety of that species. It differs from the typical *Asterocheres echinicola* in having the caudal segments rather shorter than the anal segment, while in typical specimens these are slightly longer than that segment. The general outline of the cephalothorax, and especially the outline of the posterior margin of the third segment, seem also to be slightly different, as shown by the drawing (fig. 33). Moreover, the outer lobe of the maxillæ is also apparently somewhat shorter than that of the same appendages in *Asterocheres echinicola*, but whether such differences are constant seems somewhat doubtful.

A species of *Asterocheres* described by Dr. Giesbrecht, of Naples, under the name of *Asterocheres suberites*, seems to have a *habitat* similar to this Loch Fyne form, and it also agrees with the same form in having the caudal segments shorter than the anal segment; indeed the difference in the length of the caudalsegments appears to constitute one of the principal points of distinction between *Asterocheres echinicola* (Norman) and *Asterocheres suberites* (Giesbrecht). Notwithstanding the points of agreement observed between this Clyde copepod and Giesbrecht's *A. suberites*, I prefer for the present at least to ascribe it to the *A. echinicola*, Norman. It may also be noted that *Asterocheres boecki* (G. S. Brady) was occasionally obtained in the water-passages of *Suberites* in company with the *A.* (?) *echinicola.*

Rhynchomyzon purpurocinctum (T. Scott).

1893. *Cyclopicera purpurocinctum*, T. Scott, *Eleventh Ann. Report Fish. Board of Scot.* (III.), p. 209, Pl. III., figs. 29-40.

This species, which has already been recorded from one or two places on the East Coast of Scotland, has only recently, and for the first time, been observed in the Clyde district. It occurred in the washings of dredged materials (weed, gravel, sand, etc.) collected in the vicinity of Otter Spit, Upper Loch Fyne, on January 12th, 1899, at a depth of about 8 to 15 fathoms. The occurrence of the species here would seem to indicate that though it may be, and probably is, a scarce one, it may be more or less generally distributed around our shores. The species is readily distinguished not only by its general form, but by the fact that it is adorned by a dark purple-coloured band extending across the thorax, and it is worth noting in regard to this band that a lengthened immersion in methylated spirits appears to have had little effect on it. Usually the spirit extracts the colouring matter very quickly from these microforms, but it would appear that in this case the purple pigment is of a more permanent character than that generally observed in the colours of copepoda.

Artotrogus orbicularis, Boeck.

1859. *Artotrogus orbicularis*, Boeck, Forh. Vid.-Selsk., Christiania, p. 2. Pl. I.

One specimen, about one millimetre in length and 0·78 millimetre in breadth, was obtained amongst some washings of material dredged on Tarbert Bank, Loch Fyne, on the 28th October last (1899). This is the second specimen of this rare species from the same locality.* I. C. Thompson has recorded this species from the Liverpool Bay district,† but Tarbert Bank, Lower Loch Fyne, is the only Scottish locality I know of where *Artotrogus orbicularis* has been obtained.

* *Sixteenth Ann. Report Fish. Board of Scot.* (III.), p. 272, Pl. XIV., figs. 12-21 (1898).

† *Trans. Lit. and Phil. Soc., Liverpool*, vol. viii., p. 37.

Parartotrogus richardi, T. and A. Scott.

1893. *Parartotrogus richardi*, T. and A. Scott, Ann. and Mag. Nat. Hist. (6), vol. xl., p. 210, Pl. VII.

This curious little species has not before been observed in the Clyde area. It is a form that is readily missed, and may therefore be more widely distributed than at present it appears to be. In Scotland it has only hitherto been observed in the Firth of Forth, but it has also been found in the vicinity of Naples by Dr. W. Giesbrecht.

Amphipoda.

A few of the amphipods observed in the tow-net and other gatherings sent from the Fishery steamer "Garland" may now be noticed. Only the rarer forms are recorded here.

Hyperiidæ.

Hyperia galba, *Parathemisto* (?) *oblivia*, and *Hyperoche tauriformis* have been occasionally observed in the tow-net gatherings sent from the Clyde and Loch Fyne. These may still be reckoned as comparatively rare amphipods in the Clyde area. Their scarcity here is in somewhat marked contrast to the frequency of the species on the East Coast.

Pontoporeiidæ.

Urothoë marina has been obtained at Tarbert Bank, Loch Fyne, while *Argissa hamatipes* (Norman) has been observed in tow-net gatherings collected both in Loch Fyne and in the seaward portion of the Clyde estuary. *Argissa* is sometimes frequent in under surface tow-net gatherings from the Clyde. The somewhat remarkable difference in the dorsal aspect of the urosome in the male and female is an interesting feature of this species. *Argissa* was also obtained in a tow-net gathering collected in Aberdeen Bay in May 1898.

Amphilochidæ.

A number of species belonging to this group have been observed in the gathering of tow-netted and dredged material sent from the "Garland" during the past year. One of these appears to be identical with a form discovered a few years ago in the Moray Firth. This form was described in the "Annals and Magazine of Natural History" * under the name of (?) *Cyproidia brevirostris*, T. and A. Scott; it is a very small amphipod, scarcely reaching to two millimetres in length; the Clyde specimens, which are of a somewhat chocolate-brown colour are easily overlooked. *Cyproidia brevirostris* comes very near *Cyproidia danmoniensis*, Stebbing. *Stegoplax longirostris*, G. O. Sars, is also another closely allied form. A few specimens of *Cyproidia brevirostris* were obtained in some dredged material from Tarbert Bank, Loch Fyne—a rocky bank which rises to within 15 or 17 fathoms of the surface, while all around the water is deep. This amphipod has not before been recorded from the Clyde area.

Epimeridæ.

Epimeria cornigera (Fabricius), var. In Part III. of the *Fifteenth Annual Report of the Fishery Board for Scotland* (1897), p. 169, I recorded from the Clyde a specimen of what appeared to be *Epimeria tuberculata*, G. O. Sars; and since then a few more specimens of the

* Ser. 6, vol. xii., p. 244, Pl. XIII. (1893).

same form have been obtained. They are usually found in bottom tow-net gatherings from the deeper parts of the Clyde. It now appears that these Clyde specimens do not belong to Sars' *Epimæria tuberculata*, but are a deep-sea variety of *Epimeria cornigera*. They seem to form a connecting link between the two species named, and to belong nearly as much to the one as to the other. It is a form which is in some respects as handsome as typical specimens of either species, both in size and coloration.

EUSIRIDÆ.

Specimens of *Eusirus longipes*, Boeck, have been occasionally observed during the year in bottom tow-net gatherings both from the Clyde and Loch Fyne, but few of the specimens appeared to be mature.

GAMMARIDÆ.

Mœra othonis (M.-Edw), *Cheirocrates intermedius*, G. O. Sars, and *Lilljeborgia kinahani* (Spence Bate) have all been obtained in material dredged at Tarbert Bank, Loch Fyne, at a depth of 15 to 17 fathoms. *Megaluropus agilis* was captured in a tow-net gathering from the vicinity of Sanda Island, Clyde, collected September 5th, 1899.

PHOTIDÆ.

Leptochirus pilosus.—A few specimens of this species were recently obtained in material from Tarbert Bank. In most of the Clyde specimens I have seen, some of which were females with ova, the secondary branches of the antennules are only two-jointed, the end joint being quite small. Another species, *Microprotopus maculatus*, Norman, was obtained in a bottom tow-net gathering, recently examined, collected in Aberdeen Bay in May 1898.

PODOCERIDÆ.

Of species belonging to this group the following may be mentioned :—*Ischyrocerus minutus*, which was obtained in the same gathering as that in which the *Microprotopus* referred to above, was observed. *Erichthonius abditus* occurred in a bottom tow-net gathering from 28 fathoms collected in the vicinity of Ailsa Craig, Firth of Clyde, October 10th, 1899.

CAPRELLIDÆ.

Protella phasma (Mont.) is not very rare at Tarbert Bank, Loch Fyne. There are few hauls with the dredge taken here in which it does not occur. *Caprella linearis* (Linn.) was obtained at Inverneil Bay, Loch Fyne, by Mr. F. G. Pearcey in November 1899. Males and females of the same pecies have also been captured by the fishery steamer in the Morays Firth.

Caprella septentrionalis, Kröyer.—One specimen of this somewhat rare species was captured in the Cromarty Firth on June 6th, and another on November 23rd, 1898. I am not aware of any previous record of this species for the East Coast of Scotland.

ISOPODA.

There are few isopods to record. A considerable number of the chelifera have been observed during the year, but most of the species to which they belong have already been recorded. A few, however, require further study.

Several parasitic forms have been observed, among which are the following:—*Phryxus abdominalis*, attached to the under side of the abdomen of *Spirontocaris securifrons*, captured in the shrimp-trawl net of the fishery steamer "Garland" near the seaward limit of the Clyde estuary. *Pseudione affinis*, attached under the carapace of *Pandalus montagui*, also from near the mouth of the Clyde. *Pleurocrypta marginata*, attached under the thoracic shield of *Galathea dispersa*, taken at Station XIII. (Upper Loch Fyne), October 10th, 1899. *Aspidophryxus peltatus*, attached to the back of *Erythrops serrata* and *Erythrops elegans*,* from deep water to the east of Arran, Firth of Clyde, July 18th, also obtained at Station XIII. (Upper Loch Fyne) on 29th December 1899.

Cumacea.

Several species of cumacea have been obtained in recent gatherings of tow-net and dredged material, most of which have already been recorded, but the following may be mentioned:—*Campylaspis rubicunda* has again occurred in bottom-gatherings from the deep water of Upper Loch Fyne. *Cumella pygmæa* was obtained in dredged material from Tarbert Bank, Lower Loch Fyne. *Nannastacus unguiculatus* and species of *Diastylis* have also been observed in Clyde tow-net gatherings. *Cuma edwardsii* was obtained in a bottom tow-net gathering collected in Aberdeen Bay; while *Cumopsis edwardsii* (sp. Bate) (=*C. goodsiri*, Van Ben.†) was taken between tide-marks on the shore near Millport, Cumbrae, Firth of Clyde, on May 6th, 1899, where it had previously been found by Dohrn thirty years before.‡ *Cumopsis longipes* (Dohrn) (=*C. lævis*, G. O. S.) has also been recorded from the Clyde. These two species are somewhat like each other in size and general appearance, but in *Cumopsis edwardsii* the cephalo-thoracic shield is adorned on both sides with two oblique and arcuate lateral folds; while in that of the other species the lateral folds are altogether wanting. Moreover, the natatory branches of the first pair of feet in *Cumopsis edwardsii* are composed of ten joints, but of only eight joints in *Cumopsis longipes*.§ *Cumopsis edwardsii* did not appear to be very rare between tide-marks at Cumbrae. A considerable number of adult and young specimens were included in the gathering I collected at Cumbrae in May last.

Schizopoda.

Thysanoessa neglecta (Kröyer).—I have again to report the occurrence of this Euphausid from the Firth of Clyde. In my Notes published in the *Seventeenth Annual Report*, *Thysanoessa neglecta* is recorded for the Clyde for apparently the first time. The specimens referred to in that Note had been obtained in a bottom tow-net gathering from Station X., near the seaward limit of the estuary, collected on January 16th, 1899, at a depth of 26 fathoms. The specimens referred to on the present occasion were obtained in two separate bottom tow-net gatherings from Station XII., between Arran and Turnberry Head. These gatherings were collected, the one on the 18th and the other on the 24th of July 1899. In the first one five specimens were obtained, but only two were observed in the other. This species, though apparently rare in the Clyde district, is one of the more common schizopods on the East Coast As pointed out by Dr. Norman in his useful "Synopsis of the British

* A specimen of the curious *Aspidæcia normani* occurred also on the back of a specimen of *Erythrops elegans*, from the same part of the Clyde estuary. (See also record of *Aspidæcia* in Part III. of the *Sixteenth Ann. Report of the Fishery Board for Scotland.*

† Cf. Scott, *S. F. B. Rept.*, 1888, p. 253.

‡ Cf. *Jen. Zeitschr.*, vol. v., 1869; *Unters. üb. Bau u. Entw. d. Arthropoden*, 1870, p. 23.

§ *Vide* Prof. G. O. Sars' description of the two species in his work *Middelhavets Cumaceer.*

Schizopoda," this *Thysanoessa* is readily distinguished from its near ally by having a spine over the base of the telson.

Mysidopsis gibbosa and *Mysidopsis angusta* have both been obtained in tow-net gatherings forwarded from the Clyde, as also have *Leptomysis gracilis* and *Praunus inermis*. *Neomysis vulgaris*, a Mysid which appears to be rare in the Clyde district, formed part of the contents of the stomach of a fifteen-spined stickleback (*Gasterosteus spinachia*) captured near the head of Loch Fyne on the 16th of April last (1899). The same Mysid has been obtained in the Dhu Loch, near Inveraray.

Siriella armata (M. Edw.) and *Siriella clausii*, G. O. Sars, were obtained in a gathering of crustacea from Loch Gilp by Mr. F. G. Pearcey, the naturalist on board the "Garland." The first—*Siriella armata*—has been occasionally captured in the Clyde during recent years, but the second—*Siriella clausii*—has, so far as I remember, only once before been recorded from the Clyde district, viz., in 1886, when one or two specimens were taken in East Loch Tarbert. The specimen now recorded from Loch Gilp is a male, apparently full-grown. It was captured in three to five fathoms on 31st October 1899.

Siriella armata, besides having a strongly produced rostrum, has usually some of the cephalic and caudal appendages ornamented with chocolate-coloured blotches. The body, especially on the ventral aspect, is also occasionally coloured. *Siriella clausii* appears to be colourless.

Erythrops serrata, G. O. Sars, and *Erythrops elegans*, G. O. Sars, have both been obtained in tow-net gatherings of the "Garland" forwarded from the Clyde. *Erythrops serrata*, which appears to be of more frequent occurrence than the other, has been observed for the most part in gatherings from the seaward portion of the estuary; while *Erythrops elegans* is taken occasionally in Loch Fyne, as well as further to seaward. Both are sometimes infested with parasites.

Anchialus agilis, G. O. Sars.—Two specimens of this rare Schizopod were obtained in a tow-net gathering collected at Station VI., Firth of Clyde (a little to the east and north of Sanda Island). They occurred in a bottom tow-net gathering from a depth of 20 to 27 fathoms collected on December 15th, 1898. Sars obtained the *Anchialus* in the Bay of Naples at a depth of six to eight fathoms, and he also obtained one near Messina at a depth of 20 fathoms.

Anchialus is one of the many interesting species which Dr. A. M. Norman has added to the British fauna. The single female specimen recorded by him was obtained at Plymouth in 1890. There does not appear to be any previous record of *Anchialus* from the Clyde estuary. Dr. Norman has seen my specimens.

Decapoda.

Xantho hydrophilus (Herbst).—A single specimen of this species—a male—was captured with the shrimp-trawl of the "Garland" at the mouth of the Clyde, at a depth of 60 fathoms, on June 15th, 1899, and forwarded by Mr. Pearcey to the Laboratory, Bay of Nigg, and is now in the collection there. One of the characters that seems to distinguish this form from *Xantho incisus*, Leach, is that the claws have the movable finger grooved on the upper aspect; the grooves extend nearly the whole length of the fingers. All the joints of the feet in *Xantho hydrophilus* are also ciliated on the upper edge, while in *Xantho incisus* the third only is ciliated.

Corystes cassivelaunus (Pennant).—A small male specimen of this species was captured in the same gathering as the last, and is now in the

collection at Bay of Nigg. It measures about 20mm. from the extremity of the rostrum to the base of the dorsal shield.

Jaxea nocturna, Nardo.

In my paper on Clyde tow-net and other gatherings published in Part III. of the *Seventeenth Annual Report* (1899) I reported the occurrence of an interesting lucifer-like crustacean in the Firth of Clyde. I stated further that this crustacean had been identified with a form, also from the Clyde, which had been described in the Proceedings of the Royal Society, Edinburgh, vol. xv., p. 420, figs. 1 and 2 in the text (1889), by the late George Brook under the name of *Trachelifer*. In some additional remarks which immediately follow what had been stated in regard to Brook's description of *Trachelifer*, it is clearly shown that this "*Trachelifer*" was really the young of *Calliaxis adriatica*, Heller. Nothing further transpired concerning these Clyde organisms till last summer, when I received from Mr. F. G. Pearcey, the naturalist on board the "Garland," a number of fragments of a small *Nephrops*-like crustacean which he had found in the stomachs of some gurnards captured in the vicinity of Ailsa Craig, near the mouth of the Clyde estuary. It was at once evident that these fragments did not belong to *Nephrops norvegicus*, though in some respects they had a more or less close resemblance to that crustacean. The species, however, could not be made out for a considerable time. At first it was thought that the fragments might represent one or other of the described species of *Nephropsis*, but with none of these would they fit in satisfactorily. Failing, for various reasons, to arrive at a satisfactory solution of the difficulty, I applied to the Rev. T. R. R. Stebbing, who has not unfrequently proved in such matters to be a "friend indeed;" and he, after some investigation, found that the fragments which had given us so much trouble belonged to a species which Nardo in 1847 had described under the name of *Jaxea nocturna*. He, moreover, pointed out (as he does also in his *History of Crustacea*, p 187) that *Jaxea nocturna* is identical with *Calliaxis adriatica*, Heller, described in 1856; and as *Trachelifer* is the young of *Calliaxis*, so also, as a matter of course, is it the young of *Jaxea*. The position of the species may therefore be stated thus:—

Jaxea nocturna, Nardo (1847).
= 1856. *Calliaxis adriatica*, Heller.
= 1889. *Trachelifer*, sp. (jun.), Brook.

Another point of interest that may now be considered is the *habitat* of *Jaxea*. Can we claim it as a member of the Clyde fauna? In regard to this point I am inclined, after a careful consideration of all the circumstances, to consider that we may fairly make this claim. We find these juvenile forms occurring at more or less frequent intervals in various parts of the Clyde area,* and occasionally in considerable numbers, two or three different stages of development being represented, and latterly, as pointed out, fragments of several adult specimens have been found in the stomachs of gurnards caught in the vicinity of Ailsa Craig. From the state of preservation in which these fragments were found it is scarcely likely that the time that had elapsed between the capture by the gurnards of the specimens to which the fragments belonged and the capture of the gurnards themselves in the "Garland's" trawl-net could have been very great. All this seems to indicate that the adult *Jaxea* are not very far off from the places where these larvæ and fragments were obtained. It

* *Trachelifer* was obtained in a bottom tow-net gathering collected at Station V. (Whiting Bay)—a station well within the limits of the Clyde estuary—on October 11th, 1899.

might be thought that if *Jaxea* were present in the Clyde, specimens occasionally ought to be taken in the trawl or dredge, yet none have ever been observed. This, however, does not militate against the supposition that this crustacean occurs within the Clyde estuary, for its *habitat* may be about rocky ground, where neither trawl nor dredge could be used, but which would offer no obstruction to gurnards in their search for food. Moreover, it was shown in my paper in Part III. of the *Seventeenth Annual Report* (1899) that at Naples, though the larval forms of *Calliaxis* (*Jaxea*) are met with amongst the surface fauna, the adult has only been found once in 25 years. But whatever be the opinion concerning the *habitat* of this apparently rare species—that is, "rare" as regards its adult form—the fact that fragments of adults were found in the stomachs of gurnards caught in the vicinity of Ailsa Craig is in itself of much interest to students of the British crustacea. The fragments referred to above are now in the Laboratory at Bay of Nigg.

After the preceding notes had been sent to the printer, Mr. Pearcey kindly forwarded the posterior portion of another specimen of *Jaxea*, which he had obtained in the stomach of a witch sole (*Pleuronectes cynoglossus, L.*) captured at Station VIII., Firth of Clyde, on the 20th of November last (1899). Station VIII. is about five miles west by south of Ailsa Craig. (This specimen is in our collection at Bay of Nigg with the others previously referred to.

EXPLANATION OF THE PLATES.

PLATE XIII.

Corycæus anglicus, Lubbock.

Fig. 1. Female, dorsal view . . . . . × 70.
Fig. 2. Antennule . . . . . × 190.
Fig. 3. Antenna . . . . . × 190.
Fig. 4. Mandible . . . . . × 380.
Fig. 5. Maxilla . . . . . × 380.
Fig. 6. Anterior foot-jaw . . . . . × 380.
Fig. 7. Posterior foot-jaw . . . . . × 190.
Fig. 8. Foot of first pair of swimming-feet . . . . × 190.
Fig. 9. Foot of third pair ,, ,, ... × 190.
Fig. 10. Foot of fourth pair ,, ,, ... × 190.
Fig. 11. Foot of fifth pair . . . . . × 760.
Fig. 12. Antenna, male . . . . . × 190.
Fig. 13. Posterior foot-jaw, male . . . . . × 190.
Fig. 14. Abdomen and caudal stylets, male . . . . × 160.

Monstrilla (?) *danæ*, Claparède.

Fig. 15. Female, dorsal view . . . . . × 20.
Fig. 16. Antennule, male . . . . . × 40.
Fig. 17. Foot of first pair of swimming-feet, female . . . × 80.
Fig. 18. Fifth thoracic feet, female . . . . . × 40.
Fig. 19. Last thoracic segment, abdomen and caudal stylets, male . × 80.
Fig. 20. Fifth thoracic feet, male . . . . . × 40.

Enterocola (?) *fulgens*, Van Beneden.

Fig. 21. Female, dorsal view . . . . . × 40.
Fig. 22. Antennule . . . . . × 160.
Fig. 23. Antenna . . . . . × 160.
Fig. 24. Maxilla . . . . . × 190.
Fig. 25. Posterior foot-jaw . . . . . × 253.
Fig. 26. Foot of first pair of swimming-feet . . . . × 126.
Fig. 27. Foot of second pair ,, ,, ... × 126.

Gunenotophorus (?) *globularis*, Costa.

Fig. 28. Female, lateral view . . . . . × 17.
Fig. 29. Antennule . . . . . × 190.
Fig. 30. Antenna . . . . . × 19.
Fig. 31. Mandible and palp . . . . . × 84.
Fig. 32. Posterior foot-jaw . . . . . × 190.
Fig. 33. Foot of fourth pair of swimming-feet . . . . × 80.
Fig. 34. Last segments of the abdomen and caudal stylets . . × 40.

PLATE XIV.

Canthocamptus inconspicuus, sp. n.

Fig. 1. Female, side view . . . . . × 80.
Fig. 2. Antennule . . . . . × 380.
Fig. 3. Mandible . . . . . × 380.
Fig. 4. Posterior foot-jaw . . . . . × 380.
Fig. 5. Foot of first pair of swimming-feet . . . . × 380.
Fig. 6. Foot of fourth pair ,, ,, ... × 380.
Fig. 7. Foot of fifth pair . . . . . × 380.
Fig. 8. Last segments of the abdomen and caudal stylets . . × 80.

Tetragoniceps (?) *malleolata*, Brady.

Fig. 9. Female, side view . . . . . × 80.
Fig. 10. Antennule . . . . . × 253.
Fig. 11. Posterior foot-jaw . . . . . × 380.
Fig. 12. Foot of first pair of swimming-feet . . . . × 253.
Fig. 13. Foot of third pair ,, ,, ... × 150.
Fig. 14. Foot of fourth pair ,, ,, ... × 150.
Fig. 15. Foot of fifth pair . . . . . × 166.
Fig. 16. Last abdominal segment and caudal stylets . . . × 126.
Fig. 17. Foot of fifth pair and appendage of first abdominal segment . × 253.

Tetragoniceps brevicauda, sp. n.

Fig. 18. Female, side view . . . . . × 80.
Fig. 19. Antennule . . . . . × 253.
Fig. 20. Foot of first pair of swimming-feet . . . . × 380.
Fig. 21. Foot of fifth pair . . . . . × 380.
Fig. 22. Last abdominal segment and caudal stylets . . . × 126.

Cylindropsyllus minor, T. Scott.

Fig. 23. Female, back view . . . . . × 80.
Fig. 24. Mandible and palp . . . . . × 380.
Fig. 25. Anterior foot-jaw . . . . . × 380.
Fig. 26. Posterior foot-jaw . . . . . × 380.
Fig. 27. Foot of first pair of swimming-feet . . . . × 253.
Fig. 28. Foot of fifth pair ,, ... × 380.
Fig. 29. Last abdominal segment and caudal stylets . . . × 190.
Fig. 30. Foot of second pair of swimming-feet, male . . . × 380.
Fig. 31. Foot of third pair of swimming-feet, male . . . × 380.
Fig. 32. Last abdominal segment and caudal stylets, male . . × 190.

Asterocheres echinicola, Norman.

Fig 33. Female, dorsal view . . . . . × 80.
Fig. 34. Antenna . . . . . × 190.
Fig. 35. Mandible and palp . . . . . × 190.
Fig. 36. Maxilla . . . . . × 126.

Gunenotophorus (?) *globularis*, Costa.

Fig. 37. Anterior foot-jaw . . . . . × 126.
Fig. 38. Foot of first pair of swimming-feet . . . . × 95.

apical and sub-apical setæ. The posterior foot-jaws of the female (fig. 7) have moderately short and slender terminal claws, but those of the male (fig. 13) are armed with terminal claws of considerable length. The first three pairs of swimming-feet have both branches three-jointed. The inner branches, which are considerably shorter than the outer, are provided with a number of setæ on the inner margin and apex, but have apparently no terminal spines; the outer branches are also furnished with several setæ on the inner edge. Moreover, the first and second joints bear a short but moderately stout spine on the exterior distal angle, while the third joint carries two marginal and two apical spines, the inner one of the two apical spines being longer and stouter than the other (figs. 8 and 9). In the fourth pair (fig. 10) the inner branches are reduced to a single minute joint; the outer branches are also comparatively small, and they want, to a large extent, the spiniform armature of the outer branches of the preceding pairs. The fifth pair are small, and each consists of a single one-jointed branch, which is furnished with two apical setæ (fig. 11).

In the female the lateral processes of the fourth body segment extend backward to about the middle of the penultimate segment of the abdomen. This abdominal segment appears to be larger in the male than in the female, as shown by the figure (fig. 14). The caudal segments in both male and female are moderately elongated, being about one and a half times the length of the anal segment.

This species when living is one of the more brilliantly coloured of the British Copepods, but spirit extracts the colour very quickly.

Monstrilla (?) *danæ*, Claparède. (Pl. XIII., figs. 15–20.)

1863. *Monstrilla danæ*, Clap., Beobacht. üb. Anat. u. Enwickl.-wirbellos Thiere an der Küste v. Normandie angestellt., p. 95.

Representatives of this curious genus of copepods have, as in previous years, been occasionally observed in tow-net gatherings of entomostraca from the Clyde. Two or three species of the Monstrillidæ have been recorded from North Britain, but the only one that has hitherto been observed in the Clyde estuary is the species now referred to, and which I have for the present ascribed to Claparède's *Monstrilla danæ*. The genus *Monstrilla* was added to the British fauna in 1857 by Sir John Lubbock, when he described the *Monstrilla anglica*. For nearly thirty years afterwards little or nothing further appears to have been known concerning these organisms, so far at least as regards their distribution in the British seas, and in view of this it is somewhat remarkable that now not a year passes without a lesser or greater number of specimens representing sometimes two or three different species, being observed.

In 1890 Gilbert C. Bourne published in the *Quarterly Journal of Microscopical Science* a little paper on the genus *Monstrilla*, and gave a short summary of the characters of the different forms. He divided them into two groups, distinguished by the number of furcal hairs. In the one group the number of setæ on each furcal member is said not to exceed three, while in the other there are said to be six setæ on each of the caudal furca. *Monstrilla danæ* was placed by Mr. Bourne in the first of these groups.

The Clyde specimens which I record here, and which I am inclined to ascribe to *Monstrilla danæ*, do not fit in with either of Mr. Bourne's groups as regards the number of furcal hairs. In the more perfect of the specimens there are five hairs on each of the caudal rami, four of which are prominent and one very small; of the four large hairs, three spring

from the end of the furca and one from a notch on the outer margin; the small hair is also marginal.

The male and female have each three abdominal segments. Those of the male are nearly of equal size, but in the female the genital segment is about as long as the combined length of the next two, and it is provided on the ventral aspect with two moderately long setæ. In the specimen figured (fig. 15) several minute ova were observed attached to these genital setæ, as shown in the drawing. The fifth thoracic feet in the female (fig. 18) are sub-cylindrical, and rather longer than broad, and carry two apical setæ.

Monstrilla danæ appears to be more frequent in Upper Loch Fyne than in the seaward part of the Clyde. In a tow-net gathering collected on the 28th November last (1899) near the head of the loch as many as twenty-seven specimens of *Monstrilla* were obtained, apparently all belonging to this species. But a much larger number of specimens was obtained in a gathering collected, also near the head of the loch, in the month of September immediately preceding. This gathering, which was collected with the surface tow-net on the 29th of the month referred to, was a small gathering, and contained a considerable quantity of fibrous matter. It was not examined until the following month of March, when over eighty specimens were obtained! The specimens comprised both males and females, but whether they all belong to the one species I am not yet in a position to say. The fact that such a large number of specimens was found in a single small gathering is of no little interest in its bearing on the distribution of these curious animals.

Pseudanthessius thorellii (Brady and Robertson).

1875. *Lichomolgus thorellii*, B. and R., Brit. Assoc. Report, p. 197.

This species, which is one of the Lichomolgidæ distinguished by the possession of elongated caudal furca, has been obtained in dredged material from various parts of the Clyde area. It is quite easily distinguished from *Lichomolgus forficula*, which also has long furca, not only by the structure of the inner branches of the fourth pair of swimming-feet and the difference in the proportional lengths of the abdominal segments, but also by the difference in *habitat*. *Lichomolgus forficula* lives in the branchial cavity of large Ascidians, while *Pseudanthessius thorellii* appears to live free amongst weed or zoophytes, and perhaps also amongst *Filograna*. I have not on any occasion found it naturally inside an Ascidian, and neither does Professor Brady in his description of the species refer to it as a commensal.

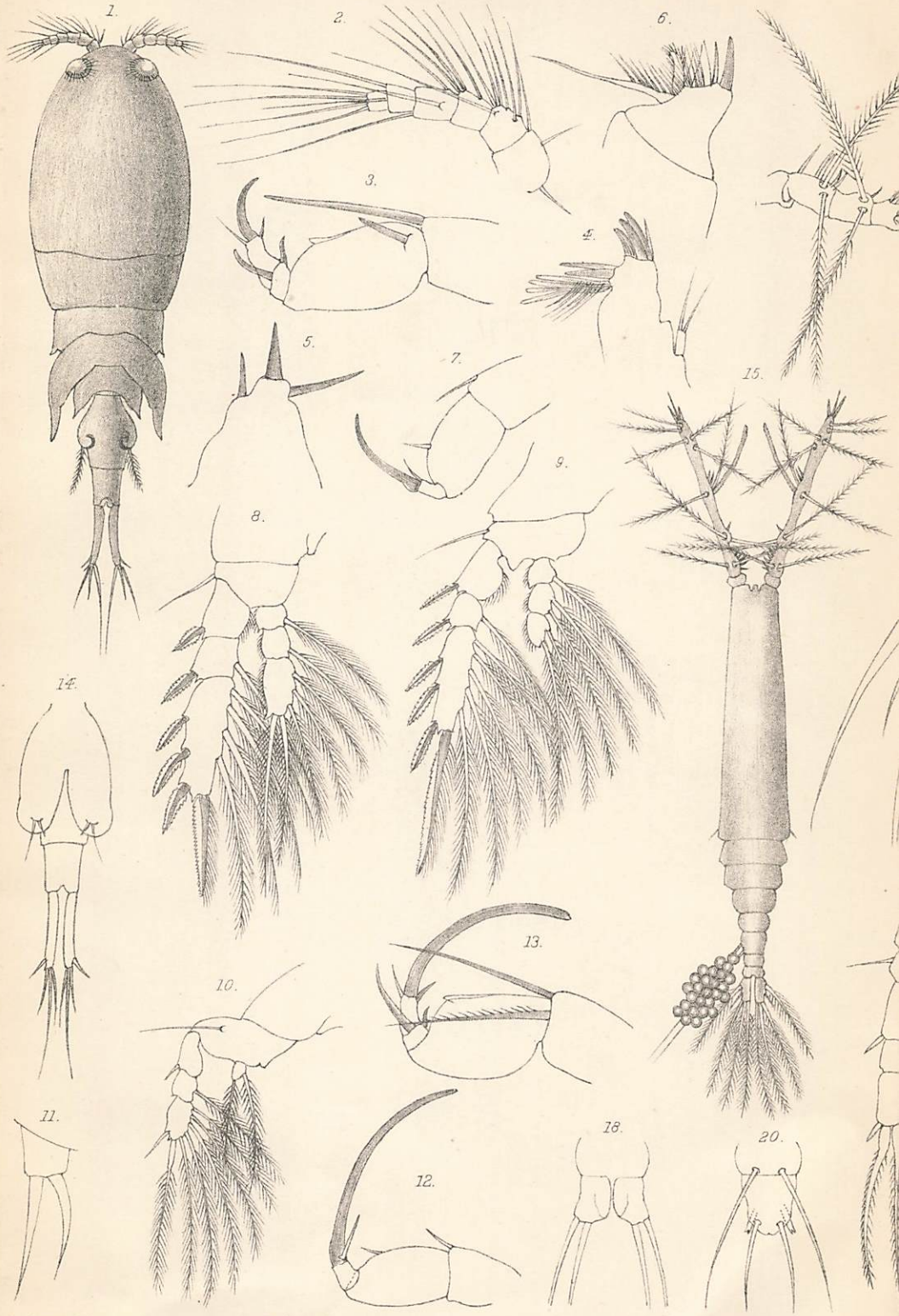
Hermanella arenicola (G. S. Brady).

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

A specimen of this fine species was obtained in a gathering of entomostraca from Loch Gilp (near Ardrishaig, Loch Fyne), which is a new Clyde Station for this species. The vicinity of Otter Spit is the only other locality within the Clyde area that I know of where *Hermanella arenicola* has been obtained.

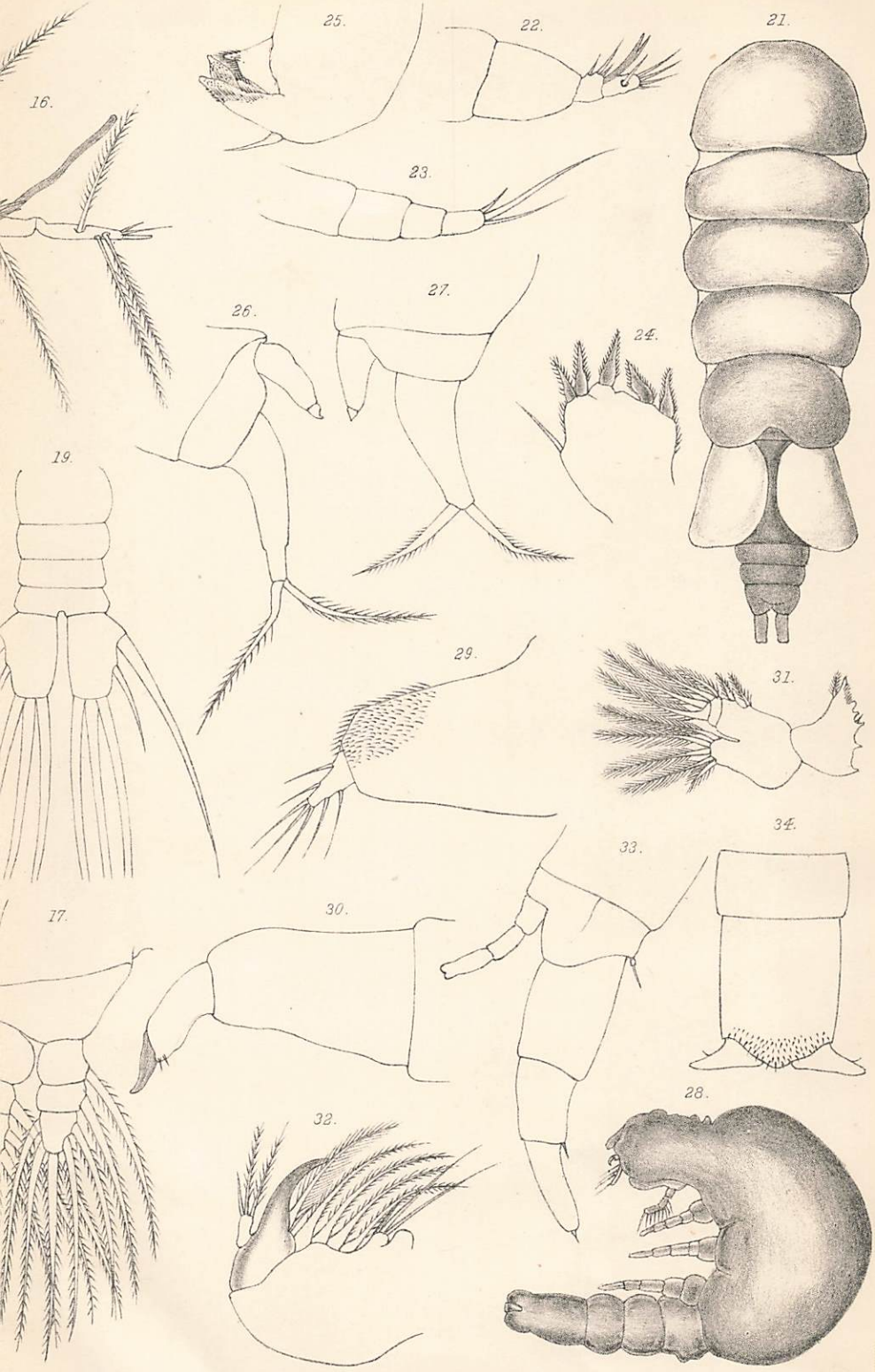
Asterocheres (?) *echinicola* (Norman). (Pl. XIV., figs.33–36.)

An *Asterocheres* is obtained in the water passages of a sponge (*Suberites* sp.), common both in the Clyde and Loch Fyne, which is closely allied to *Asterocheres echinicola* (Norman), and which may probably be only a

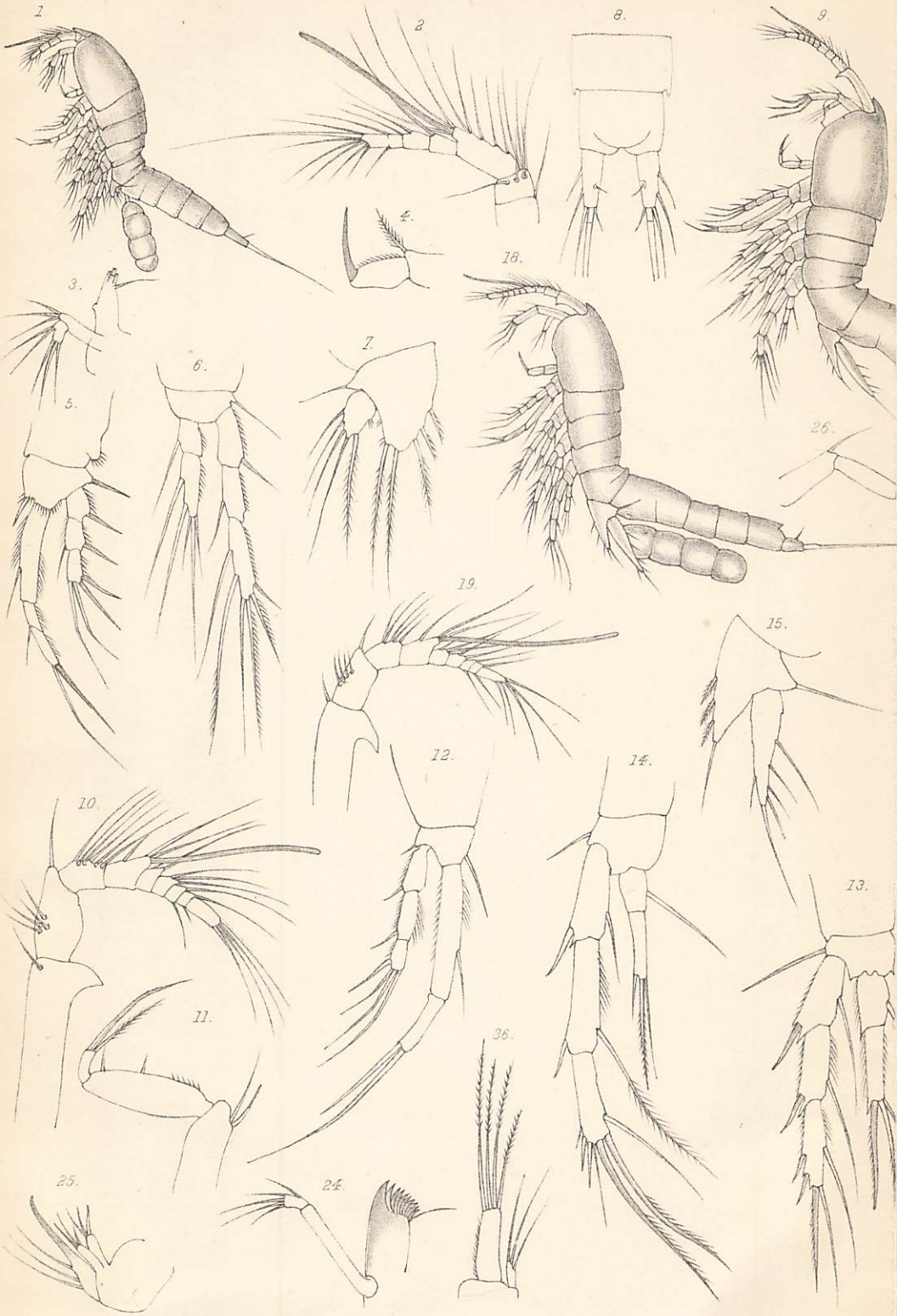


A. Scott, *del. ad nat.*

Figs. 1–14.—*Corycæus anglicus* (Lubb.). Figs. 15–20.—*Monstrilla* (?) *danæ* (Clap.) Figs. 21–27.

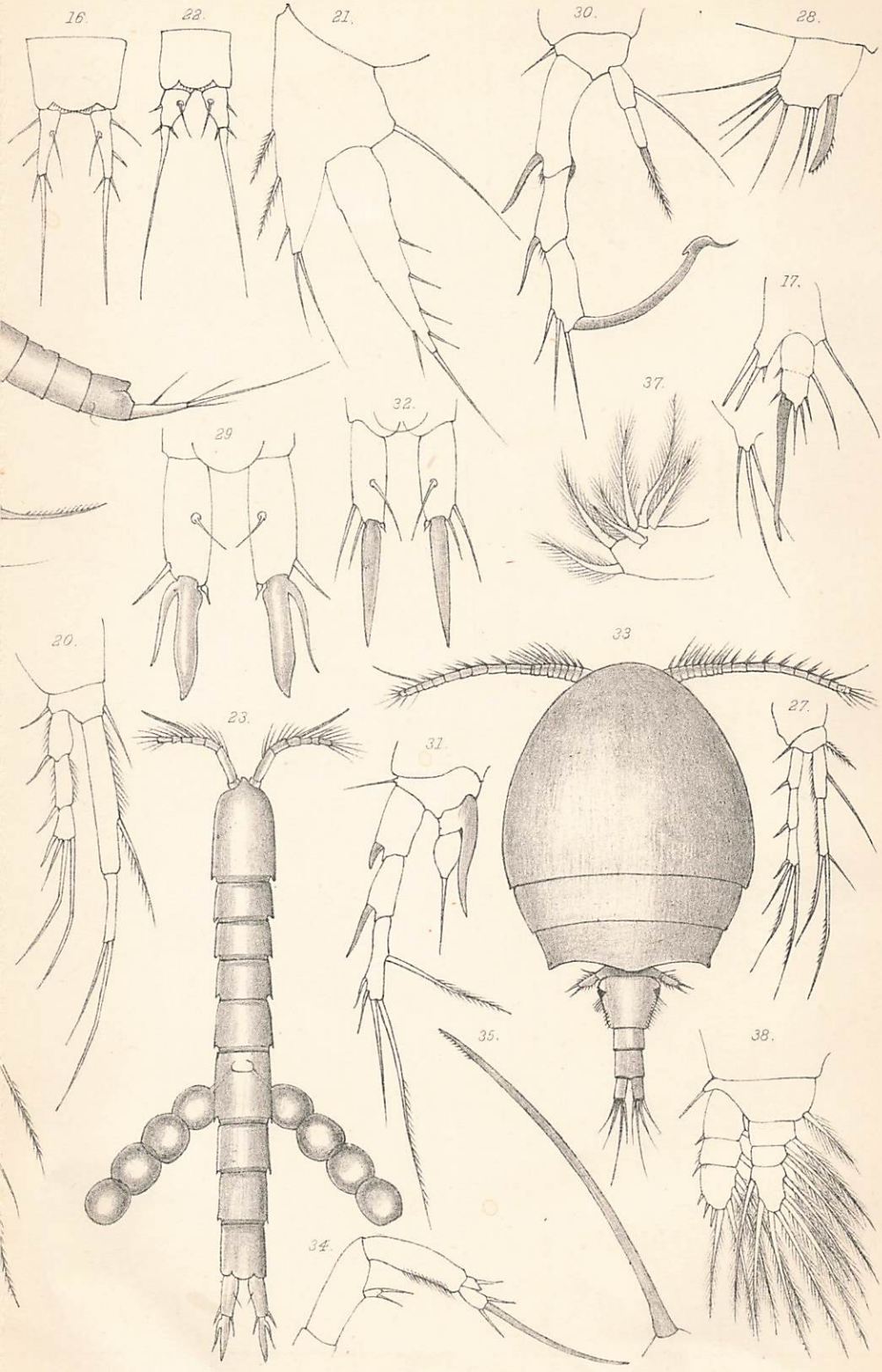


—*Enterocola* (?) *fulgens* (V. Ben.). Figs. 28-34.—*Gunenotophorus* (?) globularis (Costa).



A. Scott, *del. ad nat.*

Figs. 1-8.—*Canthocamptus inconspicuus*, sp. n. Figs. 9-17.—*Tetragoniceps* (?)
Figs. 23-32.—*Cylindropsyllus minor* (T. Scott). Figs. 33-36.—*Asterocheres* (?)



malleolata (Brady). FIGS. 18–22.—*Tetragoniceps brevicauda*, sp. n.
echinicola (Norman). FIGS. 37 and 38.—*Gunenotophorus globularis* (Costa).